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Species diversity, taxonomy and phylogeny of Polyporaceae (Basidiomycota) in China

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Abstract

Polyporaceae is one of the most important families of Basidiomycota. Investigations on the species diversity, taxonomy and phylogeny of Polyporaceae in China are carried out. So far 217 species belonging to 42 genera are reported from China. Two new genera: *Amylosporia* gen. nov. and *Murinicarpus* gen. nov., twelve new species: *Coriolopsis dendriformis* sp. nov., *C. hainanensis* sp. nov., *Funalia cystidiata* sp. nov., *Haploporus microsporus* sp. nov., *Perenniporia citrinoalba* sp. nov., *P. yinggelingensis* sp. nov., *Picipes hainanensis* sp. nov., *P. jiajinensis* sp. nov., *P. pseudovarius* sp. nov., *Trametes duplexa* sp. nov., *T. ellipsoidea* sp. nov. and *T. stiptica* sp. nov., and six new combinations, *Amylosporia hattorii* comb. nov., *Hornodermoporus latissimus* comb. nov., *Murinicarpus subadustus* comb. nov., *Picipes pumilus* comb. nov., *Vanderbylia delavayi* comb. nov. and *Vanderbylia robiniophila* comb. nov., are proposed. All the species are described based on the Chinese collections. Keys to genera of Polyporaceae occurring in China and keys to species of each genus are provided. This monograph provides a revised classification of Polyporaceae in China according to the modern taxonomy. The phylogeny of Polyporaceae from China are reconstructed based on DNA sequences of multiple loci including the internal transcribed spacer (ITS) regions, the large subunit nuclear ribosomal RNA gene (nLSU), the small subunit nuclear ribosomal RNA gene (nSSU), the small subunit mitochondrial rRNA gene sequences (mtSSU), the translation elongation factor 1-α gene (TEF1), the β-tubulin gene (TBB1), the RNA polymerase II largest subunit (RPB1) and second largest subunit (RPB2) genes. In addition, full morphological descriptions, illustrations, color photographs, taxonomic notes, ecology and all the available sequences of Polyporaceae species found from China are provided.

Keywords Classification · Multi-gene phylogeny · Polypore · Systematics · White-rot fungi

Introduction

The concept of Polyporaceae Fr. ex Cord was originally described by Fries (1838) as a family of the Aphyllophorales that included all fungi with poroid hymenophores. This was an artificial system which emphasizes the obvious poroid hymenophores, but the important microscopic features for classifications were by then largely ignored. Subsequently, many mycologists revised the concept of Polyporaceae. The classifications of Polyporaceae were in changing for a long time (Karsten 1879, 1881, 1892; Patouillard 1900; Donk 1960, 1964; Jülich 1981; Ryvarden 1991; Zhao 1998; Kirk et al. 2008) and species in this family were usually regarded as polypores in previous studies. Among those studies, Leif Ryvarden alone or with collaborators made a major

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contribution on the taxonomy of polypores (Ryvarden 1976, 1978, 1983, 1984, 1985a, b, 1988a, b, 1989, 1990, 1991, 1992; Ryvarden and Johansen 1980; Gilbertson and Ryvarden 1986, 1987; Ryvarden and Gilbertson 1993, 1994; Núñez and Ryvarden 2001). According to 10th edition of Dictionary of Fungi (Kirk et al. 2008), 92 genera and 636 species are accepted in Polyporaceae.

Polypores had been intensively studied in the past time because these fungi can decompose cellulose, hemicellulose, and lignin in the plant cell walls, and therefore play a key role in nutrient recycling in most forest ecosystems. Moreover, some polypores are economically important forest pathogens (Bader et al. 1995; Dai et al. 2007c; Gilbert et al. 2008; Lindner and Banik 2008; Garbelotto and Gonthier 2013; Rajchenber and Robledo 2013; Coetzee et al. 2015; Cui et al. 2014, 2015; Song et al. 2018; Xing et al. 2018), medicinal mushrooms (Dai et al. 2009a) and play an important role in industrial biotechnology (Moldes and Sanromán 2006; Marco-Urrea et al. 2009; Wang et al. 2012a, b, 2013a, b, 2014; Si and Cui 2013a, b; Si et al. 2013a, b, 2014, 2015, 2016; Zheng et al. 2016, 2017).

In recent years, with the rapid development of molecular techniques, molecular data, of which mostly DNA sequene data have been widely used in the taxonomic studies of polypores and largely contributed to a more natural classification system of Polyporaceae. Hibbett and Donoghue (1995) used sequence data from mitochondrial small-subunit ribosomal DNA to infer phylogenetic relationships of the Polyporaceae. The initial core polyporoid clade was recognized by Hibbett and Donoghue (1995), whom also indicated that this clade may serve as the core clade for a recircumscription of the Polyporaceae. Binder et al. (2005) studied the phylogenetic relationships of resupinate Homobasidiomycetes using ribosomal DNA sequences and a large sampling of resupinate and non-resupinate taxa; the polyporoid clade was divided into three main groups: the core polyporoid clade, the antrodia clade and the phlebioid clade. Most taxa in the core polyporoid clade produce a white rot, have a dimitic or trimitic hyphal structure and a tetrapolar mating system which provides the initial framework of a natural circumpscription of Polyporaceae. Binder et al. (2013) presented a phylogenetic and phylogenomic overview of the Polyporales, they suggested the core polyporoid clade could represent Polyporaceae. Justo et al. (2017) provided a revised family-level classification of the Polyporales based on phylogenetic analyses inferred from nrLSU, nrITS and RPB1 genes. The Polyporaceae was defined as following: mostly polypores, rarely corticioid species, and producing a white-rot; hyphal system mostly dimitic or trimitic, some monomitic species also present, and those usually with dendroid hyphal elements in the hymenium; hyphae with clamp-connections, exceptionally simple-septate; basidiospores thin- to thick-walled, smooth to ornamented, relatively big, hyaline to brown; cystidia mostly absent. The type genus of Polyporaceae is *Polyporus* P. Micheli ex Adans. Other genera accepted in Polyporaceae by Justo et al. (2017) include *Abundisporus* Ryvarden, *Amauroderma* Murrill, *Cerarioporia* F. Wu, L.W. Zhou & J. Si, *Colospora* Miettinen & Spirin, *Cryptoporus* (Peck) Shear, *Datronia* Donk, *Datroniella* B.K. Cui, Hai J. Li & Y.C. Dai, *Dendrodontia* Hjortstam & Ryvarden, *Dentocorticium* (Parmasto) M.J. Larsen & Gilb., *Dichomitus* D.A. Reid, *Donkioporia* Kotl. & Pouzar, *Earliella* Murrill, *Echinochaete* D.A. Reid, *Epithele* (Pat.) Pat., *Favolus* P. Beauv., *Fomes* (Fr.) Fr., *Fomitella* Murrill, *Ganoderma* P. Karst., *Grammothele* Berk. & M.A. Curtis, *Grammothelopsis* Jülich, *Hexagonia* Fr., *Haploporus* Bondartsev & Singer ex Singer, *Hornodermoporus* Teixeira, *Lentinus* Fr., *Lignosus* Lloyd ex Torrend, *Lopharia* Kalchbr. & MacOwan, *Megasporia* B.K. Cui, Y.C. Dai & Hai J. Li, *Megasporoporia* Ryvarden & J.E. Wright, *Melanoderma* B.K. Cui & Y.C. Dai, *Microporellus* Murrill, *Microporus* P. Beauv., *Neodatronia* B.K. Cui, Hai J. Li & Y.C. Dai, *Neofavolus* Sotome & T. Hatt., *Pachykytospora* Kotl. & Pouzar, *Perenniporia* Murrill, *Perenniporiella* Decock & Ryvarden, *Pseudofavolus* Pat., *Pyrofomes* Kotl. & Pouzar, *Tinctoporellus* Ryvarden, *Tomophagus* Murrill, *Trametes* Fr., *Truncospora* Pilát ex Pilát, *Vanderbylia* D.A. Reid and *Yuchengia* B.K. Cui & Steffen. The following families: Coriolaceae Singer, Cryptoporaceae Jülich, Echinochaetaceae Jülich, Fomitaceae Jülich, Ganodermataceae (Donk) Donk, Grammotheleaceae Jülich, Haddowiaceae Jülich, Microporaceae Jülich, Pachykytosporaceae Jülich, Perenniporiaceae Jülich, Sparsitubaceae Jülich, Lophariaceae Boidin, Mugnier & Canales and Trametaceae Boidin, Mugnier & Canales were treated as synonyms of Polyporaceae.

The taxonomic studies of Polyporaceae in China began from the late 19th century. Those studies were carried out by foreigners instead of Chinese (Patouilliard 1890, 1893, 1895; Karsten 1892). Teng Shu-Chun started to investigate fungal diversity from China in 1930s, and recorded more than 300 species of polypores in the monograph "Fungi of China" (Teng 1963). Tai (1979) also summarized the knowledge about fungal species in China and recorded about 380 species of polypores. Zhao (1998) extensively studied polypores from China and published a monograph of Polyporaceae from China in Chinese, in which 287 species belonging to 69 genera were described. However, many of the described species are inaccurate identified; the classification system defined by Zhao (1998) was artificial and is not widely accepted according to the modern taxonomy. 178 species belonging to 50 genera

described by Zhao (1998) were transferred to other families instead of Polyporaceae.

The senior author began to study polypores in China from 1996; he and his collaborators investigated the species diversity of polypores from China and published many new species based on morphological characters (Dai 1996a, b, 1999, 2000; Dai and Li 2002; Dai et al. 2002, 2003, 2004a, b, c; Dai and Wu 2004; Cui et al. 2005, 2006a, b; Dai and Penttilä 2006; Dai et al. 2006; Cui and Dai 2007; Cui et al. 2007; Dai and Yuan 2007; Dai et al. 2007a, b, c, d, e, f; Li et al. 2007a, b, c; Cui et al. 2008; Dai and Cui 2008; Li et al. 2008; Xiong et al. 2008; Yuan and Dai 2008; Dai et al. 2009a, b; Wang et al. 2009; Dai et al. 2011a, b; Dai 2012a). In 2012, Dai summarized the knowledge about polypore diversity and their distribution in China and provided a preliminary checklist including 704 species in 132 genera (Dai 2012b). However, many of the listed species, currently, do not belong to Polyporaceae according to the restricted definition of the family. Recently, more genera and species of Polyporaceae have been described from China based on both morphological characteristics and molecular data (Cui et al. 2011a, b; Cui and Zhao 2012; Zhao and Cui 2012a; Zhou and Dai 2012; Li and Cui 2013a; Zhao and Cui 2013a, b, c; Zhao et al. 2013a, b; Dai et al. 2014; Li et al. 2014a, b; Zhao et al. 2014a, b, Zhao et al. 2015; Shen et al. 2016; Zhou et al. 2016; Zhou and Cui 2017). However, molecular sequences are lacking for most recorded species from China. Furthermore, species descriptions were dispersed in various journals and books, and their descriptions were hardly uniform and hard to be compared. So a comprehensive investigation on a broad overview of Polyporaceae from China is badly needed.

In the current study, species diversity, geographic distribution, taxonomy and phylogeny of Polyporaceae have been investigated. The concept of Polyporaceae is re-defined, 217 species belonging to 42 genera are found from China, including two new genera and twelve new species. All the species are described based on the Chinese collections. Keys to accepted genera of Polyporaceae and species of different genera in China are provided. The phylogeny of accepted genera in Polyporaceae found from China are reconstructed based on DNA sequences of multiple loci including the internal transcribed spacer (ITS) regions, the large subunit nuclear ribosomal RNA gene (nLSU), the small subunit nuclear ribosomal RNA gene (nSSU), the small subunit mitochondrial rRNA gene sequences (mtSSU), the translation elongation factor 1-α gene (TEF1), the β-tubulin gene (TBB1), the RNA polymerase II largest subunit (RPB1) and second largest subunit (RPB2) genes.

Materials and methods

Morphological studies

The studied specimens are deposited at the herbaria of Institute of Microbiology, Beijing Forestry University, China (BJFC), Institute of Applied Ecology, Chinese Academy of Sciences, China (IFP), Institute of Microbiology, Chinese Academy of Sciences, China (HMAS), Kunming Institute of Botany, Chinese Academy of Sciences, China (HKAS), Guangdong Institute of Microbiology (GDGM), and Botanical Museum of University of Helsinki, Finland (H). The microscopic routines followed Han et al. (2016) and Zhou et al. (2016). Sections were studied at a magnification up to × 1000 using a Nikon E80i microscope and phase contrast illumination (Nikon, Tokyo, Japan). Drawings were made with the aid of a drawing tube. Microscopic features, measurements and drawings were made from slide preparations stained with Cotton Blue and Melzer's reagent. Spores were measured from sections cut from the tubes. In presenting the variation in the size of the spores, 5% of measurements were given in parentheses. In the text the following abbreviations were used: IKI = Melzer's reagent, IKI+ = amyloid, IKI– = non-dextrinoid and non-amyloid, KOH = 5% potassium hydroxide, CB = Cotton Blue, CB+ = cyanophilous, CB– = acyanophilous, L = mean spore length (arithmetic average of all spores), W = mean spore width (arithmetic average of all spores), Q = variation in the L/W ratios between the specimens studied, n = number of spores measured from given number of specimens. Special color terms followed Petersen (1996).

DNA extraction, amplification and sequencing

A cetyl trimethylammonium bromide (CTAB) rapid plant genome extraction kit-DN14 (Aidlab Biotechnologies Co., Ltd, Beijing, China) was used to extract total genomic DNA from dried specimens, and performed the polymerase chain reaction (PCR) according to the manufacturer's instructions with some modifications as described by Chen et al. (2016a, 2017b). The ITS regions were amplified with primer pairs ITS5 and ITS4 (White et al. 1990). RPB1 was amplified with primer pairs RPB1-Af and RPB1-Cr (Matheny et al. 2002). RPB2 was amplified with primer pairs bRPB2-6F and bRPB2-7R (Matheny 2005). TBB1 was amplified with primer pairs Bt-1a and Bt-1b (Glass and Donaldson 1995). Part of TEF1 was amplified with primer pairs EF1-983F and EF1-1567R (Rehner 2001). The nLSU regions were amplified with primer pairs LR0R and LR7 (http://www.biology.duke.edu/fungi/mycolab/primers.htm). The nSSU regions were amplified with primer pairs NS1 and NS4 (White et al. 1990). The mtSSU regions were

amplified with primer pairs MS1 and MS2 (White et al. 1990).

The PCR cycling schedule for ITS, mtSSU, TEF1 and TBB1 included an initial denaturation at 95 °C for 3 min, followed by 35 cycles at 94 °C for 40 s, 53–58 °C (ITS) and 54–56 °C (mtSSU, TEF1 and TBB1) for 45 s, 72 °C for 1 min, and a final extension at 72 °C for 10 min. The PCR cycling schedule for nLSU and nSSU included an initial denaturation at 94 °C for 1 min, followed by 35 cycles at 94 °C for 30 s, 50 °C (nLSU) and 53 °C (nSSU) for 1 min, 72 °C for 1.5 min, and a final extension at 72 °C for 10 min. The PCR cycling schedule for RPB1 and RPB2 included an initial denaturation at 94 °C for 2 min, followed by 10 cycles at 94 °C for 40 s, 60 °C for 40 s and 72 °C for 2 min, then followed by 37 cycles at 94 °C for 45 s, 53–58 °C for 1.5 min and 72 °C for 2 min, and a final extension of 72 °C for 10 min. The PCR products were purified and sequenced at the Beijing Genomics Institute (BGI), China, with the same primers. All the available sequences for species of Polyporaceae found from China were provided in Table 1.

Phylogenetic analyses

Sequences used for phylogenetic analyses in this study were listed in Table 2. All sequences of ITS, nLSU, nSSU, mtSSU, TEF1, TBB1, RPB1 and RPB2 were respectively aligned in MAFFT 7 (Katoh and Standley 2013; http://mafft.cbrc.jp/alignment/server/) and manually adjusted in BioEdit (Hall 1999). Alignments were spliced in Mesquite (Maddison and Maddison 2017). The missing sequences were coded as "N". Ambiguous nucleotides were coded as "N". The final concatenated sequence alignment was deposited at TreeBase (http://purl.org/phylo/treebase; submission ID: 22856).

Phylogenetic analyses used in this study followed the approach of Song et al. (2016a) and Song and Cui (2017). The maximum likelihood (ML), Maximum parsimony (MP) and Bayesian inference (BI) methods were used to analyze the combined datasets of ITS, nLSU, nSSU, mtSSU, TEF1, TBB1, RPB1 and RPB2 sequences. The congruences of the eight gene sequences were evaluated with the incongruence length difference (ILD) test (Farris et al. 1994) implemented in PAUP* 4.0b10 (Swofford 2002), under heuristic search and 1000 homogeneity replicates. *Laetiporus montanus* Černýex Tomšovský & Jankovský and *L. sulphureus* (Bull.) Murrill were selected as outgroups.

The best-fit evolutionary model to the dataset was selected by hierarchical likelihood ratio tests (hLRT) and Akaike information criterion (AIC) in MrModeltest 2.3 (Nylander 2004) after scoring 24 models of evolution by PAUP* version 4.0b10 (Swofford 2002). Maximum parsimony (MP) analysis was applied to the combined multiple genes dataset and the tree construction procedure was performed in PAUP* version 4.0b10. All characters were equally weighted and gaps were treated as missing data. Trees were inferred using the heuristic search option with TBR branch swapping and 1000 random sequence additions. Max-trees were set to 5000, branches of zero length were collapsed and all parsimonious trees were saved. Clade robustness was assessed using a bootstrap (BT) analysis with 1000 replicates (Felsenstein 1985). Descriptive tree statistics tree length (TL), consistency index (CI), retention index (RI), rescaled consistency index (RC), and homoplasy index (HI) were calculated for each Most Parsimonious Tree (MPT) generated. RAxML v.7.2.8 was used to construct a maximum likelihood (ML) tree with GTR+G+I model of site substitution including estimation of Gamma-distributed rate heterogeneity and a proportion of invariant sites (Stamatakis 2006). The branch support was evaluated with bootstrapping method of 1000 replicates (Hillis and Bull 1993).

In the Maximum likelihood (ML) analysis, the ML topology was performed in PAUP* version 4.0b10 (Swofford 2002). The best fit model selected and applied in the ML analysis was GTR+I+G. The ML bootstrap values (ML-BS) obtained from 200 replicates were performed using RAxML v.7.2.6 with the GTRCAT model to assess the reliability of the nodes.

Bayesian inference (BI) was calculated with MrBayes v3.1.2 with a general time reversible (GTR) model of DNA substitution and a gamma distribution rate variation across sites (Ronquist and Huelsenbeck 2003). Four Markov chains were run from random starting trees for 13,000,000 generations until the split deviation frequency value < 0.01, and trees were sampled every 100 generations. The first 25% of the sampled trees were discarded as burn-in and the remaining ones were used to reconstruct a majority rule consensus and calculate Bayesian posterior probabilities (BPP) of the clades.

Trees were viewed in FigTree v1.4.2 (http://tree.bio.ed.ac.uk/software/figtree/). Branches that received bootstrap support for maximum parsimony (MP), maximum likelihood (BS) and Bayesian posterior probabilities (BPP) greater than or equal to 75% (MP and BS) and 0.95 (BPP) were considered as significantly supported, respectively.

Results

Phylogeny

The combined dataset (ITS, nLSU, nSSU, mtSSU, TEF1, TBB1, RPB1 and RPB2) contains sequences from 145 fungal samples representing 77 species. The dataset has an aligned length of 7498 total characters including gaps, of

Table 1 All the available sequences for species of Polyporaceae found from China

Species	Sample no.	GenBank accessions								References
		ITS	NLSU	MtSSU	RPB1	RPB2	TEF1	TBB1	NSSU	
Abundisporus fuscopurpureus	Cui 10950	KC456254	KC456256	KF051025	–	–	KF181154	–	–	Zhao et al. (2015)
Abundisporus fuscopurpureus	Cui 10969	KC456255	KC456257	KF051026	–	–	KF181155	–	MG847239	Zhao et al. (2015)
Abundisporus mollissimus	Cui 6257	JX141451	JX141461	KF051027	–	–	KF181156	–	–	Zhao et al. (2015)
Abundisporus pubertatis	Dai 11310	KC787568	KC787575	KF051031	–	–	KF181125	KF482825	–	Zhao et al. (2015)
Abundisporus pubertatis	Dai 11927	KC787569	KC787576	KF051034	–	–	KF181128	KF482828	–	Zhao et al. (2015)
Abundisporus quercicola	Dai 3084	KC415907	KC415909	KF051035	–	–	–	–	–	Zhao et al. (2015)
Abundisporus roseoalbus	Dai 12272	KC787571	KC787578	KF051036	–	–	KF181130	–	–	Zhao et al. (2015)
Abundisporus roseoulbus	Dai 12269	KC415908	KC415910	KF051037	–	–	KF181131	–	–	Zhao et al. (2015)
Amylosporia hattorii	Dai 10315	JQ861740[a]	JQ861756[a]	KF218290[a]	–	–	–	–	–	Present study
Amylosporia hattorii	Dai 10318	JQ861741[a]	JQ861757[a]	KF218291[a]	–	–	–	–	–	Present study
Amylosporia hattorii	Cui 10912	KX900675[a]	KX900725[a]	KX900776[a]	–	–	KX900852[a]	–	–	Present study
Coriolopsis aspera	Cui 6726	KC867358[a]	KC867480[a]	–	–	–	–	–	–	Present study
Coriolopsis aspera	Dai 10737	KC867355[a]	KC867474[a]	–	–	–	–	–	–	Present study
Coriolopsis brunneoleuca	Dai 12118	KC867418[a]	KC867436[a]	KX838372[a]	–	–	–	–	–	Present study
Coriolopsis brunneoleuca	Cui 8428	KC867413[a]	KC867437[a]	KX838373[a]	–	–	–	–	–	Present study
Coriolopsis cf. *byrsina*	Cui 6556	KC867351[a]	KC867426[a]	–	–	–	–	–	–	Present study
Coriolopsis cf. *byrsina*	Dai 10788	KC867350[a]	KC867425[a]	KX838374[a]	–	–	–	–	–	Present study
Coriolopsis dendriformis	Yuan 6316	KC867409[a]	KC867446[a]	–	–	–	–	–	–	Present study
Coriolopsis dendriformis	Cui 6719	KC867408[a]	KC867445[a]	–	–	–	–	–	–	Present study
Coriolopsis glabro-rigens	Dai 7894	KC867395	–	KX838375[a]	–	–	–	–	–	Li et al. (2016b)
Coriolopsis glabro-rigens	Cui 4207	KC867396	–	–	–	–	–	–	–	Li et al. (2016b)
Coriolopsis hainanensis	Cui 6671	KC867375[a]	KC867448[a]	–	KX885082[a]	KX885088[a]	–	–	–	Present study
Coriolopsis hainanensis	Dai 10786	KC867376[a]	KC867449[a]	–	KX885083[a]	KX885089[a]	KX838442[a]	–	–	Present study
Coriolopsis retropicta	Dai 13074	KX832055[a]	KX832064[a]	KX838415[a]	–	–	–	–	–	Present study
Coriolopsis retropicta	Dai 9333	KC867402[a]	KC867441[a]	KX838376[a]	–	–	–	–	–	Present study
Coriolopsis sanguinaria	Dai 9362	KC867391	KC867466	KX838377	–	–	–	–	–	Li et al. (2016b)
Coriolopsis sanguinaria	Dai 9350	KC867389	KC867464	KX838378	–	–	–	–	–	Li et al. (2016b)
Coriolopsis strumosa	Dai 10642	JX559278	JX559303	KX838379[a]	KX885080[a]	JX559312	KX838416[a]	KX838443[a]	–	Li et al. (2014b)
Coriolopsis strumosa	Dai 10657	KC867371	KC867491	KX838380[a]	KX885081[a]	KF274650	KX838417[a]	KX838444[a]	–	Li et al. (2014b)
Cryptoporus sinensis	HMAS 41197	KX885071[a]	KX885074[a]	–	–	–	–	–	–	Present study
Cryptoporus volvatus	Cui 16468	MG847207[a]	MG847216[a]	MG847225[a]	–	MG867676[a]	MG867694[a]	–	MG847240[a]	Present study
Daedaleopsis confragosa	Cui 6892	KU892428	KU892448	KX838381[a]	KU892481	KU892507	KX838418	–	–	Li et al. (2016a)
Daedaleopsis confragosa	Cui 9756	KU892438[a]	KU892451[a]	–	KU892483[a]	KU892508[a]	–	–	–	Present study
Daedaleopsis confragosa	Cui 9408	KU892440[a]	KU892461[a]	KX838411[a]	–	KU892502[a]	KX838439[a]	KX838460[a]	–	Present study
Daedaleopsis confragosa	Cui 9732	JX569731[a]	JX569748[a]	KX838382[a]	KU892482[a]	KF274647[a]	KX838419[a]	KX838445[a]	–	Present study
Daedaleopsis hainanensis	Dai 9268	KU892434	KU892458	KX838414[a]	KU892480	KU892496	–	–	–	Li et al. (2016a)
Daedaleopsis hainanensis	Cui 5178	KU892435	KU892462	KX838413[a]	KU892479	KU892495	KX838441[a]	–	–	Li et al. (2016a)

Table 1 (continued)

Species	Sample no.	GenBank accessions								References
		ITS	NLSU	MtSSU	RPB1	RPB2	TEF1	TBB1	NSSU	
Daedaleopsis purpurea	Dai 8060	KU892442	KU892475	KX838409[a]	KX838475[a]	KU892498	KX838438[a]	–	–	Li et al. (2016a)
Daedaleopsis purpurea	Dai 13583a	KX832054[a]	KX832063[a]	KX838412[a]	KX838476[a]	KX838480[a]	KX838440[a]	–	–	Present study
Daedaleopsis sinensis	Dai 11429	KU892444	KU892446	KX838383[a]	KU892476	KU892493	KX838420[a]	KX838446[a]	–	Li et al. (2016a)
Daedaleopsis sinensis	Dai 11431	JX569732	JX569749	KX838384[a]	KU892477	KF274648	KX838421[a]	KX838447[a]	–	Li et al. (2016a)
Daedaleopsis tricolor	Dai 8349	KU892432	KU892470	KX838385[a]	KU892490	KU892501	KX838422[a]	KX838448[a]	–	Li et al. (2016a)
Daedaleopsis tricolor	Cui 8301	KU892426[a]	KU892468[a]	KX838386[a]	KU892487[a]	KU892513[a]	KX838423[a]	KX838449[a]	–	Present study
Datronia mollis	Dai 11456	JX559253	JX559292	KX838388[a]	–	JX559307	KX838424[a]	KX838450[a]	–	Li et al. (2014a)
Datronia mollis	Dai 11253	JX559258	JX559289	KX838387[a]	KX885079[a]	JX559306	–	–	–	Li et al. (2014a)
Datroniella melanocarpa	Cui 10646	KC415186	KC415194	KX885076[a]	KX885084[a]	KC415201	KX838425[a]	–	–	Li et al. (2014a)
Datroniella scutellata	Cui 7265	JX559263	JX559300	KX838389[a]	KX838463[a]	–	KX838426[a]	KX838451[a]	–	Li et al. (2014a)
Datroniella subtropica	Dai 12883	KC415184	KC415191	KX838390[a]	KX838464[a]	KC415198	KX838427[a]	–	–	Li et al. (2014a)
Datroniella subtropica	Dai 12885	KC415185	KC415192	KX838391[a]	KX838465[a]	KC415199	KX838428[a]	–	–	Li et al. (2014a)
Datroniella tibetica	Cui 9486	JX559265	JX559299	KX838392[a]	–	JX559309	–	–	–	Li et al. (2014a)
Datroniella tibetica	Cui 9510	JX559264	JX559298	KX838393[a]	–	JX559308	–	–	–	Li et al. (2014a)
Datroniella tropica	Dai 13152	KC415182	KC415190	KX838395[a]	–	KX885091[a]	–	–	–	Li et al. (2014a)
Datroniella tropica	Dai 13147	KC415181	KC415189	KX838394[a]	KX838466[a]	KC477838	KX838429[a]	–	–	Li et al. (2014a)
Dichomitus campestris	IFP 14643	KX832053[a]	KX832062[a]	KX838408[a]	KX838474[a]	–	–	KX838459[a]	–	Present study
Dichomitus hubeiensis	Wei 2045	JQ780387[a]	JQ780421[a]	KX838396[a]	–	–	–	–	–	Present study
Dichomitus kirkii	Yuan 1237	JQ780406[a]	JQ780436[a]	–	–	–	–	–	–	Present study
Dichomitus squalens	Cui 9725	JQ780408	JQ780427	KX838403[a]	KX838470[a]	–	KX838435[a]	KX838457[a]	MG847241[a]	Zhao et al. (2016)
Dichomitus squalens	Cui 9639	JQ780407	JQ780426	KX838404[a]	KX838471[a]	KX838478[a]	KX838436[a]	KX838458[a]	–	Zhao et al. (2016)
Earliella scabrosa	He 31	KC867365[a]	KC867484[a]	KX838397[a]	KX885077[a]	KX885085[a]	KX838430[a]	KX838452[a]	–	Present study
Earliella scabrosa	Cui 6236	KC867366[a]	KC867485[a]	KX838398[a]	–	KX885087[a]	KX838431[a]	KX838453[a]	–	Present study
Echinochaete ruficeps	Dai 11504	KX832052[a]	KX832061[a]	KX838407[a]	–	–	–	–	–	Present study
Echinochaete russiceps	Dai 13868	KX832051[a]	KX832060[a]	KX838406[a]	KX838473[a]	KX838479[a]	KX838437[a]	–	–	Present study
Echinochaete russiceps	Dai 13866	KX832050[a]	KX832059[a]	KX838405[a]	KX838472[a]	–	–	–	–	Present study
Favolus acervatus	Cui 11053	KU189774	KU189805	KU189956	KU189889	KU189994	KU189920	KU189864	–	Zhou and Cui (2017)
Favolus acervatus	Dai 10749b	KX548953	KX548979	KX549018	KX549065	KX549073	KX549043	KX549033	–	Zhou and Cui (2017)
Favolus emerici	Cui 10926	KU189776	KU189807	–	KU189890	KU189995	KU18992	KU189866	–	Zhou and Cui (2017)
Favolus emerici	Yuan 4410	KX548954	KX548980	–	KX549066	–	KX549044	KX549034	–	Zhou and Cui (2017)
Favolus fibrillosus	Cui 10941	KX548976	KX548998	KX549032	–	–	KX549062	KX549042	KX549016	Zhou and Cui (2017)
Favolus fibrillosus	Dai 7959	KX548977	KX548999	–	–	–	KX549063	–	KX549017	Zhou and Cui (2017)
Favolus niveus	Cui 11129	KX548955	KX548981	KX549019	KX549067	KX549074	KX549045	KX549035	KX549002	Zhou and Cui (2017)
Favolus niveus	Dai 13276	KX548956	KX548982	KX549020	KX549068		KX549046	KX549036	KX549003	Zhou and Cui (2017)
Favolus pseudoemerici	Cui 11079	KX548958	KX548984	KX549022	KX549069	KX549075	KX549048	KX549037	KX549004	Zhou and Cui (2017)
Favolus pseudoemerici	Cui 13757	KX548959	KX548985	KX549023	–	–	KX549049	–	KX549005	Zhou and Cui (2017)
Favolus septatus	Zhou 287	KX548968	–	KX549024	–	–	KX549054	–	KX549008	Zhou and Cui (2017)
Favolus spathulatus	Cui 8290	KX548969	KX548991	KX549025	–	–	KX549055	KX549038	–	Zhou and Cui (2017)

Table 1 (continued)

Species	Sample no.	GenBank accessions								References
		ITS	NLSU	MtSSU	RPB1	RPB2	TEF1	TBB1	NSSU	
Favolus spathulatus	Dai 13615a	KU189775	KU189806	KU189957	–	–	KU189921	KU189865	–	Zhou and Cui (2017)
Favolus subtropicus	Cui 4292	KX548970	KX548992	KX549026	–	–	KX549056	–	KX549010	Zhou and Cui (2017)
Favolus subtropicus	Dai 11355	KX548972	KX548994	KX549028	–	–	KX549058	–	KX549012	Zhou and Cui (2017)
Favolus subtropicu	Li 1938	KX548971	KX548993	KX549027	KX549070	KX549076	KX549057	KX549039	KX549011	Zhou and Cui (2017)
Flammeopellis bambusicola	Dai 13443	KF698748	KF698759	KF725877	–	–	KF725879	–	–	Zhao et al. (2014a)
Flammeopellis bambusicola	Dai 13506	KF698749	KF698760	KF725878	–	KX838477[a]	KF725880	–	–	Zhao et al. (2014a)
Fomes fomentarius	Cui 5769	KX885072[a]	KX832056[a]	–	–	–	–	–	–	Present study
Fomes fomentarius	Cui 8020	JX290073	JX290070	–	–	–	–	–	–	Li et al. (2014b)
Funalia cystidiata	Dai 12093	KC867394[a]	KC867457[a]	–	–	–	–	–	–	Present study
Funalia cystidiata	Cui 8396	KC867392[a]	KC867455[a]	–	–	–	–	–	–	Present study
Funalia cystidiata	Dai 12089	KC867393[a]	KC867456[a]	–	–	–	–	–	–	Present study
Funalia subgallica	Dai 10814	KC867382	KC867458	KX838399[a]	KX838467[a]	KU182648	–	KX838454[a]	–	Li et al. (2016b)
Funalia subgallica	Dai 6329	KC867386	KC867462	–	KX885078[a]	KX885086[a]	–	–	–	Li et al. (2016b)
Funalia subgallica	Cui 6317	KC867384	KC867460	MG847226[a]	MG867665[a]	KU182650	MG867695[a]	MG867709[a]	MG847242[a]	Li et al. (2016b)
Funalia subgallica	Dai 10741	KC867385	KC867461	MG847227[a]	MG867666[a]	KU182647	MG867696[a]	–	MG847243[a]	Li et al. (2016b)
Funalia trogii	Dai 11246	KC867380	KC867451	KX838400[a]	KX838468[a]	KU182653	KX838432[a]	–	–	Li et al. (2016b)
Grammothele denticulata	Dai 16112	KU512914	–	–	–	–	–	–	–	Wu et al. (2016)
Grammothele denticulata	Cui 8860	JN411113	–	–	–	–	–	–	–	Present study
Grammothele fuligo	Dai 12148a	JN411114	–	–	–	–	–	–	–	Present study
Grammothele lineata	Cui 6533	KX832048[a]	KX832057[a]	KX838401[a]	–	–	KX838433[a]	KX838455[a]	–	Present study
Grammothele lineata	Cui 6539	KX832049[a]	KX832058[a]	KX838402[a]	KX838469[a]	–	KX838434[a]	KX838456[a]	–	Present study
Grammothele quercina	Cui 9499	JQ780409	–	–	–	–	–	–	–	Present study
Grammothele quercina	Dai 11768	JQ314364	JQ780423	–	–	–	–	–	–	Present study
Grammothelopsis subtropica	Cui 9035	JQ845094	JQ845097	KF051030	–	–	KF181124	–	–	Zhao et al. (2015)
Grammothelopsis subtropica	Cui 9041	JQ845096	JQ845099	KF051039	–	–	KF181133	–	–	Zhao et al. (2015)
Haploporus alabamae	Dai 9324	FJ627252	KU941886	KU941910	–	–	–	–	–	Shen et al. (2016)
Haploporus alabamae	Cui 9046	KU941862	KU941887	KU941911	–	–	–	–	–	Shen et al. (2016)
Haploporus alabamae	Dai 10951	KX900634[a]	KX900681[a]	KX900731[a]	–	–	–	–	–	Present study
Haploporus cylindrosporus	Dai 15643	KU941853	KU941877	KU941902	–	KU941924	KU941940	–	–	Shen et al. (2016)
Haploporus cylindrosporus	Dai 15664	KU941854	KU941878	KU941903	–	KU941925	KU941941	–	–	Shen et al. (2016)
Haploporus latisporus	Dai 11873	KU941847	KU941871	KU941896	–	KU941918	KU941934	–	–	Shen et al. (2016)
Haploporus latisporus	Dai 10562	KU941848	KU941872	KU941897	–	KU941919	KU941935	–	–	Shen et al. (2016)
Haploporus microsporus	Dai 12147	KU941861	KU941885	–	–	–	KU941944		–	Shen et al. (2016)
Haploporus nepalensis	Dai 12937	KU941855	KU941879	KU941904	–	KU941926	KU941942	–	–	Shen et al. (2016)
Haploporus nepalensis	Cui 10729	KU941856	KU941880	KU941905	–	KU941927	KU941943	–	–	Shen et al. (2016)
Haploporus odorus	Dai 11296	KU941845	KU941869	KU941894	–	KU941916	KU941932	–	–	Shen et al. (2016)
Haploporus odorus	Yuan 2365	KU941846	KU941870	KU941895	–	KU941917	KU941933	–	–	Shen et al. (2016)
Haploporus papyraceus	Dai 10778	KU941839	KU941863	KU941888	–	–	–	–	–	Shen et al. (2016)

Table 1 (continued)

Species	Sample no.	GenBank accessions								References
		ITS	NLSU	MtSSU	RPB1	RPB2	TEF1	TBB1	NSSU	
Haploporus papyraceus	Cui 8706	KU941840	KU941864	KU941889	–	–	–	–	–	Shen et al. (2016)
Haploporus septatus	Cui 4100	KU941844	KU941868	KU941893	–	KU941915	KU941931	–	–	Shen et al. (2016)
Haploporus septatus	Dai 13581	KU941843	KU941867	KU941892	–	KU941914	KU941930	–	–	Shen et al. (2016)
Haploporus subpapyraceus	Dai 13580	KU941841	KU941865	KU941890	–	KU941912	KU941928	–	–	Shen et al. (2016)
Haploporus subpapyraceus	Cui 2651	KU941842	KU941866	KU941891	–	KU941913	KU941929	–	–	Shen et al. (2016)
Haploporus subtrameteus	Dai 4222	KU941849	KU941873	KU941898	–	KU941920	KU941936	–	–	Shen et al. (2016)
Haploporus subtrameteus	Cui 10656	KU941850	KU941874	KU941899	KX900782	KU941921	KU941937	–	–	Shen et al. (2016)
Haploporus thindii	Cui 9373	KU941851	KU941875	KU941900	–	KU941922	KU941938	–	–	Shen et al. (2016)
Haploporus thindii	Cui 9682	KU941852	KU941876	KU941901	–	KU941923	KU941939	–	–	Shen et al. (2016)
Hexagonia apiaria	Cui 6447	KC867362	KC867481	MG847228[a]	MG867667[a]	KF274660	MG867697[a]	–	MG847244[a]	Li et al. (2014b)
Hexagonia apiaria	Dai 10784	KX900635	KX900682	KX900732	MG867668	MG867677	KX900822	–	MG847245	Present study
Hexagonia glabra	Dai 10991	JX569733	JX569750	–	–	KF274649	–	–	–	Li et al. (2014b)
Hexagonia glabra	Cui 11380	KX900636[a]	KX900685[a]	KX900735[a]	–	–	KX900825[a]	KX900859[a]	–	Present study
Hexagonia glabra	Dai 12993	KX900637[a]	KX900683[a]	KX900733[a]	–	KX900797[a]	KX900823[a]	KX900857[a]	MG847246[a]	Present study
Hexagonia glabra	Cui 11367	KX900638[a]	KX900684[a]	KX900734[a]	MG867669[a]	KX900798[a]	KX900824[a]	KX900858[a]	MG847247[a]	Present study
Hexagonia hirta	Dai 5081	–	KC867486[a]	–	–	–	–	–	–	Present study
Hexagonia hirta	Cui 4051	KC867359[a]	KC867471[a]	–	–	–	–	–	–	Present study
Hornodermoporus latissimus	Cui 6625	HQ876604	JF706340	KF051040	–	–	KF181134	KF482834[a]	–	Zhao et al. (2014a)
Hornodermoporus latissimus	Dai 12054	KX900639[a]	KX900686[a]	KF218297[a]	–	–	KF286303[a]	KF482789[a]	–	Present study
Hornodermoporus martius	Cui 4055	KX900641[a]	KX900688[a]	KX900737[a]	–	–	–	–	–	Present study
Hornodermoporus martius	Cui 7992	HQ876603	HQ654114	KF051041	–	–	KF181135	KF482835[a]	–	Zhao et al. (2014a)
Hornodermoporus martius	Cui 4082	KX900640[a]	KX900687[a]	KX900736[a]	–	–	–	–	–	Present study
Lignosus hainanensis	Dai 10670	GU580883	GU580885	–	–	–	–	–	–	Cui et al. (2011a)
Megasporia cystidiolophora	Cui 2688	JQ780389	JQ780431	–	–	–	–	–	–	Li and Cui (2013a)
Megasporia cystidiolophora	Cui 2685	KX900647[a]	KX900695[a]	KX900744[a]	–	–	–	–	–	Present study
Megasporia cystidiolophora	Cui 5907	KX900648[a]	KX900696[a]	KX900745[a]	–	–	KX900834[a]	–	–	Present study
Megasporia ellipsoidea	Cui 5222	JQ314367	JQ314390	–	–	–	–	–	–	Li and Cui (2013a)
Megasporia ellipsoidea	Cui 11144	KX900649[a]	KX900697[a]	–	–	KX900804[a]	KX900835[a]	–	–	Present study
Megasporia guangdongensis	Cui 9129	JQ780397	JQ780430	KX900746[a]	–	–	–	–	–	Li and Cui (2013a)
Megasporia guangdongensis	Cui 9130	JQ314373	JQ780428	KX900747[a]	–	–	MG867698[a]	–	MG847250[a]	Li and Cui (2013a)
Megasporia guangdongensis	Cui 13986	MG847208[a]	MG847217[a]	MG847229[a]	–	MG867680[a]	MG867699[a]	–	MG847251[a]	Present study
Megasporia hengduanensis	Cui 8076	JQ780392	JQ780433	KX900748[a]	–	KX900805[a]	KF286337[a]	KF482823[a]	MG847252[a]	Li and Cui (2013a)
Megasporia hengduanensis	Cui 8176	JQ314370	KX900698[a]	KX900749[a]	–	KX900806[a]	MG867700[a]	–	MG847253[a]	Li and Cui (2013a)
Megasporia hexagonoides	Cui 6592	JQ780402	–	–	–	–	–	–	–	Li and Cui (2013a)
Megasporia hexagonoides	He 2608	JQ314368	JQ314388	–	–	–	–	–	–	Li and Cui (2013a)
Megasporia hexagonoides	Dai 12079	KX900650[a]	KX900699[a]	KX900750[a]	–	–	–	–	–	Present study
Megasporia hexagonoides	Cui 10896	KX900651[a]	KX900700[a]	KX900751[a]	–	–	KX900836[a]	–	MG847254[a]	Present study
Megasporia hexagonoides	Cui 13855	MG847209[a]	MG847218[a]	MG847230[a]	–	MG867681[a]	MG867701[a]	–	MG847255[a]	Present study

Table 1 (continued)

Species	Sample no.	GenBank accessions								References
		ITS	NLSU	MtSSU	RPB1	RPB2	TEF1	TBB1	NSSU	
Megasporia major	Cui 10253	JQ314366	JQ780437	–	–	–	–	–	–	Li and Cui (2013a)
Megasporia major	Yuan 1183	JQ314365	–	–	–	–	–	–	–	Li and Cui (2013a)
Megasporia violacea	Cui 13838	MG847210[a]	MG847219[a]	MG847231[a]	–	MG867682[a]	MG867702[a]	–	MG847256[a]	Present study
Megasporia violacea	Cui 13845	MG847211[a]	MG847220[a]	MG847232[a]	–	MG867683[a]	MG867703[a]	–	MG847257[a]	Present study
Megasporia violacea	Cui 6570	JQ780393	–	–	–	–	–	–	–	Li and Cui (2013a)
Megasporia violacea	Cui 6601b	JQ780395	JQ780434	KX900752[a]	–	–	–	–	–	Li and Cui (2013a)
Megasporia violacea	Cui 11331	KX900652[a]	KX900701[a]	KX900753[a]	–	KX900807[a]	KX900837[a]	–	–	Present study
Megasporoporia bannaensis	Cui 13967	MG847212[a]	MG847221[a]	MG847233[a]	MG867672[a]	MG867684[a]	MG867704[a]	MG867710[a]	MG847258[a]	Present study
Megasporoporia bannaensis	Dai 12306	JQ314362	JQ314379	–	–	–	KF494979	KF494961	–	Li and Cui (2013a)
Megasporoporia bannaensis	Dai 12278	JQ314361	–	–	–	–	–	–	–	Li and Cui (2013a)
Megasporoporia bannaensis	Dai 13596	KX900653[a]	KX900702[a]	KX900754[a]	–	KX900808[a]	KX900838[a]	–	–	Present study
Megasporoporia minor	Dai 12170	JQ314363	JQ314380	–	–	–	KF286336[a]	KF482822[a]	–	Li and Cui (2013a)
Megasporoporia setulosa	Dai 13673	KX900655[a]	KX900704[a]	KX900756[a]	–	KX900809[a]	–	–	–	Present study
Megasporoporiella lacerata	Yuan 3880	JQ314377	JQ314395	–	–	–	–	–	–	Li and Cui (2013a)
Megasporoporiella pseudocavernulosa	Yuan 1270	JQ314360	JQ314394	–	–	–	–	–	–	Li and Cui (2013a)
Megasporoporiella pseudocavernulosa	Cui 10261	KX900656[a]	KX900705[a]	KX900757[a]	–	–	KX900840[a]	–	–	Present study
Megasporoporiella pseudocavernulosa	Cui 11106	KX900657[a]	KX900706[a]	KX900758[a]	–	–	–	–	–	Present study
Megasporoporiella rhododendri	Dai 4226	JQ314356	JQ314392	–	–	–	–	–	–	Li and Cui (2013a)
Megasporoporiella rhododendri	Dai 4235a	JQ314355	KX900707[a]	KX900759[a]	–	KX900810[a]	KX900841[a]	–	–	Li and Cui (2013a)
Megasporoporiella rhododendri	Cui 10725	KX900658[a]	KX900708[a]	KX900760[a]	–	KX900811[a]	KX900842[a]	–	–	Present study
Megasporoporiella subcavernulosa	Cui 14247	MG847213[a]	MG847222[a]	MG847234[a]	MG867673[a]	MG867685[a]	MG867705[a]	–	MG847259[a]	Present study
Megasporoporiella subcavernulosa	Cui 9252	JQ780378	JQ780416	MG847235[a]	MG867674[a]	MG867686[a]	MG867706[a]	–	MG847260[a]	Li and Cui (2013a)
Megasporoporiella subcavernulosa	Cui 10050	JQ314357	–	–	–	–	–	–	–	Li and Cui (2013a)
Megasporoporiella subcavernulosa	Cui 11103	KX900659[a]	KX900709[a]	KX900761[a]	–	KX900812[a]	KX900843[a]	–	–	Present study
Megasporoporiella subcavernulosa	Dai 11755	KX900660[a]	KX900710[a]	KX900762[a]	–	–	–	–	–	Present study
Melanoderma microcarpum	Cui 10967	KX900661[a]	KX900711[a]	KX900763[a]	–	KX900813[a]	–	–	–	Present study
Melanoderma microcarpum	Dai 8116	KF495002[a]	KF495012[a]	KF494986[a]	–	–	KF482759[a]	–	–	Present study
Melanoderma microcarpum	Cui 10970	KX900662[a]	KX900712[a]	KX900764[a]	KX900791[a]	KX900814[a]	KX900845[a]	–	–	Present study
Microporellus obovatus	Dai 10937	KX880613[a]	KX880653[a]	KX880695[a]	–	–	KX880873[a]	KX880772[a]	–	Present study
Microporus affinis	Cui 7714	JX569739	JX569746	KX880696[a]	–	KF274661	–	–	–	Li et al. (2014b)
Microporus affinis	Cui 8188	KX880614[a]	KX880654[a]	KX880697[a]	–	–	KX880874[a]	KX880773[a]	–	Present study
Microporus subaffinis	Dai 11334	KX880615[a]	KX880655[a]	KX880698[a]	–	–	KX880875[a]	KX880774[a]	–	Present study
Microporus subaffinis	Dai 11712	KX880616[a]	KX880656[a]	KX880699[a]	–	–	KX880876[a]	KX880775[a]	–	Present study
Microporus subaffinis	Dai 10708	KX880617[a]	KX880657[a]	KX880700[a]	–	KX880848[a]	KX880925[a]	KX880776[a]	–	Present study
Microporus vernicipes	Dai 9283	KX880618[a]	KX880658[a]	KX880701[a]	–	–	KX880926[a]	–	–	Present study
Microporus vernicipes	Dai 7252	KX880619[a]	–	KX880702[a]	–	–	KX880877[a]	KX880777[a]	–	Present study
Microporus xanthopus	Cui 8284	JX290074	JX290071	KX880703[a]	–	JX559313	KX880878[a]	KX880778[a]	–	Li et al. (2014b)
Microporus xanthopus	Dai 12076	KX880620[a]	KX880659[a]	KX880704[a]	–	KX880849[a]		KX880779[a]	–	Present study

Table 1 (continued)

Species	Sample no.	GenBank accessions								References
		ITS	NLSU	MtSSU	RPB1	RPB2	TEF1	TBB1	NSSU	
Murinicarpus subadustus	Dai 10661	HQ876606	–	–	–	–	–	–	–	Zhao and Cui (2013c)
Murinicarpus subadustus	Dai 13895	KX880621[a]	KX880660[a]	–	–	–	KX880879[a]	KX880780[a]	–	Present study
Neodatronia gaoligongensis	Cui 8055	JX559269	JX559286	MG847236[a]	–	JX559317	KX900846[a]	–	MG847261[a]	Li et al. (2014a)
Neodatronia gaoligongensis	Cui 8186	JX559268	JX559285	MG847237[a]	–	JX559318	–	–	MG847262[a]	Li et al. (2014a)
Neodatronia sinensis	Dai 11921	JX559272	JX559283	–	–	JX559320	–	–	–	Li et al. (2014a)
Neodatronia sinensis	Cui 9949	KX900663[a]	KX900713[a]	KX900765[a]	–	–	KX900847[a]	–	–	Present study
Neofavolus alveolaris	Dai 11290	KU189768	KU189799	KU189949	KU189885	KU189982	KU189913	KU189859	–	Zhou and Cui (2017)
Neofavolus alveolaris	Cui 9900	KX548974	KX548996	KX549030	KX549072	KX549078	KX549060	KX549040	–	Zhou and Cui (2017)
Neofavolus cremeoalbidus	Cui 12412	KX899982[a]	KX900109[a]	KX900201[a]	–	–	KX900330[a]	–	KX900259[a]	Present study
Neofavolus cremeoalbidus	Cui 12408	KX899983[a]	KX900110[a]	KX900202[a]	–	–	KX900331[a]	–	KX900260[a]	Present study
Neofavolus mikawai	Dai 12361	KX548975	KX548997	KX549031	–	KX549079	KX549061	KX549041	KX549015	Zhou and Cui (2017)
Neofavolus mikawai	Cui 11152	KU189773	KU189804	KU189955	KU189888	KU189986	KU189919	KU189863	KU189834	Zhou and Cui (2017)
Neofomitella fumosipora	Cui 8816	JX569734	JX569741	KX900766[a]	–	–	–	–	–	Li et al. (2014b)
Neofomitella fumosipora	Cui 13581a	KX900664[a]	KX900714[a]	KX900767[a]	–	KX900815[a]	KX900848[a]	–	–	Present study
Neofomitella polyzonata	Dai 10419	JX569738	JX569745	–	–	KF274663	–	–	–	Li et al. (2014b)
Neofomitella polyzonata	Dai 10420	JX569736	JX569743	–	–	–	–	–	–	Li et al. (2014b)
Perenniporia africana	Cui 8676	KF018120	KF018129	KF218277[a]	–	–	KF286283[a]	KF482769[a]	–	Shen et al. (2018)
Perenniporia aridula	Dai 12396	JQ001854	JQ001846	KF218278[a]	–	–	KF181158[a]	–	–	Zhao and Cui (2013c)
Perenniporia aridula	Dai 12398	JQ001855	JQ001847	KF218279[a]	–	–	KF286285[a]	KF482771[a]	–	Zhao and Cui (2013c)
Perenniporia bambusicola	Yuan 3925	JQ861736	KX900718[a]	–	–	–	–	–	–	Zhao and Cui (2013c)
Perenniporia bambusicola	Cui 11050	KX900668[a]	KX900719[a]	KX900771[a]	–	–	–	–	–	Present study
Perenniporia bannaensis	Cui 8560	JQ291727	JQ291729	KF218280[a]	–	–	KF286286[a]	KF482772[a]	–	Zhao and Cui (2013c)
Perenniporia bannaensis	Cui 8562	JQ291728	JQ291730	KF218281[a]	–	–	KF286287[a]	KF482773[a]	–	Zhao and Cui (2013c)
Perenniporia cinereofusca	Dai 9289	KF568893	KF568895	–	–	–	–	–	–	Zhao et al. (2014b)
Perenniporia cinereofusca	Cui 5280	KF568892	KF568894		–	–	–	–	–	Zhao et al. (2014b)
Perenniporia citrinoalba	Dai 13643	KX880622[a]	KX880661[a]	KX880705[a]	–	–	–	–	–	Present study
Perenniporia citrinoalba	Cui 13615	MG847215[a]	MG847224[a]	MG847238[a]	–	MG867693[a]	MG867708[a]	–	MG847273[a]	Present study
Perenniporia contraria	Knudsen 04-111	JQ861737	JQ861755	KF218282[a]	–	–	–	KF494963[a]	–	Zhao and Cui (2013c)
Perenniporia corticola	Cui 1248	HQ848472	HQ848482	KF218284[a]	–	–	KF286290[a]	KF482776[a]	–	Zhao and Cui (2013c)
Perenniporia corticola	Dai 7330	HQ654094	HQ654108	KF218283[a]	–	–	KF286289[a]	KF482775[a]	–	Zhao and Cui (2013c)
Perenniporia corticola	Cui 1465	JN048759	JN048779	–	–	KF274651[a]	–	–	–	Zhao et al. (2013b)
Perenniporia decurrata	Yuan 2334	KX900669[a]	KX900720[a]	–	–	–	–	–	–	Present study
Perenniporia dendrohyphidia	Zhou 273	KX900670[a]	–	–	–	–	–	–	–	Present study
Perenniporia ellipsospora	Cui 10276	KF018124	KF018132	KF218286[a]	–	–	KF286292[a]	KF482778[a]	–	Shen et al. (2018)
Perenniporia ellipsospora	Cui 10284	JQ861739	KF018133	KF218285[a]	–	–	KF286291[a]	KF482777[a]	–	Shen et al. (2018)
Perenniporia gomezii	Dai 12148	KX900671[a]	KX900721[a]	KX900772[a]	–	–	–	–	–	Present study
Perenniporia gomezii	Dai 9656	KX900672[a]	KX900722[a]	KX900773[a]	–	–	–	–	–	Present study
Perenniporia gomezii	Dai 9672	KX900673[a]	KX900723[a]	KX900774[a]	–	–	–	–	–	Present study

Table 1 (continued)

Species	Sample no.	GenBank accessions								References
		ITS	NLSU	MtSSU	RPB1	RPB2	TEF1	TBB1	NSSU	
Perenniporia gomezii	Dai 13719	KX900674[a]	KX900724[a]	KX900775[a]	–	–	KX900851[a]	–	–	Present study
Perenniporia hainaniana	Cui 6364	JQ861743	JQ861759	KF051044[a]	–	–	KF181138[a]	KF482838[a]	–	Zhao and Cui (2013c)
Perenniporia hainaniana	Cui 6365	JQ861744	JQ861760	KF051045[a]	–	–	KF181139[a]	KF482839[a]	–	Zhao and Cui (2013c)
Perenniporia isabelllina	Yuan 3904	–	–	KF218292[a]	–	–	KF286298[a]	–	–	Present study
Perenniporia japonica	Cui 9181	JQ001856	JX141468	KF218293[a]	–	–	KF286299[a]	–	–	Zhao and Cui (2013c)
Perenniporia japonica	Dai 13396	KX900676[a]	KX900726[a]	KX900777[a]	–	KX900817[a]	KX900853[a]	KX900861[a]	–	Present study
Perenniporia japonica	Cui 7047	KX900677[a]	KX900727[a]	KF218294[a]	–	–	KF286300[a]	KF482786[a]	–	Present study
Perenniporia lacerata	Cui 7220	JX141448	JX141458	KF218295[a]	–	–	KF286301[a]	KF482787[a]	–	Zhao and Cui (2013c)
Perenniporia lacerata	Dai 11268	JX141449	JX141459	KF218296[a]	–	–	KF286302[a]	KF482788[a]	–	Zhao and Cui (2013c)
Perenniporia luteola	Harkonen 1308b	JX141457	JX141467	KF494990[a]	–	–	KF482764[a]	KF494967[a]	–	Zhao and Cui (2013c)
Perenniporia luteola	Dai 13071b	KX900678[a]	KX900728[a]	KX900778[a]	–	KX900818[a]	KX900854[a]	–	–	Present study
Perenniporia luteola	Dai 13094	KX900679[a]	KX900729[a]	KX900779[a]	–	KX900819[a]	KX900855[a]	–	–	Present study
Perenniporia maackiae	Cui 8929	HQ654102	JF706338	KF218299[a]	KX900795[a]	KX900820[a]	KF286305[a]	KF482791[a]	–	Zhao and Cui (2013c)
Perenniporia maackiae	Cui 10092	KX900680[a]	KX900730[a]	KX900780[a]	KX900796[a]	KX900821[a]	KX900856[a]	–	–	Present study
Perenniporia macropora	Zhou 280	JQ861748	JQ861764	KF494992[a]	–	–	KF482765[a]	KF482798[a]	–	Zhao and Cui (2013c)
Perenniporia macropora	Zhou 297	JQ861747	JQ861763	KF494993[a]	–	–	KF482766[a]	KF482799[a]	–	Zhao and Cui (2013c)
Perenniporia medulla-panis	Dai 9363	FJ627262[a]	–	–	–	–	–	–	–	Present study
Perenniporia medulla-panis	Cui 3274	JN112792	JN112793	KF051043	–	–	KF181137	KF482837[a]	–	Zhao et al. (2014a)
Perenniporia medulla-panis	Cui 14515	MG847214[a]	MG847223[a]	–	–	MG867687[a]	MG867707[a]	MG867711[a]	MG847263[a]	Present study
Perenniporia minor	Dai 9198	KF495005[a]	KF495016[a]	KF494994[a]	–	–	–	KF494969[a]	–	Present study
Perenniporia minor	Cui 5782	HQ883475	HQ654115	KF218300[a]	–	–	–	KF494968[a]	–	Zhao and Cui (2013c)
Perenniporia minutissima	Dai 12457	KF495004[a]	KF495014[a]	KF218302[a]	–	–	KF286308[a]	KF482794[a]	–	Present study
Perenniporia minutissima	Cui 10979	KF495003[a]	KF495013[a]	KF218304[a]	–	–	KF286310[a]	KF482796[a]	–	Present study
Perenniporia nanlingensis	Cui 7541	HQ848479	HQ848488	KF218306[a]	–	–	KF286312[a]	–	–	Zhao and Cui (2013c)
Perenniporia nanlingensis	Cui 7620	HQ848477	HQ848486	KF218307[a]	–	–	KF286313[a]	–	–	Zhao and Cui (2013c)
Perenniporia piceicola	Cui 10460	JQ861742	JQ861758	KF218310[a]	–	–	KF286316[a]	KF482803[a]	–	Zhao and Cui (2013c)
Perenniporia piceicola	Dai 4181	JF706328	JF706336	KF218311[a]	–	–	KF286317[a]	KF482802[a]	–	Cui and Zhao (2012)
Perenniporia pyricola	Cui 9149	JN048762	JN048782	KF218312[a]	–	–	KF286318[a]	KF482804[a]	–	Zhao and Cui (2013c)
Perenniporia pyricola	Dai 10265	JN048761	JN048781	KF218313[a]	KX838462[a]	–	KF286319[a]	KF482805[a]	–	Zhao and Cui (2013c)
Perenniporia rhizomorpha	Cui 7507	HQ654107	HQ654117	KF218314[a]	–	–	KF286320[a]	KF482806[a]	–	Zhao and Cui (2013c)
Perenniporia rhizomorpha	Dai 7248	JF706330	JF706348	KF218315[a]	–	–	KF286321[a]	KF482807[a]	–	Zhao and Cui (2013c)
Perenniporia russeuomarginata	Yuan 1262	JQ861751	JQ861767	KF218317[a]	–	–	KF286323[a]	KF482809[a]	–	Zhao and Cui (2013c)
Perenniporia russeuomarginata	Yuan 1244	JQ861750	JQ861766	KF218316[a]	–	–	KF286322[a]	KF482808[a]	–	Zhao and Cui (2013c)
Perenniporia straminea	Cui 8718	HQ876600	JF706335	KF218318[a]	–	–	KF286324[a]	KF482810[a]	–	Zhao and Cui (2013c)
Perenniporia straminea	Cui 8858	HQ654104	JF706334	KF218319[a]	–	–	KF286325[a]	KF482811[a]	–	Zhao and Cui (2013c)
Perenniporia subacida	Cui 10053	KF495006	KF495017	KF218321	KX838461[a]	–	KF286327	KF482813[a]	–	Zhao et al. (2014a)
Perenniporia subacida	Cui 3643	FJ613655	AY336753	–	–	–	–	–	–	Zhao and Cui (2013c)
Perenniporia subacida	Dai 8224	HQ876605	JF713024	–	–	–	–	–	–	Zhao and Cui (2013c)

Table 1 (continued)

Species	Sample no.	GenBank accessions								References
		ITS	NLSU	MtSSU	RPB1	RPB2	TEF1	TBB1	NSSU	
Perenniporia substraminea	Cui 10177	JQ001852	JQ001844	KF051046	–	–	KF181140	KF482840[a]	–	Zhao et al. (2014a)
Perenniporia substraminea	Cui 10191	JQ001853	JQ001845	KF051047	–	–	KF181141	KF482841[a]	–	Zhao et al. (2014a)
Perenniporia subtephropora	Dai 10962	JQ861752	JQ861768	KF218323[a]	KX880811[a]	KX880850[a]	KF286329[a]	KF482815[a]	–	Zhao and Cui (2013c)
Perenniporia subtephropora	Dai 10964	JQ861753	JQ861769	KF218324[a]	KX880812[a]	KX880851[a]	KF286330[a]	KF482816[a]	–	Zhao and Cui (2013c)
Perenniporia tenuis	Wei 2783	JQ001858	JQ001848	KF218325[a]	–	KF274652[a]	KF286331[a]	KF482817[a]	–	Zhao and Cui (2013c)
Perenniporia tenuis	Wei 2969	JQ001859	JQ001849	KF218326[a]	–	–	KF286332[a]	KF482818[a]	–	Zhao and Cui (2013c)
Perenniporia tephropora	Cui 9029	HQ876601	JF706339	KF218327[a]	KX880813[a]	KX880852[a]	KF286306[a]	KF482792[a]	–	Zhao and Cui (2013c)
Perenniporia tephropora	Cui 8040	JN048763	HQ654118	KF218328[a]	KX880814[a]	–	KF286307[a]	KF482793[a]	–	Zhao et al. (2013b)
Perenniporia tianmuensis	Cui 2648	JX141453	JX141463	KF218329[a]	–	–	–	KF494971[a]	–	Zhao and Cui (2013c)
Perenniporia tianmuensis	Cui 2715	JX141454	JX141464	KF218331[a]	–	–	–	KF494972[a]	–	Zhao and Cui (2013c)
Perenniporia tibetica	Cui 9459	JF706327	JF706333	KF218333[a]	–	–	KF286296[a]	KF482783[a]	–	Zhao and Cui (2013c)
Perenniporia tibetica	Cui 9457	JF706326	JF706332	KF218332[a]	–	–	KF286297[a]	KF482782[a]	–	Zhao and Cui (2013c)
Perenniporia truncatospora	Cui 6987	JN048778	HQ654112	KF218334[a]	–	–	KF286288[a]	KF482774[a]	–	Zhao and Cui (2013c)
Perenniporia truncatospora	Dai 5125	HQ654098	HQ848481	KF218335[a]	KX880815[a]	KX880853[a]	KX880880[a]	KF482770[a]	–	Zhao and Cui (2013c)
Perenniporia yinggelingensis	Cui 13856	MH427957[a]	MH427965[a]	MH427972[a]	MH427988[a]	MH427991[a]	MH427995[a]	–	MH427980[a]	Present study
Perenniporia yinggelingensis	Cui 13625	MH427960[a]	MH427967[a]	MH427975[a]	–	–	MH427996[a]	–	MH427983[a]	Present study
Perenniporia yinggelingensis	Cui 13627	MH427961[a]	MH427968[a]	MH427976[a]	MH427989[a]	MH427993[a]	MH427997[a]	–	MH427984[a]	Present study
Perenniporia yinggelingensis	Cui 13631	MH427962[a]	MH427969[a]	MH427977[a]	MH427990[a]	MH427994[a]	MH427998[a]	–	MH427985[a]	Present study
Picipes badius	Cui 10501	KC572015	KC572053	KU189962	–	KU189989	KU189927	KU189869	–	Zhou et al. (2016)
Picipes badius	Cui 11136	KU189781	KU189812	KU189964	KU189895	KU189990	KU189930	KU189872	–	Zhou et al. (2016)
Picipes baishanzuensis	Cui 11395	KU189763	KU189794	KU189946	–	KU189978	KU189908	KU189856	–	Zhou et al. (2016)
Picipes baishanzuensis	Dai 13418	KU189762	KU189793	KU189945	KU189882	KU189977	KU189907	KU189855	–	Zhou et al. (2016)
Picipes conifericola	Dai 11114	JX473244	KC572061	KU189969	–	–	KU189935	–	KU189849	Zhou et al. (2016)
Picipes conifericola	Cui 9950	KU189783	KU189814	KU189968	KU189897	KU189993	KU189934	KU189875	KU189848	Zhou et al. (2016)
Picipes fraxinicola	Dai 2494	KC572023	KC572062	KU189966	–	–	KU189932	–	–	Zhou et al. (2016)
Picipes hainanensis	Cui 5327	KU189751[a]	–	KU189936[a]	–	–	KU189898[a]	–	–	Present study
Picipes jiajinensis	Cui 10748	KU189754[a]	KU189786[a]	KU189939[a]	KU189878[a]	KU189974[a]	KU189901[a]	KU189852	–	Present study
Picipes pseudovarius	Cui 10548	KU189782[a]	KU189813[a]	KU189965[a]	–	KU189991[a]	KU189931[a]	KU189873	–	Present study
Picipes pumilus	Dai 6705	KX851630[a]	KX851684[a]	KX851711[a]	–	–	KX851787[a]	–	–	Present study
Picipes pumilus	Cui 5464	KX851628[a]	KX851682[a]	KX851710[a]	KX851753	KX851765[a]	KX851785[a]	KX851581[a]	–	Present study
Picipes rhizophilus	Dai 16082	KX851634[a]	KX851687[a]	KX851713[a]	–	–	KX851788[a]	–	–	Present study
Picipes rhizophilus	Dai 11599	KC572028	KC572067	KU189967	KU189896	KU189992	KU189933	KU189874	–	Zhou et al. (2016)
Picipes submelanopus	Dai 13296	KU189771	KU189802	KU189952	–	–	KU189916	KU189861	–	Zhou et al. (2016)
Picipes submelanopus	Dai 13294	KU189770	KU189801	KU189951	KU189886	KU189984	KU189915	KU189860	–	Zhou et al. (2016)
Picipes subtropicus	Cui 2662	KU189759	KU189791	KU189943	–	–	KU189905	–	–	Zhou et al. (2016)
Picipes subtropicus	Li 1928	KU189758	KU189790	KU189942	KU189881	KU189976	KU189904	KU189854	–	Zhou et al. (2016)
Picipes subtubaeformis	Dai 11870	KU189752	KU189784	KU189937	KU189876	KU189972	KU189899	KU189850	–	Zhou et al. (2016)
Picipes subtubaeformis	Cui 10793	KU189753	KU189785	KU189938	KU189877	KU189973	KU189900	KU189851	–	Zhou et al. (2016)

Table 1 (continued)

Species	Sample no.	GenBank accessions								References
		ITS	NLSU	MtSSU	RPB1	RPB2	TEF1	TBB1	NSSU	
Picipes taibaiensis	Dai 5746	KX196783	KX196784	KX196786	–	–	KX196785	–	–	Zhou et al. (2016)
Picipes tibeticus	Cui 12215	KU189755	KU189787	KU189940	KU189879	KU189975	KU189902	KU189853	KU189818	Zhou et al. (2016)
Picipes tibeticus	Cui 12225	KU189756	KU189788	KU189941	KU189880	–	KU189903	–	KU189819	Zhou et al. (2016)
Polyporus arcularius	Cui 11398	KU189766	KU189797	KU189947	KU189884	KU189980	KU189911	–	KU189826	Zhou et al. (2016)
Polyporus arcularius	Cui 10998	KX548973	KX548995	KX549029	KX549071	KX549077	KX549059	–	KX549013	Zhou and Cui (2017)
Polyporus brumalis	Cui 10750	KU189765	KU189796	–	KU189883	KU189979	KU189910	KU189857	KU189825	Zhou et al. (2016)
Polyporus brumalis	Cui 7188	KX851591[a]	KX851646[a]	–	KX851747[a]	KX851758[a]	KX851771[a]	KX851575[a]	KX851723[a]	Present study
Polyporus ciliatus	Wei 1582	KU189767	KU189798	KU189948	–	KU189981	KU189912	KU189858		Zhou et al. (2016)
Polyporus cuticulatus	Dai 13141	KX851613[a]	KX851667[a]	KX851701[a]	KX851749[a]	–	KX851776[a]	KX851576[a]	KX851727[a]	Present study
Polyporus cuticulatus	Cui 8637	KX851614[a]	KX851668[a]	KX851702[a]	KX851750[a]	KX851760[a]	KX851777[a]	–	KX851728[a]	Present study
Polyporus hapalopus	Yuan 5809	KC297219	KC297220	KU189954	–	–	KU189918	–	–	Zhou et al. (2016)
Polyporus hemicapnodes	Dai 13403	KX851627[a]	KX851681[a]	KX851709[a]	–	KX851764[a]	KX851784[a]	KX851579[a]	–	Present study
Polyporus hemicapnodes	Cui 11259	KX851625[a]	KX851679[a]	KX851707[a]	–	KX851763[a]	KX851782[a]	KX851580[a]	–	Present study
Polyporus mangshanensis	Dai 15151	KX851796[a]	KX851797[a]	KX851798[a]	KX851800[a]	KX851801[a]	KX851802[a]	KX851795[a]	–	Present study
Polyporus squamosus	Cui 10595	KU189778	KU189809	KU189960	KU189892	KU189988	KU189925	KU189868	KU189840	Zhou et al. (2016)
Polyporus squamosus	Cui 10394	KX851635[a]	KX851688[a]	KX851714[a]	KX851754[a]	KX851766[a]	KX851789[a]	KX851582[a]	KX851739[a]	Present study
Polyporus subvarius	Yu 2	AB587632	AB587621	KU189959	–	–	KU189924	–	–	Zhou et al. (2016)
Polyporus tuberaster	Dai 11271	KU189769	KU189800	KU189950	–	KU189983	KU189914	–	KU189829	Zhou et al. (2016)
Polyporus tuberaster	Dai 12462	KU507580	KU507582	KU507584	–	–	KU507590	KU507588	KU507586	Zhou et al. (2016)
Polyporus umbellatus	Pen 13513	KU189772	KU189803	KU189953	KU189887	KU189985	KU189917	KU189862	–	Zhou et al. (2016)
Polyporus varius	Dai 13874	KU189777	KU189808	KU189958	KU189891	KU189987	KU189923	KU189867	KU189838	Zhou et al. (2016)
Polyporus varius	Cui 12249	KU507581	KU507583	KU507585	KU507589	KU507592	KU507591	–	KU507587	Zhou et al. (2016)
Pseudofavolus cucullatus	Dai 11682	KX880624[a]	–	KX880707[a]	–	–	–	–	–	Present study
Pseudofavolus cucullatus	Dai 13893	KX880625[a]	KX880663[a]	KX880708[a]	–	–	–	KX880781[a]	–	Present study
Pseudofavolus cucullatus	Cui 8707	KX880623[a]	KX880662[a]	KX880706[a]	–	–	KX880881[a]	–	–	Present study
Pseudofavolus cucullatus	Dai 13894	KX880626[a]	KX880664[a]	KX880709[a]	–	–	KX880882[a]	–	–	Present study
Pyrofomes castanopsidis	Cui 8921	–	KX880669[a]	KX880713[a]	–	–	–	–	–	Present study
Pyrofomes castanopsidis	Dai 10700	–	–	KF218337[a]	–	–	–	–	–	Present study
Sparsitubus nelumbiformis	Dai 9244	KX880633[a]	KX880672[a]	KX880716[a]	–	–	–	–	–	Present study
Sparsitubus nelumbiformis	Cui 8497	KX880631[a]	KX880670[a]	KX880714[a]	–	KX880856[a]	KX880887[a]	KX880786[a]	MG847267[a]	Present study
Sparsitubus nelumbiformis	Cui 6590	KX880632[a]	KX880671[a]	KX880715[a]	KX880819[a]	–	KX880888[a]	–	MG847268[a]	Present study
Theleporus membranaceus	Cui 6348	JN411119	KX880674[a]	KX880717[a]	–	–	KX880890[a]	KX880788[a]	–	Zhou and Dai (2012)
Theleporus membranaceus	Dai 12075	JN411120	KX880673[a]	–	KX880820[a]	–	KX880889[a]	KX880787[a]	MG847269	Zhou and Dai (2012)
Theleporus minisporus	Dai 12011	JN411121	KX880675[a]	–	KX880821[a]	–	KX880891[a]	KX880789[a]	–	Zhou and Dai (2012)
Trametes acuta	Dai 13595	KX900644[a]	KX900691[a]	KX900739[a]	KX900784[a]	KX900800[a]	KX900828[a]	–	–	Present study
Trametes acuta	Dai 11621	KC848333[a]	KC848417[a]	–	–	–	–	–	–	Present study
Trametes acuta	Cui 10091	KX900642[a]	KX900689[a]	–	–	–	KX900826[a]	–	–	Present study
Trametes acuta	Dai 13103	KX900643[a]	KX900690[a]	KX900738[a]	KX900783[a]	KX900799[a]	KX900827[a]	KX900860[a]	–	Present study

Table 1 (continued)

Species	Sample no.	GenBank accessions								References
		ITS	NLSU	MtSSU	RPB1	RPB2	TEF1	TBB1	NSSU	
Trametes betulina	Cui 7095	JX290075[a]	JX290072[a]	KX900740[a]	–	MG867678[a]	KX900829[a]	–	MG847248[a]	Present study
Trametes betulina	Dai 11814	KC848303[a]	KC848388[a]	KX900741[a]	–	MG867679[a]	KX900830[a]	–	MG847249[a]	Present study
Trametes cinnabarina	Dai 14386	KX880629[a]	KX880667[a]	KX880712[a]	KX880818[a]	KX880854[a]	KX880885[a]	KX880784[a]	MG847264[a]	Present study
Trametes cinnabarina	Dai 14867	KX880630[a]	KX880668[a]	–		KX880855[a]	KX880886[a]	KX880785[a]	–	Present study
Trametes coccinea	Cui 7096	KC848330[a]	KC848414[a]	KX880718[a]	KX880822[a]	KX880857[a]	KX880892[a]	KX880790[a]	–	Present study
Trametes conchifer	Dai 8367	KC848276[a]	KC848361[a]	KX880720[a]	–	–	–	–	–	Present study
Trametes conchifer	Dai 8359	KC848278[a]	KC848363[a]	KX880723[a]	–	–	–	–	–	Present study
Trametes conchifer	Dai 3670	KX880634[a]	KX880676[a]	KX880719[a]	KX880823[a]	–	KX880893[a]	KX880791[a]	–	Present study
Trametes cystidiolophora	Cui 8087	KX880635[a]	KX880677[a]	KX880721[a]	–	KX880858[a]	KX880894[a]	KX880792[a]	–	Present study
Trametes cystidiolophora	Cui 8084	KX880636[a]	KX880678[a]	KX880722[a]	–	KX880859[a]	KX880895[a]	KX880793[a]	–	Present study
Trametes duplexa	Dai 12039	KC848262[a]	KC848348[a]	–	–	–	KX880924[a]	–	–	Present study
Trametes duplexa	Dai 9343	KC848261[a]	KC848347[a]	–	–	–	–	–	–	Present study
Trametes ectypa	Cui 2580	KX880637[a]	KX880935[a]	KX880724[a]	–	–	–	–	–	Present study
Trametes elegans	Dai 9546	KC848265[a]	KC848350[a]	KX880725[a]	KX880824[a]	KX880860[a]	KX880927[a]	KX880794[a]	–	Present study
Trametes elegans	Dai 11307	KC848264[a]	KC848349[a]	KX880726[a]	KX880825[a]	KX880861[a]	KX880896[a]	KX880795[a]	–	Present study
Trametes ellipsoidea	Yuan 3453	KC848259[a]	KC848345[a]	KX880771[a]	–	–	–	–	–	Present study
Trametes ellipsoidea	Yuan 3451	KC848257[a]	KC848344[a]	KX880770[a]	–	–	–	–	–	Present study
Trametes ellipsospora	Cui 6259	KC848248[a]	KC848335[a]	KX880727[a]	KX880828[a]	–	KX880897[a]	–	–	Present study
Trametes gibbosa	Cui 7390	KC848302[a]	KC848387[a]	KX880728[a]	–	–	KX880898[a]	–	–	Present study
Trametes gibbosa	Dai 11817	KX880638[a]	KX880679[a]	KX880729[a]	KX880826[a]	KX880862[a]	KX880899[a]	–	–	Present study
Trametes gibbosa	Cui 7451	KX880639[a]	KX880680[a]	KX880730[a]	KX880827[a]	–	KX880900[a]	–	–	Present study
Trametes hirsuta	Cui 7720	KX880640[a]	KX880681[a]	KX880733[a]	–	–	KX880901[a]	–	–	Present study
Trametes hirsuta	Cui 7784	KC848297[a]	KC848382[a]	KX880731[a]	–	–	–	–	–	Present study
Trametes hirsuta	Cui 7462	KC848299[a]	KC848384[a]	KX880732[a]	–	KX880863[a]	KX880928[a]	KX880796[a]	–	Present study
Trametes lactinea	Dai 6865	KC848327[a]	KC848411[a]	–	–	–	–	–	–	Present study
Trametes lactinea	Yuan 5493	KC848320[a]	KC848404[a]	KX880734[a]	–	–	KX880902[a]	KX880797[a]	–	Present study
Trametes ljubarskyi	Wei 1653	KC848332[a]	KC848416[a]	–	–	–	–	–	–	Present study
Trametes ljubarskyi	Li 286	KC848331[a]	KC848415[a]	–	–	–	–	–	–	Present study
Trametes manilaensis	Cui 6240	KC848321[a]	KC848405[a]	KX880735[a]	KX880829[a]	KX880864[a]	KX880903[a]	KX880798[a]	–	Present study
Trametes maxima	Dai 12274	KC848310[a]	KC848394[a]	KX880736[a]	–	–	–	–	–	Present study
Trametes maxima	Dai 12298	KC848307[a]	KX880682[a]	KX880737[a]	KX880830[a]	–	–	–	–	Present study
Trametes menziesii	Zhou 72	KC848328[a]	KC848412[a]	KX880738[a]	–	–	–	–	–	Present study
Trametes menziesii	Yuan 3555	KC848326[a]	KC848410[a]	–	–	–	–	–	–	Present study
Trametes menziesii	Dai 6782	KC848289[a]	KC848374[a]	–	–	–	–	–	–	Present study
Trametes menziesii	Cui 7613	KX880641[a]	KX880683[a]	–	–	–	–	–	–	Present study
Trametes mimetes	Dai 10608	KX880642[a]	KX880684[a]	KX880739[a]	–	–	KX880904[a]	–	–	Present study
Trametes ochracea	Cui 9337	KC848270[a]	KC848355[a]	KX880740[a]	–	–	KX880905[a]	–	–	Present study
Trametes ochracea	Dai 2005	KC848272[a]	KC848357[a]	KX880741[a]	–	–	KX880906[a]	–	–	Present study

Table 1 (continued)

Species	Sample no.	GenBank accessions								References
		ITS	NLSU	MtSSU	RPB1	RPB2	TEF1	TBB1	NSSU	
Trametes ochracea	Yuan 2477	KC848271[a]	KC848356[a]	KX880742[a]	–	–	–	–	–	Present study
Trametes orientalis	Cui 6300	KC848317[a]	KC848401[a]	KX880743[a]	KX880831[a]	–	KX880907[a]	KX880799[a]	–	Present study
Trametes orientalis	Cui 6320	KX880643[a]	KX880685[a]	KX880744[a]	KX880832[a]	–	KX880908[a]	KX880800[a]	–	Present study
Trametes orientalis	Dai 14894	KX880644[a]	KX880686[a]	KX880745[a]	KX880833[a]	–	KX880929[a]	KX880801[a]	–	Present study
Trametes orientalis	Dai 15097	KX880645[a]	KX880687[a]	KX880746[a]	KX880834[a]	–	KX880909[a]	KX880802[a]	–	Present study
Trametes pocas	Dai 11577	KC848253[a]	KC848340[a]	–	–	–	–	–	–	Present study
Trametes polyzona	Dai 12395	KX880646[a]	KX880688[a]	KX880747[a]	KX880835[a]	–	KX880910[a]	KX880803[a]	–	Present study
Trametes polyzona	Cui 11040	KX880647[a]	KX880689[a]	KX880748[a]	KX880836[a]	–	KX880930[a]	–	–	Present study
Trametes polyzona	Dai 10816	KX900665[a]	KX900715[a]	KX900768[a]	KX900792[a]	–	KX900849[a]	–	–	Present study
Trametes polyzona	Dai 10980	KX900666[a]	KX900716[a]	KX900769[a]	KX900793[a]	KX900816[a]	–	–	–	Present study
Trametes polyzona	Cui 11035	KX900667[a]	KX900717[a]	KX900770[a]	KX900794[a]	–	KX900850[a]	–	–	Present study
Trametes pubescens	Cui 5904	KC848291[a]	KC848376[a]	KX880749[a]	KX880837[a]	–	KX880931[a]	–	–	Present study
Trametes pubescens	Cui 7569	KC848292[a]	KC848377[a]	KX880750[a]	KX880838[a]	–	KX880932[a]	–	–	Present study
Trametes sanguinea	Cui 6980	KX880627[a]	KX880665[a]	KX880710[a]	KX880816[a]	MG867688[a]	KX880883[a]	KX880782[a]	MG847265[a]	Present study
Trametes sanguinea	Cui 7091	KX880628[a]	KX880666[a]	KX880711[a]	KX880817[a]	MG867689[a]	KX880884[a]	KX880783[a]	MG847266[a]	Present study
Trametes stipitata	Yuan 3273	KC848275[a]	KC848360[a]	KX880767[a]	–	–	KX880923[a]	–	–	Present study
Trametes suaveolens	Cui 10697	KC848280[a]	KC848365[a]	KX880751[a]	KX880839[a]	KX880866[a]	KX880933[a]	–	–	Present study
Trametes suaveolens	Cui 10701	KC848282[a]	KC848367[a]	KX880752[a]	KX880840[a]	KX880867[a]	KX880911[a]	–	–	Present study
Trametes subsuaveolens	Cui 269	KX880648[a]	KX880690[a]	KX880753[a]	–	–	KX880912[a]	KX880804[a]	–	Present study
Trametes tephroleuca	Cui 7977	KC848296[a]	KC848381[a]	KX880754[a]	KX880841[a]	KX880868[a]	KX880913[a]	KX880805[a]	–	Present study
Trametes tephroleuca	Cui 7987	KC848293[a]	KC848378[a]	KX880755[a]	KX880842[a]	KX880869[a]	KX880934[a]	KX880806[a]	–	Present study
Trametes thujae	Dai 4953	KC848288[a]	KC848373[a]	KX880756[a]	–	–	–	–	–	Present study
Trametes thujae	Cui 10699	KC848287[a]	KC848372[a]	KX880757[a]	–	–	KX880914[a]	–	–	Present study
Trametes thujae	Cui 10704	KX880649[a]	KX880691[a]	KX880758[a]	KX880843[a]	–	KX880915[a]	–	–	Present study
Trametes velutina	Dai 14236	KX880650[a]	KX880692[a]	KX880759[a]	KX880844[a]	KX880870[a]	KX880916[a]	KX880807[a]	–	Present study
Trametes velutina	Dai 14636	KX880651[a]	KX880693[a]	KX880760[a]	KX880845[a]	–	KX880917[a]	KX880808[a]	–	Present study
Trametes versicolor	Cui 9306	KC848267[a]	KC848352[a]	KX880761[a]	–	–	KX880918[a]	–	–	Present study
Trametes versicolor	Cui 9310	KC848266[a]	KC848351[a]	KX880762[a]	KX880846[a]	–	KX880919[a]	–	–	Present study
Trametes vespacea	Cui 7622	KC848251[a]	KC848338[a]	–	–	–	–	–	–	Present study
Trametes vespacea	Cui 8758	KC848252[a]	KC848339[a]	–	–	–	–	–	–	Present study
Trametes vespacea	Dai 13613	KX900645[a]	KX900692[a]	KX900742[a]	KX900786[a]	KX900801[a]	KX900831[a]	–	–	Present study
Trametes vespacea	Dai 13387	KX900646[a]	KX900693[a]	KX900743[a]	KX900787[a]	KX900802[a]	KX900832[a]	–	–	Present study
Truncospora macrospora	Cui 8106	JX941573	JX941596	KX880763[a]	–	KX880871[a]	KX880920[a]	KX880809[a]	–	Zhao and Cui (2013a)
Truncospora macrospora	Yuan 3777	JX941574	JX941597	–	–	–	–	–	–	Zhao and Cui (2013a)
Truncospora ochroleuca	Cui 5673	JX941585	JX941603	KF218308	–	–	KF286314	KF482800[a]	–	Zhao et al. (2014a)
Truncospora ochroleuca	Cui 5671	JX941584	JX941602	KF218309	–	–	KF286315	KF482801[a]	–	Zhao et al. (2014a)
Truncospora oranta	Cui 5714	HQ654103	HQ654116	KF051056	–	–	KF181150	KF482831[a]	–	Zhao et al. (2014a)
Vanderbylia delavayi	Dai 6891	JQ861738	KF495019	KF218287	–	–	KF286293	KF482779[a]	–	Zhao et al. (2014a)

Table 1 (continued)

Species	Sample no.	GenBank accessions								References
		ITS	NLSU	MtSSU	RPB1	RPB2	TEF1	TBB1	NSSU	
Vanderbylia delavayi	Dai 7182	KX880652[a]	KX880694[a]	KX880764[a]	KX880847[a]	KX880872[a]	KX880921[a]	–	–	Present study
Vanderbylia fraxinea	Cui 8885	HQ876611	JF706344	KF218289[a]	–	–	KF286295[a]	KF482781[a]	–	Zhao and Cui (2013c)
Vanderbylia fraxinea	Cui 8871	JF706329	JF706345	KF051050	–	MG867690[a]	KF181144	KF482844[a]	MG847270[a]	Zhao et al. (2014a)
Vanderbylia robiniophila	Cui 5644	HQ876609	JF706342	KF051051	–	MG867691[a]	KF181145	KF482845[a]	–	Zhao and Cui (2013c)
Vanderbylia robiniophila	Cui 7144	HQ876608	JF706341	KF051052	–	–	KF181146	KF482846[a]	–	Zhao et al. (2014a)
Whitfordia scopulosa	Cui 6209	KC867363[a]	KC867483[a]	KX880765[a]	–	–	–	–	MG847271[a]	Present study
Whitfordia scopulosa	Dai 10739	KC867364[a]	KC867482[a]	KX880766[a]	MG867675[a]	MG867692[a]	KX880922[a]	KX880810[a]	MG847272[a]	Present study
Yuchengia narymica	Dai 7050	JN048776	JN048795	KF051053	–	–	KF181147	KF482836[a]	–	Zhao et al. (2013b)
Yuchengia narymica	Dai 10510	HQ654101	JF706346	KF051054	–	–	KF181148	KF482833[a]	–	Zhao et al. (2013b)

which 4345 are constant, 342 are variable and parsimony-uninformative, and 2811 are parsimony-informative. MP analysis yielded 13 equally parsimonious trees (TL = 20,463, CI = 0.276, RI = 0.682, RC = 0.188, HI = 0.724). The best model for the combined dataset estimated and applied in the BI analysis was GTR+I+G. BI and ML analyses generated similar topologies as MP analysis, with an average standard deviation of split frequencies = 0.008678 (BI). The trees obtained from the BI analysis with the MP, ML and BPP values are showed in Fig. 1.

Taxonomy

Polyporaceae Fr. ex Corda, *Icon. fung.* (Prague) 3: 49 (1839).

MycoBank: MB 81203

Type genus: *Polyporus* P. Micheli ex Adans.

Basidiocarps annual to perennial, stipitate, pileate, resupinate or effused-reflexed, mostly corky, sometimes fragile to woody hard. Hymenophores mostly poroid, occasionally lamellate. Hyphal system dimitic to trimitic; generative hyphae mostly bearing clamp connections, rarely with simple-septa. Basidiospores cylindrical to broadly ellipsoid or subglobose, hyaline to yellowish brown, thin- to thick-walled, mostly smooth, occasionally echinulate, with variable reactions in Melzer's reagent and Cotton Blue. Causing a white rot.

Key to genera of Polyporaceae in China

1 Basidiospores ornamented……2
1 Basidiospores smooth……..…3
2 Tubes continuous; basidiospores hyaline……*Haploporus*
2 Tubes individual, separated from each other; basidiospores yellowish……..…*Sparsitubus*
3 Basidiospores thick-walled……..…4
3 Basidiospores thin-walled……..…16
4 Basidiocarps stipitate……5
4 Basidiocarps resupinate to pileate……..…7
5 Cystidia present……...*Murinicarpus*
5 Cystidia absent……..……6
6 Basidiocarps cream to straw-colored; basidiospores hyaline……...……..…*Microporellus*
6 Basidiocarps reddish; basidiospores yellowish…… ……...……*Flammeopellis*
7 Basidiospores pale yellowish to yellowish brown……8
7 Basidiocarps hyaline……..…9
8 Basidiocarps usually pinkish to violet; basidiospores pale yellowish, non-truncate……..…*Abundisporus*
8 Basidiocarps usually yellowish to reddish brown; basidiospores yellowish brown, truncate……..…*Pyrofomes*
9 Skeletal hyphae amyloid ……..……10
9 Skeletal hyphae non-amyloid……..…11
10 Basidiospores truncate, amyloid…...……*Amylosporia*

Table 2 A list of species, specimens, and GenBank accession number of sequences used for phylogenetic analyses in this study

Species	Sample no.	GenBank accessions								References
		ITS	NLSU	MtSSU	RPB1	RPB2	TEF1	TBB1	NSSU	
Abundisporus fuscopurpureus	Cui 10950	KC456254	KC456256	KF051025	–	–	KF181154	–	–	Zhao et al. (2015)
Abundisporus fuscopurpureus	Cui 10969	KC456255	KC456257	KF051026	–	–	KF181155	–	MG847239	Zhao et al. (2015)
Amylosporia hattorii	Dai 10315	JQ861740[a]	JQ861756[a]	KF218290[a]	–	–	–	–	–	Present study
Amylosporia hattorii	Dai 10318	JQ861741[a]	JQ861757[a]	KF218291[a]	–	–	–	–	–	Present study
Coriolopsis strumosa	Dai 10642	JX559278	JX559303	KX838379[a]	KX885080[a]	JX559312	KX838416[a]	KX838443[a]	–	Li et al. (2014b)
Coriolopsis strumosa	Dai 10657	KC867371	KC867491	KX838380[a]	KX885081[a]	KF274650	KX838417[a]	KX838444[a]	–	Li et al. (2014b)
Cryptoporus volvatus	Cui 16468	MG847207[a]	MG847216[a]	MG847225[a]	–	MG867676[a]	MG867694[a]	–	MG847240[a]	Present study
Daedaleopsis confragosa	Cui 6892	KU892428	KU892448	KX838381[a]	KU892481	KU892507	KX838418[a]	–	–	Li et al. (2016a)
Daedaleopsis confragosa	Cui 9756	KU892438	KU892451	–	KU892483	KU892508	–	–	–	Present study
Daedaleopsis purpurea	Dai 8060	KU892442	KU892475	KX838409[a]	KX838475	KU892498	KX838438[a]	–	–	Li et al. (2016a)
Daedaleopsis tricolor	Dai 8349	KU892432	KU892470	KX838385[a]	KU892490	KU892501	KX838422[a]	KX838448[a]	–	Li et al. (2016a)
Daedaleopsis tricolor	Cui 8301	KU892426[a]	KU892468[a]	KX838386[a]	KU892487[a]	KU892513[a]	KX838423[a]	KX838449[a]	–	Present study
Datronia mollis	Dai 11456	JX559253	JX559292	KX838388[a]	–	JX559307	KX838424[a]	KX838450[a]	–	Li et al. (2014a)
Datronia mollis	Dai 11253	JX559258	JX559289	KX838387[a]	KX885079[a]	JX559306	–	–	–	Li et al. (2014a)
Datroniella scutellata	Cui 7265	JX559263	JX559300	KX838389[a]	KX838463[a]	–	KX838426[a]	KX838451[a]	–	Li et al. (2014a)
Datroniella subtropica	Dai 12883	KC415184	KC415191	KX838390[a]	KX838464[a]	KC415198	KX838427[a]	–	–	Li et al. (2014a)
Datroniella subtropica	Dai 12885	KC415185	KC415192	KX838391[a]	KX838465[a]	KC415199	KX838428[a]	–	–	Li et al. (2014a)
Dichomitus squalens	Cui 9725	JQ780408	JQ780427	KX838403[a]	KX838470[a]	–	KX838435[a]	KX838457[a]	MG847241[a]	Zhao et al. (2016)
Dichomitus squalens	Cui 9639	JQ780407	JQ780426	KX838404[a]	KX838471[a]	KX838478[a]	KX838436[a]	KX838458[a]	–	Zhao et al. (2016)
Earliella scabrosa	He 31	KC867365[a]	KC867484[a]	KX838397[a]	KX885077[a]	KX885085[a]	KX838430[a]	KX838452[a]	–	Present study
Earliella scabrosa	Cui 6236	KC867366[a]	KC867485[a]	KX838398[a]	–	KX885087[a]	KX838431[a]	KX838453[a]	–	Present study
Echinochaete russiceps	Dai 13868	KX832051[a]	KX832060[a]	KX838406[a]	KX838473[a]	KX838479[a]	KX838437[a]	–	–	Present study
Echinochaete russiceps	Dai 13866	KX832050[a]	KX832059[a]	KX838405[a]	KX838472[a]	–	–	–	–	Present study
Favolus acervatus	Cui 11053	KU189774	KU189805	KU189956	KU189889	KU189994	KU189920	KU189864	–	Zhou and Cui (2017)
Favolus acervatus	Dai 10749b	KX548953	KX548979	KX549018	KX549065	KX549073	KX549043	KX549033	–	Zhou and Cui (2017)
Flammeopellis bambusicola	Dai 13443	KF698748	KF698759	KF725877	–	–	KF725879	–	–	Zhao et al. (2014a)
Flammeopellis bambusicola	Dai 13506	KF698749	KF698760	KF725878	–	KX838477[a]	KF725880	–	–	Zhao et al. (2014a)
Fomes fomentarius	Cui 5769	KX885072[a]	KX832056[a]	–	–	–	–	–	–	Present study
Fomes fomentarius	Cui 8020	JX290073	JX290070	–	–	–	–	–	–	Li et al. (2014b)
Funalia subgallica	Cui 6317	KC867384	KC867460	MG847226[a]	MG867665[a]	KU182650[a]	MG867695[a]	MG867709[a]	MG847242[a]	Li et al. (2016b)
Funalia subgallica	Dai 10741	KC867385	KC867461	MG847227[a]	MG867666[a]	KU182647	MG867696[a]	–	MG847243[a]	Li et al. (2016b)
Funalia trogii	Dai 11246	KC867380	KC867451	KX838400[a]	KX838468[a]	KU182653	KX838432[a]	–	–	Li et al. (2016b)
Grammothelopsis subtropica	Cui 9035	JQ845094	JQ845097	KF051030	–	–	KF181124	–	–	Zhao et al. (2015)

Table 2 (continued)

Species	Sample no.	GenBank accessions								References
		ITS	NLSU	MtSSU	RPB1	RPB2	TEF1	TBB1	NSSU	
Grammothelopsis subtropica	Cui 9041	JQ845096	JQ845099	KF051039	–	–	KF181133	–	–	Zhao et al. (2015)
Grammothele lineata	Cui 6539	KX832049[a]	KX832058[a]	KX838402[a]	KX838469[a]	–	KX838434[a]	KX838456[a]	–	Present study
Grammothele lineata	Cui 6533	KX832048[a]	KX832057[a]	KX838401[a]	–	–	KX838433[a]	KX838455[a]	–	Present study
Haploporus odorus	Dai 11296	KU941845	KU941869	KU941894	–	KU941916	KU941932	–	–	Shen et al. (2016)
Haploporus odorus	Yuan 2365	KU941846	KU941870	KU941895		KU941917	KU941933	–	–	Shen et al. (2016)
Haploporus subpapyraceus	Dai 13580	KU941841	KU941865	KU941890	–	KU941912	KU941928	–	–	Shen et al. (2016)
Haploporus subpapyraceus	Cui 2651	KU941842	KU941866	KU941891	–	KU941913	KU941929	–	–	Shen et al. (2016)
Haploporus thindii	Cui 9373	KU941851	KU941875	KU941900	–	KU941922	KU941938	–	–	Shen et al. (2016)
Haploporus thindii	Cui 9682	KU941852	KU941876	KU941901	–	KU941923	KU941939	–	–	Shen et al. (2016)
Hexagonia apiaria	Cui 6447	KC867362	KC867481	MG847228[a]	MG867667[a]	KF274660	MG867697[a]	–	MG847244[a]	Li et al. (2014b)
Hexagonia apiaria	Dai 10784	KX900635[a]	KX900682[a]	KX900732[a]	MG867668[a]	MG867677[a]	KX900822[a]	–	MG847245[a]	Present study
Hexagonia glabra	Dai 12993	KX900637[a]	KX900683[a]	KX900733[a]	–	KX900797[a]	KX900823[a]	KX900857[a]	MG847246[a]	Present study
Hexagonia glabra	Cui 11367	KX900638[a]	KX900684[a]	KX900734[a]	MG867669[a]	KX900798[a]	KX900824[a]	KX900858[a]	MG847247[a]	Present study
Hexagonia hirta	Dai 5081	–	KC867486[a]	–	–	–	–	–	–	Present study
Hexagonia hirta	Cui 4051	KC867359[a]	KC867471[a]	–	–	–	–	–	–	Present study
Hornodermoporus latissimus	Cui 6625	HQ876604	JF706340	KF051040	–	–	KF181134	KF482834[a]	–	Zhao et al. (2014a)
Hornodermoporus latissimus	Dai 12054	KX900639[a]	KX900686[a]	KF218297[a]	–	–	KF286303[a]	KF482789[a]	–	Present study
Hornodermoporus martius	Cui 7992	HQ876603	HQ654114	KF051041	–	–	KF181135	KF482835[a]	–	Zhao et al. (2014a)
Hornodermoporus martius	Cui 4082	KX900640[a]	KX900687[a]	KX900736[a]	–	–	–	–	–	Present study
Lignosus hainanensis	Dai 10670	GU580883	GU580885	–	–	–	–	–	–	Cui et al. (2011a)
Megasporia guangdongensis	Cui 9130	JQ314373	JQ780428	KX900747[a]	–	–	MG867698[a]	–	MG847250[a]	Li and Cui (2013a)
Megasporia guangdongensis	Cui 13986	MG847208[a]	MG847217[a]	MG847229[a]	–	MG867680[a]	MG867699[a]	–	MG847251[a]	Present study
Megasporia hengduanensis	Cui 8076	JQ780392	JQ780433	KX900748[a]	–	KX900805[a]	KF286337[a]	KF482823[a]	MG847252[a]	Li and Cui (2013a)
Megasporia hengduanensis	Cui 8176	JQ314370	KX900698[a]	KX900749[a]	–	KX900806[a]	MG867700[a]	–	MG847253[a]	Li and Cui (2013a)
Megasporia hexagonoides	Cui 10896	KX900651[a]	KX900700[a]	KX900751[a]	–	–	KX900836[a]	–	MG847254[a]	Present study
Megasporia hexagonoides	Cui 13855	MG847209[a]	MG847218[a]	MG847230[a]	–	MG867681[a]	MG867701[a]	–	MG847255[a]	Present study
Megasporia violacea	Cui 13838	MG847210[a]	MG847219[a]	MG847231[a]	–	MG867682[a]	MG867702[a]	–	MG847256[a]	Present study
Megasporia violacea	Cui 13845	MG847211[a]	MG847220[a]	MG847232[a]	–	MG867683[a]	MG867703[a]	–	MG847257[a]	Present study
Megasporoporia bannaensis	Cui 13967	MG847212[a]	MG847221[a]	MG847233[a]	MG867672[a]	MG867684[a]	MG867704[a]	MG867710[a]	MG847258[a]	Present study
Megasporoporia bannaensis	Dai 13596	KX900653[a]	KX900702[a]	KX900754[a]	–	KX900808[a]	KX900838[a]	–	–	Present study
Megasporoporia minor	Dai 12170	JQ314363	JQ314380	–	–	–	KF286336[a]	KF482822[a]	–	Li and Cui (2013a)
Megasporoporiella pseudocavernulosa	Cui 10261	KX900656[a]	KX900705[a]	KX900757[a]	–	–	KX900840[a]	–	–	Present study

Table 2 (continued)

Species	Sample no.	GenBank accessions								References
		ITS	NLSU	MtSSU	RPB1	RPB2	TEF1	TBB1	NSSU	
Megasporoporiella pseudocavernulosa	Cui 11106	KX900657[a]	KX900706[a]	KX900758[a]	–	–	–	–	–	Present study
Megasporoporiella rhododendri	Dai 4235a	JQ314355	KX900707[a]	KX900759[a]	–	KX900810[a]	KX900841[a]	–	–	Li and Cui (2013a)
Megasporoporiella rhododendri	Cui 10725	KX900658[a]	KX900708[a]	KX900760[a]	–	KX900811[a]	KX900842[a]	–	–	Present study
Megasporoporiella subcavernulosa	Cui 14247	MG847213[a]	MG847222[a]	MG847234[a]	MG867673[a]	MG867685[a]	MG867705[a]	–	MG847259[a]	Present study
Megasporoporiella subcavernulosa	Cui 9252	JQ780378	JQ780416	MG847235[a]	MG867674[a]	MG867686[a]	MG867706[a]	–	MG847260[a]	Li and Cui (2013a)
Melanoderma microcarpum	Cui 10967	KX900661[a]	KX900711[a]	KX900763[a]	–	KX900813[a]	–	–	–	Present study
Melanoderma microcarpum	Dai 8116	KF495002[a]	KF495012[a]	KF494986[a]	–	–	KF482759[a]	–	–	Present study
Microporellus obovatus	Dai 10937	KX880613[a]	KX880653[a]	KX880695[a]	–	–	KX880873[a]	KX880772[a]	–	Present study
Microporus affinis	Cui 7714	JX569739	JX569746	KX880696[a]	–	KF274661	–	–	–	Li et al. (2014b)
Microporus affinis	Cui 8188	KX880614[a]	KX880654[a]	KX880697[a]	–	–	KX880874[a]	KX880773[a]	–	Present study
Microporus subaffinis	Dai 11712	KX880616[a]	KX880656[a]	KX880699[a]	–	–	KX880876[a]	KX880775[a]	–	Present study
Microporus subaffinis	Dai 10708	KX880617[a]	KX880657[a]	KX880700[a]	–	KX880848[a]	KX880925[a]	KX880776[a]	–	Present study
Microporus xanthopus	Cui 8284	JX290074	JX290071	KX880703[a]	–	JX559313	KX880878[a]	KX880778[a]	–	Li et al. (2014b)
Microporus xanthopus	Dai 12076	KX880620[a]	KX880659[a]	KX880704[a]	–	KX880849[a]	–	KX880779[a]	–	Present study
Murinicarpus subadustus	Dai 10661	HQ876606	–	–	–	–	–	–	–	Zhao and Cui (2013c)
Murinicarpus subadustus	Dai 13895	KX880621[a]	KX880660[a]	–	–	–	KX880879[a]	KX880780[a]	–	Present study
Neodatronia gaoligongensis	Cui 8055	JX559269	JX559286	MG847236[a]	–	JX559317	KX900846[a]	–	MG847261[a]	Li et al. (2014a)
Neodatronia gaoligongensis	Cui 8186	JX559268	JX559285	MG847237[a]	–	JX559318	–	–	MG847262[a]	Li et al. (2014a)
Neodatronia sinensis	Dai 11921	JX559272	JX559283	–	–	JX559320	–	–	–	Li et al. (2014a)
Neodatronia sinensis	Cui 9949	KX900663[a]	KX900713[a]	KX900765[a]	–	–	KX900847[a]	–	–	Present study
Neofavolus alveolaris	Dai 11290	KU189768	KU189799	KU189949	KU189885	KU189982	KU189913	KU189859	–	Zhou and Cui (2017)
Neofavolus alveolaris	Cui 9900	KX548974	KX548996	KX549030	KX549072	KX549078	KX549060	KX549040	–	Zhou and Cui (2017)
Neofavolus mikawai	Cui 11152	KU189773	KU189804	KU189955	KU189888	KU189986	KU189919	KU189863	KU189834	Zhou and Cui (2017)
Neofavolus mikawai	Dai 12361	KX548975	KX548997	KX549031	–	KX549079	KX549061	KX549041	KX549015	Zhou and Cui (2017)
Neofomitella polyzonata	Dai 10419	JX569738	JX569745	–	–	KF274663	–	–	–	Li et al. (2014b)
Neofomitella polyzonata	Dai 10420	JX569736	JX569743	–	–	–	–	–	–	Li et al. (2014b)
Perenniporia medulla-panis	Cui 3274	JN112792	JN112793	KF051043	–	–	KF181137	KF482837[a]	–	Zhao et al. (2014a)
Perenniporia medulla-panis	Cui 14515	MG847214[a]	MG847223[a]	–	–	MG867687[a]	MG867707[a]	MG867711[a]	MG847263[a]	Present study
Perenniporia substraminea	Cui 10177	JQ001852	JQ001844	KF051046	–	–	KF181140	KF482840[a]	–	Zhao et al. (2014a)
Perenniporia substraminea	Cui 10191	JQ001853	JQ001845	KF051047	–	–	KF181141	KF482841[a]	–	Zhao et al. (2014a)

Table 2 (continued)

Species	Sample no.	GenBank accessions								References
		ITS	NLSU	MtSSU	RPB1	RPB2	TEF1	TBB1	NSSU	
Picipes badius	Cui 10501	KC572015	KC572053	KU189962	–	KU189989	KU189927	KU189869	–	Zhou et al. (2016)
Picipes badius	Cui 11136	KU189781	KU189812	KU189964	KU189895	KU189990	KU189930	KU189872	–	Zhou et al. (2016)
Picipes conifericola	Cui 9950	KU189783	KU189814	KU189968	KU189897	KU189993	KU189934	KU189875	KU189848	Zhou et al. (2016)
Picipes conifericola	Dai 11114	JX473244	KC572061	KU189969	–	–	KU189935	–	KU189849	Zhou et al. (2016)
Picipes tibeticus	Cui 12215	KU189755	KU189787	KU189940	KU189879	KU189975	KU189902	KU189853	KU189818	Zhou et al. (2016)
Picipes tibeticus	Cui 12225	KU189756	KU189788	KU189941	KU189880	–	KU189903	–	KU189819	Zhou et al. (2016)
Polyporus arcularius	Cui 10998	KX548973	KX548995	KX549029	KX549071	KX549077	KX549059	–	KX549013	Zhou and Cui (2017)
Polyporus arcularius	Cui 11398	KU189766	KU189797	KU189947	KU189884	KU189980	KU189911	–	KU189826	Zhou et al. (2016)
Polyporus brumalis	Cui 7188	KX851591[a]	KX851646[a]	–	KX851747[a]	KX851758[a]	KX851771[a]	KX851575[a]	KX851723[a]	Present study
Polyporus brumalis	Cui 10750	KU189765	KU189796	–	KU189883	KU189979	KU189910	KU189857	KU189825	Zhou et al. (2016)
Polyporus cuticulatus	Dai 13141	KX851613[a]	KX851667[a]	KX851701[a]	KX851749[a]	–	KX851776[a]	KX851576[a]	KX851727[a]	Present study
Polyporus cuticulatus	Cui 8637	KX851614[a]	KX851668[a]	KX851702[a]	KX851750[a]	KX851760[a]	KX851777[a]	–	KX851728[a]	Present study
Polyporus squamosus	Cui 10394	KX851635[a]	KX851688[a]	KX851714[a]	KX851754[a]	KX851766[a]	KX851789[a]	KX851582[a]	KX851739[a]	Present study
Polyporus squamosus	Cui 10595	KU189778	KU189809	KU189960	KU189892	KU189988	KU189925	KU189868	KU189840	Zhou et al. (2016)
Polyporus tuberaster	Dai 11271	KU189769	KU189800	KU189950	–	KU189983	KU189914	–	KU189829	Zhou et al. (2016)
Polyporus tuberaster	Dai 12462	KU507580	KU507582	KU507584	–	–	KU507590	KU507588	KU507586	Zhou et al. (2016)
Polyporus varius	Cui 12249	KU507581	KU507583	KU507585	KU507589	KU507592	KU507591	–	KU507587	Zhou et al. (2016)
Polyporus varius	Dai 13874	KU189777	KU189808	KU189958	KU189891	KU189987	KU189923	KU189867	KU189838	Zhou et al. (2016)
Pseudofavolus cucullatus	Cui 8707[a]	KX880623[a]	KX880662[a]	KX880706[a]	–	–	KX880881[a]	–	–	Present study
Pseudofavolus cucullatus	Dai 13894[a]	KX880626[a]	KX880664[a]	KX880709[a]	–	–	KX880882[a]	–	–	Present study
Sparsitubus nelumbiformis	Cui 8497[a]	KX880631[a]	KX880670[a]	KX880714[a]	–	KX880856[a]	KX880887[a]	KX880786[a]	MG847267[a]	Present study
Sparsitubus nelumbiformis	Cui 6590[a]	KX880632[a]	KX880671[a]	KX880715[a]	KX880819[a]	–	KX880888[a]	–	MG847268[a]	Present study
Theleporus membranaceus	Dai 12075	JN411120	KX880673[a]	–	KX880820[a]	–	KX880889[a]	KX880787[a]	MG847269[a]	Zhou and Dai (2012)
Theleporus membranaceus	Cui 6348	JN411119	KX880674[a]	KX880717[a]	–	–	KX880890[a]	KX880788[a]	–	Zhou and Dai (2012)
Trametes betulina	Cui 7095	JX290075[a]	JX290072[a]	KX900740[a]	–	MG867678[a]	KX900829[a]	–	MG847248[a]	Present study
Trametes betulina	Dai 11814	KC848303[a]	KC848388[a]	KX900741[a]	–	MG867679[a]	KX900830[a]	–	MG847249[a]	Present study
Trametes cinnabarina	Dai 14386	KX880629[a]	KX880667[a]	KX880712[a]	KX880818[a]	KX880854[a]	KX880885[a]	KX880784[a]	MG847264[a]	Present study
Trametes cinnabarina	Dai 14867	KX880630[a]	KX880668[a]	–		KX880855[a]	KX880886[a]	KX880785[a]	–	Present study
Trametes hirsuta	Cui 7784	KC848297[a]	KC848382[a]	KX880731[a]	–	–	–	–	–	Present study
Trametes hirsuta	Cui 7462	KC848299[a]	KC848384[a]	KX880732[a]	–	KX880863[a]	KX880928[a]	KX880796[a]	–	Present study
Trametes sanguinea	Cui 6980	KX880627[a]	KX880665[a]	KX880710[a]	KX880816[a]	MG867688[a]	KX880883[a]	KX880782[a]	MG847265[a]	Present study

Table 2 (continued)

Species	Sample no.	GenBank accessions								References
		ITS	NLSU	MtSSU	RPB1	RPB2	TEF1	TBB1	NSSU	
Trametes sanguinea	Cui 7091	KX880628[a]	KX880666[a]	KX880711[a]	KX880817[a]	MG867689[a]	KX880884[a]	KX880783[a]	MG847266[a]	Present study
Trametes suaveolens	Cui 10697	KC848280[a]	KC848365[a]	KX880751[a]	KX880839[a]	KX880866[a]	KX880933[a]	–	–	Present study
Trametes suaveolens	Cui 10701	KC848282[a]	KC848367[a]	KX880752[a]	KX880840[a]	KX880867[a]	KX880911[a]	–	–	Present study
Trametes versicolor	Cui 9306	KC848267[a]	KC848352[a]	KX880761[a]	–	–	KX880918[a]	–	–	Present study
Trametes versicolor	Cui 9310	KC848266[a]	KC848351[a]	KX880762[a]	KX880846[a]	–	KX880919[a]	–	–	Present study
Truncospora macrospora	Cui 8106	JX941573	JX941596	KX880763[a]	–	KX880871[a]	KX880920[a]	KX880809[a]	–	Zhao and Cui (2013a)
Truncospora macrospora	Yuan 3777	JX941574	JX941597	–	–	–	–	–	–	Zhao and Cui (2013a)
Truncospora ochroleuca	Cui 5673	JX941585	JX941603	KF218308	–	–	KF286314	KF482800[a]	–	Zhao et al. (2014a)
Truncospora ochroleuca	Cui 5671	JX941584	JX941602	KF218309	–	–	KF286315	KF482801[a]	–	Zhao et al. (2014a)
Vanderbylia fraxinea	Cui 8885	HQ876611	JF706344	KF218289[a]	–	–	KF286295[a]	KF482781[a]	–	Zhao and Cui (2013c)
Vanderbylia fraxinea	Cui 8871	JF706329	JF706345	KF051050	–	MG867690[a]	KF181144	KF482844[a]	MG847270[a]	Zhao et al. (2014a)
Vanderbylia robiniophila	Cui 5644	HQ876609	JF706342	KF051051	–	MG867691[a]	KF181145	KF482845[a]	–	Zhao and Cui (2013c)
Vanderbylia robiniophila	Cui 7144	HQ876608	JF706341	KF051052	–	–	KF181146	KF482846[a]	–	Zhao et al. (2014a)
Whitfordia scopulosa	Cui 6209	KC867363[a]	KC867483[a]	KX880765[a]	–	–	–	–	MG847271[a]	Present study
Whitfordia scopulosa	Dai 10739	KC867364[a]	KC867482[a]	KX880766[a]	MG867675[a]	MG867692[a]	KX880922[a]	KX880810[a]	MG847272[a]	Present study
Yuchengia narymica	Dai 7050	JN048776	JN048795	KF051053	–	–	KF181147	KF482836[a]	–	Zhao et al. (2013b)
Yuchengia narymica	Dai 10510	HQ654101	JF706346	KF051054	–	–	KF181148	KF482833[a]	–	Zhao et al. (2013b)
Outgroup										
Laetiporus montanus	Cui 10011	KF951274	KF951315	KX354570	MG867670[a]	KT894790	KX354617	–	KX354528	Song et al. (2018)
Laetiporus sulphureus	Cui 12388	KR187105	KX354486	KX354560	MG867671[a]	KX354652	KX354607	–	KX354518	Song et al. (2018)

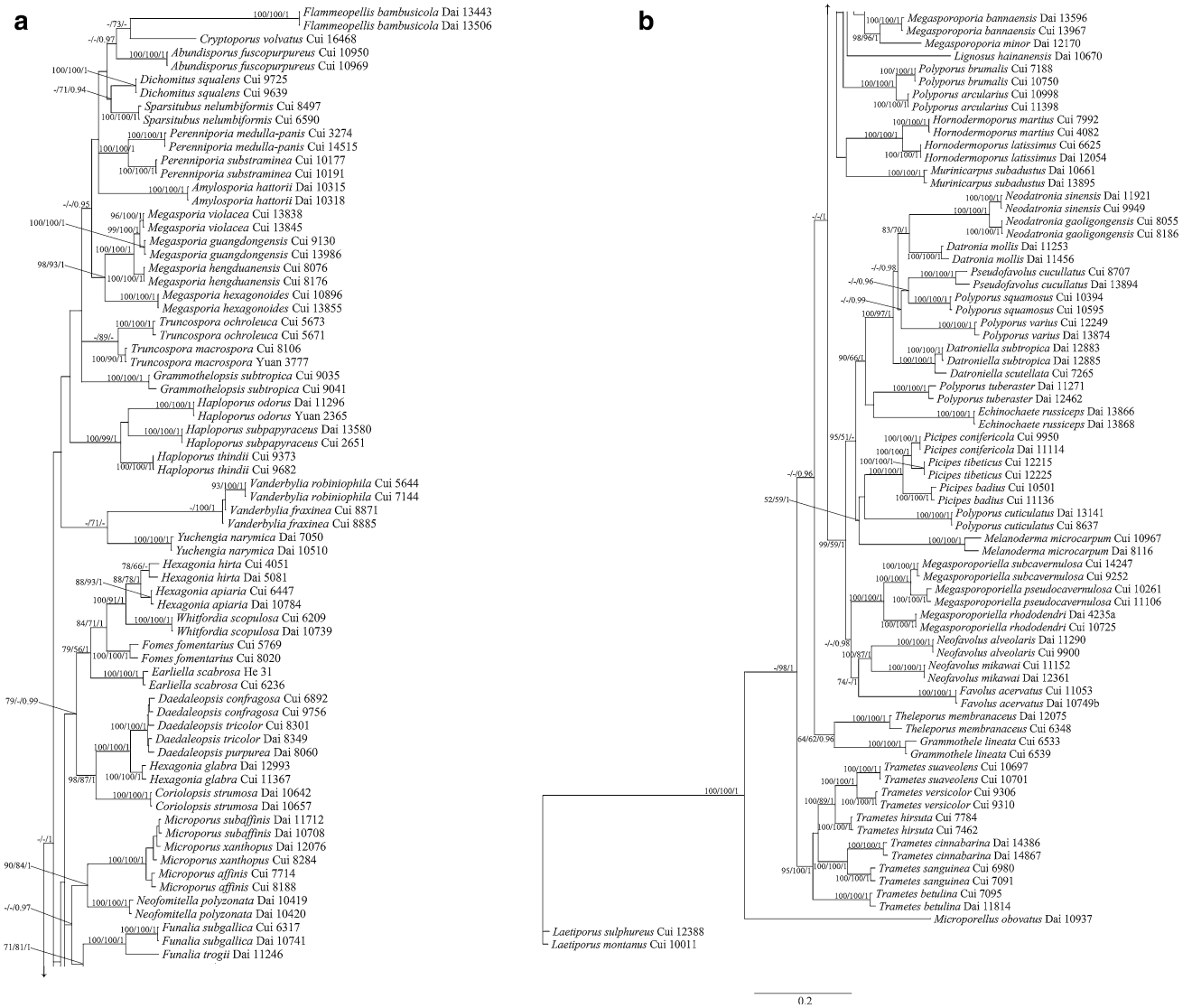

Fig. 1 The bayesian inference (BI) tree of selected taxa in different genera of Polyporaceae based on the combined sequences dataset of ITS+nLSU+TEF1+mt SSU+TBB1+RPB1+RPB2+nSSU sequences. The maximum likelihood bootstrap values (≥ 50), maximum parsimony bootstrap values (≥ 50) and bayesian posterior probability values (≥ 0.95) are indicated above the branches

10 Basidiospores non-truncate, non-amyloid……..…..
……..……..……*Yuchengia*
11 Pores surface covered with a volva-like structure…....
.....……*Cryptoporus*
11 Pores surface naked… .....…12
12 Pores shallow; hymenium continuous over the bottom of pores…..... …*Grammothelopsis*
12 Pores normal; hymenium discontinuous, lining at the inner wall of tubes.....……13
13 Basidiocarps pileate; basidiospores obovoid, non-truncate.....……*Vanderbylia*
13 Basidiocarps resupinate to pileate; basidiospores ellipsoid, truncate or not.....……14
14 Basidiocarps pileate; cystidia usually present.....
..... ……*Hornodermoporus*
14 Basidiocarps resupinate to pileate; cystidia usually absent.....……15
15 Basidiospores truncate, mostly > 9 μm in length .....
..... ……*Truncospora*
15 Basidiospores truncate or not, mostly < 9 μm in length.....……*Perenniporia*
16 Basidiocarps stipitate .....……17
16 Basidiocarps resupinate to pileate .....……25
17 Basidiocarps emerging from a distinct buried sclerotium ....……*Lignosus*
17 Basidiocarps emerging from wood.....……18
18 Spinulose cystidia present.....……*Echinochaete*
18 Spinulose cystidia absent .....……19
19 Dendrohyphidia present at dissepiments……
……..*Pseudofavolus*

19 Dendrohyphidia absent at dissepiments 20
20 Hyphal system trimitic 21
20 Hyphal system dimitic 22
21 Basidiocarps woody hard, context thick, up to 1 cm thick, brown .....*Whitfordia*
21 Basidiocarps corky, context thin, up to 4 mm thick, cream to buff .....*Microporus*
22 Skeletal hyphae strongly branched, frequently with dendroid branching in trama.....*Picipes*
22 Skeletal hyphae moderately branched, rarely with dendroid branching in trama 23
23 Basidiocarps laterally stipitate; cystidioles absent.....*Neofavolus*
23 Basidiocarps centrally to laterally stipitate; cystidioles usually present 24
24 Basidiocarps laterally stipitate, pileal surface usually with radial stripe.....*Favolus*
24 Basidiocarps centrally to laterally stipitate; pileal surface without radial stripe.....*Polyporus*
25 Basidiocarps distinctly pileate to effused reflexed 26
25 Basidiocarps resupinate to effused-reflexed.....34
26 Basidiocarps with a distinct mycelial core .....*Fomes*
26 Basidiocarps without any mycelial core 27
27 Hyphal system dimitic, cystidia usually present.....*Melanoderma*
27 Hyphal system trimitic, cystidia usually absent 28
28 Pilei with a reddish cuticle, pores irregular, elongated and sinuous.....*Earliella*
28 Pilei without a reddish cuticle, pores round to angular, hexagonal or lamellate 29
29 Pores usually hexagonal.....*Hexagonia*
29 Pores round to angular.....30
30 Dendrohyphidia usually present .....*Daedaleopsis*
30 Dendrohyphidia usually absent.....31
31 Basidiocarps distinctly crusted with a cuticle from base to margin .....*Neofomitella*
31 Basidiocarps rarely crusted.....32
32 Pileal surface usually tomentose to hispid.....*Funalia*
32 Pileal surface smooth to tomentose.....33
33 Basidiocarps brownish; hyphae yellowish to brown .....*Coriolopsis*
33 Basidiocarps variable in colors; hyphae mostly hyaline .....*Trametes*
34 Pores shallow; hymenium continuous to the bottom of pores 35
34 Pores normal; hymenium lining at the inner wall of tubes 36
35 Basidiocarps cream to white.....*Theleporus*
35 Basidiocarps grayish blue to pale grayish brown .....*Grammothele*
36 Skeletal hyphae dextrinoid .....*Megasporia / Megasporoporia / Megasporoporiella*
36 Skeletal hyphae non-dextrinoid 37
38 Context white to cream or buff.....*Dichomitus*
38 Context brownish 39
39 Basidiocarps resupinate.....*Neodatronia*
39 Basidiocarps usually effused-reflexed 40
40 Dendrohyphidia present .....*Datronia*
40 Dendrohyphidia absent.....*Datroniella*

Abundisporus Ryvarden, *Belg. Jl Bot.* 131(2): 154 (1999). MycoBank: MB 27912

Type species: *Abundisporus fuscopurpureus* (Pers.) Ryvarden.

Basidiocarps perennial, pileate or effused-reflexed to resupinate. Pilei cinnamon pink to brownish or blackish brown. Pore surface white, pinkish to buff or pinkish brown; pores round to angular; dissepiments thin, entire. Context pale umber to deep purplish brown or grayish to umber brown. Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae yellow to pale brown, usually dextrinoid, CB+. Basidiospores ellipsoid, pale yellowish, slightly thick-walled, smooth, IKI–, CB+.

Abundisporus was established by Ryvarden (1998). Morphologically, it is similar to *Perenniporia* Murrill, but separated mainly by its pinkish basidiocarps and colored basidiospores. Current species of *Abundisporus* were initially treated under *Loweporus* Wright (Corner 1989; Ryvarden 1991, 1998). Ryvarden (1998) concluded that *A. fuscopurpureus*, *A. roseoalbus* (Jungh.) Ryvarden and *A. violaceus* (Wakef.) Ryvarden formed a morphologically homogeneous alliance, and then accommodated them to a separate genus *Abundisporus*. Molecular phylogenetic analysis supported that *Abundisporus* sensu Ryvarden is monophyletic and suggested the genus as a clade distinct from the *Perenniporia* sensu stricto clade (Robledo et al. 2009; Zhao et al. 2013a, 2015). Most species of *Abundisporus* were recorded in tropical and subtropical areas (Ryvarden 1998), but *A. pubertatis* (Lloyd) Parmasto and *A. quercicola* Y.C. Dai were reported from temperate areas (Dai 2012b).

Key to species of *Abundisporus* in China

1 Pore surface white when fresh; basidiospores > 6 μm in length .....*A. quercicola*
1 Pore surface buff to pinkish or grayish brown when fresh; basidiospores < 6 μm in length 2
2 Basidiocarps soft; skeletal hyphae < 3 μm in width.....*A. mollissimus*
2 Basidiocarps corky; skeletal hyphae > 3 μm in width 3
3 Basidiocarps resupinate to effused-reflexed; skeletal hyphae non-dextrinoid .....*A. pubertatis*

3 Basidiocarps pileate; skeletal hyphae dextrinoid.....4
4 Pores > 7 per mm; skeletal hyphae branched.....*A. fuscopurpureus*
4 Pores < 7 per mm; skeletal hyphae unbranched.....*A. roseoalbus*

Abundisporus fuscopurpureus (Pers.) Ryvarden, *Belg. J. Bot.* 131: 154 (1999) (Figs. 2, 3).
MycoBank: MB 447058
Basionym: *Polyporus fuscopurpureus* Pers., *in Gaudichaud-Beaupré in Freycinet* (1827).

Fruiting body. — Basidiocarps perennial, pileate, corky, without odor or taste when fresh, becoming hard corky upon drying. Pilei applanate to slightly dimidiate or semicircular, projecting up to 5 cm, 9 cm wide and 2 cm thick at base. Pileal surface umber brown to dark brown or black, smooth, with indistinct concentric zones; margin acute, white to pale brown. Pore surface pinkish to buff when fresh, grayish brown to orange brown upon drying; pores round, 7–9 per mm; dissepiments thin, entire. Sterile margin narrow, grayish brown, up to 1 mm wide. Context clay-buff, corky, up to 2 mm thick. Tubes concolorous with pore surface, corky, up to 1.8 cm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB+; tissues becoming brownish in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 2.5–3.5 µm in diam; skeletal hyphae dominant, yellowish brown, thick-walled with a wide lumen, branched, flexuous, interwoven, 3–4.5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 2–2.5 µm in diam; skeletal hyphae dominant, yellowish brown, thick-walled with a wide lumen, occasionally branched, flexuous, interwoven, 2–3.5 µm in diam. Cystidia absent; cystidioles occasionally present, fusiform, 10–16 × 3–5 µm. Basidia barrel-shaped

Fig. 2 A basidiocarp of *Abundisporus fuscopurpureus*

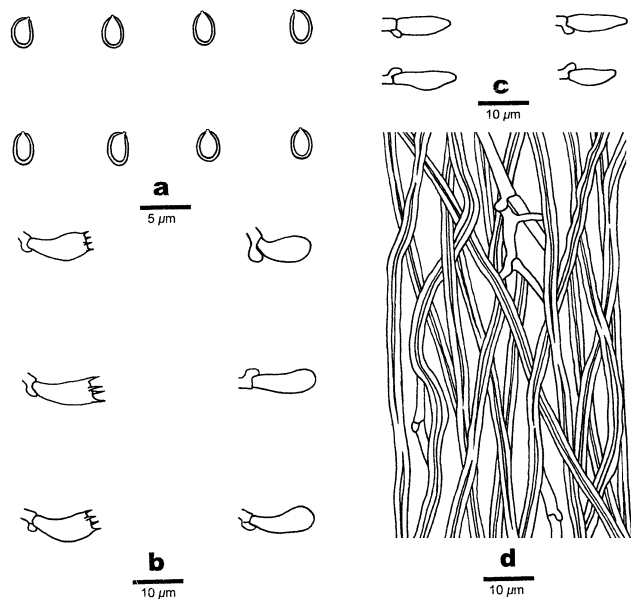

Fig. 3 Microscopic structures of *Abundisporus fuscopurpureus* (drawn from *Cui 10969*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 µm; **b–d** = 10 µm

to pear-shaped, with four sterigmata and a basal clamp connection, 12–16 × 6–10 µm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, yellowish, slightly thick-walled, smooth, non-dextrinoid, CB+, (2–)2.5–3.3(–3.5) × (1.5–)1.7–2 (–2.5) µm, L = 2.82 µm, W = 1.87 µm, Q = 1.47–1.55 (n = 120/4).

Notes. — *Abundisporus fuscopurpureus* is similar to *A. mollissimus* B.K. Cui & C.L. Zhao in producing perennial basidiocarps, similar pores (7–9 per mm) and dextrinoid skeletal hyphae. However, *A. mollissimus* is distinguished in having soft corky basidiocarp and larger basidiospores (4–4.5 × 3–3.5 µm).

Specimens examined: **CHINA**. **Hainan**, Lingshui County, Diaoluoshan Nature Reserve, on fallen angiosperm trunk, 10 November 2012, *Dai 10950* (BJFC); 11 November 2012, *Dai 10969*, *10975* (BJFC). **Yunnan**, Mengla County, Wangtianshu Park, on fallen angiosperm trunk, 3 November 2009, *Cui 8638* (BJFC).

Abundisporus mollissimus B.K. Cui & C.L. Zhao, *Mycol. Prog.* 14: 38 (2015) (Figs. 4, 5).
MycoBank: MB 811607

Fruiting body. — Basidiocarps perennial, effused-reflexed to pileate, soft, without odor or taste when fresh, becoming soft corky upon drying. Pilei semicircular to conchate, projecting up to 1.5 cm, 3.5 cm wide and 3 mm thick at base. Pileal surface yellow brown to umber-brown, velutinate, concentrically zonate; margin acute, yellowish brown. Pore surface buff to buff-yellow when fresh, buff-

Fig. 4 Basidiocarps of *Abundisporus mollissimus*

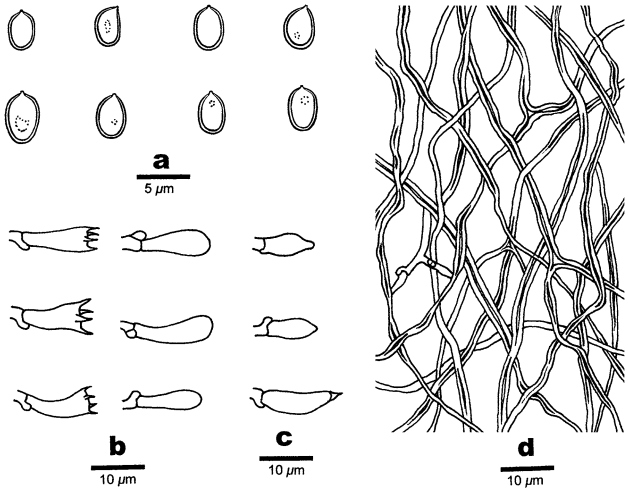

Fig. 5 Microscopic structures of *Abundisporus mollissimus* (drawn from *Cui 6257*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

yellow upon drying; pores round, 7–8 per mm; dissepiments thin, entire. Sterile margin narrow, cream to buff, up to 1 mm wide. Context dull brown, soft corky, thin, up to 1 mm thick. Tubes concolorous with pore surface, soft corky, up to 2 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB+; tissues becoming brownish in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 1.5–2.5 μm in diam; skeletal hyphae dominant, yellowish brown, thick-walled with a wide lumen, usually unbranched, flexuous, interwoven, 2.5–3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, usually unbranched, 1–1.5 μm in diam; skeletal hyphae dominant, yellowish brown, thick-walled with a narrow lumen, occasionally branched, strongly flexuous, interwoven, 2–3 μm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 10–12 × 5–5.5 μm. Basidia barrel-shaped to pear-shaped, with four sterigmata and a basal clamp connection, 11–13 × 6–7 μm; basidioles dominant, similar to basidia in shape but slightly smaller.

Spores. — Basidiospores ellipsoid, yellowish, slightly thick-walled, smooth, non-dextrinoid, CB+, (3.5–)4–4.5(–5) × (2.5–)3–3.5 μm, L = 4.3 μm, W = 3.3 μm, Q = 1.4–1.42 (n = 60/2).

Notes. — *Abundisporus mollissimus* differs from other *Abundisporus* species by soft to soft corky basidiocarps and narrow skeletal hyphae (< 3 μm in diam, Zhao et al. 2015), while other species in the genus have corky to hard corky basidiocarps and wide skeletal hyphae (> 3 μm in diam).

Specimens examined: **CHINA**. **Hainan**, Chengmai County, roadside of Forest Farm, on fallen angiosperm trunk, 6 May 2009, *Cui 6257* (holotype, BJFC); Changjiang County, Bawangling Nature Reserve, on dead tree of *Xanthophyllum hainanense*, 8 May 2009, *Dai 10764* (paratype, BJFC).

Abundisporus pubertatis (Lloyd) Parmasto, *Karstenia* 40: 133 (2000) (Figs. 6, 7).
MycoBank: MB 467619
Basionym: *Polyporus pubertatis* Lloyd, *Mycol. Writ.* 4 (Syn. Apus): 358 (1915).

Fruiting body. — Basidiocarps perennial, resupinate to effused-reflexed or pileate, adnate, corky, without odor or taste when fresh, becoming hard corky upon drying. Pilei semicircular, projecting up to 2 cm, 3 cm wide and 1 cm thick at base. Pileal surface orange-brown to pale brown, smooth, concentrically zonate; margin obtuse, grayish brown. Pore surface brownish-vinaceous to grayish brown when fresh, orange-brown to pale brown upon drying; pores round to angular, 5–7 per mm; dissepiments thin, entire. Sterile margin narrow, grayish brown, up to 1.5 mm wide. Context dull brown, soft corky, thin, up to 2 mm thick. Tubes concolorous with pore surface, corky, up to 8 mm long.

Fig. 6 Basidiocarps of *Abundisporus pubertatis*

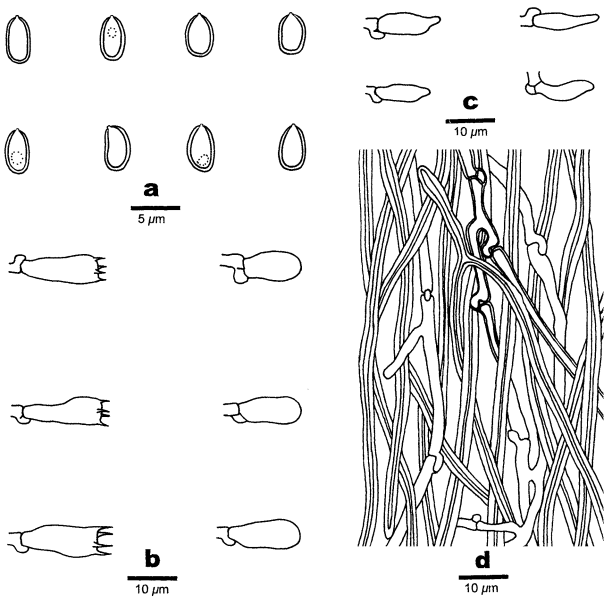

Fig. 7 Microscopic structures of *Abundisporus pubertatis* (drawn from *Dai 11310*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae non-dextrinoid, CB+; tissues becoming brownish in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 3.5–5 μm in diam; skeletal hyphae dominant, yellowish brown, thick-walled with a narrow to wide lumen, branched, more or less flexuous, interwoven, 3.5–5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 2.5–3.5 μm in diam; skeletal hyphae dominant, yellowish brown, thick-walled with a narrow to wide lumen, occasionally branched, more or less flexuous, interwoven, 3–4 μm in diam. Cystidia absent; cystidioles present, narrowly fusoid, thin-walled, smooth, 11–15 × 2–3 μm. Basidia barrel-shaped, with four sterigmata and a basal clamp connection, 15–18 × 8–10 μm; basidioles dominant, mostly pear-shaped, smaller than basidia.

Spores. — Basidiospores ellipsoid, yellowish, slightly thick-walled, smooth, non-dextrinoid, CB+, (4–)4.2–5(–5.2) × 2.5–3(–3.2) μm, L = 4.41 μm, W = 2.81 μm, Q = 1.55–1.59 (n = 120/4).

Notes. — Morphologically, *Abundisporus pubertatis* and *A. violaceus* share similar basidiospores (4.2–5 × 2.5–3 μm in *A. pubertatis*; 4.5–5.1 × 3.1–3.5 μm in *A. violaceus*). However, *A. violaceus* differs from *A. pubertatis* by its distinctly pileate basidiocarps and bigger pores (3–5 per mm, Ryvarden and Johansen 1980; Zhao et al. 2015). *Abundisporus pubertatis* is similar to *A. sclerosetosus* in its smaller pores (5–7 per mm) and pale brown to dark brown pore surface. But *A. sclerosetosus* differs from *A. pubertatis* in its dextrinoid skeletal hyphae, smaller basidiospores (3.2–3.5 × 2.3–2.6 μm), and presence of scleridioid setiform elements (Decock and Laurence 2000; Zhao et al. 2015).

Specimens examined: **CHINA**. **Anhui**, Huangshan, Huangshan Park, on fallen trunk of *Castanopsis*, 22 October 2010, *Dai 11927* (BJFC). **Fujian**, Wuyishan County, Wuyi Mountains, on angiosperm stump, 19 October 2005, *Dai 7254* (BJFC). **Henan**, Neixiang County, Baotianman Nature Reserve, on fallen trunk of *Quercus*, 23 September 2009, *Dai 11310* (BJFC). **Hunan**, Shimen County, Hupingshan Nature Reserve, on living angiosperm tree, 15 August 2010, *Dai 12140* (BJFC). **Liaoning**, Huanren County, Laotudingzi Nature Reserve, on fallen branch of *Quercus*, 1 August 2008, *Cui 5774, 5776, 5780* (BJFC). **Yunnan**, Mengla County, Wangtianshu Park, on fallen angiosperm trunk, 03 November 2009, *Cui 8607* (BJFC).

Abundisporus quercicola Y.C. Dai, *Ann. Bot. Fenn.* 39: 171 (2002) (Figs. 8, 9).
MycoBank: MB 466023

Fruiting body. — Basidiocarps perennial, pileate, solitary, becoming hard corky upon drying. Pilei ungulate, projecting up to 5 cm, 7 cm wide and 5 cm thick at base. Pileal surface dark gray to almost black, smooth, concentrically zonate; margin blunt, grayish black. Pore surface white when fresh, becoming ochraceous when dry; pores round, 5–7 per mm; dissepiments thick, entire. Context dark brown, corky, up to 3 cm thick. Tubes dull brown, paler than context, corky, up to 2 cm long, a thin layer of context present between each annual tube layer.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB+; tissues darkening in KOH.

Context. — Generative hyphae infrequent, thin-walled, usually unbranched, 2–3.5 μm in diam; skeletal hyphae dominant, yellowish brown to rust brown, thick-walled

Fig. 8 A basidiocarp of *Abundisporus quercicola*

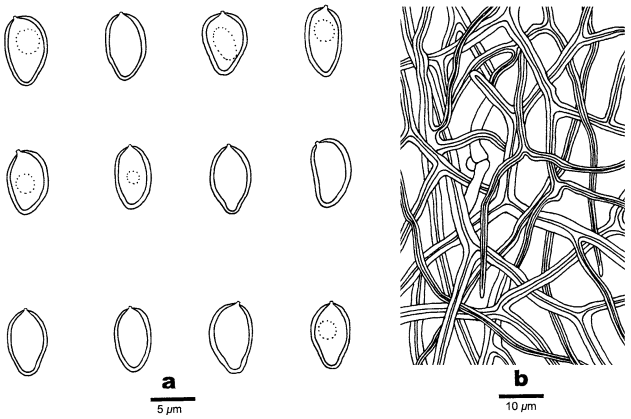

Fig. 9 Microscopic structures of *Abundisporus quercicola* (drawn from *Dai 3084*). **a**. Basidiospores; **b**. Hyphae from trama. Bars: **a** = 5 μm; **b** = 10 μm

with a wide lumen, frequently branched, flexuous, interwoven, 3–5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 2–2.5 μm in diam; skeletal hyphae dominant, yellowish brown, thick-walled with a narrow to wide lumen, frequently branched, flexuous, interwoven, 3–4 μm in diam. Cystidia and cystidioles absent. Basidia barrel-shaped, with four sterigmata and a basal clamp connection, 14–19 × 9–12 μm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores narrowly ovoid, yellowish, slightly thick-walled, smooth, non-dextrinoid, CB+, (6–)6.5–8.5(–9) × (4–)4.2–5(–5.5) μm, L = 7.6 μm, W = 4.7 μm, Q = 1.6 (n = 30/1).

Notes. — *Abundisporus quercicola* is characterized by perennial and ungulate basidiocarps, white pore surface when fresh, thick-walled, yellowish, narrowly ovoid and non-truncate basidiospores, and by its growth on living oak in temperate forests of the foothills of the Himalayas. Morphologically, *A. quercicola* is distinct from all other *Abundisporus* species in its large basidiospores (6.8–8.8 × 4.2–5 μm), while basidiospores of other species in the genus are less than 6 μm in length, Dai et al. 2002).

Specimen examined: **CHINA**. **Yunnan**, Lijiang, Sandaowan, on living tree of *Quercus*, 18 June 1999, *Dai 3084* (holotype in BJFC, isotype in IFP).

Abundisporus roseoalbus (Jungh.) Ryvarden, *Belg. J. Bot.* 131: 154 (1999) (Figs. 10, 11).
MycoBank: MB 447059
Basionym: *Polyporus roseoalbus* Jungh., *Praem. Fl. Crypt. Javae* (Batavia): 43 (1838).

Fruiting body. — Basidiocarps perennial, pileate, becoming hard corky upon drying. Pilei applanate to slightly conchate, projecting up to 2.5 cm, 4 cm wide and 1.5 cm thick at base. Pileal surface clay-buff to umber-brown;

Fig. 10 Basidiocarps of *Abundisporus roseoalbus*

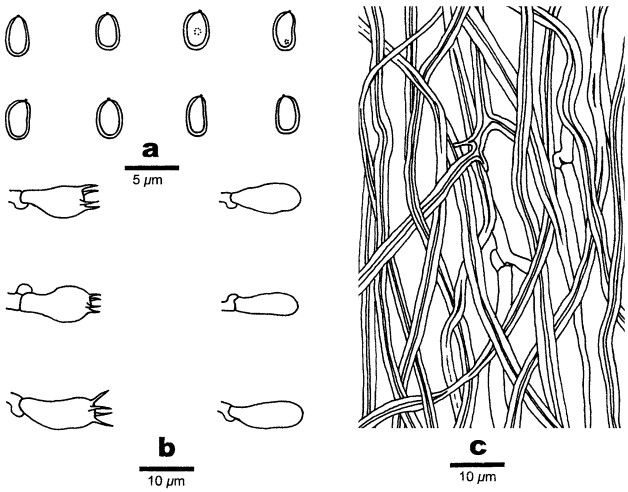

Fig. 11 Microscopic structures of *Abundisporus roseoalbus* (drawn from *Dai 12269*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from tramat. Bars: **a** = 5 μm; **b–c** = 10 μm

margin acute, pale brown. Pore surface pale pinkish to buff when fresh, pinkish buff to grayish brown upon drying; pores round, 5–7 per mm; dissepiments thin, entire. Sterile margin narrow, grayish brown, up to 1 mm wide. Context clay-buff to orange-brown, soft corky, up to 3 mm thick. Tubes concolorous with pore surface, corky, up to 1.2 cm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB+; tissues becoming brown in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 2–3 μm in diam; skeletal hyphae dominant, yellowish brown, thick-walled with a narrow to wide lumen, unbranched, slightly flexuous, interwoven, 3.5–5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 2–3.5 μm in diam; skeletal

hyphae dominant, yellowish brown, thick-walled with a narrow to wide lumen, unbranched, slightly flexuous, interwoven, 3–4 µm in diam. Cystidia absent; cystidioles present, narrowly fusoid to subulate, thin-walled, smooth, 8–10 × 1.5–2.5 µm; basidia barrel-shaped to pear-shaped, with four sterigmata and a basal clamp connection, 9–15 × 4.5–7.5 µm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, yellowish, slightly thick-walled, smooth, non-dextrinoid, CB+, (3.5–)3.7–4.2(–4.5) × (2–)2.3–3(–3.2) µm, L = 3.9 µm, W = 2.5 µm, Q = 1.39–1.53 (n = 90/3).

Notes. — *Polyporus subflexibilis* Berk. & M.A. Curtis was treated as a synonym of *Abundisporus roseoalbus* by Ryvarden (1998) due to its *Abundisporus*-like characters, such as 1) chocolate or vinaceous brown pore surface, 2) small pores (7–9 per mm), 3) a dimitic hyphal structure with yellow to pale brown skeletal hyphae that swell in KOH solution, and 4) shorter, pale yellowish, slightly thick-walled basidiospores (up to 4 µm long). Biogeographically, *Polyporus subflexibilis* was originally found from Cuba, and *A. roseoalbus* was described from Africa, thus Parmasto and Hallenberg (2000) separated these two species and proposed the new combination *A. subflexibilis* (Berk. & M.A. Curtis) Parmasto. In the present study, examination of the type specimens show that the two species cannot be separated based on morphology, so here *Polyporus subflexibilis* is treated as a synonym of *A. roseoalbus* as proposal from Ryvarden (1998). The biogeographic disjunction is interesting, and deserving of further analysis. Unfortunately, good sequences of *A. subflexibilis* were not available for this study. When appropriate sequences become available, the circumscription of *A. subflexibilis* can be re-evaluated.

Specimens examined: **CHINA**. **Hainan**, Ledong County, Jianfengling Nature Reserve, on fallen angiosperm trunk, 12 May 2009, *Cui 6650* (BJFC); Yunnan, Jinghong County, Sanchahe Nature Reserve, on fallen angiosperm trunk, 7 June 2011, *Dai 12269*, *12272* (BJFC).

Amylosporia B.K. Cui, C.L. Zhao & Y.C. Dai, **gen. nov.**
MycoBank: MB 825652

Differs from other genera by its amyloid and cyanophilous skeletal hyphae, hyaline, thick-walled, ellipsoid and truncate, amyloid and cyanophilous basidiospores.

Etymology. — *Amylosporia* (Lat.): referring to the amyloid basidiospores.

Type species: *Amylosporia hattorii* (Y.C. Dai & B.K. Cui) B.K. Cui, C.L. Zhao & Y.C. Dai.

Basidiocarps annual, resupinate to effused-reflexed, adnate, soft corky to corky when fresh, becoming corky to fragile upon drying. Pore surface cream to buff when fresh, becoming cinnamon-buff when bruised, pale yellowish brown upon drying. Subiculum cream to buff, corky. Tubes concolorous with the pore surface, corky to fragile. Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae weakly amyloid, CB+. Cystidia absent; cystidioles present. Basidiospores ellipsoid, truncate, hyaline, thick-walled, smooth, weakly amyloid, CB+.

Amylosporia hattorii (Y.C. Dai & B.K. Cui) B.K. Cui, C.L. Zhao & Y.C. Dai, **comb. nov.** (Figs. 12, 13).
MycoBank: MB 825658
Basionym: *Perenniporia hattorii* Y.C. Dai & B.K. Cui, *Ann. Bot. Fenn.* 48(3): 224 (2011).

Fruiting body. — Basidiocarps annual, resupinate to effused-reflexed, adnate, soft corky to corky, without odor or taste when fresh, becoming corky to fragile upon drying, up to 15 cm long, 4 cm wide and 1.2 mm thick at center.

Fig. 12 Basidiocarps of *Amylosporia hattorii*

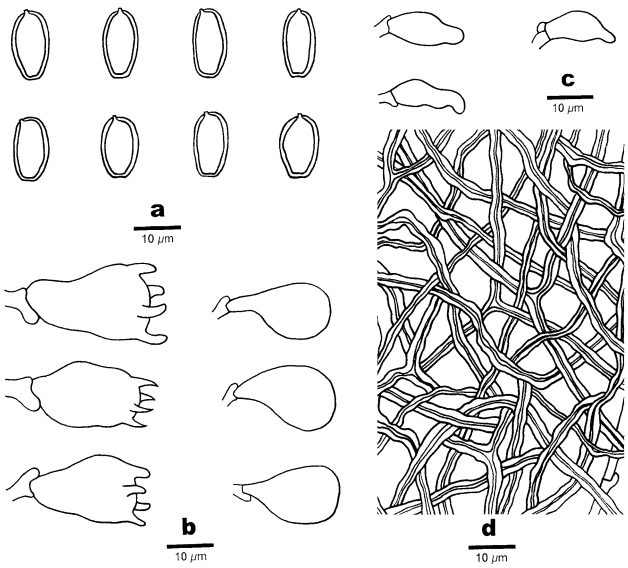

Fig. 13 Microscopic structures of *Amylosporia hattorii* (drawn from *Dai 10285*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 µm

Pore surface cream to buff when fresh, becoming cinnamon-buff when bruised, pale yellowish brown upon drying; pores round to angular, 3–5 per mm; dissepiments thin, entire. Sterile margin cream to cream buff, up to 1 mm wide. Subiculum thin, cream to buff, corky, azonate, up to 0.2 mm thick. Tubes concolorous with the pore surface, corky to fragile, up to 1 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae weakly IKI+, CB+; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.5–3.4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, occasionally branched, interwoven, 2.5–4.8 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.4–3.2 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, occasionally branched, interwoven, 2.2–4.5 µm in diam. Cystidia absent; fusoid cystidioles present, 18–25 × 6–9 µm. Basidia barrel-shaped, with four sterigmata and a basal clamp connection, 20–32 × 10–15 µm; basidioles pear-shaped, distinctly smaller than basidia.

Spores. — Basidiospores ellipsoid, truncate, hyaline, thick-walled, smooth, weakly IKI+, CB+, (9–)10–12 (–14) × (4.5–)5.5–7.5(–8) µm, L = 11 µm, W = 6.5 µm, Q = 1.65–1.76 (n = 90/3).

Notes. — *Amylosporia hattorii* was firstly described in *Perenniporia* Murrill from tropical China (Dai et al. 2011a, b). It is characterized by an annual growth habit, amyloid and cyanophilous skeletal hyphae, and ellipsoid, truncate and amyloid basidiospores. In the current study, it is transferred to the new genus *Amylosporia*. *Amylosporia* differs from *Perenniporia* by its both amyloid skeletal hyphae and amyloid basidiospores.

Perenniporia amylodextrinoidea Gilb. & Ryvarden, *P. minor* Y.C. Dai & H.X. Xiong and *Yuchengia narymica* (Pilát) B.K. Cui, C.L. Zhao & K.T. Steffen also have amyloid skeletal hyphae. However, *P. amylodextrinoidea* has dextrinoid and smaller basidiospores (4.5–5.5 × 3–3.5 µm, Gilbertson and Ryvarden 1987). *Perenniporia minor* is distinguished by pileate basidiocarps, dextrinoid and smaller basidiospores (4.9–6.2 × 3.8–4.5 µm, Xiong et al. 2008). *Yuchengia narymica* differs by having acyanophilous skeletal hyphae dissolving in KOH, and non-truncate and non-amyloid basidiospores (Zhao et al. 2013b).

Specimens examined: **CHINA**. **Hainan**, Ledong County, Jianfengling Nature Reserve, on fallen angiosperm branch, 3 September 2008, *Dai 10285* (holotype in BJFC, isotype in IFP); 6 November 2012, *Cui 10912* (BJFC); 4 September 2008, *Dai 10315* (paratype, BJFC), *Dai 10318* (paratype, BJFC).

Coriolopsis Murrill, *Bull. Torrey Bot. Club* 32(7): 358 (1905).
MycoBank: MB 17376
Type species: *Coriolopsis occidentalis* (Klotzsch) Murrill.

Basidiocarps annual to perennial, pileate. Pilei yellowish to brownish or blackish brown. Pore surface yellowish to brownish or blackish brown; pores round to angular; dissepiments thin, entire. Context yellowish to brown. Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal hyphae yellowish to brown, dextrinoid or not, CB+ or CB–. Basidiospores cylindrical to ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–.

Morphologically, *Coriolopsis* is similar to the genus *Trametes* Fr., from which it was artificially separated mainly by its brownish basidiocarps and colored hyphae, these two genera are similar in hyphal system and basidiospores (Ryvarden 1991). Corner treated *Coriolopsis* as a synonymy of *Trametes* (Corner 1989). Recently, phylogenetic analyses indicated that *Coriolopsis* is polyphyletic within the trametoid species (Justo and Hibbett 2011), but the taxonomic position of *Coriolopsis* remains in doubt. *Coriolopsis* is a worldwide genus and has a wide distribution in tropical to subtropical areas.

Key to species of *Coriolopsis* in China

1 Skeletal hyphae and binding hyphae dextrinoid.....2
1 Skeletal hyphae and binding hyphae IKI–.....4
2 Pores 1.5–3 per mm.....*C. dendriformis*
2 Pores 3–6 per mm.....3
3 Basidiospores 8–11 µm in length.....*C. hainanensis*
3 Basidiospores 6–8.5 µm in length.....*C. brunneoleuca*
4 Pores 7–10 per mm.....*C. sanguinaria*
4 Pores 2–6 per mm.....5
5 Basidiospores 2–2.5 µm in width.....6
5 Basidiospores usually > 2.5 µm in width.....7
6 Pileal surface covered with radially arranged stiff hairs.....*C. retropicta*
6 Pileal surface without stiff hairs.....*C. glabro-rigens*
7 Context olive to ochraceous.....*C. strumosa*
7 Context yellowish brown to dark brown.....*C. aspera*

Coriolopsis aspera (Jungh.) Teng, *Fungi of China*: 759 (1963) (Figs. 14, 15).
MycoBank: MB 311814
Basionym: *Polyporus asper* Jungh., *Praem. Fl. Crypt. Javae* (Batavia): 60 (1838).

Fruiting body. — Basidiocarps annual, pileate or with a discoid base, without odor or taste when fresh, hard corky to woody hard and light in weight upon drying. Pilei

Fig. 14 Basidiocarps of the *Coriolopsis aspera*

applanate, flabelliform, dimidiate or semicircular, projecting up to 2.5 cm, 4 cm wide and 8 mm thick at base. Pileal surface yellowish-brown, cinnamon to fawn when fresh, turning to orange-brown to reddish-brown with age, glabrous, concentrically sulcate, usually slightly warted in old specimens; margin cream to yellowish-brown, acute to obtuse. Pore surface white to cream when fresh, turning to pale yellowish-brown to clay-buff when dry; pores round to angular, about 3–5 per mm; dissepiments thin, entire. Context yellowish-brown to cinnamon, corky, up to 4 mm thick. Tubes clay-buff, corky, up to 4 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues darkening in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2–3 µm in diam; skeletal hyphae dominant, pale yellowish-brown to yellowish-brown, thick-walled with a narrow lumen to subsolid, straight, occasionally branched, regularly arranged, 3.8–6 µm in diam; binding hyphae pale yellowish-brown to yellowish-brown, thick-walled with a narrow lumen to subsolid, flexuous, frequently branched, 1.8–2.8 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.7–3 µm in diam; skeletal hyphae dominant, pale yellowish-brown to yellowish-brown, thick-walled with a narrow lumen to subsolid, occasionally branched, occasionally collapsed when dry, interwoven, 3–5 µm in diam; binding hyphae pale yellowish-brown to yellowish-brown, thick-walled with a narrow lumen to subsolid, flexuous, frequently branched, 1.5–3 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 16–23 × 6–9 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical to slightly allantoid, hyaline, thin-walled, smooth, usually with one guttule, IKI–, CB–, (8–)9–10.8(–11) × (2.8–)3.4–4.2(–4.3) µm, L = 9.77 µm, W = 3.66 µm, Q = 2.49–3.1 (n = 100/3).

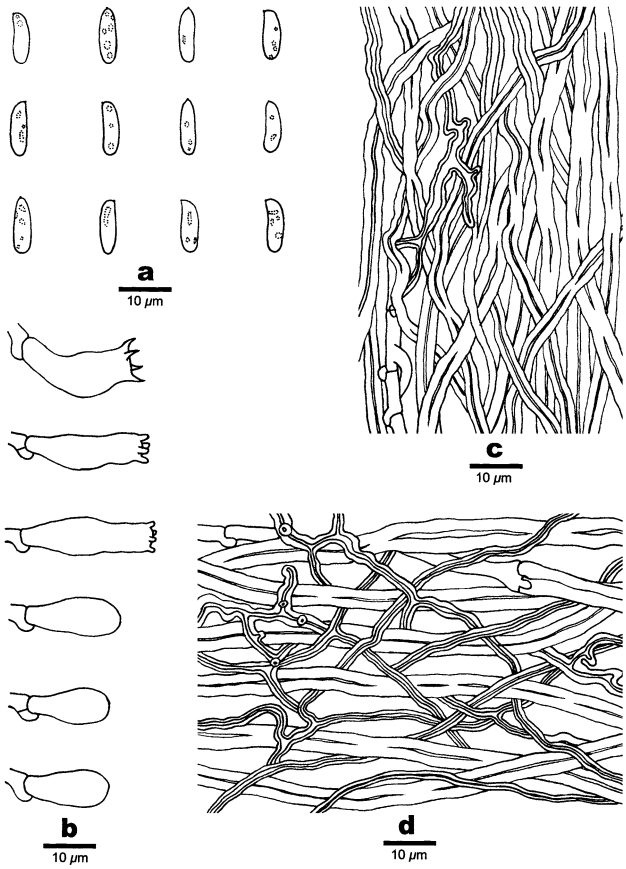

Fig. 15 Microscopic structures of *Coriolopsis aspera* (drawn from *Cui 6702*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a–d** = 10 µm

Notes. — *Coriolopsis aspera* is characterized by its brown basidiocarps, small pores, large basidiospores and distributed in tropical and subtropical areas.

Specimens examined: **CHINA**. **Guangdong**, Guangzhou, the Campus of South China Agricultural University, on dead angiosperm tree, 6 July 2010, *Cui 9128* (BJFC). **Hainan**, Changjiang County, Bawangling Nature Reserve, on fallen trunk of *Mangifera indica*, 9 May 2009, *Cui 6509* (BJFC); on angiosperm stump, 9 May 2009, *Dai 10799* (BJFC); Chengmai County, on fallen angiosperm trunk, 6 May 2009, *Cui 6215*, *Dai 10737* (BJFC); Wanning County, Damao, on fallen angiosperm trunk, 15 May 2009, *Cui 6702* (BJFC); Qionghai County, Yelin, on angiosperm stump, 15 May 2009, *Cui 6725* (BJFC); on fallen angiosperm trunk, 15 May 2009, *Cui 6726* (BJFC).

Coriolopsis brunneoleuca (Berk.) Ryvarden, *Norw. Jl Bot.* 19: 230 (1972) (Figs. 16, 17).
MycoBank: MB 311815
Basionym: *Polyporus brunneoleucus* Berk., *London J. Bot.* 5: 4 (1846).

Fig. 16 Basidiocarps of the *Coriolopsis brunneoleuca*

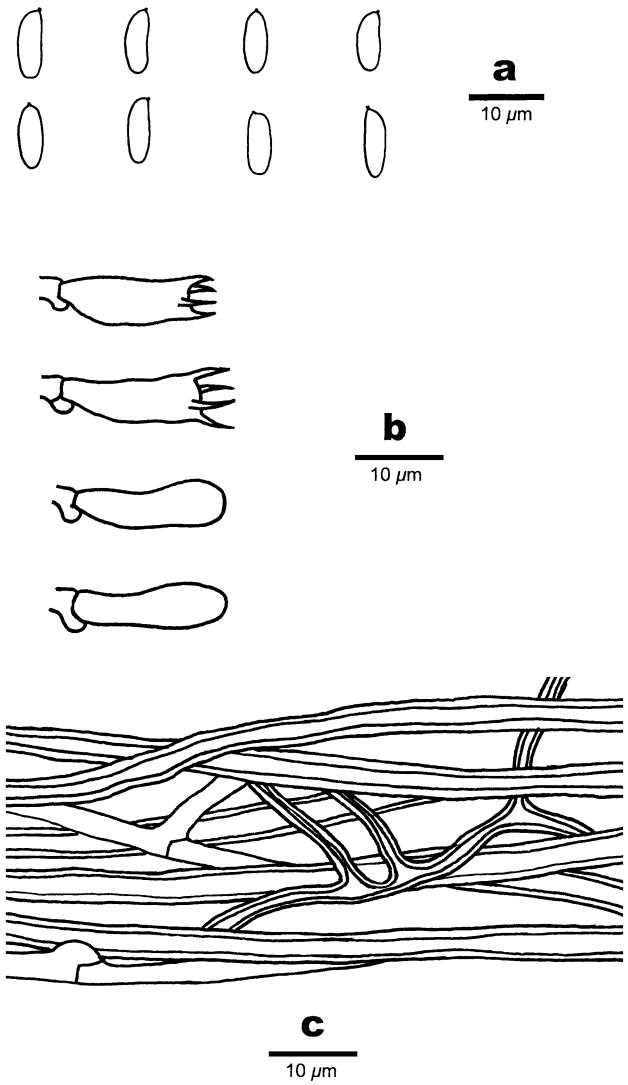

Fig. 17 Microscopic structures of *Coriolopsis brunneoleuca* (drawn from *Dai 12180*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a–c** = 10 μm

Fruiting body. — Basidiocarps annual, effused-reflexed to pileate, single or imbricate, without odor or taste when fresh, corky and light in weight when dry. Pilei semicircular to flabelliform, projecting up to 5 cm, 8 cm wide and 2 mm thick at base; the resupinate part up to 30 cm long and 12 cm wide. Pileal surface pale yellowish-brown to yellowish-brown when dry, velutinate, some parts occasionally glabrous, concentrically zonate; margin sharp. Pore surface cream, cream-buff to buff when dry, slightly shiny; pores round to angular, 3–6 per mm; dissepiments thin, entire. Sterile margin white to cream, up to 2 mm wide. Context yellowish-brown, soft corky, up to 1.2 mm thick. Tubes pale gray to yellowish-brown, corky, up to 0.8 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae dextrinoid, CB–; tissues darkening in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2.5–4 μm in diam; skeletal hyphae dominant, pale yellowish-brown to yellowish-brown, thick-walled with a wide to narrow lumen, occasionally branched, regularly arranged, 3.8–5.2 μm in diam; binding hyphae pale yellowish-brown to yellowish-brown, thick-walled to almost solid, frequently branched, interwoven, 1.8–3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, loosely arranged long the tubes, 1.5–3 μm in diam; skeletal hyphae dominant, pale yellowish-brown to yellowish-brown, thick-walled with a wide to narrow lumen, occasionally branched, occasionally collapsed when dry, interwoven, 2.5–4 μm in diam; binding hyphae pale yellowish-brown to yellowish-brown, thick-walled to almost solid, frequently branched, interwoven, 2–3 μm in diam. Cystidia and cystidioles absent. Basidia clavate to barrel-shaped, with four sterigmata and a basal clamp connection, 13–23 × 4.5–6 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical to slightly allantoid, hyaline, thin-walled, smooth, usually with one guttule, IKI–, CB–, (5.9–)6.3–8.5(–9.8) × (2–)2.3–3.3(–3.7) μm, L = 7.61 μm, W = 2.74 μm, Q = 2.42–3.26 (n = 90/3).

Notes. — *Coriolopsis brunneoleuca* is distinct in the genus by its pale yellowish-brown to yellowish-brown, velutinate pileal surface, dextrinoid skeletal and binding hyphae and had a mainly tropical to subtropical distribution. *Trametes polyzona* (Pers.) Justo (≡ *Coriolopsis polyzona* (Pers.) Ryvarden) resembles *Coriolopsis brunneoleuca* in having similar velutinate to tomentose pileal surface and basidiospores (5–8.5 × 2.5–3.5 μm), but the former has larger pores (2–3 per mm) and its skeletal and binding hyphae are negative in Melzer's reagent (Núñez and Ryvarden 2001). *Coriolopsis byrsina* (Mont.) Ryvarden has pale yellowish-brown to cinnamon brown,

velutinate pileal surface and moderate pores (3–5 per mm), which is similar to *C. brunneoleuca*, but *C. byrsina* has distinct bigger basidiospores (12.1–14.1 × 5.1–6 μm) and its skeletal and binding hyphae are negative in Melzer's reagent (Li and Cui 2010).

Specimens examined: **CHINA**. **Guangxi**, Ningming County, Nonggang Nature Reserve, on fallen angiosperm trunk, 7 July 2007, *Zhou 278* (IFP). **Hainan**, Changjiang County, Bawangling Nature Reserve, on fallen trunk of *Machilus pingii*, 26 November 2010, *Dai 12087* (BJFC); on angiosperm stump, 7 May 2009, *Cui 6343* (BJFC); on fallen angiosperm trunk, 27 November 2010, *Dai 12118* (BJFC). **Xizang (Tibet)**, Bomi County, on fallen angiosperm trunk, 19 September 2010, *Cui 9486* (BJFC). **Yunnan**, Jinghong, Xishuangbanna Nature Reserve, Sanchanhe, on fallen angiosperm trunk, 7 June 2011, *Dai 12288* (BJFC); Mengla County, Lvshilin Forest Park, on fallen angiosperm trunk, 1 November 2009, *Cui 8393*, *8428*, *8431* (BJFC); on rotten angiosperm wood, 4 August 2005, *Dai 6680* (IFP); Wangtianshu Park, on fallen angiosperm trunk, 16 September 2007, *Yuan 3605* (IFP); 17 September 2007, *Yuan3675* (IFP); Pingbian County, Daweishan Forest Park, on fallen angiosperm trunk, 4 June 2011, *Dai 12180* (BJFC).

Coriolopsis dendriformis Hai J. Li, Y.C. Dai & B.K. Cui, **sp. nov.** (Figs. 18, 19).
MycoBank: MB 825654

Differs from other *Coriolopsis* species by its dextrinoid skeletal and binding hyphae, the presence of dendriform skeletal hyphae at pileal surface.

Type. — **CHINA**. **Hainan**, Qionghai County, Jiuqujiang, on fallen angiosperm trunk, 15 May 2009, *Cui 6719* (holotype, BJFC).

Etymology. — *Dendriformis* (Lat.): referring to its dendriform skeletal hyphae from pileal surface.

Fruiting body. — Basidiocarps annual, effused-reflexed, single or imbricate, without odor or taste when fresh, soft corky and light in weight when dry. Pilei semicircular to

Fig. 18 A basidiocarp of the *Coriolopsis dendroformis*

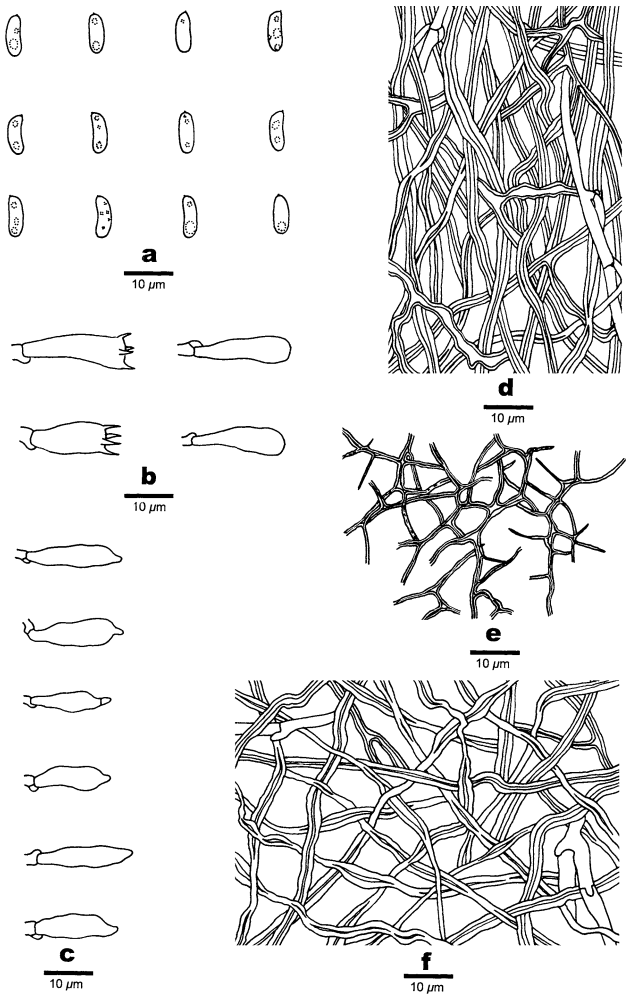

Fig. 19 Microscopic structures of *Coriolopsis dendroformis* (drawn from *Cui 6719*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **e**. Dendriform skeletal hyphae from pileal surface. **f**. Hyphae from context. Bars: **a–f** = 10 μm

circular, projecting up to 4 cm, 3 cm wide and 3 mm thick at base. Pileal surface pale yellowish-brown to yellowish-brown when dry, glabrous, concentrically zonate and sulcate; margin sharp, sometimes trend upward. Pore surface yellowish-brown to grayish-brown when dry; sterile margin white to cream, up to 2 mm wide; pores round to angular, 1.5–3 per mm; dissepiments thin, entire or slightly lacerate. Context pale yellowish-brown to yellowish-brown, soft corky, up to 1 mm thick. Tubes pale gray, corky, up to 2 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae dextrinoid, CB–; tissues darkening in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2.3–4 μm in diam; skeletal hyphae dominant, pale yellowish-brown to yellowish-brown, thick-walled with a wide to narrow lumen, occasionally branched, interwoven, 2.5–3.5 μm in diam;

binding hyphae pale yellowish-brown to yellowish-brown, thick-walled to almost solid, frequently branched, interwoven, 1.5–3.5 µm in diam; skeletal hyphae at pileal surface pale yellowish-brown to yellowish-brown, thick-walled to almost solid, frequently branched as dendroform, interwoven, 0.5–2 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.8–3 µm in diam; skeletal hyphae dominant, pale yellowish-brown to yellowish-brown, thick-walled with a wide to narrow lumen, occasionally branched, occasionally collapsed when dry, interwoven, 2.5–3.8 µm in diam; binding hyphae pale yellowish-brown to yellowish-brown, thick-walled to almost solid, frequently branched, interwoven, 1.5–3.5 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 15–20 × 4–6 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 16–23 × 6–7 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, usually with one or two guttules, IKI–, CB–, 7–9 × (2.3–)2.5–3 µm, L = 8.06 µm, W = 2.87 µm, Q = 2.84–2.9 (n = 60/2).

Notes. — *Coriolopsis dendriformis* is characterized by its pale yellowish-brown to yellowish-brown, glabrous pileal surface, dextrinoid skeletal and binding hyphae, abundant dendriform skeletal hyphae presence at pileal surface, and distribution mainly in tropical to subtropical areas.

Additional specimen (paratype) examined: **CHINA**. **Guangxi**, Shangsi County, Shiwandashan National Forest Park, on fallen angiosperm trunk, 26 July 2012, *Yuan 6316* (IFP).

Coriolopsis glabro-rigens (Lloyd) Núñez & Ryvarden, *Syn. Fung.* 14: 256 (2001) (Figs. 20, 21).
MycoBank: MB 374533
Basionym: *Polystictus glabro-rigens* Lloyd, *Mycol. Writ.* 7: 1145 (1922).

Fruiting body. — Basidiocarps annual, pileate, without odor or taste when fresh, corky and light in weight upon drying. Pilei applanate, dimidiate or semicircular to shell-shaped, projecting up to 2 cm, 5 cm wide and 5 mm thick at base. Pileal surface cinnamon to snuff brown when dry, appressed strigose near the base and glabrous towards the margin, concentrically sulcate and radially veined; margin acute. Pore surface yellowish-brown with a pinkish tint; pores angular, 5–6 per mm; dissepiments thin, entire. Context pale snuff brown to cinnamon, corky, up to 2 mm thick near the base. Tubes concolorous with context, up to 3 mm long.

Fig. 20 Basidiocarps of the *Coriolopsis glabro-rigens*

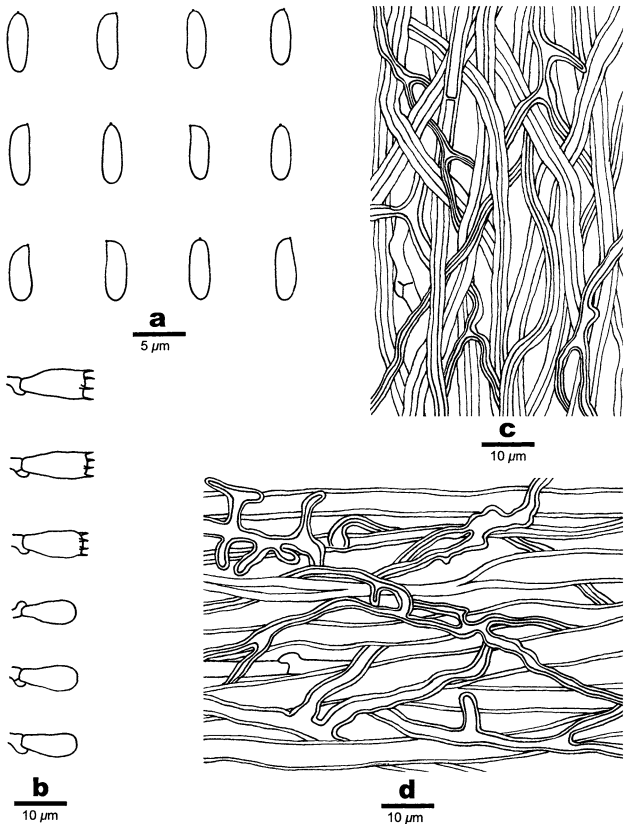

Fig. 21 Microscopic structures of *Coriolopsis glabro-rigens* (drawn from *Dai 7894*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 µm; **b–d** = 10 µm

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues darkening in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, 2–4 µm in diam; skeletal hyphae dominant, golden yellowish, thick-walled, occasionally branched, regularly arranged, 5–8 µm in diam; binding hyphae hyaline to

golden yellowish, thick-walled to subsolid, frequently branched, strongly interwoven, 1.5–3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.5–2.8 μm in diam; skeletal hyphae dominant, golden yellowish, thick-walled (up to 2 μm thick), occasionally branched and covered by large crystals, strongly interwoven, 3.5–5 μm in diam; binding hyphae hyaline to golden yellowish, thick-walled to subsolid, distinctly branched, strongly interwoven, 1.8–3 μm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 11–15 × 4.5–6 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, usually with one guttule, IKI–, CB–, (4.8–)5–6 × (1.9–)2–2.4(–2.5) μm, L = 5.48 μm, W = 2.16 μm, Q = 2.3 (n = 70/1).

Notes. — *Coriolopsis glabro-rigens* is characterized by its brown cinnamon to snuff brown basidiocarps, slightly pinkish pore surface, and distributed in subtropical to tropical areas.

Specimens examined: **CHINA**. **Fujian**, Jian'ou County, Wanmulin Nature Reserve, on fallen angiosperm trunk, 30 August 2006, *Cui 4207* (IFP). **Hainan**, Haikou, Nanchahe, on fallen angiosperm trunk, 3 September 2006, *Dai 7894* (IFP).

Coriolopsis hainanensis Hai J. Li, Y.C. Dai & B.K. Cui, **sp. nov.** (Figs. 22, 23).

MycoBank: MB 825655

Differs form other *Coriolopsis* species by its resupinate to effused-reflexed basidiocarps, velutinate pileal surface, dextrinoid skeletal and binding hyphae, and distribution in tropical China.

Type. — **CHINA. Hainan**, Chengmai County, on fallen angiosperm trunk, 6 May 2009, *Dai 10738* (holotype, BJFC).

Fig. 22 Basidiocarps of the *Coriolopsis hainanensis*

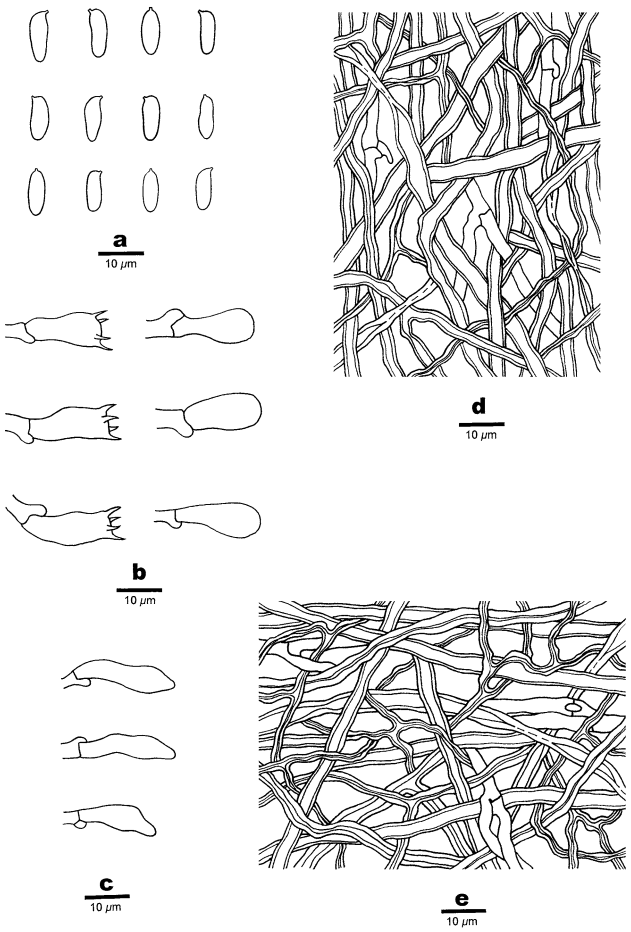

Fig. 23 Microscopic structures of *Coriolopsis hainanensis* (drawn from *Dai 10738*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **e**. Hyphae from context. Bars: **a–e** = 10 μm

Etymology. — *Hainanensis* (Lat.): referring to the locality of the species in Hainan Province of China.

Fruiting body. — Basidiocarps annual, resupinate to effused-reflexed, without odor or taste when fresh, soft coriaceous when dry. Pilei narrow, projecting up to 0.7 cm, 3 cm wide and 2 mm thick at base; resupinate part up to 10 cm long, 3 cm wide. Pileal surface pale yellowish-brown to yellowish-brown when dry, velutinate, without concentric zones; margin sharp, entire. Pore surface pale brown to grayish-brown when dry; pores round to angular, 3–4 per mm; dissepiments thin, entire. Context yellowish-brown, soft coriaceous, up to 1 mm thick. Tubes slightly paler than context, soft coriaceous, up to 1 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae dominant, thick-walled to subsolid, dextrinoid, CB–; tissues darkening in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, frequently branched, 2.5–4 μm in diam; skeletal

hyphae dominant, pale yellowish-brown to yellowish-brown, thick-walled to subsolid, occasionally branched, interwoven, 3–5 µm in diam; binding hyphae pale yellowish-brown to yellowish-brown, thick-walled to subsolid, frequently branched, interwoven, 1.8–3.5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, frequently branched, 2–3.5 µm in diam; skeletal hyphae dominant, pale yellowish-brown to yellowish-brown, thick-walled, occasionally branched, frequently collapsed when dry, interwoven, 2.5–4.5 µm in diam; binding hyphae pale yellowish-brown to yellowish-brown, thick-walled to almost solid, frequently branched, interwoven, 1.2–2.5 µm in diam. Cystidia absent; fusoid cystidioles occasionally present, hyaline, thin-walled, 16–24 × 4.5–6 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 13–26 × 6.5–9 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, 8–11 × (3–)3.3–4.4(–5) µm, L = 9.58 µm, W = 3.88 µm, Q = 2.47 (n = 30/1).

Notes. — *Coriolopsis hainanensis* is characterized by its resupinate to effused-reflexed basidiocarps, pale yellowish-brown to yellowish-brown, velutinate pileal surface, dextrinoid skeletal and binding hyphae, and distribution in tropical China. *Coriolopsis dendriformis* has dextrinoid skeletal and binding hyphae, too; but it has bigger pores (1.5–3 per mm), thinner basidiospores (7–9 × 2.5–3 µm) and the presence of dendriform skeletal hyphae at pileal surface.

Additional specimens (paratypes) examined: **CHINA**. **Hainan**, Changjiang County, Bawangling Nature Reserve, on fallen angiosperm trunk, 9 May 2009, *Dai 10786* (BJFC); Wanning County, Tianmao, on fallen angiosperm trunk, 14 May 2009, *Cui 6671* (BJFC).

Coriolopsis retropicta (Lloyd) Teng, *Fungi of China*: 760 (1963) (Figs. 24, 25).
MycoBank: MB 328931
Basionym: *Trametes retropicta* Lloyd, *Mycol. Writ.* 7: 1113 (1922).

Fruiting body. — Basidiocarps annual, effused-reflexed to pileate, without odor or taste when fresh, corky and light in weight upon drying. Pilei applanate, dimidiate or semicircular, projecting up to 5 cm, 8 cm wide and 10 mm thick at base. Pileal surface yellowish-brown, cinnamon to fawn when dry, concentrically sulcate, glabrous to roughened at base, sometimes bearing radially arranged stiff hairs; margin acute, cream to pale yellowish. Pore surface gray white to pale brown; sterile margin distinct, up to 1 mm; pores round, 3–5 per mm; dissepiments slightly thick, entire. Context yellowish-brown, tan to cinnamon,

Fig. 24 Basidiocarps of the *Coriolopsis retropica*

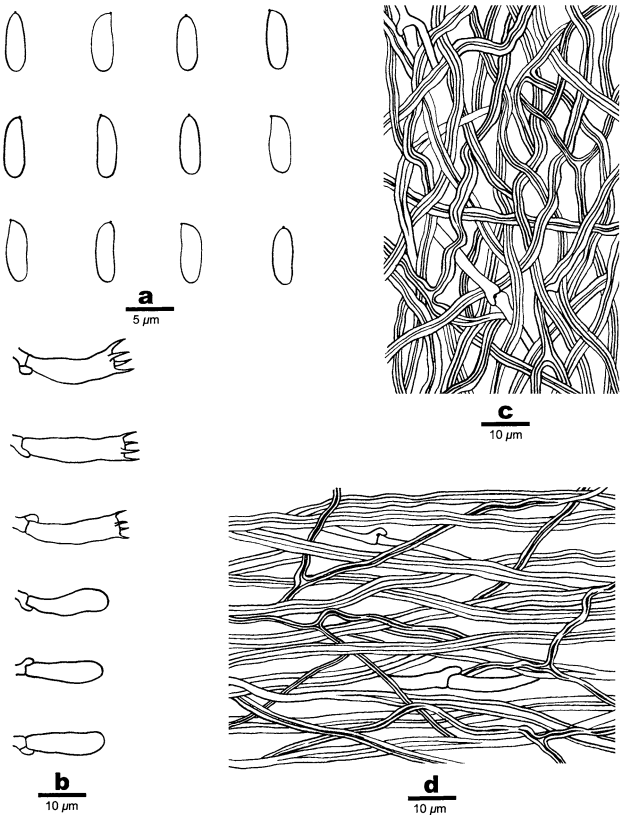

Fig. 25 Microscopic structures of *Coriolopsis retropica* (drawn from *Dai 9924*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 µm; **b–d** = 10 µm

corky, up to 6 mm thick near the base. Tubes gray white, paler than context, up to 4 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB+; tissues becoming black in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2–3.8 µm in diam; skeletal hyphae dominant, pale yellowish-brown to yellowish-brown, thick-walled with a wide to narrow lumen, occasionally collapsed when dry, occasionally branched, straight, regularly

arranged, 2.5–4 µm in diam; binding hyphae pale yellowish-brown to yellowish-brown, thick-walled with a narrow lumen to subsolid, flexuous, frequently branched, 1.5–2.3 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.5–2.8 µm in diam; skeletal hyphae dominant, pale yellowish-brown to yellowish-brown, thick-walled with a narrow lumen, occasionally branched, occasionally collapsed when dry, interwoven, 2.5–3.8 µm in diam; binding hyphae pale yellowish-brown to yellowish-brown, thick-walled with a narrow lumen to subsolid, flexuous, frequently branched, 1.7–2.5 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 13–16 × 5–6 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, usually with one guttule, IKI–, CB–, (5.2–) 5.4–6.8(–7) × 2–2.5(–2.6) µm, L = 6.02 µm, W = 2.24 µm, Q = 2.69 (n = 50/1).

Notes. — *Coriolopsis retropicta* is characterized by its yellowish-brown, cinnamon to fawn basidiocarps with radially arranged stiff hairs.

Specimens examined: **CHINA**. **Hainan**, Ledong County, Jianfengling Nature Reserve, on fallen angiosperm trunk, 1 June 2008, *Dai 9924* (IFP); 2 June 2008, *Dai 9987* (IFP); Lingshui County, Diaoluoshan Forest Park, on fallen angiosperm trunk, 20 November 2007, *Dai 9333* (IFP); 30 May 2008, *Dai 9870* (IFP).

Coriolopsis sanguinaria (Klotzsch) Teng, *Fungi of China*: 760 (1963) (Figs. 26, 27).
MycoBank: MB 311825
Basionym: *Polyporus sanguinarius* Klotzsch, *Linnaea* 8: 484 (1833).

Fruiting body. — Basidiocarps annual, effused-reflexed to pileate, single or imbricate, without odor or taste when fresh, corky and slightly light in weight upon drying. Pilei dimidiate or semicircular, projecting up to 5 cm, 8 cm wide and 4 mm thick at base. Pileal surface pale yellowish-brown, yellowish-brown to reddish-brown when fresh, reddish-brown to dark brown near the base, concentrically sulcate or not, glabrous to roughened at base, usually bearing radially arranged stiff hairs, gradually disappearing with age; margin cream to pale yellowish, acute. Pore surface pale yellowish-brown to yellowish-brown; pores round, 7–10 per mm; dissepiments moderately thick, entire. Context yellowish-brown to pale brown, slightly darker near tubes, corky, up to 2 mm thick near the base. Tubes pale yellowish-brown to gray white, corky, up to 2 mm long.

Fig. 26 Basidiocarps of the *Coriolopsis sanguinaria*

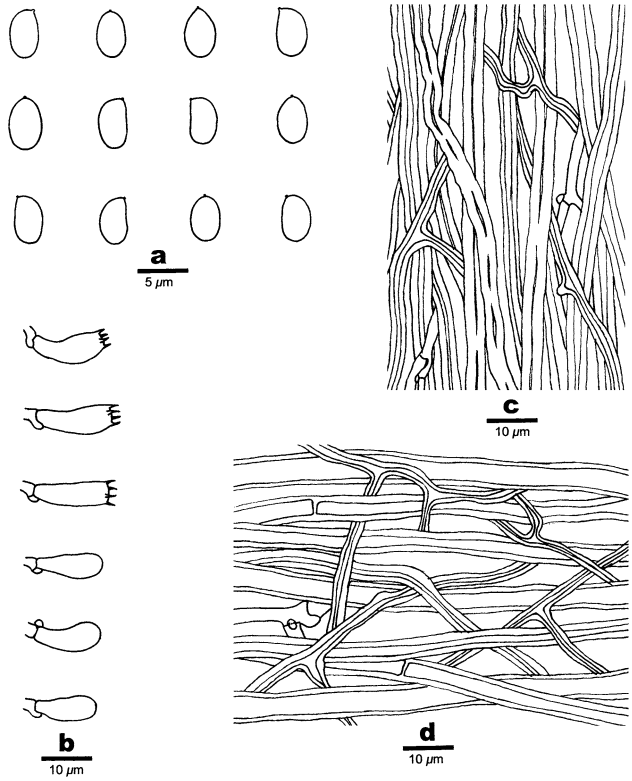

Fig. 27 Microscopic structures of *Coriolopsis sanguinaria* (drawn from *Cui 5470*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 µm; **b–d** = 10 µm

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB+; tissues becoming black in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2–2.8 µm in diam; skeletal hyphae dominant, pale yellowish-brown to yellowish-brown, thick-walled with a wide lumen, sometimes with secondary septa, occasionally collapsed when dry, occasionally branched, straight, regularly arranged, 4–6 µm in diam; binding hyphae pale yellowish-brown to yellowish-

brown, thick-walled, flexuous, frequently branched, 2.5–3.5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.8–2.4 μm in diam; skeletal hyphae dominant, pale yellowish-brown to yellowish-brown, thick-walled to subsolid, occasionally branched, occasionally collapsed when dry, interwoven, 3–5 μm in diam; binding hyphae pale yellowish-brown, thick-walled, flexuous, frequently branched, 2–3.3 μm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 12–16 × 4–6 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, hyaline, thin-walled, smooth, usually with one guttule, IKI–, CB–, (3.8–)4–5 × (2.5–) 2.6–3.3 μm, L = 4.25 μm, W = 2.77 μm, Q = 1.52–1.55 (n = 48/2).

Notes. — *Coriolopsis sanguinaria* is characterized by its yellowish-brown to reddish-brown basidiocarps, small pore and small ellipsoid basidiospores, and distributed in subtropical and tropical areas.

Specimens examined: **CHINA**. **Fujian**, Wuyishan County, Wuyi Mountain, Tianyoufeng, on fallen angiosperm trunk, 26 August 2006, *Cui 4088* (IFP). **Guangxi**, Jinxiu County, Dayaoshan Nature Reserve, on fallen angiosperm trunk, 23 August 2011, *Yuan 5779*, *5796* (IFP); Tianlin County, Cenwanglaoshan Nature Reserve, on fallen angiosperm trunk, 17 July 2012, *Yuan 6070*, *6099* (IFP). **Hainan**, Haikou, Xiuying, on fallen angiosperm trunk, 6 May 2009, *Cui 6202* (BJFC); Lingshui County, Diaoluoshan Nature Reserve, on fallen angiosperm trunk, 19 November 2007, *Dai 9314* (IFP); 20 November 2007, *Cui 5296* (BJFC), *Dai 9350* (IFP); 21 November 2007, *Dai 9362* (IFP); Ledong County, Jianfengling Nature Reserve, on fallen angiosperm trunk, 2 June 2008, *Dai 9980*, *9990* (IFP); Wuzhishan County, Wuzhishan Nature Reserve, on fallen angiosperm trunk, 25 November 2007, *Cui 5444* (BJFC); 26 November 2007, *Cui 5470* (BJFC).

Coriolopsis strumosa (Fr.) Ryvarden, *Kew Bull.* 31(1): 95 (1976) (Figs. 28, 29).
MycoBank: MB 311826
Basionym: *Polyporus strumosus* Fr., *Epicr. syst. mycol.* (Upsaliae): 462 (1838).

Fruiting body. — Basidiocarps annual, pileate, single to imbricate, without odor or taste when fresh, corky and distinctly light in weight upon drying. Pilei applanate, flabelliform, dimidiate or semicircular, projecting up to 12 cm, 15 cm wide and 10 mm thick at base. Pileal surface glabrous, yellowish-brown, olivaceous-brown to umber, turning to grayish-brown with age, concentrically sulcate or not, warted at base in old specimens; margin acute to obtuse. Pore surface cream to pale gray, turning to grayish-brown, dark grayish-brown to olivaceous-brown with age;

Fig. 28 Basidiocarps of the *Coriolopsis strumosa*

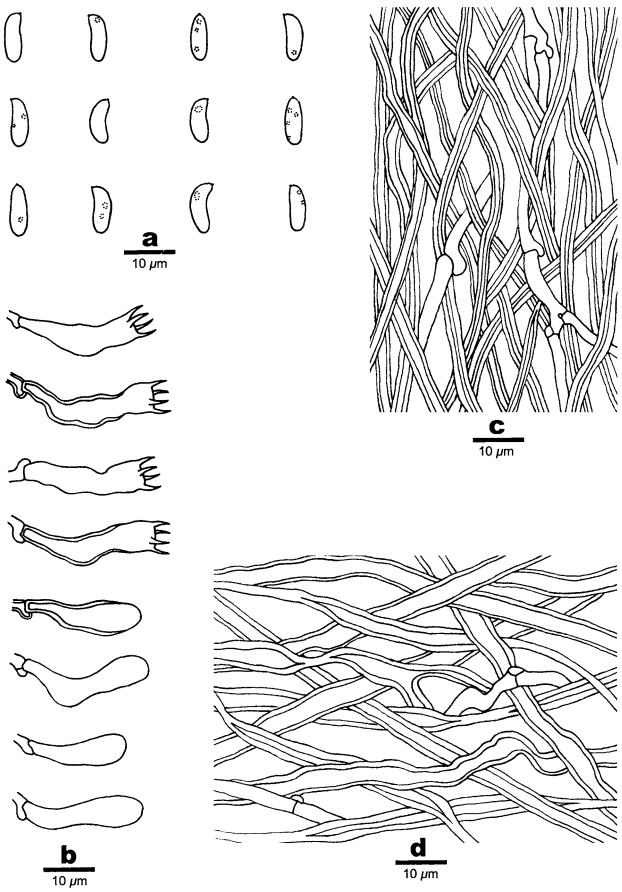

Fig. 29 Microscopic structures of *Coriolopsis strumosa* (drawn from *Dai 10657*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a–d** = 10 μm

pores round, 3–5 per mm; dissepiments thin, entire. Context olivaceous-brown to umber, soft corky, up to 6 mm thick. Tubes dark yellowish-brown, up to 4 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB+; tissues turning to dark brown in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2–3 μm in diam; skeletal hyphae dominant, yellowish-brown, thick-walled with a wide lumen, occasionally collapsed when dry, occasionally branched, straight, interwoven, 4–6 μm in diam; binding hyphae pale yellowish-brown to yellowish-brown, thick-walled, flexuous, frequently branched, 2–3.5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.8–2.4 μm in diam; skeletal hyphae dominant, pale yellowish-brown to yellowish-brown, thick-walled with a wide lumen, occasionally collapsed when dry, occasionally branched, straight, interwoven, 2.8–4 μm in diam; binding hyphae pale yellowish-brown, thick-walled, flexuous, frequently branched, 1.3–2 μm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 20–28 × 6–8 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, usually with one to several guttules, IKI–, CB–, (6.8–)7–10(–10.5) × (2.9–)3–4 μm, L = 8.74 μm, W = 3.51 μm, Q = 2.5–2.72 (n = 90/3).

Notes. — *Coriolopsis strumosa* is characterized by its olivaceous-brown to umber basidiocarps, olivaceous-brown to umber and soft corky context, and large cylindrical basidiospores.

Specimens examined: **CHINA**. **Beijing,** Beijing Botanical Garden, on fallen angiosperm trunk, 27 September 2008, *Dai 10642*, *10657* (BJFC); on fallen angiosperm branch, 4 September 2011, *Cui 10239*, *10240* (BJFC). **Guangxi**, Longzhou County, Nonggang Nature Reserve, on fallen angiosperm trunk, 2 July 2007, *Zhou 14* (IFP); 3 July 2007, *Zhou 52*, *90* (IFP). **Hainan**, Roadside from Baoting to Tunchang, on fallen trunk of *Albizia julibrissin*, 25 November 2002, *Dai 4582* (IFP). **Henan**, Neixiang County, Baotianman Nature Reserve, on fallen trunk of *Ziziphus jujuba*, 26 August 2006, *Li 1174* (IFP). **Hubei**, Tongshan County, Jiugongshan Nature Reserve, on fallen angiosperm trunk, 6 September 2006, *Li 1515* (IFP). **Hunan**, Changsha, Yuelu Mountain, on fallen angiosperm trunk, 14 July 2011, *Dai 12456* (BJFC). **Jiangsu**, Nanjing, Zijin Mountain, on fallen trunk of *Quercus*, 21 August 2006, *Cui 4002* (IFP). **Sichuan**, Xichang, on fallen trunk of *Quercus*, 16 September 2012, *Dai 12876* (BJFC); on fallen angiosperm trunk, 16 September 2012, *Dai 12884*, *12890* (BJFC). **Shannxi**, Zhouzhi County, Louguantai Forest Park, on fallen branch of *Diospyros kaki*, 19 September 2005, *Wang 546* (IFP). **Yunnan**, Yingjiang County, Tongbiguan Nature Reserve, on fallen angiosperm trunk, 30 October 2012, *Dai 13127* (BJFC).

Cryptoporus Shear, *Bull. Torrey Bot. Club* 29: 450 (1902).
MycoBank: MB 17416

Type species: *Cryptoporus volvatus* (Peck) Shear.

Basidiocarps annual, pileate, solitary, ungulate to oblate spheroidal. Pilei cream to deep pinkish buff; margin of pilei extending over the pore surface as a volva with a small basal opening. Pore surface pale to dark brown; pores round; dissepiments thick, entire. Context cream to buff. Tubes obviously paler than pore surface, hard corky. Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal hyphae dominant, hyaline, non-dextrinoid, cyanophilous. Cystidia absent; cystidioles fusiform. Basidia clavate, with four sterigmata and a basal clamp connection. Basidiospores cylindrical to oblong-ellipsoid, hyaline, thick-walled, smooth, IKI–, CB+.

Cryptoporus was established by Shear (1902). Species in the genus have petiolate or nearly sessile basidiocarps with the margin of the pilei extending over the pore surface as a volva with a small basal opening. The hyphal system is trimitic with clamped generative hyphae and non-dextrinoid skeletal hyphae, and basidiospores are thick-walled, hyaline and cylindrical (Gilbertson and Ryvarden 1987). The genus was suggested to be closely related to *Trametes* Fr. due to the trimitic hyphal system and cylindrical basidiospores (Ryvarden 1991). Hibbett and Donoghue (1995) inferred that *Cryptoporus* and *Trametes* belong to one of their seven studied groups based on a phylogenetic classification of the Polyporaceae through parsimony analysis of mitochondrial ribosomal DNA sequences. Moreover, *Ganoderma* P. Karst. is the closest genus to *Cryptoporus* among the genera that they studied. *Cryptoporus* has long been known as a monotypic genus, with the generic type of *C. volvatus* (Peck) Shear, until *C. sinensis* Sheng H. Wu & M. Zang (Wu and Zang 2000) was described.

Key to species of *Cryptoporus* in China

1. Basidiospores 9.2–11.5 × 4.1–5 μm.....*C. volvatus*
1. Basidiospores 8.3–9.5 × 3.8–4.2 μm.....*C. sinensis*

Cryptoporus sinensis Sheng H. Wu & M. Zang, *Mycotaxon* 74(2): 416 (2000) (Figs. 30, 31).
MycoBank: MB 467359

Fruiting body. — Basidiocarps annual, pileate, solitary, without odor or taste when fresh, hard corky upon drying. Pilei oblate spheroidal, projecting up to 2 cm, 3 cm wide and 1 cm thick at base. Pileal surface cream to pinkish buff when fresh, yellowish brown to reddish brown upon drying; margin extending over the pore surface as a volva with a small basal opening. Pore surface pale brown; pores round, 3–5 per mm; dissepiments thick, entire. Context cream, hard corky upon dying, up to 7 mm thick. Tubes cream, obviously paler than pore surface, hard corky, up to 3 mm long.

Fig. 30 A basidiocarp of *Cryptoporus sinensis*

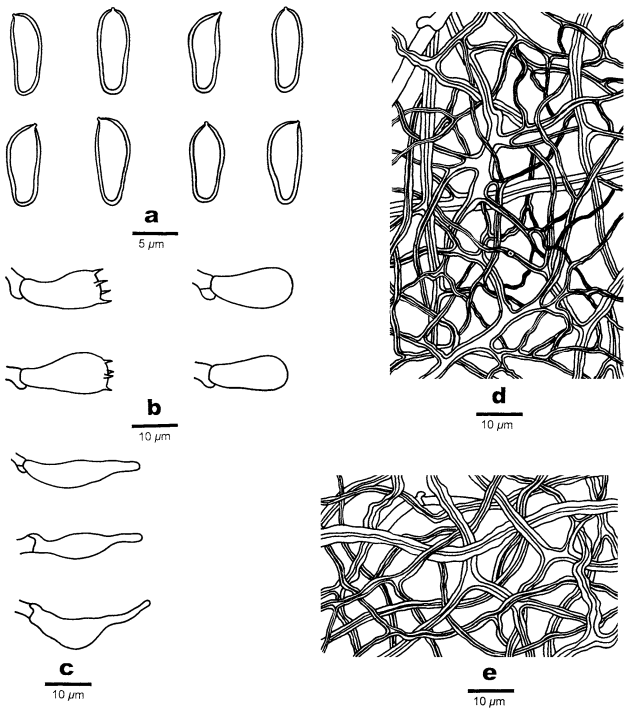

Fig. 31 Microscopic structures of *Cryptoporus sinensis*. **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **f**. Hyphae from context. Bars: **a** = 5 μm; **b–e** = 10 μm

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB+; tissues darkening in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, branched, interwoven, 3–4.2 μm in diam; binding hyphae abundant, thick-walled, frequently branched, strongly interwoven, 1.2–2.5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3 μm in diam; skeletal hyphae dominant, hyaline to pale yellowish brown, thick-walled to subsolid, frequently branched, interwoven, 2.5–3 μm in diam; binding hyphae abundant, frequently branched, thick-walled, strongly interwoven, 1.5–2 μm in diam. Cystidia absent; fusoid cystidioles present, thin-walled, smooth. Basidia clavate, with four sterigmata and a basal clamp connection, 14–18 × 5–7 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical to oblong-ellipsoid, hyaline, thick-walled, smooth, IKI–, CB+, (8.2–)8.3–9.5(–9.8) × (3.7–)3.8–4.2(–4.3) μm, L = 8.92 μm, W = 3.95 μm, Q = 2.26 (n = 30/1).

Notes. — *Cryptoporus sinensis* was described from southern China (Wu and Zang 2000) and is the second species in the genus. It is very similar to *C. volvatus* and very difficult to separate from the latter in macro-morphology, but the latter has bigger basidiospores (9.2–11.5 × 4.1–5 μm).

Specimens examined: **CHINA**. **Fujian**, Sanming, on fallen trunk of *Pinus*, 23 July 1994, HMAS 41197 (HMAS); Wuyishan County, Wuyishan Nature Reserve, on dead tree of *Pinus*, 20 October 2005, *Dai 7281* (BJFC). **Yunnan**, Jinghong, Dadugang, on living tree of *Pinus*, 8 June 2011, *Dai 12341, 12346* (BJFC).

Cryptoporus volvatus (Peck) Shear, *Bull. Torrey Bot. Club* 29: 450 (1902) (Figs. 32, 33).
MycoBank: MB 185937
Basionym: *Polyporus volvatus* Peck, *Ann. Rep. N.Y. St. Mus. nat. Hist.* 27: 98 (1875).

Fruiting body. — Basidiocarps annual, pileate, solitary, without odor or taste when fresh, hard corky upon drying. Pilei oblate spheroidal, projecting up to 4.5 cm, 3.5 cm wide and 2.5 cm thick at base. Pileal surface cream to deep

Fig. 32 Basidiocarps of *Cryptoporus volvatus*

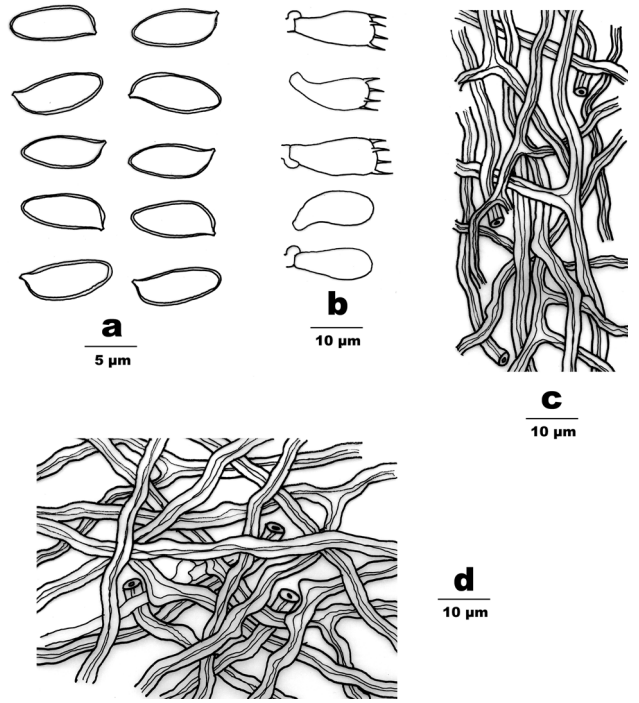

Fig. 33 Microscopic structures of *Cryptoporus volvatus*. **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 µm; **b–d** = 10 µm

pinkish buff, margin extending over the pore surface as a volva with a small basal opening, paler than pileal surface. Pore surface chestnut; pores round, 3–5 per mm; dissepiments thick, entire. Context cream to pale yellow, soft leathery to soft corky, 1–2 mm thick. Tubes light yellowish brown, obviously lighter than pore surface, hard corky, up to 5 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB+; tissues darkening in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 3–4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, branched, interwoven, 3–6.2 µm in diam; binding hyphae abundant, thick-walled, frequently branched, strongly interwoven, 1.2–3.5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2.5–4 µm in diam; skeletal hyphae dominant, hyaline to pale yellowish brown, thick-walled to subsolid, frequently branched, interwoven, 2.5–4.5 µm in diam; binding hyphae abundant, frequently branched, thick-walled, strongly interwoven, 1.5–3 µm in diam. Cystidia absent; fusoid cystidioles present, thin-walled, smooth, 18–24 × 7–9 µm. Basidia short clavate, with four sterigmata and a basal clamp connection, 17–22 × 7–10 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical to oblong-ellipsoid, hyaline, thick-walled, smooth, IKI–, CB+, (8.5–)9.2–11.5(–11.8) × (3.5–)4.1–5(–5.5) µm, L = 10.44 µm, W = 4.74 µm, Q = 2.17–2.26 (n=60/2).

Notes. — *Cryptoporus volvatus* has a widespread distribution in North America and East Asia whereas *C. sinensis* is so far known only from southern China. Further studies based on more specimens and multi-loci are needed to clarify whether the basidiospores size range of *C. sinensis* indicate a distinct species or belong to the natural size of *C. volvatus*.

Specimens examined: **CHINA**. **Heilongjiang**, Yichun, Fenglin Nature Reserve, on fallen trunk of *Pinus*, 10 August 2000, *R. Penttila 13434* (IFP). **Hunan**, Yizhang, Mangshan Nature Reserve, on fallen trunk of *Pinus*, 27 June 2007, *Li 1822* (IFP). **Sichuan**, Xichang, on fallen trunk of *Pinus*, 16 September 2012, *Dai 12877* (BJFC).

Daedaleopsis J. Schröt., *Krypt.-Fl. Schlesien (Breslau)* 3.1(25–32): 492 (1888).
MycoBank: MB 17466
Type species: *Daedaleopsis confragosa* (Bolton) J. Schröt.

Basidiocarps annual, pileate to effused-reflexed. Pilei pale brown to deep red, zonate, mostly glabrous. Hymenophore poroid to lamellate. Context pale brown. Hyphal system trimitic; generative hyphae bearing clamp connections; dendrohyphidia present, hyaline, thin-walled. Basidiospores cylindrical, slightly curved, hyaline, thin-walled, smooth, IKI–, CB–.

Species in *Daedaleopsis* cause a white rot, and have a wide distribution in the North Hemisphere (Dai 2012b). At present, five species have been recorded from China (Li et al. 2016a).

Key to species of *Daedaleopsis* in China

1 Hymenophore usually lamellate ..... ……*D. tricolor*
1 Hymenophore usually poroid ..... ……2
2 Basidiocarps reddish brown..... ……*D. purpurea*
2 Basidiocarps not reddish brown ..... ……3
3 Distribution in tropical areas ..... ……*D. hainanensis*
3 Distribution in temperate areas..... ……4
4 Pileal surface pale ochraceous, pores sinuous ..... ……
……..*D. sinensis*
4 Pileal surface pale yellow to brown, pores variable but not sinuous ..... ……*D. confragosa*

Daedaleopsis confragosa (Bolton) J. Schrot., *Crypt. Fl. Schlesien* 3: 493 (1888) (Figs. 34, 35).
MycoBank: MB 355679
Basionym: *Boletus confragosus* Bolton, *Hist. fung. Halifax, App.* (Huddersfield) 3: 160 (1792).

Fruiting body. — Basidiocarps annual, pileate, occasionally effused-reflexed, usually imbricate, soft corky to

Fig. 34 Basidiocarps of *Daedaleopsis confragosa*

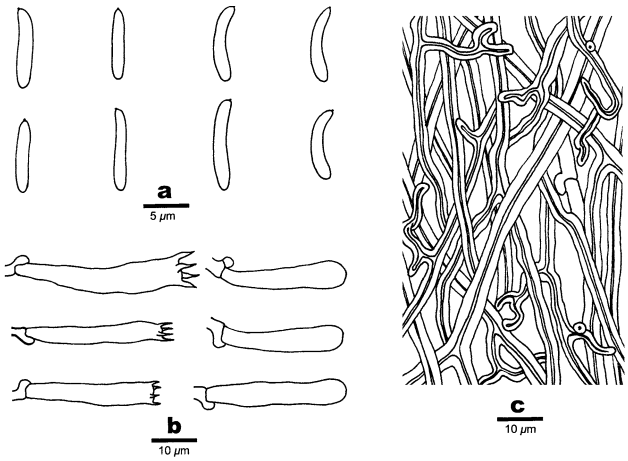

Fig. 35 Microscopic structures of *Daedaleopsis confragosa* (drawn from *Dai 1609*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 μm; **b–c** = 10 μm

leathery, without odor or taste when fresh, hard corky and light in weight upon drying. Pilei applanate, flabelliform, conchoidal or semicircular, projecting up to 7 cm, 16 cm wide and 2.5 cm thick at base. Pileal surface pale yellow to pale brown to brown, velutinate when juvenile, turning to glabrous with age, concentrically zonate, with radial longitudinal stripe, sometimes slightly warted in old specimens; margin acute. Pore surface cream to pale yellowish brown when fresh, turning to pale brown to pale dark brown when dry; pores variable, round to elongated, daedaleoid or lamellate, about 1 per mm; dissepiments thin, entire to lacerate. Sterile margin narrow, cream, up to 0.5 mm wide. Context yellowish brown, corky, azonate, up to 15 mm thick. Tubes concolorous with context, slightly paler than pore surface, corky, up to 10 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, weakly CB+; tissues darkening in KOH.

Context. — Generative hyphae frequent, hyaline, thin-walled, frequently branched, flexuous, 3–4 μm in diam; skeletal hyphae dominant, hyaline to pale yellow, thick-walled with a wide to narrow lumen, frequently branched, flexuous, interwoven, 3.5–5.5 μm in diam; binding hyphae hyaline to pale yellow, thick-walled, subsolid, flexuous, 1.5–3.2 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, frequently branched, 2–3 μm in diam; skeletal hyphae dominant, hyaline to pale yellow, thick-walled with a wide to narrow lumen, frequently branched, flexuous, loosely interwoven, 2–5.5 μm in diam; binding hyphae hyaline to pale yellow, thick-walled, subsolid, flexuous, 1.5–3 μm in diam. Cystidia and cystidioles absent. Dendrohyphidia frequently present. Basidia clavate, with four sterigmata and a basal clamp connection, 17–23 × 4–6 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, slightly curved, hyaline, thin-walled, smooth, IKI–, CB–, (6–)6.5–9(–10) × (1.2–)1.5–2(–2.6) μm, L = 7.86 μm, W = 1.76 μm, Q = 4.46–4.95 (n = 90/3).

Notes. — The hymenophore of *Daedaleopsis confragosa* is variable from poroid to daedaleoid or lamellate. It usually grows on living or dead trees of *Salix*.

Specimens examined: **CHINA**. **Hebei**, Xinglong County, Wulingshan Nature Reserve, on living tree of *Salix*, 30 July 2009, *Cui 6892* (BJFC). **Heilongjiang**, Tangyuan County, Daliangzihe Forest Park, on living tree of *Salix*, 25 August 2014, *Cui 11410* (BJFC). **Jilin**, Antu County, Changbaishan Nature Reserve, on living tree of *Betula*, 13 September 2007, *Dai 9162* (BJFC). **Jiangsu**, Nanjing, Zijin Mountain, on living tree of *Salix*, 10 October 2003, *Dai 5295* (BJFC). **Jiangxi**, Jiujiang, Nanhu Park, on living tree of *Salix*, 10 October 2008, *Cui 6104* (BJFC). **Shanxi**, Jiaocheng County, Pangquangou Nature Reserve, on living tree of *Salix*, 22 September 2006, *Yuan 2496* (IFP). **Sichuan**, Xiaojin County, Siguniangshan Nature Reserve, on living tree of *Salix*, 16 September 2012, *Cui 10695* (BJFC). **Xizang (Tibet)**, Linzhi, Gadinggou Park, on living tree of *Salix*, 25 September 2010, *Cui 9732* (BJFC).

Daedaleopsis hainanensis Hai J. Li & S.H. He, *Phytotaxa* 275: 296 (2016) (Figs. 36, 37).
MycoBank: MB 816543

Fruiting body. — Basidiocarps annual, pileate, usually single, without odor or taste when fresh, corky and distinctly light in weight upon drying. Pilei applanate, flabelliform, dimidiate or semicircular, projecting up to 3.2 cm, 5.3 cm wide and 3 mm thick at base. Pileal surface pale yellowish-brown to grayish brown when fresh, turning to yellowish-brown to cinnamon-buff when dry, glabrous, concentrically sulcate, sometimes slightly warted at base; margin acute. Pore surface pale gray to fuscous with a distinct rose to pink margin when fresh, turning to

Fig. 36 Basidiocarps of *Daedaleopsis hainanensis*

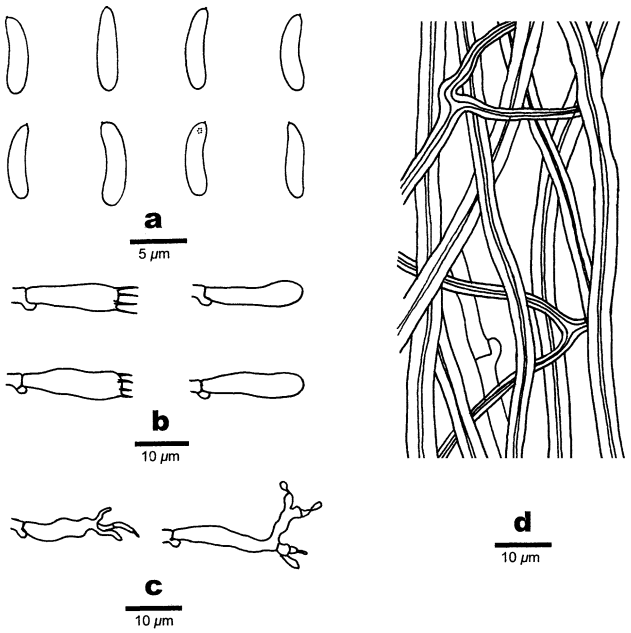

Fig. 37 Microscopic structures of *Daedaleopsis hainanensis* (drawn from *Cui 5178*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Dendrohyphidia; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

yellowish-brown to grayish-brown with a pale yellowish-brown margin; pores round to slightly elongated, about 3–4 per mm; dissepiments thin to moderately thick, entire. Context pale yellowish-brown to yellowish-brown, soft corky, up to 2 mm thick near the base. Tubes yellowish-brown to pale grayish-brown, corky, up to 1 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues darkening in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, branched, 2.5–3.5 μm in diam; skeletal hyphae dominant, pale yellowish-brown, thick-walled to subsolid, frequently branched, interwoven, 3–5 μm in diam; binding hyphae pale yellowish-brown, thick-walled to almost solid, branched, interwoven, 2–3.2 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2–2.5 μm in diam; skeletal hyphae dominant, yellowish-brown to golden yellowish, thick-walled to subsolid, frequently branched, interwoven, 2.5–3.4 μm in diam; binding hyphae yellowish-brown to golden yellowish, flexuous, thick-walled to almost solid, branched, 2–2.8 μm in diam. Cystidia and cystidioles absent. Dendrohyphidia and hyphal pegs present in the hymenium. Basidia clavate, with four sterigmata and a basal clamp connection, 20–25 × 5–6 μm; basidioles similar to basidia in shape, but slightly smaller.

Spores. — Basidiospores allantoid to cylindrical, usually tapering towards the apiculus, hyaline, thin-walled, smooth, IKI–, CB–, 6–8 × (1.5–)1.7–2.2 μm, L = 6.9 μm, W = 1.8 μm, Q = 3.8 (n = 40/1).

Notes. — *Daedaleopsis hainanensis* was recently described from tropical area of China (Li et al. 2016a). It is distinct by annual, flabelliform, dimidiate or semicircular pilei with a glabrous, more or less yellowish-brown and concentrically sulcate pileal surface, a rose to pink fresh pore surface, round pores, the presence of dendrohyphidia and hyphal pegs, and allantoid to cylindrical basidiospores measuring as 6–8 × 1.7–2.2 μm.

Specimens examined: **CHINA**. **Hainan**, Ledong County, Jianfengling Nature Reserve, on fallen angiosperm trunk, 17 November 2007, *Cui 5178* (holotype, BJFC), *Cui 5187* (paratype, BJFC); on fallen angiosperm branch, 17 November 2007, *Dai 9268* (paratype, BJFC).

Daedaleopsis purpurea (Cooke) Imazeki & Aoshima, *Flora of eastern Himalaya* (Tokyo): 619 (1966) (Figs. 38, 39).

MycoBank: MB 329650

Basionym: *Trametes purpurea* Cooke, *Grevillea* 10(no. 56): 121 (1882).

Fruiting body. — Basidiocarps annual, pileate, solitary, without odor or taste when fresh, hard corky and light in

Fig. 38 A basidiocarp of *Daedaleopsis purpurea*

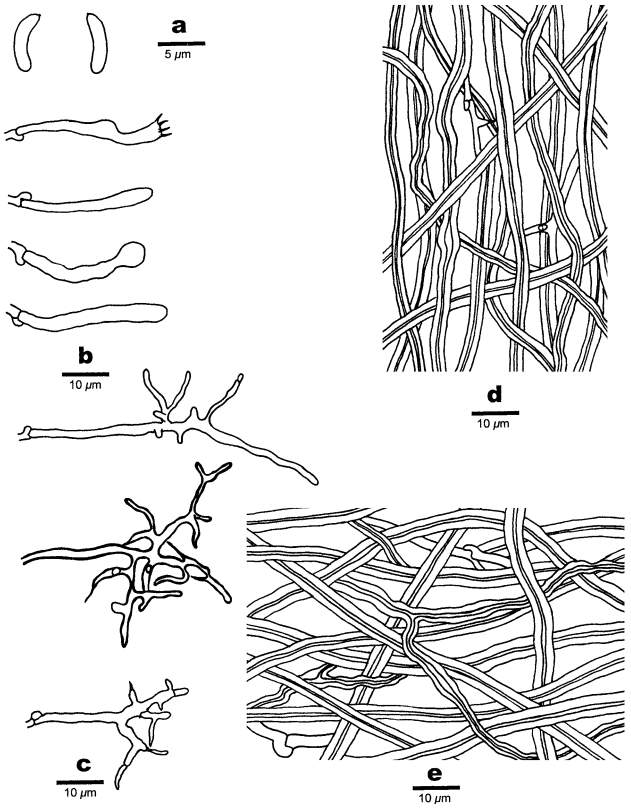

Fig. 39 Microscopic structures of *Daedaleopsis purpurea* (drawn from *Dai 13583a*). **a**. Basidiospores; **b**. A basidium and basidioles; **c**. Dendrohyphidia; **d**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 μm; **b–e** = 10 μm

weight when dry. Pilei semicircular to dimidiate, projecting up to 3.5 cm, 5 cm wide and 7 mm thick at base. Pileal surface red to reddish brown when fresh, slightly paler when dry, concentrically zonate and sulcate, glabrous or velutinate; margin sharp. Pore surface white to cream when fresh, cream to pale cinnamon when dry; pores round to angular, 3–5 per mm; dissepiments thin, entire. Context pale brown, corky when dry, up to 1 mm thick; tubes concolorous with the pore surface, hard corky, up to 6 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues darkening in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3 μm in diam; skeletal hyphae dominant, pale yellowish-brown, thick-walled to subsolid, frequently branched, interwoven, 2.8–5.4 μm in diam; binding hyphae pale yellowish-brown, thick-walled to subsolid, branched, strongly interwoven, 2–3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 1.5–2.5 μm in diam; skeletal hyphae dominant, pale yellowish-brown, thick-walled to subsolid, frequently branched, interwoven, 2.2–3.2 μm in diam; binding hyphae infrequent, pale yellowish-brown, thick-walled to subsolid, occasionally branched, interwoven, 1.8–2.5 μm in diam. Cystidia and cystidioles absent. Dendrohyphidia abundant in the hymenium, thin- to slightly thick-walled. Hymenium almost collapsed in the studied specimens, only one basidium was observed, clavate, with four sterigmata and a basal clamp connection, 33 × 5 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Only two basidiospores observed, cylindrical, slightly curved, hyaline, thin-walled, smooth, IKI–, CB–, 7 × 1.7–2 μm.

Notes. — *Daedaleopsis purpurea* is characterized by its reddish brown pilei, the presence of dendrohyphidia in the hymenium, and cylindrical, curved basidiospores.

Specimens examined: **CHINA**. **Yunnan**, Jingdong County, Ailaoshan Nature Reserve, on angiosperm wood, 3 September 2007, *Yuan 3282, 3283, 3301* (IFP); on angiosperm wood, 15 October 2013, *Dai 13583a* (BJFC).

Daedaleopsis sinensis (Lloyd) Y.C. Dai, *Fungal Science*, 11(3, 4): 90, (1996) (Figs. 40, 41).
MycoBank: MB 446763
Basionym: *Daedalea sinensis* Lloyd, *Mycol. Writ.* 7(Letter 66): 1112, (1922).

Fruiting body. — Basidiocarps annual, pileate, solitary or imbricate, corky, without odor or taste when fresh, hard corky and light in weight upon drying. Pilei applanate, conchoidal or semicircular, projecting up to 6 cm, 11 cm wide and 4 cm thick at base. Pileal surface white, ochraceous, pale yellow to pale yellowish brown, velutinate when juvenile, turning to glabrous with age, concentrically zonate, sometimes slightly warted in old specimens; margin acute. Pore surface cream to pale yellow when fresh, turning to pale yellow to yellowish brown or grayish brown when dry; pores round to angular, 1–2 per mm;

Fig. 40 Basidiocarps of *Daedaleopsis sinensis*

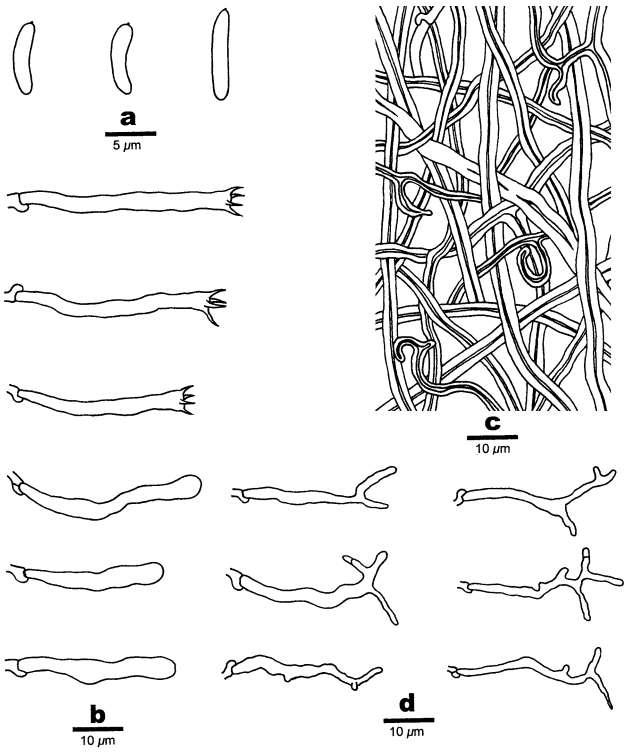

Fig. 41 Microscopic structures of *Daedaleopsis sinensis* (drawn from *Dai 14552*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Dendrohyphidia. Bars: **a** = 5 μm; **b–d** = 10 μm

dissepiments thin, entire to lacerate. Context cream to pale yellow, corky, up to 20 mm thick. Tubes concolorous with context, corky, up to 20 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, weakly CB+; tissues darkening in KOH.

Context. — Generative hyphae hyaline, thin-walled, branched, 2.5–4 μm in diam; skeletal hyphae dominant, hyaline to pale yellow, thick-walled with a wide to narrow lumen, branched, interwoven, 3–5 μm in diam; binding hyphae hyaline to pale yellow, thick-walled, subsolid, flexuous, 1.5–3.5 μm in diam.

Tubes. — Generative hyphae hyaline, thin-walled, branched, 2–3 μm in diam; skeletal hyphae dominant, hyaline to pale yellow, thick-walled with a wide to narrow lumen, branched, interwoven, 2.5–5 μm in diam; binding hyphae hyaline to pale yellow, thick-walled, subsolid, flexuous, 1.5–3 μm in diam. Cystidia and cystidioles absent. Dendrohyphidia frequently present. Basidia clavate, with four sterigmata and a basal clamp connection, 20–35 × 3.5–6 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores allantoid to cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (4.9–)5–6.5(–7.2) × (1.4–)1.6–1.8(–2) μm, L = 5.96 μm, W = 1.73 μm, Q = 3.45 (n = 30/1).

Notes. — *Daedaleopsis sinensis* is characterized by its white to pale ochraceous pileal surface, usually glabrous and warted pilei, sinuous pores in old specimens, and grows mostly on *Alnus*.

Specimens examined: **CHINA**. **Heilongjiang**, Tangyuan County, Daliangzihe Forest Park, on living tree of *Alnus*, 25 August 2014, *Cui 11408* (BJFC). **Jilin**, Tumen, Xiaohelong Forest Farm, on living tree of *Alnus*, 10 October 2009, *Dai 11429* (BJFC).

Daedaleopsis tricolor (Bull.) Bondartsev & Singer, *Annls mycol.* 39(1): 64 (1941) (Figs. 42,43).
MycoBank: MB 118341
Basionym: *Agaricus tricolor* Bull., *Hist. Champ. Fr. (Paris)* 1: 541 (1791).

Fruiting body. — Basidiocarps annual, pileate, imbricate, corky to leathery, without odor or taste when fresh, hard corky and light in weight upon drying. Pilei applanate, flabelliform, conchoidal or semicircular, projecting up to 5 cm, 10 cm wide and 1.2 cm thick at base. Pileal surface grayish brown to reddish brown, glabrous, concentrically zonate; margin acute. Hymenophore surface cream to pale gray when fresh, turning to pale grayish brown to chestnut brown or dark brown when dry; hymenophores irregular poroid when juvenile, pores 1–2 per mm, mostly lamellate when old, sometimes dichotomous branching, lamellae 1–2 per mm. Context pale brown, corky, up to 2 mm thick.

Fig. 42 Basidiocarps of *Daedaleopsis tricolor*

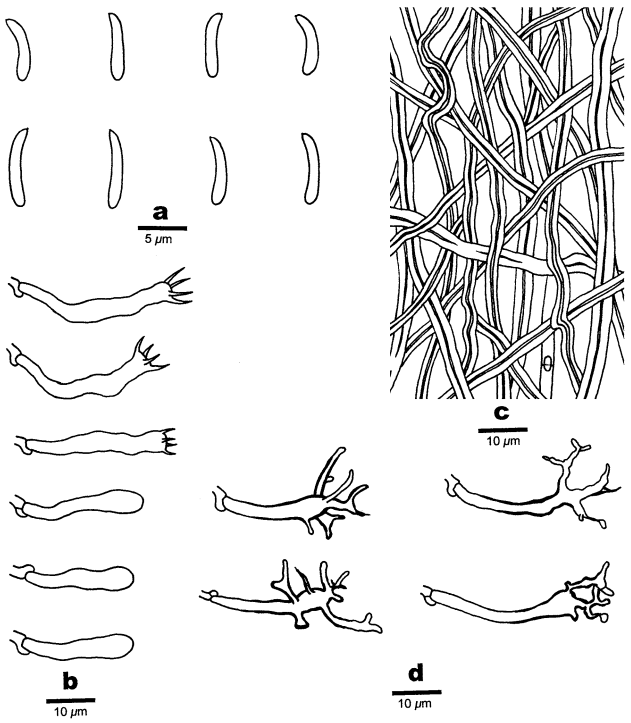

Fig. 43 Microscopic structures of *Daedaleopsis tricolor* (drawn from *Dai 8349*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Dendrohyphidia. Bars: **a** = 5 μm; **b–d** = 10 μm

Lamellae slightly paler than hymenophore surface, corky, up to 10 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues darkening in KOH.

Context. — Generative hyphae hyaline, thin- to slightly thick-walled, branched, 2.5–4 μm in diam; skeletal hyphae dominant, pale yellow, thick-walled with a narrow lumen to subsolid, branched, interwoven, 3–5 μm in diam; binding hyphae pale yellow, thick-walled, subsolid, flexuous, 1.5–2.5 μm in diam.

Tubes. — Generative hyphae hyaline, thin-walled, occasionally branched, 2–4 μm in diam; skeletal hyphae dominant, pale yellow, thick-walled with a narrow lumen to subsolid, branched, interwoven, 3–4.5 μm in diam; binding hyphae pale yellow, thick-walled, subsolid, flexuous, 1–2 μm in diam. Cystidia and cystidioles absent. Dendrohyphidia frequently present. Basidia clavate, with four sterigmata and a basal clamp connection, 23–27 × 4–5 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, slightly curved, hyaline, thin-walled, smooth, IKI–, CB–, (6.5–)7–9(–9.5) × 2–2.5 μm, L = 7.92 μm, W = 2.3 μm, Q = 3.44 (n = 20/1).

Notes. — *Daedaleopsis tricolor* is characterized by its lamellate hymenophores and reddish brown pilei.

Specimens examined: **CHINA**. **Anhui**, Huangshan, Yellow Mountain, on fallen angiosperm branch, 21 October 2010, *Dai 11907* (BJFC). **Beijing**, Beijing Botanical Garden, on fallen angiosperm branch, 27 July 2009, *Cui 6789* (BJFC). **Guangdong**, Ruyang County, Nanling Nature Reserve, on fallen angiosperm branch, 16 September 2009, *Cui 7543* (BJFC). **Hunan**, Yizahng County, Mangshan Nature Reserve, on fallen angiosperm branch, 17 September 2009, *Cui 7656* (BJFC). **Heilongjiang**, Yichun, Fenglin Nature Reserve, on fallen angiosperm branch, 3 August 2011, *Cui 9902* (BJFC). **Jilin**, Antu County, Changbaishan Nature Reserve, on living tree of *Acer*, 28 August 2005, *Dai 7073* (BJFC). **Jiangxi**, Yushan County, Sanqing Mountain, on fallen angiosperm branch, 2 October 2008, *Cui 5909* (BJFC). **Sichuan**, Qionglai County, Tiantaishan Forest Park, on fallen angiosperm branch, 23 September 2012, *Cui 10886* (BJFC). **Xizang (Tibet)**, Linzhi, Lulang, on fallen angiosperm branch, 16 September 2010, *Cui 9261* (BJFC). **Yunnan**, Baoshan, Gaoligongshan Nature Reserve, on fallen angiosperm branch, 25 October 2009, *Cui 8081*(BJFC). **Zhejiang**, Lin'an County, Tianmushan Nature Reserve, on fallen angiosperm branch, 9 October 2005, *Cui 2587* (IFP).

Datronia Donk, *Persoonia* 4(3): 337 (1966).
MycoBank: MB 17468
Type species: *Datronia mollis* (Sommerf.) Donk.

Basidiocarps annual, usually effused-reflexed, sometimes resupinate. Pilei brown to black, tomentose or glabrous. Pore surface white, grayish brown to blackish brown; pores angular, large, entire to lacerate. Context more or less brownish, usually with a black line upwards. Tubes concolorous with pore surface, corky. Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dominant, IKI–, weakly CB+. Cystidia absent; cystidioles present. Basidia clavate, with four sterigmata and a basal clamp connection. Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–.

Previously, eight species were accepted in *Datronia*, recently, two new genera were segregated from the genus based on multilocus phylogeny, and most species were transferred to these new genera (Li et al. 2014a). Till now, only one species of *Datronia* was recorded from China.

Datronia mollis (Sommerf.) Donk, *Persoonia* 4(3): 338 (1966) (Figs. 44, 45).
MycoBank: MB 329707
Basionym: *Daedalea mollis* Sommerf., *Suppl. Fl. lapp.* (Oslo): 271 (1826).

Fruiting body. — Basidiocarps annual, effused-reflexed, easily separate from the substrate, soft corky, without odor or taste when fresh, corky upon drying. Pilei conchoidal or

Fig. 44 Basidiocarps of *Datronia mollis*

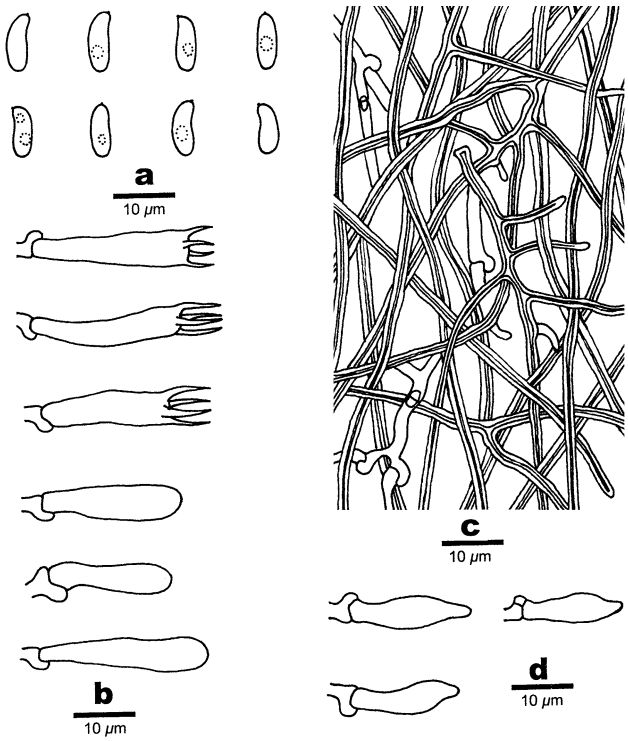

Fig. 45 Microscopic structures of *Datronia mollis* (drawn from *Dai 11456*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Cystidioles. Bars: **a–d** = 10 μm

semicircular, projecting up to 5 cm, 8 cm wide and 6 mm thick at base; resupinate parts up to 40 cm long, 5 cm wide, and 4 mm thick at center. Pileal surface dark brown to blackish, velutinate when juvenile, turning to glabrous with age, concentrically zonate, with radial longitudinal stripe, sometimes slightly warted in old specimens; margin acute. Pore surface gyey, grayish brown, pale brown, dark brown or dirty brown; pores irregular, 0.5–2 per mm; dissepiments thin, entire to lacerate. Sterile margin distinct, up to 1.5 mm wide. Context duplex, an irregular black line present, the upper tomentum layer pale brown, soft, up to 1.5 mm thick; the lower context layer pale buff to pale yellowish brown, corky to fibrous, up to 1.5 mm thick. Tubes pale grayish brown, corky, up to 3 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae IKI–, weakly CB+; tissues darkening in KOH.

Context. — Generative hyphae hyaline, thin-walled, branched, 1.2–3.5 μm in diam; skeletal hyphae dominant, hyaline to pale brown, thick-walled, with a wide to narrow lumen to subsolid, frequently branched, interwoven, 2–4 μm in diam.

Tubes. — Generative hyphae hyaline, thin-walled, branched, 1.2–3 μm in diam; skeletal hyphae dominant, hyaline to pale brown, thick-walled, with a wide to narrow lumen or subsolid, often branched, interwoven, 1.5–3.5 μm in diam. Cystidia absent; fusoid cystidioles present, thin-walled, smooth, 15–27 × 4–6 μm. Dendrohyphidia sometimes present. Basidia clavate, with four sterigmata and a basal clamp connection, 19–30 × 5–7.5 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, slightly curved, hyaline, thin-walled, smooth, IKI–, CB–, 6.5–9 × 2.5–3.5 μm, L = 7.76 μm, W = 3 μm, Q = 2.59 (n=30/1).

Notes. — *Datronia mollis* is characterized by effused-reflexed basidiocarps with blackish brown pilei, large, irregular pores, duplex context with a black line.

Specimens examined: **CHINA**. **Beijing**, Mentougou, Xiaolongmen Forest Farm, on fallen angiosperm branch, 13 October 2009, *Dai 11456* (BJFC). **Guangdong**, Shixing County, Chebaling Nature Reserve, on fallen branch of *Melia*, 13 September 2009, *Cui 7414* (BJFC). **Hebei**, Xinglong County, Wulingshan Nature Reserve, on fallen trunk of *Populus*, 29 July 2009, *Cui 6826* (BJFC). **Jilin**, Linjiang, Huashan Forest Park, on fallen angiosperm branch, 5 August 2016, *Cui 14145* (BJFC). **Jiangxi**, Fenyi County, Dagangshan, on fallen trunk of *Sapindus*, 22 September 2009, *Cui 7813* (BJFC). **Sichuan**, Baoxing County, Fengtongzhai Nature Reserve, on fallen angiosperm branch, 18 September 2012, *Cui 10765* (BJFC). **Yunnan**, Mengla County, Xishuangbanna Botanical Garden, on fallen angiosperm trunk, 31 October 2009, *Cui 8369* (BJFC). **Zhejiang**, Taishun County, Wuyanling Nature Reserve, on fallen angiosperm trunk, 23 August 2011, *Cui 10228* (BJFC).

Datroniella B.K. Cui, Hai J. Li & Y.C. Dai, *Persoonia* 32: 172 (2014).

MycoBank: MB 803225

Type species: *Datroniella scutellata* (Schwein.) B.K. Cui, Hai J. Li & Y.C. Dai.

Basidiocarps annual, pileate to effused-reflexed, rarely resupinate. Pilei usually projecting less than 3 cm. Pileal surface brown to black, glabrous. Pore surface white, cream to pale brown; pores large to small, round to angular. Context pale brown to brown, corky. Hyphal system

dimitic; generative hyphae bearing clamp connections; skeletal hyphae usually dominating, pale brown to brown, moderately to frequently branched in context and frequently branched in trama, IKI−, CB+; tissues darkening in KOH. Dendrohyphidia and cystidia absent, thin-walled cystidioles usually present. Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–.

Datroniella was newly set up by Li et al. (2014a), species in this genus, previously, were included in *Datronia*. It is difficult to separate *Datroniella* from *Datronia*, the main differences are species in *Datroniella* having moderate to frequent branched skeletal hyphae and lacking dendrohyphidia. Phylogenetically, *Datroniella* is distinct from *Datronia* sensu stricto based on molecular sequences (Li et al. 2014a).

Key to species of *Datroniella* in China

1 Pores 2–3 per mm ..... *D. melanocarpa*
1 Pores 3–8 per mm 2
2 Basidiospores 6.8–8 µm long ..... *D. subtropica*
2 Basidiospores > 8 µm long 3
3 Cystidioles absent ..... *D. tibetica*
3 Cystidioles present 4
4 Pores 3–5 per mm ..... *D. scutellata*
4 Pores 5–7 per mm ..... *D. tropica*

Datroniella melanocarpa ***B***.K. Cui, Hai J. Li & Y.C. Dai, *Persoonia* 32: 173 (2014) (Figs. 46, 47).
MycoBank: MB 803226

Fruiting body. — Basidiocarps annual, pileate, without odor or taste when fresh, becoming corky upon drying. Pilei projecting up to 8 mm, 2 cm wide and 3 cm thick at base. Pileal surface fuscous to black, glabrous, often wrinkled and distinctly sulcate with zones. Pore surface white or cream to slightly pink when fresh, become brown when bruised, cream to pale brown when dry; pores round, 2–3 per mm; dissepiments thin, entire. Context pale yellowish brown, corky, up to 0.5 mm thick. Tubes concolorous with pore surface, corky, up to 2.5 cm long.

Fig. 46 Basidiocarps of *Datroniella melanocarpa*

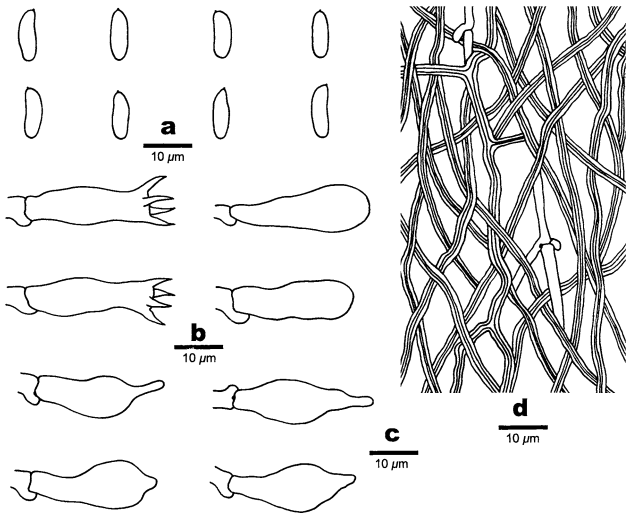

Fig. 47 Microscopic structures of *Datroniella melanocarpa* (drawn from *Cui 10646*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 µm

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae IKI–, slightly CB+; tissues turning to black in KOH and fading when dry.

Context. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 2.5–3.5 µm in diam; skeletal hyphae dominant, yellowish brown, thick-walled with a wide lumen, branched, flexuous, interwoven, 3–4.5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.8–2.5 µm in diam; skeletal hyphae dominant, pale brown to pale yellowish-brown, thick-walled with a narrow lumen to subsolid, interwoven, frequently branched, straight to flexuous, occasionally with lateral aborted processes, 3.3–4 µm wide in the main part, up to 80 µm long, the branches 2–3.5 µm wide, 50–250 µm long. Dendrohyphidia absent. Cystidia absent; cystidioles present, more or less ventricose, thin-walled, smooth, 23–30 × 6–9 µm. Basidia clavate to uniform, with four sterigmata and a basal clamp connection, 25–30 × 8–9 µm; basidioles clavate or pear-shaped, smaller than basidia.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (8.7–)8.8–11 × (2.9–)3–4 µm, L = 9.69 µm, W = 3.46 µm, Q = 2.8 (n = 40/1).

Notes. — *Datroniella melanocarpa* is characterized by its small black basidiocarps, large and round pores (2–3 per mm, Li et al. 2014a).

Specimen examined: **CHINA. Sichuan**, Jiuzhaigou County, Jiuzhaigou Nature Reserve, on living angiosperm tree, 12 October 2012, *Cui 10646* (holotype, BJFC).

Datroniella scutellata (Schwein.) B.K. Cui, Hai J. Li & Y.C. Dai, *Persoonia* 32: 173 (2014) (Figs. 48, 49).
MycoBank: MB 803227
Basionym: *Polyporus scutellatus* Schwein., *Trans. Am. phil. Soc., New Series* 4(2): 157 (1832).

Fruiting body. — Basidiocarps annual, effused-reflexed or pileate, without odor or taste when fresh, becoming corky upon drying. Pilei projecting up to 8 mm, 12 mm wide, and 3 mm thick at base. Pileal surface yellowish-brown to black from margin towards the base, glabrous and sulcate. Pore surface white or cream to pale brown when dry; pores round, 3–5 per mm; dissepiments thin, entire. Context yellowish brown to brown, corky, up to 2 mm thick. Tubes concolorous with context, corky, up to1 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae IKI–, CB+; tissues turning to black in KOH and fading when dry.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2–2.5 µm in diam; skeletal hyphae dominant, pale brown, thick-walled with a narrow lumen to subsolid, interwoven, moderately to frequently branched, straight to flexuous, with an unbranched, thick-walled basal stem, 3.8–4.5 µm wide, up to 200 µm long, the branches 1.7–3.8 µm wide, 200–360 µm long.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.5–2.3 µm in diam; skeletal hyphae dominant, pale brown, thick-walled with a narrow lumen to subsolid, interwoven, frequently branched, straight to flexuous, then occasionally with lateral aborted processes, 3–5 µm wide in the main part, up to 150 µm long, the branches 2–3.5 µm wide, 120–370 µm long. Cystidia and cystidioles absent. Dendrohyphidia absent. Basidia clavate, with four sterigmata and a basal clamp connection, 20–27 × 6–8 µm; basidioles in shape similar to basidia, but smaller.

Fig. 48 Basidiocarps of *Datroniella scutellata*

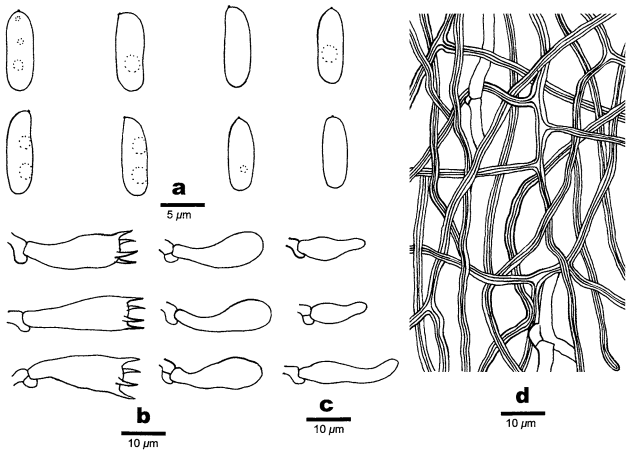

Fig. 49 Microscopic structures of *Datroniella scutellata* (drawn from *Cui 7265*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 µm; **b–d** = 10 µm

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, usually with one to three guttules, IKI–, CB–, (7.6–)7.8–9.2(–9.8) × 3–3.6(–3.8) µm, L = 8.53 µm, W = 3.13 µm, Q = 2.69–2.76 (n = 60/2).

Notes. — *Datroniella scutellata* is characterized by its effused-reflexed to pileate basidiocarps, small and round pores (3–5 per mm), and white or cream to pale brown pore surface (Li et al. 2014a).

Specimens examined: **CHINA**. **Henan**, Xiuwu County, Yuntaishan Park, on fallen angiosperm trunk, 4 September 2009, *Cui 7263* (BJFC); on living tree of *Ulmus*, 4 September 2009, *Cui 7265* (BJFC).

Datroniella subtropica B.K. Cui, Hai J. Li & Y.C. Dai, *Persoonia* 32: 175 (2014) (Figs. 50, 51).
MycoBank: MB 803228

Fruiting body. — Basidiocarps annual, effused-reflexed or pileate, without odor or taste when fresh, becoming corky upon drying. Pilei projecting up to 8 mm, 1.5 cm wide and 2 mm thick at base. Pileal surface buff or yellowish-brown to black from margin towards the base, glabrous, narrowly sulcate. Pore surface white to pale brown when dry; pores round, 6–8 per mm; dissepiments thick, entire. Context yellowish brown, corky, up to 0.2 mm thick. Tubes concolorous with pore surface, corky, up to 1.8 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae IKI–, CB+; tissues turning to black in KOH and fading when dry.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.7–3.5 µm in diam; skeletal

Fig. 50 Basidiocarps of *Datroniella subtropica*

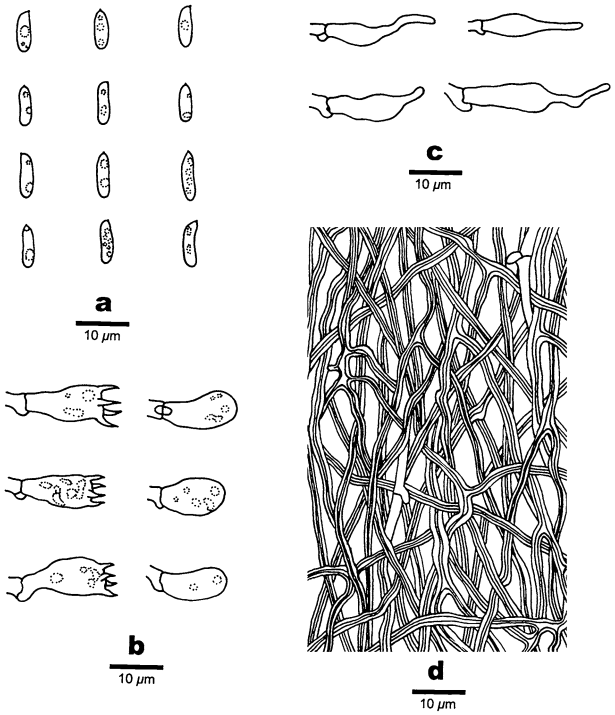

Fig. 51 Microscopic structures of *Datroniella subtropica* (drawn from *Dai 12881*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 μm

hyphae dominant, pale yellowish-brown, thick-walled with a narrow lumen to subsolid, interwoven, moderately to frequently branched, straight to flexuous, with an unbranched, little differentiated, thick-walled basal stalk, 2.8–4 μm wide, up to 400 μm long, the branches 1.8–3 μm wide, usually over 200 μm long.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, usually incrusted with fine crystals at dissepimental eages, moderately branched, 1.5–3 μm in diam; skeletal hyphae dominant, pale yellowish-brown, thick-walled with a narrow lumen to subsolid, interwoven, frequently branched, straight to flexuous, 3–6 μm wide in the main part, up to 80 μm long, the branches 2–3.5 μm wide, 50–170 μm long. Cystidia absent; cystidioles present, more or less fusoid, thin-walled, smooth, 13–23 × 4–5 μm. Dendrohyphidia absent. Basidia more or less barrel-shaped, with four sterigmata and a basal clamp connection, 15–18 × 6–8 μm; basidioles in shape similar to basidia, but smaller.

Spores. — Basidiospores cylindrical, slightly tapering at apiculus, hyaline, thin-walled, smooth, usually with one to several small guttules, IKI–, CB–, (6.5–)6.8–8 × 2–2.7(–3) μm, L = 7.27 μm, W = 2.31 μm, Q = 3.13–3.16 (n = 80/2).

Notes. — *Datroniella subtropica* is characterized by its effused-reflexed to pileate basidiocarps, a glabrous, narrowly sulcate pileus, buff to yellowish-brown to black from margin towards the base, small and round pores (6–8 per mm) and a subtropical distribution (Li et al. 2014a). *Datronia glabra* Ryvarden also has small pores (7–8 per mm) and similar basidiospores (7–9 × 2–3 μm, Ryvarden 1987), but it has dextrinoid skeletal hyphae, while skeletal hyphae are non-dextrinoid in *D. subtropica*.

Specimens examined: **CHINA. Fujian**, Wuyishan County, Wuyishan Nature Reserve, on fallen angiosperm branch, 18 October 2005, *Dai 7186* (BJFC). **Sichuan**, Xichang, on fallen angiosperm branch, 16 September 2012, *Dai 12881* (holotype, BJFC), *Dai 12883* (paratype, BJFC), *Dai 12885* (paratype, BJFC).

Datroniella tibetica B.K. Cui, Hai J. Li & Y.C. Dai, *Persoonia* 32: 175 (2014) (Figs. 52, 53).
MycoBank: MB 803229

Fruiting body. — Basidiocarps annual, resupinate to effused-reflexed or pileate, without odor or taste when fresh, becoming corky upon drying. Pilei projecting up to 7 mm, 1.5 cm wide and 3 mm thick at base. Pileal surface buff, yellowish-brown or cinnamon to black from margin towards the base, glabrous and distinctly sulcate with zones. Pore surface grayish white when fresh, ash-gray when dry; pores round to angular, 4–6 per mm; dissepiments thin to thick, entire. Context pale yellowish brown, corky, up to 0.3 mm thick. Tubes concolorous with pore surface, corky, up to 2.7 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae IKI–, CB+; tissues turning to black in KOH and fading when dry.

Context. — Generative hyphae infrequent, hyaline, thin-walled, sometimes incrusted with fine crystals, moderately branched, 2–4 μm in diam; skeletal hyphae dominant, pale yellowish-brown to golden yellow, thick-walled with a narrow lumen to subsolid, interwoven, moderately to frequently branched, straight to flexuous, with an unbranched, little differentiated, thick-walled basal stalk, 3–5 μm wide, usually over 90 μm long, the branches 2.8–4 μm wide, 200–400 μm long.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, usually incrusted with fine crystals at dissepimental

Fig. 52 Basidiocarps of *Datroniella tibetica*

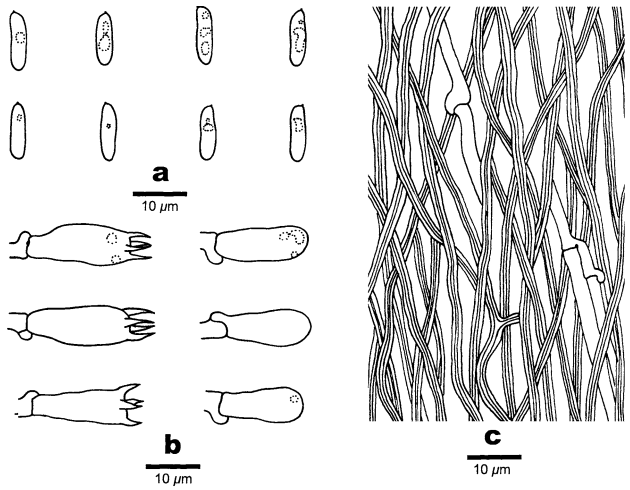

Fig. 53 Microscopic structures of *Datroniella tibetica* (drawn from *Cui 9486*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a–c** = 10 μm

edges, moderately branched, 1.8–2.8 μm in diam; skeletal hyphae dominant, pale yellowish-brown to golden yellowish, thick-walled with a narrow lumen to subsolid, interwoven, frequently branched, straight to flexuous, occasionally with lateral aborted processes, 3.5–5.2 μm wide in the main part, up to 60 μm long, the branches 2.2–3.6 μm wide, 110–160 μm long. Cystidia and cystidioles absent. Dendrohyphidia absent. Basidia more or less barrel-shaped, with four sterigmata and a basal clamp connection, 16–25 × 6–8 μm; basidioles in shape similar to basidia, but smaller.

Spores. — Basidiospores cylindrical, slightly tapering at apiculus, hyaline, thin-walled, smooth, usually with one to three small guttules, IKI–, CB–, (7.8–)8–10.2(–10.8) × 2.5–3(–3.1) μm, L = 9.13 μm, W = 2.88 μm, Q = 3.01–3.33 (n = 80/2).

Notes. — *Datroniella tibetica* is characterized by its small basidiocarps with buff to yellowish-brown or cinnamon pileal surface, small, round to angular pores (4–6 per mm), and generative hyphae sometimes encrusted with fine crystals (Li et al. 2014a). *Datroniella scutellata* also has effused-reflexed or pileate basidiocarps, similar pores (3–5 per mm), but its basidiospores (7.8–9.2 × 3–3.6 μm) are distinctly wider than those in *D. tibetica*.

Specimens examined: **CHINA**. **Xizang (Tibet)**, Bomi County, on fallen angiosperm branch, 19 September 2010, *Cui 9486* (holotype, BJFC), *Cui 9510* (paratype, BJFC).

Datroniella tropica B.K. Cui, Hai J. Li & Y.C. Dai, *Persoonia* 32: 176 (2014) (Figs. 54, 55).
MycoBank: MB 803230

Fruiting body. — Basidiocarps annual, effused-reflexed, without odor or taste when fresh, becoming corky upon drying. Pilei projecting up to 2 cm, 2 cm wide and 2.5 mm thick at base. Pileal surface yellowish-brown to reddish-brown or almost black from margin towards the base, glabrous, azonate to slightly sulcate. Pore surface white to cream when fresh, become brown when bruised, pale gray when dry; pores round, 5–7 per mm; dissepiments thin to thick, entire. Sterile margin buff to cinnamon-buff or brown, up to 1 mm wide. Context yellowish brown to

Fig. 54 Basidiocarps of *Datroniella tropica*

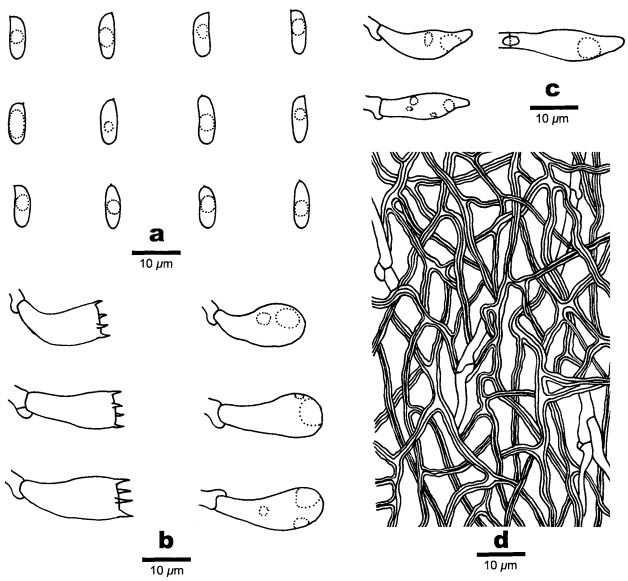

Fig. 55 Microscopic structures of *Datroniella tropica* (drawn from *Dai 13147*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 μm

brown, corky, up to 2.2 mm thick. Tubes concolorous with pore surface, corky, up to 0.3 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae IKI–, CB+; tissues turning to black in KOH and left a black stain when dry.

Context. — Generative hyphae infrequent, hyaline, thin- to slightly thick-walled, moderately branched, 1.8–3.5 µm in diam; skeletal hyphae dominant, pale yellowish-brown, thick-walled with a narrow lumen to subsolid, interwoven, moderately to frequently branched, straight to flexuous, with an unbranched, little differentiated, thick-walled basal stalk, 3–8 µm wide, up to 120 µm long, the branches 2–4 µm wide, 200–380 µm long.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.3–2.3 µm in diam; skeletal hyphae dominant, pale yellowish-brown, thick-walled with a narrow lumen to subsolid, interwoven, frequently branched, straight to flexuous, occasionally with lateral aborted processes, 3.7–4.8 µm wide in the main part, up to 70 µm long, branches well differentiated from the main part, 1.8–3 µm wide, 20–160 µm long. Cystidia absent; cystidioles present, fusoid, thin-walled, smooth, 13–22 × 4–6 µm. Dendrohyphidia absent. Basidia more or less barrel-shaped, with four sterigmata and a basal clamp connection, 16–25 × 6–8 µm; basidioles mostly pear-shaped, smaller than basidia.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, usually with one to three guttules, IKI–, CB–, (7.4–)8–9.8(–10) × (2.1–)2.5–3.5(–3.9) µm, L = 8.54 µm, W = 2.93 µm, Q = 2.66–3.1 (n = 101/4).

Notes. — *Datroniella tropica* is characterized by its effused-reflexed basidiocarps, yellowish-brown to reddish-brown or almost black pileus, small and round pores (5–7 per mm) and a tropical distribution in China (Li et al. 2014a). *Datroniella subtropica* also has small pores (6–8 per mm), but its basidiospores are distinctly smaller (6.8–8 × 2–2.7 µm) than those in *D. tropica*.

Specimens examined: **CHINA**. **Hainan**, Ledong County, Jianfengling Nature Reserve, on fallen angiosperm branch, 18 November 2007, *Cui 5201* (paratype, BJFC); on fallen angiosperm trunk, 18 November 2007, *Dai 9291* (paratype, BJFC). **Yunnan**, Longchuan County, Tongbiguan Nature Reserve, on fallen angiosperm branch, 31 October 2012, *Dai 13147* (holotype, BJFC), *Dai 13152* (paratype, BJFC); Manhai County, Mangao Nature Reserve, on fallen angiosperm trunk, 8 June 2011, *Dai 12336* (paratype, BJFC).

Dichomitus D.A. Reid, *Revta Biol.*, Lisb. 5(1–2): 149 (1965).
MycoBank: MB 17501
Type species: *Dichomitus squalens* (P. Karst.) D.A. Reid.

Basidiocarps annual to perennial, resupinate to effused-reflexed. Pileal surface white to blackish. Sterile margin distinct to indistinct, white to yellowish brown. Pore surface white to pale grayish; pores round to angular; dissepiments thin. Subiculum or context white to straw-yellow. Hyphal system dimitic; generative hyphae bearing clamp connections; arboriform skeletal hyphae hyaline, thick-walled, IKI–, CB+. Basidiospores oblong-ellipsoid to cylindrical, hyaline, thin-walled, IKI–, CB–.

The arboriform skeletal hyphae and the white rot separate *Dichomitus* from *Antrodia*. *Dichomitus* is related to *Polyporus* s. str. because of the typical binding hyphae and the cylindrical basidiospores. *Megasporoporia* Ryvarden & J.E. Wright has a close relationship with *Dichomitus* by sharing similar basidiocarps, hyphal structure and basidiospores (Zhou and Dai 2008; Du and Cui 2009; Dai and Wu 2004), and it was treated as a synonym of *Dichomitus* by Masuka and Ryvarden (1999) and Robledo and Rajchenberg (2007).

Key to species of *Dichomitus* in China

1 Pores 1–2 per mm; basidiospores usually > 10 µm in length 2
1 Pores > 2 per mm; basidiospores usually < 10 µm in length 4
2 Sterile margin indistinct; basidiospores usually > 20 µm long ..... *D. kirkii*
2 Sterile margin distinct; basidiospores usually < 20 µm long 3
3 Cystidioles and dendrohyphidia present ..... *D. hubeiensis*
3 Cystidioles and dendrohyphidia absent ..... *D. campestris*
4 Basidiocarps resupinate to effused-reflexed; on gymnosperm ..... *D. squalens*
4 Basidiocarps resupinate; on angiosperm ..... *D. sinuolatus*

Dichomitus campestris (Quél.) Domański & Orlicz, *Acta Soc. Bot. Pol.* 35: 627 (1966) (Figs. 56, 57).
MycoBank: MB 329875
Basionym: *Trametes campestris* Quél., *Mém. Soc. Émul. Montbéliard, Sér. 2* 5: 286 (1872).

Fruiting body. — Basidiocarps annual, resupinate to effused-reflexed, without special odor and taste when fresh, becoming corky upon drying, up to 5 cm long, 2 cm wide and 5 mm thick at center. Pileal surface black when dry; sterile margin narrow, dirty ochraceous to blackish, up to 3 mm. Pore surface pale fawn; pores round to angular, 2 per mm; dissepiments slightly thick, entire. Context white to wood color, corky, up to 2 mm thick. Tubes concolorous with pore surface, corky, up to 3 mm long.

Fig. 56 A basidiocarp of *Dichomitus campestris*

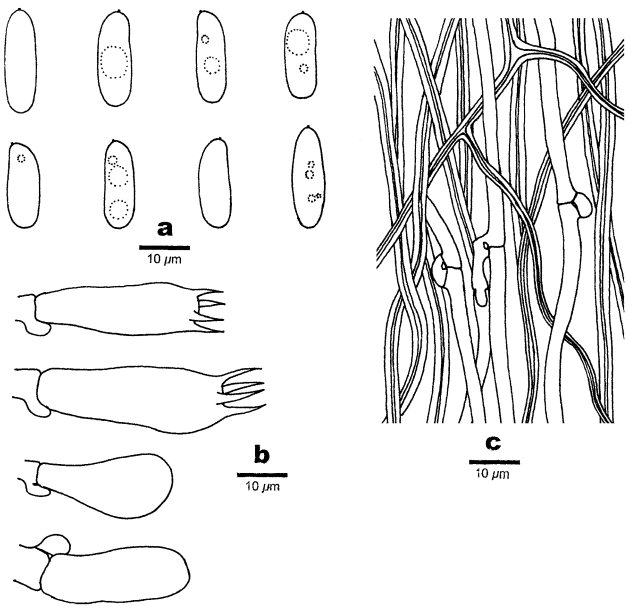

Fig. 57 Microscopic structures of *Dichomitus campestris* (drawn from *Cui 11110*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a–c** = 10 μm

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

Context. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3.8 μm in diam; skeletal hyphae dominant, hyaline to pale yellow, thick-walled to subsolid, frequently branched, interwoven, 1.2–5.4 μm in diam.

Tubes. — Generative hyphae hyaline, thin-walled, moderately branched, 1.8–3.5 μm in diam; skeletal hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 1.2–4.9 μm in diam. Cystidia or cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 21–40 × 7–12 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores oblong to cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (9.5–)10–14(–14.6) × (4.5–)5–7 μm, L = 11.86 μm, W = 5.82 μm, Q = 2.04 (n = 30/1).

Notes. — *Dichomitus campestris* may be confused with *D. hubeiensis* macroscopically, both species have similar pores and basidiospores, but the latter one has cystidioles and dendrohyphidia.

Specimens examined: **CHINA**. **Beijing**, Baihua Mountain, on living tree of *Salix*, 1 November 1993, *Dai 1772* (IFP). **Liaoning**, Shenyang, on fallen angiosperm branch, 6 July 2007, *Dai 8188* (IFP). **Yunnan**, Weishan County, Weibaoshan Forest Park, on fallen angiosperm branch, 13 July 2013, *Cui 11110* (BJFC).

Dichomitus hubeiensis Hai J. Li & B.K. Cui, *Nordic J. Bot.* 31(1): 118 (2013) (Figs. 58, 59).
MycoBank: MB 564418

Fruiting body. — Basidiocarps annual, resupinate, cushion-shaped, without odor or taste when fresh, becoming corky upon drying, up to 5 cm long, 3 cm wide, and 7 mm thick at center. Pore surface cream to straw-yellow when dry; pores angular, 1–2 per mm; dissepiments thin, entire to lacerate. Sterile margin white, narrow, up to 1 mm wide. Subiculum cream to straw-yellow, corky, azonate, up to 2 mm thick. Tubes concolorous with the pore surface, corky, up to 5 mm long.

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

Subiculum. — Generative hyphae hyaline, thin-walled, frequently branched, 2–5 μm in diam; skeletal hyphae dominant, thick-walled with a narrow lumen, frequently branched, interwoven, 2–3.5 μm in diam.

Tubes. — Generative hyphae hyaline, thin-walled, frequently branched, 1.8–3.8 μm in diam; skeletal hyphae dominant, thick-walled with a narrow lumen, frequently

Fig. 58 Basidiocarps of *Dichomitus hubeiensis*

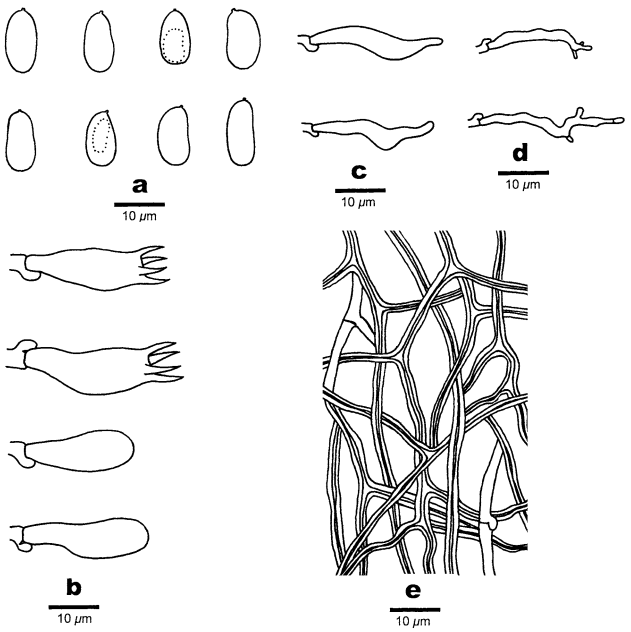

Fig. 59 Microscopic structures of *Dichomitus hubeiensis* (drawn from *Wei 2045*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Dendrohyphidia; **e**. Hyphae from trama. Bars: **a–e** = 10 μm

branched, more or less flexuous, 1.7–3 μm in diam. Hyphal pegs occasionally present. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 23–31 × 5–6 μm. Dendrohyphidia present in the hymenium, rarely branched in the tip part. Basidia clavate, with four sterigmata and a basal clamp connection, 25–39 × 10–12 μm; basidioles in shape similar to basidia, but smaller.

Spores. — Basidiospores cylindrical to oblong-ellipsoid, hyaline, thin-walled, smooth, sometimes with one round or irregular guttule, IKI–, CB–, (9–)10–14(–15) × (5–)5.6–7(–7.2) μm, L = 12.14 μm, W = 6.16 μm, Q = 1.86–2.09 (n = 60/2).

Notes. — *Dichomitus hubeiensis* is characterized by its cream to straw-yellow pore surface and large pores (1–2 per mm), the presence of cystidioles and dendrohyphidia, more or less ellipsoid basidiospores (Li and Cui 2013b). It may be confused with *D. kirkii* Masuka & Ryvarden macroscopically, both have similar pores, but the latter species has distinct larger cylindrical basidiospores (20–24 × 6.5–9 μm, Masuka and Ryvarden 1999). *Dichomitus perennis* Ryvarden has similar basidiospores (12–16 × 5–7 μm) with *D. hubeiensis*. However, the perennial growth habit and strongly dextrinoid skeletal hyphae can easily separate it from *D. hubeiensis* (Ryvarden 2007).

Specimens examined: **CHINA. Hubei**, Fang County, Shennongjia Nature Reserve, on fallen angiosperm branch, 22 September 2004, *Wei 2036* (paratype, IFP), *Wei 2045* (holotype, IFP).

Dichomitus kirkii Masuka & Ryvarden, *Mycol. Res.* 103(9): 1129 (1999) (Figs. 60, 61).
MycoBank: MB 460668

Fruiting body. — Basidiocarps annual, resupinate, without special odor or taste when fresh, becoming corky upon drying, up to 10 cm long, 3 cm wide, and 4 mm thick at cente; sterile margin indistinct. Pore surface buff-yellow to cinnamon-buff when dry; pores angular, 1–2 per mm; dissepiments thin, entire on horizontal parts and lacerate on the sloping part. Subiculum buff to buff-yellow, corky,

Fig. 60 Basidiocarps of *Dichomitus kirkii*

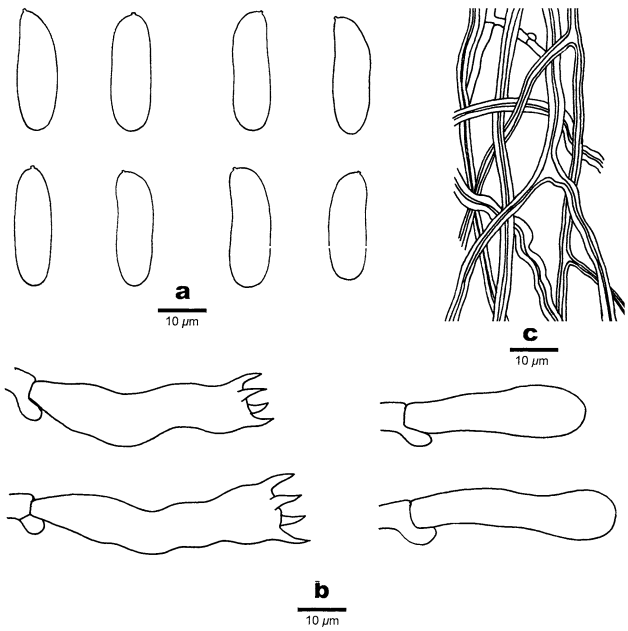

Fig. 61 Microscopic structures of *Dichomitus kirkii* (drawn from *Yuan 1237*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a–c** = 10 μm

azonate, up to 1 mm thick. Tubes concolorous with pore surface, corky, up to 3 mm long.

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

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.8–3 µm in diam; skeletal hyphae dominant, thick-walled with a narrow lumen, occasionally branched, interwoven, 2–4 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, frequently branched, 1.5–2.5 µm in diam; skeletal hyphae dominant, thick-walled with a wide to narrow lumen, moderately branched, 2–3.5 µm in diam. Cystidia and cystidioles absent. Dendrohyphidia absent. Basidia clavate, with four sterigmata and a basal clamp connection, 40–54 × 11–16 µm; basidioles in shape similar to basidia, but smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (19.5–)20.8–25(–28) × (6.5–)6.8–8(–9) µm, L = 22.81 µm, W = 7.32 µm, Q = 3.12 (n = 30/1).

Notes. — *Dichomitus kirkii* is characterized by its buff-yellow to cinnamon-buff pore surface, large pores (1–2 per mm) and large cylindrical basidiospores. *Dichomitus mexicanus* (Ryvarden) Ryvarden has similar basidiospores (20–26 × 6–9 µm), but its distinct larger pores (0.5 per mm or larger) and strongly dextrinoid skeletal hyphae make it is different from *D. kirkii* (Hjortstam and Ryvarden 2007).

Specimen examined: **CHINA. Yunnan**, Chuxiong, Zixishan Nature Reserve, on fallen angiosperm branch, 1 August 2009, *Yuan 1237* (IFP).

Dichomitus sinuolatus H.S. Yuan, *Nova Hedwigia* 97: 497 (2013) (Figs. 62, 63).
MycoBank: MB 564168

Fruiting body. — Basidiocarps annual, resupinate, coriaceous, without special odor or taste when fresh, corky to cartilaginous when dry, up to 10 cm long, 1.5 cm wide and 1 mm thick at center. Pore surface cream to pale-buff when fresh, buff upon drying; pores angular to sinuous when juvenile, 2–4 per mm, irregular or somewhat labyrinthine with age, on sloping substrates more or less prolonged; dissepiments thin, becoming lacerate with age. Subiculum very thin, corky, white to cream, ca. 0.2 mm thick. Tubes concolorous with pore surface, cartilaginous, ca. 0.8 mm long.

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

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, arboriform branched with long whip-like endings, interwoven, 1.5–3.5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, basal stems long, occasionally arboriform branched, interwoven,

Fig. 62 Basidiocarps of *Dichomitus sinuolatus*

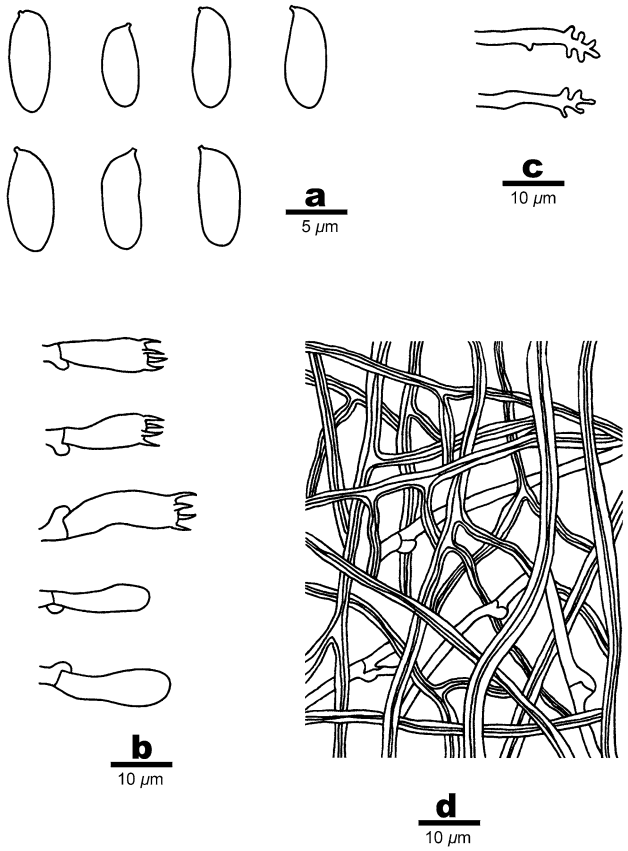

Fig. 63 Microscopic structures of *Dichomitus sinuolatus* (drawn from *Dai 7521*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Dendrohyphidia; **d**. Hyphae from trama. Bars: **a** = 5 µm; **b–d** = 10 µm

1.5–3 µm in diam. Cystidia and cystidioles absent. Dendrohyphidia scattered in hymenium. Basidia clavate, with four sterigmata and a basal clamp connection, 14–20 × 4.5–5.5 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (8.2–)8.4–9(–9.2) × 3.5–4 µm, L = 8.75 µm, W = 3.75 µm, Q = 2.29–2.35 (n = 90/3).

Notes. — *Dichomitus sinuolatus* is characterized by annual and resupinate basidiocarps, cream to buff pore surface, angular to sinuous pores (2–4 per mm), cyanophilous and arboriform branched skeletal hyphae, and cylindrical basidiospores (Yuan 2013).

Specimens examined: **CHINA. Guangdong**, Zhaoqing, Dinghushan Nature Reserve, on fallen angiosperm branch, 25 May 2006, *Dai 7521* (holotype, IFP), *Dai 7523*, *7534* & *7545* (paratypes, IFP).

Dichomitus squalens (P. Karst.) D.A. Reid, *Revta Biol.*, Lisb. 5(1–2): 150 (1965) (Figs. 64, 65).
MycoBank: MB 312964
Basionym: *Trametes squalens* P. Karst., *Fungi europ. extra-eur. exsicc.*: no. 3528 (1886).

Fruiting body. — Basidiocarps annual to biennial, pileate, resupinate or effused-reflexed, single to imbricate, without odor or taste when fresh, corky, becoming woody corky upon drying. Pilei irregular, projecting up to 3 cm, 4 cm wide and 15 mm thick at base; resupinate basidiocarps up to 20 cm long, 7 cm wide, and 9 mm thick at center. Pileal surface white to cream when fresh, velutinate, pale yellowish white to yellowish brown upon drying; sterile margin acute or slightly blunt, pale yellow to yellowish brown. Pore surface white to cinnamon when fresh, becoming pale yellowish brown to pale yellowish brown; pores round to angular, 3–5 per mm; dissepiments thin, entire. Subiculum or context white to pale yellow, fibrous to corky, up to 4 mm thick. Tubes concolorous with pore surface or paler, corky when fresh, woody corky when dry, up to 5 mm long.

Fig. 64 Basidiocarps of *Dichomitus squalens*

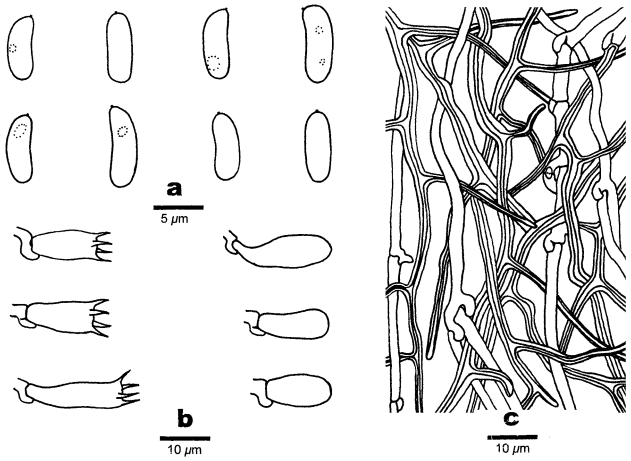

Fig. 65 Microscopic structures of *Dichomitus squalens* (drawn from *Cui 9725*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 µm; **b–c** = 10 µm

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

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.5–4.2 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, moderately branched, interwoven, 1.5–6.7 µm in diam.

Tubes. — Generative hyphae hyaline, thin-walled, frequently branched, 1.5–3.6 µm in diam; skeletal hyphae dominant, thick-walled to subsolid, abundantly arboriform branched, interwoven, 1.5–5.2 µm in diam. Cystidia or cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 15–22 × 5.7–8.2 µm; basidioles dominant, in shape similar to basidia, but smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, 8.2–10 × 2.9–3.2 µm, L = 9.17 µm, W = 3.1 µm, Q = 2.96 (n=30/1).

Notes. — Macroscopically, *Dichomitus squalens* can be taken for an *Antrodia* P. Karst. species, particularly *A. serialis* (Fr.) Donk, especially when *D. squalens* is juvenile and whitish. However, the arboriform hyphae and the white rot are the diagnostic of *D. squalens*.

Specimens examined: **CHINA. Fujian**, Wuyishan County, Wuyishan Nature Reserve, on fallen trunk of *Pinus*, 20 October 2005, *Dai 7276* (BJFC). **Guangdong,** Lianzhou County, Nanling Nature Reserve, on fallen trunk of *Pinus*, 16 May 2009, *Dai 10955* (BJFC). **Heilongjiang**, Yichun, Wuying, 9 September 2002, *Dai 3737* (BJFC). **Jilin,** Dunhua County, Huangnihe, on rotten wood of *Pinus*, 7 August 1997, *Dai 2275* (IFP). **Xizang (Tibet)**, Bomi County, Wetland Park, on fallen trunk of *Pinus*, 24 September2010, *Cui 9634*, *9637*, *9639* (BJFC).

Earliella Murrill, *Bull. Torrey bot. Club* 32(9): 478 (1905).
MycoBank: MB 17534
Type species: *Earliella cubensis* Murrill = *Polyporus scabrosus* Pers.

Basidiocarps annual, effused-reflexed to pileate. Pileal surface more or less reddish or reddish brown from the base. Pore surface white, pale grayish white to yellowish-brown; pores angular or irregular; dissepiments thin, entire to lacerate. Context white to cream. Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal hyphae IKI–, CB–. Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–.

Earliella is closely related to *Trametes* because of the typical trimitic hyphal system and the cylindrical basidiospores. Currently, only one species is accepted in the genus.

Earliella scabrosa (Pers.) Gilb. & Ryvarden, *Mycotaxon* 22(2): 364 (1985) (Figs. 66, 67).
MycoBank: MB 105299
Basionym: *Polyporus scabrosus* Pers., *Voy. Uranie., Bot.:* 172 (1827).

Fruiting body. — Basidiocarps annual, pileate to effused-reflexed, usually imbricate, corky, without odor or taste when fresh, corky and light in weight when dry. Pilei semicircular to dimidiate, projecting up to 5 cm, 9 cm wide and 6 mm thick at base. Pileal surface white to gray white, turning to reddish brown, glabrous, concentrically zonate; margin thin and sharp. Pore surface white, cream to yellowish-brown; pores angular to irregular, 2–3 per mm; dissepiments thin to thick, entire at the margin and lacerate at other parts. Sterile margin cream to pale yellowish, up to 2 mm. Context white to cream, corky, up to 4 mm thick. Tubes cream to buff, corky, up to 2 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Fig. 66 Basidiocarps of *Earliella scabrosa*

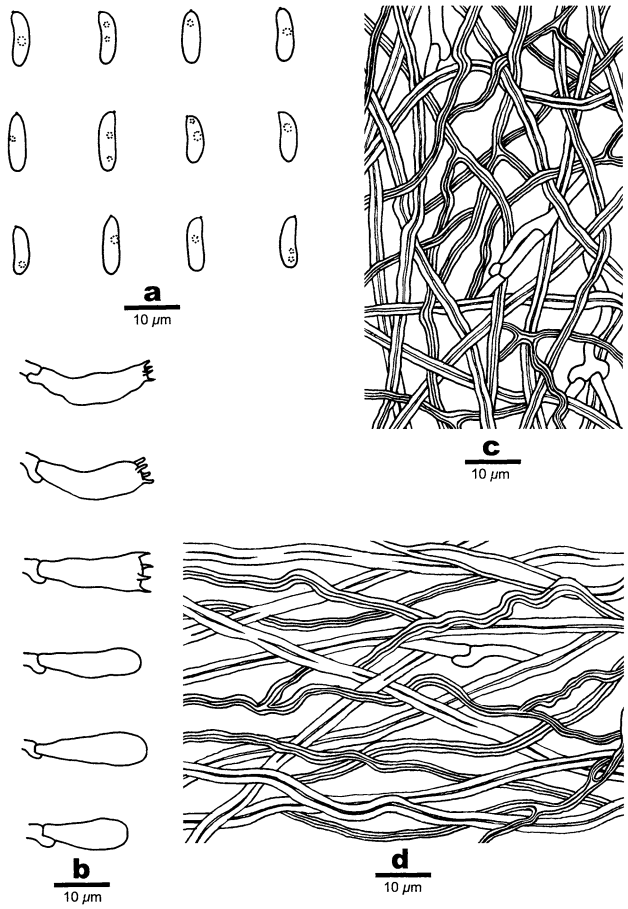

Fig. 67 Microscopic structures of *Earliella scabrosa* (drawn from *Cui 6236*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a–d** = 10 μm

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2–3.2 μm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, branched, more or less regularly arranged, 3–4 μm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 1.4–3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.8–2.4 μm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, branched, interwoven, 2.2–3 μm; binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 1.5–2.5 μm. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 15–23 × 5–8 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (7.5–)8.5–11(–12) × (2.6–)2.8–4(–4.9) μm, L = 9.76 μm, W = 3.48 μm, Q = 2.66–2.99 (n = 80/2).

Notes. — *Earliella scabrosa* is characterized by its pileate to effused-reflexed basidiocarps with reddish brown

pileal surface and lacerate pores. It is a common species in tropical and subtropical areas.

Specimens examined: **CHINA. Guangdong**, Foshan, Xiqiaoshan Forest Park, on fallen angiosperm trunk, 13 February 2009, *Dai 10682* (BJFC); Guangzhou, Huanan Botanical Garden, on fallen angiosperm trunk, 19 September 2009, *Cui 7689* (BJFC); 5 July 2010, *Cui 9137* (BJFC); Zhaoqing, Dinghushan Nature Reserve, on fallen angiosperm trunk, 29 June 2010, *Cui 8923* (BJFC). **Guangxi**, Nanning, Qingxiushan, on fallen angiosperm trunk, 9 November 2009, *Dai 11481* (BJFC); Longzhou County, Nonggang Nature Reserve, on fallen angiosperm trunk, 2 July 2007, *Zhou 12*, *13* (IFP). **Hainan**, Baoting County, Qixianling Forest Park, on fallen angiosperm trunk, 27 November 2007, *Cui 5489* (BJFC); 6 September 2008, *Dai 10344* (BJFC); Changjiang County, on fallen angiosperm trunk, 9 July 2009, *He 31* (BJFC), Bawangling Nature Reserve, on fallen angiosperm trunk, 9 May 2009, *Cui 6431* (BJFC), 25 November 2010, *Dai 12073* (BJFC), 26 November 2010, *Dai 12084* (BJFC); Chengmai County, on fallen angiosperm trunk, 6 May 2009, *Cui 6223*, *6236*, *6309* (BJFC); Haikou, Xiuying, on stump of *Hevea brasiliensis*, 6 May 2009, *Cui 6206* (BJFC); Ledong County, Jianfengling Nature Reserve, on fallen angiosperm trunk, 5 September 2008, *Dai 10329* (BJFC); Lingshui County, Diaoluoshan Forest Park, on fallen angiosperm trunk, 20 November 2007, *Cui 5271* (BJFC); Qionghai County, Yelin, on fallen angiosperm trunk, 15 May 2009, *Cui 6728* (BJFC); Qiongzhong County, Limushan Forest Park, on fallen angiosperm trunk, 24 May 2008, *Dai 9574* (BJFC); Sanya, on fallen angiosperm trunk, 6 September 2006, *Dai 7980* (IFP); Wuzhishan County, Wuzhishan Nature Reserve, on fallen angiosperm trunk, 24 November 2007, *Cui 5390* (BJFC). **Jiangxi**, Fenyi County, Dagangshan, on fallen angiosperm trunk, 21 September 2009, *Cui 7757* (BJFC). **Sichuan**, Miyi County, on fallen angiosperm trunk, 20 September 2012, *Dai 12992* (BJFC). **Taiwan**, Taizhong, Botanical Garden, on fallen angiosperm trunk, 15 November 2009, *Dai 11500* (BJFC). **Yunnan**, Jinghong, Menglun, Lvshilin Park, on fallen angiosperm trunk, 4 August 2005, *Dai 6674a* (IFP & BJFC); 1 November 2009, *Cui 8392* (BJFC), Xishaungbanna Botanical Garden, on fallen angiosperm trunk, 6 August 2005, *Dai 6840* (IFP); Mengla County, Wangtianshu, on fallen angiosperm trunk, 2 November 2009, *Cui 8511, 8557, 8559* (BJFC).

Echinochaete D.A. Reid, *Kew Bull.* 17(2): 283 (1963).
MycoBank: MB 17537
Type species: *Echinochaete megalopora* (Mont.) D.A. Reid 1963.

Basidiocarps annual, flabelliform to spathulate with a short stipe-like base. Pilei tomentose especially near the attachment, more smooth when old, reddish to brown when dry. Pore surface white to cream to dirty brown; pores angular to hexagonal, small to large. Hyphal system dimitic; generative hyphae with clamp connections; skeletal hyphae yellowish to rusty-brown, dextrinoid. Spinulose cystidia present. Basidiospores cylindrical, hyaline, smooth, thin-walled.

Echinochaete was established by Reid (1963), members of this genus are mainly distributed in tropical areas and characterized by basidiocarps with short, lateral stipes, a dimitic hyphal system with dextrinoid arboriform skeleto-binding hyphae and clamped generative hyphae, spinulose setoid elements on the pileus surface and in the hymenium, and cylindrical basidiospores (Reid 1963; Ryvarden and Johansen 1980; Corner 1984; Núñez and Ryvarden 1995; 2001; Sotome et al. 2009b). There are very small differences between the hyphae structure and basidiospore size of the species in the genus, which are mainly separated by macroscopic differences and shape of the setoid element (Núñez and Ryvarden 2001).

Key to species of *Echinochaete* in China

1 Pores small, 3–6 per mm ..... *E. russiceps*
1 Pores large, 1–2 per mm 2
2 Basidiocarps up to 10 cm wide; spinulose cystidia absent on pilei ..... *E. brachyporus*
2 Basidiocarps 1–5 cm wide; spinulose cystidia present on pilei ..... *E. ruficeps*

Echinochaete brachypora (Mont.) Ryvarden, *Bull. Jard. Bot. natn. Belg.* 48: 101 (1978) (Figs. 68, 69).
MycoBank: MB 355801
Basionym: *Polyporus brachyporus* Mont., *Annls Sci. Nat., Bot.* 4 1: 131 (1854).

Fruiting body. — Basidiocarps annual, pileate, laterally stipitate, corky when fresh, brittle when dry. Pilei dimidiate or flabelliform, projecting up to 7 cm, 10 cm wide and 7 mm thick at base. Pileal surface rust-colour to dark-cinnamon when dry, with irregular, dark-brown spots and lines, azonate; margin acute. Pore surface wood-colour to rust-coloured when dry; pores angular, 1–2 per mm; dissepiments thin, entire to lacerate. Context pale wood-colour to umber, up to 3 mm thick. Tubes concolorous with the context, up to 4 mm long. Stipe usually darker than pilei, solid, usually short, up to 1 cm long.

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

Context. — Generative hyphae infrequent, hyaline, thin-walled, 1.5–3 μm in diam; skeletal hyphae dominant,

Fig. 68 Basidiocarps of *Echinochaete brachypora*

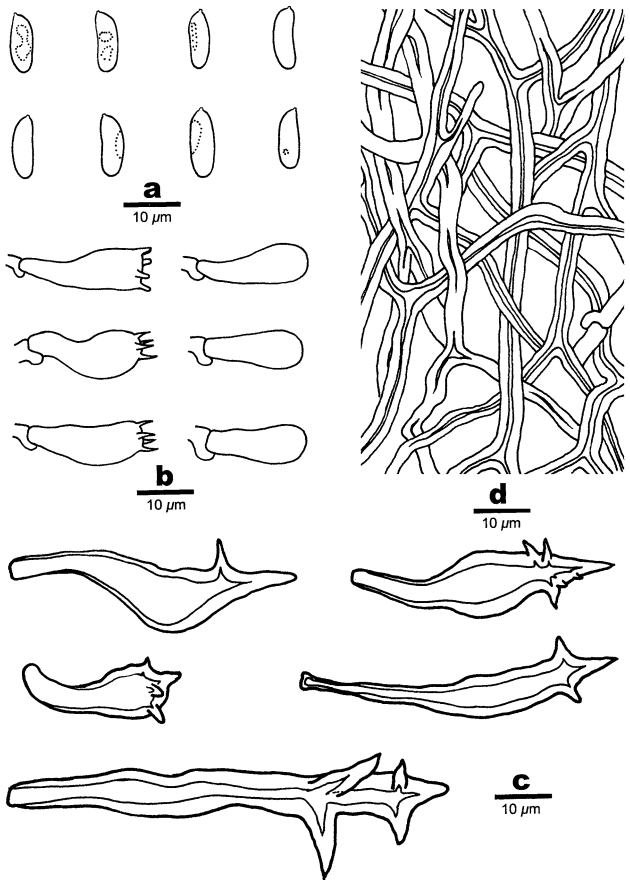

Fig. 69 Microscopic structures of *Echinochaete brachypora* (drawn from *Dai 11569A*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Spinulose cystidia; **d**. Hyphae from trama. Bars: **a–d** = 10 μm

thick-walled with a narrow lumen to subsolid, frequently branched, strongly interwoven, 3–7.5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, 1.5–3 μm in diam; skeletal hyphae dominant, thick-walled with a narrow lumen to subsolid, frequently branched, interwoven, 2–6 μm in diam. Setoid elements on the pileal surface absent, but thick-walled hyphal ends present, up to 225 μm long and 7.5 μm in diam; setoid elements (cystidia) in the hymenium subulate, lanceolate to ventricose with lateral spines, thick-walled, 23–40 μm long, 4–8 μm in diam. Basidia clavate, with four sterigmata and a basal clamp connection, 16–22 × 6–8 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (8.5–)9–13.8(–15.5) ×3–4.2(–5) μm, L = 10.93 μm, W = 3.61 μm, Q = 3.02 (n = 30/1).

Notes. — *Echinochaete brachypora* resembles *Polyporus tenuiculus* (P. Beauv.) Fr. when fresh by its flabelliform basidiocarps with hexagonal pores (Núñez and Ryvarden 2001), but the latter one lacks of setoid elements.

Specimen examined: **CHINA. Taiwan**, Hualian County, Lintianshan Forest Farm, on fallen angiosperm branch, 22 November 2009, *Dai 11569a* (BJFC).

Echinochaete ruficeps (Berk. & Broome) Ryvarden, *Norw. Jl Bot.* 19: 231 (1972) (Figs. 70, 71).
MycoBank: MB 313449
Basionym: *Favolus ruficeps* Berk. & Broome, *J. Linn. Soc., Bot.* 14(no. 73): 57 (1873).

Fruiting body. — Basidiocarps annual, pileate, laterally stipitate, often caespitose, corky when fresh, brittle to hard corky when dry. Pilei dimidiate to flabelliform or spatulate, projecting up to 4 cm, 5 cm wide and 5 mm thick at base. Pileal surface pale buff to dark reddish-brown, first minutely tomentose, smoother when dry; sterile margin acute, deflexed when dry, even or lobed. Pore surface pinkish ochraceous to dark-brown; pores angular, 1–2 per mm, but often elongated radially towards the stipe; dissepiments thin, entire. Context straw yellow, corky, up to 2.5 mm thick. Tubes usually paler than pore surface, but darker than context, straw to ochraceous, brittle to fibrous, up to

Fig. 70 Basidiocarps of *Echinochaete ruficeps*

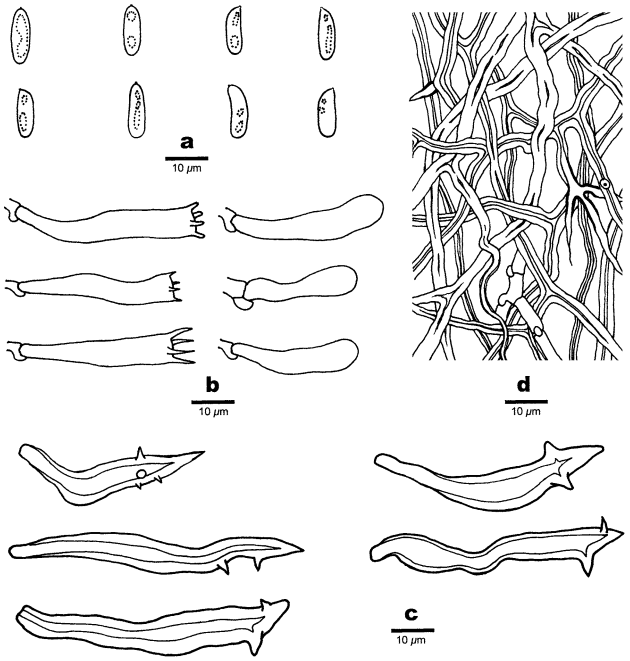

Fig. 71 Microscopic structures of *Echinochaete ruficeps* (drawn from *Dai 11504*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Spinulose cystidia; **d**. Hyphae from trama. Bars: **a–d** = 10 μm

2.5 mm long. Stipe short, up to 1 cm long and 5 mm in diam, with decurrent pore-layer.

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

Context. — Generative hyphae infrequent, hyaline, thin-walled, 1.2–3.2 μm in diam; skeletal hyphae dominant, thick-walled with a narrow lumen to subsolid, frequently branched, strongly interwoven, 2–6 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, 1.2–3 μm in diam; skeletal hyphae dominant, thick-walled with a narrow lumen to subsolid, frequently branched, interwoven, 2–5 μm in diam. Setoid elements on the pileal surface lanceolate with branched and pointed hyphal ends, yellowish brown to brown, up to 100 μm long, usually with lateral spines; setoid elements (cystidia) in the hymenium subulate, lanceolate to ventricose, thick-walled, 30–40 μm long, 4–8 μm in diam, with sharp spines up to 5 μm long. Basidia clavate, with four sterigmata and a basal clamp connection, 32–40 × 5.5–7.5 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, smooth, hyaline and thin-walled, IKI–, CB–, 10–12.5(–13.5) × 3–4(–4.5) μm, L = 11.8 μm, W = 3.7 μm, Q = 3.06 (n = 30/1).

Notes. — Macroscopically, *Echinochaete ruficeps* is close to *E. brachyporus*, but the former produces smaller basidiocarps with spinulose setoid elements at the pileal surface.

Specimen examined: **CHINA**. **Taiwan**, Taizhong, on fallen angiosperm trunk, 15 November 2009, *Dai 11504* (BJFC).

Echinochaete russiceps (Berk. & Broome) D.A. Reid, *Kew Bull.* 17(2): 285 (1963) (Figs. 72, 73).
MycoBank: MB 330282
Basionym: *Polyporus russiceps* Berk. & Broome, *J. Linn. Soc. Bot.* 14(73): 48 (1873).

Fruiting body. — Basidiocarps annual, pileate, with a flattened base or laterally short stipe, corky when fresh, brittle and hard corky upon drying. Pilei semicircular to dimidiate, small, projecting up to 3 cm, 4 cm wide and 3 mm thick. Pileal surface yellowish brown to reddish brown, tomentose; margin acute, even. Pore surface dark yellowish brown to reddish brown when fresh, colour unchanged upon drying; pores angular, regular, 3–6 per mm; dissepiments thin, entire. Context pale wood-colour, corky, thin, up to 1 mm thick. Tubes wood-colour, up to 2 mm long. The flattened base very short, concolourous with the pileal surface.

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

Context. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 1.5–3 μm in diam; skeletal hyphae dominant, pale yellow, thick-walled to almost solid, frequently branched, flexuous, tightly interwoven, 1–4 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3 μm in diam; skeletal hyphae dominant, pale yellow, thick-walled with a narrow lumen to subsolid, frequently branched, tightly interwoven, 2.5–4 μm in diam. Spinose setae abundant in the hymenium, few in the pileal surface, dark brown, thick-walled, with projecting spines near the apex, 26–50 × 5.5–15 μm. Setoid elements on the pileal surface usually present, but often absent when juvenile, aculeate to lanceolate with

Fig. 72 Basidiocarps of *Echinochaete russiceps*

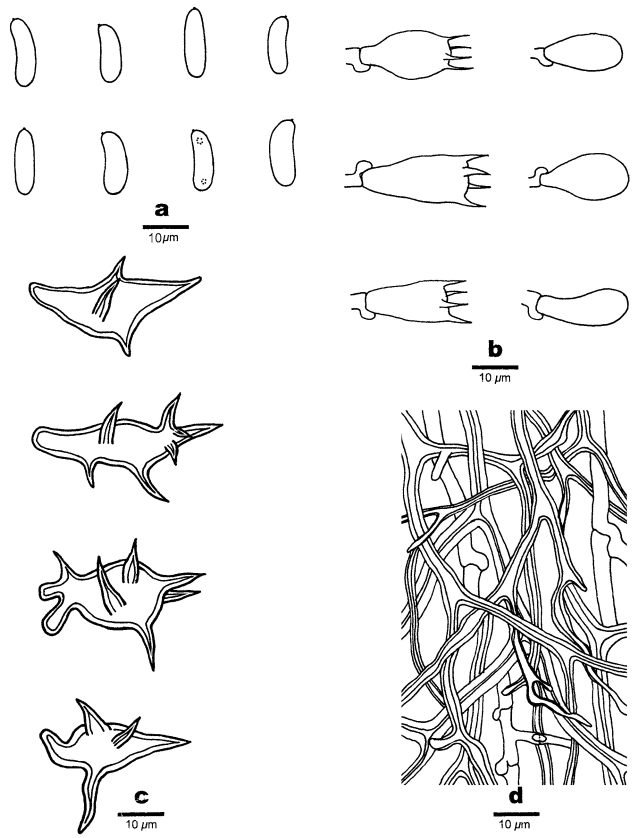

Fig. 73 Microscopic structures of *Echinochaete russiceps* (drawn from *Yuan 3614*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Spinulose cystidia; **d**. Hyphae from trama. Bars: **a–d** = 10 μm

branched and pointed hyphal ends, yellowish brown to brown, thick-walled, up to 130 μm long and 6 μm in diam, usually with lateral spines up to 10 μm long; in the hymenium subulate, lanceolate to ventricose, thick-walled, pale to dark brown, 25–47 μm long, 7–13 μm in diam, with spines up to 10 μm long, often conspicuous on the pore edge. Basidia clavate, with four sterigmata and a basal clamp connection, 22–28 × 6.5–10 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (9–)10–12 × (3–)3.5–5 μm, L = 10.8 μm, W = 4.74 μm, Q = 2.28 (n = 30/1).

Notes. — *Echinochaete russiceps* is widely distributed in both tropical areas and temperate areas of China and occurs on hardwood (Dai 2012). The species is readily distinguished from *E. brachyporus* and *E. ruficeps* by the smaller pores.

Specimens examined: **CHINA. Guangdong**, Fengkai County, Heishiding Nature Reserve, on fallen angiosperm trunk, 2 July 2010, *Cui 9056* (BJFC). **Jiangxi**, Fenyi County, Dagang Moutain, on living tree of *Rhododendron delavayi*, 22 September 2009, *Cui 7799* (BJFC); on fallen angiosperm trunk, 18 September 2008, *Dai 10455* (BJFC). **Shaanxi**, Foping County, Foping Nature Reserve, on fallen angiosperm trunk, 27 October 2006, *Yuan 2800* (BJFC). **Yunnan**, Jinghong, Xishuangbanna Nature Reserve, on fallen angiosperm branch, 16 September 2007, *Yuan 3614* (IFP).

Favolus Fr., *Elench. fung*. (Greifswald) 1: 44 (1828).
MycoBank: MB 829
Type species: *Favolus brasiliensis* (Fr.) Fr.

Basidiocarps annual, laterally stipitate to substipitate. Pilei spathulate, reniform to dimidiate, pileal surface glabrous or velutinate, occasionally with spinulose scales toward the base, more or less radially striate, azonate, variable in color. Stipe without brown to black cuticle. Context fleshy-tough to leathery when fresh, leathery to corky or brittle when dry. Pores large to small, angular to round, regular or radially elongated. Hyphal system dimitic; generative hyphae thin-walled bearing clamp connections or simple-septa; skeletal hyphae hyaline, thick-walled and frequently branched, IKI−. Basidiospores cylindrical to navicular, thin-walled, smooth, hyaline, IKI–.

Favolus was considered a synonym of *Polyporus* for a long time (Corner 1984; Ryvarden 1991; Sotome et al. 2008, 2011; Dai 2012a; Zhou and Cui 2017). Núñez and Ryvarden (1995) treated *Favolus* as an infrageneric group of *Polyporus*. Based on a phylogenetic analysis of nLSU and ITS regions, species in the *Favolus* group were segregated into two natural genera, *Favolus* and *Neofavolus* Sotome & T. Hatt. (Sotome et al. 2013). This conclusion was well accepted (Dai et al. 2014; Seelan et al. 2015; Sotome et al. 2016; Zhou et al. 2016; Zmitrovich and Kovalenko 2016).

Key to species of *Favolus* in China

1 Simple-septate generative hyphae present 2
1 Simple-septate generative hyphae absent.....5
2 Pores 1–2 per mm or bigger, basidiocarps fragile when dry.....3
2 Pores 2–4 per mm or smaller, basidiocarps corky when dry.....4
3 Generative hyphae with both simple septa and clamps .....*F. niveus*
3 Generative hyphae with simple septa only .....*F. spathulatus*
4 Pileal surface light colored; generative hyphae with simple septa only .....*F. acervatus*
4 Pileal surface orange; generative hyphae mainly with clamps .....*F. pseudoemerici*
5 Pileal surface without radial stripes .....*F. septatus*
5 Pileal surface with distinctly radial stripes.....6
6 Basidiocarps fragile when dry..... .....*F. subtropicus*
6 Basidiocarps hard corky to woody hard when dry 7
7 Pores 2–4 per mm; cystidioles present ... .*F. emerici*

7 Pores 1–2 per mm or elongated; cystidioles absent …… ……..……*F. fibrillosus*

Favolus acervatus (Lloyd) Sotome & T. Hatt., *Fungal Divers.* 58: 254 (2013) (Figs. 74, 75).
MycoBank: MB 801930
Basionym: *Polyporus acervatus* Lloyd, *Mycol. Writ.* 6 (64): 1006 (1920).

Fruiting body. — Basidiocarps annual, laterally stipitate or attached to substrate with a very short base, solitary to imbricate, leathery when fresh, corky upon drying. Pilei reniform, fan-shaped to semicircular, projecting up to 8 cm, 10.5 cm wide and 8 mm thick at base. Pileal surface white, cream to pinkish-buff when fresh, becoming cream, buff to clay buff upon drying, glabrous, azonate, with slightly radial stripes or not; margin sharp, straight when fresh, straight to incurved when dry. Pore surface white to cream when fresh, buff yellow to clay buff when dry; pores angular, 2–4 per mm; dissepiments thin, entire. Context white to cream when fresh, ivory to buff when dry, up to 6.5 mm thick. Tubes concolorous with pore surface, decurrent along one side of the stipe, up to 2 mm long. Stipe concolorous with the pileal surface, glabrous, 2.2 cm long and 2 cm in diam.

Hyphal structure. — Hyphal system dimitic; generative hyphae simple septate; skeletal hyphae IKI–, slightly CB+; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, infrequently branched, 3–7 µm diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, moderately branched, interwoven, 1.5–6.5 µm in diam.

Fig. 74 Basidiocarps of *Favolus acervatus*

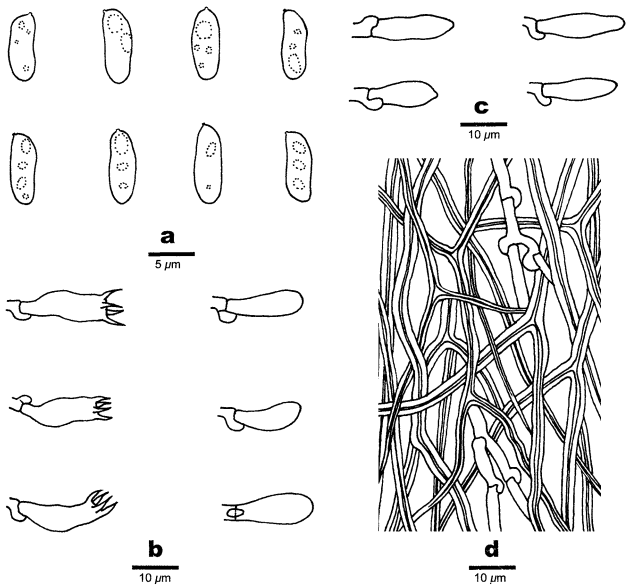

Fig. 75 Microscopic structures of *Favolus acervatus* (drawn from *Cui 11053*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphal structure. Bars: **a** = 5 µm; **b–d** = 10 µm

Tubes. — Generative hyphae frequent, hyaline, thin-walled, rarely branched, 2–4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen or subsolid, moderately branched, interwoven, 2–5 µm in diam. Cystidia absent; cystidioles infrequent, subulate, 15.5–18 × 4–5.5 µm. Basidia infrequent, clavate, with four sterigmata and a simple-septum, 22.5–26 × 5–7 µm; basidioles similar to basidia, but smaller than basidia.

Stipe. — Generative hyphae infrequent, hyaline, thin-walled, 2–5 µm in diam; skeletal hyphae dominant, thick-walled with a wide to narrow lumen or subsolid, moderately branched, interwoven, 1.5–7 µm in diam.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, usually with one to three guttules, IKI–, CB–, (5.7–)6.1–8(–8.5) × (2.3–)2.5–3.1(–3.2) µm, L = 6.99 µm, W = 2.81 µm, Q = 2.06–3.08 (n = 176/5).

Notes. — *Favolus acervatus* has variable basidiocarps, but it can be characterized by the white to cream pileal surface, angular pores, and simple-septate generative hyphae. Phylogenetically, it is closely related to *F. niveus* and *F. spathulatus*. But, *F. niveus* has brittle dried basidiocarps, bigger pores (0.5–1 per mm) and basidiospores (6.5–9.5 × 2.5–4 µm), while *F. spathulatus* has much slender stipe and bigger pores (1–2 per mm).

Specimens examined: **CHINA. Fujian**, Xiamen, Xiamen Botanical Garden, on fallen angiosperm branch, 27 October 2013, *Cui 11349* (BJFC). **Guangdong,** Fengkai County, Heishiding Nature Reserve, on fallen angiosperm trunk, 1 June 2014, *Li 0001* (BJFC); on fallen angiosperm trunk, 1 April 2015, *Li 1313* (BJFC); on fallen angiosperm

trunk, 2 April 2015, *Li 1980* (BJFC). **Hainan**, Changjiang County, Bawangling Nature Reserve, on fallen angiosperm branch, 7 May 2009, *Cui 6345* (BJFC); Danzhou, on fallen angiosperm branch, 7 May 2009, *Dai 10749b* (BJFC); Haikou, Xiuying, on fallen branch of *Hevea*, *Cui 6201* (BJFC). **Liaoning**, Kuandian County, Qingshangou, on fallen angiosperm branch, 30 July 2008, *Cui 5662* (BJFC); Kuandian County, Tianhuashan, on fallen branch of *Quercus*, 28 July 2008, *Cui 5580* (BJFC). **Yunnan**, Cangyuan County, Banlao, on fallen angiosperm branch, 11 July 2013, *Cui 11053* (BJFC); Pu'er, Laiyanghe Forest Park, on fallen angiosperm branch, 6 June 2011, *Dai 12208* (BJFC); 9 June 2011, *Dai 12370* (BJFC); 8 July 2013, *Cui 11004* (BJFC); Tengchong County, Shuanghe, on fallen angiosperm branch, 5 August 2014, *Dai 13883* (BJFC).

Favolus emerici (Berk. ex Cooke) Imazeki, *Bull. Tokyo Sci. Mus* 6:95 (1943) (Figs. 76, 77).
MycoBank: MB 297432
Basionym: ***Polyporus emerici*** Berk. ex Cooke, Grevillea 10:96 (1882).
= *Favolus grammocephalus* (Berk.) Imazeki, *Bull. Tokyo Sci. Mus.* 6: 95 (1943).
= *Polyporus grammocephalus* Berk., *London J. Bot.* 1: 148 (1842).

Fruiting body. — Basidiocarps annual, laterally stipitate or attached to substrate with a narrow base, solitary to gregarious, leathery when fresh, corky upon drying. Pilei fan-shaped to semi-circular, projecting up to 6.7 cm, 11.5 cm wide and 5 mm thick at base. Pileal surface yellowish-brown, orangish-brown, grayish-brown to blackish brown, glabrous, azonate, with distinctly radial stripes; margin sharp, straight when fresh, incurved when dry. Pore surface cream, buff, pinkish-buff to orangish-brown; pores circular to angular, 2–4 per mm; dissepiments thin, entire. Context cream to buff, corky, up to 3 mm thick. Tubes concolorous with pore surface, decurrent on one side of the stipe, corky, up to 2 mm long. Stipe short, concolorous to pileal surface, up to 1 cm long and 5 mm in diam.

Fig. 76 Basidiocarps of *Favolus emerici*

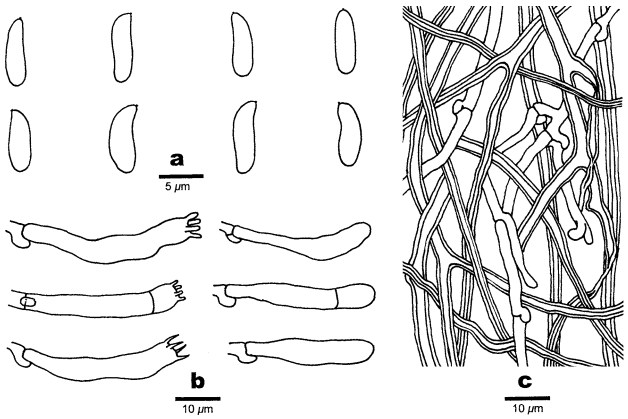

Fig. 77 Microscopic structures of *Favolus emerici* (drawn from *Cui 10926*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphal structure. Bars: **a** = 5 μm; **b–c** = 10 μm

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

Context. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, moderately branched, interwoven, 2–5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 1.8–4.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, with dendroid branches, strongly interwoven, 2–6 μm in diam. Cystidia absent; cystidioles infrequent, subulate, 19–22 × 5.5–8 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 18–25.5 × 7–10 μm; basidioles similar to basidia in shape, smaller than basidia.

Stipe. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2–4.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, frequently branched, interwoven, 2–6 μm in diam.

Spores. — Basidiospores uncommon, cylindrical, hyaline, thin-walled, smooth, occasionally with one guttule, CB–, IKI–, (7.2–)7.9–11.2(–11.8) × 2.7–4.2(–4.5) μm, L = 9.26 μm, W = 3.75 μm, Q = 2.07–2.74 (n = 46/2).

Notes. — *Favolus spathulatus* often has the same sort of veined pileus with *F. emerici*. However, the former has simple septate generative hyphae and occasionally branched skeletal hyphae (Ryvarden and Johansen 1980). In addition, *F. spathulatus* has bigger pores (1–4 per mm, Ryvarden and Johansen 1980) than *F. emerici* (4–6 per mm).

Specimens examined: **CHINA. Hainan**, Baoting County, Qixianling Forest Park, on fallen angiosperm trunk, 9 November 2012, *Cui 10926* (BJFC); Changjiang County, Bawangling Nature Reserve, on fallen angiosperm branch, 12 November 2007, *Yuan 4251* (IFP); Ledong

County, Jianfengling Nature Reserve, on fallen angiosperm branch, 15 November 2007, *Yuan 4410* (IFP). **Yunnan**, Ruili County, Moli Tropical Rain Forest Park, 1 November 2012, *Dai 11053* (BJFC).

Favolus fibrillosus Lév., *Annls Sci. Nat., Bot.*, *sér. 3* 2: 201 (1844) (Figs. 78, 79).
MycoBank: MB 220076
= *Polyporus philippinensis* Berk., *London J. Bot.* 1(3): 148 (1842).

Fruiting body. — Basidiocarps annual, laterally stipitate or with a short base, solitary, leathery when fresh, becoming corky upon drying. Pilei fan-shaped to sub-circular, projecting up to 4 cm, 6 cm wide and 8 mm thick at base. Pileal surface yellow-brown to tan when fresh, becoming light yellow-brown to yellow-brown after drying, glabrous, azonate, with distinctly radial stripes, slightly wrinkled when dry; margin sharp and straight, often incurved when dry. Pore surface pale yellow to pale brown; pores angular, radially ranged, 1–2 per mm, occasionally elongated to 3 mm long and 1 mm wide; dissepiments slightly thick, entire. Context cream when fresh, light yellowish-brown when dry, 5 mm thick. Tubes concolorous with pore surface, decurrent along one side of the stipe, up to 3 mm long. Stipe concolorous with pileal surface, glabrous, 2 cm long and 8 mm in diam.

Fig. 78 Basidiocarps of *Favolus fibrillosus*

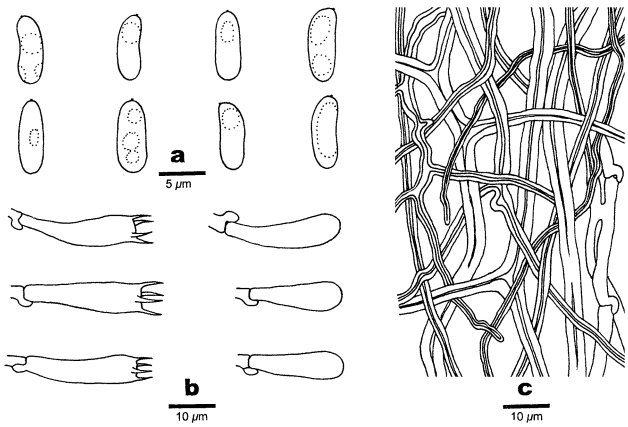

Fig. 79 Microscopic structures of *Favolus fibrillosus* (drawn from *Dai 7959*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphal structure. Bars: **a** = 5 μm; **b–c** = 10 μm

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

Context. — Generative hyphae infrequent, hyaline, thin-walled, 2–6 μm in diam; skeletal hyphae dominant, thick-walled with a distinct narrow lumen or subsolid, moderately branched, interwoven, 2–5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 3–6 μm in diam; skeletal hyphae dominant, thick-walled with a distinct narrow lumen or subsolid, moderately branched, interwoven, 2–5 μm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 17–29 × 6–8 μm; basidioles similar to basidia in shape, smaller than basidia.

Stipe. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2–5 μm in diam; skeletal hyphae dominant, thick-walled with a distinct narrow lumen or subsolid, moderately branched, interwoven, 2–5 μm in diam.

Spores. — Basidiospores infrequent, cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, 6.6–9 × 2.7–3.3(–3.6) μm, L = 7.65 μm, W = 3.31 μm, Q = 2.44 (n = 21/1).

Notes. — *Polyporus philippinensis* Berk. is widely accepted as a distinct species of *Favolus* (Sotome et al. 2013), but the epithet *philippinensis* cannot be combined with *Favolus* because it has been used in another *Favolus* species "*F. philippinensis*" Berk. So, in this study, we use its earliest synonymy, *F. fibrillosus* as the accepted name instead of *P. philippinensis*. *Favolus fibrillosus* is characterized by its rough and radial pilei, big and radially ranged pores. *Favolus emerici* is close to *F. fibrillosus* by the similar pileal surface and stipe, but the smaller pores (2–4 per mm), somewhat larger basidiospores (7.9–11.2 × 2.7–4.2 μm) and the presence of subulate cystidioles make *F. emerici* different from *F. fibrillosus*.

Specimens examined: **CHINA. Hainan,** Ledong County, Jianfengling Nature Reserve, on fallen angiosperm branch, 4 September 2006, *Dai 7959*, *Dai 7961* (BJFC); Lingshui County, Diaoluoshan Forest Park, on fallen angiosperm branch, 10 November 2012, *Cui 10941* (BJFC).

Favolus niveus J.L. Zhou & B.K. Cui, *Mycologia* 109: 767 (2017) (Figs. 80, 81).
MycoBank: MB 817940

Fig. 80 A basidiocarp of *Favolus niveus*

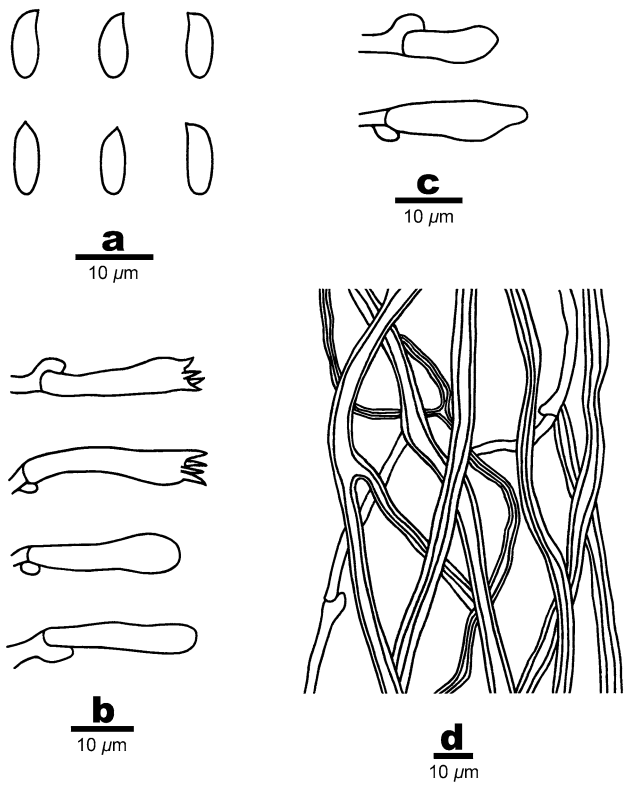

Fig. 81 Microscopic structures of *Favolus niveus* (drawn from *Dai 13276*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 μm

Fruiting body. — Basidiocarps annual, laterally stipitate, solitary or gregarious, fleshy to leathery when fresh, fragile when dry. Pilei spathulate to dimidiate, projecting up to 5.5 cm, 4.8 cm wide and 2.5 mm thick at base. Pileal surface white when fresh, becoming pinkish buff, apricot-orange to cinnamon upon drying, glabrous, azonate, radially striate; margin sharp, straight when fresh, incurved when dry. Pore surface white to cream when fresh, usually becoming ivory towards the stipe, buff, light brown to yellowish brown when dry; pores angular, radially elongated, 0.5–1 per mm, sometimes elongated up to 3.5 mm long and 1.5 mm wide; dissepiments slightly thick, entire to slightly lacerate. Context white, fleshy to leathery when fresh, white to buff, fragile when dry, less than 0.5 mm thick. Tubes concolorous with pore surface, decurrent along one side of the stipe, up to 2.5 mm long. Stipe short, cylindrical, white to buff when fresh, glabrous, up to 9 mm long and 6.5 mm in diam.

Hyphal structure. — Hyphal system dimitic; generative hyphae normally with simple septa, occasionally bearing clamp connections; skeletal hyphae IKI–, CB+; tissues unchanged in KOH.

Context. — Generative hyphae frequent, hyaline, thin-walled, rarely branched, 2.5–8.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, occasionally branched, interwoven, 2–8 μm in diam, sometimes inflated up to 12 μm in diam.

Tubes. — Generative hyphae dominant, hyaline, thin-walled, rarely branched, parallel arranged, 2–4.5 μm in diam; skeletal hyphae frequent, hyaline, thick-walled with a wide lumen, moderately branched and interwoven, 2–6.5 μm in diam, sometimes inflated up to 8.5 μm in diam. Cystidia absent; cystidioles frequent, sickle-shaped to subulate, 20–36 × 4–6.5 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 24–31.5 × 5.5–6 μm; basidioles in shape similar to basidia, but smaller than basidia.

Stipe. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.5–5.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, infrequently branched, interwoven, 2–6 μm in diam, sometimes inflated up to 25 μm in diam.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, usually with one or several guttules, IKI–, CB–, (6–)6.5–9.5(–10.5) × 2.5–4 μm, L = 7.81 μm, W = 3.27 μm, Q = 1.97–3.1 (n = 122/3).

Notes. — *Favolus niveus* was collected from Southwest China, and is characterized by its fragile basidiocarps when dry, white pilei with radial stripes, elongated pores, and both simple-septate and clamped generative hyphae. Phylogenetically, it is closely related to *F. spatulatus* (Zhou and Cui 2017). Morphologically, both species have spathulate to dimidiate white pilei, lateral stipe, fragile basidiocarps, and big white pores (Sotome et al. 2013). However, based on the Chinese specimens, although dried specimens of *F. spatulatus* are also fragile, they are tougher than *F. niveus*. Furthermore, *F. spatulatus* always has strongly incurved basidiocarps in dried condition, simple-septate generative hyphae lacking clamp connections, and somewhat smaller basidiospores (5.5–8 × 2.5–3 μm). *Favolus niveus* also resembles *F. brasiliensis* in its lateral stipe, radially striate pilei, fragile basidiocarps in dried

condition, and big pores. In contrast, *F. brasiliensis* is distinctive because of its clamped generative hyphae and larger basidiospores (7–12 × 2.2–4.6 µm; Sotome et al. 2013).

Specimens examined: **CHINA. Yunnan**, Cangyuan County, Banlao, on fallen angiosperm branch, 10 July 2013, *Cui 11032* (paratype, BJFC); Nanhua County, Dazhongshan Nature Reserve, on fallen angiosperm branch, 15 July 2013, *Dai 13276* (holotyoe, BJFC); on fallen angiosperm branch, 15 July 2013, *Cui 11129* (paratype, BJFC).

Favolus pseudoemerici J.L. Zhou & B.K. Cui, *Mycologia* 109: 772 (2017) (Figs. 82, 83).
MycoBank: MB 817941

Fruiting body. — Basidiocarps annual, laterally stipitate, solitary to gregarious or clustery, leathery when fresh, becoming woody hard when dry. Pilei spathulate, fan-shaped to dimidiate, projecting up to 8.2 cm, 5.1 cm wide and 3 mm thick at base. Pileal surface beige to orange red or clay brown when fresh, becoming sepia brown, ochre brown or black brown when dry; glabrous, azonate, radially striate; margin sharp, straight. Pore surface beige to deep orange when fresh, orange brown to ochre brown when m dry; pores circular to angular, 3–6 per mm; dissepiments thin, entire. Context white to buff, leathery when fresh; buff to beige, woody hard when dry; less than 1 mm thick. Tubes concolorous with pore surface, decurrent, up to 2 mm long. Stipe short, cylindrical, beige to clay brown, glabrous, up to 1.6 cm long and 9 mm in diam.

Hyphal structure. — Hyphal system dimitic; generative hyphae mainly bearing clamp connections, occasionally with simple septa in tubes; skeletal hyphae IKI–, CB+; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2–6 µm in diam; skeletal hyphae

Fig. 82 Basidiocarps of *Favolus pseudoemerici*

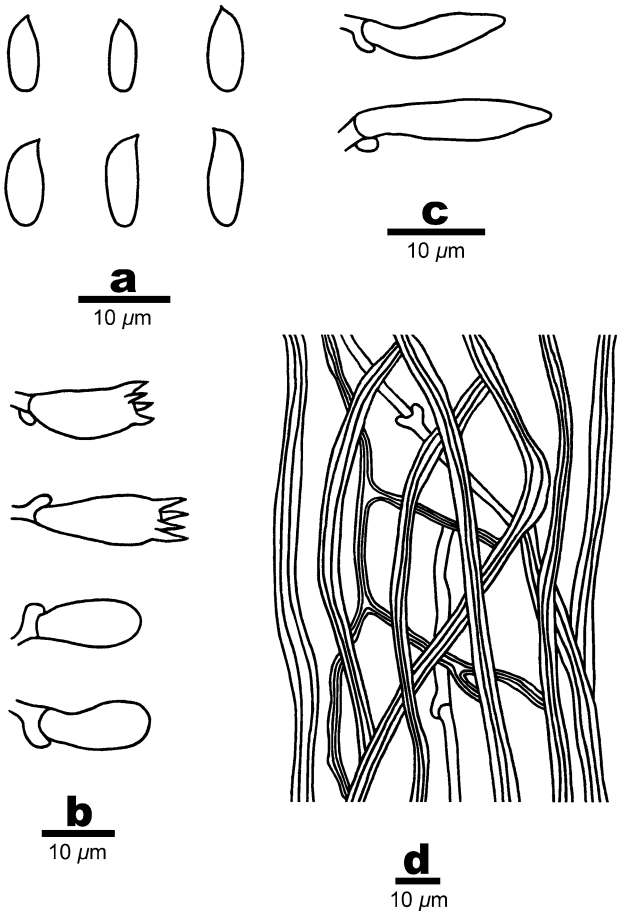

Fig. 83 Microscopic structures of *Favolus pseudoemerici* (drawn from *Cui 13757*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 µm

dominant, hyaline, thick-walled with a narrow lumen to subsolid, moderately branched, usually inflated at the branched part, interwoven, 1.5–5.5 µm in diam, sometimes inflated to 8 µm in diam at the branched part.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, infrequently branched, 2.5–5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, moderately branched, interwoven, 1.5–6.5 µm in diam. Cystidia absent; cystidioles infrequent, sickle shaped to subulate, 14.2–21.4 × 3.7–6.5 µm. Basidia usually clavate, with a basal clamp and four sterigmata, 12.5–17.8 × 6–9.4 µm; basidioles in shape similar to basidia, smaller than basidia.

Stipe. — Generative hyphae infrequent, hyaline, thin-walled, infrequently branched, 2.5–5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, moderately branched, interwoven, 1.5–7 µm in diam.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, usually with one or several guttules, IKI–, CB– or slightly CB+, various in size according to different

specimens, (6.5–)7–10.5(−11.5) × 2.5–4 (−4.5) μm, L = 8.72 μm, W = 3.33 μm, Q = 1.97–3.29 (n = 297/7).

Notes. — *Favolus pseudoemerici* is a tropical species characterized by its dry hard basidiocarps, villous pileal surface when juvenile, circular to angular pores (3–6 per mm), generative hyphae with both clamp connections and simple septa in tubes, skeletal hyphae that are usually inflated at the branched parts, and short basidia (12.5–17.8 × 6–9.4 μm). Phylogenetically, it is closely related to *F. septatus*, which has fragile basidiocarps and bigger pores when dry; while *F. pseudoemerici* has woody hard basidiocarps and smaller pores (Zhou and Cui 2017). *Favolus pseudoemerici* and *F. emerici* have similar basidiocarps and hyphal structures, but the latter has larger basidia (18–24 × 6–7.5 μm), and relatively larger basidiospores (8.1–12 × 2.7–4.8 μm; Sotome et al. 2013). Moreover, *F. emerici* lacks simple septa on its generative hyphae.

Specimens examined: **CHINA. Hainan**, Ledong County, Jianfengling Forest Park, on fallen angiosperm branch, 21 November 2015, *Cui 13757* (holotype, BJFC); Changjiang County, Bawangling Nature Reserve, on fallen angiosperm branch, 13 November 2007, *Yuan 4341* (paratype, IFP); Baoting County, Qixianling Forest Park, on fallen angiosperm branch, 20 November 2015, *Cui 13715* (paratype, BJFC); Wuzhishan County, Wuzhishan Nature Reserve, on fallen angiosperm branch, 19 November 2015, *Cui 13679* (paratype, BJFC). **Taiwan**, Yilan County, Linmei Trail, on fallen angiosperm branch, 20 November 2009, *Dai 11533* (paratype, BJFC). **Yunnan**, Mengla County, Wangtianshu Park, on fallen angiosperm branch, 3 November 2009, *Cui 8630* (paratype, BJFC); Cangyuan County, Banlao, on fallen angiosperm branch, 11 July 2013, *Cui 11079* (paratype, BJFC).

Favolus septatus J.L. Zhou & B.K. Cui, *Mycologia* 109: 773 (2017) (Figs. 84, 85).
MycoBank: MB 817942

Fruiting body. — Basidiocarps annual, laterally stipitate, solitary, fragile when dry. Pilei fan-shaped to semicircular, projecting up to 2.5 cm, 1.5 cm wide and 3 mm thick at base. Pileal surface pinkish buff to yellowish brown upon drying, always depressed near the margin, glabrous, azonate; margin sharp, straight when dry. Pore surface yellowish brown to apricot-orange when dry; pores angular, radially elongated, 0.5–1 per mm; dissepiments thin, entire to lacerate. Context very thin, buff, fragile upon drying. Tubes lighter than pore surface, decurrent on one side of the stipe, less than 3 mm long. Stipe short, lighter than pileal surface, glabrous, up to 4 mm long and 2.5 mm in diam.

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

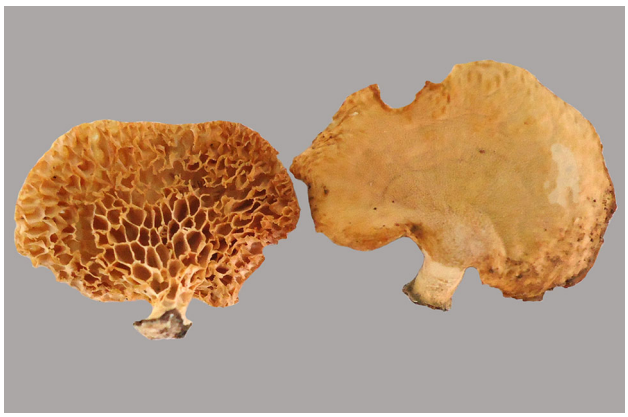

Fig. 84 Basidiocarps of *Favolus septatus*

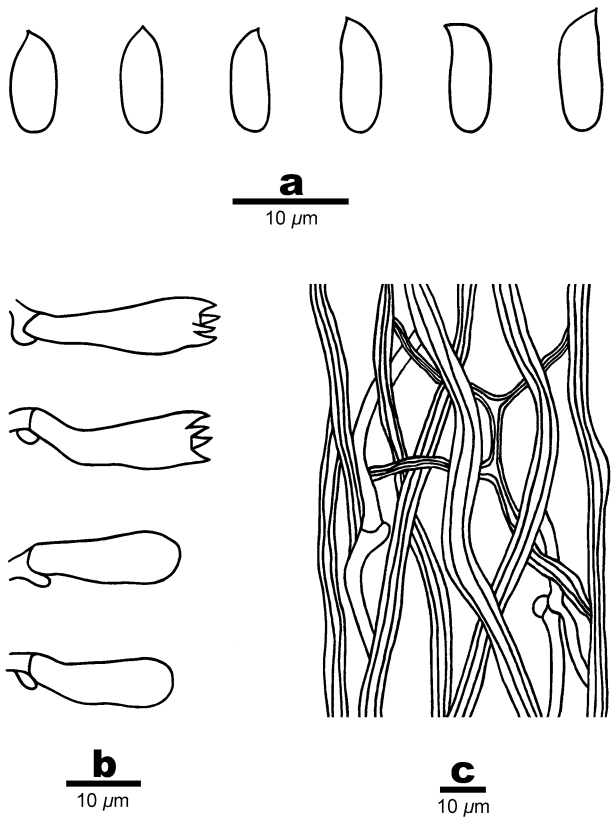

Fig. 85 Microscopic structures of *Favolus septatus* (drawn from *Zhou 287*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a–c** = 10 μm

Context. — Generative hyphae frequent, hyaline, thin-walled, rarely branched, 3–6.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, occasionally with simple septa, infrequently branched, interwoven, 2–6.5 μm in diam, sometimes inflated up to 10 μm in diam.

Tubes. — Generative hyphae frequent, hyaline, thin-walled, occasionally branched, 1.5–5 μm in diam; skeletal

hyphae dominant, hyaline, thick-walled with a wide lumen, frequently with simple septa and arboriform branches, moderately interwoven, 1.5–5 µm in diam, sometimes inflated up to 10.5 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 21.5–27 × 5.5–8 µm; basidioles in shape similar to basidia, smaller than basidia.

Stipe. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2–7 µm in diam; skeletal hyphae hyaline, thick-walled with a wide lumen, infrequently branched, moderately interwoven, 1.5–6 µm in diam, sometimes inflated up to 8.3 µm in diam.

Spores. — Basidiospores cylindrical, rarely oblong, thin-walled, hyaline, smooth, usually with one to three guttules, IKI–, CB– or slightly CB+, (7–)7.5–10 (−11) × 3–4 µm, L = 8.86 µm, W = 3.39 µm, Q = 2.62 (n = 30/1).

Notes. — *Favolus septatus* is a species collected from South China, it can be identified by its brittle dry basidiocarps, glabrous pileal surface without radial stripes, big pores and inflated skeletal hyphae. Phylogenetically, it is closely related to an undescribed species collected from Australia (Zhou and Cui 2017). Morphologically, *F. septatus* is quite similar to *F. niveus* in its brittle basidiocarps, inflated thick-walled skeletal hyphae with a wide lumen and similar basidiospores. But the later differs from *F. septatus* in its radially striate pileal surface, simple-septate generative hyphae and sickle shaped to subulate cystidioles. *F. lagunae* Lloyd also has brittle dry basidiocarps and clamp connections on generative hyphae, but its cream pileal surface, uninflated and thick-walled to solid skeletal hyphae are different from *F. septatus* (Sotome et al. 2013).

Specimen examined: **CHINA**. **Guangxi**, Ningming County, Nonggang Nature Reserve, on fallen angiosperm branch, 7 July 2007, *Zhou 287* (holotype, IFP).

Favolus spathulatus (Jungh.) Lév., *Annls Sci. Nat. Bot. sér.3* 2: 203 (1844) (Figs. 86, 87).
MycoBank: MB 124514
Basionym: *Laschia spathulata* Jungh., *Praem. Fl. Crypt. Java* (Batavia): 75 (1838).
= *Favolus moluccensis* Mont., Annls Sci. Nat. Bot., sér. 2: 20: 365 (1843).
= *Polyporus moluccensis* (Mont.) Ryvarden, *Mycotaxon* 38: 84 (1990).

Fruiting body. — Basidiocarps annual, laterally stipitate, solitary to gregarious, occasionally imbricate, soft leathery when fresh, becoming hard fragile upon drying. Pilei fan-shaped, spathulate to dimidiate, projecting up to 3.5 cm, 4.5 cm wide and 2 mm thick at base. Pileal surface white to cream when fresh, light brown to tan upon drying, glabrous, radially striate; margin occasionally lacerated, straight when fresh and incurved when dry. Pore surface white to cream when fresh, buff to orangish-brown upon drying; pores angular, radially ranged, 1–2 per mm and frequently elongated up to 1.5 mm long and 0.5 mm wide; dissepiments thin, entire to lacerate. Context white to cream when fresh, sienna when dry, 0.6 mm thick. Tubes concolorous with pore surface, decurrent along one side of

Fig. 86 Basidiocarps of *Favolus spathulatus*

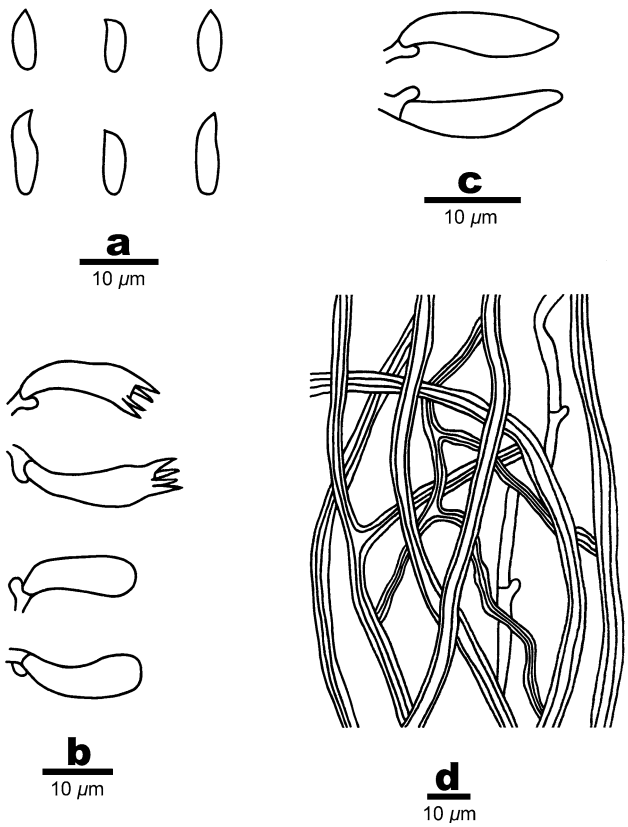

Fig. 87 Microscopic structures of *Favolus spathulatus* (drawn from *Cui 10966*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 µm

the stipe, up to 1.4 mm long. Stipe concolorous with pileal surface, up to 1 cm long and 3 mm in diam.

Hyphal structure. — Hyphal system dimitic, generative hyphae simple-septate; skeletal hyphae IKI–, CB+; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, interwoven, 2–5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 1.5–3 µm in diam; skeletal hyphae dominant, thick-walled with a wide to narrow lumen, moderately branched, interwoven, 1.7–4 µm in diam. Cystidia absent; cystidioles frequent, subulate, 15.5–20 × 4.5–6 µm. Basidia clavate, with four sterigmata and a basal simple-septum, 15–22 × 5–6 µm; basidioles similar to basidia, but slightly smaller.

Stipe. — Generative hyphae infrequent, hyaline, thin-walled, infrequently branched, 2–4.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, moderately branched, interwoven, 1.5–4.5 µm in diam.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (5.3–)5.5–8.1(–9.2) × (2.3–)2.4–3(–3.3) µm, L = 6.67 µm, W = 2.69 µm, Q = 2.48 (n = 30/1).

Notes. — *Favolus spathulatus* is characterized by the white basidiocarps, radially striate pileal surface, elongated angular pores and simple-septate generative hyphae. *Favolus spathulatus* is similar to *F. niveus* in macro-morphology, both have laterally stipitate basidiocarps, white and radially striate pileal surface. But, *F. spathulatus* has much harder fruiting bodies in dried condition than the later one. Moreover, *F. niveus* has slightly bigger pores and basidiospores, and both simple-septate and clamped generative hyphae. *Favolus brasiliensis* is another species similar to *F. spathulatus*, but the former has much larger pores and clamped generative hyphae (Sotome et al. 2013).

Specimens examined: **CHINA. Hainan**, Lingshui County, Diaoluoshan Forest Park, 11 November 2012, *Cui 10966* (BJFC); Baoting County, Qixianling Forest Park, 9 November 2012, *Cui 10929* (BJFC). **Taiwan**, Yilan County, Linmeibudao, *Dai 11530* (BJFC). **Yunnan**, Mengla County, Wangtianshu Park, 3 November 2009, *Cui 8634* (BJFC).

Favolus subtropicus J.L. Zhou & B.K. Cui, *Mycologia* 109: 775 (2017) (Figs. 88, 89).
MycoBank: MB 817943

Fruiting body. — Basidiocarps annual, laterally stipitate, solitary to scattered, fleshy when fresh, fragile when dry. Pilei fan-shaped to dimidiate, projecting up to 4.3 cm, 5.2 cm wide and 3 mm thick at base. Pileal surface buff, saffron yellow to olive brown in dried condition, usually covered with pinkish buff spinules towards the stipe, glabrous, azonate, radially striate; margin sharp, involved or straight when dry. Pore surface white when fresh, becoming saffron yellow to light orange upon drying; pores angular, 0.5 per mm, frequently elongated up to 4 mm long and 2 mm wide; dissepiments thin, entire to lacerate. Context white when fresh, buff when dry, up to 1 mm

Fig. 88 Basidiocarps of *Favolus subtropicus*

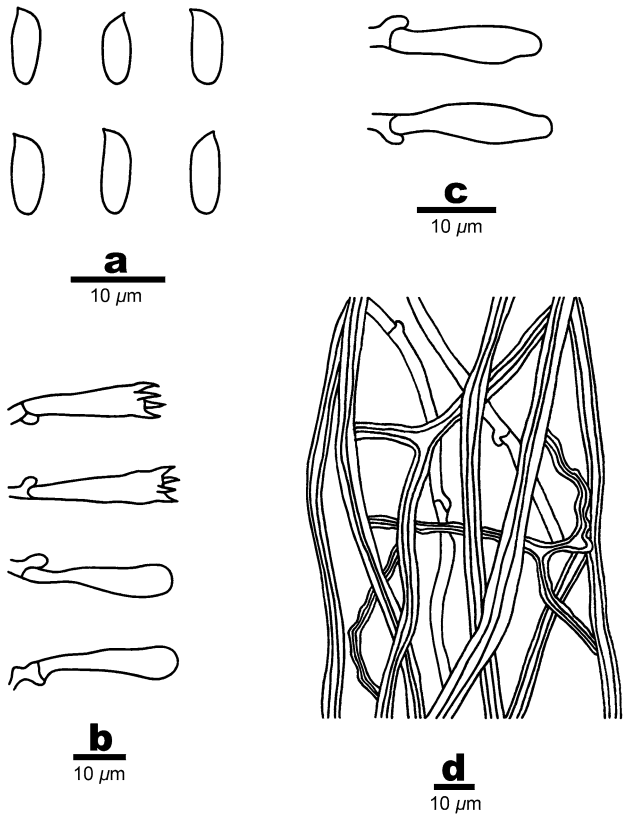

Fig. 89 Microscopic structures of *Favolus subtropicus* (drawn from *Cui 4292*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 µm

thick. Tubes concolorous with pore surface, slightly decurrent or not, up to 2.5 mm long. Stipe short, cylindrical, lighter than pilei surface, glabrous, up to 1 cm long and 6.5 mm in diam.

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

Context. — Generative hyphae frequent, hyaline, thin-walled, occasionally branched, 2–6.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, moderately branched, usually inflated at the branched area, interwoven, 1.5–5.5 µm in diam, sometimes inflated up to 8.5 µm in diam. Hyphae in cuticle thin-walled bearing clamp connections, 2.5–7.5 µm in diam, occasionally inflated up to 16 µm diam.

Tubes. — Generative hyphae frequent, hyaline, thin-walled, occasionally branched, 2.5–4.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, moderately branched, interwoven, 1.5–4.5 µm in diam, slightly inflated up to 5.8 in diam in branched area. Cystidia absent; cystidioles frequent, subulate, 18–27 × 4.5–5.5 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 22.5–33 × 5.5–8.5 µm; basidioles in shape similar to basidia, smaller than basidia.

Stipe. — Generative hyphae frequent, hyaline, thin-walled, frequently branched, 2.5–7 µm in diam; skeletal hyphae hyaline, thick-walled with a wide to narrow lumen, moderately branched, interwoven, 2–8.5 µm in diam.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, usually with one or several guttules, IKI–, CB– or slightly CB+, (6.8–)7.3–9.1(−9.3) × (2.5–)2.7–3.5(−3.8) µm, L = 8.18 µm, W = 3 µm, Q = 2.22–3.2 (n = 124/2).

Notes. — *Favolus subtropicus* is a species collected from subtropical area, it can be distinguished by its fragile dry basidiocarps, radially striate pileal surface covered with spinules towards the stipe, long and narrow pores, and inflated skeletal hyphae (Zhou and Cui 2017). Based on the phylogenetic analysis, *F. subtropicus* is sister to *F. pseudobetulinus*. But its fragile basidiocarps, inflated skeletal hyphae and clamp connections on generative hyphae are much different from the later one. *Favolus niveus* and *F. septatus* also have brittle dry basidiocarps and inflated skeletal hyphae, but the former one differs from *F. subtropicus* by its normally simple-septate generative hyphae, while the later one differs from *F. subtropicus* by the absence of cystidioles (Zhou and Cui 2017).

Specimens examined: **CHINA. Fujian**, Jian'ou County, Wanmulin Nature Reserve, on fallen angiosperm branch, 31 August 2006, *Cui 4292* (holotype, BJFC). **Guangdong**, Fengkai County, Heishiding Nature Reserve, on dead angiosperm tree, 19 March 2015, *Li 1938* (paratype, BJFC). **Hunan**, Chengbu County, on fallen angiosperm branch, 14 September 2009, *Dai 11355* (paratype, BJFC).

Flammeopellis Y.C. Dai, B.K. Cui & C.L. Zhao, *Mycol. Prog.* 13(3): 776 (2014).
MycoBank: MB 807157
Type species: *Flammeopellis bambusicola* Y.C. Dai, B.K. Cui & C.L. Zhao.

Basidiocarps annual, stipitate, corky. Pilei convex. Pileal surface and stipe bearing a reddish cuticle. Pore surface white to cream. Context white to cream, soft corky when fresh, becoming corky upon drying. Tubes concolorous with pore surface, corky. Stipe distinctly reddish, corky. Hyphal system dimitic; generative hyphae frequently with simple septa, occasionally bearing clamp connections; skeletal hyphae strongly dextrinoid, CB+. Basidiospores pale yellowish, thick-walled, smooth, weakly dextrinoid, CB+.

Flammeopellis is newly set up based on morphological characters and molecular data (Zhao et al. 2014a). Morphologically, the stipitate basidiocarps with a reddish cuticle at pileal surface remind a few similar genera in wood-rotting fungi: *Ganoderma* P. Karst. and *Pyrrhoderma* Imazeki. *Ganoderma* differs from *Flammeopellis* by double-walled basidiospores with echinulate in endospore (Moncalvo and Ryvarden 1997). *Pyrrhoderma* is separated from *Flammeopellis* by a monomitic hyphal structure with simple septate generative hyphae, hyaline and thin-walled basidiospores (Dai 2010a).

Flammeopellis bambusicola Y.C. Dai, B.K. Cui & C.L. Zhao, *Mycol. Prog.* 13(3): 777 (2014) (Figs. 90, 91).
MycoBank: MB 807158

Fruiting body. — Basidiocarps annual, laterally stipitate, solitary or gregarious, soft corky and without odor or taste when fresh, becoming corky upon drying. Pilei more or less semicircular to spathulate, projecting up to 7 cm, 5 cm wide and 4 mm thick at center. Pileus convex, pileal surface bearing a reddish brown cuticle which becoming dark reddish brown with age, irregularly rough, with distinctly sulcate. Pore surface white when fresh, white to cream upon drying; pores round, 6–7 per mm; dissepiments thick, entire. Sterile margin narrow, cream to pale brown, up to 1 mm wide. Context white to cream, corky, up to 1.5 mm thick. Tubes concolorous with pore surface, corky, up to 2.5 mm long. Stipe distinctly reddish, corky, up to 4.5 cm long, 1.5 mm in diam.

Hyphal structure. — Hyphal system dimitic; generative hyphae frequently with simple septa, occasionally bearing clamp connections; skeletal hyphae strongly dextrinoid, CB+; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 3.5–5 µm in diam; skeletal

Fig. 90 A basidiocarp of *Flammeopellis bambusicola*

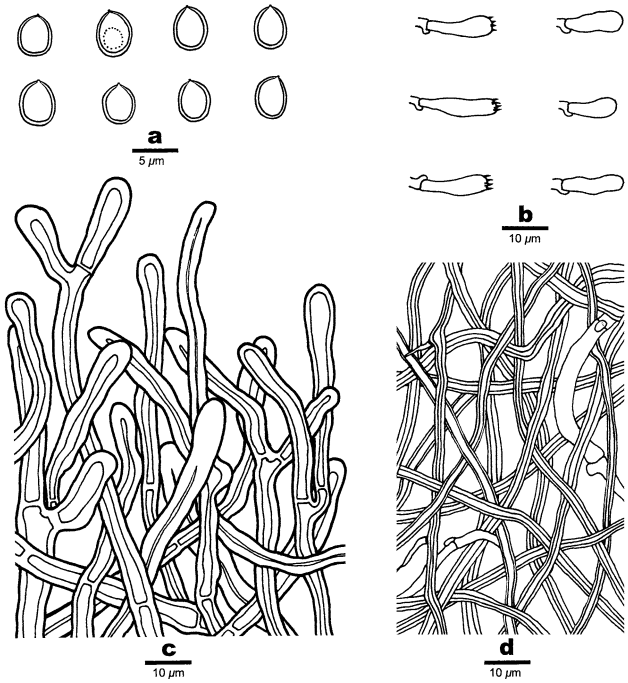

Fig. 91 Microscopic structures of *Flammeopellis bambusicola* (drawn from *Dai 13443*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Palisade of cells from the upper surface cuticle; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

hyphae dominant, hyaline, thick-walled with a wide lumen, unbranched, interwoven, occasionally collapsed, 4.0–6.0 μm in diam.

Cuticle. — Composed of a vertical and closely-packed palisade of cells; cells mostly clavate, yellowish to pale brown, thick-walled, with 1–2 septa, weakly dextrinoid, 31–45 × 5–7 μm.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 3–4.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, unbranched, interwoven, 3.5–5 μm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 10–14 × 3–4 μm. Basidia clavate to barrel-shaped, with four sterigmata and a basal clamp connection, 15–16 × 5–6.5 μm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Stipe. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 3.0–5.0 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, unbranched, interwoven, 3.5–6 μm in diam.

Spores. — Basidiospores ellipsoid to drop-shaped, pale yellowish, thick-walled, smooth, weakly dextrinoid, CB+, (4.3–)4.5–5.1(–5.4) × (3.3–)3.5–4 (–4.2) μm, L = 4.83 μm, W = 3.8 μm, Q = 1.25–1.28 (n = 60/2).

Notes. — *Flammeopellis bambusicola* is characterized by an annual growth habit, laterally stipitate basidiocarps with a reddish brown cuticle at pileal surface, a dimitic hyphal system with generative hyphae frequently with simple septa, occasionally bearing clamp connections, strongly dextrinoid, cyanophilous, unbranched skeletal hyphae, and ellipsoid to drop-shaped, pale yellowish, thick-walled, smooth, weakly dextrinoid and cyanophilous basidiospores (4.5–5.1 × 3.5–4 μm, Zhao et al. 2014a).

Specimens examined: **CHINA. Sichuan**, Qionglai County, Pingle, Lugouzhuhai, on stump of *Bambusa*, 12 August 2013 *Dai 13443* (holotype, BJFC), *Dai 13506* (paraype, BJFC).

Fomes (Fr.) Fr., *Summa veg. Scand., Sectio Post.* (Stockholm): 319 (adnot.), 321 (1849).
MycoBank: MB 17608
Type species: *Polyporus fomentarius* (L.) Fr.

Basidiocarps perennial, pileate, woody hard. Pilei ungulate. Pileal surface gray to blackish. Pore surface pale brown. Context pale brown, usually with a mycelial core towards the substrate. Tubes pale brown. Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae IKI–, weakly CB+. Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–.

Fomes is characterized by its perennial and ungulate basidiocarps, brownish pores and context with a mycelial core towards the substrate, a dimitic hyphal system with clamped generative hyphae, and cylindrical basidiospores.

Fomes fomentarius (L.) Gillet, *Hyménomycètes* (Alençon): 686 (1878) (Figs. 92, 93).
MycoBank: MB 194860
Basionym: *Boletus fomentarius* L., Sp. pl. 2: 1176 (1753).

Fruiting body. — Basidiocarps perennial, sessile, corky and without odor or taste when fresh, becoming woody hard upon drying. Pilei ungulate, projecting up to 30 cm, 20 cm wide and 12 cm thick at center. Pileal surface gray to grayish black, usually with a hard and glabrous crust, concentrically zonate and sulcate; margin pale brown, with narrow zones, obtuse. Pore surface brownish; pores round,

Fig. 92 Basidiocarps of *Fomes fomentarius*

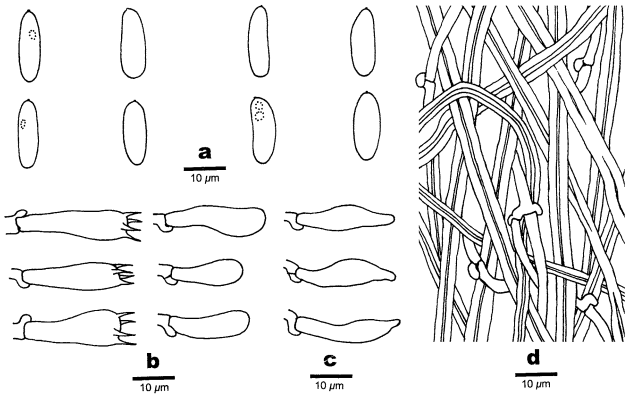

Fig. 93 Microscopic structures of *Fomes fomentarius* (drawn from *Cui 6829*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 μm

3–4 per mm; dissepiments thick, entire. Sterile margin narrow, cream to pale brown, up to 1 mm wide. Context pale yellowish brown to rusty-brown, tough-fibrous, up to 5 cm thick; usually with a distinct mycelial core; core brown, darker than context, globose, woody hard, up to 4 cm in diam. Tubes distinctly stratified, pale brown, slightly lighter than context, hard corky, up to 7 cm long, white mycelial sometimes present between different layers.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae IKI–, weakly CB+; tissues darkening in KOH.

Context. — Generative hyphae hyaline, thin- to slightly thick-walled, occasionally branched, 2–3.5 μm in diam; skeletal hyphae dominant, pale yellowish to pale yellowish brown, thick-walled with a narrow lumen to subsolid, frequently branched, interwoven, 3–8.5 μm in diam.

Tubes. — Generative hyphae frequent, hyaline, thin-walled, often branched, 1.5–3 μm in diam; skeletal hyphae dominant, pale yellow, thick-walled with a narrow lumen to subsolid, branched, interwoven, 3–8 μm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 20–14 × 3.5–6 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 20–24 × 7–8 μm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, 13–21 × 4–6 μm, L = 17.25 μm, W = 4.96 μm, Q = 3.48 (n = 30/1).

Notes. — *Fomes fomentarius* is a very common species and usually grows on *Betula* trees. It is easily to recognize in the field by its perennial growth habit, ungulate and grayish basidiocarps with a hard and glabrous crust (Núñez and Ryvarden 2001). It separates from *Ganoderma applanatum* (Pers.) Pat. by its mycelial core at the base of context and thin-walled basidiospores.

Specimens examined: **CHINA. Fujian,** Wuyishan County, Virgin Forest Park, on living angiosperm tree, 19 October 2005, *Dai 7257* (BJFC). **Hebei**, Xinglong County, Wulingshan Nature Reserve, on living tree of *Betula*, 29 July 2009, *Cui 6829* (BJFC). **Heilongjiang**, Tangyuan County, Daliangzihe Forest Park, on living tree of *Betula*, 25 August 2014, *Cui 11455, 11456, 11457* (BJFC); Yichun, Dailing, Liangshui Nature Reserve, on living tree of *Betula*, 26 August 2014, *Cui 11547, 11548, 1145497* (BJFC); Yichun, Wuying, Fenglin Nature Reserve, on living tree of *Betula*, 28 August 2014, *Cui 11755* (BJFC). **Jilin**, Antu County, Changbaishan Nature Reserve, on living tree of *Betula*, 7 August 2011, *Cui 9948* (BJFC). **Liaoning**, Kuandian County, Tianhua Mountain, on living tree of *Quercus*, 29 July 2008, *Cui 5609* (BJFC); Huanren County, Laotudingzi Nature Reserve, on living tree of *Betula*, 31 July 2008, *Cui 5712* (BJFC). **Shanxi**, Qinshui County, Lishan Nature Reserve, on living tree of *Betula*, 18 September 2006, *Yuan 2407* (IFP). **Xizang (Tibet)**, Bomi County, Tongmai, on living tree of *Betula*, 22 September 2014, *Cui 12255* (BJFC). **Xinjiang**, Bahe County, Baihabahe Forest Park, on living tree of *Betula*, 10 September 2015, *Dai 15844* (BJFC). **Yunnan**, Tengchong County, Gaoligong Mountains, on living tree of *Betula*, 24 October 2009, *Cui 8020* (BJFC).

Funalia Pat., *Essai Tax. Hyménomyc.* (Lons-le-Saunier): 95 (1900).
MycoBank: MB 17619
Type species: *Funalia mons-veneris* (Jungh.) Pat.

Basidiocarps annual, pileate. Pileal surface pale yellowish to yellowish brown or grayish brown, usually tomentose to hispid. Pore surface cream to buff when fresh, yellowish to brown when dry; pores round to angular; dissepiments thin, entire to lacerate. Context white to cream when fresh, cream to pale yellowish-brown when dry. Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal

hyphae IKI–, CB+. Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–.

Funalia is characterised by pileate basidiocarps, a trimitic hyphal system with clamped generative hyphae and cyanophilous skeletal hyphae, hyaline and thin-walled cylindrical basidiospores that are negative in Melzer's reagent and Cotton Blue and usually longer than 10 µm, and causing a white rot (Dai and Yuan 2010; Zmitrovich and Malysheva 2013; Li et al. 2016b). *Funalia* was treated as a synonym of *Trametes* Fr. by Bondartsev and Singer (1941). Both genera share a trimitic hyphal system and cylindrical basidiospores, but the skeletal hyphae are acyanophilous in *Trametes* (Niemelä et al. 1992). *Funalia* is also similar to *Coriolopsis* Murrill, but the latter genus has distinctly brownish context and colored skeletal hyphae (Núñez and Ryvarden 2001).

Key to species of *Funalia* in China

1 Cystidia present ..... ……*F. cystidiata*
1 Cystidia absent ..... ……2
2 Basidiospores 4–5 µm wide; distributed in tropical areas ..... ……*F. subgallica*
2 Basidiospores 2–4 µm wide; distributed in temperate to subtropical areas..... ……3
3 Context white to pale yellowish-brown; mainly grows on *Salix* and *Populus*..... ……*F. trogii*
3 Context yellowish-brown to dark brown; grows on other trees..... ……*F. gallica*

Funalia cystidiata Hai J. Li, Y.C. Dai & B.K. Cui, **sp. nov.** (Figs. 94, 95).

MycoBank: MB 825656

Differs from other species in the genus by its effused-reflexed to pileate basidiocarps, dentate pores, the presence of encrusted and branched cystidia.

Type. — **CHINA**. **Hainan**, Changjiang County, Bawangling Nature Reserve, on fallen trunk of *Cratoxylum cochinchinense*, 26 November 2010, *Dai 12093* (holotype, BJFC).

Etymology. — *Cystidiata* (Lat.), referring to the species having cystidia.

Fruiting body. — Basidiocarps annual, effused-reflexed to pileate, usually with strong mushroom odor when fresh, imbricate, corky and light in weight when dry. Pilei semicircular to flabelliform, projecting up to 3 cm, 5 cm wide and 2 mm thick at base. Pileal surface white to cream when fresh, pale yellowish-brown to pale ochraceous when dry, sometimes turning to reddish-brown near the base, velutinate to tomentose, occasionally sulcate; margin sharp, entire. Pore surface cream when fresh and turning to pale yellowish-brown to yellowish-brown when dry; pores angular, 1–2.5 per mm; dissepiments thin, dentate. Context white to cream when fresh, cream to pale yellowish-brown when dry, corky, up to 0.5 mm thick. Tubes concolorous with pore surface, corky, up to 1.5 mm long.

Fig. 94 Basidiocarps of *Funalia cystidiata*

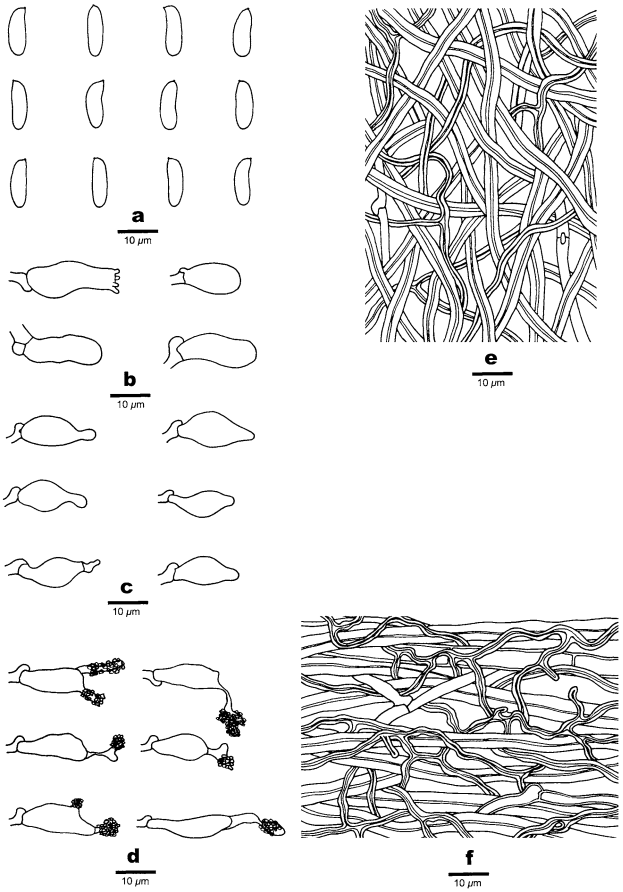

Fig. 95 Microscopic structures of *Funalia cystidiata* (drawn from *Dai 12093*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Cystidia; **e**. Hyphae from trama; **f**. Hyphae from context. Bars: **a–f** = 10 µm

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB+; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2.3–3.5 µm in diam; skeletal hyphae dominant, hyaline to pale brown, thick-walled with a narrow to wide lumen, occasionally branched, more or less regularly arranged, 4–6.2 µm in diam; binding hyphae hyaline to pale brown, thick-walled to subsolid, frequently branched, interwoven, 1.4–3.2 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2–3 µm in diam; skeletal hyphae dominant, hyaline to pale brown, thick-walled, occasionally branched, interwoven, 3–5 µm in diam; binding hyphae hyaline to pale brown, thick-walled to almost solid, frequently branched, interwoven, 1.5–3 µm in diam. Cystidia clavate to barrel-shaped, hyaline, thin-walled, usually with encrusted and branched tips, 27–36 × 6–8 µm; cystidioles fusoid, hyaline, thin-walled, 18–22 × 7–9 µm. Hyphal pegs present in the hymenium. Basidia clavate, with four sterigmata and a basal clamp connection, 20–28 × 8–10 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (8.5–)9–12(–13.8) × (3–)3.1–4(–4.5) µm, L = 10.48 µm, W = 3.65 µm, Q = 2.73–3.03 (n = 60/2).

Notes. — *Funalia cystidiata* is characterized by its effused-reflexed to pileate basidiocarps, dentate pores, the presence of encrusted and branched cystidia and hyphal pegs, and distributed in tropical areas in China.

Additional specimens (paratypes) examined. — **CHINA**. **Hainan**, Changjiang County, Bawangling Nature Reserve, on fallen trunk of *Cratoxylum cochinchinense*, 26 November 2010, *Dai 12089* (BJFC). **Yunnan**, Mengla County, Lvshilin Forest Park, on fallen angiosperm trunk, 1 November 2009, *Cui 8396* (BJFC).

Funalia gallica (Fr.) Bondartsev & Singer, *Annls mycol.* 39: 62 (1941) (Figs. 96, 97).
MycoBank: MB 297529
Basionym: *Polyporus gallicus* Fr., *Syst. mycol.* (Lundae) 1: 345 (1821).

Fruiting body. — Basidiocarps annual, pileate to effused-reflexed, with strong mushroom odor when fresh, single or imbricate, corky and light in weight when dry. Pilei semicircular to flabelliform, projecting up to 5.5 cm, 10 cm wide and 9 mm thick at base. Pileal surface densely tomentose to hispid, yellowish-brown to grayish-brown when dry, sometimes with slightly concentric zones; margin sharp, entire. Pore surface cream to pale yellow when fresh and turning to yellowish-brown to brown when dry; pores angular, 1–2 per mm; dissepiments thin, entire. Context yellowish-brown when dry, corky, up to 3 mm thick. Tubes cream to pale grayish-brown when dry, corky, up to 6 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB+; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2–3.5 µm in diam; skeletal hyphae dominant, yellowish-brown to golden yellowish, subsolid, occasionally branched, more or less regularly arranged, 3–6 µm in diam; binding hyphae frequent, yellowish-brown to golden yellowish, thick-walled to subsolid, frequently branched, interwoven, 1.8–3 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.7–3.2 µm in diam; skeletal hyphae dominant, yellowish-brown to golden yellowish, subsolid, occasionally branched, interwoven, 3–4 µm in

Fig. 96 Basidiocarps of *Funalia gallica*

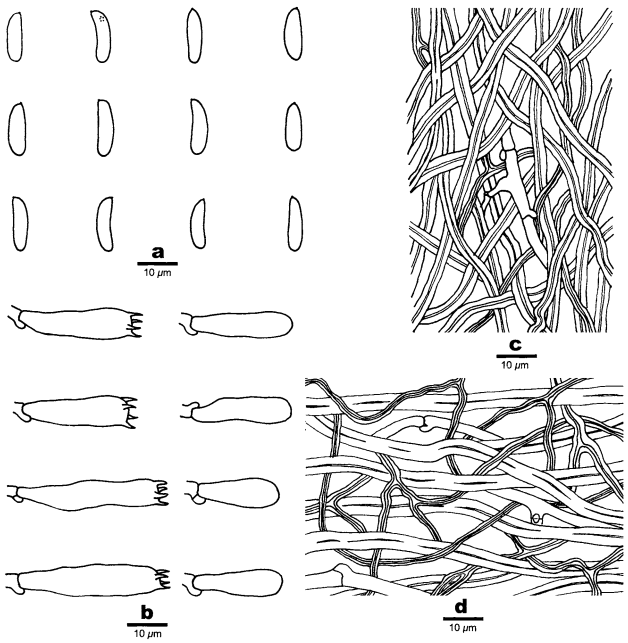

Fig. 97 Microscopic structures of *Funalia gallica* (drawn from *Dai 10997*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a–d** = 10 µm

diam; binding hyphae pale yellowish-brown to golden yellowish, thick-walled to almost solid, frequently branched, interwoven, 1.5–3 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 26–35 × 7–9 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (10.9–)11–15(–17) × (3.1–)3.2–4(–4.1) µm, L = 12.76 µm, W = 3.76 µm, Q = 3.39 (n = 50/1).

Notes. — *Funalia gallica* is characterized by its densely tomentose to hispid pileal surface, large basidiospores, yellowish-brown context and pale grayish-brown tubes.

Specimen examined: **CHINA**. **Yunnan**, Kunming, Kunming Institute of Botany, Chinese Academy of Science, on dead angiosperm tree, 22 May 2009, *Dai 10997* (BJFC).

Funalia subgallica Hai J. Li & S.H. He, *Mycol. Prog.* 15: 23 (2016) (Figs. 98, 99).
MycoBank: MB 815394

Fruiting body. — Basidiocarps annual, pileate to occasionally effused-reflexed, with strong mushroom odor when fresh, hard corky and light in weight when dry. Pilei semicircular to flabelliform, projecting up to 8 cm, 10 cm wide and 2 cm thick at base. Pileal surface strongly hispid to strigose, the hirsute tomentum white to cream when juvenile, becoming buff-yellow to cinnamon buff with age, azonate, up to 1 cm thick; margin concolorous with the pileal surface, acute and descending when dry. Pore surface cream when actively growing, turning to buff yellow, yellowish-brown or even fuscous with age; pores angular, 1–3 per mm; dissepiments thin, entire to slightly dentate. Sterile margin indistinct. Context white to cream when fresh, cream to buff-yellow when dry, corky, up to 14 mm thick. Tubes cream to cinnamon, distinctly paler than pore surface with age, hard corky, up to 6 mm long.

Fig. 98 Basidiocarps of *Funalia subgallica*

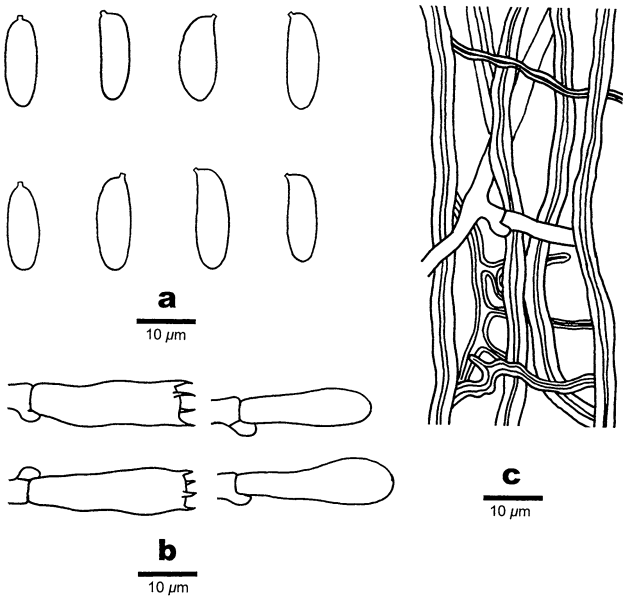

Fig. 99 Microscopic structures of *Funalia subgallica* (drawn from *Cui 6329*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a–c** = 10 µm

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB+; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 3–5 µm in diam; skeletal hyphae dominant, hyaline to slightly yellowish-brown, thick-walled with a narrow lumen to subsolid, unbranched, straight, loosely interwoven to more or less regularly arranged, 4–5.3 µm in diam; binding hyphae hyaline to slightly yellowish-brown, thick-walled with a narrow lumen to subsolid, flexuous, frequently branched, 1.5–3.5 µm diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2.5–4 µm diam; skeletal hyphae dominant, hyaline to slightly brown, thick-walled with a narrow lumen to subsolid, occasionally branched, more or less straight, interwoven, 3.8–5.2 µm in diam; binding hyphae hyaline to slightly brown, thick-walled with a narrow lumen to subsolid, flexuous, frequently branched, 2.5–4 µm in diam. Cystidia and cystidioles absent. Basidia clavate, bearing four sterigmata and a basal clamp connection, 25–32 × 8–10 µm; immature basidia dominant, in shape similar to basidia, but smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, 11–15(−17) × 4–5 µm, L = 12.9 µm, W = 4.5 µm, Q = 2.7–3.2 (n = 120/4).

Notes. — *Funalia subgallica* in China was previously treated as *F. gallica* (= *Coriolopsis gallica*, Dai 2012b) since they share similar hispid pileal surface and basidiospores (10–16 × 3–5 µm in *F. gallica*, Núñez and Ryvarden 2001). However, close morphological studies

show that *F. gallica* has a distinctly darker pileal surface than *F. subgallica* and mainly inhabits temperate zones (Gilbertson and Ryvarden 1986; Ryvarden and Gilbertson 1993; Núñez and Ryvarden 2001). *Funalia trogii* (Berk.) Bondartsev & Singer, the other common species with a hispid pileal surface, differs from *F. subgallica* in having smaller basidiospores (8.1–11.2 × 3–3.8 µm) and a distribution in northern China mainly on *Salix* and *Populus* (Dai et al. 2007c). Phylogenetically, *F. subgallica* is distinct from *F. gallica* and *F. trogii* (Li et al. 2016b).

Specimens examined: **CHINA**. **Hainan**, Changjiang County, on fallen angiosperm trunk, 7 May 2009, *Cui 6329* (holotype, BJFC), *Cui 6317*, *6328* (paratypes, BJFC); 9 May 2009, *Cui 6510* (paratype, BJFC); Bawangling Nature Reserve, on fallen angiosperm trunk, 9 May 2009, *Dai 10814* (paratype, BJFC); Baoting County, Tropical Botanic Garden, on stump of *Hevea brasiliensis*, 27 May 2008, *Dai 9718* (paratype, IFP), on fallen trunk of *Hevea brasiliensis*, 27 May 2008, *Dai 9720* (paratype, IFP); Tunchang County, on fallen angiosperm trunk, 6 May 2009, *Dai 10741* (paratype, BJFC); 23 November 2010, *Dai 11968* (paratype, BJFC).

Funalia trogii (Berk.) Bondartsev & Singer, *Annales Mycologici* 39: 62 (1941) (Figs. 100, 101).
MycoBank: MB 297531
Basionym: *Trametes trogii* Berk., *Mittheil. d. schweiz. Naturf. Ges. in Bern* 2: 52 (1850).

Fruiting body. — Basidiocarps annual, pileate to effused-reflexed, with strong mushroom odor when fresh, usually imbricate, corky and light in weight when dry. Pilei semicircular to flabelliform, projecting up to 15 cm, 20 cm wide and 40 mm thick at base. Pileal surface densely tomentose to hispid, yellowish-brown to grayish-brown when dry, sometimes slightly concentrically zonate; margin sharp or obtuse, entire. Pore surface white to cream when fresh and turning to pale yellowish-brown to brown when dry; pores round to angular, 1–3 per mm; dissepiments thin, entire. Context white to pale yellowish-brown when dry, corky, up to 12 mm thick. Tubes white to pale yellowish-brown when dry, corky, up to 28 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB+; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2.5–3.2 µm in diam; skeletal hyphae dominant, hyaline to pale yellowish-brown, thick-walled to subsolid, occasionally branched, more or less regularly arranged, 2–5 µm in diam; binding hyphae hyaline to pale yellowish-brown, thick-walled to subsolid, frequently branched, interwoven, 1.5–3 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.5–2.5 µm in diam; skeletal

Fig. 100 Basidiocarps of *Funalia trogii*

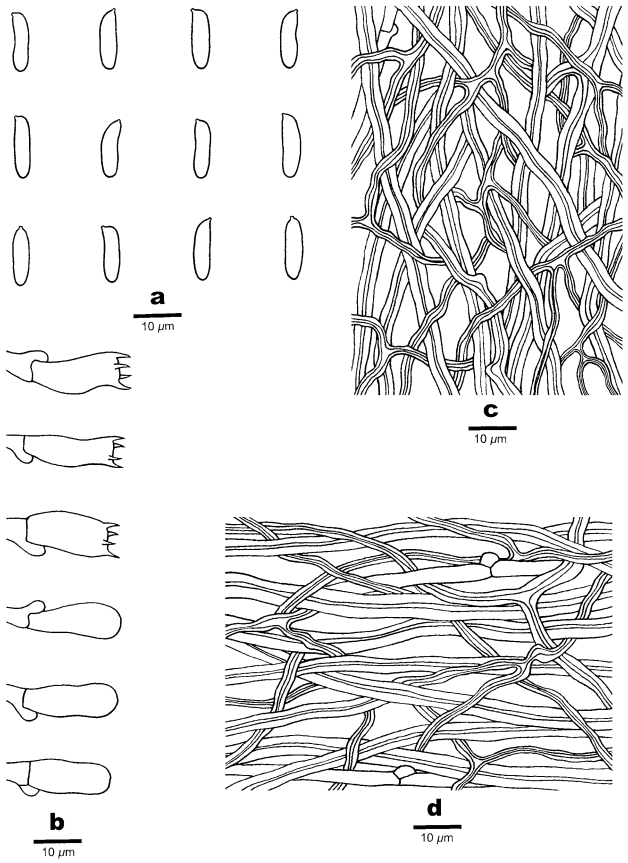

Fig. 101 Microscopic structures of *Funalia trogii* (drawn from *Cui 6969*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a–d** = 10 µm

hyphae dominant, hyaline to pale yellowish-brown, thick-walled, occasionally branched, interwoven, 2–3 µm in diam; binding hyphae hyaline to pale yellowish-brown, thick-walled to almost solid, frequently branched, interwoven, 1.3–2.2 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal

clamp connection, 13–20 × 6.5–8 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical to slightly allantoid, hyaline, thin-walled, smooth, IKI–, CB–, (9–)9.8–12.7(–13.6) × (2.8–)3–3.9(–4) μm, L = 10.98 μm, W = 3.33 μm, Q = 3.22–3.36 (n = 120/4).

Notes. — *Funalia trogii* is characterized by its densely tomentose to hispid pileal surface, large basidiospores and growing mainly on *Populus* and *Salix*.

Specimens examined: **CHINA**. **Beijing**, the campus of Chinese Academy of Forestry, on living tree of *Prunus*, 25 September 1993, *Dai 1334* (IFP); Yanqing County, Songshan Nature Reserve, on fallen tree of *Populus*, 27 July 2005, *Dai 6633* (IFP). **Gansu**, Lingtai County, Shizi Town, on fallen angiosperm trunk, 5 October 2010, *Cui 9799* (BJFC). **Hebei**, Laishui County, on stump of *Populus*, 22 August 2008, *Cui 5877, 5890* (BJFC). **Henan**, Xiuwu County, Yuntaishan, on living tree of *Salix*, 3 September 2009, *Cui 7219, 7248* (BJFC); Zhengzhou, Zhengzhou Forest Park, on fallen tree of *Populus*, 5 September 2009, *Cui 7306* (BJFC). **Heilongjiang**, Harbin, the campus of Heilongjiang University, on fallen branch of *Salix*, 3 August 2010, *Cui 9184* (BJFC); Mudanjiang, Wenchun, on living tree of *Salix*, 11 August 2009, *Cui 7103* (BJFC); on dead tree of *Populus*, 12 August 2009, *Cui 7110* (BJFC); Ning'an County, Jingbohu Park, on dead tree of *Ulmus*, 8 September 2007, *Dai 8352* (IFP); on living tree of *Salix*, 8 September 2007, *Dai 8361* (IFP); Yichun, Fenglin Nature Reserve, on living tree of *Salix*, 1 August 2011, *Cui 9821* (BJFC). **Hubei**, Fang County, Shennongjia Nature Reserve, on fallen angiosperm trunk, 29 August 2006, *Li 1205* (IFP). **Hunan**, Zhangjiajie, Huanglongdong, on living tree of *Salix*, 18 August 2010, *Yuan 5481* (IFP). **Inner Mongolia**, Baotou, A Er Ding Plant Garden, on living tree of *Populus*, 23 April 2009, *Cui 6169, 6171* (BJFC); Hohhot, Qingcheng Park, on living tree of *Salix*, 21 April 2009, *Cui 6149, 6151, 6152* (BJFC); Ejin Horo Banner, near Mausoleum of Genghis Khan, on living tree of *Populus*, 22 April 2009, *Cui 6157* (BJFC); on living tree of *Salix*, 22 April 2009, *Cui 6160* (BJFC). **Jilin**, Hunchun, Hadamen, on living tree of *Salix*, 7 August 2009, *Cui 7089* (BJFC); on fallen trunk of *Populus*, 7 August 2009, *Cui 7092* (BJFC). **Jiangsu**, Nanjing, Zijin Mountain, on fallen trunk of *Xylosma racemosum*, 11 October 2003, *Dai 5279* (IFP). **Jiangxi**, Jiujiang, Nanhu Park, on living tree of *Salix*, 10 October 2008, *Cui 6095* (BJFC); Xinyu, Xiannv Lake, on stump of *Populus*, 20 September 2008, *Dai 10540* (BJFC). **Liaoning**, Huanren County, Laotudingzi Nature Reserve, on living tree of *Populus*, 31 July 2008, *Cui 5709, 5768* (BJFC). **Qinghai**, Huzhu County, Beishan Forest Farm, on fallen trunk of *Populus*, 31 August 2003, *Dai 4936* (BJFC). **Shandong**, Linyi, Linyi Botanical Garden, on stump of *Populus*, 17 July 2009, *Cui 6772* (BJFC); Mengyin County, Mengshan Forest Park, on living tree of *Populus*, 7 August 2007, *Cui 5122* (BJFC); Junan County, dead tree of *Populus*, 18 July 2007, *Cui 5001, 5004, 5025* (BJFC); Tai'an, Taishan Mountain, on fallen trunk of *Populus*, 13 October 2003, *Dai 5306* (IFP). **Shannxi**, Zhouzhi County, Qinling Botanical Garden, on fallen angiosperm trunk, 22 October 2006, *Yuan 2564* (IFP). **Shanxi**, Jiaocheng County, Pangquangou Nature Reserve, on stump of *Populus*, 12 October 2004, *Yuan 847* (IFP); Qinshui County, Lishan Nature Reserve, on living tree of *Salix*, 18 September 2006, *Yuan 2381* (IFP). **Sichuan**, Jiuzhaigou County, Jiuzhaigou Nature Reserve, on living tree of *Salix*, 13 October 2002, *Dai 4106, 4118* (IFP). **Tianjin**, Ji County, on living tree of *Salix*, 31 July 2009, *Cui 6968, 6969, 6970, 6972, 6977, 6978* (BJFC). **Xizang (Tibet)**, Bomi County, wetland park, on fallen trunk of *Populus*, 24 September 2010, *Cui 9629, 9632* (BJFC); Lasa, norbulingka, on fallen trunk of *Populus*, 27 September 2010, *Cui 9783* (BJFC); Linzhi County, Bayi, on living tree of *Salix*, 15 September 2010, *Cui 9236* (BJFC); Linzhi County, on fallen angiosperm trunk, 18 September 2010, *Cui 9402, 9419* (BJFC). **Xinjiang**, Gongliu County, Kurdistin Nature Reserve, on fallen angiosperm trunk, 20 August 2004, *Wei 1558* (IFP); Xinyuan County, Nalati Nature Reserve, on fallen trunk of *Populus*, 22 August 2004, *Wei 1620* (IFP). **Yunnan**, Dali, Hudiequan Park, on living tree of *Salix*, 30 August 2010, *Dai 11741* (BJFC); Lanping County, on fallen trunk of *Populus*, 18 September 2011, *Cui 10335* (BJFC); Lijiang, Baishuihe, on fallen trunk of *Populus*, 1 September 2010, *Dai 11784* (BJFC). **Zhejiang**, Lin'an County, Tianmushan Nature Reserve, on fallen trunk of *Populus*, 14 October 2004, *Dai 6265* (IFP); 17 October 2004, *Dai 6499* (IFP); on fallen angiosperm trunk, 8 October2005, *Cui 2538* (IFP); 13 October 2005, *Cui 2803, 2808* (IFP).

Grammothele Berk. & M.A. Curtis, *J. Linn. Soc., Bot.* 10(no. 46): 327 (1868).
MycoBank: MB 17692
Type species: *Grammothele lineata* Berk. & M.A. Curtis.

Basidiocarps annual to perennial, resupinate, adnate. Pore surface grayish blue to pale grayish brown; pores very shallow, irregular. Subiculum very thin. Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid or not, CB−. Dendrohyphidia usually present in the hymenium; hyphal pegs present. Basidiospores cylindrical to ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–.

Grammothele is closely related to *Theleporus* Fr. in morphology, both have resupinate basidiocarps with shallow pores and dendrohyphidia. The main difference is that *Theleporus* has lighter colored pore surface. *Grammothele* and *Theleporus* grouped together in the phylogenetic

analysis inferred from the ITS sequences (Zhou and Dai 2012).

Key to species of *Grammothele* in China

1 Basidiocarps perennial ..... ……*G. quercina*
1 Basidiocarps annual ..... ……2
2 Growing on palm or bamboo (monocotyledonous)……
..... *G. fuligo*
2 Growing on other angiosperm trees (dicotyledonous).....
..... ……3
3 Basidiospores cylindrical, < 2.5 μm in width .....
.....……*G. denticulata*
3 Basidiospores ellipsoid, > 2.5 μm in width.....
.....……*G. lineata*

Grammothele denticulata Y.C. Dai & L.W. Zhou, *Mycologia* 104: 920 (2012) (Figs. 102, 103).
MycoBank: MB 561974

Fruiting body. — Basidiocarps annual, resupinate, inseparable, hard corky when dry; up to 20 cm long, 4 cm wide and 0.3 mm thick at center. Pore surface gray and irregularly cracked when dry; pores angular, 4–5 per mm; dissepiments very thin, irregularly irpicoid to dentate. Hymenium present at both the vertical tube-walls and the bases of the pores. Hyphal pegs frequent, dotted-looking. Sterile margin very narrow to almost lacking. Subiculum gray, corky when dry, up to 0.1 mm thick. Tubes concolorous with pore surface, up to 0.2 mm long.
Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae IKI–, CB–; tissues darkening in KOH.

Subiculum. — Generative hyphae hyaline, thin-walled, occasionally branched, 1.7–3.5 μm in diam; skeletal hyphae thick-walled to subsolid, frequently branched, interwoven, 1.8–3.8 μm in diam. Hyphal peg imbedded, apically encrusted; large cubic to irregular crystals present.

Fig. 102 Basidiocarps of *Grammothele denticulata*

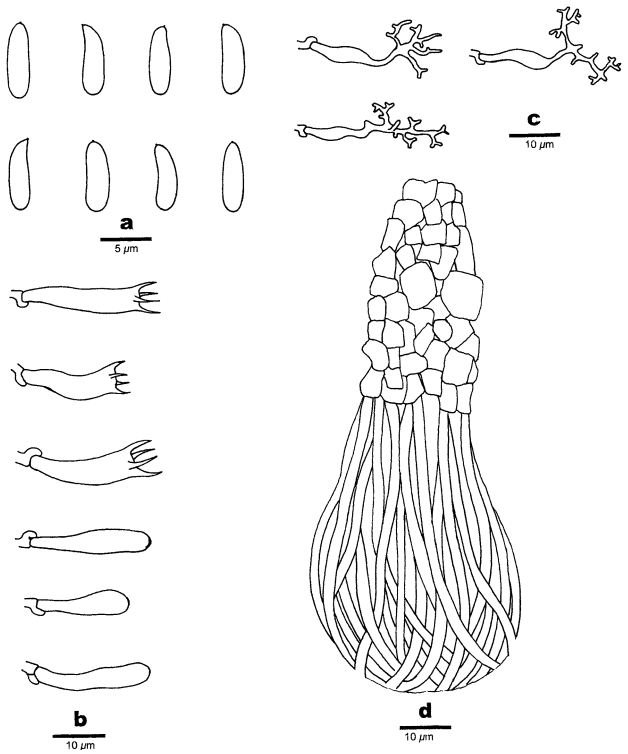

Fig. 103 Microscopic structures of *Grammothele denticulata* (drawn from *Cui 8860*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Dendrohyphidia; **d**. Hyphal structure. Bars: **a** = 5 μm; **b–d** = 10 μm

Tubes. — Generative hyphae hyaline, thin-walled, occasionally branched, 1.3–3 μm in diam; skeletal hyphae dominant, thick-walled to subsolid, occasionally branched, loosely interwoven, 1.5–3.4 μm in diam. Cystidia and cystidioles absent. Hyphal pegs abundant, apically encrusted, strongly dextrinoid. Dendrohyphidia present at all the hymenia. Basidia clavate, with four sterigmata and a basal clamp connection, 19–28 × 4–6 μm; basidioles in shape similar to basidia, but slightly smaller. Large cubic to irregular crystals present.

Spores. — Basidiospores cylindrical, tapering at apiculus, hyaline, thin-walled, smooth, IKI–, CB–, (5.4–)5.9–7(–7.1) × (1.9–)2–2.3(–2.7) μm, L = 6.12 μm, W = 2.13 μm, Q = 2.89–2.94 (n = 60/2).

Notes. — Phylogenetically, *Grammothele denticulata* clustered with *G. lineata*, the generic type species, with high statistical supports (Zhou and Dai 2012), and both species have grayish pores, but the latter has larger pores (2–4 per mm) and oblong-ellipsoid spores (4.6–6.5 × 2.6–3.2 μm).

Specimens examined: **CHINA. Guangdong**, Shixing County, Chebaling Nature Reserve, on fallen angiosperm trunk, 26 June 2010, *Cui 8860* (holotype, BJFC); 23 November 2010, *Cui 8711* (paratype, BJFC).

Grammothele fuligo (Berk. & Broome) Ryvarden, *Trans. Br. mycol. Soc.* 73(1): 15 (1979) (Figs. 104, 105).
MycoBank: MB 314701
Basionym: *Polyporus fuligo* Berk. & Broome, *J. Linn. Soc., Bot.* 14(no. 73): 53 (1873).

Fruiting body. — Basidiocarps annual, resupinate, adnate, inseparable, leathery to corky; up to 15 mm, 8 mm wide and 0.6 mm thick at center. Pore surface grayish blue when fresh, becoming pale grayish blue to dark gray; pores angular, 7–9 per mm; dissepiments thin, entire. Sterile margin distinct, pale bluish gray, up to 2 mm wide. Subiculum very thin, corky, up to 0.2 mm thick. Tubes concolorous with the pore surface, shallow, up to 0.4 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB–; tissues turning to dark brown in KOH.

Subiculum. — The hyphal structure in subiculum is similar to those in tubes.

Tubes. — Generative hyphae abundant, hyaline, thin-walled, frequently branched, 1.5–3.5 µm in diam; skeletal hyphae pale brown, thick-walled with a narrow lumen to subsolid, interwoven, frequently branched, 1.5–4 µm in diam. Cystidia and cystidioles absent. Dendrohyphidia present. Basidia clavate, with four sterigmata and a basal clamp connection, 20–25 × 5–7.5 µm; basidioles in shape similar to basidia, but smaller.

Spores. — Basidiospores ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, (5–)5.2–7(–7.1) × (2–)2.3–3(–3.1) µm, L = 6.4 µm, W = 2.65 µm, Q = 2.28 (n = 30/1).

Notes. — *Grammothele fuligo* is characterized by annual and resupinate basidiocarps, grayish blue pore surface, smaller and shallow pores (7–9 per mm), the presence of dendrohyphidia, and growing on palm or bamboos.

Specimens examined: **CHINA**. **Fujian**, Xiamen, Xiamen Botanical Garden, on bamboo, 23 August 2006, *Cui 4027* (IFP & BJFC). **Guangdong**, Guangzhou, South China Botanical Garden, on palm, 19 September 2009, *Cui 7698* (BJFC). **Guangxi**, Xingan County, Maoershan Nature Reserve, on palm, 20 August 2011, *Yuan 5683* (IFP). **Hainan**, Ledong County, Jianfengling Nature Reserve, on palm, 23 March 2011, *Dai 12148* (BJFC). **Yunnan**, Pingbian County, Daweishan Nature Reserve, on palm, 4 June 2011, *Dai 12189* (BJFC).

Fig. 104 Basidiocarps of *Grammothele fuligo*

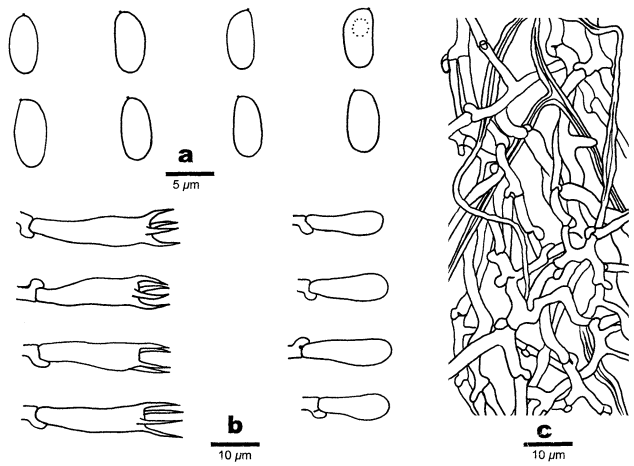

Fig. 105 Microscopic structures of *Grammothele fuligo* (drawn from *Cui 4178*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphal structure. Bars: **a** = 5 µm; **b–c** = 10 µm

Grammothele lineata Berk. & M.A. Curtis, *J. Linn. Soc., Bot.* 10(no. 46): 327 (1868) (Figs. 106, 107).
MycoBank: MB 168936

Fruiting body. — Basidiocarps resupinate, adnate, up to 16 cm long, 5 cm wide and 1 mm thick, corky to coriaceous, without special odor or taste when fresh, becoming hard corky and light in weight upon drying. Pore surface bluish-gray to sordid gray; pores angular to irregular, 2–3 per mm; dissepiment thin, entire to lacerate, with plenty hyphal pegs; hyphal pegs often projecting out of tube walls, yellowish brown at base. Sterile margin white to pale pinkish. Subiculum corky, whitish to pinkish, becoming dark and resinous with age, very thin, about 0.2 mm thick. Tubes shallow, rigid corky when dry, concolorous with pore surface, up to 0.8 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB–; tissues darkening in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, 1.5–2.5 µm in diam; skeletal hyphae dominant, hyaline to pale brownish, thick-walled to subsolid, occasionally branched, interwoven, 1–2.5 µm in diam.

Tubes. — Generative hyphae hyaline, thin-walled, occasionally branched, 2–2.6 µm in diam; skeletal hyphae dominant, thick-walled with a narrow lumen, occasionally branched, interwoven, 2–2.9 µm in diam. Cystidia and cystidioles absent. Dendrohyphidia richly present, hyaline,

Fig. 106 Basidiocarps of *Grammothele lineata*

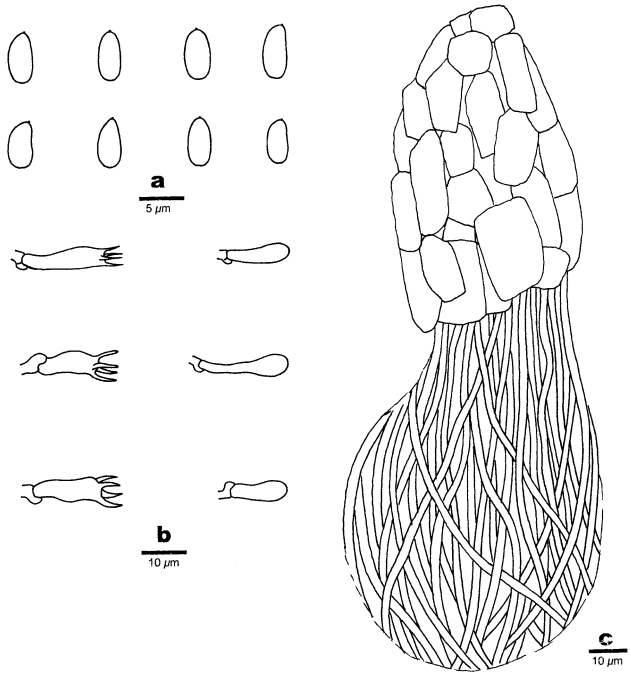

Fig. 107 Microscopic structures of *Grammothele lineata* (drawn from *Cui 6687*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphal structure. Bars: **a** = 5 μm; **b–c** = 10 μm

thin-walled, moderately to strongly branched. Basidia clavate, with four sterigmata and a basal clamp connection, 15.5–22.8 × 4.6–5.9 μm; basidioles mostly clavate, slightly smaller than basidia.

Spores. — Basidiospores oblong-ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, (4.4–)4.6–6.5(–6.8) × (2.5–)2.6–3.2 μm, L = 5.55 μm, W = 2.9 μm, Q = 1.91 (n = 30/1).

Notes. — *Grammothele lineata* differs from *G. fulgio* by its bigger pores (2–3 per mm), and growth on the substrate of dicotyledonous trees.

Specimens examined: **CHINA. Hainan**, Baoting County, Qixianling Forest Park, on fallen angiosperm trunk, 27 November 2007, *Yang 871* (IFP); Danzhou, on fallen trunk of *Litch*, 7 May 2009, *Cui 6286* (BJFC); Changjiang County, Bawangling Nature Reserve, on fallen angiosperm trunk, 9 May 2009, *Cui 6462* (BJFC); Wanning County, Hele, on fallen angiosperm trunk, 14 May 2009, *Cui 6687* (BJFC). **Guangxi**, Longzhou County, Nonggang Nature Reserve, on rotten angiosperm wood, 3 August 2007, *Zhou 67* (IFP). **Yunnan**, Mengla County, Menglun, Lvshilin Park, on fallen angiosperm trunk, 1 November 2009, *Cui 8441* (BJFC).

Grammothele quercina (Y.C. Dai) B.K. Cui & Hai J. Li, *Mycologia* 105: 379 (2013) (Figs. 108, 109).
MycoBank: MB 801194
Basionym: *Megasporoporia quercina* Y.C. Dai, *Mycotaxon* 89: 380 (2004).

Fruiting body. — Basidiocarps perennial, resupinate, adnate, difficult to separate from substrate, leathery when fresh, becoming hard corky upon drying, up to 200 cm long, 20 cm wide and 5 mm thick. Pore surface cream to pale grayish cream when fresh, becoming grayish cream to pale straw upon drying; pores round to irpicoid, 1–2 per mm; dissepiments thin, lacerate, bearing abundant hyphal pegs (easily seen by lens). Subiculum pale straw color, hard corky, up to 0.5 mm thick. Tubes concolorous with poroid surface, hard corky, up to 4.5 mm long, tubes stratified, tube layers usually distinct; tube walls bearing crowded hyphal pegs.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB+; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, occasionally branched, 2–4 μm in diam; skeletal hyphae dominant, thick-walled, flexuous, dendritically branched, tightly interwoven, agglutinated, 2.2–3.5 μm in diam.

Tubes. — Generative hyphae infrequent, thin-walled, occasionally branched, 2–3.5 μm in diam; skeletal hyphae dominant, mostly subsolid, dendritically branched, tightly interwoven, agglutinated, 2–3.3 μm in diam. Cystidia and

Fig. 108 Basidiocarps of *Grammothele quercina*

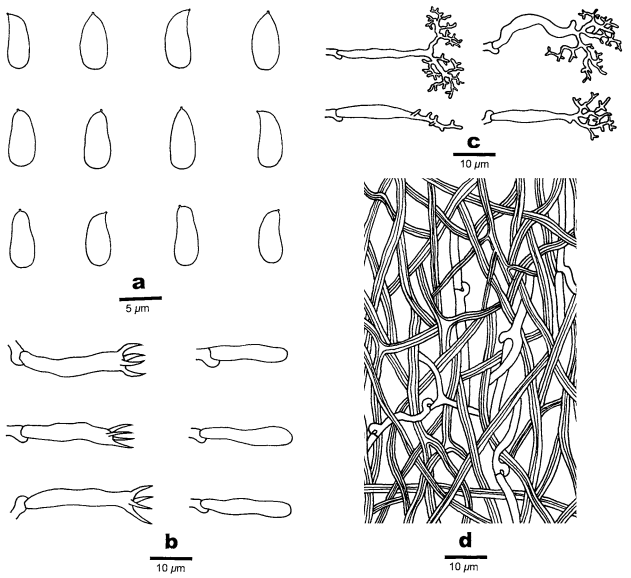

Fig. 109 Microscopic structures of *Grammothele quercina* (drawn from *Cui 9486*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Dendrohyphidia; **d**. Hyphal structure. Bars: **a** = 5 μm; **b–d** = 10 μm

cystidioles absent. Hyphal pegs frequent, some of them submerged in trama, mostly penetrating into hymenium. Hyphae of hyphal pegs hyaline, thick-walled, straight, strongly agglutinated, parallel along the peg, strongly dextrinoid, CB+, 2–3 μm in diam. Dendrohyphidia frequent in hymenium and the edges of dissepiments. Basidia narrowly clavate, with a basal clamp and four sterigmata, 20–26 × 4–6 μm; basidioles in shape similar to basidia, but slightly smaller. Polyhedric crystals frequent among subhymenium and hymenium.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, glued in tetrads, IKI–, CB–, (5.1–)5.6–8(–8.2) × (2.1–)2.3–3(–3.5) μm, L = 6.56 μm, W = 2.71 μm, Q = 2.42 (n = 60/1).

Notes. — *Grammothele quercina* is characterized by resupinate and perennial basidiocarps, grayish pore surface, lacerate to irpicoid pores (1–2 per mm), the presence of dendrohyphidia and hyphal pegs. It is distributed in high altitude of the Himalaya and surrounding areas and usually produces large fruiting bodies. It was described in genus *Megasporoporia* Ryvarden & J.E. Wright (Dai and Wu 2004) and transferred to *Grammothele* based on phylogenetic analysis inferred from rDNA sequences (Li and Cui 2013a).

Specimens examined: **CHINA**. **Xizang (Tibet)**, Bomi County, on fallen trunk of *Quercus*, 19 September 2010, *Cui 9465*, *9470*, *9476, 9482*, *9488* (BJFC). **Yunnan**, Lijiang, Heishuihe, on fallen decorticated trunk of *Quercus*, 15 June 1999, *Dai 3054* (holotype, IFP).

Grammothelopsis Jülich, *Biblthca Mycol.* 85: 397 (1982).
MycoBank: MB 17693
Type species: *Grammothelopsis macrospora* (Ryvarden) Jülich.

Basidiocarps annual, resupinate to effused-reflexed, adnate. Pore surface light color; pores shallow, irregular. Subiculum thin. Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, CB+. Dendrohyphidia usually present in the hymenium, hyphal pegs present. Basidiospores ellipsoid, hyaline, thick-walled, smooth, weakly dextrinoid, weakly CB+.

Grammothelopsis was established by Jülich (1981) and typified by *G. macrospora* (Ryvarden) Jülich. It is characterized by resupinate to effused basidiocarps, shallow irregular pores, and large thick-walled variably dextrinoid basidiospores. *Grammothelopsis* species occur mostly in tropical Africa and America (Ryvarden and de Meijer 2002; Robledo and Ryvarden 2007), but two species recently described from tropical China (Dai et al. 2011a; Zhao and Cui 2012b).

Key to species of *Grammothelopsis* in China

1 Pores 1–2 per mm; dendrohyphidia present .... ……*G. subtropica*
1 Pores 3–4 per mm; dendrohyphidia absent..... ..... ……*G. asiatica*

Grammothelopsis asiatica Y.C. Dai & B.K. Cui, *Ann. bot. fenn.* 48(3): 220 (2011) (Figs. 110, 111).
MycoBank: MB 518961

Fruiting body. — Basidiocarps annual, resupinate, adnate, corky, without odor or taste when fresh, becoming corky upon drying, up to 9 cm long, 1 cm wide and 0.6 mm thick at center. Pore surface cream; pores round to angular, 3–4 per mm; dissepiments thin, entire to slightly lacerate. Sterile margin narrow, cream, less than 1 mm wide. Subiculum very thin, cream, corky, azonate, less than 0.1 mm thick. Tubes concolorous with the pore surface, corky, less than 0.5 mm long.

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

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.6–3.2 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, unbranched, interwoven, 2–4.5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.4–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, rarely branched, interwoven, 1.8–4.2 μm in diam. Cystidia absent; cystidioles present, fusoid to subulate, 18–25 × 6–9 μm. Basidia clavate, with four sterigmata and

Fig. 110 Basidiocarps of *Grammothelopsis asiatica*

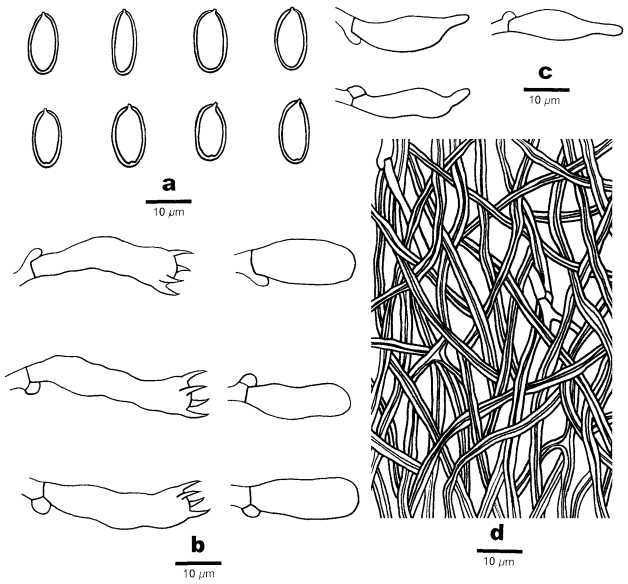

Fig. 111 Microscopic structures of *Grammothelopsis asiatica* (drawn from *Cui 8336*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 μm

a basal clamp connection, 22–34 × 6–10 μm; basidioles in shape similar to basidia, but distinctly smaller.

Spores. — Basidiospores ellipsoid to oblong-ellipsoid, hyaline, thick-walled, smooth, IKI–, weakly CB+, (9–)10.5–13(–15) × (5–)5.4–6(–6.7) μm, L = 12.14 μm, W = 5.72 μm, Q = 2.1–2.2 (n = 60/2).

Notes. — *Grammothelopsis asiatica* is similar to *G. bambusicola* Ryvarden & de Meijer which also was found on bamboo (Ryvarden and de Meijer 2002). However, *G. bambusicola* has strongly dextrinoid skeletal hyphae and basidiospores, and it has dendrohyphidia at dissepiment edge. In addition, its basidiospores are broadly ellipsoid, strongly cyanophilous. However, *G. asiatica* has non-dextrinoid skeletal hyphae and basidiospores, dendrohyphidia are absent at dissepiment edges, and the basidiospores are ellipsoid to oblong-ellipsoid, weakly cyanophilous. *Grammothelopsis incrustata* A. David & Rajchenb. and *G. neotropica* Robledo & Ryvarden have non-dextrinoid basidiospores, but they both have distinctly larger basidiospores (16–22 × 6–8 μm and 18–20 × 7–8 μm, Robledo and Ryvarden 2007). *Grammothelopsis macrospora* (Ryvarden) Jülich differs from *G. asiatica* by having large pores (1–2 per mm), abundant dendrohyphidia, broadly ellipsoid and strongly dextrinoid basidiospores (15–20 × 7.5–11 μm, Robledo and Ryvarden 2007). *Grammothelopsis puiggarii* (Speg.) Rajchenb. & J.E. Wright is distinguished from *G. asiatica* by larger pores (1–2 per mm), broadly ellipsoid and strongly dextrinoid basidiospores (17–20 × 10–12 μm, Robledo and Ryvarden 2007).

Specimens examined: **CHINA. Hainan**, Lingshui County, Diaoluoshan Forest Park, on fallen bamboo, 30 May 2008, *Dai 9881* (paratype, BJFC); Changjiang County, Bawangling Nature Reserve, on fallen bamboo, 9 November 2009, *Dai 11588* (paratype, BJFC). **Yunnan**, Mengla County, Xishuangbanna Botanical Garden, on fallen bamboo, 31 October 2009, *Cui 8336* (holotype, BJFC).

Grammothelopsis subtropica B.K. Cui & C.L. Zhao, *Mycotaxon* 121: 292 (2012) (Figs. 112, 113).
MycoBank: MB 564797

Fruiting body. — Basidiocarps annual, resupinate, adnate, soft corky, without odor or taste when fresh, becoming corky upon drying; up to 7.5 cm long, 1.6 cm wide and 0.7 mm thick at center. Pore surface white to cream when fresh, cream upon drying; pores round to angular, 1–2 per mm; dissepiments thin, entire. Sterile margin narrow, white, up to 1 mm wide. Subiculum cream, thin, ca. 0.2 mm thick. Tubes concolorous with pore surface, corky, up to 0.5 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, CB+; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, 2.1–2.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, frequently branched, flexuous, interwoven, 2.3–2.8 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, 2–2.3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, frequently branched, flexuous, interwoven, 2–2.5 μm in diam. Dendrohyphidia abundant in dissepiments, hyaline, thin-walled, up to 45 μm long. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 28.1–36 × 4.2–6.4 μm. Basidia clavate to pear-shaped, with four sterigmata and a basal clamp connection, 36.5–39.1 × 8.9–9.8 μm; basidioles dominant, mostly pear-shaped, slightly smaller than basidia.

Fig. 112 Basidiocarps of *Grammothelopsis subtropica*

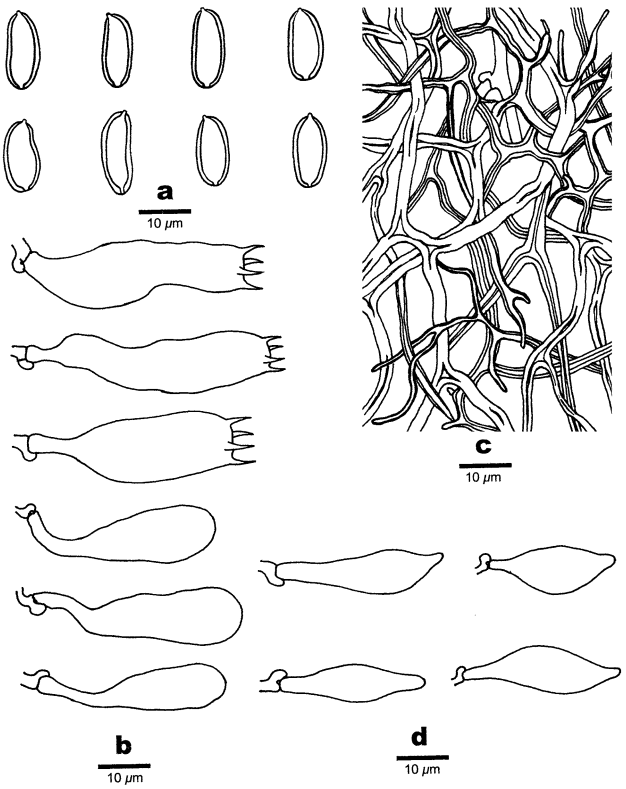

Fig. 113 Microscopic structures of *Grammothelopsis subtropica* (drawn from *Cui 9035*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Cystidioles. Bars: **a–d** = 10 μm

Spores. — Basidiospores ellipsoid to oblong-ellipsoid, hyaline, thick-walled, smooth, slightly dextrinoid, weakly CB+, (11.2–)12.7–15.2(–16) × (4.7–)4.9–5.9(–6.1) μm, L = 13.7 μm, W = 5.3 μm, Q = 2.4–2.7 (n = 90/3).

Notes. — *Grammothelopsis bambusicola* has a dimitic hyphal system with strongly dextrinoid skeletal hyphae and presence of dendrohyphidia. However, it differs from *G. subtropica* in having smaller pores (4 per mm) and strongly dextrinoid and wider basidiospores (11–13.5 × 7.8–9 μm: measured from type specimen by Dai et al. 2011a). *Grammothelopsis macrospora* may be confused with *G. subtropica* due to its resupinate basidiocarps with larger pores (1–2 per mm) and presence of dendrohyphidia, but it is distinguished from *G. subtropica* by its non-dextrinoid and unbranched skeletal hyphae. In addition, its basidiospores are strongly dextrinoid and larger (15–20 × 7.5–11 μm: Robledo and Ryvarden 2007).

Specimens examined: **CHINA**. **Guangdong**, Fengkai County, Heishiding Nature Reserve, on fallen angiosperm branch, 1 July 2010, *Cui 9035* (holotype, BJFC), *Cui 9041* (paratype, BJFC). **Huan**, Yizhang County, Mangshan Nature Reserve, on fallen angiosperm trunk, 24 June 2007, *Li 1662* (paratype, IFP).

Haploporus Bondartsev & Singer, *Mycologia* 36(1): 68 (1944).

MycoBank: MB 17722

Type species: *Haploporus odorus* (Sommerf.) Bondartsev & Singer.

Basidiocarps annual to perennial, resupinate, sessile or effused-reflexed. Pore surface cream to buff when fresh, becoming cream to pale yellowish brown when dry; pores round to angular. Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid or not, CB+, variably branched. Basidiospores ellipsoid, hyaline, thick-walled, ornamented, IKI–, CB+.

Haploporus was established in 1944 and typified by *H. odorus*. Kotlaba and Pouzar (1963) described *Pachykytospora* for *Polyporus tuberculosus* Fr., but Dait et al. (2002) argued that there was no significant differences between the two genera, hence, *Pachykytospora* was treated as a synonym of *Haploporus*.

Key to species of *Haploporus* in China

1 Basidiocarps pileate or effused-reflexed .....*H. odorus*
1 Basidiocarps resupinate.....2
2 Pores 2–3 per mm.....3
2 Pores > 3 per mm.....4
3 Basidiospores > 13 μm in length.....*H. latisporus*
3 Basidiospores ≤ 12 μm in length.....*H. nepalensis*
4 Cystidioles present.....5
4 Cystidioles absent.....7
5 Cystidioles clavate with apically simple septa .....
.....*H. subpapyraceus*
5 Cystidioles fusiform without apically simple septa.....6
6 Skeletal hyphae without septa at dissepimental edge.....*H. alabamae*
6 Skeletal hyphae with septa at dissepimental edge.....
.....*H. septatus*
7 Skeletal hyphae dextrinoid.....8
7 Skeletal hyphae non-dextrinoid.....10

8 Dendrohyphidia present at dissepiment edges……*H. papyraceus*
8 Dendrohyphidia absent at dissepiment edges .....……9
9 Basidiospores cylindrical, > 9 µm in length……*H. cylindrosporus*
9 Basidiospores ellipsoid, < 6 µm in length……*H. microsporus*
10 Pore surface light reddish brown when dry; basidiospores ellipsoid..... ……*H. subtrameteus*
10 Pore surface clay-buff when dry; basidiospores cylindrical..... ……*H. thindii*

Haploporus alabamae (Berk. & Cooke) Y.C. Dai & Niemelä, *Ann. bot. fenn.* 39(3): 181 (2002) (Figs. 114, 115).
MycoBank: MB 384315
Basionym: *Polyporus alabamae* Berk. & Cooke, *Grevillea* 6 (40): 130 (1878).

Fruiting body. — Basidiocarps annual, resupinate, adnate, not easily separated from the substrate, leathery to corky upon drying, up to 9 cm long, 3 cm wide and 2 mm thick at center. Pore surface cream when fresh, pale brown when dry; pores semicircular, 3–5 per mm; dissepiments thin, slightly lacerate. Sterile margin distinct, up to 1 mm wide. Subiculum very thin, corky, up to o.5 mm thick. Tubes slightly paler than the pore surface, corky, up to 1.5 mm long.

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

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 1.5–3 µm in diam; skeletal hyphae dominant, hyaline to pale brown, thick-walled to subsolid, frequently branched, interwoven, 1.5–6 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, often branched, 1.5–2.8 µm in diam; skeletal hyphae dominant, thick-walled to subsolid, frequently branched, interwoven, 1.3–5 µm in diam. Cystidia absent;

Fig. 114 Basidiocarps of *Haploporus alabamae*

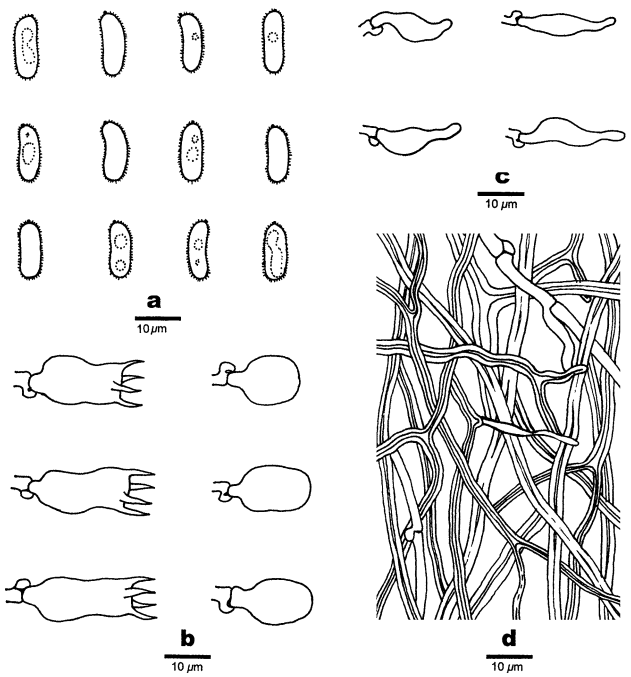

Fig. 115 Microscopic structures of *Haploporus alabamae* (drawn from *Cui 9046*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 µm

fusiform cystidioles present, thin-walled, smooth, 20–27.5 × 5–10 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 18–28.5 × 8–15 µm; basidioles in shape similar to basidia, but smaller.

Spores. — Basidiospores oblong-ellipsoid, hyaline, thick-walled, ornamented with longitudinal striae, IKI–, CB+, (8–)8.3–12.5(–12.9) × (3.5–)4–6.5(–7) µm, L = 10.49 µm, W = 5.54 µm, Q = 1.84–2.36 (n = 60/2).

Notes. — *Haploporus alabamae* is close to *H. papyraceus*, but the latter has longer basidiospores (13–15 × 5–6 µm) and dendrohyphidia at the dissepimental edge.

Specimens examined: **CHINA. Guangdong**, Lianzhou County, Nanling Nature Reserve, on fallen angiosperm branch, 15 May 2009, *Dai 10951* (BJFC); Shixing County, Chebaling Nature reserve, on fallen angiosperm branch, 23 June 2010, *Cui 8700, 8702, 8706, 8713* (BJFC); 24 June 2010, *Cui 8722, 8776* (BJFC); Fengkai County, Heishiding Nature reserve, on fallen angiosperm branch, 1 July 2010, *Cui 9042, 9046* (BJFC). **Hainan**, Ledong County, Diaoluoshan Forest Park, on fallen branch of *Dacrydium soland*, 20 November 2007, *Dai 9324* (BJFC).

Haploporus cylindrosporus L.L. Shen, Y.C. Dai & B.K. Cui, *Mycol. Prog.*, 15: 734 (2016) (Figs. 116, 117).
MycoBank: MB 816519

Fruiting body. — Basidiocarps annual, resupinate, inseparable, soft corky when fresh, without odor or taste, becoming hard corky upon drying, up to 8.5 cm long,

Fig. 116 Basidiocarps of *Haploporus cylindrosporus*

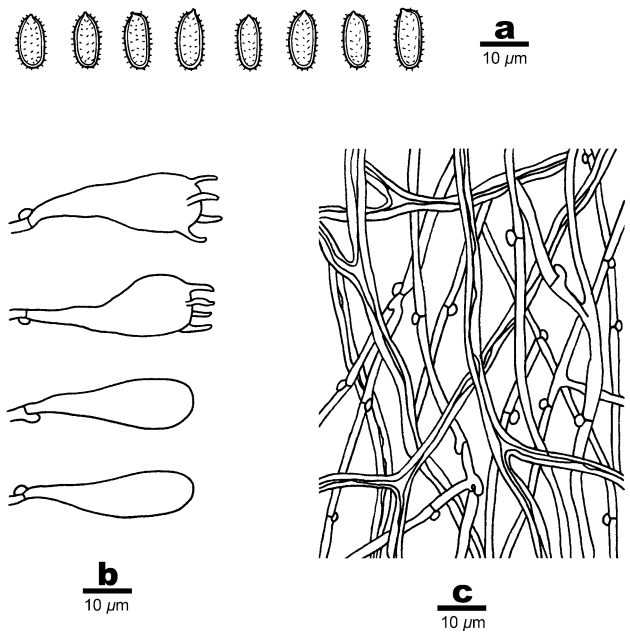

Fig. 117 Microscopic structures of *Haploporus cylindrosporus* (drawn from *Dai 15643*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a–c** = 10 μm

2.5 cm wide and 2 mm thick at center. Pore surface white to cream when fresh, becoming pinkish buff to clay-buff when bruised or upon drying; pores regular, mostly round, 4–5 per mm; dissepiments thin, entire. Sterile margin distinct, up to 2.5 mm wide. Subiculum cream, corky, very thin, about 0.1 mm thick. Tubes pinkish buff, woody corky, up to 2 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB+; tissues unchanged in KOH.

Subiculum. — Generative hyphae hyaline, thin-walled, occasionally branched, interwoven, 2.5–3 μm in diam; skeletal hyphae dominant, hyaline, distinctly thick-walled with a narrow lumen to almost solid, frequently branched, interwoven, 3–4 μm in diam. Big irregular crystals occasionally present. Abundant oily substance present among hyphae.

Tubes. — Generative hyphae hyaline, thin-walled, frequently branched, flexuous, 1–3 μm in diam; skeletal hyphae hyaline, thick-walled with a narrow lumen to almost solid, frequently branched, interwoven, 2.5–4 μm in diam. Cystidia and cystidioles absent. Basidia pear-shaped to barrel-shaped, with four sterigmata and a basal clamp connection, 33–35 × 9–11 μm; basidioles dominant, in shape similar to basidia, but slightly smaller. Abundant oily substance present in trama.

Spores. — Basidiospores cylindrical, hyaline, thick-walled, with longitudinal echinulate ornamentations, IKI–, CB+, (9.5–)10–11.5(–12) × (4–)4.5–5(–5.5) μm, L = 10.6 μm, W = 4.69 μm, Q = 2.15–2.27 (n = 60/2).

Notes. — *Haploporus cylindrosporus* is characterized by having big irregular crystals present in the subiculum, an abundant oily substance among hyphae and typically cylindrical basidiospores (10–11.5 × 4.5–5 μm, Shen et al. 2016).

Specimens examined: **CHINA**. **Yunnan**, Jingdong County, Ailaoshan Nature Reserve, on dead angiosperm tree, 25 August 2015, *Dai 15643* (holotype, BJFC); on dead tree of *Rhododendron*, 27 August 2015, *Dai 15664* (paratype, BJFC).

Haploporus latisporus Juan Li & Y.C. Dai, *Mycotaxon* 99: 182 (2007) (Figs. 118, 119).
MycoBank: MB 510574

Fruiting body. — Basidiocarps annual, resupinate, difficult to separate from the substrate, soft corky when fresh, becoming corky upon drying, up to 10 cm, 3 cm wide and 1 mm thick at center. Pore surface white to cream, become cream to buff upon drying; pores round to angular, 1–3 per mm; dissepiments thin, entire to slightly lacerate. Sterile margin almost lacking. Subiculum white, corky, very thin, almost lacking. Tubes concolorous with pore surface, corky, about 1 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae IKI– or weakly dextrinoid, CB+; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.8–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, frequently branched, interwoven, 1–2.5 μm in diam.

Tubes. — Generative hyphae frequent, hyaline, thin-walled, rarely branched, 1.5–3.2 μm in diam; skeletal hyphae dominant, thick-walled, with a narrow lumen, frequently branched, 1.8–3.8 μm in diam. Cystidia absent; cystidioles present, fusiform, thin- to slightly thick-walled,

Fig. 118 Basidiocarps of *Haploporus latisporus*

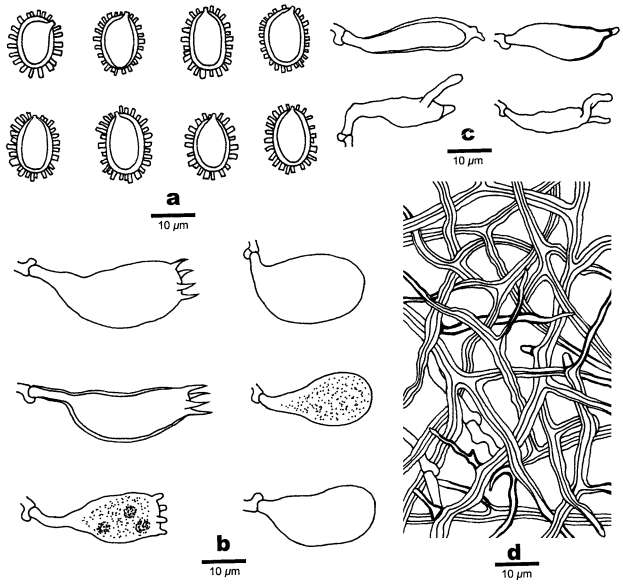

Fig. 119 Microscopic structures of *Haploporus latisporus* (drawn from *Dai 10562*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 μm

24–32 × 7–16 μm. Basidia broadly clavate or barrel-shaped, with four sterigmata and a basal clamp connection, 25–40 × 12–16 μm; basidioles similar in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, hyaline, thick-walled, ornamented with warts, IKI–, CB+, 13–18.5(–19) × (7.5–)8–10 μm, L = 15.25 μm, W = 8.57 μm, Q = 1.64–1.92 (n = 90/3).

Notes. — *Haploporus latisporus* is characterized by annual, resupinate and thin basidiocarps, larger pores (1–3 per mm), warted (warts up to 2 μm long) and wide basidiospores (up to 10 μm). In addition, *H. latisporus* grows only on branches of gymnosperm trees (Li et al. 2007a).

Specimens examined: **CHINA. Anhui**, Huangshan, Huangshan Mountain, on fallen gymnosperm branch, 21 October 2010, *Dai 11873* (BJFC). **Guizhou**, Jiangkou County, Ecological Botanical Garden, on fallen branch of *Taiwania*, 23 November 2014, *Dai 14938* (BJFC). **Henan**, Xinyang, Jigongshan Nature Reserve, on fallen branch of *Pinus*, 23 August 2005, *Li 120* (paratype, IFP), *Li 131* (holotype, IFP); 27 October 2014, *Cui 12344, 12349* (BJFC). **Hunan**, Zhangjiajie, Zhangjiajie Forest Park, on fallen gymnosperm branch, 17 August 2010, *Dai 11656, 11658* (BJFC). **Jiangxi**, Jiujiang, Lushan Mountain, on fallen branch of *Abies*, 9 October 2008, *Cui 6075* (BJFC); Jinggangshan, Jinggang Mountain, on living branch of *Metasequoia*, 22 September 2008, *Dai 10562* (BJFC).

Haploporus microsporus L.L. Shen, Y.C. Dai & B.K. Cui**, sp. nov.** (Figs. 120, 121).

MycoBank: MB 825659

Differs from other species in the genus by its cream to buff basidiocarps, round to angular pores (4–5 per mm), and smaller basidiospores (4.5–5.8 × 3–3.5 μm).

Type. — **CHINA**. **Hainan**, Ledong County, Jianfengling Nature Reserve, on dead angiosperm branch, 23 March 2010, *Dai 12147* (holotype, BJFC).

Etymology. — *Microsporus* (Lat.), referring to the small basidiospores.

Fruiting body. — Basidiocarps annual, resupinate, difficult to separate from the substrate, without odor or taste, fleshy corky when fresh, corky to brittle when dry, up to 12 cm long, 2 cm wide and 2 mm thick at center. Pore surface white to cream when fresh, becoming cream buff to pinkish buff upon drying; pores round to angular, 4–5 per mm; dissepiments thin, entire. Sterile margin narrow, paler than the pore surface, up to 1 mm wide. Subiculum olivaceous-buff, corky, about 0.5 mm thick. Tubes concolorous with the pore surface, corky to brittle, up to 1.5 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, CB+; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, slightly thick-walled, branched, 2.5–3 μm in diam; skeletal hyphae dominant, hyaline, distinctly thick-walled with a narrow lumen, frequently branched, interwoven, 2–4 μm in diam.

Tubes. — Generative hyphae hyaline, thin- to slightly thick-walled, occasionally branched, 2–3 μm in diam; skeletal hyphae dominant, hyaline, distinctly thick-walled with a narrow lumen, frequently branched, interwoven, 2–4.5 μm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 20–23.5 × 5.5–6.5 μm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, hyaline, thick-walled, ornamented with warts, IKI–, strongly CB+, (4.2–)

Fig. 120 Basidiocarps of *Haploporus microsporus*

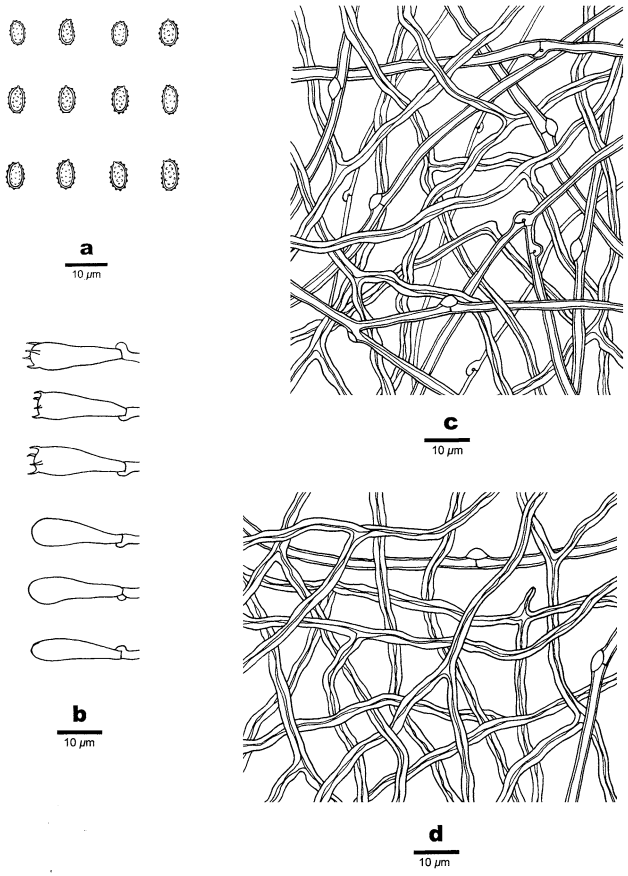

Fig. 121 Microscopic structures of *Haploporus microsporus* (drawn from *Dai 12147*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from subiculum. Bars: **a–d** = 10 µm

4.5–5.8(–6) × (2.8–)3–3.5 µm, L = 5.37 µm, W = 3.18 µm, Q = 1.69 (n = 30/1).

Notes. — *Haploporus microsporus* is characterized by resupinate and annual basidiocarps, cream to buff pore surface, small, ellipsoid and ornamented basidiospores. It may be confused with *H. nanosporus* (A. David & Rajchenb.) Piątek which also has small basidiospores. However, *H. nanosporus* differs in having smaller pores (7–8 per mm). The two species are different in the rDNA sequences (data not shown).

Haploporus nepalensis (T. Hatt.) Piątek, *Polish Bot. J.* 48(1): 82 (2003) (Figs. 122, 123).
MycoBank: MB 371186
Basionym: *Pachykytospora nepalensis* T. Hatt., *Bull. natn. Sci. Mus., Tokyo, B* 28(2): 29 (2002).

Fruiting body. — Basidiocarps annual, resupinate, difficult to separate from the substrate, soft corky when fresh, becoming corky upon drying, up to 9 cm, 2 cm wide and 1 mm thick at center. Pore surface white to cream, become cream to buff upon drying; pores round to angular, 2–3 per mm; dissepiments thin to slightly thick, entire to slightly lacerate. Sterile margin indistinct. Subiculum cream, corky, very thin, about 0.1 mm thick. Tubes concolorous with pore surface, corky, about 0.9 mm long.

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

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, frequently branched, 2–3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, frequently branched, interwoven, 2–3 µm in diam.

Tubes. — Generative hyphae hyaline, thin-walled, often branched, 2–3.2 µm in diam; skeletal hyphae dominant, thick-walled, with a wide lumen, frequently branched, interwoven, 3–6 µm in diam. Cystidia absent; cystidioles present, fusiform, thin-walled, 15–29 × 5–8 µm. Basidia broadly clavate or pear-shaped, with four sterigmata and a basal clamp connection, 26–33 × 8–15 µm; basidioles similar in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, hyaline, thick-walled, ornamented with warts, IKI–, CB+, (9.5–)10–11.2(–

Fig. 122 Basidiocarps of *Haploporus nepalensis*

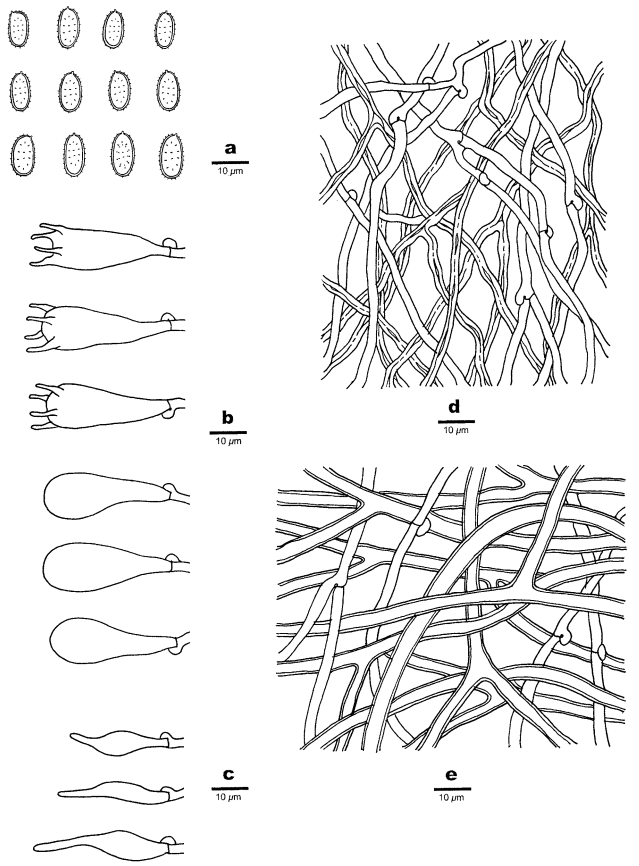

Fig. 123 Microscopic structures of *Haploporus nepalensis* (drawn from *Dai 12937*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **e**. Hyphae in subiculum. Bars: **a–e** = 10 μm

11.5) × (4.8–)5–5.5(–6) μm, L = 10.86 μm, W = 5.27 μm, Q = 1.97–2.13 (n = 60/2).

Notes. — *Haploporus nepalensis* is characterized by annual, resupinate basidiocarps, white to cream pore surface, big pores (2–3 per mm), the presence of cystidioles, ellipsoid basidiospores (10–11.2 × 5–5.5 μm). It has a distribution in mountainous areas in Southwest China and Nepal.

Specimens examined: **CHINA. Sichuan**, Mianning County, Lingshansi Park, on dead angiosperm branch, 18 September 2012, *Dai 12397* (BJFC); Xiaojin County, Jiajin Mountain, on dead angiosperm branch, 17 September 2012, *Cui 10729* (BJFC).

Haploporus odorus (Sommerf.) Bondartsev & Singer, *Mycologia* 36 (1): 68 (1944) (Figs. 124, 125).
MycoBank: MB 286847
Basionym: *Polyporus odorus* Sommerf., *Suppl. Fl. lapp.* (Oslo): 275 (1826).

Fig. 124 A basidiocarp of *Haploporus odorus*

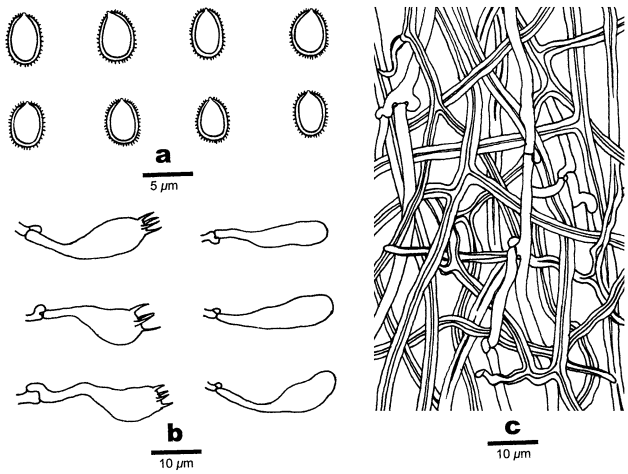

Fig. 125 Microscopic structures of *Haploporus odorus* (drawn from *Cui 6907*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 μm; **b–c** = 10 μm

Fruiting body. — Basidiocarps perennial, sessile or effused-reflexed, single or imbricate, leathery, with a strong sweet odor when fresh, becoming hard corky and consistently with a sweet odor when dry. Pilei ungulate to semicircular, projecting up to 10 cm, 14 cm wide and 6 cm at base. Pileal surface cream when juvenile, becoming buff to cinnamon buff with age, glabrous, azonate; margin obtuse. Pore surface white to cream when fresh, becoming grayish white to pale buff when dry; pores round to angular, 3–4 per mm; dissepiments thick, entire. Context cream when fresh, pale buff when dry, corky, sometimes zonate, up to 3 cm thick. Tubes distinctly stratified, slightly paler than the pore surface, corky, up to 3 cm thick.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae weakly dextrinoid, CB+; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, frequently branched, 1.6–2.5 μm in diam; skeletal

hyphae dominant, hyaline, thick-walled to subsolid, frequently branched, interwoven, 1.5–4.2 µm in diam.

Tubes. — Generative hyphae hyaline, thin-walled, often branched, 1.5–2.4 µm in diam; skeletal hyphae dominant, thick-walled, with a narrow lumen, frequently branched, interwoven, 2–3.8 µm in diam. Cystidia and cystidioles absent. Basidia clavate or pear-shaped, with four sterigmata and a basal clamp connection, 20–29 × 8–10 µm; basidioles similar in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, hyaline, thick-walled, ornamented with warts, IKI–, CB+, (4.5–)5–6(–7) × (3.5–)3.9–5 (–5.5) µm, L = 5.68 µm, W = 4.23 µm, Q = 1.27–1.47 (n = 90/3).

Notes. — *Haploporus odors* is characterized by perennial, pileate basidiocarps with distinct sweet odor. It may be confused with *Fomes fomentarius* in the field. However, the latter lacks sweet odor, and its basidiospores are smooth without warts.

Specimens examined: **CHINA. Hebei**, Xinglong County, Wulingshan Nature Reserve, on dead angiosperm tree, 30 July 2009, *Cui 6910 (*BJFC). **Heilongjiang**, Ning'an County, Jingboho Park, on living tree of *Salix matsudala*, 10 September 2007, *Dai 8881*, *8916* (BJFC). **Henan**, Neixiang County, Baotianman Nature Reserve, on dead angiosperm tree, 22 September 2009, *Dai 11296* (BJFC). **Shaanxi**, Foping County, Foping Nature Reserve, on dead tree of *Salix*, 28 September 2006, *Yuan 2867*, *2869* (IFP); 11 September 2013, *Cui 11182, 11185* (BJFC). **Shanxi**, Jiaocheng County, Pangquangou Nature Reserve, on living tree of *Salix*, 20 October 2004, *Yuan 1114* (IFP); on dead tree of *Salix*, 22 September 2006, *Yuan 2472* (IFP). **Yunnan**, Lanping County, Changyanshan Nature Reserve, on living angiosperm tree, 18 September 2011, *Cui 10277* (BJFC).

Haploporus papyraceus (Cooke) Y.C. Dai & Niemelä, *Ann. bot. fenn.* 39(3): 181 (2002) (Figs. 126, 127).
MycoBank: MB 384313
Basionym: *Poria papyracea* Cooke, Grevillea 14(no. 72): 111 (1886).

Fruiting body. — Basidiocarps annual, resupinate, difficult to separate from the substrate, soft corky when fresh, becoming corky upon drying, up to 10 cm, 4 cm wide and 4 mm thick at center. Pore surface white to cream, become cream to buff upon or pale brown when dry; pores round to angular, 2–3 per mm; dissepiments thin, entire. Sterile margin distinct, white, up to 1 mm wide. Subiculum white to cream, corky, thin, up to 1 mm thick. Tubes concolorous with pore surface, corky, up to 3 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB+; tissues unchanged in KOH.

Fig. 126 Basidiocarps of *Haploporus papyraceus*

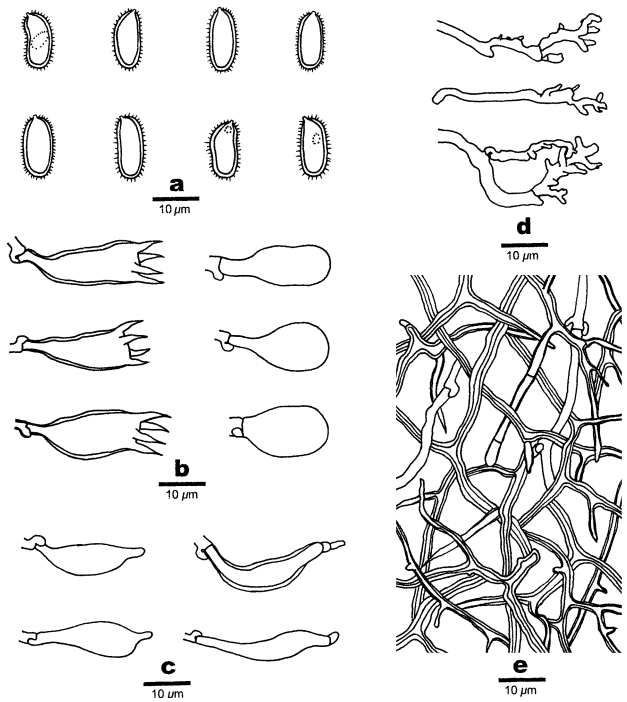

Fig. 127 Microscopic structures of *Haploporus papyraceus* (drawn from *Dai 10778*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Dendrohyphidia; **e**. Hyphae in tube trama. Bars: **a–e** = 10 µm

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3.5 µm in diam; skeletal hyphae dominant, hyaline to pale yellowish, thick-walled, with a narrow lumen to subsolid, frequently branched, interwoven, 2–5 µm in diam.

Tubes. — Generative hyphae hyaline, thin-walled, occasionally branched, 2–4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled, frequently branched, interwoven, 2–5 µm in diam. Cystidia and absent; cystidioles present, fusiform, thin-walled, 20–30 × 5–10 µm. Basidia broadly clavate or pear-shaped, with four sterigmata and a basal

clamp connection, 17–28 × 7–12 µm; basidioles similar in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores oblong to ellipsoid, hyaline, thick-walled, ornamented with warts, IKI–, CB+, (12.5–) 13–15(–15.5) × 5–6(–6.5) µm, L = 13.97 µm, W = 5.62 µm, Q = 2.36–2.51 (n = 60/2).

Notes. — *Haploporus papyraceus* is similar to *H. alabamae*. However, the latter one has smaller pores (3–5 per mm) and shorter basidiospores (8.3–12.5 × 4–6.5 µm), and its basidiocarps are slightly thicker than *H. alabamae*.

Specimens examined: **CHINA. Guangdong**, Shixing County, Chebaling Nature Reserve, on fallen angiosperm branch, 23 June 2010, *Cui 8706* (BJFC). **Hainan**, Changjiang County, Bawangling Nature Reserve, on dead angiosperm branch, 8 May 2009, *Dai 10778* (BJFC).

Haploporus septatus L.L. Shen, Y.C. Dai & B.K. Cui, *Mycol. Prog.* 15: 735 (2016) (Figs. 128, 129).
MycoBank: MB 816520

Fruiting body. — Basidiocarps annual, resupinate, inseparable, fleshy-rubbery when fresh, without odor or taste, becoming leathery to corky upon drying, up to 5.5 cm in long, 2.5 cm wide and 0.8 mm thick at center. Pore surface white to cream when fresh, cream to buff-yellow when dry; pores round, 5–6 per mm; dissepiments thick, entire. Sterile margin distinct, up to 1 mm wide. Subiculum cream, corky, very thin, about 0.1 mm thick. Tubes light buff, leathery to corky, up to 0.7 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, CB+; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to almost solid, frequently branched, interwoven, 2.5–3.5 µm in diam.

Fig. 128 Basidiocarps of *Haploporus septatus*

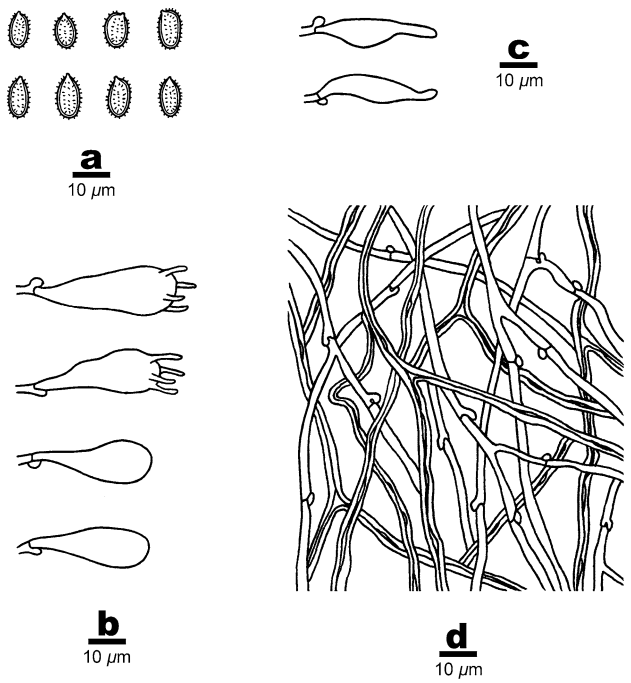

Fig. 129 Microscopic structures of *Haploporus septatus* (drawn from *Dai 13581*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 µm

Tubes. — Generative hyphae hyaline, thin-walled, frequently branched, 2–2.5 µm in diam; skeletal hyphae hyaline, thick-walled with a narrow lumen to almost solid, frequently branched, interwoven, 2–3 µm in diam, tapering towards the ends, simple septate at dissepimental edge. Cystidia absent; fusiform cystidioles present, hyaline, thin-walled, 26–31 × 5–8 µm. Basidia pear-shaped to barrel-shaped, with four sterigmata and a basal clamp connection, 32–34 × 9–10 µm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores oblong to ellipsoid, hyaline, thick-walled, with longitudinal echinulate ornamentations, IKI–, CB+, (8–)8.5–11(–11.5) × 5–6 µm, L = 9.9 µm, W = 5.25 µm, Q = 1.78–1.92 (n = 60/2).

Notes. — *Haploporus septatus* is characterized by leathery to corky dry basidiocarps, small round pores (5–6 per mm), simple septate skeletal hyphae at dissepimental edge, and oblong to ellipsoid basidiospores (Shen et al. 2016).

Specimens examined: **CHINA**. **Yunnan**, Jingdong County, Ailaoshan Nature Reserve, on fallen angiosperm branch, 15 October 2013, *Dai 13581* (holotype, BJFC). **Fujian**, Wuyishan County, Wuyi Mountains, on dead angiosperm tree, 26 August 2006, *Cui 4100* (paratype, BJFC).

Haploporus subpapyraceus L.L. Shen, Y.C. Dai & B.K. Cui, *Mycol. Prog.* 15: 736 (2016) (Figs. 130, 131).

Fig. 130 Basidiocarps of *Haploporus subpapyraceus*

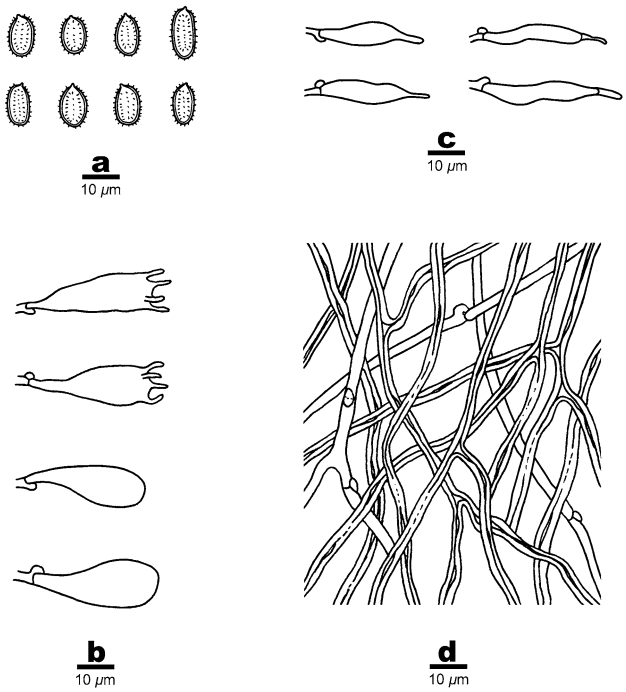

Fig. 131 Microscopic structures of *Haploporus subpapyraceus* (drawn from *Cui 2651*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 μm

MycoBank: MB 816521

Fruiting body. — Basidiocarps annual, resupinate, difficult to separate from the substrate, soft corky when fresh, without odor or taste, becoming corky upon drying, up to13 cm in long, 1.2 cm wide and 1 mm thick at center. Pore surface white to cream when fresh, becoming cream to light buff upon drying; pores angular, 3–5 per mm; dissepiments slightly thick, entire. Sterile margin distinct, up to 1.5 mm wide. Subiculum cream, corky, very thin, about 0.1 mm thick. Tubes concolorous with pore surface, corky, up to 0.9 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB+; tissues unchanged in KOH.

Subiculum. — Generative hyphae hyaline, thin-walled, occasionally branched, interwoven, 2–4 μm in diam; skeletal hyphae dominant, hyaline, distinctly thick-walled with a narrow lumen to almost solid, frequently branched, interwoven, 2–2.5 μm in diam.

Tubes. — Generative hyphae hyaline, thin-walled, occasionally branched, interwoven, 2.5–5 μm in diam; skeletal hyphae hyaline, distinctly thick-walled with a narrow lumen, frequently branched, interwoven, 2–3 μm in diam. Cystidia absent; cystidioles numerous, usually slim clavate, apically with simple septa, 26–35 × 5–8 μm. Basidia pear-shaped to barrel-shaped, with four sterigmata and a basal clamp connection, 32–37 × 10–15 μm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, hyaline, thick-walled, with longitudinal echinulate ornamentations, IKI–, strongly CB+, (8.5–)9–12(–13) × (5–)5.5–8(–8.5) μm, L = 10.64 μm, W = 6.42 μm, Q = 1.58–1.69 (n = 60/2).

Notes. — *Haploporus subpapyraceus* is characterized by white to cream basidiocarps, numerous apically simple septate cystidioles and ellipsoid basidiospores (9–12 × 5.5–8 μm, Shen et al. 2016).

Specimens examined: **CHINA. Yunnan**, Jinghong County, Ailaoshan Nature Reserve, on fallen angiosperm trunk, 15 October 2013, Dai 13580 (paratype, BJFC). **Zhejiang**, Lin'an County, Tianmushan Nature Reserve, on dead angiosperm tree, 10 October 2005, *Cui 2651* (holotype, BJFC).

Haploporus subtrameteus (Pilát) Y.C. Dai & Niemelä, *Ann. Bot. Fenn.* 39(3): 181 (2002) (Figs. 132, 133).
MycoBank: MB 384312
Basionym: *Poria subtrametea* Pilát, *Sb. Nár. Mus. v Praze, Rada B, Prír. Vedy* 9(2): 106 (1953).

Fig. 132 Basidiocarps of *Haploporus subtrameres*

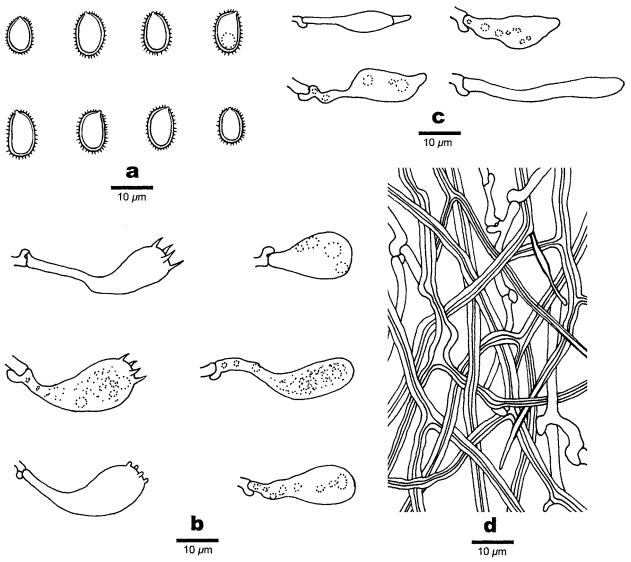

Fig. 133 Microscopic structures of *Haploporus subtrameres* (drawn from *Cui 10656*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 μm

Fruiting body. — Basidiocarps perennial, resupinate, more or less cushion-shaped, inseparable, soft corky when fresh, becoming hard corky upon drying, up to 15 cm long, 7 cm wide and 11 mm thick at center. Pore surface white to cream when fresh, pale buff to pinkish buff or pale reddish brown when dry; pores round or angular, 3–4 per mm; dissepiments slightly thick, entire. Sterile margin indistinct. Subiculum cream colored to pale buff, corky, thin, up to 1 mm thick. Tubes pale buff, corky to hard corky, up to 10 mm long, indistinctly stratified.

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

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 1.8–4 μm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, frequently branched, interwoven, 1–4.2 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 1.8–3.2 μm in diam; skeletal hyphae dominant, hyaline, thick-walled, with a narrow lumen, frequently branched, interwoven, 1.8–4 μm in diam. Cystidia absent; cystidioles present, fusiform, thin-walled, 15–20 × 3.5–6 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 15–28 × 8–11 μm; basidioles pear-shaped, slightly smaller than basidia.

Spores. — Basidiospores oblong to ellipsoid, hyaline, thick-walled, ornamented, IKI–, CB+, (7.5–)7.7–11(–13.7) × (4.3–)4.6–6.2(–6.8) μm, L = 9.03 μm, W = 4.83 μm, Q = 1.68–1.82 (n = 60/2).

Notes. — *Haploporus subtrameteus* is characterized by perennial and resupinate basidiocarps, oblong to ellipsoid basidiospores (7.7–11 × 4.6–6.2 μm). It is similar to *H. alabamae* in micro-characters. However, the latter species has an annual habit, and its tube dissepiments are thin.

Specimens examined: **CHINA. Henan**, Neixiang County, Baotianman Nature Reserve, on dead angiosperm tree, 22 September 2009, *Dai 11270* (BJFC); on rotten angiosperm wood, 23 September 2009, *Dai 11315* (BJFC). **Sichuan**, Songpan County, Huanglong Nature Reserve, on dead tree of *Prunus*, 15 October 2002, *Dai 4222* (IFP); 14 September 2012, *Cui 10656, 10658*, *10659*, *10663* (BJFC). **Xizang (Tibet)**, Linzhi County, on fallen angiosperm branch, 18 September 2010, Cui 9429 (BJFC).

Haploporus thindii (Natarajan & Koland.) Y.C. Dai, *Fungal Science*, 20(3, 4): 61 (2005) (Figs. 134, 135).
MycoBank: MB 548453
Basionym: *Pachykytospora thindii* Natarajan & Koland., *Cryptog. bot.* 3(2-3): 195 (1993).

Fruiting body. — Basidiocarps perennial, resupinate, inseparable, soft corky, with fragrant odor when fresh, becoming hard corky when dry, up to 25 cm long, 12 cm wide and 8 mm thick at center. Pore surface cream to pinkish buff, turning to pinkish buff when dry; pores angular, 3–4 per mm; dissepiments thin, entire. Sterile margin distinct, up to 5 mm wide. Subiculum pinkish buff to pale brownish, slightly darker than tubes, corky, up to 1 mm thick. Tubes pinkish buff, hard corky, up to 7 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae mostly bearing clamp connections, occasionally with simple septa; skeletal hyphae IKI–, strongly CB+; tissues unchanged in KOH.

Subiculum. — Generative hyphae frequent, hyaline, thin-walled, occasionally branched, 2.5–4 μm in diam; skeletal hyphae hyaline, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 2–4 μm diam.

Fig. 134 A basidiocarps of *Haploporus thindii*

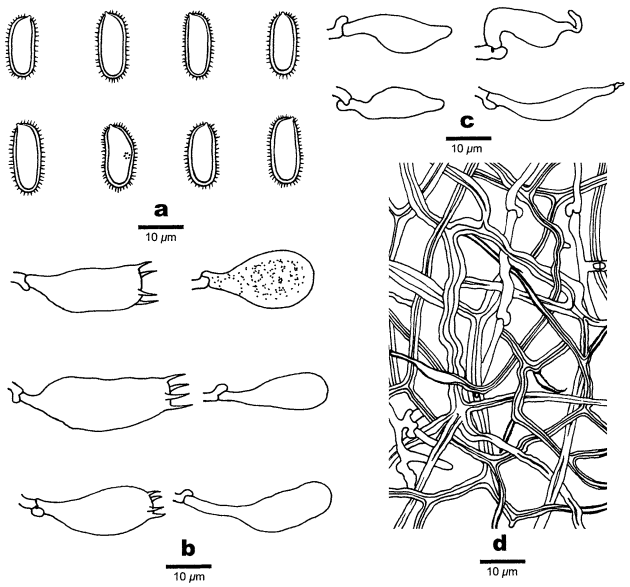

Fig. 135 Microscopic structures of *Haploporus thindii* (drawn from *Cui 9453*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 μm

Tubes. — Generative hyphae frequent, hyaline, thin-walled, occasionally branched, 2–3 μm in diam; skeletal hyphae dominant, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 2.7–3.5 μm in diam. Cystidia absent; cystidioles present, fusiform, thin-walled, 18–30 × 5–10 μm. Basidia barrel-shaped, with four sterigmata and a basal clamp connection, 20–37 × 9–15 μm; basidioles in shape mostly similar to basidia, but some pear-shaped, smaller than basidia.

Spores. — Basidiospores oblong-ellipsoid, hyaline, thick-walled, ornamented with echinulate ornamentations, IKI–, strongly CB+, (10.4–)10.5–14.5(–14.6) × (5–)5.2–6.5 (–7) μm, L = 12.55 μm, W = 5.94 μm, Q = 2.03–2.19 (n = 60/2).

Notes. — *Haploporus thindii* is characterized by perennial and resupinate basidiocarps, abundant generative hyphae in subiculum, oblong-ellipsoid basidiospores.. It is closely related to *H. papyraceus*, but the latter species has dextrinoid skeletal hyphae.

Specimens examined: **CHINA. Xizang (Tibet)**, Linzhi County, on fallen angiosperm branch, 18 September 2010, *Cui 9453* (BJFC); Lulang, on fallen angiosperm branch, 17 September 2010, *Cui 9370*, *9373* (BJFC); on fallen branch of *Betula*, 25 September 2010, *Cui 9682* (BJFC).

Hexagonia Fr., *Fl. Scan.*: 496 (1836).
MycoBank: MB 17755
Type species: *Hexagonia crinigera* Fr.

Basidiocarps annual to perennial, pileate. Pileal surface brown, glabrous, tomentose or densely hispid. Pores large, angular to hexagonal. Context brown. Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal hyphae yellowish to yellowish brown. Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–.

*Hexagonia i*s characterized by pileate basidiocarps, large and angular to hexagonal pores, a trimitic hyphal system with clamped generative hyphae and colored skeletal hyphae, large and cylindrical basidiospores (Núñez and Ryvarden 2001). According to our phylogenetic analysis (Fig. 1), *H. apiaria* (Pers.) Fr. grouped together with *H. hirta* (P. Beauv.) Fr., and then clustered with *Whitfordia scopulosa* (Berk.) Núñez & Ryvarden; while *H. glabra* Lév. clustered with species of *Daedaleopsis*. The results showed that species in the genus *Hexagonia* with superficial similarities of the hexagonal pores did not group together in the phylogenetic analysis, the extensive taxonomical changes on this genus need to be clarified in near future.

Key to species of *Hexagonia* in China

1 Pileal surface glabrous ..... *H. glabra*
1 Pileal surface tomentose or hispid 2
2 Basidiospores usually < 11 μm in length ..... *H. hirta*
2 Basidiospores usually > 11 μm in length ..... *H. apiaria*

Hexagonia apiaria (Pers.) Fr., *Epicr. syst. mycol. (Upsaliae):* 497 (1838) (Figs. 136, 137).
MycoBank: MB 142717
Basionym: *Polyporus apiarius* Pers., *Freycinet, Voy. Uranie., Bot.*: 169 (1827).

Fruiting body. — Basidiocarps annual, pileate, single or imbricate, without odor or taste when fresh, corky and slightly light in weight upon drying. Pilei dimidiate, semicircular to nearly circular, projecting up to 8 cm, 14 cm wide and 20 mm thick at base. Pileal surface pale grayish-brown, grayish-brown to yellowish-brown when fresh, turning to dark grayish-brown with age, dark brown to black at base, concentrically sulcate or not, usually bearing concentrically arranged stiff hairs, gradually disappear with age; margin pale yellowish-brown to

Fig. 136 Basidiocarps of *Hexagonia apiaria*

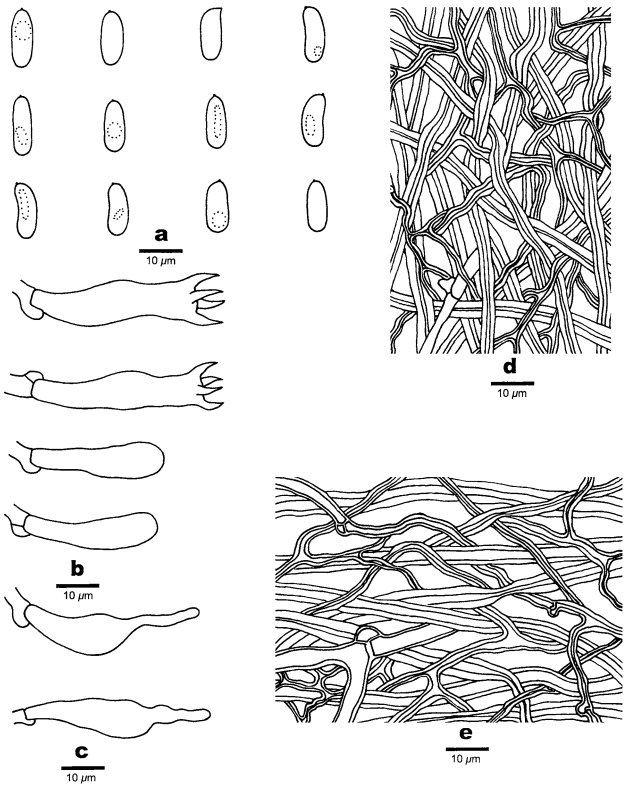

Fig. 137 Microscopic structures of *Hexagonia apiaria* (drawn from *Dai 7488*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **e**. Hyphae from context. Bars: **a–e** = 10 μm

yellowish-brown, acute. Pore surface pale yellowish-brown to pale grayish-brown; pores hexagonal, about 2–4 mm in diam; dissepiments thin, entire. Context yellowish-brown to dark brown, corky, up to 10 mm thick near the base. Tubes grayish-brown, corky, up to 10 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues darkening in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2.3–4.5 μm in diam; skeletal hyphae dominant, hyaline to pale yellowish-brown, thick-walled with a wide to narrow lumen, occasionally branched, interwoven, 3–5 μm in diam; binding hyphae hyaline to pale yellowish-brown, thick-walled to subsolid, frequently branched, interwoven, 1.5–3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.8–3 μm in diam; skeletal hyphae dominant, hyaline to pale yellowish-brown, thick-walled with a wide to narrow lumen, occasionally branched, interwoven, 2.5–4.5 μm in diam; binding hyphae hyaline to pale yellowish-brown, thick-walled to subsolid, frequently branched, interwoven, 1.4–2.8 μm in diam. Cystidia absent; fusoid cystidioles occasionally present, hyaline, thin-walled, 25–40 × 8–11 μm. Hyphal pegs present in the hymenium. Basidia clavate, with four sterigmata and a basal clamp connection, 30–43 × 9–12 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, 11–15 × 5–6 μm, L = 13.3 μm, W = 5.4 μm, Q = 2.41 (n = 30/1).

Notes. — *Hexagonia apiaria* is characterized by its grayish-brown to dark brown pileal surface with concentrically arranged stiff hairs, large and hexagonal pores and cylindrical basidiospores (11–15 × 5–6 μm).

Specimens examined: **CHINA**. **Guangdong**, Huidong County, Gutian Nature Reserve, on dead angiosperm tree, 24 May 2006, *Dai 7488* (BJFC). **Hainan**, Changjiang County, Bawangling Nature Reserve, on fallen trunk of *Mallotus yunnanensis*, 9 May 2009, *Cui 6467* (BJFC); on fallen angiosperm trunk, 9 May 2009, *Cui 6447* (BJFC); on fallen trunk of *Euphoria longan*, 9 May 2009, *Dai 10784* (BJFC).

Hexagonia glabra Lév., *Annls Sci. Nat., Bot.*, sér. 3 5: 143 (1846) (Figs. 138, 139).
MycoBank: MB 238288

Fruiting body. — Basidiocarps annual, pileate to slightly reflexed at base, mostly single, without odor or taste when fresh, corky and slightly light in weight upon drying. Pilei semicircular, up to 4 cm long, 8.5 cm wide and 3 mm thick at base. Pileal surface pale yellowish-brown to yellowish-brown when dry, concentrically zonate and sulcate, glabrous, usually slightly radially wrinkled; margin yellowish-brown, acute. Pore surface pale yellowish-brown to pale grayish yellow; pores hexagonal, about 1 per mm; dissepiments thin, entire. Context duplex, the upper layer near pileal surface pale yellowish-brown, corky, up to 1.3 mm thick; the lower layer white to cream, corky, up to 0.7 mm thick. Tubes cream to pale yellowish-brown when dry, corky, up to 1 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues darkening in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3.5 μm in diam; skeletal hyphae dominant, hyaline to pale yellowish-brown, usually with a narrow lumen to subsolid, occasionally branched, interwoven, 2–4.5 μm in diam; binding hyphae hyaline to pale yellowish-brown, thick-walled to subsolid, frequently branched, interwoven, 1–3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2–3.2 μm in diam; skeletal hyphae dominant, hyaline to pale yellowish-brown, with a narrow lumen to subsolid, occasionally branched, interwoven, 2.8–4.2 μm in diam; binding hyphae hyaline to pale yellowish-brown, thick-walled to subsolid, frequently branched, interwoven, 1–3 μm in diam. Cystidia and

Fig. 138 Basidiocarps of *Hexagonia glabra*

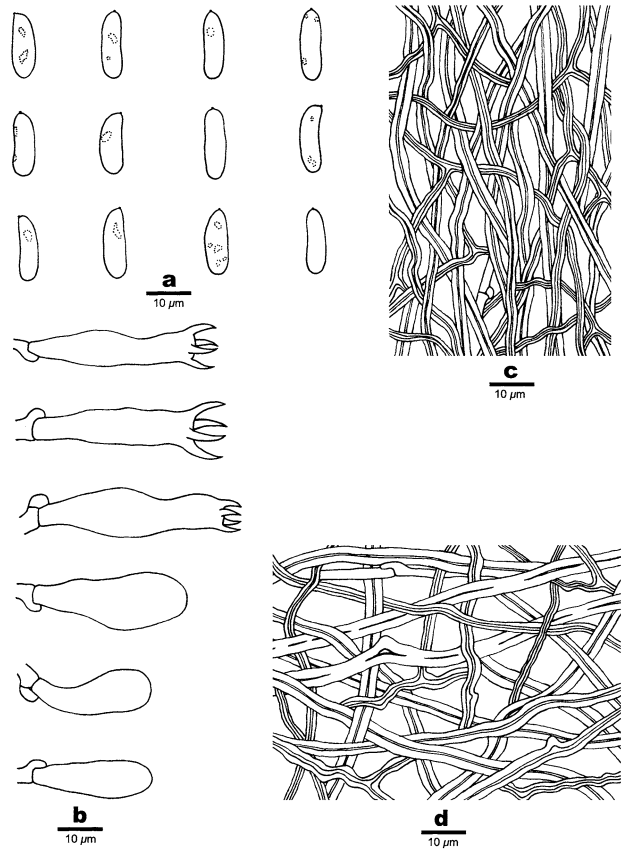

Fig. 139 Microscopic structures of *Hexagonia glabra* (drawn from *Dai 10991*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a–d** = 10 μm

cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 35–38 × 7–12 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (12–)13.1–15.5(–16) × (4–)4.2–5.6(–6) μm, L = 14.43 μm, W = 4.77 μm, Q = 3.03 (n = 50/1).

Notes. — *Hexagonia glabra* differs frpm other species in the genus by its pale yellowish-brown to yellowish-brown basidiocarps, concentrically zonate and sulcate, glabrous, usually slightly radially wrinkled pileal surface, large pores and basidiospores.

Specimens examined: **CHINA**. **Guangdong**, Guangzhou, South China Botanical Garden, on fallen angiosperm trunk, 18 May 2009, *Dai 10991* (BJFC). **Taiwan**, Taizhong, on fallen angiosperm trunk, 15 November 2009, *Dai 11509* (BJFC).

Hexagonia hirta (P. Beauv.) Fr., *Epicr. syst. mycol. (Upsaliae):* 496 (1838) (Figs. 140, 141).
MycoBank: MB 141280
Basionym: *Favolus hirtus* P. Beauv., *Flore Oware Benin* 1: 74 (1805).

Fruiting body. — Basidiocarps annual, pileate, single or imbricate, without odor or taste when fresh, corky and distinctly light in weight upon drying. Pilei semicircular to flabelliform, up to 5 cm long, 7 cm wide and 5 mm thick at base. Pileal surface pale yellowish-brown to yellowish-brown when fresh, yellowish-brown to dark yellowish-brown when dry, with depressed and clustered stiff hairs, concentrically zonate and sulcate; margin acute. Pore surface pale yellowish-brown to pale grayish yellow when fresh, yellowish-brown to dark yellowish-brown when dry; pores hexagonal to angular, about 0.8–2 per mm; dissepiments thin, entire. Sterile margin pale yellowish-brown to yellowish-brown, up to 1.5 mm. Context pale yellowish-brown, dark yellowish-brown to black brown, corky, up to 3 mm thick. Tubes cream to pale yellowish-brown to pale gray brown, corky, up to 2 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues darkening in KOH.

Context. — Generative hyphae frequent, hyaline, thin-walled, moderately branched, 2–4 μm in diam; skeletal

Fig. 140 Basidiocarps of *Hexagonia hirta*

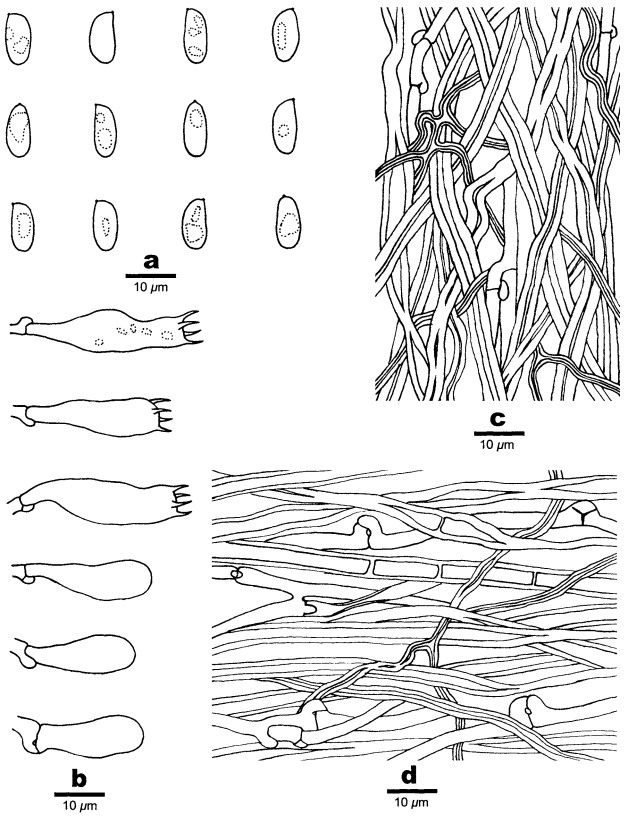

Fig. 141 Microscopic structures of *Hexagonia hirta* (drawn from *Dai 5081*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a–d** = 10 μm

hyphae dominant, pale yellowish-brown to yellowish-brown, usually with a wide lumen, occasionally with secondary septa, usually collapsed when dry, occasionally branched, more or less regularly arranged, 2.8–5 μm in diam; binding hyphae infrequent, pale yellowish-brown to yellowish-brown, thick-walled to subsolid, frequently branched, interwoven, 1.8–2.5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2–3 μm in diam; skeletal hyphae dominant, pale yellowish-brown to yellowish-brown, thick-walled, mostly with a narrow lumen to subsolid, sometimes collapsed when dry, occasionally branched, interwoven, 3.2–5 μm in diam; binding hyphae pale yellowish-brown to yellowish-brown, thick-walled to subsolid, frequently branched, interwoven, 1.8–3 μm in diam. Cystidia and cystidioles absent. Hyphal pegs present in the hymenium. Basidia clavate, with four sterigmata and a basal clamp connection, 25–28 × 8–10 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, usually with one to three irregular guttules, (8–)9–11.4(–12) × (3.7–)3.9–5.3(–6) μm, L = 10.93 μm, W = 4.48 μm, Q = 2.18–2.73 (n = 90/3).

Notes. — *Hexagonia hirta* is characterized by its yellowish-brown to dark yellowish-brown pileal surface with depressed and clustered stiff hairs, large pores and basidiospores.

Specimens examined: **CHINA**. **Fujian**, Xiamen, Xiamen Botanical Garden, on fallen trunk of *Ficus*, 8 September 2003, *Dai 5081* (IFP); on fallen angiosperm trunk, 23 August 2006, *Cui 4051* (IFP). **Guangxi**, Longzhou County, Nonggang Nature Reserve, on living tree of *Dimocarpus longan*, 4 July 2016, *Cui 13962, 13963* (BJFC).

Hornodermoporus Teixeira, *Boletim do Instituto de Botânica, São Paulo* 8: 21 (1993).
MycoBank: MB 27305
Type species: *Hornodermoporus martius* (Berk.) Teixeira.

Basidiocarps annual to perennial, pileate to effused-reflexed, woody hard. Pilei applanate to ungulate, glabrous, usually irregularly concentrically sulcate, dirty brown to black with a distinct crust. Pore surface white to dirty ochraceous; pores round; dissepiments thick, entire. Context pale buff to wood color, woody hard. Tubes concolorous with pore surface, hard corky. Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, cyanophilous; tissues unchanged in KOH. Cystidia present. Basidiospores ellipsoid, truncate, hyaline, thick-walled, smooth, strongly dextrinoid, CB+.

Hornodermoporus was established by Teixeira (1993). Morphologically, it is similar to *Perenniporia* Murrill, but differs by having a black crust at pileal surface, the presence of cystidia and oblong-ellipsoid basidiospores. Previously, species in the genus were treated in *Perenniporia*. Recent phylogenetic studies supported that *Hornodermoporus* is distinct from the *Perenniporia* sensu stricto clade (Zhao and Cui 2013a, b, c; Zhao et al. 2013a).

Key to species of *Hornodermoporus* in China

1 Basidiocarps annual, effused-reflexed to pileate……*H. latissimus*
1 Basidiocarps perennial, pileate ..... ……*H. martius*

Hornodermoporus latissimus (Bres.) B.K. Cui & Y.C. Dai, **comb. nov.** (Figs. 142, 143).
MycoBank: MB 825660
Basionym: *Fomes latissimus* Bres., *Annls mycol.* 8(6): 588 (1910).

Fruiting body. — Basidiocarps annual, effused-reflexed to pileate, corky when fresh, woody hard when dry. Pilei applanate to ungulate, projecting up to 8.5 cm, 11.5 cm wide and 3.2 cm thick at base. Pileal surface fuscous brown to dull black, with a dark brown to black cuticle;

Fig. 142 A basidiocarp of *Hornodermoporus latissimus*

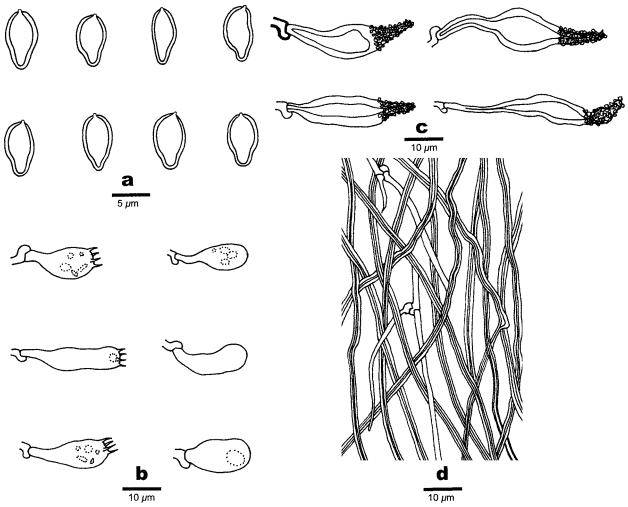

Fig. 143 Microscopic structures of *Hornodermoporus latissimus* (drawn from *Cui 6625*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidia; **d**. Hyphae from trama. Bars: **a–d** = 10 μm. Bars: **a** = 5 μm; **b–d** = 10 μm

margin distinct, white to cream, obtuse. Pore surface white to cream; pores round, 4–6 per mm; dissepiments thick, entire. Context pale buff to wood color, woody hard, up to 5 mm thick. Tubes concolorous with pore surface, corky, up to 2.7 cm thick.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, CB+; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, unbranched, interwoven, 2.5–3.5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, unbranched, interwoven, 2–3 μm in diam. Cystidia abundant, clavate to mucronate, hyaline, thick-walled, encrusted at the apex, 17–30 × 8–15 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 13.5–20 × 7–12.5 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid to amygdaliform, truncate, hyaline, thick-walled, smooth, strong dextrinoid, CB+, (6.8–)7.1–8(–8.3) × (4–)4.2–5(–5.2) μm, L = 7.7 μm, W = 4.7 μm, Q = 1.63–1.65 (n = 90/3).

Notes. — Morphologically, *Hornodermoporus latissimus* has annual, effused-reflexed to pileate basidiocarps, clavate to mucronate, thick-walled and encrusted cystidia, ellipsoid to amygdaliform, truncate basidiospores. Previously, it was accepted in the genus *Perenniporia* as *P. latissima* (Bres.) Ryvarden (Núñez and Ryvarden 2001). Recent phylogenetic studies showed that it grouped with *H. martius* (Berk.) Teixeira (Zhao and Cui 2013a, b, c; Zhao et al. 2013a). Thus, it is transferred to the genus *Hornodermoporus* and the above combination is proposed.

Specimens examined: **CHINA**. **Hainan**, Ledong County, Jianfengling Nature Reserve, on living angiosperm tree, 11 May 2009, *Cui 6625, 6630* (BJFC); Lingshui County, Diaoluoshan Forest Park, on living angiosperm tree, 20 November 2007, *Cui 5263* (BJFC); 21 November 2007, *Cui 5314* (BJFC), *Dai 9368* (BJFC); 22 November, 2007 *Cui 5371* (BJFC); Changjiang County, Bawangling Nature Reserve, on living angiosperm tree, 25 November 2010, *Dai 12054* (BJFC).

Hornodermoporus martius (Berk.) Teixeira, *Boletim do Instituto de Botânica, São Paulo* 8: 21 (1993) (Figs. 144, 145).

MycoBank: MB 362615

Basionym: *Polyporus martius* Berk., *Hooker's J. Bot. Kew Gard. Misc.* 8: 198 (1856).

Fruiting body. — Basidiocarps perennial, pileate, single, corky when fresh, woody hard when dry. Pilei usually ungulate, projecting up to 8 cm, 10 cm wide and 7 cm

Fig. 144 A basidiocarp of *Hornodermoporus latissimus*

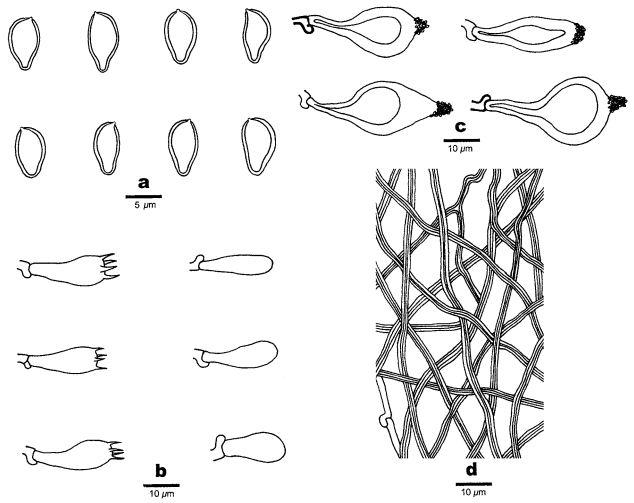

Fig. 145 Microscopic structures of *Hornodermoporus latissimus* (drawn from *Dai 9255*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidia; **d**. Hyphae from trama. Bars: **a–d** = 10 μm. Bars: **a** = 5 μm; **b–d** = 10 μm

thick at base. Pileal surface brown to dull black on drying, with a dark brown to black cuticle; margin obtuse. Pore surface white to cream; pores round, 4–5 per mm; dissepiments thick, entire. Context pale buff to wood color, woody, up to 3 cm thick. Tubes distinctly stratified, concolorous with pore surface, hard corky, each layer up to 6 mm thick.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, CB+; hyphae unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, unbranched, 2–3.4 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, occasionally branched, interwoven, 3–4.3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, unbranched, 2–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, occasionally branched, interwoven, 3–4.5 μm in diam. Cystidia abundant, clavate to ventricose, hyaline, thick-walled, encrusted at the apex, 20–37 × 10–25 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 12.5–27 × 8–11 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid to amygdaliform, truncate, hyaline, thick-walled, smooth, strong dextrinoid, CB+, (7–)7.5–9(–9.7) × (4–)4.2–5.5(–5.9) μm, L = 8.15 μm, W = 4.96 μm, Q = 1.64 (n = 30/1).

Notes. — *Hornodermoporus latissimus* and *H. martius* share similar morphological characters and are difficult to separate. In addition, their distribution areas are overlapped. The main differences are *H. latissimus* usually produces annual and effused-reflexed to pileate basidiocarps, while *H. martius* has perennial and pileate basidiocarps.

Specimens examined: **CHINA**. **Hainan**, Ledong County, Jianfengling Nature Reserve, on living angiosperm tree, 17 November 2007, *Dai 9255* (IFP). **Fujian**, Xiamen, Xianmen Botanical Garden, on living angiosperm tree, 23 August 2006, *Cui 4055* (BJFC); Nanputuo, 24 August 2006, on living angiosperm tree, *Cui 4074, 4076, 4082* (BJFC). **Yunan**, Jinghong, Xishuangbanna Botanic Garden, on living angiosperm tree, 6 August 2005, *Dai 6841* (IFP); Tengchong County, Gaoligong Mountain, on living angiosperm tree, 23 October 2009, *Cui 7995, 7992* (BJFC).

Lignosus Lloyd ex Torrend, *Brotéria Série Botânica* 18: 121 (1920).
MycoBank: MB 17977
Type species: *Lignosus sacer* (Afzel. ex Fr.) Torrend.

Basidiocarps annual, centrally stipitate, solitary; stipe arising from a distinct sclerotium in the ground. Pilei more or less circular, white to brownish, glabrous to velutinate, usually concentrically zonate. Pore surface cream to buff; pores round to angular; dissepiments thin, entire. Context cream. Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal hyphae IKI–, CB–. Basidiospores cylindrical to ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–.

Lignosus is characterized by centrally stipitate and solitary basidiocarps arising from a distinct sclerotium in the ground, a trimitic hyphal system with clamped generative hyphae, hyaline and thin-walled, cylindrical to ellipsoid basidiospores that are negative in Melzer's reagent and Cotton Blue. It occurs in tropical areas (Cui et al. 2011a).

Key to species of *Lignosus* in China

1 Pores 3–4 per mm; basidiospores > 4.5 μm in length ..... ……*L. hainanensis*
1 Pores 6–8 per mm; basidiospores < 4.5 μm in length ..... ……*L. rhinocerotis*

Lignosus hainanensis B.K. Cui, *Mycol Progress* 10: 268 (2011) (Figs. 146, 147).
MycoBank: MB 518072

Fruiting body. — Basidiocarps annual, terrestrial, centrally stipitate, solitary; stipe arising from a distinct sclerotium in the ground; without odor or taste when fresh, hard corky to woody hard when dry. Pilei more or less circular, up to 10 cm in diam and 5 mm thick at center. Pileal surface yellowish brown to cinnamon-brown, glabrous, concentrically zonate; margin sharp, wrinkled, cinnamon-brown. Pore surface cream to cream-buff when dry, slightly shining; pores round to angular, 3–4 per mm; dissepiments thin, entire. Context cream, corky upon

Fig. 146 A basidiocarp of *Lignosus hainanensis*

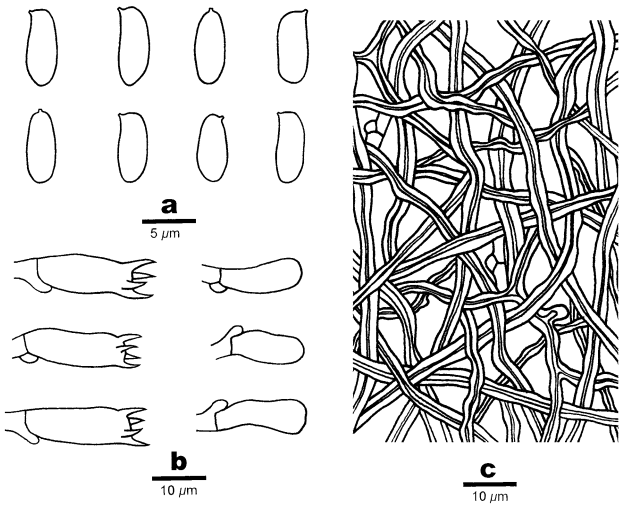

Fig. 147 Microscopic structures of *Lignosus hainanensis* (drawn from *Dai 10670*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 μm; **b–c** = 10 μm

drying, up to 1 mm thick. Tubes cream, hard corky when dry, up to 4 mm long. Stipe usually branched at the base, pale mouse-gray to pale grayish brown, hard corky upon drying, up to 8 cm long and 0.8 cm in diam; context from stipe cream, soft corky. Sclerotium irregular, elongated, up to 6 cm long, 5 cm wide, wrinkled, very light-weighted, the surface dirty brown to fawn-brown, the context cream.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 2–3.8 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, often branched, interwoven, 2.6–5.5 μm in diam; binding hyphae occasionally present, branched, flexuous, interwoven, 1.5–2.5 μm in diam.

Sclerotium. — Sclerids frequent, variable in shape from globose, pear-shape, ellipsoid to irregular, inflated and thick-walled, with a rather narrow lumen, 15–40 × 30–55 μm. Inflated and thick-walled sclerids connected to hyphae, as observed in Glycerol aqueous solution or water, but appearing stratified or layered in KOH. Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 2–3.4 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, often branched, interwoven, 2.4–5 μm in diam; binding hyphae present, hyaline, branched, flexuous, interwoven, 1.3–2.4 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 1.8–3.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, frequently branched, flexuous, interwoven, 2.5–5 μm in diam. Cystidia and cystidioles absent. Basidia clavate, with a basal clamp connection and four sterigmata, 10–16 × 5–7 μm; basidioles in shape similar to basidia, but distinctly smaller.

Spores. — Basidiospores oblong-ellipsoid to cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (4.6–)4.9–6(–6.4) × (2.1–)2.2–2.9(–3) μm, L = 5.54 μm, W = 2.6 μm, Q = 2.13 (n = 50/1).

Notes. — *Lignosus hainanensis* is characterized by its centrally stipitate basidiocarps arising from a sclerotium, yellowish brown to cinnamon-brown pileal surface, cream to cream-buff pore surface with 3–4 pores per mm, a trimitic hyphal system with clamped generative hyphae, and oblong-ellipsoid to cylindrical basidiospores. *Lignosus ekombitii* Douanla-Meli, recently described from Cameroon (Douanla-Meli and Langer 2003), resembles *L. hainanensis* in having similar pores, but differs by having thin basidiocarps (up to 1.5 mm thick), larger basidiospores (6–8.2 × 2.8–3.2 μm), and abundant dendrohyphidia (Cui et al. 2011a).

Specimen examined: **CHINA. Hainan**, Ledong County, Jianfengling Nature Reserve, on ground of angiosperm forest, 12 December 2008, *Dai 10670* (holotype, BJFC).

Lignosus rhinocerus (Cooke) Ryvarden, *Norwegian Journal of Botany* 19: 232 (1972) (Figs. 148, 149).
MycoBank: MB 316915
Basionym: *Polyporus rhinocerus* Cooke, *Trans. & Proc. Bot. Soc. Edinb.* 13: 150 (1879).

Fruiting body. — Basidiocarps annual, centrally stipitate, solitary; stipe arising from a distinct sclerotium in the ground; without odor or taste when fresh, hard corky to woody hard when dry. Pilei more or less circular, depressed in the center like infundibuliform, up to 8 cm in diam and 4 mm thick at center. Pileal surface olivaceous-buff or yellowish brown to cinnamon-brown, glabrous, concentrically zonate; margin sharp, wrinkled, cinnamon-brown. Pore surface cream-buff to olivaceous-buff when dry, slightly shining; pores round, 6–8 per mm; dissepiments

Fig. 148 A basidiocarp of *Lignosus rhinocerus*

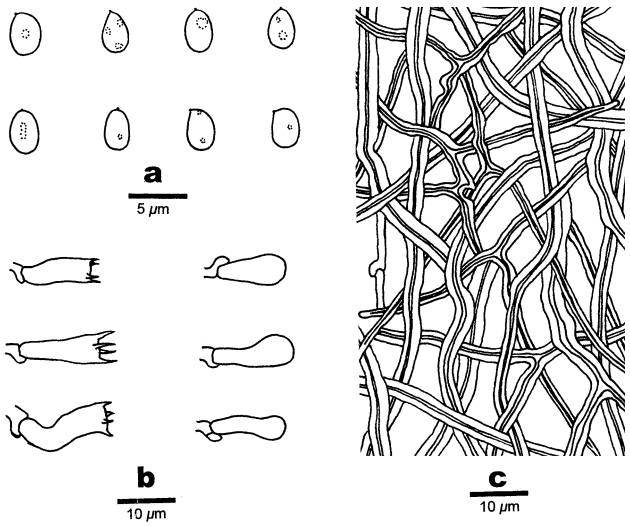

Fig. 149 Microscopic structures of *Lignosus rhinocerus* (drawn from *HMAS 30036*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 μm; **b–c** = 10 μm

thick, entire. Context cream, corky upon drying, up to 1 mm thick. Tubes buff, hard corky when dry, up to 3 mm long. Stipe clay-buff, hard corky upon drying, up to 11 cm long and 0.8 cm in diam; context in stipe cream, soft corky. Sclerotium irregular, elongated, up to 5 cm long, 4 cm wide, wrinkled, light-weighted, the surface dirty buff to fawn-brown, the context cream.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 2–2.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, often branched, interwoven, 2–5 μm in diam; binding hyphae hyaline, branched, flexuous, interwoven, 1.5–2.5 μm in diam.

Sclerotium. — Sclerids frequent, variable in shape from globose, pear-shape, ellipsoid to irregular, inflated and thick-walled, with a rather narrow lumen, 15–36 × 25–50 μm. Inflated and thick-walled sclerids connected to hyphae, as observed in Glycerol aqueous solution or water, but appearing stratified or layered in KOH. Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 2–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, often branched, interwoven, 2–5 μm in diam; binding hyphae present, hyaline, branched, flexuous, interwoven, 1.2–2.5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 2–3.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, frequently branched, flexuous, interwoven, 2.5–5 μm in diam. Cystidia and cystidioles absent. Basidia clavate, with a basal clamp connection and four sterigmata, 10–15 × 4.5–7 μm; basidioles in shape similar to basidia, but distinctly smaller.

Spores. — Basidiospores ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, (3.5–)3.6–3.9(–4.1) × (2–)2.2–2.9(–3.4) μm, L = 3.86 μm, W = 2.55 μm, Q = 1.51 (n = 30/1).

Notes. — *Lignosus rhinocerus* also occurs in tropical China, it may be confused with *L. hainanensis* in the field. However, the latter has bigger pore (3–4 per mm) and longer basidiospores (4.9–6 × 2.2–2.9 μm).

Specimen examined: **CHINA**. **Hainan**, Baoting County, on ground of forest, 15 October 1958, *Yu 438* (HMAS).

Megasporia B.K. Cui, Y.C. Dai & Hai J. Li, *Mycologia* 105(2): 369 (2013).
MycoBank: MB 801180
Type species: *Megasporia hexagonoides* (Speg.) B.K. Cui, Y.C. Dai & Hai J. Li.

Basidiocarps annual, resupinate. Pore surface cream, white, pale yellowish, ash-gray, honey-yellow to grayish violet. Pores round to angular, large to small. Hyphal system dimitic with clamped generative hyphae; skeletal hyphae strongly to moderately dextrinoid and cyanophilous, rarely to moderately branched. Basidiospores large (longer than 10 μm), cylindrical to ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–. Polyhedric crystals present among subhymenium and hymenium.

Megasporia was set up recently based on phylogenetic anlysis (Li and Cui 2013a). Species in this genus were previously treated in the genus *Megasporoporia* Ryvarden & J.E. Wright (Dai and Li 2002; Dai and Wu 2004; Cui and Dai 2007; Du and Cui 2009; Li and Cui 2013a), these two genera are closely related to and hardly separate from each

other in morphology, but phylogenetically, they belong to different clades.

Key to species of *Megasporia* in China

1 Pores 0.5–2 per mm 2
1 Pores 2–7 per mm 4
2 Basidiospores ellipsoid, gloeocystidia present ..... *M. ellipsoidea*
2 Basidiospores cylindrical, gloeocystidia absent 3
3 Pores 0.5–1 per mm, pore surface ash gray ..... *M. hexagonoides*
3 Pores 1–1.5 per mm, pore surface cream ..... *M. major*
4 Pores 5–7 per mm; dendrohyphidia present ..... *M. violacea*
4 Pores 2–5 per mm; dendrohyphidia absent 5
5 Pores 2–3 per mm ..... *M. hengduanensis*
5 Pores 3–5 per mm 6
6 Basidiospores 3.4–4.5 μm in width, cystidioles collapsed ..... *M. guangdongensis*
6 Basidiospores 4.1–5.6 μm in width, cystidioles not collapsed ..... *M. cystidiolophora*

Megasporia cystidiolophora (B.K. Cui & Y.C. Dai) B.K. Cui & Hai J. Li, Mycologia 105(2): 375 (2013) (Figs. 150, 151).

MycoBank: MB 801181

Basionym: *Megasporoporia cystidiolophora* B.K. Cui & Y.C. Dai, *Mikol. Fitopatol.* 41(6): 512 (2007).

Fruiting body. — Basidiocarps annual, resupinate, easily to separate from substrate, leathery, without odor or taste when fresh, becoming hard corky upon drying, up to 4 cm long, 3.8 cm wide and 3 mm thick. Pore surface cream to cream buff when fresh, becoming pale pinkish brown to salmon colored upon drying; pores round to angular, 3–5 per mm; dissepiments thin to slightly thick, entire; hyphal pegs absent. Sterile margin distinct, cream to pale yellow, making the basidiocarps dish-shaped and purfle-like, up to 1 mm wide. Subiculum cream, hard corky, azonate, up to 1 mm thick. Tubes concolorous with the pore surface, corky, up to 2 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB+; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 1.7–3.6 μm in diam; skeletal hyphae dominant, hyaline, thick-walled, occasionally branched, fairly straight to slightly flexuous, interwoven, 2–5.1 μm in diam.

Tubes. — Generative hyphae frequent at the dissepimental edges, hyaline, thin-walled, occasionally branched, 1.5–3.4 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, rarely branched, interwoven, agglutinated, 1.8–4.6 μm in diam.

Fig. 150 Basidiocarps of *Megasporia cystidiolophora*

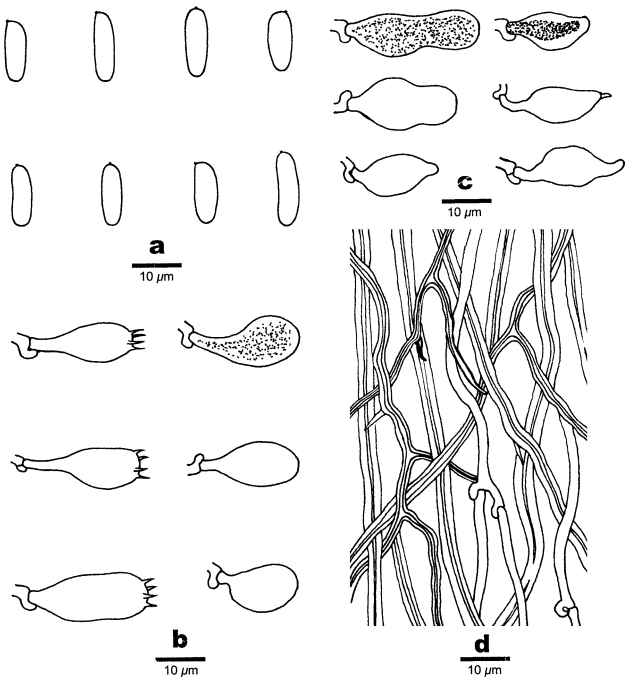

Fig. 151 Microscopic structures of *Megasporia cystidiolophora* (drawn from *Cui 2664*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 μm

Cystidia absent; cystidioles present, subulate or ventricose, thin-walled, smooth, 17–23.2 × 5.3–8 μm. Dendrohyphidia absent in hymenium and dissepimental edges. Hyphal pegs absent. Basidia clavate, with four sterigmata and a basal clamp connection, 18–25 × 7–10 μm; basidioles in shape similar to basidia, but slightly smaller. Polyhedric crystals frequent among subhymenium and hymenium.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, usually with one or two big guttules, CB–,

IKI–, (10–)11.7–14.9(–15.5) × (4–)4.1–5.6(–6) μm, L = 13.29 μm, W = 4.63 μm, Q = 2.67–3.01 (n = 90/3).

Notes. — *Megasporia cystidiolophora* is characterized by its distinct sterile margin, salmon colored pore surface when dry, and microscopically it has subulate or ventricose cystidioles, and lacks hyphal pegs and dendrohyphidia (Cui and Dai 2007).

Specimens examined: **CHINA. Zhejiang**, Lin'an County, Tianmushan Nature Reserve, on fallen angiosperm trunk, 11 October 2005, *Cui 2664* (holotype, IFP), *Cui 2688* (paratype, IFP); on fallen angiosperm branch, 10 October 2005, *Cui 2609* (paratype, IFP).

Megasporia ellipsoidea (B.K. Cui & P. Du) B.K. Cui & Hai J. Li, *Mycologia* 105(2): 375 (2013) (Figs. 152, 153).
MycoBank: MB 801182
Basionym: *Megasporoporia ellipsoidea* B.K. Cui & P. Du, *Mycotaxon* 110: 132 (2009).

Fruiting body. — Basidiocarps annual, resupinate, easily to separate from the substrate, without odor or taste when fresh, becoming corky upon drying, up to 10 cm long, 2 cm wide and 0.8 mm thick at center. Pore surface cream buff when fresh, becoming buff to orange yellow when dry; pores round to angular, 1–1.5 per mm; dissepiments thin, entire; tube wall frequently covered with hyphal pegs. Sterile margin distinct, orange yellow, up to 1 mm wide. Subiculum buff yellow to orange yellow, corky, azonate, up to 0.2 mm thick. Tubes concolorous with the pore surface, corky, up to 0.6 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae very weakly dextrinoid, CB+; tissues becoming dark brown in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3.2 μm in diam; skeletal hyphae dominant, hyaline to yellowish, thick-walled with a wide to narrow lumen, rarely branched, interwoven, 2.8–4.9 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 1.8–2.8 μm in diam; skeletal hyphae dominant, hyaline to yellowish, thick-walled with a wide to narrow lumen, frequently branched, more or less straight to flexuous, sometimes coarsely

Fig. 152 Basidiocarps of *Megasporia ellipsoidea*

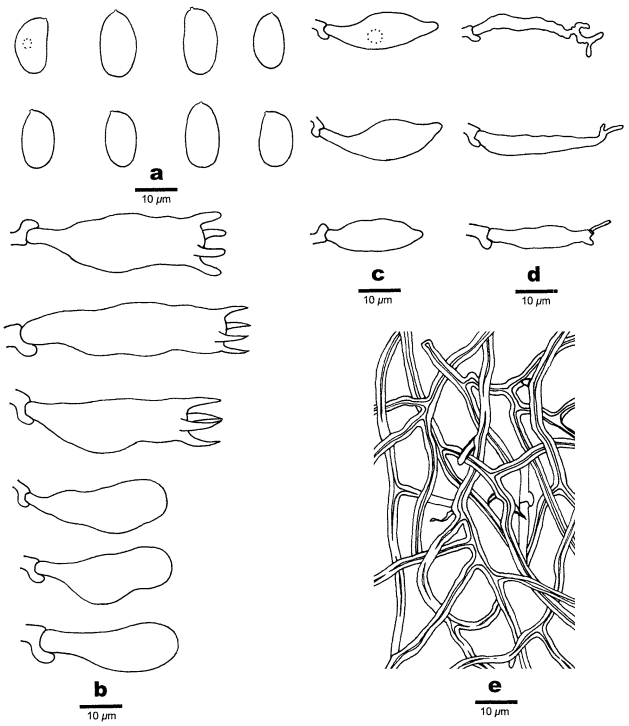

Fig. 153 Microscopic structures of *Megasporia ellipsoidea* (drawn from *Cui 5222*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Dendrohyphidia; **e**. Hyphae from tram. Bars: **a–e** = 10 μm

encrusted, 2–3.7 μm in diam. Gloeocystidia present, barrel to calabash-shaped, thin-walled, smooth, 26–45 × 11–15.3 μm. Hyphae of hyphal pegs hyaline, thin- to fairly thick-walled, branched. Dendrohyphidia frequently in hymenium and dissepimental edges, delicately branched in the tip part. Basidia barrel-shaped, sometimes constricted, with four sterigmata and a basal clamp connection, 23–40 × 9–15 μm; basidioles barrel-shaped, distinctly smaller than basidia. Rhomboid or bipyramidic crystals frequently present.

Spores. — Basidiospores ellipsoid, hyaline, thin-walled, smooth, usually with one or two big guttules, IKI–, CB–, (11–)12–15(–18) × 6–8.2(–9) μm, L = 13.8 μm, W = 7.18 μm, Q = 1.92 (n = 30/1).

Notes. — *Megasporia ellipsoidea* is characterized by its cream to orange yellow pore surface and larger pores (1–1.5 per mm), calabash-shaped gloeocystidia, ellipsoid basidiospores (Du and Cui 2009).

Specimens examined: **CHINA**. **Hainan**, Ledong County, Jianfengling Nature Reserve, on fallen angiosperm branch, 18 November 2007, *Cui 5222* (holotype, BJFC); 7 November 2012, *Cui 10918* (BJFC); Changjiang County, Bawangling Nature Reserve, on fallen angiosperm branch, 5 November 2012, *Cui 10896* (BJFC). **Yunnan**, Nanhua County, Dazhongshan Nature Reserve, on fallen angiosperm branch, 15 July 2013, *Cui 111144* (BJFC).

Megasporia guangdongensis B.K. Cui & Hai J. Li, *Mycologia* 105(2): 371 (2013) (Figs. 154, 155).
MycoBank: MB 801183

Fruiting body. — Basidiocarps annual, resupinate, corky, without odor or taste when fresh, becoming hard corky upon drying, up to 7 cm long, 3.5 cm wide and 3 mm thick at center. Pore surface cream, ash-gray, honey-yellow or grayish violet when dry; pores angular, 4–5 per mm; dissepiments thin, entire; hyphal pegs absent. Sterile margin distinct, cream to buff, up to 2 mm wide. Subiculum cream to pale yellowish brown, hard corky, up to 0.8 mm thick. Tubes ash-gray, honey-yellow or grayish violet, darker than pore surface, corky, up to 2.2 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, CB+; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 1.6–2.8 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, moderately branched, mostly flexuous, interwoven, 1.4–3.6 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.5–2.4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, moderately branched, flexuous, interwoven, 1.8–3.4 µm in diam. Cystidia absent; cystidioles present, subulate or ventricose, thin-walled, smooth, often with collapsed tips, and tips with one or two secondary septa, 24–34 × 6–9 µm. Dendrohyphidia and hyphal pegs absent. Basidia clavate to barrel-shaped, with four sterigmata and a basal clamp connection, 20–28 × 5–7.5 µm; basidioles in shape similar to basidia, but smaller. Polyhedric crystals frequently present among subhymenium and hymenium.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (10–)11–14.9(–15) × (3–)3.4–4.5(–4.9) µm, L = 12.25 µm, W = 3.89 µm, Q = 2.8–3.36 (n = 90/3).

Notes. — *Megasporia guangdongensis* is characterized by its cream, ash-gray, honey-yellow or grayish violet pore surface and special cystidioles with collapsed tips and secondary septa (Li and Cui 2013a). *Megasporia violacea* is similar to *M. guangdongensis* by having grayish violet to pale fawn brown pore surface, presence of cystidioles and similar basidiospores (11–14.9 × 3.2–5 µm), but the former species has smaller pores (5–7 per mm) and dendrohyphidia, and its cystidioles are not collapsed and without secondary septa (Du and Cui 2009).

Fig. 154 Basidiocarps of *Megasporia guangdongensis*

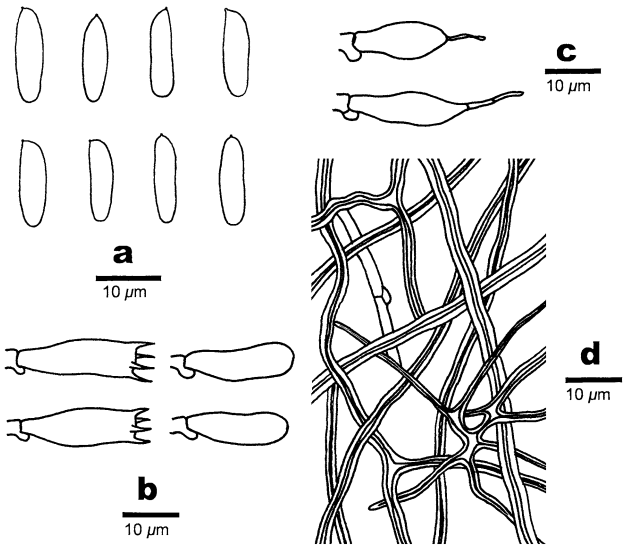

Fig. 155 Microscopic structures of *Megasporia guangdongensis* (drawn from *Cui 9130*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 µm

Specimens examined: **CHINA. Guangdong**, Guangzhou, Forest Park of South China Agricultural University, on fallen angiosperm branch, 5 July 2010, *Cui 9129* (paratype, BJFC), *Cui 9130* (holotype, BJFC); Fengkai County, Heishiding Nature Reserve, on fallen angiosperm branch, 1 July 2010, *Cui 9032* (paratype, BJFC); 2 July 2010, *Cui 9090* (paratype, BJFC); Guangzhou, Maofengshan Forest Park, on fallen angiosperm branch, 19 August 2011, *Cui 10135, 10143* (paratype, BJFC); Foshan, Xiqiaoshan Forest Park, on fallen angiosperm branch, 13 February 2009, *Dai 10685* (paratype, BJFC).

Megasporia hengduanensis B.K. Cui & Hai J. Li, *Mycologia* 105: 374 (2013) (Figs. 156, 157).
MycoBank: MB 801184

Fruiting body. — Basidiocarps annual, resupinate, without odor or taste when fresh, becoming corky upon drying, up to 6 cm long, 1.5 cm wide and 1.4 mm thick at center. Pore surface cream to cream buff when dry; pores round to angular, 2–3 per mm; dissepiments thin, entire; hyphal pegs absent. Sterile margin distinct, white to cream, up to 1.5 mm wide. Subiculum cream to buff, corky, up to 0.4 mm thick. Tubes concolorous with pore surface, corky, up to 1 mm long.

Fig. 156 Basidiocarps of *Megasporia hengduanensis*

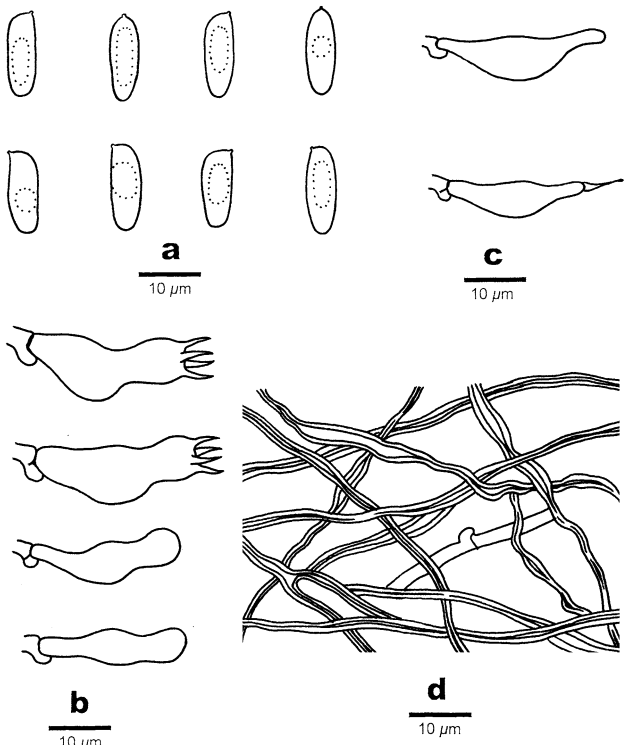

Fig. 157 Microscopic structures of *Megasporia hengduanensis* (drawn from *Cui 8076*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 μm

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae moderately dextrinoid, CB+; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2–2.8 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, usually collapsed, rarely branched, interwoven, 2–4 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.8–2.5 μm in diam; skeletal hyphae dominant, thick-walled, rarely branched, interwoven, 2–3 μm in diam. Cystidia absent; cystidioles present, fusoid, thin-walled, smooth, occasionally with collapsed tips, 25–32 × 6–8 μm. Dendrohyphidia and hyphal pegs absent. Basidia more or less calabash-shaped, with four sterigmata and a basal clamp connection, 30–37 × 9–12 μm; basidioles in shape similar to basidia, but smaller. Small polyhedric crystals present among subhymenium and hymenium.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (10.8–)11–15(–16.5) × (4–)4.2–5.2(–6.2) μm, L = 13.09 μm, W = 4.85 μm, Q = 2.65–2.75 (n = 60/2).

Notes. — *Megaspoia hengduanensis* is characterized by its cream to cream buff pore surface, larger pores (2–3 per mm), almost unbranched skeletal hyphae, and presence of calabash-shaped basidia in the hymenium (Li and Cui 2013a). *Megasporia cystidiolophora* is similar to *M. hengduanensis* by having similar basidiospores (11.7–14.9 × 4.1–5.6 μm), but the former species has pale pinkish brown to salmon colored pore surface, and smaller pores (3–5 per mm).

Specimens examined: **CHINA**. **Yunnan**, Baoshan, Hengduan Mountains, Gaoligong, on fallen angiosperm branch, 25 October 2009, *Cui 8076* (holotype, BJFC), *Cui 8176* (paratype, BJFC).

Megasporia hexagonoides (Speg.) B.K. Cui, Y.C. Dai & Hai J. Li, *Mycologia* 105(2): 375 (2013) (Figs. 158, 159).
MycoBank: MB 801185
Basionym: *Poria hexagonoides* Speg., *An. Mus. Nac. Hist. Nat. B. Aires,* 6:170 (1898).

Fruiting body. — Basidiocarps annual, resupinate, difficult to separate from the substrate, without odor or taste, leathery when fresh, becoming hard corky upon drying, up to 10 cm long, 5 cm wide and 3 mm thick at center. Pore surface cream to pale grayish buff when fresh, becoming pale yellowish brown when dry; pores round to angular, 0.5–1 per mm; dissepiments thin, entire to lacerate; hyphal pegs absent. Sterile margin indistinct. Subiculum pale brown, corky, up to 1 mm thick. Tubes concolorous with the pore surface, corky, up to 2 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB+; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2.5–3 μm in diam; skeletal hyphae dominant, hyaline to yellowish, thick-walled with a narrow lumen, frequently branched, interwoven, 2.5–5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, often branched, 1.5–3.5 μm in diam; skeletal hyphae dominant, hyaline to yellowish, thick-walled with a narrow lumen, frequently branched, interwoven, 2–4 μm in diam. Cystidia and cystidioles absent. Hyphal pegs and dendrohyphidia absent. Basidia clavate, with four sterigmata and a basal clamp connection, 28–40 × 8–12 μm;

Fig. 158 Basidiocarps of *Megasporia hexagonoides*

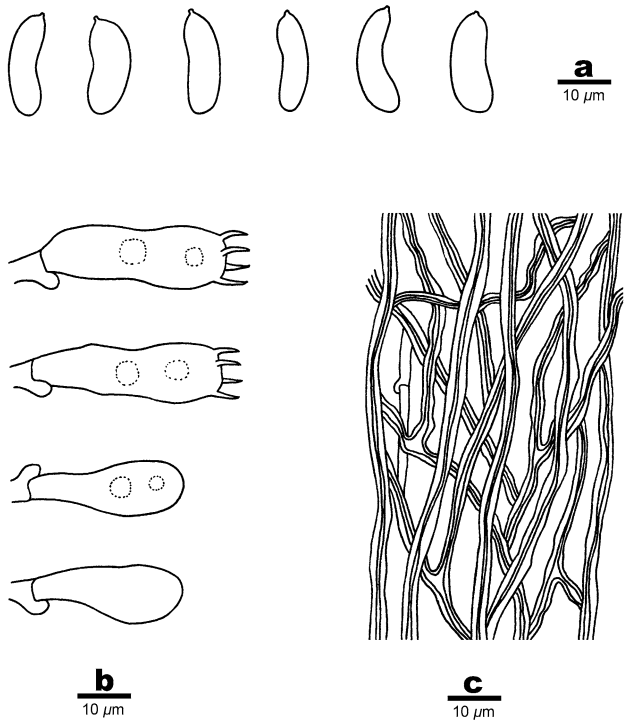

Fig. 159 Microscopic structures of *Megasporia hexagonoides* (drawn from *Dai 7834*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a–c** = 10 μm

basidioles in shape similar to basidia, but smaller. Rhomboid crystals frequently present.

Spores. — Basidiospores cylindrical to allantoid, hyaline, thin-walled, smooth, IKI–, CB–, (15–)17–21(–18) × 5–6(–6.7) μm, L = 18.5 μm, W = 5.67 μm, Q = 3.26 (n = 30/1).

Notes. — *Megasporoporia hexagonoides* is characterized by big pores, large and cylindrical to allantoid basidiospores (17–21 × 5–6 μm), the absence of hyphal pegs and dendrohyphidia.

Specimens examined: **CHINA**. **Hainan**, Changjiang County, Bawangling Nature Reserve, on fallen angiosperm branch, 2 September 2006, *Dai 7834* (IFP); Ledong County, Jianfengling Nature Reserve, on fallen angiosperm branch, 18 November 2007, *Dai 9281* (BJFC); 11 May 2009, *Cui 6592* (BJFC).

Megasporia major (G.Y. Zheng & Z.S. Bi) B.K. Cui & Hai J. Li, *Mycologia* 105(2): 375 (2013) (Figs. 160, 161).
MycoBank: MB 801186
Basionym: *Pachykytospora major* G.Y. Zheng & Z.S. Bi, *Acta Mycol. Sin.* 8(3): 198 (1989).

Fruiting body. — Basidiocarps annual, resupinate, difficult to separate from the substrate, without odor or taste, leathery when fresh, becoming hard corky upon drying, up to 6 cm long, 3 cm wide and 2 mm thick at center. Pore surface white to cream when fresh, becoming pale buff when dry; pores round to angular, 1–1.5 per mm; dissepiments thin, entire; tube wall with hyphal pegs. Sterile margin indistinct. Subiculum cream, corky, up to 0.5 mm thick. Tubes cream to pale wood color, corky, up to 1.5 mm long.

Fig. 160 Basidiocarps of *Megasporia major*

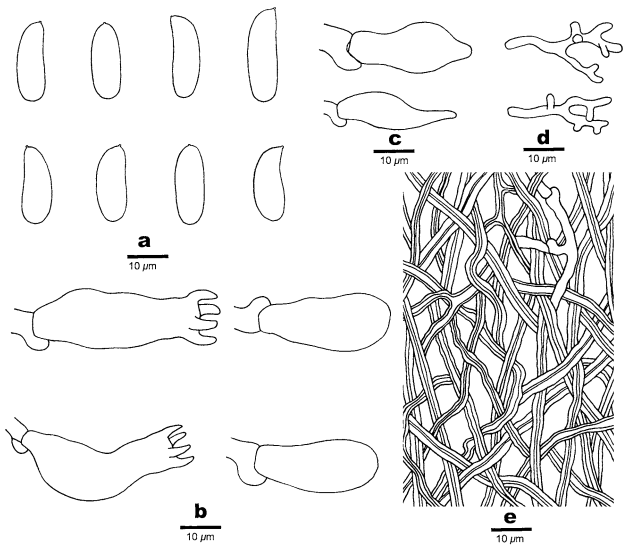

Fig. 161 Microscopic structures of *Megasporia major* (drawn from *Zheng 11124*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Dendrohyphidia; **e**. Hyphae from trama. Bars: **a–e** = 10 μm

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB+; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, frequently branched, 2.2–3.2 µm in diam; skeletal hyphae dominant, hyaline, thick-walled, with a narrow lumen to subsolid, occasionally branched, interwoven, 2.5–4.5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, frequently branched, 2–3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled, with a narrow lumen to subsolid, occasionally branched, flexuous, interwoven, 2.5–4.2 µm in diam. Cystidia absent; cystidioles present, subulate to ventricose, thin-walled, smooth, 16–35 × 10–15 µm. Hyphae of hyphal pegs hyaline, thin- to fairly thick-walled, branched, cyanophilous. Dendrohyphidia frequently in dissepimental edges. Basidia clavate, with four sterigmata and a basal clamp connection, 24–38 × 12–17 µm; basidioles in shape similar to basidia, but smaller. Rhomboid crystals frequently present.

Spores. — Basidiospores oblong-ellipsoid to cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (14–)16–20(–22) × (5.5–)5.8–7.1(–7.5) µm, L = 17.63 µm, W = 6.71 µm, Q = 2.72 (n = 30/1).

Notes. — *Megasporia major* was described Guangdong Province of China, and it was treated in the genus *Pachykytospora* Kotl. & Pouzar as *P. major* G.Y. Zheng & Z.S. Bi (Zheng and Bi 1989). However, *Pachykytospora* is characterized by ornamented and ellipsoid basidiospores, while the type specimen of *P. major* has smooth basidiospores, thus it was transferred to *Megasporoporia* (Dai and Li 2002). Recently, Li and Cui (2013a) transferred it into the genus *Megasporia* based on molecuar anaylsis.

Specimens examined: **CHINA**. **Guangdong**, Huidong County, Gutian, on fallen angiosperm branch, 26 September 1986, *Zheng 11124* (holotye, GDGM); Ruyang County, Nanling Nature Reserve, on fallen angiosperm branch, 16 September 2009, *Cui 7578* (BJFC); Fengkai County, Heishiding Nature Reserve, on fallen angiosperm branch, 8 July 2007, *Zhou 389*, *399* (IFP). **Guangxi**, Ningming County, Nonggang Nature Reserve, on fallen angiosperm branch, 16 September 2009, *Cui 7578* (BJFC). **Hainan**, Ledong County, Jianfengling Nature Reserve, on fallen angiosperm branch, 1 June 2008, *Dai 9915* (BJFC); Changjiang County, Bawangling Nature Reserve, on fallen angiosperm branch, 5 November 2012, *Cui 10900* (BJFC).

Megasporia violacea (B.K. Cui & P. Du) B.K. Cui & Hai J. Li, *Mycologia* 105(2): 375 (2013) (Figs. 162, 163).
MycoBank: MB 801187
Basionym: *Megasporoporia violacea* B.K. Cui & P. Du, Mycotaxon 110:134 (2009).

Fruiting body. — Basidiocarps annual, resupinate, difficult to separate from substrate, hard corky, without odor or taste when fresh, becoming hard corky upon drying, up to 20 cm long, 3 cm wide and 1 mm thick at center. Pore surface violet when fresh, grayish violet to pale fawn brown when dry; pores round to angular, 5–7 per mm; dissepiments thick, entire; hyphal pegs absent. Sterile margin distinct, pinkish buff, up to 1 mm wide. Subiculum cream to pinkish buff, hard corky, azonate, up to 0.2 mm thick. Tubes concolorous with the pore surface, corky, up to 0.8 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, CB+; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 1.8–3 µm in diam;

Fig. 162 Basidiocarps of *Megasporia violacea*

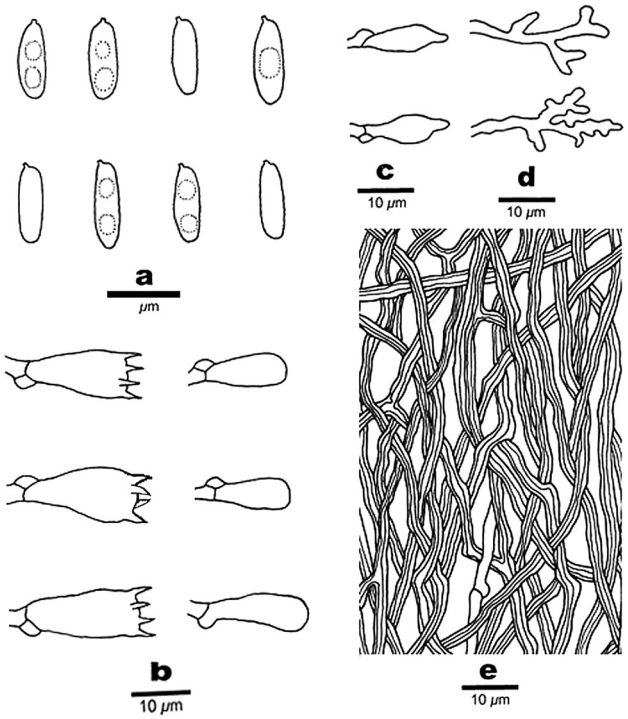

Fig. 163 Microscopic structures of *Megasporia violacea* (drawn from *Cui 6570*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Dendrohyphidia; **e**. Hyphae from trama. Bars: **a–e** = 10 µm

skeletal hyphae dominant, thick-walled with a wide to narrow lumen, frequently branched, mostly flexuous, interwoven, agglutinated, 2–4.5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 1.5–2.5 µm in diam; skeletal hyphae dominant, thick-walled with a wide to narrow lumen, frequently branched, flexuous, interwoven, 1.8–3.3 µm in diam. Cystidia absent; cystidioles present, subulate or ventricose, thin-walled, smooth, 9.8–15.8 × 4–5 µm. Dendrohyphidia present in hymenium and dissepimental edges; hyphal pegs absent. Basidia barrel-shaped, with a basal clamp connection and four sterigmata, 13–18.5 × 5–9.8 µm; basidioles basically clavate, distinctly smaller than basidia. Polyhedric crystals frequently present among subhymenium and hymenium.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, usually with one or two big guttules, IKI–, CB–, (10–)11–14.9(–15.2) × (3–)3.2–5(–5.2) µm, L = 12.58 µm, W = 4.22 µm, Q = 2.83–3.16 (n = 60/2).

Notes. — *Megasporia violacea* is unique in the genus by its violet to grayish violet pore surface, smaller pores (5–7 per mm), the presence of both cystidioles and dendrohyphidia, and absence of hyphal pegs (Du and Cui 2009). *Megasporia violacea* is similar to *M. cystidiolophora* by having cystidioles and similar basidiospores, but the latter has pale pinkish brown to salmon colored pores. In addition, *M. cystidiolophora* has larger pores (3–5 per mm) and cystidioles (17–23.2 × 5.3–8 µm), and lacks dendrohyphidia (Cui and Dai 2007).

Specimens examined: **CHINA**. **Fujian**, Yongjing County, Huboliao Nature Reserve, on fallen angiosperm branch, 26 October 2013, *Cui 11331* (BJFC). **Guangdong**, Huidong County, Gutian Nature Reserve, on fallen angiosperm branch, 24 May 2006, *Dai 7487* (BJFC); Guangzhou, Maofengshan Forest Park, on fallen angiosperm branch, 19 August 2011, *Cui 10147* (BJFC). **Hainan**, Ledong County, Jianfengling Nature Reserve, on fallen angiosperm branch, 11 May 2009, *Cui 6570* (holotype, BJFC), *Cui 6601b* (paratype, BJFC); Changjiang County, Bawangling Nature Reserve, on fallen angiosperm branch, 5 November 2012, *Cui 10905* (BJFC). **Yunnan**, Mengla County, Wangtianshu Park, on fallen angiosperm branch, 2 November 2009, *Cui 8585* (BJFC).

Megasporoporia Ryvarden & J.E. Wright, *Mycotaxon* 16(1): 173 (1982)
MycoBank: MB 18028
Type species: *Megasporoporia setulosa* (Henn.) Rajchenb.

Basidiocarps annual, resupinate. Pore surface cream, white, pale yellowish to yellowish brown; pores round to angular. Hyphal system dimitic to trimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid and cyanophilous, rarely branched. Dendrohyphidia absent. Hyphal pegs present. Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–.

Megasporoporia was established by Ryvarden et al. (1982) based on *Poria setulosa* Henn. The genus is characterized by resupinate basidiocarps, large or small pores, basidiospores mostly greater than 10 µm in length, a dimitic to trimitic hyphal system with clamped generative hyphae and dextrinoid skeletal hyphae, the presence of rhomboid or bipyramidic crystals, dendrohyphidia, hyphal pegs, mainly occurring on angiosperm branches and causing a white rot (Ryvarden et al. 1982; Dai and Wu 2004; Dai et al. 2004a; Cui and Dai 2007; Du and Cui 2009; Li and Cui 2013a).

Megasporoporia was treated as a synonym of *Dichomitus* (Masuka and Ryvarden 1999, Ryvarden 2007). Both genera have a dimitic hyphal system with clamped generative hyphae, hyaline, thin-walled and smooth basidiospores which are negative in Melzer's reagent and cause a white-rot on hardwood (Dai and Wu 2004). However, Dai and Wu (2004) considered the species with dextrinoid skeletal hyphae, rhomboid or bipyramidic crystals and dendrohyphidia and hyphal pegs to constitute a natural group. Recently, two new genera, *Megasporia* and *Megasporoporiella* B.K. Cui, Y.C. Dai & Hai J. Li, were segregated from *Megasporoporia* based on phylogenetic analysis (Li and Cui 2013a).

Key to species of *Megasporoporia* in China

1. Pores 6–7 per mm ..... *M. minor*
1. Pores 1–2 per mm 2
2. Basidiospores 3.9–4.6 µm in width ..... *M. bannaensis*
2. Basidiospores 4.2–5.7 µm in width ..... *M. setulosa*

Megasporoporia bannaensis B.K. Cui & Hai J. Li, Mycologia 105(2): 375 (2013) (Figs. 164, 165).
MycoBank: MB 564123

Fruiting body. — Basidiocarps annual, resupinate, without odor or taste when fresh, becoming corky upon drying, up to 14 cm long, 2.8 cm wide and 1.5 mm thick at center. Pore surface cream to buff when dry; pores angular, 1–2 per mm; dissepiments thin, entire. Sterile margin distinct, white to cream, up to 1 mm wide. Subiculum cream to buff, corky, up to 0.2 mm thick. Tubes concolorous with pore surface, corky, up to 1.3 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, CB+; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.5–3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, rarely branched, interwoven, 1.8–4.5 µm in diam.

Fig. 164 Basidiocarps of *Megasporoporia bannaensis*

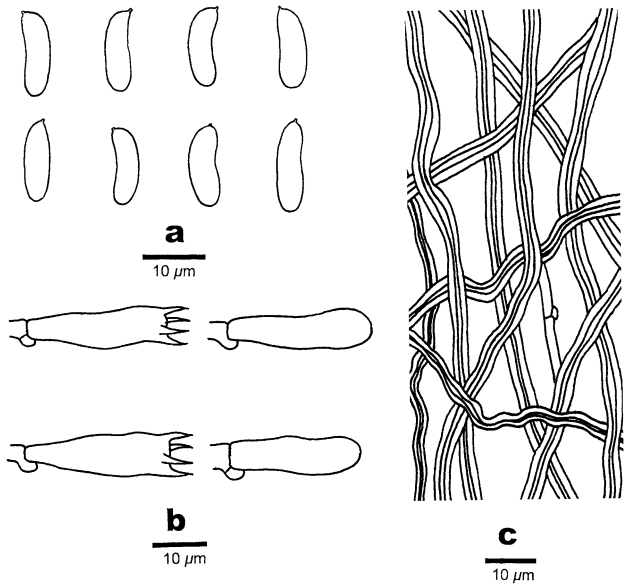

Fig. 165 Microscopic structures of *Megasporoporia bannaensis* (drawn from *Dai 12306*). **a**. Basidiospores; **b**. A section of hyphal peg in hymenium; **c**. Hyphae from trama. Bars: **a–c** = 10 μm

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.3–2.8 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, unbranched, interwoven, 1.5–3.5 μm in diam. Dendrohyphidia absent. Thin and long hyphal pegs abundant in the hymenium. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 20–32 × 8–10 μm; basidioles in shape similar to basidia, but smaller. Large polyhedric crystals present among subhymenium and hymenium.

Spores. — Basidiospores cylindrical to allantoid, hyaline, thin-walled, smooth, IKI–, CB–, (9.7–)10–14(–15) × (3.7–)3.9–4.6(–5) μm, L = 12.28 μm, W = 4.15 μm, Q = 2.67–3.26 (n = 90/3).

Notes. — *Megasporoporia bannaensis* is characterized by its white to cream pore surface, larger pores (1–2 per mm), strongly dextrinoid and almost unbranched skeletal hyphae, and the presence of long and thin hyphal pegs in the hymenium. *Megasporoporia setulosa* is similar to *M. bannaensis* by having similar basidiocarps and pore size (1–2 per mm), dextrinoid and almost unbranched skeletal hyphae, but its basidiospores are slightly wider (10–14 × 4.2–5.7 μm, Ryvarden et al. 1982).

Specimens examined: **CHINA. Yunnan,** Jianghong, Sanchahe Nature Reserve, on fallen angiosperm branch, 7 June 2011, *Dai 12306* (holotype, BJFC), *Dai 12325* (paratype, BJFC); Mengla County, Menglun, Lvshilin Park, on fallen angiosperm branch, 4 August 2005, *Dai 6697* (paratype, IFP and BJFC); Pu'er, Laiyanghe Forest Park, on fallen angiosperm branch, 7 June 2011, *Dai 12278* (paratype, BJFC).

Megasporoporia minor B.K. Cui & Hai J. Li, *Mycologia* 105(2): 376 (2013) (Figs. 166, 167).
MycoBank: MB 564126

Fruiting body. — Basidiocarps annual, resupinate, without odor or taste when fresh, becoming corky upon drying, up to 5 cm long, 2.1 cm wide and 1 mm thick at center. Pore surface cream to buff when fresh, turning to pale brown when bruised; pores angular, 6–7 per mm; dissepiments thin, entire. Sterile margin distinct, white to cream, up to 1.5 mm wide. Subiculum very thin, cream to buff, corky, up to 0.1 mm thick. Tubes concolorous with pore surface, corky, up to 0.9 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, CB+; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.7–3.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, rarely branched, interwoven, 1.8–4 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.5–3.2 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, rarely branched, interwoven, 1.7–3.5 μm in diam. Dendrohyphidia absent; arboriform hyphae present, mainly restrict at the base of tubes, with more or less fusoid base and thin, frequently branched tip parts. Hyphal pegs occasionally present. Cystidia absent; fusoid cystidioles present, thin-walled, smooth, 14–22 × 5–7 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 18–26 × 6–8 μm; basidioles in shape similar to basidia, but smaller. Crystals absent in the hymenium.

Fig. 166 Basidiocarps of *Megasporoporia minor*

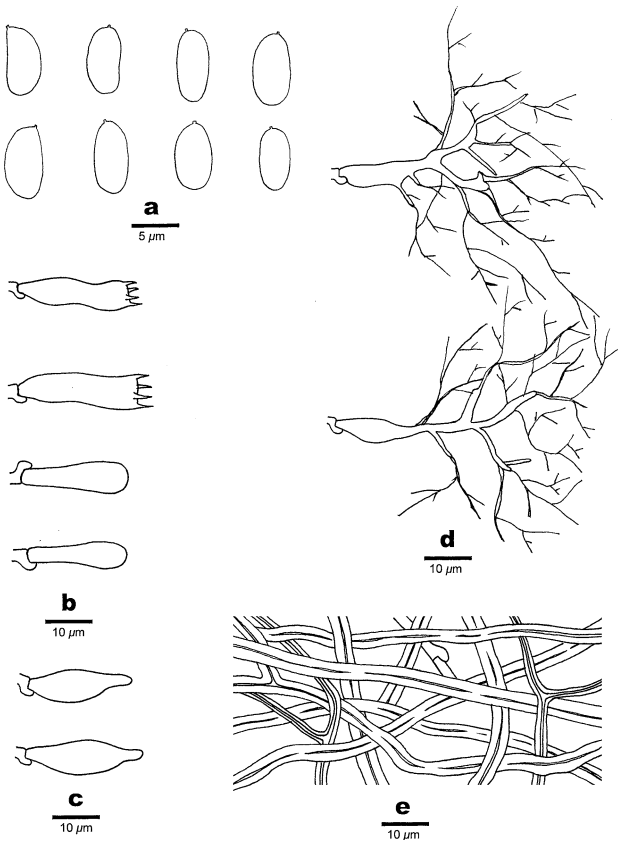

Fig. 167 Microscopic structures of *Megasporoporia minor* (drawn from *Dai 12170*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Arboriform hyphae from the base of tubes; **e**. Hyphae from trama. Bars: **a** = 5 μm; **b–e** = 10 μm

Spores. — Basidiospores cylindrical to oblong-ellipsoid to ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, 6–7.8(–8) × (2.5–)2.6–4 μm, L = 6.86 μm, W = 3.2 μm, Q = 2.14 (n = 50/1).

Notes. — *Megasporoporia minor* is unique in the genus by its small pores (6–7 per mm) and basidiospores (6–7.8 × 2.6–4 μm). In addition, its dendrohyphidia are very special, with more or less fusoid base and thin, frequently branching tip parts which look like arboriform hyphae. *Megasporia violacea* also shares small pores (5–7 per mm), but its violet to grayish violet pore surface, larger basidiospores (11–14.9 × 3.2–5 μm) can easily distinguish from *Megasporoporia minor* (Du and Cui 2009).

Specimen examined: **CHINA**. **Yunnan**, Pingbian County, Daweishan Forest Park, on fallen angiosperm branch, 04 June 2011, *Dai 12170* (holotype, BJFC).

Megasporoporia setulosa (Henn.) Rajchenb., *Mycotaxon* 16(1): 180 (1982) (Figs. 168, 169).
MycoBank: MB 110222
Basionym: *Poria setulosa* Henn., *Bot. Jb.* 28(3): 321 (1900).

Fruiting body. — Basidiocarps annual, resupinate, adnate, leathery, without odor or taste when fresh, becoming corky upon drying, up to 7 cm long, 1.5 cm wide and 1 mm thick at center. Pore surface buff, ochraceous to pale yellowish brown when dry; pores angular, hexagonal, 0.5–1 per mm; dissepiments thin, entire; tube wall with hyphal pegs. Sterile

Fig. 168 Basidiocarps of *Megasporoporia setulosa*

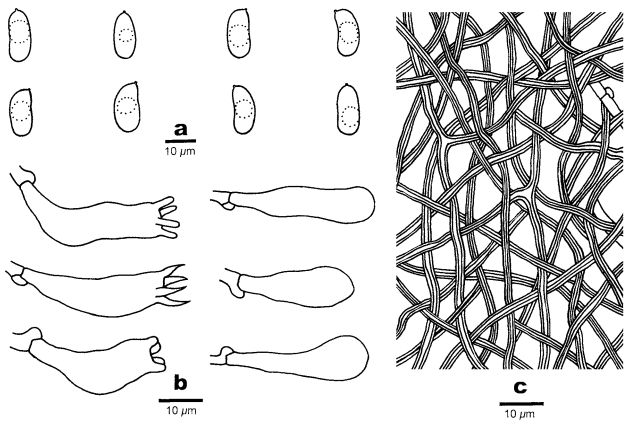

Fig. 169 Microscopic structures of *Megasporoporia setulosa* (drawn from *Cui 8169*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a–c** = 10 μm

margin indistinct. Subiculum cream to pale yellowish brown, corky, up to 0.2 mm thick. Tubes concolorous with the pore surface, corky, up to 0.8 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae strongly dextrinoid, CB+; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.5–3 µm in diam; skeletal hyphae dominant, hyaline to yellowish brown, thick-walled with a narrow lumen to subsolid, often branched, interwoven, 3–4.7 µm in diam; binding hyphae hyaline to yellowish brown, thick-walled with a narrow lumen to subsolid, flexuous, frequently branched, interwoven, 1–3 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 1.5–3 µm in diam; skeletal hyphae dominant, hyaline to yellowish brown, thick-walled with a narrow lumen to subsolid, often branched, interwoven, 3–5 µm in diam; binding hyphae hyaline to yellowish brown, thick-walled with a narrow lumen to subsolid, flexuous, frequently branched, interwoven, 1–3 µm in diam. Cystidia and cystidioles absent. Dendrohyphidia absent. Hyphal pegs present. Basidia clavate, with four sterigmata and a basal clamp connection, 20–35 × 8–15 µm; basidioles in shape similar to basidia, but smaller. Polyhedric crystals frequently present.

Spores. — Basidiospores oblong-ellipsoid to cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (15.3–)15.6–19.3(–19.6) × (5.1–)5.3–7(–7.6) µm, L = 17.34 µm, W = 6.59 µm, Q = 2.85 (n = 30/1).

Notes. — *Megasporoporia setulosa* is characterized by big and hexagonal pores, buff, ochraceous to pale yellowish brown pore surface, a trimitic hyphal system, and oblong-ellipsoid to cylindrical basidiospores.

Specimens examined: **CHINA. Guizhou**, Jiangkou County, Fanjingshan Nature Reserve, on fallen angiosperm branch, 24 November 2014, *Dai 14990* (BJFC). **Hainan**, Changjiang County, Bawangling Nature Reserve, on fallen angiosperm branch, 16 June 2010, *Dai 13673* (BJFC). **Sichuan**, Mianning County, Lingshansi Park, on fallen angiosperm branch, 17 September 2012, *Dai 12923* (BJFC). **Yunnan**, Jinghong, Xishuangbanna Botanical Garden, on fallen angiosperm branch, 23 July 2014, *Dai 13896, 13901, 13902* (BJFC); Baoshan, Gaoligong Mountains, on fallen angiosperm branch, 25 October 2009, *Cui 8169* (BJFC).

Megasporoporiella B.K. Cui, Y.C. Dai & Hai J. Li, *Mycologia* 105(2): 377 (2013).
MycoBank: MB 801188
Type species: *Megasporoporiella cavernulosa* (Berk.) B.K. Cui, Y.C. Dai & Hai J. Li.

Basidiocarps annual, resupinate. Pore surface cream, pale yellowish to honey-yellow; pores round to angular, large to small. Hyphal system dimitic with clamped generative hyphae; skeletal hyphae strongly to weakly dextrinoid and cyanophilous, rarely to frequently branched. Polyhedric crystals usually present among subhymenium and hymenium. Basidiospores cylindrical to ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–.

Megasporia and *Megasporoporiella* were segregated from *Megasporoporia* based on ITS and nLSU sequences data. However, these three genera share similar morphological characters, and there are no distinct characters to separate them from each other. The most important diagnostic morphological characters of *Megasporoporia s. l.* (including *Megasporia*, *Megasporoporia* and *Megasporoporiella*) are the pore size, basidiospore morphology, hyphal system and the reaction of skeletal hyphae in Melzer's reagent; these combined characters define *Megasporia*, *Megasporoporia* and *Megasporoporiella* and separate them from other genera in the core polyporoid clade. The presence of dendrohyphidia, hyphal pegs, cystidioles and crystals are also important to the identification of species. However, these morphological characters have evolved multiple times in the evolution of *Megasporoporia s. l.*, and are not stable indicators of phylogenetic relationships apart from those with closely related species (Li and Cui 2013a).

Key to species of *Megasporoporiella* in China

1 Pores 4–5 per mm; basidiospores ellipsoid..... ……*M. rhododendri*
1 Pores 1–4 per mm; basidiospores cylindrical ..... ……2
2 Dendrohyphidia present ..... ……*M. subcavernulosa*
2 Dendrohyphidia absent..... ……3
3 Pore surface buff to honey-yellow, dissepiments lacerate ..... ……*M. lacerata*
3 Pore surface white to cream, dissepiments entire..... ……*M. pseudocavernulosa*

Megasporoporiella lacerata B.K. Cui & Hai J. Li, *Mycologia* 105(2): 377 (2013) (Figs. 170, 171).
MycoBank: MB 801190

Fruiting body. — Basidiocarps annual, resupinate, without odor or taste when fresh, becoming corky upon drying, up to 7 cm long, 5 cm wide and 1 mm thick at center. Pore surface white to cream near margin and buff to honey-yellow at center when dry; pores angular, 1.5–3 per mm; dissepiments thin, mostly lacerate. Sterile margin distinct, white to cream, up to 2 mm wide. Subiculum cream, corky, up to 0.6 mm thick. Tubes concolorous with pore surface, corky, up to 0.4 mm long.

Fig. 170 Basidiocarps of *Megasporoporiella lacerata*

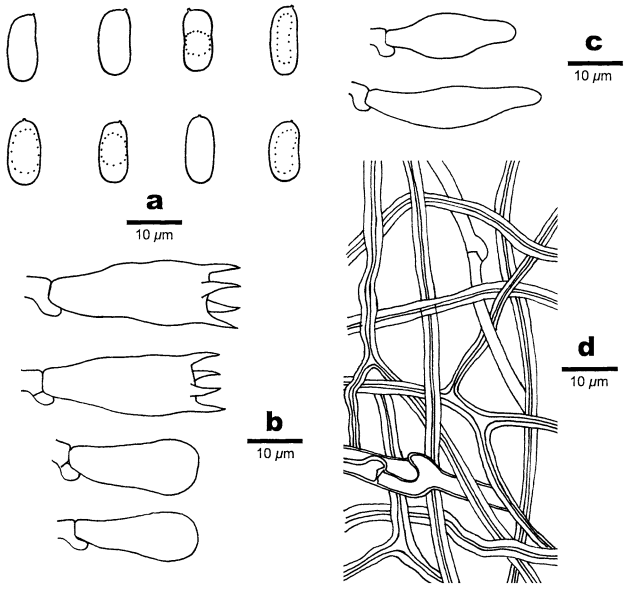

Fig. 171 Microscopic structures of *Megasporoporiella lacerata* (drawn from *Yuan 3880*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 μm

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae weakly dextrinoid, CB+; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin- to slightly thick-walled, moderately branched, 1.5–4 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, moderately branched, interwoven, 1.2–3.6 μm in diam. Large rhomboid or bipyramidic crystals occasionally present.

Tubes. — Generative hyphae infrequent, hyaline, thin- to slightly thick-walled, moderately branched, 1.8–3.2 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, moderately branched, interwoven, 1–3 μm in diam. Dendrohyphidia absent. Large hyphal pegs abundant in the hymenium. Cystidia absent; fusoid cystidioles occasionally present, thin-walled, smooth, 20–32 × 6–8 μm. Basidia clavate to barrel-shaped, with four sterigmata and a basal clamp connection, 23–35 × 7–11 μm; basidioles in shape similar to basidia, but smaller. Large polyhedric crystals present among subhymenium and hymenium and yellow oil substances present among trama.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, usually with one big guttule, IKI–, CB–, (9–)9.6–12(–12.8) × (4.7–)4.8–5.9(–6.2) μm, L = 10.5 μm, W = 5.21 μm, Q = 1.95–2.09 (n = 60/2).

Notes. — *Megasporoporiella lacerata* is characterized by its buff to honey-yellow pore surface, strongly lacerate pores and the presence of yellowish oily substances among trama. *Megasporoporiella subcavernulosa* has similar pores (2–4 per mm), but it has cream to pale grayish pore surface, slightly thinner basidiospores (9–12.1 × 4.2–5.2 μm) and presence of dendrohyphidia (Dai and Wu 2004).

Specimens examined: **CHINA. Yunnan**, Baoshan, Gaoligong Mountains, Baihualing Nature Reserve, on fallen angiosperm branch, 9 September 2007, *Yuan 3874* (paratype, IFP), *Yuan 3880* (holotype, IFP).....

Megasporoporiella pseudocavernulosa B.K. Cui & Hai J. Li, *Mycologia* 105(2): 378 (2013) (Figs. 172, 173).
MycoBank: MB 801191

Fruiting body. — Basidiocarps annual, resupinate, without odor or taste when fresh, becoming corky upon drying, up to 6 cm long, 1.8 cm wide and 1 mm thick at center. Pore surface white to cream; pores angular, shallow, 1.5–2.5 per mm; dissepiments thin, entire. Sterile margin white, up to 1 mm wide. Subiculum white to cream, corky, up to 0.7 mm thick. Tubes concolorous with pore surface, corky, up to 0.3 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB+; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin- to slightly thick-walled, frequently branched, 2–4 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 1.2–3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin- to slightly thick-walled, moderately branched, 1.6–3.2 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 1–2.5 μm in diam. Dendrohyphidia absent. Large hyphal pegs present, mainly restricted at the base of tubes. Cystidia absent; fusoid cystidioles occasionally present, thin-walled, smooth, sometimes with one secondary septum, 25–36 × 6–8 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 34–52 × 10–12 μm;

Fig. 172 Basidiocarps of *Megasporoporiella pseudocavernulosa*

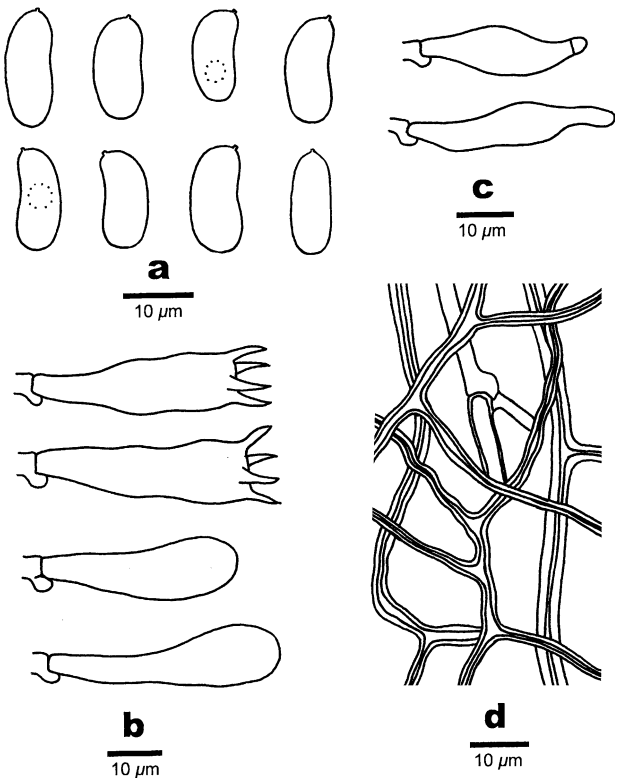

Fig. 173 Microscopic structures of *Megasporoporiella pseudocavernulosa* (drawn from *Yuan 1270*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 μm

basidioles in shape similar to basidia, but smaller. Small polyhedric or irregular crystals present among subhymenium and hymenium.

Spores. — Basidiospores cylindrical to allantoid, hyaline, thin-walled, smooth, IKI–, CB–, (9.4–)10.8–14(–14.8) × (5–)5.3–6.5(–7) μm, L=12.33 μm, W=5.79 μm, Q=2.11–2.15 (n=60/2).

Notes. — *Megasporoporiella pseudocavernulosa* is easily to recognize by its white to cream basidiocarps, large and shallow pores. *Megasporoporiella cavernulosa* has similar basidiospores (10–16 × 5–7 μm) with *M. pseudocavernulosa*, but it has slightly smaller pores (2–4 per mm) and dendrohyphidia (Ryvarden et al. 1982).

Specimens examined: **CHINA**. **Yunnan**, Chuxiong, Zixishan Nature Reserve, on fallen angiosperm branch, 1 August 2005, *Yuan 1270* (holotype in IFP, isotype in BJFC), *Yuan 1277* (paratype, IFP).

Megasporoporiella rhododendri (Y.C. Dai & Y.L. Wei) B.K. Cui & Hai J. Li, *Mycologia* 105(2): 378 (2013) (Figs. 174, 175).
MycoBank: MB 801192
Basionym: *Megasporoporia rhododendri* Y.C. Dai & Y.L. Wei, *Ann. Bot. Fenn.* 41: 323 (2004).

Fruiting body. — Basidiocarps annual, resupinate, rarely effused-reflexed, difficult to separate from substrate, leathery when fresh, becoming hard corky upon drying, up to 10 cm long, 4 cm wide and 2 mm thick. Pilei very narrow when reflexed, projecting up to 2 mm and 2 cm wide. Pileal surface pale brownish when dry. Pore surface cream when fresh, becoming pale grayish cream or smoke gray upon drying; pores round, freely arranged, 3–5 per mm; dissepiments thick, entire. Sterile margin distinct, buff, up to 3 mm wide. Subiculum and context cream to buff, corky, up to 1.5 mm thick. Tubes concolorous with the pore surface, corky, up to 0.5 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB+; tissues unchanged in KOH.

Context. — Generative hyphae frequent, hyaline, thin-walled, occasionally branched, 2–3.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, dendritically branched, flexuous, interwoven, 3–5 μm in diam.

Tubes. — Generative hyphae dominant, hyaline, thin-walled, frequently branched, 2–4 μm in diam; skeletal

Fig. 174 Basidiocarps of *Megasporoporiella rhododendri*

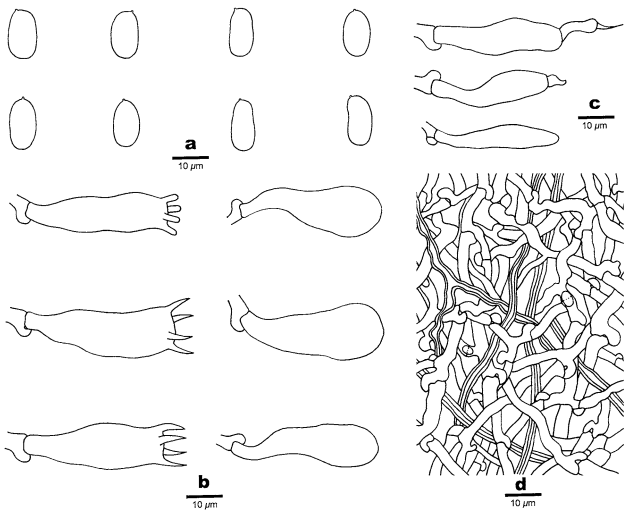

Fig. 175 Microscopic structures of *Megasporoporiella rhododendri* (drawn from *Dai 4226*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 µm

hyphae infrequent, hyaline, thick-walled with a wide to narrow lumen, dendritically branched, flexuous, 3–4.8 µm in diam. Cystidia absent; clavate to subulate cystidioles frequently present, thin-walled, smooth, often with collapsed tips, and tips with one or two secondary septa, 25–38 × 6–12 µm. Subhymenium indistinct. Dendrohyphidia and hyphal pegs absent. Polyhedric crystals absent. Basidia clavate, with four sterigmata and a basal clamp connection, 23–40 × 9–14 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores oblong-ellipsoid, hyaline, thin-walled, smooth, usually with one large guttule, CB–, IKI–, (10–)11–14(–15) × (6–)6.5–8(–9) µm, L = 12.28 µm, W = 7.48 µm, Q = 1.62–1.66 (n = 60/2).

Notes. — *Megasporoporiella rhododendri* is characterized by resupinate to effused-reflexed basidiocarps, the absence of dendrohyphidia, hyphal pegs and crystals in hymenium, tramal hyphae dominant by generative hyphae, oblong to ellipsoid basidiospores, and growing on *Rhododendron* at high altitude (Dai et al. 2004a).

Specimens examined: **CHINA. Sichuan**, Songpan County, Huanglong Nature Reserve, on fallen trunk of *Rhododendron*, 15 October 2002, *Dai 4226* (holotype, IFP), *Dai 4229, 4235a* (paratypes, IFP); Xiaojin County, Jiajin Mountain, on fallen trunk of *Rhododendron*, 17 September 2012, *Cui 10725, 10745* (BJFC).

Megasporoporiella subcavernulosa (Y.C. Dai & Sheng H. Wu) B.K. Cui & Hai J. Li, *Mycologia* 105: 379 (2013) (Figs. 176, 177).

MycoBank: MB 801193

Basionym: *Megasporoporia subcavernulosa* Y.C. Dai & Sheng H. Wu, *Mycotaxon* 89: 384 (2004).

Fruiting body. — Basidiocarps annual, resupinate, difficult to separate from substrate, leathery when fresh, becoming hard corky upon drying, up to 7 cm long, 1 cm wide and 1.5 mm thick. Pore surface cream when fresh, becoming pale grayish upon drying; pores round, freely arranged, 2–4 per mm; dissepiments thin, entire.

Fig. 176 Basidiocarps of *Megasporoporiella subcavernulosa*

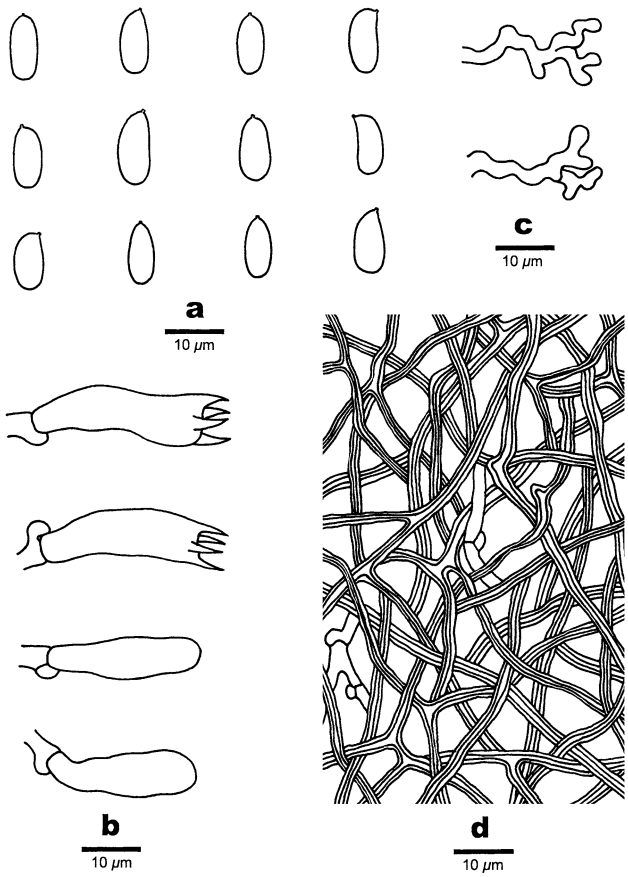

Fig. 177 Microscopic structures of *Megasporoporiella subcavernulosa* (drawn from *Cui 2789*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Dendrohyphidia; **d**. Hyphae from trama. Bars: **a–d** = 10 µm

Subiculum cream, corky, up to 0.5 mm thick. Tubes concolorous with pore surface, hard corky, up to 1 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB+; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, 2–3.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled, occasionally branched in the apical parts, flexuous, some encrusted, interwoven, 2–3.8 µm in diam.

Tubes. — Generative hyphae infrequent, thin-walled, 1.8–3.3 µm in diam; skeletal hyphae dominant, hyaline, mostly subsolid, branched in an arboriform fashion, interwoven, strongly agglutinated, 2–3.5 µm in diam. Cystidia and cystidioles absent. Dendrohyphidia frequent in hymenium and the edges of dissepiments. Hyphal pegs frequent; hyphae of pegs hyaline, thin-walled, frequently septate, bearing clamp connections, weakly dextrinoid, slightly CB+. Basidia clavate, with four sterigmata and a basal clamp connection, 18–24 × 8–11 µm; basidioles in shape similar to basidia, but distinctly smaller. Polyhedric crystals frequent among subhymenium and hymenial elements.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, CB–, IKI–, (8.5–)9–12.1(–13.2) × (4–)4.2–5.2(–6) µm, L = 10.27 µm, W = 4.77 µm, Q = 2.09–2.42 (n = 120/4).

Notes. — *Megasporoporiella subcavernulosa* is characterized by its white to cream pore surface, relatively large pores (2–4 per mm), and the presence of dendrohyphidia and hyphal pegs (Dai and Wu 2004). It is similar to *M. cavernulosa*, but the latter one differs by having bigger basidiospores (10–16 × 5–7 µm, Ryvarden et al. 1982).

Specimens examined: **CHINA**. **Anhui**, Huangshan, Yellow Mountain, on fallen angiosperm branch, 13 October 2004, *Dai 6175*, *6188, 6210, 6211* (BJFC). **Fujian**, Wuyishan County, Wuyishan Nature Reserve, Taoyuanyu, on fallen angiosperm branch, 22 October 2005, *Dai 7390* (BJFC); Wuping County, Liangyeshan Nature Reserve, on fallen angiosperm branch, 25 October 2013, *Cui 11307* (BJFC). **Guangdong**, Zhaoqing, Dinghushan Nature Reserve, on fallen angiosperm branch, 30 June 2010, *Cui 8975* (BJFC). **Yunnan**, Kunming, Xishan Park, on fallen twig of *Cyclobalanopsis*, 25 August 1995, *Wu 9508–328* (holotype, TNM & BJFC). **Zhejiang**, Lin'an County, Tianmushan Nature Reserve, on fallen angiosperm branch, 9 October 2005, *Cui 2789* (IFP & BJFC).

Melanoderma B.K. Cui & Y.C. Dai, *Mycotaxon* 116: 297 (2011).
MycoBank: MB 519872
Type species: *Melanoderma microcarpum* B.K. Cui & Y.C. Dai.

Basidiocarps perennial, pileate to effused-reflexed. Pilei circular to irregular shaped. Pileal surface dark reddish brown to blackish brown, concentrically zonate, glabrous; margin obtuse. Pore surface white when fresh, cream buff when dry; pores circular; dissepiments thick, entire. Context cream-buff, woody hard. Tubes cream-buff, woody hard, stratified. Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB+; tissues unchanged in KOH. Cystidia clavate to ventricose, hyaline, thin-walled, usually apically encrusted. Basidia clavate, with four sterigmata and a basal clamp connection. Rhomboid crystals frequently present in trama and hymenium. Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–.

Melanoderma is characterized by a perennial growth habit, pileate to effused-reflexed basidiocarps with a blackish crust at pileal surface, a white to cream-buff pore surface, and small, round pores, a dimitic hyphal system with clamped generative hyphae, dextrinoid and cyanophilous skeletal hyphae, cylindrical, thin-walled, non-amyloid, non-dextrinoid and acyanophilous basidiospores, and lack of hyphal pegs and dendrohyphidia (Cui et al. 2011b).

Melanoderma microcarpum B.K. Cui & Y.C. Dai, *Mycotaxon* 116: 298 (2011) (Figs. 178, 179).
MycoBank: MB 519873

Fruiting body. — Basidiocarps perennial, pileate to effuse-reflexed, narrowly attached, woody hard upon drying, without odor or taste. Pilei circular to irregularly shaped, projecting up to 1.6 cm, 1.5 cm broad and 5 mm thick at base. Pileal surface dark reddish brown to blackish brown, concentrically zonate, glabrous; margin obtuse, cream-buff when juvenile, becoming black when mature. Pore surface white when fresh, cream to cream-buff when dry; pores distinctly circular, 7–9 per mm; dissepiments thick, entire. Context cream-buff, woody hard, up to 1 mm thick, upper surface with a blackish crust. Tubes cream-buff, woody hard, stratified, about 1 mm long in each layer.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB+; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.5–3.6 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, often branched, interwoven, 1.5–5.7 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, unbranched, 1.2–3 µm in diam; skeletal hyphae dominant, thick-walled to subsolid, usually branched, strongly interwoven, 1.2–5 µm in diam. Cystidia clavate to ventricose, hyaline, thin-walled, usually apically encrusted, 20–32 × 4.8–7.6 µm; cystidioles clavate, hyaline, thin-walled, 17.6–24 × 4–6.2 µm. Basidia clavate, with four sterigmata and a basal

Fig. 178 Basidiocarps of *Melanoderma microcarpum*

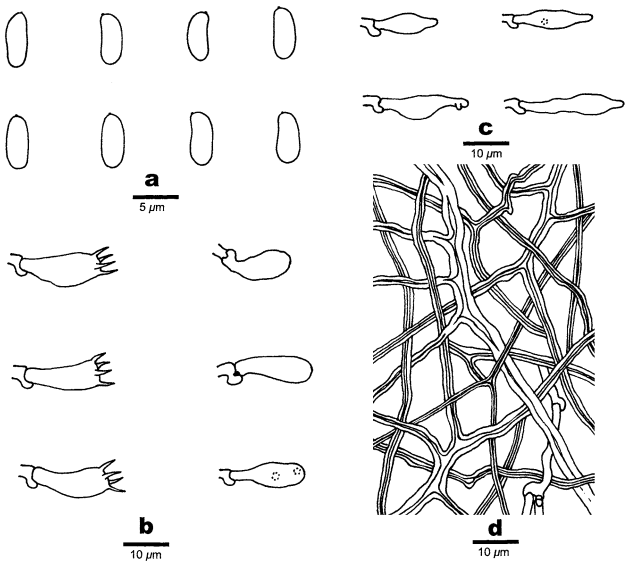

Fig. 179 Microscopic structures of *Melanoderma microcarpum* (drawn from *Dai 8116*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidia; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

clamp connection, 9.8–16 × 5–6.5 μm; basidioles similar in shape to basidia, but slightly smaller. Rhomboid crystals frequently present in trama and hymenium.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (5–)5.1–6.4(–7.2) × (1.8–)1.9–2.7(–3) μm, L = 5.92 μm, W = 2.28 μm, Q = 2.25–2.79 (n = 90/3).

Notes. — *Melanoderma microcarpum* is characterized by a perennial growth habit, pileate to effuse-reflexed basidiocarps with a distinct blackish crust at pileal surface, small and round pores, dimitic hyphal system with clamped generative hyphae, dextrinoid and cyanophilous skeletal hyphae, cylindrical, thin-walled basidiospores, negative in Melzer's reagent and Cotton Blue, and presence of apically encrusted cystidia (Cui et al. 2011b).

Specimens examined: **CHINA. Hunan**, Yizhang County, Mangshan Forest Park, on fallen angiosperm trunk, 25 June 2007, *Dai 8116* (holotype in BJFC, isotype in IFP). **Hainan**, Lingshui County, Diaoluoshan Forest Park, on fallen angiosperm trunk, 29 May 2008, *Dai 9811* (paratype, BJFC); Ledong County, Jianfengling Nature Reserve, on fallen angiosperm branch, 11 May 2009, *Cui 6582* (paratype, BJFC).

Microporellus Murrill, *Bull. Torrey bot. Club* 32(9): 483 (1905).
MycoBank: MB 18062
Type species: *Microporellus dealbatus* (Berk. & Curt.) Murrill.

Basidiocarps annual, centrally or laterally stipitate; stipe often somewhat reduced to a long tapering base. Pilei round, single or confluent, tomentus to glabrous, gray to pale buff, concentrically zonate, coriaceous when fresh, rather hard when dry. Pore surface pinkish buff to pale ochraceous; pores small. Context white to ochraceous. Hyphal system dimitic; generative hyphae with clamp connections; skeletal hyphae present in trama, absent or present in the context, dextrinoid or negative in Melzer's reagent. Basidiospores ellipsoid to obovoid or subglobose, hyaline, smooth, thin- to slightly thick-walled, IKI–, CB–.

Microporellus usually has stipitate basidiocarps, a dimitic hyphal system, clamped generative hyphae, slightly dextrinoid skeletal hyphae, and hyaline, thin- to slightly thick-walled, ellipsoid to obovoid or subglobose basidiospores (Gilbertson and Ryvarden 1987). Only one species of this genus is known from China (Dai 2012b).

Microporellus obovatus (Jungh.) Ryvarden, *Norw. J. Bot.* 19: 232 (1972) (Figs. 180, 181).
MycoBank: MB 317697
Basionym: *Polyporus obovatus* Jungh., *Praem. Fl. Crypt. Javae* (Batavia): 65 (1838).

Fruiting body. — Basidiocarps annual, centrally stipitate, solitary, corky when fresh, hard corky when dry. Pilei circular, flabelliform to trumpet-shaped, sometimes pendent, projecting up to 5 cm, 6 cm wide and 5 mm thick at center. Pileal surface white, cream, ochraceous to straw-colored, tomentose, sometimes with grayish to umber zones and radially striate; margin obtuse. Pore surface white, cream to pale straw-colored; pores angular, 9–10 per mm; dissepiments thin, entire. Context white, corky, up to 2 mm thick. Tubes concolorous with the pore surface, hard corky, up to 3 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections or simple septa; skeletal hyphae slightly dextrinoid, CB–; tissues unchanged in KOH.

Fig. 180 Basidiocarps of *Microporellus obovatus*

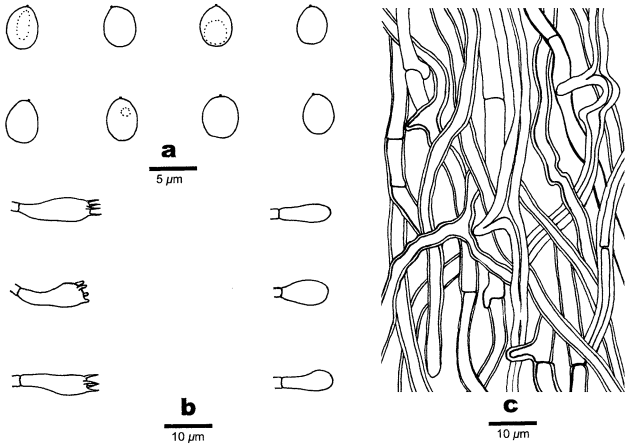

Fig. 181 Microscopic structures of *Microporellus obovatus* (drawn from *Dai 10937*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 μm; **b–c** = 10 μm

Context. — Generative hyphae frequent, hyaline, thin- to slightly thick-walled, usually unbranched, 3–6 μm in diam; skeletal hyphae hyaline, thick-walled with a wide to narrow lumen, branched, interwoven, 2.5–5 μm in diam.

Tubes. — Generative hyphae frequent, hyaline, thin- to slightly thick-walled, usually unbranched, 2.5–6 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, branched, interwoven, 2–4.5 μm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 12–20 × 5–6 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid to obovoid, hyaline, thin- to slightly thick-walled, smooth, IKI–, weakly CB+, (3–)3.5–4.5(–5) × (2.5–)3–3.5(–4) μm, L = 4 μm, W = 3.5 μm, Q = 1.2 (n = 30/1).

Notes. — *Microporellus obovatus* is characterized by stipitate basidiocarps with tomentose upper surface, white, cream to pale straw-colored pore surface, a dimitic hyphal system with both clamped and simple-septate generative hyphae, and ellipsoid to obovoid, hyaline, thin- to slightly thick-walled basidiospores.

Specimen examined: **CHINA. Guangdong**, Ruyuan County, Nanling Nature Reserve, on fallen angiosperm trunk, 15 May 2009, *Dai 10937* (BJFC).

Microporus P. Beauv., *Fl. Oware Benin*: 12 (1805).
MycoBank: MB 18063
Type species: *Microporus perula* P. Beauv.

Basidiocarps annual, centrally or laterally stipitate, solitary or in groups. Pilei circular, flabelliform to spathulate, white to reddish brown to cinnamon brown to black, smooth to hirsute, often zonated. Stipe lateral or central, round and usually with expanded foot at the base, white to black, smooth or hirsute. Pore surface white to cream; pores round, small, 5–10 per mm; dissepiments thin to slightly thick, entire. Context ream to buff. Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae hyaline, thick-walled, non-dextrinoid. Basidiospores allantoid to cylindrical, thin-walled, hyaline, smooth, IKI–, CB–.

Microporus is characterized by stipitate basidiocarps with concentrically zonate pileal surface and smaller pores, a trimitic hyphal system, and allantoid to cylindrical basidiospores. Ryvarden (1991) suggested that the genus is most closely related to *Polyporus* P. Micheli ex Adans. *s. str.* and regarded it as an evolutionary advanced stage adapted to dry areas. Corner (1989) placed the genus in synonymy with *Trametes* Fr. thus violating the principle of priority since *Microporus* is an older name than *Trametes*.

Key to species of *Microporus* in China

1 Basidiocarps centrally stipitate, infundibuliform ..... ……*M. xanthopus*
1 Basidiocarps laterally stipitate, not infundibuliform……2
2 Pores < 7 per mm ..... ……*M. subaffinis*
2 Pores > 7 per mm ..... ……3
3 Pores 7–8 per mm, basidiocarps thin and not very flat..... ……*M. vernicipes*
3 Pores 8–10 per mm, basidiocarps thick and very flat..... ……*M. affinis*

Microporus affinis (Blume & T. Nees) Kuntze, *Revis. gen. pl. (Leipzig)* 3(2): 494 (1898) (Figs. 182, 183).
MycoBank: MB 445965
Basionym: *Polyporus affinis* Blume & T. Nees, *Nova Acta Acad. Caes. Leop.-Carol.* 13: 18 (1826).

Fruiting body. — Basidiocarps annual, laterally stipitate or almost pileate, solitary or in groups, hard leathery or hard corky upon drying. Pilei flat, flabelliform, spathulate

Fig. 182 Basidiocarps of *Microporus affinis*

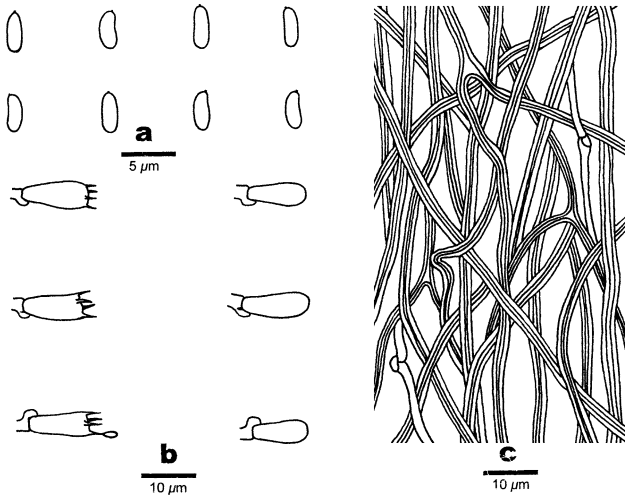

Fig. 183 Microscopic structures of *Microporus affinis* (drawn from *Cui 8188*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 μm; **b–c** = 10 μm

to semicircular, projecting up to 5 cm, 8 cm wide and 6 mm thick at base. Pileal surface yellow buff, brown, reddish brown, dark brown to black, velutinate to glabrous, concentrically zonate, mature pilei usually covered with a thin crust; margin distinct, slightly obtuse to acute, cream. Pore surface white to cream when fresh, cream buff to ochraceous upon drying; pores round, 8–10 per mm; dissepiments thin to slightly thick, entire. Context cream buff upon drying, hard corky to hard leathery, up to 4 mm thick. Tubes concolorous with the pore surface, hard corky, up to 2 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.5–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, frequently branched, flexuous, interwoven, 2–3.5 μm in diam; binding hyphae hyaline, thick-walled with a narrow lumen to subsolid, moderately branched, 1.5–2.5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.5–2.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, frequently branched, flexuous, interwoven, 2–3.2 μm in diam; binding hyphae hyaline, thick-walled with a narrow lumen to subsolid, moderately branched, 1.5–2.5 μm in diam. Cystidia and cystidioles absent. Coralloid dichophytic elements present along the dissepiments, arboriform branched. Basidia clavate, with four sterigmata and a basal clamp connection, 9–12 × 3.5–6 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores allantoid to cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (3–)3.5–4.5(–4.8) × (1.5–)1.8–2(–2.5) μm, L = 4.1 μm, W = 1.92 μm, Q = 2.1 (n = 30/1).

Notes. — *Microporus affinis* usually has laterally stipitate basidiocarps with variable colored and concentrically zonate pileal surface. It is a variable species which has been repeatedly described as new for many times based on variation in color and tomentum on the pileus (Núñez and Ryvarden 2001).

Specimens examined: **CHINA. Anhui**, Huangshan, Yellow Mountain, on fallen angiosperm trunk, 21 October 2010, *Dai 11882, 11894* (BJFC). **Fujian**, Wuyishan County, Wuyishan Forest Park, Longchuan Valley, on fallen angiosperm trunk, 16 October 2005, *Cui 2855, 2845* (BJFC); Jian'ou County, Wanmulin Nature Reserve, on fallen angiosperm trunk, 30 August 2006, *Cui 4206, 4216, 4256, 4259* (BJFC). **Guangdong**, Ruyang County, Nanling Nature Reserve, on fallen angiosperm trunk, 16 September 2009, *Cui 7540, 7559, 7577, 7586* (BJFC); Shixing County, Chebaling Nature Reserve, on fallen angiosperm trunk, 13 September 2009, *Cui 7392*, *7435* (BJFC); Zhaoqing, Dinghushan Nature Reserve, on fallen angiosperm trunk, 30 June 2010, *Cui 8958, 8967*, *8974* (BJFC). **Hainan**, Wuzhishan County, Wuzhishan Nature Reserve, on fallen angiosperm trunk, 24 September 2007, *Cui 5380* (BJFC). **Jiangxi**, Fenyi County, Dagangshan, on fallen angiosperm trunk, 21 September 2009, *Cui 7714, 7727, 7744, 7840* (BJFC). **Yunnan**, Baoshan, Gaoligong Mountains, on fallen angiosperm branch, 26 October 2009, *Cui 8188* (BJFC); Puer, Taiyanghe Nature Reserve, on fallen angiosperm trunk, 8 July 2010, *Cui 11009, 11025* (BJFC).

Microporus subaffinis (Lloyd) Imazeki, *Bulletin of the Tokyo Science Museum* 6: 95 (1943) (Figs. 184, 185).
MycoBank: MB 301160

Basionym: *Polystictus subaffinis* Lloyd, *Mycological Writings* 4 (40): 550 (1916).

Fruiting body. —Basidiocarps annual, laterally stipitate to plieate, solitary or in groups, hard leathery or hard corky upon drying. Pilei flabelliform to semicircular, projecting up to 4 cm, 5 cm wide and 5 mm thick at base. Pileal surface pale gray, ochraceous brown, yellowish brown to dark reddish brown, glabrous, concentrically zonate; margin acute. Pore surface white to cream when fresh, cream buff to cinnamon-buff upon drying; pores round to angular, 5–7 per mm; dissepiments thin, entire. Context cream buff upon drying, hard corky to leathery, up to 3 mm thick. Tubes concolorous with the pore surface, hard corky, up to 2 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae hyaline, thin-walled, unbranched, 2.5–3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, occasionally branched, strongly interwoven, 3.5–6 µm in diam; binding hyphae hyaline, thick-walled to subsolid, arboriform branched, 1–3 µm in diam.

Fig. 184 Basidiocarps of *Microporus subaffinis*

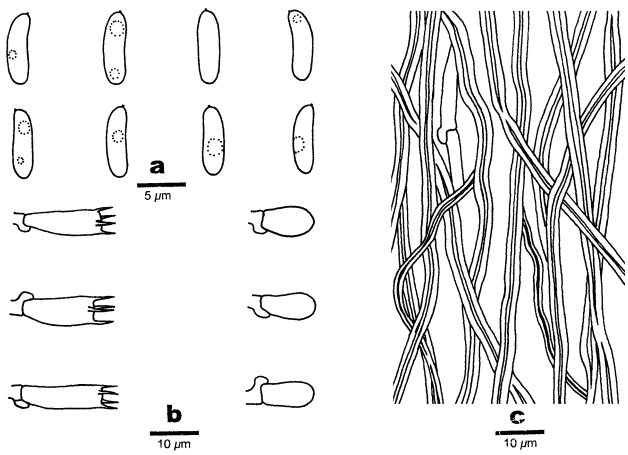

Fig. 185 Microscopic structures of *Microporus subaffinis* (drawn from *Dai 11708*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 µm; **b–c** = 10 µm

Tubes. — Generative hyphae frequent, hyaline, thin-walled, unbranched, 2–3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, occasionally branched, interwoven, 3–5 µm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, 1–3 µm in diam. Cystidia and cystidioles absent. Coralloid dichophytic elements present along the dissepiments, arboriform branched, sometimes crystallized. Basidia clavate, with four sterigmata and a basal clamp connection, 10–13 × 4.5–6 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, slightly curved, hyaline, thin-walled, smooth, IKI–, CB–, (5.5–)6–7.5(–8) × (1.8–)2–2.5(–2.8) µm, L = 6.9 µm, W = 2.3 µm, Q = 3 (n = 30/1).

Notes. — *Microporus subaffinis* is characterized by pileate to laterally stipitate basidiocarps with glabrous, concentrically zonate pileal surface, sharp and undulant margin. This species may be confused with *M. affinis*, but the latter species have flat and thicker basidiocarps, smaller pores (8–10 per mm) and smaller basidiospores (3.5–4.5 × 1.8–2 µm).

Specimens examined: **CHINA**. **Guangdong**, Shixing County, Chebaling Nature Reserve, on fallen trunk of *Quercus*, 13 September 2009, *Cui 7400, 7428* (BJFC). **Hainan**, Baoting County, Qixianling Forest Park, on fallen angiosperm trunk, 27 November 2007, *Cui 5492* (BJFC).

Microporus vernicipes (Berk.) Kuntze, *Revis. gen. pl.* 3(2): 497 (1898) (Figs. 186, 187).
MycoBank: MB 301161

Basionym: *Polyporus vernicipes* Berk., *J. Linn. Soc., Bot.* 16(no. 89): 50 (1878).

Fruiting body. — Basidiocarps annual, laterally stipitate, solitary or in groups, hard leathery or hard corky upon drying. Pilei flabelliform, spathulate to semicircular, projecting up to 5 cm, 4 cm broad and 4 mm thick at base. Pileal surface grayish, yellowish brown to dark brown, glabrous,

Fig. 186 Basidiocarps of *Microporus vernicipes*

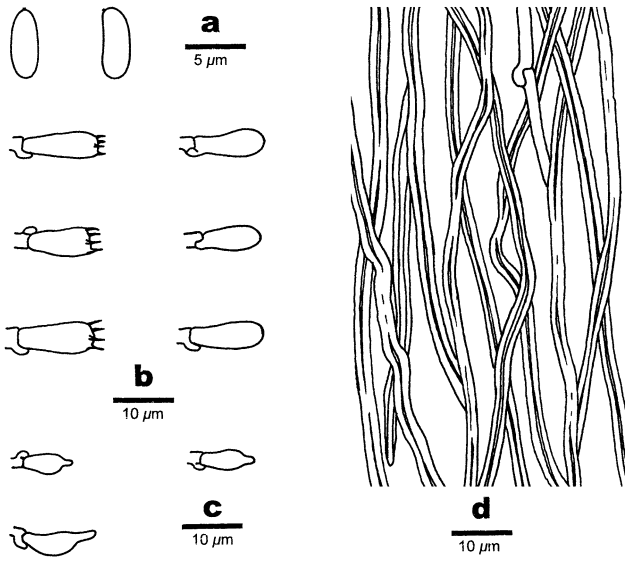

Fig. 187 Microscopic structures of *Microporus vernicipes* (drawn from *Dai 7252*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

concentrically zonate and radially striated; margin sharp, undulant. Pore surface cream when fresh, cream buff to ochraceous upon drying; pores angular, 7–10 per mm; dissepiments thin, entire. Sterile margin distinct, up to 2 mm wide. Context cream buff to pinkish buff upon drying, up to 3 mm thick. Tubes concolorous with the pore surface, up to 1 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae hyaline, thin-walled, unbranched, 2.5–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, occasionally branched, strongly interwoven, 3–6 μm in diam; binding hyphae hyaline, thick-walled to subsolid, arboriform branched, 1.5–3 μm in diam.

Tubes. — Generative hyphae frequent, hyaline, thin-walled, unbranched, 2–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, occasionally branched, interwoven, 2–4.5 μm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, 1–3 μm in diam. Cystidia absent; cystidioles present, subulate, thin-walled, smooth. Coralloid dichophytic elements present along the dissepiments, arboriform branched, sometimes crystallized. Basidia clavate, with four sterigmata and a basal clamp connection, 7–10 × 4–6 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, slightly curved, hyaline, thin-walled, smooth, IKI–, CB–, (4.5–)5–7(–7.8) × (1.6–)2–2.5(–3.2) μm, L = 6.1 μm, W = 2.3 μm, Q = 2.7 (n = 30/1).

Notes. — *Microporus vernicipes* is usually easy to recognize by the semicircular to spathulate brown basidiocarps with a lateral stipe and a distinct light mycelial pad at the base of pilei (Núñez and Ryvarden 2001).

Specimens examined: **CHINA**. **Fujian**, Wuyishan County, Wuyishan Forest Park, on fallen angiosperm trunk, 19 October 2005, *Dai 7252* (BJFC). **Hainan**, Ledong County, Jianfengling Nature Reserve, on fallen angiosperm branch, 18 November 2007, *Dai 9283* (BJFC).

Microporus xanthopus (Fr.) Kuntze, *Revis. gen. pl.* 3(2): 494 (1898) (Figs. 188, 189).
MycoBank: MB 456171
Basionym: *Polyporus xanthopus* Fr., *Observ. mycol.* 2: 255 (1818).

Fruiting body. —Basidiocarps annual, centrally stipitate, solitary or in groups, leathery when fresh, hard leathery or hard corky upon drying. Pilei circular, infundibuliform, projecting up to 10 cm in diam and 5 mm

Fig. 188 Basidiocarps of *Microporus xanthopus*

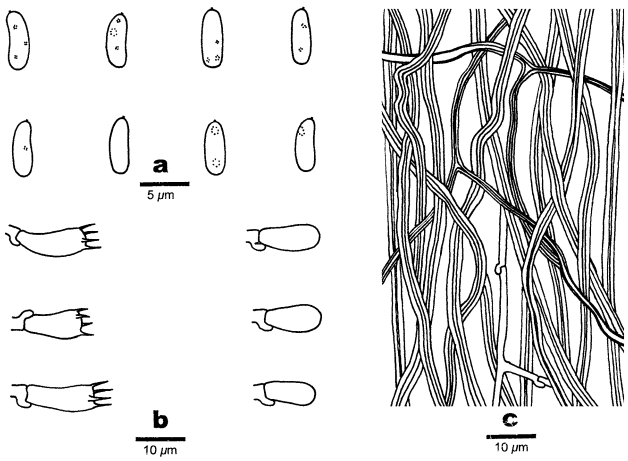

Fig. 189 Microscopic structures of *Microporus xanthopus* (drawn from *Dai 12333*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 μm; **b–c** = 10 μm

thick at base. Pileal surface ochraceous brown to pale reddish brown, glabrous, concentrically zonate; margin sharp, cream to buff, undulant. Pore surface white to cream when fresh, cream buff to ochraceous upon drying; pores angular, 8–10 per mm; dissepiments thin, entire. Sterile margin distinct, up to 1 mm wide. Context cream buff upon drying, hard corky, up to 3 mm thick. Tubes concolorous with the pore surface, hard corky, up to 2 mm long. Stipe light brownish yellow, smooth, up to 2 cm long, up to 2.5 mm in diam.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae hyaline, thin-walled, unbranched, 1.5–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, occasionally branched, strongly interwoven, 2–5 μm in diam; binding hyphae hyaline, thick-walled to subsolid, arboriform branched, 1–3 μm in diam.

Tubes. — Generative hyphae frequent, hyaline, thin-walled, unbranched, 2–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, occasionally branched, interwoven, 2.5–4 μm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, 1–3 μm in diam. Cystidia and cystidioles absent. Coralloid dichophytic elements present along the dissepiments, arboriform branched, sometimes crystallized. Basidia clavate, with four sterigmata and a basal clamp connection, 7–14 × 4–6 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores allantoid to cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (4.5–)5–6(–6.5) × (1.6–)2–2.5(–2.8) μm, L = 5.6 μm, W = 2.3 μm, Q = 2.5 (n = 30/1).

Notes. — *Microporus xanthopus* is easy to recognize in field by the infundibuliform and centrally stipitate basidiocarps with a glossy and strongly zonate pilei, glabrous stipe and very minute pores.

Specimens examined: **CHINA**. **Guangdong**, Shixing County, Chebaling Nature Reserve, on fallen angiosperm trunk, 24 June 2010, *Cui 8781* (BJFC). **Hainan**, Baoting County, Qixianling Forest Park, on fallen angiosperm trunk, 9. September 2012, *Cui 10933* (BJFC). **Yunnan**, Jinghong, Mangao Nature Reserve, on fallen angiosperm trunk, 8 June 2011, *Dai 12333* (BJFC). **Zhejiang**, Lin'an County, Tianmushan Nature Reserve, on fallen angiosperm trunk, 12 October 2005, *Cui 2736* (BJFC).

Murinicarpus B.K. Cui & Y.C. Dai, **gen. nov.**
MycoBank: MB 825661

Differs from other genera by stipitate basidiocarps with grayish pilei, dextrinoid and cyanophilous skeletal hyphae, presence of thick-walled cystidia, and hyaline, thick-walled, ellipsoid, non-truncate and cyanophilous basidiospores.

Etymology. — *Murinicarpus* (Lat.): referring to the grayish pilei.

Type species: *Murinicarpus subadustus* (Z.S. Bi & G.Y. Zheng) B.K. Cui & Y.C. Dai.

Basidiocarps annual, pileate, with a distinct lateral or central stipe, solitary. Pilei circular; margin undulating, blunt, more or less reflexed when dry. Pileal surface grayish to grayish brown, smooth. Pore surface ochraceous when dry. Context cream to ochraceous, soft corky. Tubes cream to pale straw color, corky. Stipe bearing a grayish to blackish cuticle, glabrous, slender, soft corky to corky when fresh, becoming corky to fragile upon drying. Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB+. Cystidia present, thick-walled. Basidiospores ellipsoid, non-truncate, hyaline, thick-walled, smooth, IKI–, CB+.

Murinicarpus subadustus (Z.S. Bi & G.Y. Zheng) B.K. Cui & Y.C. Dai, **comb. nov.** (Figs. 190, 191).
MycoBank: MB 825662
Basionym: *Wrightoporia subadusta* Z.S. Bi & G.Y. Zheng, *Bot. Res.* 7: 76 (1987).
≡ *Perenniporia subadusta* (Z.S. Bi & G.Y. Zheng) Y.C. Dai, *Ann. Bot. Fenn.* 39: 180 (2002).
= *Perenniporia cystidiata* Y.C. Dai, W.N. Chou & Sheng H. Wu, *Mycotaxon* 83: 209 (2002).

Fruiting body. — Basidiocarps annual, with a distinct lateral to central stipe, solitary, soft corky when fresh, hard corky upon drying. Pilei circular, up to 5 cm in diam and 8 mm thick at base. Pileal surface grayish to grayish brown, glabrous; margin undulating, blunt, more or less reflexed when dry. Pore surface grayish white when fresh, ochraceous when dry; pores round to angular, 3–4 per mm;

Fig. 190 A basidiocarp of *Murinicarpus subadustus*

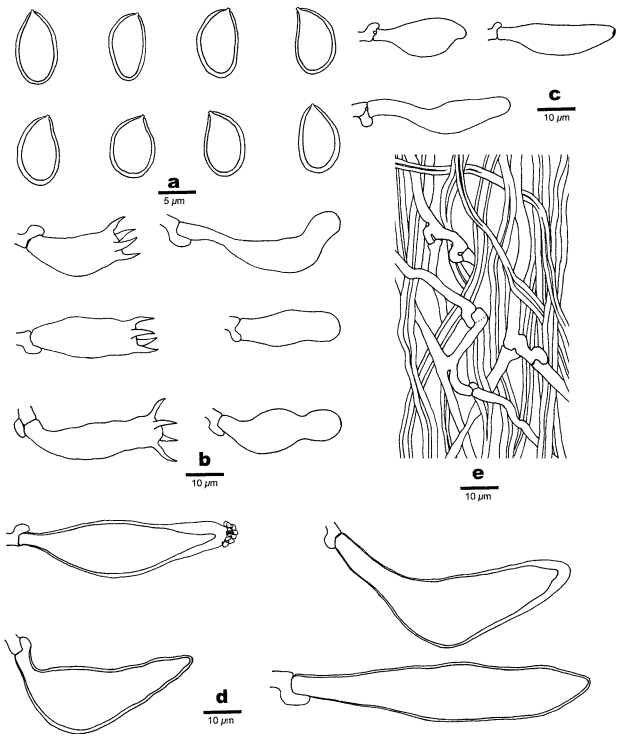

Fig. 191 Microscopic structures of *Murinicarpus subadustus* (drawn from *Cui 8459*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Cystidia; e. Hyphae from trama. Bars: **a** = 5 μm; **b–e** = 10 μm

dissepiments thin, entire to slightly lacerate. Context cream to ochraceous, soft corky, up to 3 mm thick. Tubes cream to pale straw color, corky when dry, up to 5 mm long. Stipe bearing a grayish to blackish cuticle, glabrous, slender, up to 3 cm long, and 5 mm in diam.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, strongly CB+; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, 3–4.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, rarely branched, interwoven, 4.5–6.5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, branched, 2.5–3.8 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, occasionally branched, subparallel along the tubes, 3–4.3 μm in diam. Cystidia present, hyaline, thick-walled, slightly dextrinoid, CB+, usually covered with crystals, 25–40 × 12–18 μm; cystidioles occasionally present, fusiform. Basidia barrel-shaped, with four sterigmata and a basal clamp connection, 15–20 × 6.5–8.5 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, non-truncate, hyaline, thick-walled, smooth, IKI–, CB+, (5.5–)6–8(–8.5) × (4–)4.5–5(–5.5) μm, L = 7.05 μm, W = 4.95 μm, Q = 1.42–1.44 (n = 60/2).

Notes. — Type materials of *Wrightoporia subadusta* and *Perenniporia cystidiata* were studied. Both represent the same species. This species has dimitic hyphal structure with strongly dextrinoid and cyanophilous skeletal hyphae, its basidiospores are hyaline, thick-walled, and distinctly cyanophilous, but negative in Melzer's reagent. These characters match the concept of *Perenniporia*. However, this species has stipe and cystidia, which are different from other species of *Perenniporia*. Moreover, *Murinicarpus subadustus* is distant from the *Perenniporia* sensu stricto clade in the phylogenetic analysis. Therefore, the new genus is set up and the new combination is proposed. *Perenniporia stipitata* Ryvarden and *M. subadusta* share similar character by having lateral stipe basidiocarps, but *P. stipitata* has smaller pores (8–10 per mm) and smaller basidiospores (5–6 × 3–4 μm, Dai et al. 2002).

Specimens examined: **CHINA**. **Guangdong**, Dapu County, Fengxi Forest Farm, 29 June 1987, *Zheng 11271* (holotype, HMGD). **Hainan**, Ledong County, Jianfengling Nature Reserve, 12 December 2008, *Dai 10661* (BJFC). **Taiwan**, Nantou County, Lianhuachi, 5 July 1995, *Chou 1011* (IFP). **Yunnan**, Mengla County, Lvshilin Park, 1 November 2009, *Cui 8459* (BJFC).

Neodatronia B.K. Cui, Hai J. Li & Y.C. Dai, *Persoonia* 32: 177 (2014).
MycoBank: MB 804548
Type species: *Neodatronia sinensis* B.K. Cui, Hai J. Li & Y.C. Dai.

Basidiocarps annual, resupinate. Pore surface white, cream to pale brown; pores moderate to small, round to angular. Subiculum yellowish brown to cinnamon, corky. Tubes fragile when dry. Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae usually dominating, pale brown to brown, IKI−, CB+; tissues darkening in KOH. Dendrohyphidia present in the hymenium and dissepimental edges; cystidia absent; cystidioles usually present. Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–.

Neodatronia was newly set up by Li et al. (2014a). It differs from *Datronia s. s.* by producing distinct resupinate basidiocarps, moderately to frequently branched skeletal hyphae in subiculum (Li et al. 2014a).

Key to species of *Neodatronia* in China
1 Basidiospores 2–2.6 μm wide..... ……*N. sinensis*
1 Basidiospores 3–3.8 μm wide.....……*N. gaoligongensis*

Neodatronia gaoligongensis B.K. Cui, Hai J. Li &Y.C. Dai, *Persoonia* 32: 177 (2014) (Figs. 192, 193).
MycoBank: MB 804549

Fig. 192 Basidiocarps of *Neodatronia gaoligongensis*

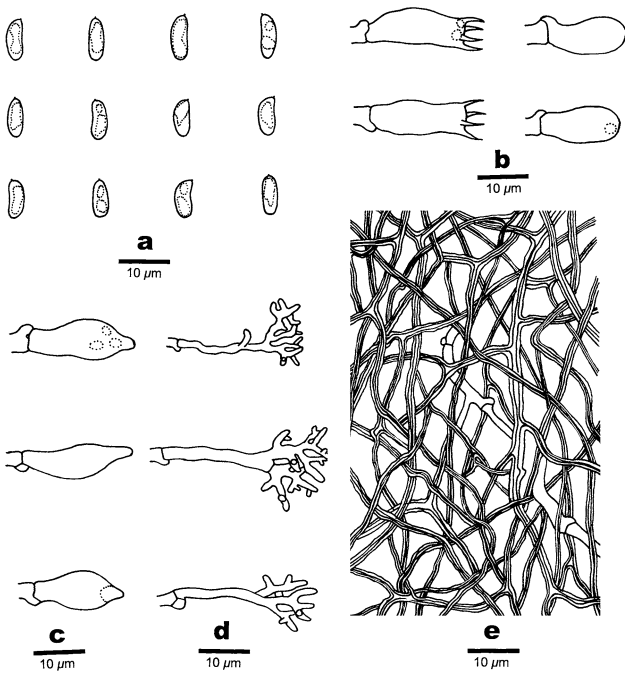

Fig. 193 Microscopic structures of *Neodatronia gaoligongensis* (drawn from *Cui 8055*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Dendrohyphidia; **e**. Hyphae from trama. Bars: **a–e** = 10 μm

Fruiting body. — Basidiocarps annual, resupinate, corky, without odor or taste when fresh, becoming hard corky upon drying, up to 17 cm long, 3 cm wide and 0.4 mm thick at center. Pore surface cream to pale gray; pores angular, shallow, 5–8 per mm; dissepiments thin, usually entire to lacerate. Sterile margin indistinct. Subiculum yellowish brown, hard corky, up to 0.2 mm thick. Tubes concolorous with pore surface, fragile, up to 0.2 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae IKI–, CB+; tissues in subiculum darkening in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.8–2.8 μm in diam; skeletal hyphae dominant, yellowish-brown, thick-walled with a wide to narrow lumen, interwoven, moderately to frequently branched, straight to flexuous, with an unbranched, little differentiated, thick-walled basal stalk, 3–5 μm wide, up to 180 μm long, the branches 1.8–3.4 μm wide, 80–320 μm long.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.5–2.5 μm in diam; skeletal hyphae dominant, pale yellowish-brown, thick-walled with a narrow lumen, interwoven, frequently branched, straight to flexuous, then occasionally with lateral aborted processes, 3–4 μm wide in the main part, up to 50 μm long, branches well differentiated from the main part, 1.4–2 μm wide, 50–200 μm long. Dendrohyphidia abundant in the hymenium and dissepimental edges. Cystidia absent; cystidioles present, fusoid, thin-walled, smooth, 16–25 × 5–7 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 17–21 × 6.5–9 μm; basidioles in shape similar to basidia, but smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, with one to two large guttules, IKI–, CB–, (6.8–)7–9.8(–10.2) × (–2.7)3–3.8(–4) μm, L = 8.1 μm, W = 3.2 μm, Q = 2.31–2.74 (n = 90/3).

Notes. — *Neodatronia gaoligongensis* is characterized by its cream to pale gray pore surface, small pores (5–8 per mm), and the presence of dendrohyphidia in the hymenium and dissepimental edges (Li et al. 2014a). *Neodatronia gaoligongensis* is similar to *N. sinensis* by having resupinate basidiocarps, but the latter species has larger pores (4–6 per mm), and narrower basidiospores (6.8–8 × 2–2.6 μm).

Specimen examined: **CHINA. Yunnan**, Baoshan, Gaoligong Nature Reserve, on fallen angiosperm branch, 24 October 2009, *Cui 8055* (holotype, BJFC); 25 October 2009, *Cui 8132, 8186* (paratypes, BJFC).

Neodatronia sinensis B.K. Cui, Hai J. Li &Y.C. Dai, *Persoonia* 32: 178 (2014) (Figs. 194, 195).
MycoBank: MB 804550

Fruiting body. — Basidiocarps annual, resupinate, corky, without odor or taste when fresh, becoming hard corky upon drying, up to 20 cm long, 7 cm wide and 1 mm thick at center. Pore surface cream to buff to pale gray; pores angular, shallow, 4–6 per mm; dissepiments thin, usually entire, and lacerate on sloping parts. Sterile margin distinct, pale yellowish brown to cinnamon, up to 1 mm wide. Subiculum yellowish brown to cinnamon, hard

Fig. 194 Basidiocarps of *Neodatronia sinensis*

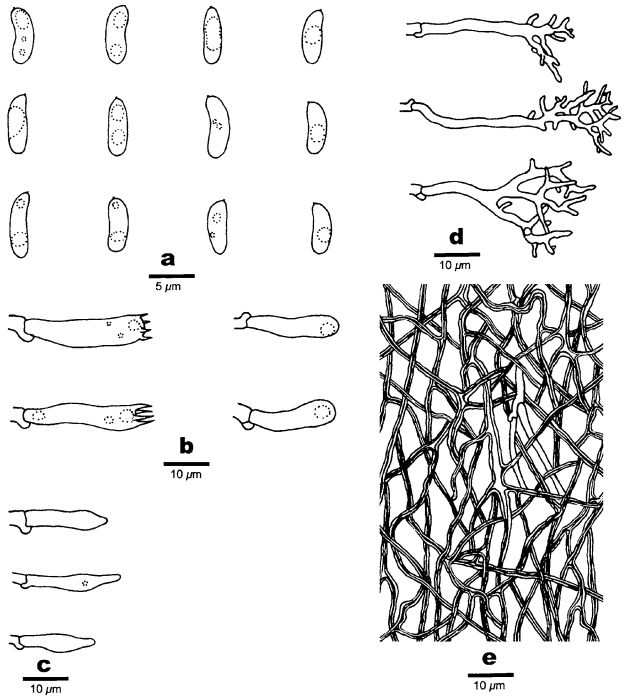

Fig. 195 Microscopic structures of *Neodatronia sinensis* (drawn from *Dai 11921*). **a**. Basidiospores; **b**. Basidia and basidioles; c. Cystidioles; d. Dendrohyphidia; e. Hyphae from trama. Bars: **a** = 5 μm; **b–e** = 10 μm

corky, up to 0.8 mm thick. Tubes concolorous with pore surface, fragile, up to 0.2 mm long.

Hyphal structure. — Hyphal dimitic; generative hyphae bearing clamp connections; skeletal hyphae IKI–, CB+; tissues in subiculum darkening in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3.8 μm in diam; skeletal hyphae dominant, pale brown, thick-walled with a wide to narrow lumen, interwoven, moderately to frequently branched, straight to flexuous, with an unbranched, little differentiated, thick-walled basal stalk, 2.8–5 μm wide, up to 150 μm long, the branches 2–3 μm wide, 60–240 μm long.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.2–2.2 μm in diam; skeletal hyphae dominant, pale brown, thick-walled with a wide to narrow lumen, interwoven, frequently branched, straight to flexuous, then occasionally with lateral aborted processes, 2.8–4 μm wide in the main part, up to 30 μm long, branches well differentiated from the main part, 1.3–2.6 μm wide, 15–220 μm long. Dendrohyphidia abundant in the hymenium and dissepimental edges. Cystidia absent; cystidioles present, fusoid, thin-walled, smooth, 12–18 × 3.5–5 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 18–24 × 4.5–6.5 μm; basidioles in shape similar to basidia, but smaller.

Spores. — Basidiospores cylindrical, usually slightly curved, hyaline, thin-walled, smooth, with one to three small to large guttules, IKI–, CB–, (6.2–)6.8–8(–8.8) × 2–2.6(–2.7) μm, L = 7.29 μm, W = 2.28 μm, Q = 3.06–3.35 (n = 60/2).

Notes. — *Datronia stereoides* resembles *Neodatronia sinensis* by having similar pores (4–5 per mm), cystidioles and dendrohyphidia in the hymenium, but the former species has distinct larger basidiospores (8–12 × 3.5–4.5 μm, Núñez and Ryvarden 2001).

Specimens examined: **CHINA**. **Anhui**, Huangshan, Yellow Mountain, on dead tree of *Cyclobalanopsis*, 22 October 2010, *Dai 11921* (holotype, BJFC). **Fujian**, Wuyishan County, Wuyishan Nature Reserve, on fallen angiosperm branch, 22 October 2005, *Dai 7374* (paratype, BJFC). **Jilin**, Antu County, Changbaishan Nature Reserve, on fallen trunk of *Acer*, 7 August 2011, *Cui 9949* (paratype, BJFC); on fallen angiosperm branch, 8 August 2011, *Cui 9976* (BJFC). **Sichuan**, Baoxing County, Fengtongzhai Nature Reserve, on fallen angiosperm branch, 18 September 2012, *Cui 10758, 10764, 10769* (paratypes, BJFC). **Xizang (Tibet)**, Linzhi County, on fallen angiosperm branch, 18 September 2010, *Cui 9434* (paratype, BJFC). **Yunnan**, Baoshan, Gaoligongshan Nature Reserve, on fallen angiosperm branch, 25 October 2009, *Cui 8181* (paratype, BJFC); 28 October 2012, *Dai 13096* (paratype, BJFC).

Neofavolus Sotome & T. Hatt., *Fungal Diversity* 58(1): 249 (2013).

MycoBank: MB 801926

Type species: *Neofavolus alveolaris* (DC.) Sotome & T. Hatt.

Basidiocarps annual, frequently laterally stipitate and rarely centrally stipitate, occasionally substipitate; soft leathery to leathery when fresh, becoming corky to woody hard when dry. Pilei reniform to semicircular or irregularly

circular, white to cream or reddish-brown, pileal surface covered with brightly colored scales or smooth, azonate. Stipe short, concolorous with pileal surface or lighter. Pores angular, big to small, usually radially elongated. Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae IKI−. Pileal surface with hyaline to brown agglutinated and parallel generative hyphae. Cystidia and cystidioles absent. Basidiospores cylindrical, thin-walled, smooth, hyaline, IKI–, CB–.

Neofavolus is a genus segregated from *Favolus* based on phylogenetic analysis of nLSU and ITS sequences (Sotome et al. 2013), species in *Neofavolus* are mostly known from temperate regions, occasionally from tropical areas (Sotome et al. 2013; Zhou and Cui 2017).

Key to species of *Neofavolus* in China

1 Pileal surface glabrous, pores more than 2 per mm……2
1 Pileal surface fibrillose to squamous, pores 1–2 per mm……*N. alveolaris*
2 Basidiospores 8–10.7 × 3–3.8 µm……*N. cremeoalbidus*
2 Basidiospores 6.3–8.4 × 2.8–3.6 µm…… ……*N. mikawai*

Neofavolus alveolaris (DC.) Sotome & T. Hatt., *Index Fungorum* 313: 1 (2016) (Figs. 196, 197).
MycoBank: MB 551613
Basionym: *Merulius alveolaris* DC., *Fl. franç., Edn 3 (Paris)* 5/6: 43 (1815).

Fruiting body. — Basidiocarps annual, laterally to centrally stipitate, mostly solitary, leathery when fresh, becoming corky upon drying. Pilei fan-shaped, reniform to semicircular, usually circular in centrally stipitate specimens, projecting up to 5 cm, 8.6 wide and 7 mm thick at center. Pileal surface usually fibrillose to squamous with flattened triangular squamules, cream to orange when fresh, buff to reddish-orange when dry, azonate, margin straight when fresh, straight or slightly incurved upon drying. Pore surface cream to buff when fresh, buff to light-brown when dry; pores angular to radially elongated, 1–2 per mm, frequently elongated up to 4 mm long and 2.5 mm wide; dissepiments thin, entire to slightly lacerate. Context white to cream when fresh, buff when dry, up to 3 mm thick. Tubes concolorous with pore surface or slightly paler, decurrent, up to 5 mm long. Stipe concolorous with pileal surface or paler, up to 1 cm long and 8 mm in diam.

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

Context. — Generative hyphae frequent, hyaline, thin-walled, frequently branched, 2.5–5.5 µm in diam; skeletal hyphae dominant, hyaline, slightly thick-walled with a wide lumen in juvenile specimens and thick-walled with a narrow lumen to subsolid when mature, moderately branched, interwoven, 2–6 µm in diam. Hyphae in squamules thin-walled bearing clamp connections, with buff inclusion, 3–7.5 µm in diam.

Fig. 196 Basidiocarps of *Neofavolus alveolaris*

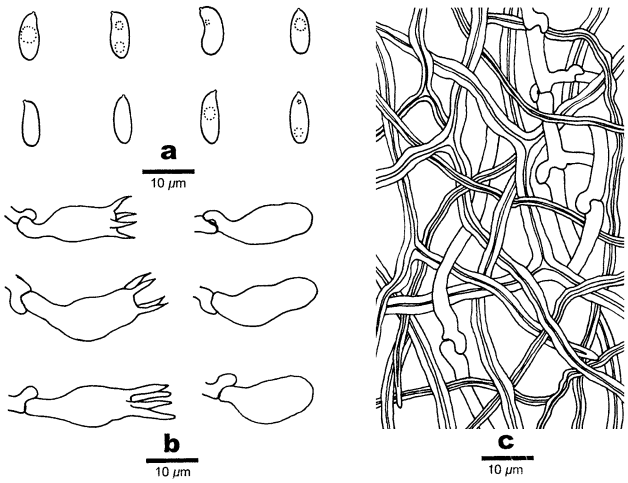

Fig. 197 Microscopic structures of *Neofavolus alveolaris* (drawn from *Cui 11156*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 µm; **b–c** = 10 µm

Tubes. — Generative hyphae frequent, hyaline, thin-walled, frequently branched, 2–4.3 µm in diam; skeletal hyphae dominant, hyaline, slightly thick-walled with a wide lumen in juvenile specimens and thick-walled with a narrow lumen to subsolid when mature, moderately branched, interwoven, 2–5.5 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 16.5–32.3 × 6.5–8.5 µm; basidioles in shape similar to basidia, but slightly smaller.

Stipe. — Generative hyphae frequent, hyaline, thin-walled, frequently branched, 2–5.5 µm in diam; skeletal hyphae dominant, hyaline, slightly thick-walled with a wide lumen in juvenile specimens and thick-walled with a narrow lumen to subsolid when mature, moderately branched, interwoven, 1.5–6.6 µm in diam.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (7–)8–11.8(–13.5) × (2.6–)2.8–3.8(–4) µm, L = 9.51 µm, W = 3.26 µm, Q = 2.09–3.75 (n = 206/6).

Notes. — *Neofavolus alveolaris* has variable size of basidiospores and variable color of pileal surface in different specimens. Its fibrillose to squamous basidiocarps is different from other *Neofavolus* species.

Specimens examined: **CHINA. Hainan**, Ledong County, Jianfengling Forest Park, on fallen angiosperm branch, 4 September 2006, *Dai 7946* (IFP). **Henan**, Neixiang County, Baotianman Nature Reserve, on fallen branch of *Carpinus*, 22 September 2009, *Dai 11290* (BJFC); Xinyang, Jigongshan Nature Reserve, on fallen branch of *Quercus*, 27 October 2009, *Cui 12350* (BJFC). **Heilongjiang**, Yichun, Wuying, Fenglin Nature Reserve, on fallen branch of *Betula*, 2 August 2011, *Cui 9858, 9882, 9898* (BJFC). **Hunan**, Liuyang County, Daweishan Forest Park, on fallen branch of *Pinus*, 22 December 2000, *Dai 3266* (IFP). **Jiangsu**, Najing, Zijin Mountain, on fallen angiosperm branch, 11 October 2003, *Dai 5288* (BJFC). **Jilin**, Huinan County, Hongqi Forest Farm, on fallen angiosperm branch, 13 July 1993, *Dai 479, 504* (IFP). **Liaoning**, Anshan, Qianshan Mountain, on fallen branch of *Tilia*, 12 August 2009, *Dai 813* (IFP); Kuandian County, Baishilazi Nature Reserve, on fallen branch of *Betula*, 29 June 2004, *Wei 1308* (IFP). **Qinghai**, Huzhu County, Beishan Forest Farm, on fallen branch of *Populus*, 1 September 2003, *Dai 5044* (IFP). **Shaanxi**, Mei County, Taibai Mountain, Honghegu Forest Park, on fallen angiosperm branch, 9 September 2013, *Cui 11156* (BJFC). **Xizang (Tibet)**, Bomi County, Tongmai, 22 September 2014, *Cui 12256* (BJFC).

Neofavolus cremeoalbidus Sotome & T. Hatt. *Fungal Diversity* 58: 250 (2013) (Figs. 198, 199).
MycoBank: MB 801927

Fruiting body. — Basidiocarps annual, laterally stipitate, solitary or scattered, fleshy to leathery when fresh, becoming woody hard to brittle when dry. Pilei reniform to dimidiate, projecting up to 2 cm, 5 cm wide and 3 mm thick. Pileal surface white, cream to grayish beige when fresh, white, ivory to grayish beige upon drying, glabrous, sometimes radially striate, zonate or azonate; margin sharp, straight when fresh, usually incurved upon drying. Pore surface white to cream when fresh, buff to pinkish buff when dry; pores angular, 2–4 per mm; dissepiments thin, entire to lacerate. Context white, fleshy to leathery when fresh, woody hard to brittle when dry, up to 1 mm thick. Tubes concolorous with pore surface, decurrent, less than 2.5 mm thick. Stipe short, cylindrical, black to blackish red at base, glabrous, up to 4 mm long and 5 mm in diam.

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

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2.4–5.2 µm in diam; skeletal

Fig. 198 Basidiocarps of *Neofavolus cremeoalbidus*

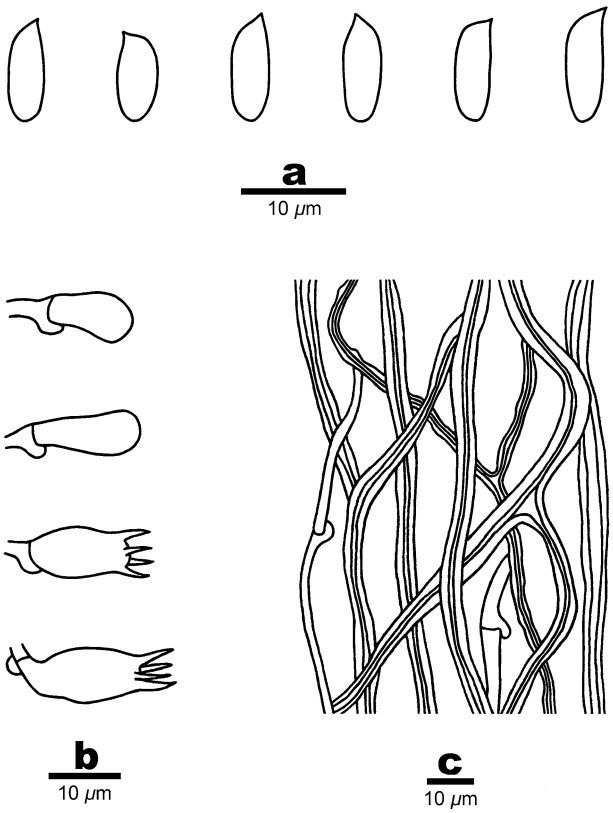

Fig. 199 Microscopic structures of *Neofavolus cremeoalbidus* (drawn from *Cui 12408*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a–c** = 10 µm

hyphae dominant, hyaline, thick-walled with a wide to narrow lumen or subsolid, occasionally septate, moderately branched, interwoven, 1.5–8.2 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, infrequently branched, 2.6–4.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen or subsolid, occasionally septate, frequently with arboriform branches, moderately interwoven, 1.8–4.5 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 11.7–21.8 × 5.8–7.9 µm; basidioles in shape similar to basidia, but slightly smaller.

Stipe. — Generative hyphae infrequent, hyaline, thin-walled, infrequently branched, 2.5–5.5 µm in diam; skeletal hyphae hyaline, thick-walled with a wide lumen, infrequently branched, moderately interwoven, 2.2–5.9 µm in diam. Hyphae in cuticle thick-walled with a wide lumen, with light brown to brown inclusion, 1.9–3.4 µm diam.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, usually bearing one or more guttules, IKI–, CB–, (7–)8–10.7(−11) × (2.9–)3–3.8(−3.9) µm, L = 9.16 µm, W = 3.37 µm, Q = 2.12–3.3 (n = 102/2).

Notes. — *Neofavolus cremeoalbidus* was originally described from Japan (Sotome et al. 2013), it is characterized by its light colored pilei, laterally blackish stipe, medium angular pores (2–4 per mm), uninflated hyphae and medium to large cylindrical basidiospores (8–10.7 × 3–3.8 µm). *Neofavolus cremeoalbidus* is phylogenetically clustered with *N. alveolaris*. Morphologically, both *N. alveolaris* and *N. cremeoalbidus* have light colored pilei and pore surface, but *N. alveolaris* can be distinguished from *N. cremeoalbidus* by its light colored stipe and much larger pores (1–2 per mm).

Specimens examined: **CHINA. Zhejiang**, Qingyuan County, Baishanzu Nature Reserve, on fallen angiosperm branch, 12 August 2015, *Cui 12408*, *12412* (BJFC).

Neofavolus mikawai (Lloyd) Sotome & T. Hatt., *Fungal Diversity* 58(1): 251 (2013) (Figs. 200, 201).
MycoBank: MB 801929
Basionym: ***Polyporus mikawai*** Lloyd, *Mycol. Writ.* 4(Letter 54): 5 (1915).

Fruiting body. — Basidiocarps annual, laterally stipitate or with a short base, solitary to scattered, fleshy when fresh, corky upon drying. Pilei reniform, fan-shaped to semicircular, occasionally concave towards the stipe, projecting up to 6 cm, 8 cm wide and 5 mm thick at center. Pileal surface cream to beige when fresh, buff to umber when dry, glabrous, azonate, frequently with radial stripes; margin straight when fresh, incurved or not upon drying. Pore surface cream when fresh, buff to tan upon drying; pores angular, decurrent on one side of the stipe, 3–5 per mm; dissepiments thin, entire to slightly lacerate. Context white when fresh, buff upon drying, corky, up to 3 mm thick. Tubes concolorous with pore surface, corky, up to 2 mm long. Stipe concolorous with pileal surface, less than 1 cm long and 8 mm in diam.

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

Context. — Generative hyphae infrequent, hyaline, thin-walled, infrequently branched, 2–3.5 µm in diam; skeletal hyphae dominant, thick-walled with a narrow lumen to subsolid, moderately branched, strongly interwoven, 1.5–5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3.5 µm in diam; skeletal hyphae dominant, thick-walled with a narrow lumen to subsolid, moderately branched, strongly interwoven, 2–6 µm in diam. Cystidia and cystidioles absent. Basidia

Fig. 200 Basidiocarps of *Neofavolus mikawai*

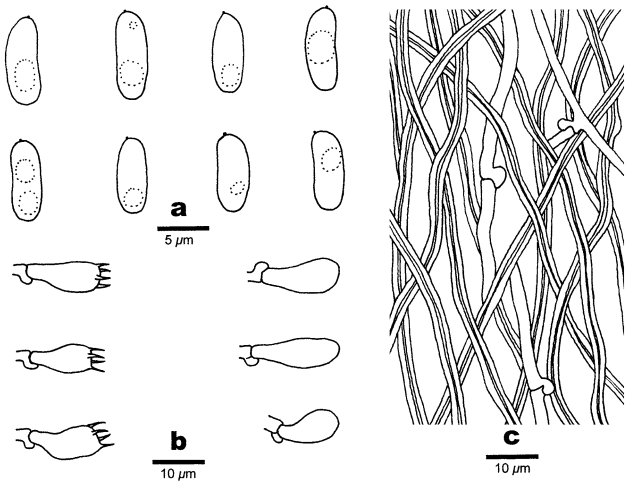

Fig. 201 Microscopic structures of *Neofavolus mikawai* (drawn from *Dai 12361*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 µm; **b–c** = 10 µm

clavate, with four sterigmata and a basal clamp connection, 16–24 × 5.5–8.5 µm; basidioles in shape similar to basidia, but slightly smaller.

Stipe. — Generative hyphae infrequent, hyaline, thin-walled, infrequently branched, 2–4 µm in diam; skeletal hyphae dominant, thick-walled with a narrow lumen to subsolid, moderately branched, strongly interwoven, 1.5–5 µm in diam.

Spores. — Basidiospores oblong to cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (6–)6.3–8.4(–8.5) × (2.5–)2.8–3.6 µm, L = 7.4 µm, W = 3.14 µm, Q = 2.03–2.77 (n = 138/4).

Notes. — *Neofavolus mikawai* has smaller pores and basidiospores among species in the genus. The type specimen of *N. mikawai* was once treated as an immature specimen of *P. varius* (Ryvarden 1990), and then it was put into group *Melanopus* with *P. varius* for the incorrect identification (Núñez and Ryvarden 1995). Indeed, *P. varius* has black stipe, smaller pores (5–9 per mm) and slightly larger basidiospores (Núñez and Ryvarden 1995).

Specimens examined: **CHINA. Fujian**, Xiamen, Xiamen Botanic Garden, on fallen angiosperm trunk, 23 August 2006, *Cui 4032* (IFP). **Guangdong**, Zhaoqing, Dinghushan Nature Reserve, on fallen angiosperm branch, 30 June 2010, *Cui 8945* (BJFC). **Guangxi**, Xing'an County, Maoershan Nature Reserve, on fallen angiosperm trunk, 19 August 2011, *Yuan 5680* (IFP). **Guizhou**, Suiyang County, Kuankuoshui Nature Reserve, on fallen angiosperm branch, 17 June 2000, *Dai 3209* (IFP). **Hainan**, Changjiang County, Bawangling Nature Reserve, on fallen branch of *Castanopsis*, 8 May 2009, *Cui 6359* (BJFC). **Shanxi**, Qinshui County, Lishan Nature Reserve, on fallen branch of *Quercus*, 21 October 2004, *Yuan 1141* (IFP). **Yunnan**, Nanhua County, Dazhongshan Nature Reserve, on fallen angiosperm branch, 15 July 2013, *Cui 11138, 11152* (BJFC); Pu'er, Taiyanghe Forest Park, on fallen angiosperm branch, 9 June 2011, *Dai 12353, 12361* (BJFC).

Neofomitella Y.C. Dai, Hai J. Li & Vlasák, *Mycotaxon* 129(1): 12 (2014).
MycoBank: MB 804799
Type species: *Polyporus rhodophaeus* Lév.

Basidiocarps annual or perennial, pileate or effused-reflexed. Pileal surface yellowish-brown, brown, orange-brown, reddish-brown, fuscous to almost black, usually concentrically zonate or sulcate, glabrous to velutinate. Context buff, yellowish brown, brown to pale gray, corky to hard corky, with a dark agglutinated crust developing from base to margin. Pore surface usually white, cream to pale buff when fresh, pale brown to yellowish-brown when dry. Hyphal system trimitic with clamped generative hyphae; skeletal and binding hyphae well differentiated, IKI–. Cystidia absent. Basidiospores oblong-ellipsoid to cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, tissues darkening in KOH.

Neofomitella was recently set up by Li et al. (2014b). It differs from *Fomitella* Murrill by its distinctly crusted basidiocarps with the cuticle developing from base to margin; and differs from *Microporus* by its buff, yellowish brown, brown to pale gray context. Morphologically, *Coriolopsis* shares many features with *Fomitella* and *Neofomitella*, such as a more or less brown context, a trimitic hyphal system with clamped generative hyphae, hyaline basidiospores, and causing a white rot (Gilbertson and Ryvarden 1986; Núñez and Ryvarden 2001; Hattori 2005). However, phylogenetic analysis shows *Coriolopsis* is polyphyletic, and its type species, *Polyporus occidentalis* Klotzsch clusters within the *Trametes* clade and distinctly separated from *Fomitella* and *Neofomitella* (Li et al. 2014b).

Key to species of *Neofomitella* in China

1 Pores 3–4 per mm ..... ……*N. polyzonata*
1 Pores 6–10 per mm .....……*N. fumosipora*

Neofomitella fumosipora (Corner) Y.C. Dai, Hai J. Li & Vlasák, *Mycotaxon* 129(1): 12 (2014) (Figs. 202, 203)
MycoBank: MB 804803
Basionym: *Trametes fumosipora* Corner, *Beih. Nova Hedwigia* 97: 106 (1989).
≡ *Fomitella fumosipora* (Corner) T. Hatt., *Mycoscience* 46: 309 (2005).

Fruiting body. — Basidiocarps annual, pileate to effused-reflexed, solitary to imbricate and often laterally fused to form larger compounds, without odor or taste when fresh, hard and slightly light in weight when dry. Pilei semicircular to flabelliform, projecting up to 7 cm, 8 cm wide and 8 mm thick at base. Pileal surface first pale bluish-gray or pale gray to pinkish-buff, then turning to orange-brown to dark reddish-brown or black with age, glabrous, a cuticle present, distinctly concentrically zonate and slightly sulcate; margin cream to pale buff-yellow and turning to grayish-brown with age, thick and obtuse. Pore surface cream to pale buff and turning to grayish-brown with age or bruised; pores round to angular, 6–10 per mm; dissepiments thin to thick, entire. Context duplex, upper part cream to pale gray, rigid, up to 4 mm thick, lower part pale yellowish-brown to brown, rigid, up to 2 mm thick. Tubes concolorous with pore surface, or slightly darker, rigid, up to 2 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues turning to olive to deep olive in KOH.

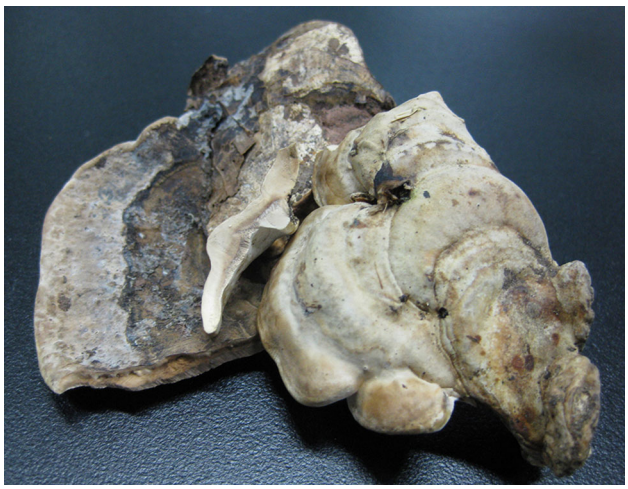

Fig. 202 Basidiocarps of *Neofomitella fumosipora*

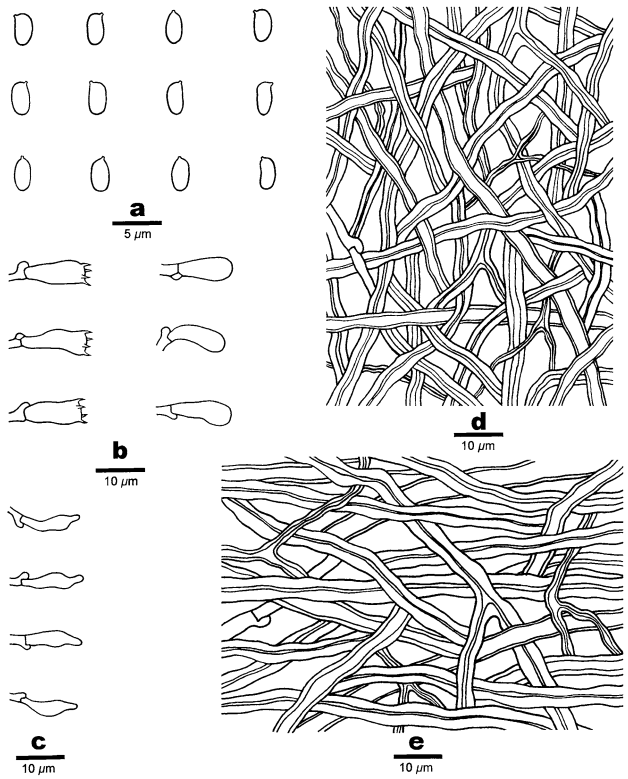

Fig. 203 Microscopic structures of *Neofomitella fumosipora* (drawn from *Cui 8757*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **e**. Hyphae from context. Bars: **a** = 5 μm; b–e = 10 μm

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2.5–3.5 μm in diam; skeletal hyphae dominant, pale buff to pale yellowish-brown, thick-walled to subsolid, occasionally branched, more or less regularly arranged to loosely interwoven, 3.7–6 μm in diam; binding hyphae pale buff to pale yellowish-brown, thick-walled to almost solid, frequently branched, interwoven, 2–3.2 μm.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.7–2.8 μm in diam; skeletal hyphae dominant, pale buff to pale yellowish-brown, thick-walled to subsolid, occasionally branched, interwoven, 2.5–4 μm; binding hyphae pale buff to pale yellowish-brown, flexuous, thick-walled to almost solid, frequently branched, 1.2–2.3 μm. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 8–23 × 3–4 μm. Rhombic, cubic to hexagonal crystals abundant in the hymenium and trama. Basidia clavate, with four sterigmata and a basal clamp connection, 9.5–18 × 3.5–5 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical to oblong-ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, (2.8–)3–4(–4.3) × (1.6–)1.7–2.2(–2.3) μm, L = 3.52 μm, W = 1.97 μm, Q = 1.73–1.87 (n = 180/6).

Notes. — *Neofomitella fumosipora* is unique in the genus by its glabrous, cuticle covered pilei, duplex context, small pores (6–10 per mm) and basidiospores 3–4 × 1.7–2.2 μm (Li et al. 2014b). *Neofomitella rhodophaea* (Lév.) Y.C. Dai, Hai J. Li & Vlasák shares similar pores (7–8 per mm) and slightly larger basidiospores (3.5–4.5 × 2.3 μm, Ryvarden and Johansen 1980), but it is distinguished from *N. fumosipora* by having homogenous context, usually larger basidiocarps, and paler pilei and tubes (Ryvarden and Johansen 1980).

Specimens examined: **CHINA**. **Hainan**, Changjiang County, Bawangling Nature Reserve, on fallen trunk of *Cratoxylum cochinchinense*, 26 November 2010, *Dai 12089* (BJFC). **Yunnan**, Mengla County, Lvshilin Park, on fallen angiosperm trunk, 1 November 2009, *Cui 8396* (BJFC). **Guangdong**, Shixing County, Chebaling Nature Reserve, on fallen angiosperm trunk, 14 September 2009, *Cui 7474* (BJFC); 24 June 2010, *Cui 8757* (BJFC); 25 June 2010, *Cui 8791, 8794, 8813, 8816* (BJFC).

Neofomitella polyzonata Y.C. Dai, Hai J. Li & Vlasák, *Mycotaxon* 129(1): 12 (2014) (Figs. 204, 205)
MycoBank: MB 804804

Fruiting body. — Basidiocarps annual, pileate, usually imbricate, without odor or taste when fresh, hard corky to woody hard and light in weight upon drying. Pilei applanate, semicircular to dimidiate, projecting up to 6 cm, 10 cm wide and 6 mm thick at base. Pileal surface buff-yellow, curry-yellow, cinnamon, orange-brown to reddish brown, with one or more vinaceous brown, dark blue to almost black zones, finely velutinate, concentrically zonate; white to cream outgrowth occasionally spreading from the base with age; margin cream, buff to buff-yellow, usually acute or slightly wavy. Pore surface cream to buff when fresh, buff to yellowish brown when dry or bruised;

Fig. 204 Basidiocarps of *Neofomitella polyzonata*

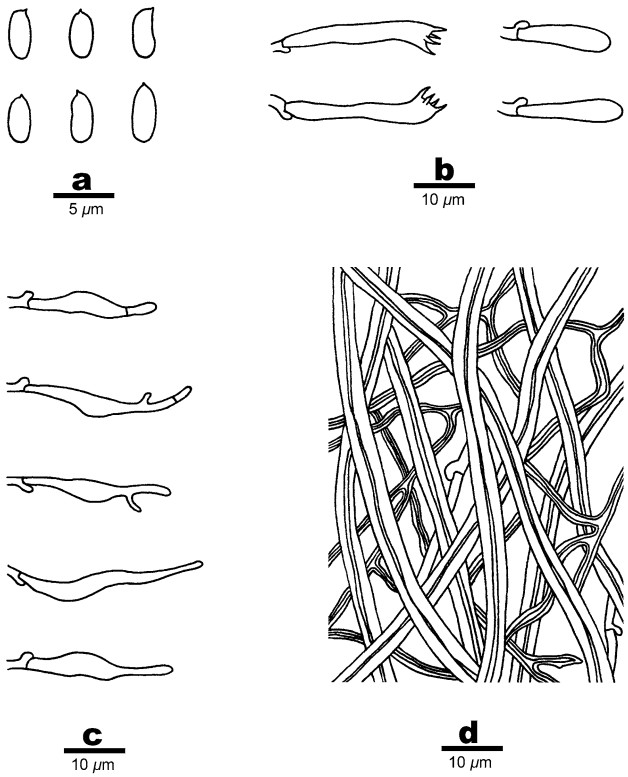

Fig. 205 Microscopic structures of *Neofomitella polyzonata* (drawn from *Dai 10419*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 μm; b–d = 10 μm

pores round, 3–4 per mm; dissepiments thin, entire. Sterile margin indistinct, white to cream, up to 0.5 mm wide. Context buff to yellowish brown, hard corky, azonate, up to 3 mm thick, a more or less dark agglutinated crust present as black zones in context towards upper surface. Tube layer concolorous with pore surface, up to 3 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues darkening in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.5–3 μm in diam; skeletal hyphae dominant, hyaline to pale yellowish brown, thick-walled with a narrow lumen to subsolid, occasionally branched, straight, more or less regularly arranged, 3–5 μm in diam; binding hyphae abundant, hyaline to pale yellowish brown, thick-walled with a narrow lumen to subsolid, flexuous, frequently branched, interwoven, 1–2.5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.2–2 μm in diam; skeletal hyphae dominant, hyaline to pale yellowish brown, thick-walled, occasionally branched, more or less straight, interwoven, 2.4–4 μm in diam; binding hyphae hyaline to pale yellowish brown, thick-walled with a narrow lumen to subsolid, flexuous, frequently branched, interwoven, 1–2 μm in diam. Cystidia absent; cystidioles present, fusoid to tubular with branched and septate tips, hyaline, thin-walled, 22–34 × 2.5–4.5 μm. Basidia clavate, bearing four sterigmata and a basal clamp connection, 18–24 × 3.5–5 μm; basidioles in shape similar to basidia, but distinctly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (3.8–)3.9–5 × (1.8–)1.9–2.1(–2.5) μm, L = 4.34 μm, W = 2.04 μm, Q = 2.13 (n = 9/1).

Notes. — *Neofomitella polyzonata* is characterized by its distinctly velutinate and crusted pileal surface with multiple concentric zones, larger pores and cylindrical basidiospores (Li et al. 2014b).

Specimens examined: **CHINA**. **Fujian**, Wuyishan County, Wuyi Mountains, Longfenggu Forest Park, on fallen angiosperm trunk, 27 August 2006, *Cui 4124* (paratype, BJFC); Wuyishan Nature Reserve, Taoyuanyu, on fallen angiosperm trunk, 24 August 2006, *Dai 7376* (paratype, IFP). **Hunan**, Shimen County, Hupingshan Nature Reserve, on fallen angiosperm trunk, 16 September 2009, *Dai 11360* (paratype, BJFC). **Jiangxi**, Fenyi County, Dagang Mountain, on fallen trunk of *Cyclobalanopsis blakei*, 18 September 2008, *Dai 10419* (holotype, BJFC), *Dai 10420* (paratype, BJFC).

Perenniporia Murrill, *Mycologia* 34: 595 (1942).
MycoBank: MB 18204
Type species: *Perenniporia medulla-panis* (Jacq.) Donk.

Basidiocarps annual to perennial, resupinate to widely effused, occasionally pileate. Pore surface white to cream; pores round to angular. Context white to pale ochraceous, corky. Tubes concolorous with pore surface, corky. Hyphal system dimitic to trimitic; generative hyphae hyaline, thin-

walled, rarely branched, bearing clamp connections, often difficult to observe; skeletal hyphae dominate, hyaline, thick-walled with a wide to narrow lumen to subsolid, non-dextrinoid to strongly dextrinoid, cyanophilous; tissues unchanged in KOH. Cystidia absent, cystidioles variably present. Basidiospores ellipsoid, truncate or not, hyaline, thick-walled, smooth, dextrinoid, CB + .

Perenniporia is a large cosmopolitan genus, about 100 species have been accepted in the genus worldwide (Gilbertson and Ryvarden 1987; Hattori and Lee 1999; Decock and Ryvarden 2000; Decock et al. 2001; Núñez and Ryvarden 2001; Dai et al. 2002; Cui et al. 2007; Xiong et al. 2008; Choeyklin et al. 2009; Dai 2010b; Decock et al. 2011; Ryvarden and Melo 2014; Cui and Zhao 2012; Zhao and Cui 2012a, 2013b, c; Zhao et al. 2013a, 2014b).

Key to species of *Perenniporia* in China

1 Basidiocarps resupinate.....2
1 Basidiocarps pileate.....34
2 Basidiospores truncate.....3
2 Basidiospores non-truncate.....27
3 Dendrohyphidia present at dissepimental edges.....4
3 Dendrohyphidia absent at dissepimental edges.....8
4 Skeletal hyphae non-amyloid.....5
4 Skeletal hyphae amyloid.....7
5 Tissues pale brown to black in KOH.....*P. cinereofusca*
5 Tissues unchanged in KOH.....6
6 Pores 2–3 per mm; basidiospores > 6 µm in length.....*P. macropora*
6 Pores 6–8 per mm; basidiospores < 6 µm in length.....*P. dendrohyphidia*
7 Basidiospores > 4 µm in length.....*P. hainaniana*
7 Basidiospores < 4 µm in length.....*P. substraminea*
8 Skeletal hyphae brownish in KOH.....9
8 Skeletal hyphae hyaline in KOH.....11
9 Skeletal hyphae branched.....*P. subtephropora*
9 Skeletal hyphae unbranched.....10
10 Pores 4–6 per mm; basidiospores ellipsoid.....*P. tephropora*
10 Pores 6–8 per mm; basidiospores amygdaliform.....*P. gomezii*
11 Basidiospores > 8 µm in length.....12
11 Basidiospores < 8 µm in length.....14
12 Pores > 4 per mm.....*P. nanlingensis*
12 Pores < 4 per mm.....13
13 Cystidia present.....*P. piceicola*
13 Cystidia absent.....*P. isabelllina*
14 Basidiocarps with rhizomorphs.....15
14 Basidiocarps without rhizomorphs.....16
15 Pores 2–3 per mm.....*P. tibetica*
15 Pores 6–7 per mm.....*P. japonica*
16 Pore surface bright yellow or orange.....17
16 Pore surface whitish to pale yellowish.....22
17 On *Maackia*; basidiospores > 5.5 µm in length.....*P. maackiae*
17 On wood other than *Maackia*; basidiospores < 5.5 µm in length.....18
18 Tissues pale brown to black in KOH.....19
18 Tissues unchanged in KOH.....21
19 Pore surface orange; growing on bamboo.....*P. bambusicola*
19 Pore surface yellowish; growing on agiosperm.....20
20 Skeletal hyphae dextrinoid; cystidioles present.....*P. citrinoalba*
20 Skeletal hyphae non-dextrinoid; cystidioles absent.....*P. xantha*
21 Basidiospores > 3.3 µm in width.....*P. corticola*
21 Basidiospores < 3.3 µm in width.....*P. straminea*
22 Sterile margin distinct reddish-brown.....*P. russeimarginata*
22 Sterile margin whitish to cream-buff.....23
23 Basidiocarps annual.....24
23 Basidiocarps perennial.....25
24 Pores lacerate.....*P. lacerata*
24 Pores entire.....*P. tenuis*
25 Skeletal hyphae dextrinoid.....*P. pyricola*
25 Skeletal hyphae non-dextrinoid.....26
26 Pore surface whitish, pores 4–6 per mm.....*P. medulla-panis*
26 Pore surface cream to buff-yellow, pores 6–7 per mm.....*P. aridula*
27 Basidiocarps with rhizomorphs.....*P. rhizomorpha*
27 Basidiocarps without rhizomorphs.....28
28 Basidiocarps annual.....29
28 Basidiocarps perennial.....32
29 Basidiospores non-dextrinoid.....*P. fergusii*
29 Basidiospores dextrinoid.....30
30 Pores < 5 per mm; basidiospores mainly < 5.2 µm in length.....*P. ellipsospora*
30 Pores > 5 per mm; basidiospores mainly > 5.2 µm in length.....31
31 Pores 5–6 per mm; basidiospores mainly > 6 µm in length.....*P. yinggelingensis*
31 Pores 6–8 per mm; basidiospores mainly < 6 µm in length.....*P. bannaensis*
32 Basidiospores > 6 µm in length.....*P. luteola*
32 Basidiospores < 6 µm in length.....33
33 Basidiospores < 5 µm in length, dextrinoid.....*P. africana*
33 Basidiospores > 5 µm in length, non-dextrinoid.....*P. subacida*
34 Basidiocarps osseous.....*P. minutissima*
34 Basidiocarps corky, not osseous.....35
35 Basidiospores non-truncate.....36
35 Basidiospores truncate.....37

36 Basidiocarps annual; basidiospores dextrinoid .... *P. tianmuensis*
36 Basidiocarps perennial; basidiospores non-dextrinoid... .... *P. contraria*
37 Skeletal hyphae pale brown to black in KOH..... .... *P. inflexibilis*
37 Skeletal hyphae unchanged in KOH 38
38 Skeletal hyphae weakly amyloid..... .....*P. minor*
38 Skeletal hyphae dextrinoid 39
39 Basidiospores non-dextrinoid, > 5 µm in length... .... *P. truncatospora*
39 Basidiospores dextrinoid, < 5 µm in length..... .... *P. decurrata*

Perenniporia africana Ipulet & Ryvarden, *Syn. Fung.* 20: 94 (2005) (Figs. 206, 207)
MycoBank: MB 470420

Fruiting body. — Basidiocarps perennial, resupinate, corky when fresh, becoming hard corky when dry, up to 10 cm long, 6.5 cm wide and 1.2 cm thick at center. Pore surface buff to ochraceous when fresh, cream when dry; pores tiny, round, 6–8 per mm; dissepiments thin, entire. Subiculum thin, cream, up to 1 mm thick. Tubes concolorous with pore surface, up to 1.1 cm thick.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, 2.2–2.6 µm in diam; skeletal hyphae dominant, thick-walled with a wide lumen, unbranched, interwoven, 3.5–4.5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, 2.1–2.4 µm in diam; skeletal hyphae dominant, thick-walled with a wide lumen, unbranched, interwoven, 3.1–4.2 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 11.8–12.9 × 3–3.8 µm. Basidia barrel- to pear-shaped, with four sterigmata and a basal clamp connection, 13.1–14.8 × 6.9–8.7 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores subglobose to broadly ellipsoid, non-truncate, hyaline, thick-walled, smooth, slightly dextrinoid, CB + , (4–)4.1–5(–5.1) × (3.1–)3.2–4(–4.1) µm, L = 4.6 µm, W = 3.6 µm, Q = 1.26–1.29 (n = 60/2).

Notes. — *Perenniporia africana* is distinguished by a perennial habit, resupinate basidiocarps and a dimitic hyphal system with unbranched skeletal hyphae, and non-truncate, slightly dextrinoid basidiospores. *Perenniporia globispora* Ipulet & Ryvarden may be confused with *P. africana* by having resupinate basidiocarps and non-truncate, slightly dextrinoid basidiospores. However, *P. globispora* has an annual habit, bigger pores (5–6 per mm), frequently branched skeletal hyphae and larger basidiospores (5–6 × 4.5–5 µm, Ipulet and Ryvarden 2005).

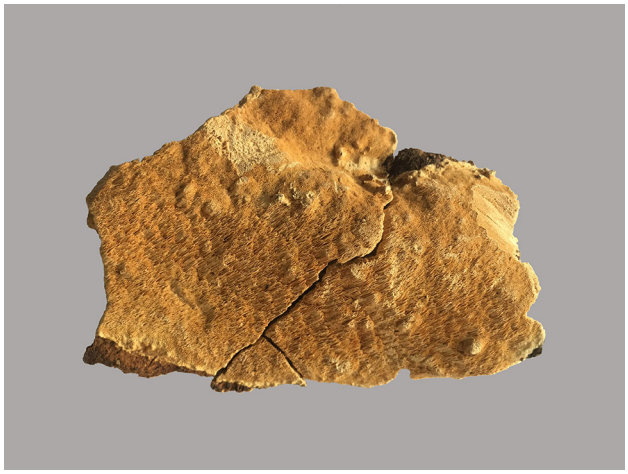

Fig. 206 Basidiocarps of *Perenniporia africana*

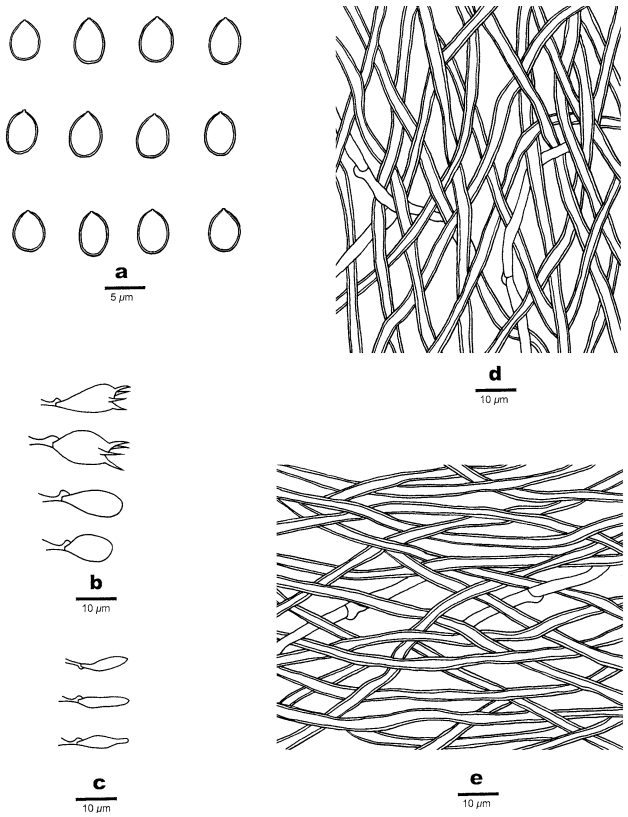

Fig. 207 Microscopic structures of *Perenniporia africana* (drawn from *Cui 8674*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **e**. Hyphae from context. Bars: **a** = 5 µm; **b–e** = 10 µm

Perenniporia straminea (Bres.) Ryvarden and *P. africana* share a perennial habit, resupinate basidiocarps, buff to ochraceous pore surface, and a dimitic hyphal system. However, the former has smaller pores (8–9 per mm) and truncate basidiospores (3.3–3.8 × 2.7–3.2 µm, Decock 2001a).

Specimens examined: **CHINA**. **Anhui**, She County, Qingliangfeng Nature Reserve, on fallen angiosperm trunk, 14 December 2009, *Cui 8674*, *8676* (BJFC).

Perenniporia aridula B.K. Cui & C.L. Zhao, *Fungal Diversity* 58: 48 (2013) (Figs. 208, 209)
MycoBank: MB 800238

Fruiting body. — Basidiocarps perennial, resupinate, adnate, corky, without odor or taste when fresh, becoming hard corky upon drying, up to 18 cm long, 8.5 cm wide and 6.2 mm thick at center. Pore surface cream when fresh, becoming cream to buff-yellow upon drying; pores round, 6–7 per mm; dissepiments thick, entire. Sterile margin more or less receding, cream-buff to pale salmon, up to 2 mm wide. Subiculum buff, thin, up to 0.6 mm thick. Tubes concolorous with pore surface, hard corky, up to 5.6 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 1.8–2.2 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, occasionally branched, interwoven, 2.7–3.2 µm in diam; binding hyphae hyaline, thick-walled, frequently branched, flexuous, interwoven, 0.9–1.9 µm in diam.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, unbranched, 1.5–2 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, frequently branched, interwoven, 2.1–2.7 µm; binding hyphae hyaline, thick-walled, frequently branched, interwoven, 1–1.5 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 13.1–19.2 × 3.2–5 µm. Basidia barrel-shaped to pear-shaped, with four sterigmata and a basal clamp connection, 11.5–17.2 × 8.7–10 µm; basidioles dominant, mostly pear-shaped, slightly smaller than basidia.

Fig. 208 Basidiocarps of the *Perenniporia aridula*

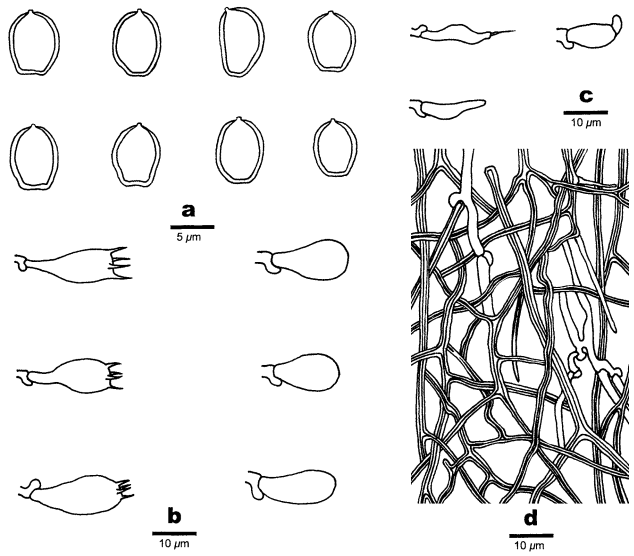

Fig. 209 Microscopic structures of *Perenniporia aridula* (drawn from *Dai 12396*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 µm; **b–d** = 10 µm

Spores. — Basidiospores ovoid to subglobose, truncate, hyaline, thick-walled, smooth, strongly dextrinoid, CB + , (6–)6–7(–7.1) × (5–)5.1–6(–6.1) µm, L = 6.65 µm, W = 5.61 µm, Q = 1.17–1.2 (n = 60/2).

Notes. — *Perenniporia meridionalis* Decock & Stalpers is similar to *P. aridula* in having perennial basidiocarps and basidiospores (6–7.7 × 4.5–6.2 µm), but differs by having a dimitic hyphal system with dextrinoid skeletal hyphae, and presence of arboriform hyphae (Decock and Stalpers 2006). *Perenniporia rosmarini* A. David & Malençon resembles *P. aridula* by having a trimitic hyphal system, and truncate and dextrinoid basidiospores (6.5–7.5 × 5.5–6.5 µm), but it differs in having tough to hard basidiocarps, white to isabelline pore surface and rarely branched skeletal hyphal (Ryvarden and Gilbertson 1994).

Specimens examined: **CHINA**. **Yunnan**, Yuanjiang County, on fallen angiosperm trunk, 9 June 2011, *Dai 12396* (holotype, BJFC), *Dai 12398* (BJFC).

Perenniporia bambusicola Choeyklin, T. Hatt. & E.B.G. Jones, *Fungal Diversity* 36: 122 (2009) (Figs. 210, 211)
MycoBank: MB 511874

Fruiting body. — Basidiocarps annual, resupinate, adnate, corky when dry; up to 3 cm long, 0.5 cm wide and 1 mm thick at center. Pore surface orange when fresh, dark orange to orange-brown when dry; pores tiny, round to angular, 6–7 per mm; dissepiments thin, entire. Sterile margin orange to pale orange, less than 1 mm wide. Subiculum almost lacking, cream

Fig. 210 Basidiocarps of *Perenniporia bambusicola*

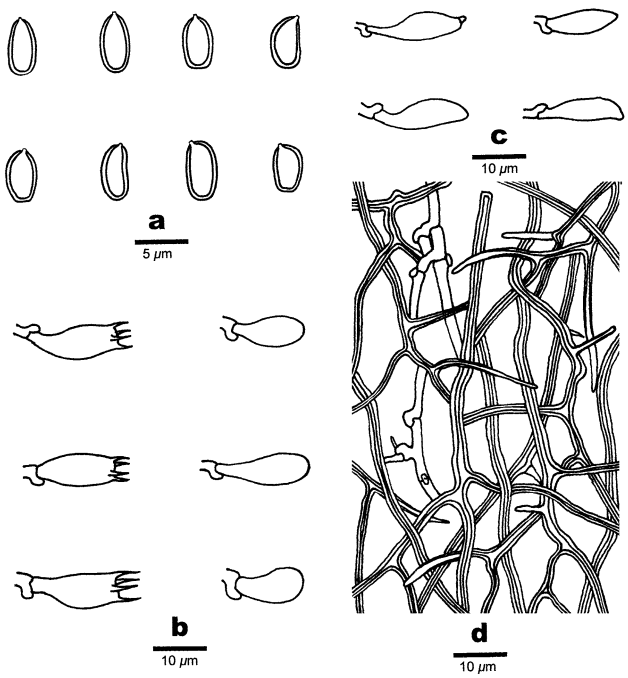

Fig. 211 Microscopic structures of *Perenniporia bambusicola* (drawn from *Yuan 3925*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

to light orange. Tubes concolorous with pore surface, corky, up to 1 mm thick.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae IKI–, CB + ; tissues becoming violet in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, branched, 2–3.3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, branched, flexuous, interwoven, 1.9–3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, branched, 2.5–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, branched, flexuous, interwoven, 1.9–2.4 μm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 14–18.1 × 4.7–6.2 μm. Basidia barrel-shaped, with four sterigmata and a basal clamp connection, 12.9–15.2 × 6.1–6.7 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores oblong-ellipsoid, truncate, hyaline, thick-walled, smooth, slightly dextrinoid, CB + , (4–)4.2–5(–5.3) × (2.5–)2.7–3.8(–4) μm, L = 4.5 μm, W = 3.2 μm, Q = 1.4 (n = 30/1).

Notes. — *Perenniporia bambusicola* is distinguished by host specificity, growing only on dead bamboo cane and surrounding litter, resupinate basidiocarps with vivid orange pore surface and oblong-ellipsoid basidiospores. In addition, its pore surface becoming violet in KOH. *Perenniporia corticola* (Corner) Decock is morphologically related to *P. bambusicola* by similar truncate basidiospores, but differs by having yellowish pore surface and tissues unchanged in KOH (Choeyklin et al. 2009). *Perenniporia xantha* Decock & Ryvarden sharing similar tiny pores and smaller truncate basidiospores, and its pore surface become violet to black in KOH, too. However, it has bright yellow pore surface, and growth on angiosperm wood rather than bamboo (Decock and Ryvarden 1999).

Specimen examined: **CHINA**. **Yunnan**, Baoshan, Gaoligongshan Nature Reserve, on bamboo, 24 September 2007, *Yuan 3925* (BJFC).

Perenniporia bannaensis B.K. Cui & C.L. Zhao, *Fungal Diversity* 58: 52 (2013) (Figs. 212, 213)
MycoBank: MB 800240

Fruiting body. — Basidiocarps annual, resupinate, adnate, corky, without odor or taste when fresh, becoming hard corky upon drying, up to 10 cm long, 6.5 cm wide and 2 mm thick at center. Pore surface cream to buff when fresh, becoming buff-yellow to pinkish buff upon drying; pores round to angular, 6–8 per mm; dissepiments thin, entire to distinctly lacerate. Sterile margin thin, cream-buff, up to 2 mm wide. Subiculum buff-yellow, thin, up to 0.3 mm thick. Tubes concolorous with pore surface, corky, up to 1.7 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 2.5–3.9 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, usually unbranched, interwoven, 2–3.7 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, unbranched, 1.9–3.3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, rarely branched, interwoven, 2–3.4 μm. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 15.5–21 × 5–6.5 μm. Basidia barrel-shaped, with four

Fig. 212 Basidiocarps of *Perenniporia bannaensis*

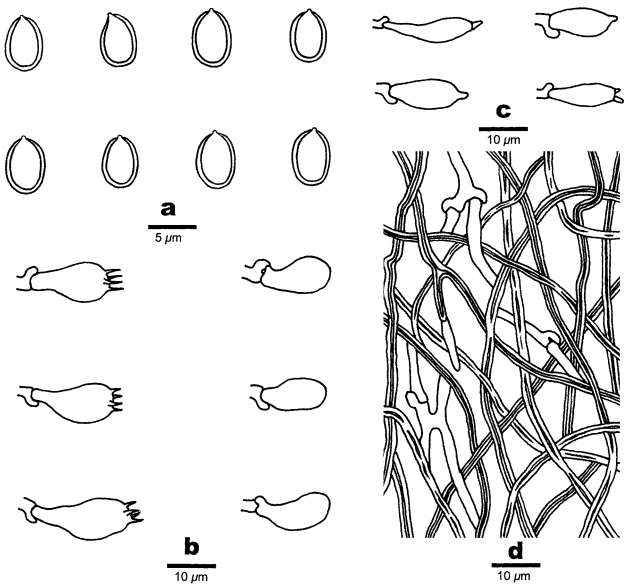

Fig. 213 Microscopic structures of *Perenniporia bannaensis* (drawn from *Cui 8560*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

sterigmata and a basal clamp connection, 11.5–15 × 5.9–8.2 μm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, hyaline, thick-walled, smooth, strongly dextrinoid, CB + , (5–)5.2–6(–6.4) × (3.9–)4–4.6(–4.8) μm, L = 5.45 μm, W = 4.22 μm, Q = 1.27–1.32 (n = 120/4).

Notes. — *Perenniporia chromatica* (Berk. & Broome) Decock & Ryvarden and *P. bannaensis* share a dimitic hyphal system and dextrinoid basidiospores, but the former differs in its bigger pores (4–5 per mm), arboriform hyphae and truncate basidiospores (Decock and Ryvarden 1999). *Perenniporia subacida* (Peck) Donk is similar to *P. bannaensis*, and both have non-truncate basidiospores and usually unbranched skeletal hyphae. However, *P. subacida* is distinguished from *P. bannaensis* by having distinctly perennial basidiocarps with ivory to yellowish pore surface, bigger pores (5–6 per mm), and its basidiospores are slightly thick-walled and negative in Melzer's reagent (Núñez and Ryvarden 2001; Decock and Stalpers 2006).

Specimens examined: **CHINA**. **Yunnan**, Xishuangbanna, Mengla County, Wangtianshu Nature Reserve, on fallen angiosperm trunk, 17 September 2007, *Yuan 3665*, *3683* (IFP); 2 November 2009, *Cui 8560*, *8562* (BJFC).

Perenniporia cinereofusca B.K. Cui & C.L. Zhao, *Mycoscience* 55: 419 (2014) (Figs. 214, 215)
MycoBank: MB 805466

Fruiting body. — Basidiocarps annual, resupinate, adnate, corky, without odor or taste when fresh, becoming hard corky upon drying, up to 8 cm long, 5 cm wide and 1.5 mm thick at center. Pore surface cream to clay-buff

Fig. 214 Basidiocarps of *Perenniporia cinereofusca*

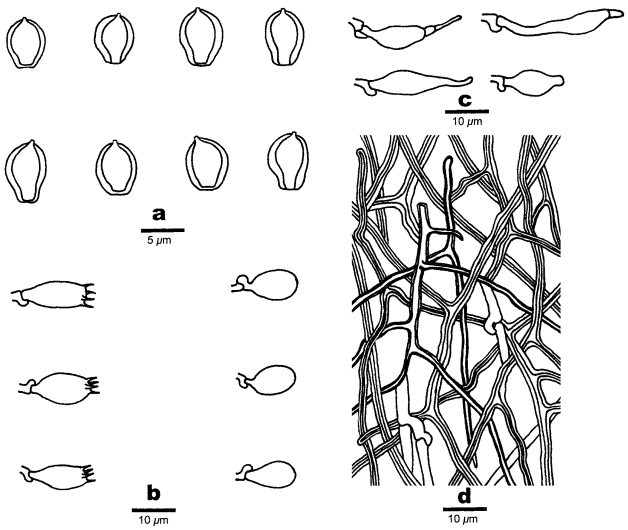

Fig. 215 Microscopic structures of *Perenniporia cinereofusca* (drawn from *Dai 9289*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

when fresh, gray to pale brown upon drying; pores round to angular, 4–6 per mm; dissepiments thin to thick, entire. Sterile margin wide, brown, up to 3 mm wide. Subiculum clay-buff to brown, thin, up to 0.5 mm thick. Tubes concolorous with pore surface, corky, up to 1 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae weakly dextrinoid, CB + ; tissues pale brown to black in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 2–3 µm in diam; skeletal hyphae dominant, hyaline to pale yellowish, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 2.5–3.5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–2.5 µm in diam; skeletal hyphae dominant, hyaline to pale yellowish, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 2–3 µm in diam. Dendrohyphidia common at the dissepimental edges. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 22–33 × 6–7 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 20–25 × 9.5–11.5 µm; basidioles dominant, in shape similar to basidia, but slightly smaller. Large rhomboid crystals present.

Spores. — Basidiospores ellipsoid, truncate, hyaline to pale yellowish, distinct thick-walled, smooth, IKI–, CB + , (6.2–)6.5–7.7(–8) × (5.1–)5.3–6.3(–6.5) µm, L = 7.02 µm, W = 5.75 µm, Q = 1.15–1.22 (n = 60/2).

Notes. — Morphologically, the truncate and large basidiospores (L > 6 µm) of *Perenniporia cinereofusca* remind several similar *Perenniporia* species in China. *Perenniporia pyricola* Y.C Dai & B.K Cui may be confused with *P. cinereofusca* in producing resupinate basidiocarps, a dimitic hyphal system and similar basidiospores (6.3–7.6 × 4.8–6.5 µm). However, *P. pyricola* differs in its perennial basidiocarps and dextrinoid basidiospores (Dai 2010b). *Perenniporia lacerata* B.K. Cui & C.L. Zhao is similar to *P. cinereofusca* by annual, resupinate basidiocarps, a dimitic hyphal system and ellipsoid, truncate basidiospores (6.1–7 × 5–5.7 µm). However, it differs by having lacerate pores and dextrinoid basidiospores (Zhao and Cui 2013b).

Specimens examined: **CHINA**. **Hainan**, Ledong County, Jianfengling Nature Reserve, on fallen angiosperm trunk, 18 November 2007, *Dai 9289* (holotype, BJFC); on fallen angiosperm trunk, 20 November 2007, *Cui 5280* (paratype, BJFC).

Perenniporia citrinoalba B.K. Cui, C.L. Zhao & Y.C. Dai, **sp. nov.** (Figs. 216, 217)
MycoBank: MB 825663

Differs from other *Perenniporia* species by pale yellow to yellow pore surface when fresh, white to grayish white or yellowish upon drying, smaller pores (7–9 per mm), tissues pale brown to black in KOH, and broad ellipsoid basidiospores measuring as 5.5–6 × 4.7–5.2 µm.

Type. — **CHINA**. Hainan, Qiongzhong County, Limushan Forest Park, on fallen trunk of *Castanopsis*, 15 June 2014, *Dai 13643* (holotype, BJFC).

Etymology. — *Citrinoalba* (Lat.): referring to its yellowish to whitish pore surface.

Fruiting body. — Basidiocarps annual, resupinate, without odor or taste when fresh, becoming corky upon drying, up to 5 cm long, 3 cm wide and 6 mm thick at center. Pore surface pale yellow to yellow when fresh, white to grayish white or yellowish upon drying; pores

Fig. 216 Basidiocarps of *Perenniporia citrinoalba*

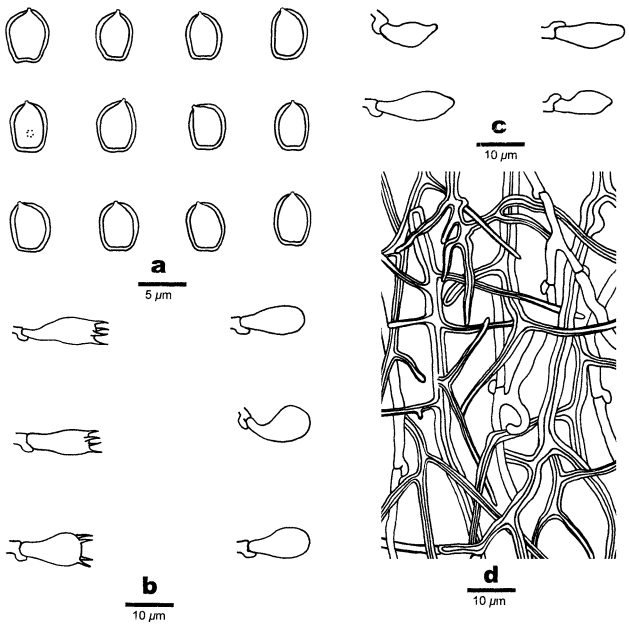

Fig. 217 Microscopic structures of *Perenniporia citrinoalba* (drawn from *Dai 13643*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 µm; **b–d** = 10 µm

round, 7–9 per mm; dissepiments slightly thick, entire. Sterile margin wide, grayish white to pale brown, up to 3 mm wide. Subiculum cream to buff, thin, up to 0.5 mm thick. Tubes clay-buff to pale brown, corky, up to 5.5 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB + ; tissues pale brown to black in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, frequently branched, 2.5–3.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, frequently branched, interwoven, 3–4 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, frequently branched, 2–3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, frequently branched, interwoven, 2–3.5 µm. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 14–16 × 4–6.5 µm. Basidia barrel-shaped, with four sterigmata and a basal clamp connection, 16–18 × 7–8 µm; basidioles dominant, mostly pear-shaped, but slightly smaller than basidia.

Spores. — Basidiospores broad ellipsoid, truncate, hyaline, distinct thick-walled, smooth, dextrinoid, CB + , (5.3–)5.5–6(–6.2) × (4.5–)4.7–5.2(–5.5) µm, L = 5.89 µm, W = 4.94 µm, Q = 1.18–1.21 (n = 60/2).

Notes. — Morphologically, *Perenniporia corticola* (Corner) Decock and *P. maackiae* (Bondartsev & Ljub.) Parmasto produce yellow to bright yellow pore surface. However, *P. corticola* differs from *P. citrinoalba* by its small basidiospores (4.4–5 × 3.4–4 µm, Decock 2001a). *Perenniporia maackiae* differs in its effused-reflexed basidiocarps; additionally, it grows on the host of *Maackia amurensis* Rupr. & Maxim (Núñez and Ryvarden 2001) and distributes in temperate areas. *Perenniporia xantha* Decock & Ryvarden may be confused with *P. citrinoalba* in macro-morphology, but *P. xantha* differs in its non-dextrinoid skeletal hyphae, absence of cystidioles, and smaller basidiospores (4.5–5.5 × 3.3–4 µm).

Additional specimen (paratype) examined: **CHINA**. **Hainan**, Qiongzhong County, Limushan Forest Park, on fallen trunk of *Castanopsis*, 15 June 2014, *Dai 13640* (BJFC).

Perenniporia contraria (Berk. & M.A. Curtis) Ryvarden, *Norw. J. Bot.* 19: 233 (1972) (Figs. 218, 219)
MycoBank: MB 319325

Fruiting body. — Basidiocarps perennial, pileate, solitary, woody hard upon drying. Pilei triquetrous, projecting up to 1 cm, 1.5 cm wide and 1.2 cm thick at base. Pileal surface pale orange brown, concentrically zonate; margin cream to light brownish, obtuse. Pore surface whitish to cream when dry; pores round to angular, 5–7 per mm; dissepiments thin, entire. Context pale pinkish brown, hard corky, azonate, up to 2 mm thick. Tubes cream buff to pale brown, hard corky to fibrous, up to 1 cm long.

Hyphal structure. — Hyphal system dimitic to trimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, distinctly CB + ; tissues unchanged in KOH.

Context. — Generative hyphae rare, hyaline, thin-walled, rarely branched, 1.3–3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow but distinct lumen, occasionally branched (trimitic-like), interwoven, 1.4–3.5 µm in diam.

Tubes. — Generative hyphae rare, hyaline, thin-walled, rarely branched, 1.1–3 µm in diam; skeletal hyphae

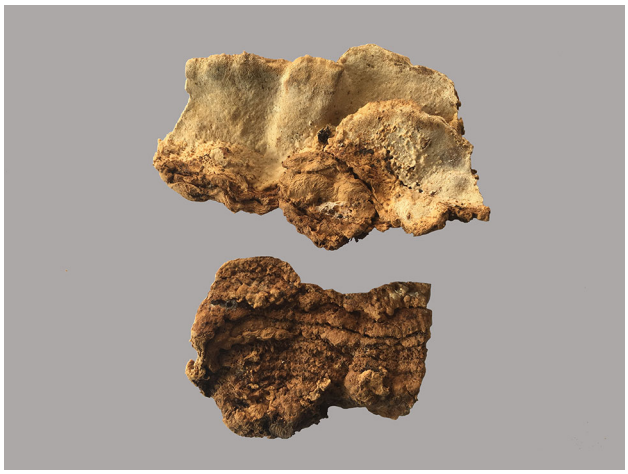

Fig. 218 Basidiocarps of *Perenniporia contraria*

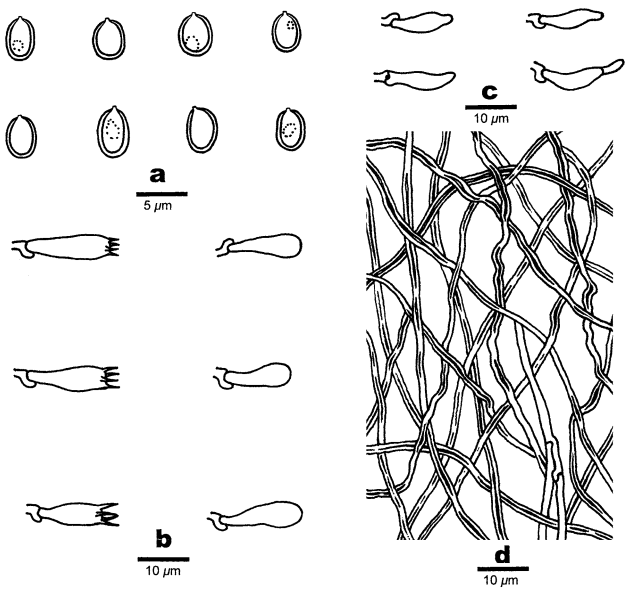

Fig. 219 Microscopic structures of *Perenniporia contraria* (*drawn from Dai 9534*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 µm; **b–d** = 10 µm

dominant, hyaline, thick-walled with a narrow lumen, frequently branched, interwoven, 1.2–3.2 µm in diam. Cystidia absent; fusoid cystidioles occasionally present. Basidia clavate, with four sterigmata and a basal clamp connection, 10–15 × 4–6 µm; basidioles dominant, in shape similar to basidia, but slightly smaller than basidia.

Spores. — Basidiospores ellipsoid to ovoid, non-truncate, hyaline, thick-walled, smooth, IKI–, CB + , (3.3–)3.4–4(–4.2) × (2.4–)2.5–3.1(–3.3) µm, L = 3.75 µm, W = 2.88 µm, Q = 1.3 (n = 30/1).

Notes. — *Perenniporia contraria* is closely related to *P. subannosa* (Bres.) C. Decock et al. However, the latter species has bigger pores (4–5 per mm) and larger basidiospores (3.7–5.5 × 2.7–4.5 µm) according to Decock et al. (2001).

Specimens examined: **CHINA**. **Hainan**, Qiongzhong County, Limushan Forest Park, on angiosperm wood, 24 October 2008, *Dai 9534* (BJFC). **Yunnan**, Xishuangbanna, Dadugang, on angiosperm wood, 31 August 2004, *Knudsen 04-111* (BJFC).

Perenniporia corticola (Corner) Decock, *Mycologia* 93: 776 (2001)..... …… (Figs. 220, 221)
MycoBank: MB 474696
Basionym: *Parmastomyces corticola* Corner, *Beih. Nova Hedwigia* 96: 96 (1989).

Fruiting body. — Basidiocarps perennial, resupinate, adnate, corky, without odor or taste when fresh, becoming hard corky upon drying, up to 14.5 cm long, 9.5 cm wide and 1.5 mm thick at center. Pore surface pale yellowish when fresh, yellowish upon drying; pores round, 7–9 per mm; dissepiments thick, entire. Sterile margin narrow, cream to pale yellowish to brown, up to 2 mm wide. Subiculum cream, thin, up to 2 mm thick. Tubes concolorous with pore surface, corky, up to 1.3 cm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae weakly dextrinoid, CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, 1.9–3.3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, branched, interwoven, 2–3.5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, 1.5–3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, branched, interwoven, 2–3.3 µm. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 11.5–16.5 × 4.9–7.5 µm. Basidia barrel-shaped, with four sterigmata and a basal clamp connection, 11–13.5 × 6–8 µm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, truncate, hyaline, thick-walled, smooth, strongly dextrinoid, CB + , (4.2–)4.4–5(–5.3) × (3.3–)3.5–4(–4.2) µm, L = 4.74 µm, W = 3.65 µm, Q = 1.28–1.33 (n = 120/4).

Fig. 220 Basidiocarps of *Perenniporia corticola*

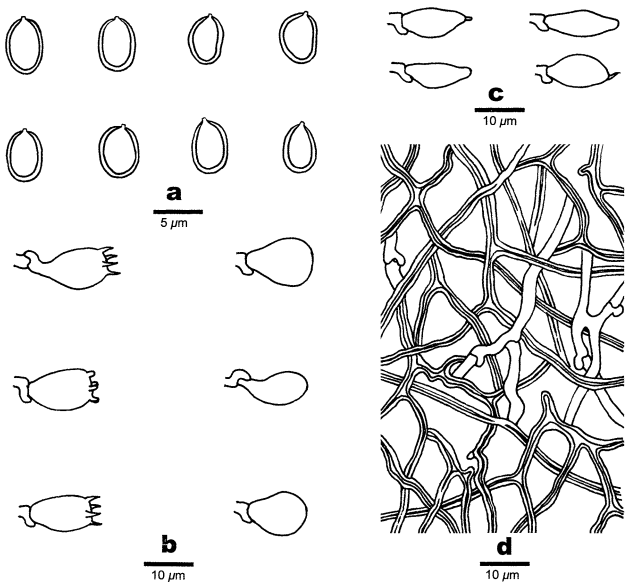

Fig. 221 Microscopic structures of *Perenniporia corticola* (drawn from *Dai 9534*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 µm; **b–d** = 10 µm

Notes. — *Perenniporia corticola* and *P. xantha* Decock & Ryvarden share similar resupinate basidiocarps with yellowish pore surface, but *P. xantha* differs from *P. corticola* by having bigger pores (6–7 per mm, Decock 2001a).

Specimens examined: **CHINA**. **Anhui**, Huangshan, Huangshan Mountain, on fallen angiosperm trunk, 13 October 2004, *Dai 6130* (IFP). **Fujian**, Wuyishan County, Wuyishan Nature Reserve, on fallen angiosperm trunk, 21 October 2005, *Dai 7330* (IFP). **Guangxi**, Nanning, Damingshan, on fallen angiosperm trunk, 28 August 2011, *Yuan 5654* (IFP). **Guizhou**, Jiangkou County, Fanjingshan Nature Reserve, on fallen angiosperm trunk, 29 August, 2010, *Cui 9807, 9808* (BJFC). **Hunan**, Liuyang County, on fallen

angiosperm trunk, 21 December, *Dai 3257* (IFP). **Xizang (Tibet)**, Bomi County, on fallen angiosperm trunk, 19 September 2010, *Cui 9460, 9466, 9496* (BJFC). **Yunnan**, Lanping County, Tongdian, Luoguqing, on fallen angiosperm trunk, 19 September 2011, *Cui 10349, 10350, 10351, 10352, 10353, 10354* (BJFC). **Zhejiang**, Lin'an County, Tianmushan Nature Reserve, on fallen angiosperm trunk, 15 October 2004, *Dai 6347* (IFP); 9 October 2005, *Cui 2551* (IFP); 10 October 2005, *Cui 2655* (BJFC); 12 October 2005, *Cui 2748* (BJFC).

Perenniporia decurrata Corner, *Beihefte zur Nova Hedwigia* 96: 105 (1989) (Figs. 222, 223)
MycoBank: MB 136523

Fruiting body. — Basidiocarps perennial, pileate, solitary, woody hard upon drying. Pilei triquetrous, projecting up to 1.5 cm, 2.5 cm wide and 1 cm thick at base. Pileal surface clay-cuff to orange-brown, concentrically sulcate with narrow zones, glabrous. Pore surface white to buff upon drying; pores tiny, round, 7–9 per mm; dissepiments thin, entire. Context pinkish buff to cinnamon, corky, about 0.5 mm thick. Tubes concolorous with pore surface, woody hard, up to 9.5 mm thick.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, CB + ; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, 1.3–1.7 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, flexuous, interwoven, 1.1–1.6 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, 1–1.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow but distinct lumen, frequently branched, flexuous, interwoven, 1.2–1.5 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 11.7–13.2 × 3.1–3.5 µm. Basidia barrel- to pear-shaped, with four sterigmata and a basal clamp connection, 8.2–11.5 × 4.7–5.3 µm; basidioles in shape similar to basidia, but slightly smaller.

Fig. 222 Basidiocarps of *Perenniporia decurrata*

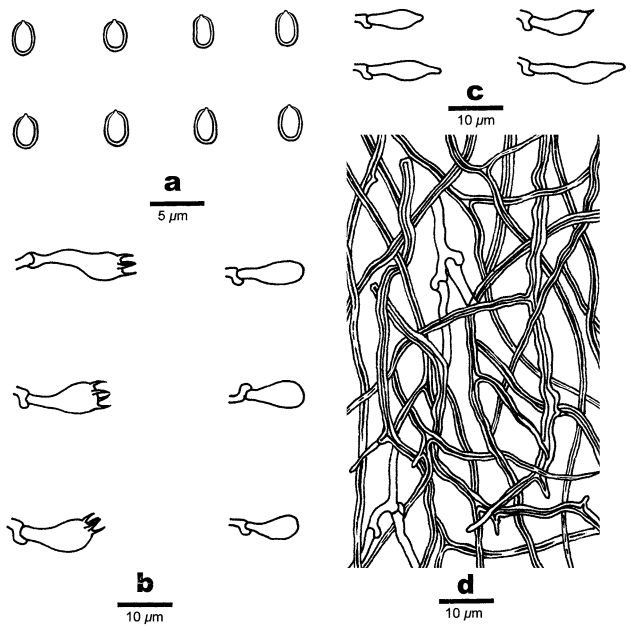

Fig. 223 Microscopic structures of *Perenniporia decurrata* (drawn from *Yuan 3401*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 µm; **b–d** = 10 µm

Spores. — Basidiospores ellipsoid, truncate, hyaline, thick-walled, smooth, slightly dextrinoid, CB + , (3.5–)3.6–4(–4.1) × (2.5–)2.6–3(–3.1) µm, L = 3.8 µm, W = 2.8 µm, Q = 1.35–1.39 (n = 90/3).

Notes. — *Perenniporia decurrata* is characterized by its pileate basidiocarps, tiny pores (7–9 per mm) and smaller, truncate basidiospores. *Perenniporia contraria* is similar to *P. decurrata* by having smaller pileate basidiocarps, a dimitic hyphal system, and similar basidiospores (3.7–4.5 × 2.7–3.8 µm). However, the former has usually non-truncate and non-dextrinoid basidiospores (Decock et al. 2001; Cui et al. 2006a, b). *Perenniporia subannosa* (Bres.) Decock et al. and *P. decurrata* share a dimitic hyphal system and similar basidiospores (3.7–5.5 × 2.7–4.5 µm), but the former differs from *P. decurrata* by having bigger pores (4–5 per mm), wider skeletal hyphae, and non-dextrinoid basidiospores (Decock et al. 2001).

Specimens examined: **CHINA**. **Yunnan**, Xishuangbanna, Menglun, on fallen angiosperm trunk, 12 September 2006, *Yuan 2334* (IFP); 11 September 2007, *Yuan 3401, 3403* (IFP).

Perenniporia dendrohyphidia Ryvarden, *Mycotaxon* 31: 408 (1988) (Figs. 224, 225)
MycoBank: MB 134057

Fruiting body. — Basidiocarps annual, resupinate, adnate, corky when dry, up to 6.5 cm long, 2 cm wide and 1.5 mm thick at center. Pore surface whitish to cream,

Fig. 224 Basidiocarps of *Perenniporia dendrohyphidia*

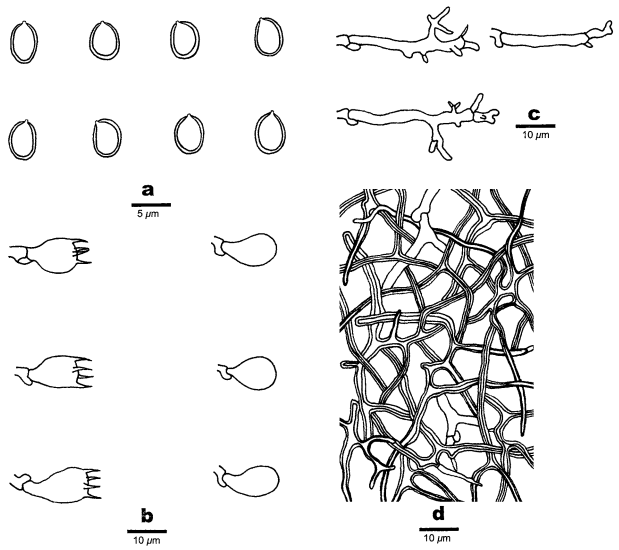

Fig. 225 Microscopic structures of *Perenniporia dendrohyphidia* (*drawn from Zhou 273*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Dendrohyphidia; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

grayish white, grayish cream to pale grayish brown; pores tiny, angular, but elongated on oblique part, 6–8 per mm; dissepiments thin, entire. Subiculum thin, whitish to cream or dark grayish brown. Tubes concolorous with pore surface, corky, up to 1 mm thick.

Hyphal structure. — Hyphal system dimitic to trimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, 2.9–3.8 μm in diam; skeletal hyphae dominant, thick-walled, branched, flexuous, interwoven, 2.4–4 μm in diam; binding hyphae hyaline, thick-walled, frequently branched, interwoven, 0.9–2.1 μm.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, 2.7–3.5 μm in diam; skeletal hyphae dominant, thick-walled, branched, flexuous, interwoven, 1.8–3.3 μm in diam; binding hyphae hyaline, thick-walled, frequently branched, interwoven, 0.8–1.5 μm. Dendrohyphidia common at the dissepimental edges. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 14.2–21 × 3.7–7.9 μm. Basidia barrel-shaped to pear-shaped, with four sterigmata and a basal clamp connection, 16.9–19.1 × 7.1–8 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores subglobose to ovoid, rarely truncate, hyaline, thick-walled, smooth, dextrinoid, CB + , (5–)5.1–6 × (4–)4.1–5 μm, L = 5.6 μm, W = 4.6 μm, Q = 1.2 (n = 30/1).

Notes. — *Perenniporia dendrohyphidia* is characterized by having dendrohyphidia at the dissepimental edges, subglobose to ovoid and dextrinoid basidiospores. It is similar to *P. subdendrohyphidia* C. Decock by sharing dendrohyphidia and similar pores (6–8 per mm), but the latter species has oblong to oblong-ellipsoid, and non-dextrinoid basidiospores (Decock 2001b).

Specimen examined: **CHINA**. **Guangxi**, Ningming County, Nonggang Nature Reserve, on angiosperm wood, 7 July 2007, *Zhou 273* (IFP).

Perenniporia ellipsospora Ryvarden & Gilb., *Mycotaxon* 19: 140 (1984) (Figs. 226, 227)
MycoBank: MB 107105

Fruiting body. — Basidiocarps annual, resupinate, adnate, corky when dry, up to 7.5 cm long, 5.5 cm wide and 3.5 mm thick at center. Pore surface white to cream when fresh, becoming pale straw-colored or pale yellowish when dry; pores round to angular, 3–4 per mm; dissepiments thin, entire to lacerate. Subiculum thin, white to cream, up to 0.5 mm thick. Tubes concolorous with pore surface, corky, up to 3 mm thick.

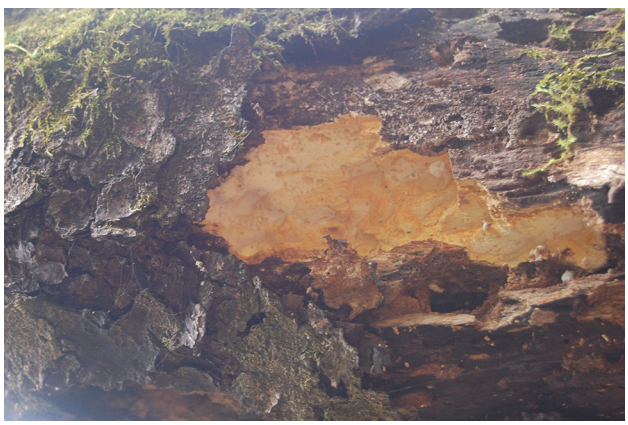

Fig. 226 Basidiocarps of *Perenniporia ellipsospora*

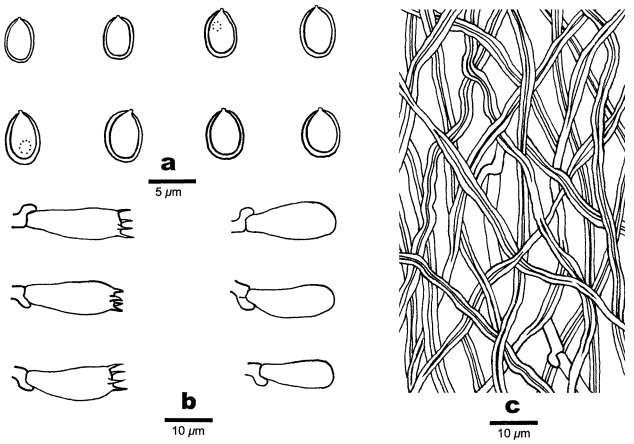

Fig. 227 Microscopic structures of *Perenniporia ellipsospora* (drawn from *Cui 10284*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 μm; **b–c** = 10 μm

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, 1.9–2.5 μm in diam; skeletal hyphae dominant, thick-walled with a wide lumen, unbranched, interwoven, 2.5–3.9 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, 1.7–2.3 μm in diam; skeletal hyphae dominant, thick-walled with a wide lumen, interwoven, 2.3–3.7 μm in diam. Cystidia and cystidioles absent. Basidia barrel- to pear-shaped, with four sterigmata and a basal clamp connection, 10.3–14.1 × 4.9–7.2 μm; basidioles in shape similar to basidia, but slightly bigger.

Spores. — Basidiospores ellipsoid, non-truncate, hyaline, thick-walled, smooth, dextrinoid, CB + , (4.5–)4.6–5.2(–5.3) × (3.2–)3.4–4(–4.1) μm, L = 4.9 μm, W = 3.8 μm, Q = 1.28–1.29 (n = 60/2).

Notes. — *Perenniporia ellipsospora* is characterized by its resupinate basidiocarps, pale straw-colored or pale yellowish pore surface, bigger pores (3–4 per mm), unbranched skeletal hyphae, and non-truncate, dextrinoid basidiospores. *Perenniporia subaurantiaca* (Rodway & Cleland) P.K. Buchanan & Ryvarden is similar to *P. ellipsospora* by having a dimitic hyphal system, and non-truncate, dextrinoid basidiospores. However, it differs by having cream to grayish orange pore surface and larger basidiospores (7.2–9.5 × 4.2–5.5 μm, Decock et al. 2000). *Perenniporia medulla-panis* (Jacq.) Donk resembles *P. ellipsospora* by having resupinate basidiocarps and similar basidiospores (5–6.5 × 3.5–4. 5 μm), but it differs from the latter by having white pore surface, a trimitic hyphal system and truncate basidiospores (Núñez and Ryvarden 2001).

Specimens examined: **CHINA**. **Yunan**, Lanping County, Changyanshan Nature Reserve, on fallen angiosperm trunk, 18 September 2011, *Cui 10276*, *10284* (BJFC).

Perenniporia fergusii Gilb. & Ryvarden, *N. Amer. Polyp.* 2: 517 (1987) (Figs. 228, 229)
MycoBank: MB 132926

Fruiting body. — Basidiocarps annual, resupinate to effused-reflexed, without distinct odor or taste, hard corky upon drying. Pilei triquetrous, projecting up to 6.5 cm, 4.5 cm wide and 6 mm thick at base. Pore surface pinkish buff when fresh, pinkish buff to pale salmon when dry; pores round to angular, 4–6 per mm; dissepiments thick, entire. Context pinkish buff, up to 2.5 mm thick. Tubes concolorous with pore surface, corky, up to 3.5 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae dextrinoid, distinctly CB + ; tissues unchanged in KOH.

Fig. 228 Basidiocarps of *Perenniporia fergusii*

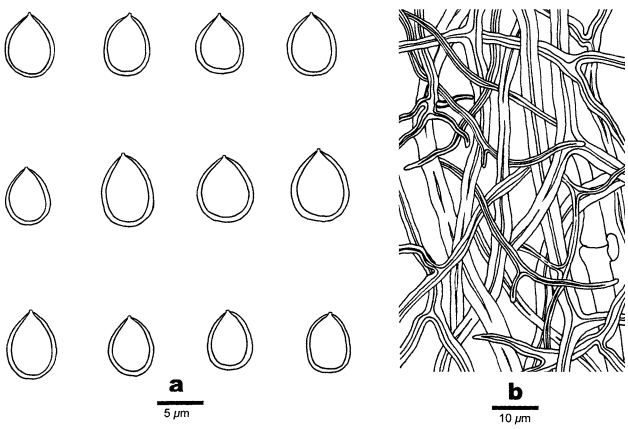

Fig. 229 Microscopic structures of *Perenniporia fergusii* (drawn from *Dai 10678*). **a**. Basidiospores; **b**. Hyphae from trama. Bars: **a** = 5 μm; **b** = 10 μm

Subiculum. — Generative hyphae rare, hyaline, thin-walled, 2.3–4.3 µm in diam; skeletal hyphae dominant, thick-walled, branched, interwoven, 3.3–5.2 µm in diam; binding hyphae hyaline, thick-walled, frequently branched, flexuous, interwoven, 1.9–3.1 µm in diam.

Tubes. — Generative hyphae rare, hyaline, thin-walled, 2–4 µm in diam; skeletal hyphae dominant, thick-walled with a wide lumen, branched, interwoven, 3–5 µm in diam; binding hyphae hyaline, thick-walled, frequently branched, flexuous, interwoven, 1.5–2.8 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 13.5–15 × 5.9–6.5 µm. Basidia barrel-shaped, with four sterigmata and a basal clamp connection, 9.5–13.1 × 7.9–11.1 µm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, non-truncate, hyaline, thick-walled, smooth, IKI–, CB + , (4.6–)4.8–5.5 (–5.8) × (3.6–)3.8–4.6 (–4.8) µm, L = 5.34 µm, W = 4.01 µm, Q = 1.26 (n = 30/1).

Notes. — *Perenniporia fergusii* and *P. medulla-panis* share resupinate to effused-reflexed basidiocarps, similar pores and non-dextrinoid basidiospores. However, *P. medulla-panis* has white pore surface and truncate basidiospores (Gilbertson and Ryvarden 1987).

Specimens examined: **CHINA**. **Guangdong**, Foshan, Xiqiaoshan Park, on fallen angiosperm trunk, 13 February 2009, *Dai 10678* (BJFC). **Guizhou**, Suiyang County, Kuankuoshui Nature Reserve, on fallen angiosperm trunk, 17 June 2000, *Dai 3226* (IFP).

Perenniporia gomezii Rajchenb. & J.E. Wright, *Mycotaxon* 15: 306 (1982) (Figs. 230, 231)
MycoBank: MB 106395

Fruiting body. — Basidiocarps annual, widely resupinate and tightly attached to substrate, soft corky when fresh, becoming corky when dry, up to 5.5 cm long, 3.5 cm wide and 2.5 mm thick at center. Pore surface cream to buff upon drying; pores tiny, round, 6–8 per mm; dissepiments thick, entire. Sterile margin narrow, less than 1 mm wide, buff. Subiculum honey-yellow, corky, thin, less than 1 mm thick. Tubes concolorous with pore surface, corky, up to 1.5 mm thick.

Fig. 230 Basidiocarps of *Perenniporia gomezii*

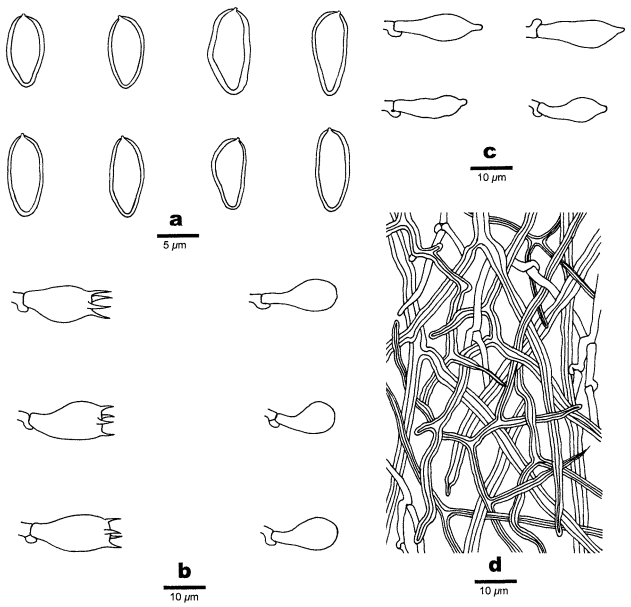

Fig. 231 Microscopic structures of *Perenniporia gomezii* (drawn from *Cui 5460*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 µm; **b–d** = 10 µm

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae IKI–, CB + ; tissues becoming pale ochraceous in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, 2.8–4.2 µm in diam; skeletal hyphae dominant, slightly buff-yellow, thick-walled, unbranched, flexuous, interwoven, 2–4.5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, 3–4 µm in diam; skeletal hyphae dominant, slightly buff-yellow, thick-walled, unbranched, flexuous, interwoven, 2.1–5 µm in diam. Arboriform hyphae present, 2.1–5.1 µm wide, branching at the dissepiment edges. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 13–17 × 5–7 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 14.1–16.4 × 6.1–7.3 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid to amygdaliform, truncate or not, hyaline, thick-walled, smooth, IKI–, CB + , (7.2–) 8.3–9.3(–10.2) × (3.5–)3.8–4.2(–4.3) µm, L = 8.94 µm, W = 4.06 µm, Q = 2.2 (n = 30/1).

Notes. — *Perenniporia gomezii* is characterized by its resupinate basidiocarps with small pores, ellipsoid to amygdaliform, non-dextrinoid and cyanophilous

basidiospores. In addition, its tissues become pale ochraceous in KOH. *Perenniporia phloiophila* Gilb. & Blackw. is similar to *P. gomezii* by having resupinate basidiocarps, non-dextrinoid skeletal hyphae, and truncate basidiospores, but differs by its bigger pores (4–6 per mm) and larger dextrinoid basidiospores (7.5–11 × 6–8 µm, Gilbertson and Ryvarden 1987).

Specimen examined: **CHINA**. **Hainan**, Wuzhishan County, Wuzhishan Nature Reserve, on fallen angiosperm trunk, 26 November 2007, *Cui 5460* (BJFC).

Perenniporia hainaniana B.K. Cui & C.L. Zhao, *Mycologia* 105: 946 (2013) (Figs. 232, 233)
MycoBank: MB 800565

Fruiting body. — Basidiocarps perennial, resupinate, adnate, corky, without odor or taste when fresh, becoming hard corky upon drying, up to 15.5 cm long, 6 cm wide and 3 mm thick at center. Pore surface cream when fresh, becoming cream buff upon drying; pores round, 5–6 per mm; dissepiments thin, entire. Sterile margin narrow, white to cream, up to 1 mm wide. Subiculum cream, thin, up to 0.2 mm thick. Tubes concolorous with pore surface, hard corky, up to 3 mm long.

Fig. 232 Basidiocarps of *Perenniporia hainaniana*

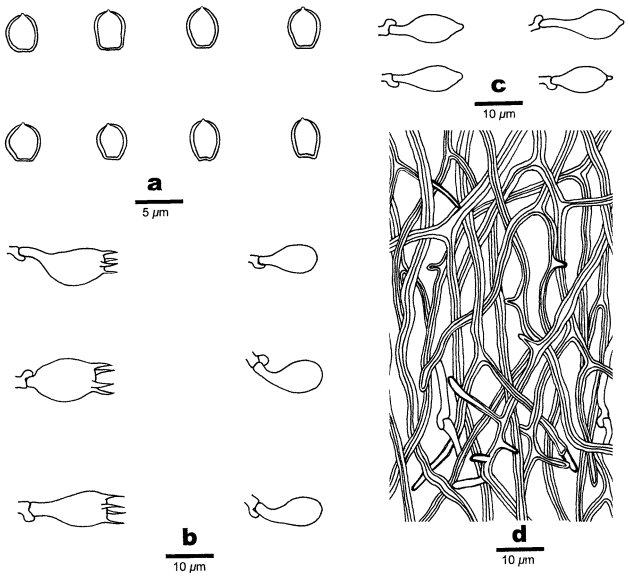

Fig. 233 Microscopic structures of *Perenniporia hainaniana* (drawn from *Cui 6366*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphal structure. Bars: **a** = 5 µm; **b–d** = 10 µm

Hyphal structure. — Hyphal system dimitic to trimitic; generative hyphae bearing clamp connections; skeletal hyphae IKI + , CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, branched, interwoven, normally 3–4 µm in diam; binding hyphae hyaline, thick-walled, frequently branched, flexuous, interwoven, 1–1.5 µm diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, branched, 2–2.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, branched, interwoven, 2.5–3.5 µm wide; binding hyphae hyaline, thick-walled, frequently branched, interwoven, 1–1.5 µm in diam. Dendrohyphidia common at the dissepimental edges. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 10–12 × 3.7–4.8 µm. Basidia barrel- to pear-shaped, with four sterigmata and a basal clamp connection, 10.5–13.5 × 5–8 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores broadly ellipsoid, truncate, hyaline, thick-walled, smooth, dextrinoid, CB + , (3.5–) 4–4.5(–5) × 3–4 µm, L = 4.3 µm, W = 3.6 µm, Q = 1.21–1.25 (n = 90/3).

Notes. — Morphologically, *Perenniporia subdendrohyphidia* Decock is similar to *P. hainaniana* in having dendrohyphidia and similar basidiospores (4–4.8 × 2.8–3.3 µm). However, *P. subdendrohyphidia* separates by a dimitic hyphal system with strongly dextrinoid skeletal hyphae and non-dextrinoid basidiospores (Decock 2001b). *Perenniporia amylodextrinoidea* Gilb. & Ryvarden may be confused with *P. hainaniana* in morphology, as they both produce amyloid skeletal hyphae and dextrinoid basidiospores, but *P. amylodextrinoidea* is an annual species with bigger pores (3–5 per mm) and a dimitic hyphal system (Gilbertson and Ryvarden 1987).

Specimens examined: **CHINA**. **Hainan**, Changjiang County, Bawangling Nature Reserve, on an angiosperm stump, 8 May 2009, *Cui 6364* (holotype, BJFC), *Cui 6365*, *6366* (paratypes, BJFC).

Perenniporia inflexibilis (Berk.) Ryvarden, *Norw. J. Bot.* 19: 233 (1972) (Figs. 234, 235)
MycoBank: MB 319329

Basionym: *Polyporus inflexibilis* Berk., *Hooker's J. Bot. Kew Gard. Misc.* 8: 199 (1856).

Fruiting body. — Basidiocarps perennial, pileate, corky, without odor or taste when fresh, becoming hard cork upon

Fig. 234 Basidiocarps of *Perenniporia inflexibilis*

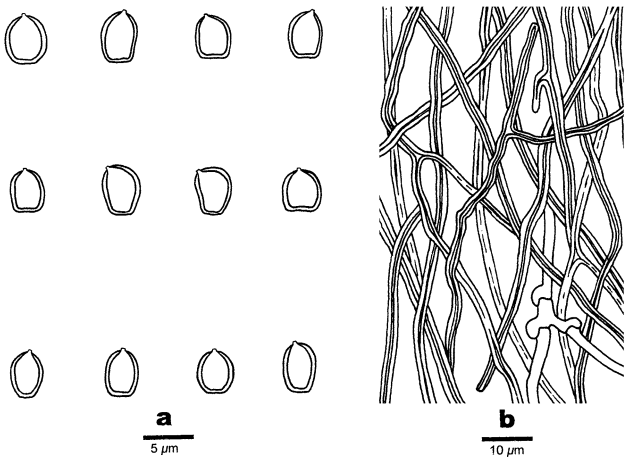

Fig. 235 Microscopic structures of *Perenniporia inflexibilis* (drawn from *Cui 8755*). **a**. Basidiospores; **b**. Hyphae from trama. Bars: **a** = 5 μm; **b** = 10 μm

drying. Pilei applanate, projecting up to 4.5 cm, 7.5 cm wide and 1 cm thick at base. Pileal surface dark gray to grayish brown, glabrous, concentrically sulcate with narrow zones. Pore surface gray to pale brown upon drying; pores tiny, round, 6–8 per mm; dissepiments thin, entire. Context thin, pale brown, corky, about 0.5 mm thick. Tubes concolorous with pore surface, woody hard, up to 9.5 mm thick.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, CB + ; tissues becoming pale olivaceous to brown in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, 2.2–2.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, frequently branched, interwoven, 2–3.3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, 1.9–2.3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, frequently branched, interwoven, 2.3–3.1 μm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 11.3–13.5 × 3–3.5 μm. Basidia barrel- to pear-shaped, with four sterigmata and a basal clamp connection, 10.9–13.3 × 6.9–7.5 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, truncate, hyaline to slightly yellowish, thick-walled, smooth, slightly dextrinoid, CB + , (4.7–)4.8–5.3(–5.4) × (3.6–)3.7–4.1(–4.2) μm, L = 4.9 μm, W = 3.9 μm, Q = 1.25–1.27 (n = 90/3).

Notes. — *Perenniporia inflexibilis* is characterized by pileate basidiocarps, gray to pale brown pore surface with small pores (6–8 per mm), and truncate, hyaline to slightly yellowish basidiospores. In addition, its tissues become pale olivaceous to brown in KOH. *Perenniporia tephropora* (Mont.) Ryvarden resembles *P. inflexibilis* by having pale brown pore surface, similar truncate basidiospores (4.5–6 × 3.5–4.5 μm), and tissues becoming pale olivaceous to brown in KOH. However, the former has resupinate basidiocarps, bigger pores (4–6 per mm), and unbranched skeletal hyphae (Núñez and Ryvarden 2001).

Specimens examined: **CHINA**. **Fujian**, Wuyishan County, Longchuan Valley, on dead branch of living *Castanopsis*, 16 October 2005, *Cui 2904* (BJFC). **Guangdong**, Shixing County, Chebaling Nature Reserve, on angiosperm stump, 24 November 2010, *Cui 8755, 8779* (BJFC).

Perenniporia isabellina (Pat. ex Sacc.) Ryvarden, *Occ. Pap. Farlow Herb.* 18: 22 (1983) (Figs. 236, 237)
MycoBank: MB 283597
Basionym: *Poria isabellina* Pat. ex Sacc., *Syll. Fung.* 9: 192 (1891).

Fruiting body. — Basidiocarps annual, resupinate, adnate, corky when dry, up to 7 cm long, 5 cm wide and 2.1 mm thick at center. Pore surface grayish orange to faintly ochraceous; pores round to angular, 3–4 per mm; dissepiments thin, entire. Subiculum thin, whitish to cream, paler than the tubes, up to 0.5 mm thick. Tubes grayish orange to faintly ochraceous, corky, up to 1.6 mm thick.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, 2–3.8 μm in diam; skeletal hyphae dominant, hyaline, thick-walled, branched, interwoven, 3–4 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, 1.8–3.2 μm in diam; skeletal hyphae dominant, hyaline, thick-walled, branched, interwoven, 3–3.3 μm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 16.1–24 × 4.8–6.5 μm. Basidia barrel-shaped, with four sterigmata and a basal clamp connection,

Fig. 236 Basidiocarps of *Perenniporia isabellina*

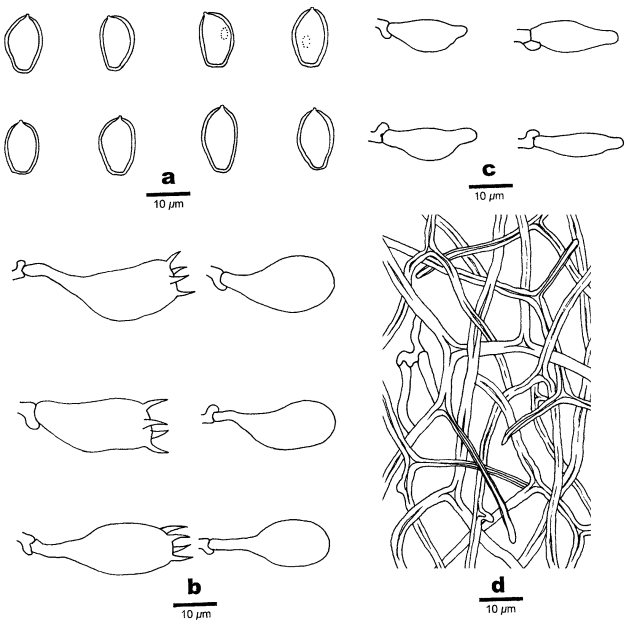

Fig. 237 Microscopic structures of *Perenniporia isabellina* (drawn from *Yuan 3904*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

17–25 × 9.9–12.2 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, truncate, hyaline, thick-walled, smooth, strongly dextrinoid, CB + , (10.9–)11–13.7(–14) × (6.5–)6.8–7.9(–8) μm, L = 12.3 μm, W = 7.3 μm, Q = 1.7 (n = 30/1).

Notes. — *Perenniporia isabelllina* is characterized by resupinate basidiocarps, grayish orange pores, large basidiospores. *Perenniporia piceicola* Y.C. Dai may be confused with *P. isabelllina* by sharing resupinate basidiocarps and similar pores, but the former species is distinguished by having pale yellowish pores, narrower basidiospores (11–14 × 5.4–7.5 μm) and presence of cystidia (Decock and Ryvarden 1999; Dai et al. 2002).

Specimen examined: **CHINA**. **Yunnan**, Baoshan, Gaoligongshan Nature Reserve, on angiosperm wood, 24 September 2007, *Yuan 3904* (IFP).

Perenniporia japonica (Yasuda) T. Hatt. & Ryvarden, *Mycotaxon* 50: 36 (1994) (Figs. 238, 239)
MycoBank: MB 361672
Basionym: *Trametes japonica* Yasuda, *Bot. Mag. Tokyo* 32: 356 (1918).

Fruiting body. — Basidiocarps annual to perennial, resupinate, corky when dry, up to 25 cm long, 6 cm wide and 4.5 mm thick at center. Pore surface white to pale buff when dry; pores round, 5–7 per mm; dissepiments thick, entire. Sterile margin narrow, with rhizomorphs. Subiculum thin, cream, up to 1 mm thick. Tubes concolorous with pore surface, corky, up to 3.5 mm thick.

Fig. 238 Basidiocarps of *Perenniporia japonica*

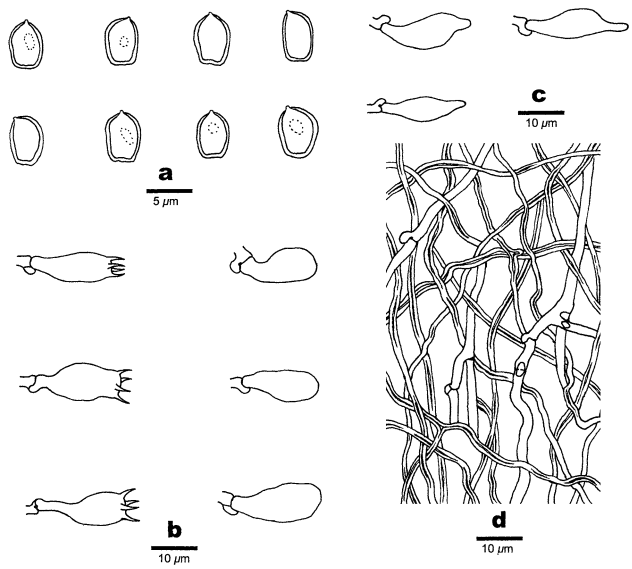

Fig. 239 Microscopic structures of *Perenniporia japonica* (drawn from *Dai 10654*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae weakly dextrinoid, CB + ; tissues darkening in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, branched, 2.3–4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled, branched, interwoven, 2.1–2.6 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, branched, 2.2–3.3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, rarely branched, interwoven, 1.4–2.4 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin- walled, 12.6–14.9 × 2.5–3.1 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 13.7–16.5 × 7.3–7.9 µm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, truncate, hyaline, thick-walled, smooth, dextrinoid, CB + , (3.9–)4.1–4.8(–5) × (3–)3.2–3.9(–4.1) µm, L = 4.46 µm, W = 3.53 µm, Q = 1.26–1.27 (n = 60/2).

Notes. — *Perenniporia tibetica* B.K. Cui & C.L. Zhao is similar to *P. japonica* by having resupinate basidiocarp and rhizomorphs, but it differs from *P. japonica* by bigger basidiospores (6.7–8.7 × 5.3–6.8 µm, Cui and Zhao 2012).

Specimens examined: **CHINA**. **Beijing**, Beijing Botanic Garden, on fallen angiosperm trunk, 6 September 2005, *Dai 7172A* (IFP); Beijing Zoo, on fallen angiosperm trunk, 27 September 2008, *Dai 10654* (BJFC). **Henan**, Xiuwu County, Yuntaishan, on fallen angiosperm trunk, 3 September 2009, *Cui 7226, 7230, 7243, 7246, 7256, 7257* (BJFC). **Liaoning**, Anshan, Qianshan Park, on fallen angiosperm trunk, 22 August 2005, *Dai 6936* (IFP). **Shandong**, Tai'an, Taishan Mountain, on fallen angiosperm trunk, 3 August 2010, *Cui 9178, 9181* (BJFC); 13 October 2003, *Dai 5315, 5316, 5320, 5321, 5326* (IFP). **Tianjing**, Ji County, Panshan Mountain, on fallen angiosperm trunk, 1 August 2009, *Cui 7002, 7032, 7047* (BJFC).

Perenniporia lacerata B.K. Cui & C.L. Zhao, *Mycoscience* 54: 232 (2013) (Figs. 240, 241)
MycoBank: MB 800937

Fruiting body. — Basidiocarps annual, resupinate, adnate, papery, without odor or taste when fresh, becoming corky upon drying, up to 9.5 cm long, 5.5 cm wide and 0.5 mm thick at center. Pore surface cream to buff when fresh, buff to yellowish buff upon drying; pores angular, 3–5 per mm; dissepiments thin, lacerate. Sterile margin narrow, cream, up to 0.5 mm wide. Subiculum cream, thin, up to 0.2 mm thick. Tubes concolorous with pore surface, corky, up to 0.3 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae weakly dextrinoid, CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 3–5.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 1–3.9 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 3.1–4.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 1–3.5 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 16–17.5 × 5–6 µm. Basidia clavate, with four sterigmata and a basal clamp connection,

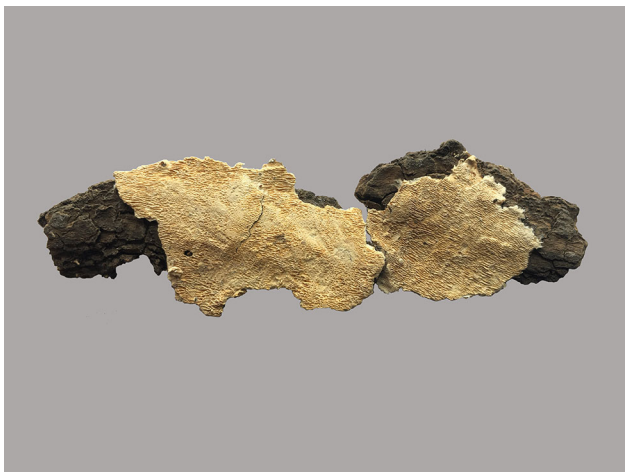

Fig. 240 Basidiocarps of *Perenniporia lacerata*

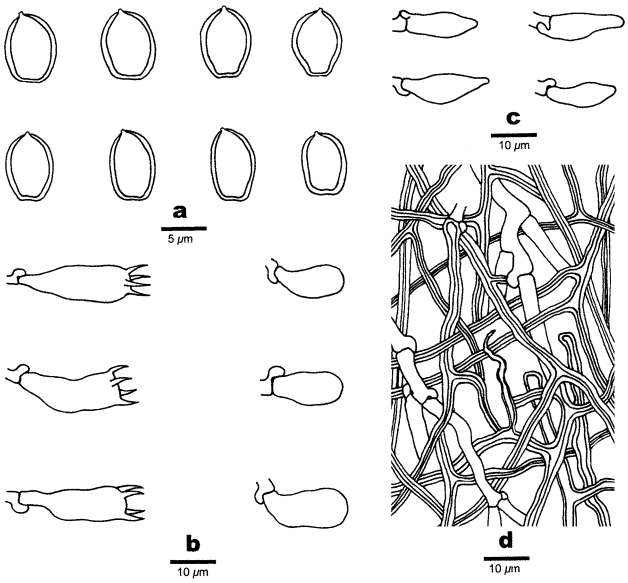

Fig. 241 Microscopic structures of *Perenniporia lacerata* (drawn from *Cui 7220*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 µm; **b–d** = 10 µm

16–20 × 8–9 µm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, truncate, hyaline, thick-walled, smooth, dextrinoid, CB + , (5.9–)6.1–7(–7.2) × (4.8–)5–5.7(–5.9) µm, L = 6.55 µm, W = 5.37 µm, Q = 1.13–1.29 (n = 90/3).

Notes. — *Perenniporia lacerata* is characterized by an annual habit, resupinate and papery basidiocarps with lacerate pores, a dimitic hyphal system with weakly dextrinoid skeletal hyphae, and ellipsoid, truncate, dextrinoid basidiospores (6.1–7 × 5–5.7 µm). *Perenniporia tenuis* (Schwein.) Ryvarden may be confused with *P. lacerata* by sharing resupinate basidiocarps and bigger pores (3–5 per mm). However, *P. tenuis* is distinguished from *P. lacerata* by having subparallel tramal hyphae, and smaller basidiospores (5.5–6.5 × 4.5–5 µm, Dai et al. 2002). *Perenniporia pyricola* Y.C. Dai & B.K. Cui is similar to *P. lacerata* in producing resupinate basidiocarps, truncate and dextrinoid basidiospores (6.3–7.6 × 4.8–6.5 µm). However, *P. pyricola* differs in perennial and thick basidiocarps with entire pores (Dai 2010b). *Perenniporia rosmarini* A. David & Malençon resembles *P. lacerata* by having truncate and dextrinoid basidiospores (6.5–7.5 × 5.5–6.5 µm), but it differs in having perennial basidiocarps with white to isabelline pore surface and smaller pores (6–7 per mm, Ryvarden and Melo 2014). *Perenniporia medulla-panis* (Jacq.) Donk is similar to *P. lacerata* by having resupinate basidiocarps and similar sized pores (4–5 per mm). However, *P. medulla-panis* has non-dextrinoid skeletal hyphae and smaller basidiospores (4.5–5.5 × 3.5–4.5 µm, Decock and Stalpers 2006).

Specimens examined: **CHINA**. **Henan**, Xiuwu County, Yuntaishan Park, on fallen angiosperm trunk, 3 September 2009, *Cui 7220* (holotype, BJFC); on rotten angiosperm wood, 22 September 2009, *Dai 11268* (paratype, BJFC). **Hubei**, Wufeng County, Houhe Nature Reserve, on fallen angiosperm trunk, 27 September 2004, *Wei 2208* (paratype, IFP).

Perenniporia luteola B.K. Cui & C.L. Zhao, *Mycoscience* 54: 235 (2013) (Figs. 242, 243)
MycoBank: MB 800938

Fruiting body. — Basidiocarps perennial, resupinate, adnate, corky, without odor or taste when fresh, becoming hard corky upon drying, up to 5.5 cm long, 3 cm wide and 2 mm thick at center. Pore surface buff to buff-yellow when fresh, buff-yellow upon drying; pores round, 4–6 per mm; dissepiments thin, entire. Sterile margin wide, cream to buff, up to 3 mm wide. Subiculum cinnamon-buff, thin, up to 0.5 mm thick. Tubes concolorous with pore surface, corky, up to 1.5 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 2–3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, usually unbranched, interwoven, 2.5–3.5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 1.7–2.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 2–3 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 16–18 × 4–6 µm; basidia barrel-shaped, with four sterigmata and a basal clamp connection, 19–22 × 8–10 µm; basidioles dominant, in shape similar to basidia, but slightly smaller.

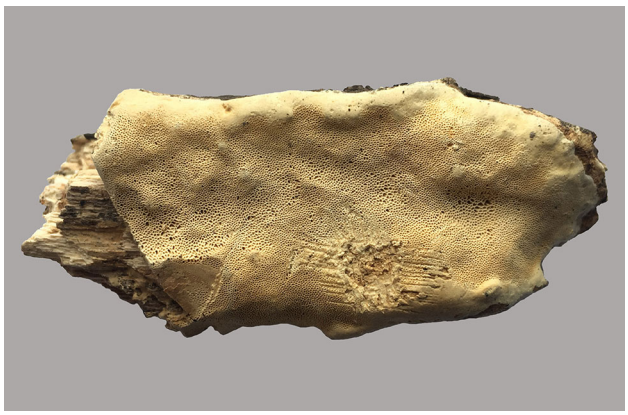

Fig. 242 Basidiocarps of *Perenniporia luteola*

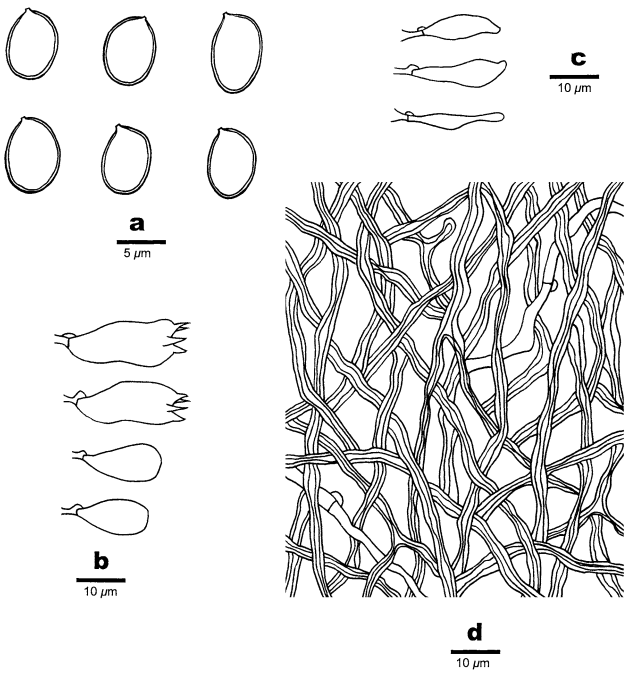

Fig. 243 Microscopic structures of *Perenniporia luteola* (drawn from *Harkonen 1308a*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 µm; **b–d** = 10 µm

Spores. — Basidiospores ellipsoid, non-truncate, hyaline, thick-walled, smooth, dextrinoid, CB +, (5.8–)6.1–6.9(–7) × (4.9–)5.1–5.4(–5.6) µm, L = 6.38 µm, W = 5.16 µm, Q = 1.23–1.24 (n = 60/2).

Notes. — *Perenniporia luteola* is characterized by a perennial habit, resupinate basidiocarps with buff-yellow pore surface, a dimitic hyphal system with dextrinoid skeletal hyphae, ellipsoid, non-truncate and dextrinoid basidiospores (6.1–6.9 × 5.1–5.4 µm). *Perenniporia bannaensis* may be confused with *P. luteola* by sharing a dimitic hyphal system with dextrinoid skeletal hyphae, ellipsoid, non-truncate and dextrinoid basidiospores. However, *P. bannaensis* is distinguished by its annual basidiocarps, smaller pores (6–8 per mm) and basidiospores (5.2–6 × 4–4.6 µm, Zhao et al. 2013a). *Perenniporia chromatica* (Berk. & Broome) Decock & Ryvarden and *P. luteola* share similar sized pores (4–5 per mm), a dimitic hyphal system, and dextrinoid basidiospores (5.2–6.7 × 4.1–5.9 µm), but *P. chromatica* differs in having arboriform hyphae and truncate basidiospores (Decock and Ryvarden 1999). *P. subacida* (Peck) Donk is similar to *P. luteola*, and they both have resupinate basidiocarps, a dimitic hyphal system, and non-truncate basidiospores. However, *P. subacida* has smaller basidiospores (4.5–6 × 3.5–4.5 µm, Ryvarden and Melo 2014; 4.3–5.4 × 3.2–4.1 µm, Dai et al. 2002). *Perenniporia subaurantiaca* (Rodway & Cleland) P.K. Buchanan & Ryvarden is similar to *P. luteola* by producing similar sized pores (4–6 per mm), a dimitic hyphal system, and non-truncate, strongly dextrinoid basidiospores. However, it differs by having cream to grayish orange pore surface and larger basidiospores (7.2–9.5 × 4.2–5.5 µm, Decock et al. 2000).

Specimens examined: **CHINA**. **Hunan**, Wugang County, Yunshan National Forest Park, on fallen angiosperm trunk, 19 September 2001, *Harkonen 1308a* (holotype, BJFC), *Harkonen 1308b* (paratype, BJFC).

Perenniporia maackiae (Bondartsev & Ljub.) Parmasto, *Ann. Bot. Fenn.* 32: 223 (1995) (Figs. 244, 245)
MycoBank: MB 413715
Basionym: *Fomitopsis maackiae* Bondartsev & Ljub., *Botanicheskie Materialy* 15: 103 (1962).

Fruiting body. — Basidiocarps annual to perennial, resupinate to reflexed-effused, hard corky when dry, when resupinate up to 30 cm long, 5 cm wide and up to 5.5 mm thick at center. Pore surface cream to yellow when fresh, honey yellowish when dry; pores tiny, round, 6–8 per mm; dissepiments thin to thick, entire. Sterile margin narrow, cream to yellowish buff. Subiculum thin, up to 1.5 mm thick. Tubes concolorous with pore surface, hard corky, up to 4 mm thick.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB +; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, branched, 2.2–2.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 3.1–5.3 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, branched, 2–2.3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 3–5 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 11.1–15.1 × 3.6–4.1 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 11–15.8 ×

Fig. 244 Basidiocarps of *Perenniporia maackiae*

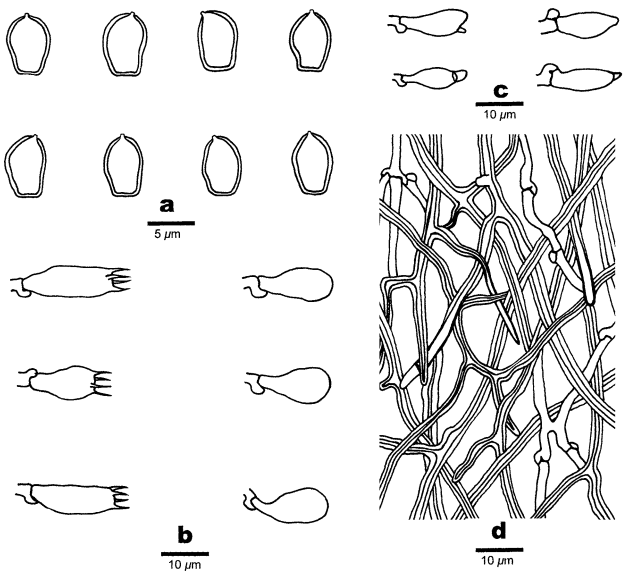

Fig. 245 Microscopic structures of *Perenniporia maackiae* (drawn from *Cui 10092*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 µm; **b–d** = 10 µm

5–7.5 µm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, truncate, hyaline, thick-walled, smooth, dextrinoid, CB + , (5.2–)5.4–6.1(–6.3) × (3.7–)3.9–4.9(–5.2) µm, L = 5.86 µm, W = 4.21 µm, Q = 1.39 (n = 30/1).

Notes. — *Perenniporia corticola* and *P. maackiae* share similar characters by having yellowish pore surface, but it differs by its smaller basidiospores (4–5 × 3–4 µm, Núñez and Ryvarden 2001).

Specimens examined: **CHINA**. **Heilongjiang**, Anning County, Jingbohu Park, on fallen trunk of *Maackia*, 10 September 2007, *Dai 8929* (IFP). **Jilin**, Antu County, Changbaishan Nature Reserve, on fallen trunk of *Maackia*, 21 September 2002, *Dai 3919* (IFP); Fusong County, Lushuihe Forest Farm, on fallen trunk of *Maackia*, 11 August 2011, *Cui 10092, 10097* (BJFC); 26 August 2005, *Dai 6992* (IFP). **Liaoning**, Kuandian County, Tianhua Mountain, on fallen trunk of *Maackia*, 29 July 2008, *Dai 5605* (IFP).

Perenniporia macropora B.K. Cui & C.L. Zhao, *Mycologia* 105: 947 (2013) (Figs. 246, 247)
MycoBank: MB 800567

Fruiting body. — Basidiocarps annual, resupinate, adnate, soft when fresh, becoming corky upon drying, up to 2.5 cm long, 1.5 cm wide and 1 mm thick at center. Pore surface cream when fresh, becoming cream buff upon drying; pores angular, 2–3 per mm; dissepiments thin, entire. Sterile margin narrow, cream, up to 0.5 mm wide. Subiculum cream, thin, up to 0.2 mm thick. Tubes concolorous with pore surface, corky, up to 0.8 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, unbranched, 2–4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, branched, interwoven, 2.5–3.5 µm in diam.

Fig. 246 Basidiocarps of *Perenniporia macropora*

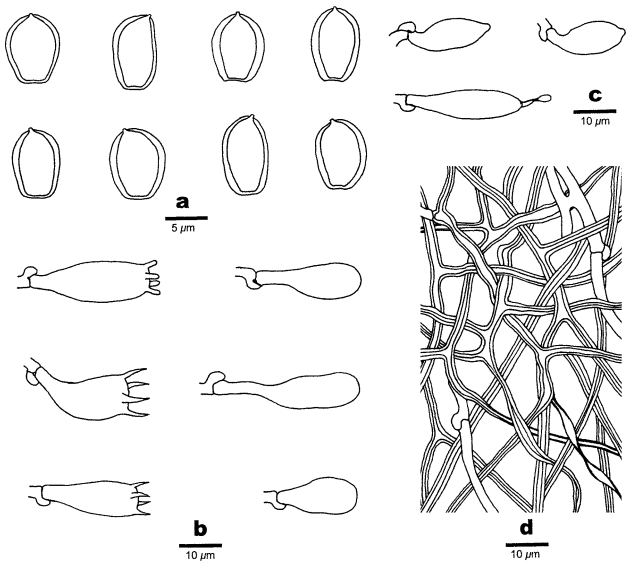

Fig. 247 Microscopic structures of *Perenniporia macropora* (drawn from *Zhou 407*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 µm; **b–d** = 10 µm

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, unbranched, 2–3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, branched, interwoven, 2–3 µm wide. Dendrohyphidia present at the dissepiments. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 16–17.5 × 3–5 µm. Basidia barrel- to pear-shaped, with four sterigmata and a basal clamp connection, 15.5–21 × 9–10 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid to broadly ellipsoid, truncate, hyaline, thick-walled, smooth, dextrinoid, CB + , (6.5–)7–8.5(–8.8) × (5–)5.5–6.5(–7) µm, L = 7.7 µm, W = 5.9 µm, Q = 1.24–1.37 (n = 90/3).

Notes. — *Perenniporia dendrohyphidia* resembles *P. macropora* by having annual resupinate basidiocarps with a cream pore surface, dimitic hyphal system, and presence of dendrohyphidia. However, *P. dendrohyphidia* differs in having smaller pores (6–8 per mm) and basidiospores (5.3–6.3 × 4.3–5.5 µm, Decock 2001b). *Perenniporia pyricola* may be confused with *P. macropora* as they produce resupinate basidiocarps with cream buff pore surface, a dimitic hyphal system with dextrinoid and branched skeletal hyphae, and similar basidiospores (6.3–7.6 × 4.8–6.5 µm). However, *P. pyricola* differs in its perennial basidiocarps and smaller pores (3–5 per mm, Dai 2010b).

Specimens examined: **CHINA**. **Guangxi**, Ningming County, Nonggang Nature Reserve, on a fallen angiosperm branch, 7 July 2007, *Zhou 280*, *297* (paratypes, IFP); 8 July 2007, *Zhou 407* (holotype, IFP).

Perenniporia medulla-panis (Jacq.) Donk, *Persoonia* 5: 76 (1967) (Figs. 248, 249)
MycoBank: MB 335815
Basionym: *Boletus medulla-panis* Jacq., *Miscell. Austriac.* 1: 141 (1778).

Fruiting body. — Basidiocarps annual to perennial, usually resupinate, corky when dry, up to 8 cm long, 3.5 cm wide and 5 mm thick at center. Pore surface white when fresh, white to cream when dry; pores round, 4–6 per mm; dissepiments thick, entire. Subiculum thin, cream, up to 1 mm thick. Tubes concolorous with pore surface, corky, up to 4 mm thick.

Fig. 248 Basidiocarps of *Perenniporia medulla-panis*

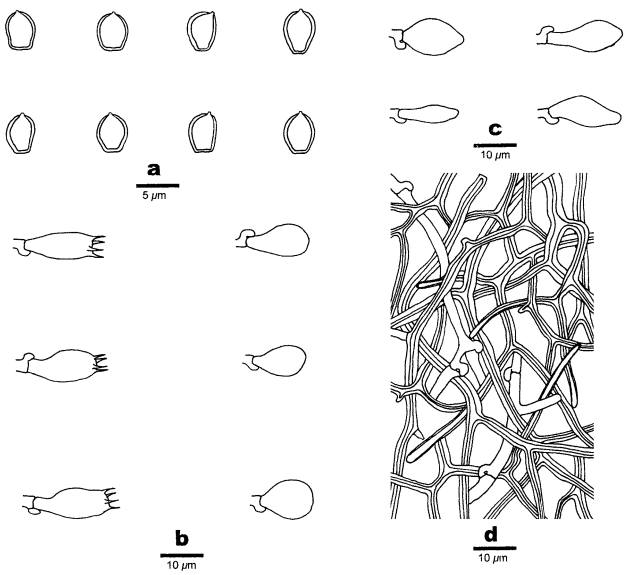

Fig. 249 Microscopic structures of *Perenniporia medulla-panis* (drawn from *Dai 1457*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

Hyphal structure. — Hyphal system dimitic to trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae dextrinoid, CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, branched, 2.5–4 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 1.5–2.1 μm in diam; binding hyphae hyaline, thick-walled, frequently branched, flexuous, interwoven, 0.7–1 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, branched, 2.1–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 1.5–2.1 μm in diam; binding hyphae hyaline, thick-walled, frequently branched, flexuous, interwoven, 0.7–1 μm in diam. Cystidia absent, fusoid cystidioles present, hyaline, thin-walled, 10–19.8 × 1.5–6.1 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 10.5–20.5 × 5–9.9 μm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, truncate, hyaline, thick-walled, smooth, dextrinoid, CB + , (4.7–)4.9–5.5(–6) × (3.7–)3.9–4.5(–4.8) μm, L = 5.07 μm, W = 3.99 μm, Q = 1.25–1.28 (n = 60/3).

Notes. — *Perenniporia albo-incarnata* (Pat. & Gaillard) Decock & Ryvarden is similar to *P. medulla-panis* by having resupinate basidiocarps and truncate, dextrinoid basidiospores, but it differs from *P. medulla-panis* by having larger basidiospores (6–7 × 5–6 μm, Decock and Ryvarden 2011). *Perenniporia guyanensis* Decock & Ryvarden and *P. medulla-panis* share similar basidiospores (5–5.5 × 4–4.5 μm), but it differs by its smaller pores (8–9 per mm, Decock and Ryvarden 2011).

Specimens examined: **CHINA**. **Anhui**, Huangshan, Huangshan Mountain, on fallen angiosperm trunk, 11 October 2004, *Dai 6061, 6073* (IFP); 12 October 2004, *Cui 6099* (BJFC). **Fujian**, Wuyishan County, Wuyishan Nature Reserve, on fallen angiosperm trunk, 21 October 2005, *Dai 7332* (IFP); 23 October 2005, *Cui 3274* (IFP); Taoyuanyu, on fallen angiosperm trunk, 28 August, 2006, *Cui 4157* (BJFC). **Guangdong**, Shixing County, Chebaling Nature Reserve, on fallen angiosperm trunk, 24 November 2010, *Cui 8749* (BJFC). **Guangxi,** Nanning, Damingshan, on fallen angiosperm trunk, 11 July 2007, *Zhou 497* (IFP). **Hainan**, Lingshui County, Diaoluoshan Nature Reserve, on fallen angiosperm trunk, 20 November 2007, *Dai 932, 9328* (IFP); 21 November 2007, *Dai 9363* (IFP); Changjiang County, Bawangling Nature Reserve, on fallen angiosperm trunk, 8 May 2009, *Dai 10780* (BJFC). **Hunan**, Zhangjiajie, Zhangjiajie Forestry Park, on fallen angiosperm trunk, 17 August, 2010, *Dai 11663* (BJFC). **Jilin**, Huinan County, on fallen angiosperm trunk, 10

October 1993, *Dai 1457* (IFP); Huadian County, on fallen angiosperm trunk, 16 October 1993, *Dai 1632* (IFP); Fusong County, Lushuihe Forest Farm, on fallen angiosperm trunk, 11 August, 2011 *Cui 10098*, *10111* (BJFC). **Jiangxi**, Jinggangshan County, Jinggang Mountain, on fallen angiosperm trunk, 23 September 2008, *Dai 10592* (BJFC); Fenyi County, Dagang Mountain, on fallen angiosperm trunk, 17 September 2008, *Dai 10393* (BJFC). **Shanxi**, Jiaocheng County, Pangquangou Nature Reserve, on fallen angiosperm trunk, 20 October 2004, *Yuan 1111* (IFP). **Yunan**, Baoshan, Gaoligongshan Nature Reserve, Baihualing, on fallen angiosperm trunk, 22 September 2007, *Yuan 3809* (IFP); Pingbian County, Daweishan Forest Park, on fallen angiosperm trunk, 5 June 2011, *Dai 12197*, *12205* (BJFC). **Zhejiang**, Lin'an County, Tianmushan Nature Reserve, on fallen angiosperm trunk, 15 October 2004, *Cui 6348a* (BJFC); 9 October 2005, *Cui 2541, 2599* (BJFC); 11 October 2005, *Cui 2696* (BJFC).

Perenniporia minor Y.C. Dai & H.X. Xiong, *Mycotaxon* 105: 60 (2008) (Figs. 250, 251)
MycoBank: MB 511703

Fruiting body. — Basidiocarps annual, pileate, solitary, soft corky, without distinct odor or taste when fresh, hard corky when dry. Pilei semicircular to spathulate, projecting up to 0.8 cm, 1 cm wide and 0.3 cm thick at base. Pileal surface cream to pale buff when fresh, smooth, indistinctly concentrically zonate, becoming cinnamon-buff to pale brick, distinctly concentrically zonate or sulcate when dry. Pore surface cream when fresh, becoming cinnamon-buff when dry; pores round, 4–6 per mm; dissepiments fairly thick, entire. Context white when fresh, becoming cream and corky when dry, up to 0.1 cm thick, with a very thin cuticle present at the upper surface, cinnamon-buff. Tubes concolorous with pore surface, darker than context, hard corky, up to 0.2 cm long.

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

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2.5–3.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, occasionally branched, flexuous, interwoven, 2.5–4.5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, occasionally branched, interwoven, 2–4 µm in diam. Cystidia and cystidioles absent. Basidia barrel-shaped to clavate, with four sterigmata and a basal clamp connection, 13–16 × 4.5–6.5 µm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Fig. 250 A basidiocarp of *Perenniporia minor*

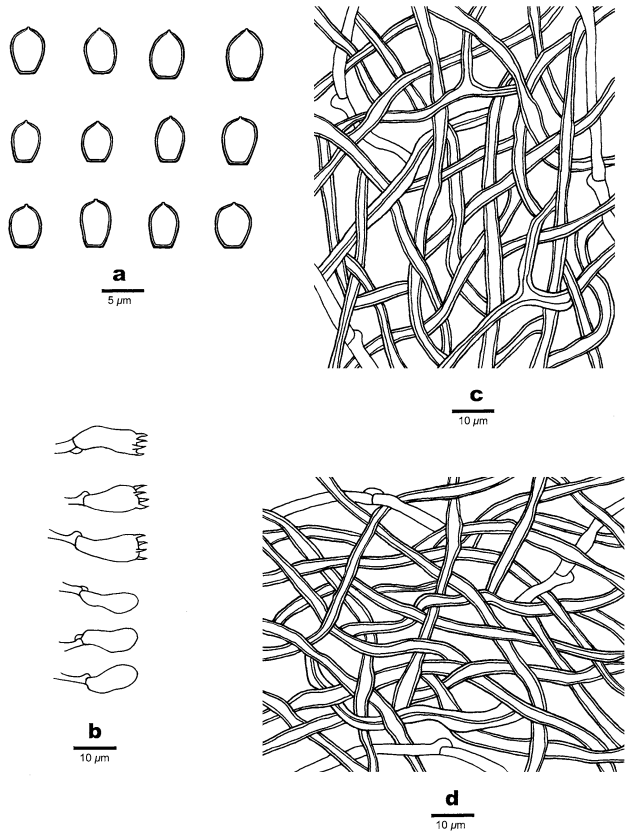

Fig. 251 Microscopic structures of *Perenniporia minor* (drawn from *Dai 9198*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 µm; **b–d** = 10 µm

Spores. — Basidiospores ellipsoid, truncate, hyaline, thick-walled, smooth, usually with a small guttule, dextrinoid, CB + , (4.5–)4.9–6.2(–7) × (3.5–)3.8–4.5(–4.8) µm, L = 5.4 µm, W = 4.2 µm, Q = 1.25–1.35 (n = 120/4).

Notes. — *Truncospora ochroleuca* (Berk.) Pilát and *T. ohiensis* (Berk.) Pilát share similar characters with *Perenniporia minor* by having small basidiocarps. However, *T.*

ochroleuca is distinguished from *P. minor* by having cream to ochraceous pilei and larger basidiospores (14–17 × 7–9.5 µm, Decock 2011). *T. ohiensis* differs by its perennial basidiocarps, smaller pores (5–7 per mm), and larger basidiospores (13–16 × 7–10 µm, Gilbertson and Ryvarden 1987).

Specimens examined: **CHINA**. **Jilin**, Antu county, Changbaishan Nature Reserve, Huangsongpu, on fallen branch of *Acer*, 14 September 2007, *Dai 9198* (holotype, IFP); on fallen angiosperm branch, 29 November 2007, *Wei 3500* (paratype, IFP); Fusong County, Lushuihe, Hongwei, on fallen angiosperm branch, 28 November 2007, *Wei 3467* (paratype, IFP). **Liaoning**, Huanren County, Laotudingzi Nature Reserve, on fallen branch of *Quercus*, 31 July 2008, *Cui 5738* (BJFC); 1 August 2008, *Cui 5782* (BJFC).

Perenniporia minutissima (Yasuda) T. Hatt. & Ryvarden, *Mycotaxon* 50: 37 (1994) (Figs. 252, 253)
MycoBank: MB 361673
Basionym: *Trametes minutissima* Yasuda, *Bot. Mag. Tokyo* 34: 29 (1920).

Fruiting body. — Basidiocarps annual, pileate, solitary or imbricate, corky, without distinct odor or taste when fresh, becoming rigidly osseous upon drying. Pilei triquetrous to irregular, projecting up to 6 cm, 8 cm wide and 8 cm thick at base. Pileal surface orange brown to dark reddish brown, azonate, verrucose; margin yellowish brown, obtuse. Pore surface cream when fresh, becoming yellowish brown to ochraceous-tawny when dry; pores angular, 3–5 per mm; dissepiments thin, entire. Context cream to buff-yellow, rigidly osseous, azonate, up to 2 cm thick. Tubes cream buff to yellowish brown, rigidly osseous, up to 1 cm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae very weakly dextrinoid, contextual hyphae CB–, tramal hyphae CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.5–3.6 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a distinct lumen, readily branched, interwoven, 2.2–4.6 µm in diam.

Tubes. — Generative hyphae hyaline, thin-walled, rarely branched, 1.5–3.2 µm in diam; skeletal hyphae dominant, hyaline, thick walled with a narrow lumen, frequently branched, interwoven, 2.1–4.2 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 17–34 × 3–7 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 18.7–30 × 7.2–13 µm; basidioles mostly clavate, slightly smaller than basidia.

Spores. — Basidiospores oblong-ellipsoid, truncate or not, hyaline, thick-walled, smooth, very weakly dextrinoid, CB + , (9–)9.9–12.8(–13.7) × (5–)5.9–7.8(–8) µm, L = 11.5 µm, W = 6.81 µm, Q = 1.68–1.71 (n = 120/4).

Fig. 252 Basidiocarps of *Perenniporia minutissima*

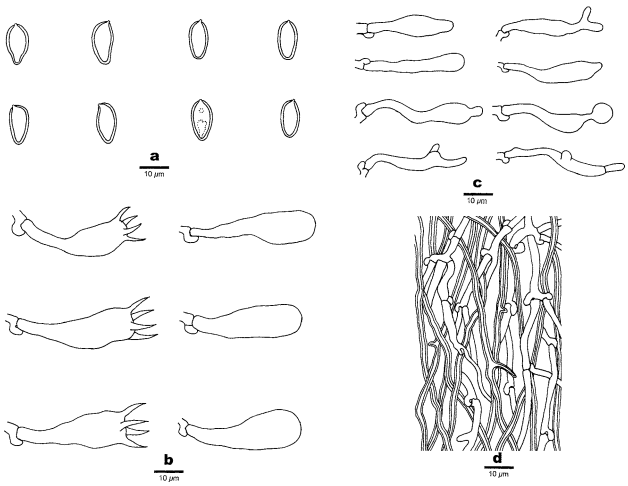

Fig. 253 Microscopic structures of *Perenniporia minutissima* (drawn from *Dai 13417*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 µm

Notes. — *Truncospora ochroleuca* is similar to *P. minutissima* with large, truncate basidiospores, but it differs from *P. minutissima* by having smaller, corky basidiocarps (Núñez and Ryvarden 2001).

Specimens examined: **CHINA**. **Hunan**, Changsha, Yuelu Mountain, on angiosperm stump, 14 July 2011, *Dai 12455, 12457* (BJFC); 4 December 2002, *Dai 3574* (IFP). **Hubei**, Wuhan, on rotten angiosperm stump, 8 July 2010, *Dai 11643* (BJFC). **Jiangsu**, Nanjing, Zijin Mountain, on angiosperm stump, 31 July 2003, *Wei 1058, 1059* (IFP); 11 October 2003, *Dai 5257* (IFP); 22 August 2006, *Dai 4016* (IFP). **Jiangxi**, Jiujiang, Lushan Mountain, on angiosperm stump, 9 October 2008, *Cui 6053* (BJFC). **Shandong**, Taian, Taishan Mountain, on stump of *Symplocos*, 4 August 2012, *Cui 10979* (BJFC). **Zhejiang**, Lin'an

County, Tianmushan Nature Reserve, on base of dead angiosperm tree, 15 October 2004, *Dai 6402* (IFP); on fallen angiosperm branch, 16 October 2004, *Dai 6425* (IFP); on angiosperm stump, 9 October 2005, *Dai 2573* (IFP); 12 October 2005, *Cui 2721*, *2738* (IFP).

Perenniporia nanlingensis B.K. Cui & C.L. Zhao, *Mycol. Prog.* 11: 556 (2012) (Figs. 254, 255)
MycoBank: MB 561625

Fruiting body. — Basidiocarps annual, resupinate, adnate, corky, without odor or taste when fresh, becoming hard corky upon drying, up to 35 cm long, 10 cm wide and 5.5 mm thick at center. Pore surface cream-buff to yellowish buff when fresh, pinkish buff to cinnamon-buff upon drying; pores round, 6–7 per mm; dissepiments thick, entire. Sterile margin narrow, cream-buff, up to 1 mm wide. Subiculum cream to buff, thin, up to 0.5 mm thick. Tubes concolorous with pore surface, hard corky, up to 5 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae weakly dextrinoid, CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 2.5–3.8 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, branched, interwoven, 2.6–5.2 µm in diam; binding hyphae hyaline, thick-walled, frequently branched, flexuous, interwoven, 1.5–2.5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, unbranched, 2.8–3.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, branched, interwoven, 2.9–5 µm; binding hyphae hyaline, thick-walled, frequently branched, interwoven, 1.1–2.7 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 10–13 × 4.2–6 µm. Basidia

Fig. 254 Basidiocarps of *Perenniporia nanlingensis*

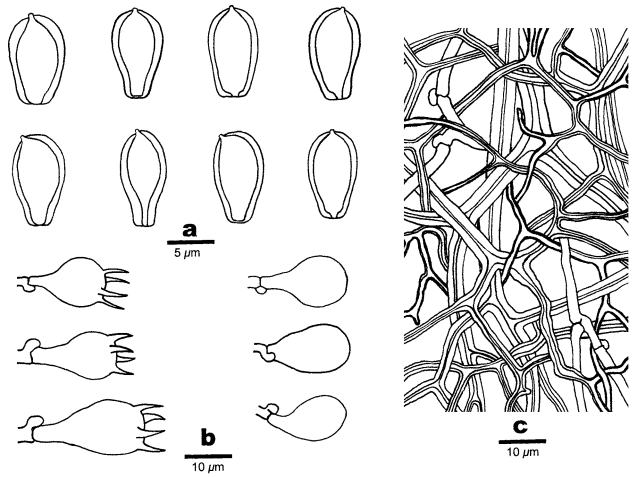

Fig. 255 Microscopic structures of *Perenniporia nanlingensis* (drawn from *Cui 7589*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 µm; **b–c** = 10 µm

barrel-shaped, with four sterigmata and a basal clamp connection, 10.2–11.1 × 8.2–9.3 µm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, distinctly truncate, hyaline, thick-walled, smooth, strongly dextrinoid, CB + , (8.8–)9–9.8(–10) × (4.9–)5–5.9(–6) µm, L = 9.32 µm, W = 5.39 µm, Q = 1.7–1.76 (n = 90/3).

Notes. — Morphologically, *Perenniporia nanlingensis* may be confused with *P. subacida* by sharing resupinate basidiocarps and buff to cinnamon-buff pore surface (Núñez and Ryvarden 2001), but the latter species is distinguished from *P. nanlingensis* by having perennial basidiocarps and smaller basidiospores (4.3–5.4 × 3.2–4.1 µm, Dai et al. 2002). *Perenniporia straminea* (Bres.) Ryvarden is similar to *P. nanlingensis*, both have an annual growth habit, resupinate basidiocarps, similar pores (6–7 per mm), and truncate basidiospores. However, *P. straminea* is distinguished from *P. nanlingensis* by having distinctly smaller basidiospores (3.2–4 × 2.4–3 µm, Cui et al. 2010).

Specimens examined: **CHINA**. **Anhui**, Huangshan, Huangshan Mountain, on dead angiosperm tree, 12 October 2004, *Cui 1221* (BJFC). **Guangdong**, Ruyang County, Nanling Nature Reserve, on dead angiosperm tree, 16 September 2009, *Cui 7589* (holotype, BJFC), *Cui 7541*, *7620* (paratypes, BJFC). **Guangxi**, Nanning, Damingshan, on fallen angiosperm trunk, 11 July 2007, *Zhou 447, 496* (IFP). **Zhejiang**, Lin'an County, Tianmushan Nature Reserve, 9 October 2005, *Cui 2542* (BJFC).

Perenniporia piceicola Y.C. Dai, *Ann. Bot. Fenn.* 39: 173, 2002 (Figs. 256, 257)
MycoBank: MB 373657

Fruiting body. — Basidiocarps annual to biennial, resupinate, soft corky when fresh, becoming tough corky

Fig. 256 Basidiocarps of *Perenniporia piceicola*

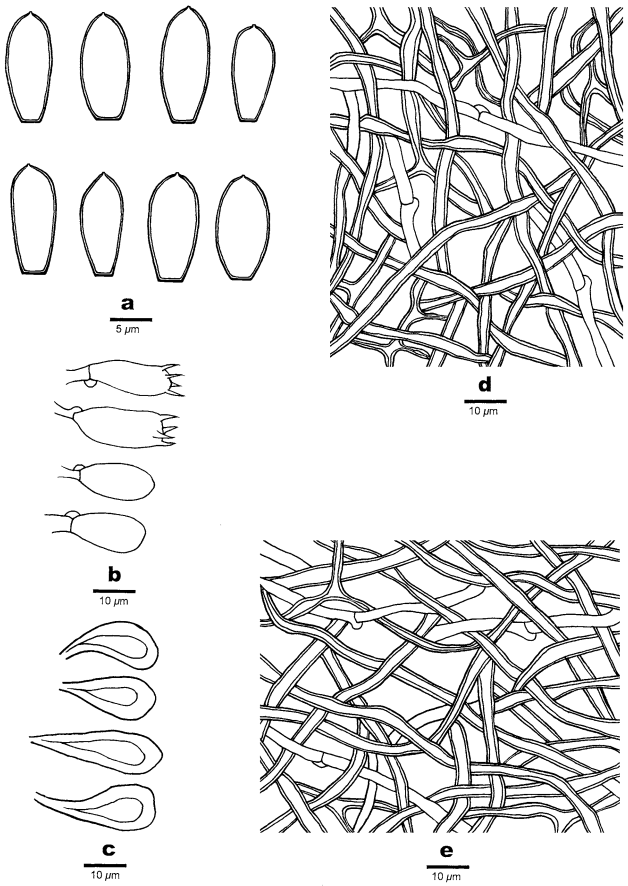

Fig. 257 Microscopic structures of *Perenniporia piceicola* (drawn from *Dai 3089*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidia; **d**. Hyphae from trama; **e**. Hyphae from context. Bars: **a** = 5 µm; **b–e** = 10 µm

when dry, up to 5 cm long, 5 cm wide and 5 mm thick at center. Pore surface cream to buff when fresh, cream buff to yellowish buff upon drying; pores round, 2–3 per mm; dissepiments thin, entire. Subiculum ochraceous, corky, up to 2 mm thick. Tubes yellowish ochraceous or straw colored, corky, up to 3 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae slightly dextrinoid, CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae frequent, hyaline, thin-walled, occasionally branched, 2–4.6 µm in diam; skeletal hyphae dominant, hyaline, thick-walled, branched, flexuous, 3–5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, frequently branched, 2–3.2 µm in diam; skeletal hyphae dominant, hyaline, thick-walled, flexuous, 2.5–4.5 µm in diam. Cystidia usually infrequent, but sometimes common, pear-shaped, thick-walled, smooth, strongly CB + , 25–40 × 8–14 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 23–27 × 8–11 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, truncate, hyaline, fairly thick-walled, smooth, slightly dextrinoid, CB + , (10–) 11–14 (–16) × (5–) 5.4–7.5(–8) µm, L = 12.73 µm, W = 6.39 µm. Q = 1.99 (n = 60/1).

Notes. — *Perenniporia piceicola* is characterized by its resupinate basidiocarps, presence of cystidia, and growing on *Picea* (Dai et al. 2002).

Specimens examined: **CHINA**. **Sichuan**, Jiuzhaigou County, Jiuzhaigou Nature Reserve, on fallen trunk of *Picea*, 14 October 2002, *Dai 4184* (IFP). **Yunnan**, Lijiang, Yunshanping, on fallen trunk of *Picea*, 18 June 1999, *Dai 3089* (holotype, IFP & H); Weixi County, Laojun Mountain, on fallen trunk of *Picea*, 22 September 2011, *Cui 10460* (BJFC).

Perenniporia pyricola Y.C. Dai & B.K. Cui, *Mycosystema* 29: 815 (2010) (Figs. 258, 259)
MycoBank: MB 516782

Fruiting body. — Basidiocarps perennial, resupinate, adnate, corky, without odor or taste when fresh, becoming hard corky upon drying, up to 20 cm long, 8 cm wide and 1.2 cm thick at center. Pore surface cream to cinnamon-buff when fresh, pale yellowish buff upon drying; pores round to angular, 3–5 per mm; dissepiments thin, entire. Sterile margin cream to cream buff, up to 1 mm wide. Subiculum thin, cream buff, hard corky, azonate, up to 0.2 mm thick. Tubes concolorous with the pore surface, hard corky, up to 1 cm long, distinctly stratified.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, moderately CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.8–3.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, occasionally branched, flexuous, interwoven, 2–4.2 µm in diam.

Fig. 258 Basidiocarps of *Perenniporia pyricola*

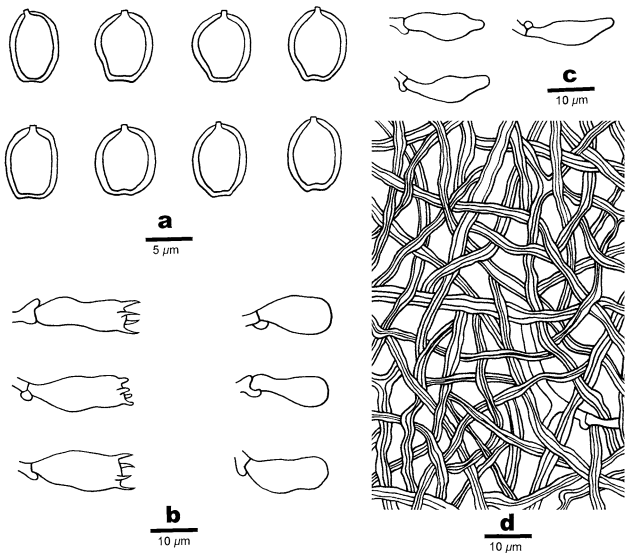

Fig. 259 Microscopic structures of *Perenniporia pyricola* (drawn from *Cui 5896*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.5–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, occasionally branched, flexuous, interwoven, 1.7–4 μm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 13–19 × 4.5–7 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 17–26 × 5–8 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, usually truncate, hyaline, thick-walled, smooth, dextrinoid, CB + , (5.8–)6.3–7.6(–8.1) × (4–)4.8–6.5(–7) μm, L = 7.03 μm, W = 5.33 μm, Q = 1.27–1.35 (n = 90/3).

Notes. — *Perenniporia medulla-panis* resembles *P. pyricola* by having similar pores, but its skeletal hyphae are non-dextrinoid, and its basidiospores are smaller (4.5–5 × 3.2–3.8 μm, Dai et al. 2002). *Perenniporia tenuis* may be confused with *P. pyricola* by more or less similar macro-morphology, but its pores are more yellowish. In addition, it is readily distinguished from *P. pyricola* by smaller basidiospores (5.5–6.5 × 4.5–5.5 μm, Dai et al. 2002).

Specimens examined: **CHINA**. **Beijing**, campus of Beijing Forestry University, on living tree of *Prunus*, 3 September 2008, *Cui 5896* (BJFC); Beijing Botanic Garden, on living tree of *Prunus*, 27 September 2008, *Dai 10647, 10634* (BJFC); 27 July 2009, *Cui 6777, 6776, 6775* (BJFC); 11 July 2010, *Cui 9149* (BJFC). **Hebei**, Laishui County, Beixinzhuang, on living tree of *Prunus*, 25 August 2008, *Cui 5893* (BJFC); Laishui, on living tree of *Prunus*, 10 August 2009, *Cui 7119* (BJFC). **Liaoning**, Anshan, Qianshan Mountain, on living tree of *Pyrus*, 5 August 2008, *Dai 10265* (holotype, BJFC); 12 August 2004, *Dai 5785, 5825* (paratypes, IFP).

Perenniporia rhizomorpha B.K. Cui, Y.C. Dai & Decock, *Mycotaxon* 99: 176 (2007) (Figs. 260, 261)
MycoBank: MB 510573

Fruiting body. — Basidiocarps annual, resupinate, adnate, corky, without odor or taste when fresh, becoming corky upon drying, up to 15 cm long, 4 cm wide and 3 mm thick at center. Pore surface cream buff to yellow-buff when fresh, buff to buff-yellow upon drying; pores round to angular, 4–6 per mm; dissepiments thin, entire. Sterile margin wide, cream buff to buff-yellow, up to 1 mm wide, usually with rhizomorphs. Subiculum cream to buff, corky, thin, up to 1 mm thick. Tubes concolorous with pore surface, corky, up to 2 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.5–3.3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen,

Fig. 260 Basidiocarps of *Perenniporia rhizomorpha*

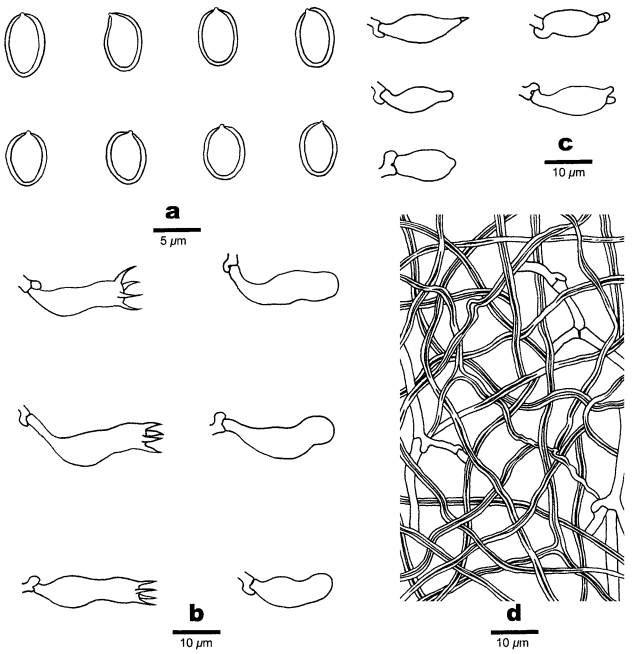

Fig. 261 Microscopic structures of *Perenniporia rhizomorpha* (drawn from *Dai 6165*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

rarely branched, interwoven, usually encrusted with fine crystals, 2.3–4.2 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 1.4–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, occasionally branched, interwoven, 1.6–3 μm in diam. Cystidia and cystidioles absent. Basidia and basidioles not seen.

Spores. — Basidiospores ellipsoid, non-truncate, hyaline, thick-walled, smooth, dextrinoid, CB + , (5–)5.3–6.5(–7) × (4–)4.2–5.5(–6) μm, L = 5.96 μm, W = 4.78 μm, Q = 1.22–1.28 (n = 90/3).

Notes. — *Perenniporia bannaensis* is similar to *P. rhizomorpha* by having non-truncate basidiospores, but it differs by smaller pores (6–8 per mm) and unbranched, strongly dextrinoid skeketal hyphae (Zhao et al. 2013a).

Specimens examined: **CHINA**. **Anhui**, Huangshan, Yellow Mountain, on fallen angiosperm trunk, 13 October 2004, *Dai 6165* (holotype, IFP), *Dai 6166* (paratype, IFP). **Fujian**, Wuyishan County, Wuyishan Nature Reserve, on fallen angiosperm branch, 19 October 2005, *Dai 7248* (paratype, IFP).

Perenniporia russeimarginata B.K. Cui & C.L. Zhao, *Mycologia* 105: 947 (2013) (Figs. 262, 263)
MycoBank: MB 800568

Fruiting body. — Basidiocarps perennial, resupinate, adnate, soft corky when fresh, becoming corky upon drying, up to 8 cm long, 5 cm wide and 7 mm thick at center. Pore surface white to cream when fresh, becoming cream upon drying; pores round, 6–8 per mm; dissepiments thick, entire. Sterile margin distinct, reddish-brown, up to 6 mm wide. Subiculum pinkish buff, thin, up to 0.5 mm thick. Tubes cinnamon-buff, slightly darker than pore surface, corky, up to 6.5 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, unbranched, 1.5–2 μm in diam; skeletal hyphae dominant, hyaline, thick-walled, branched, interwoven, 1.5–2 μm in diam.

Fig. 262 Basidiocarps of *Perenniporia russeimarginata*

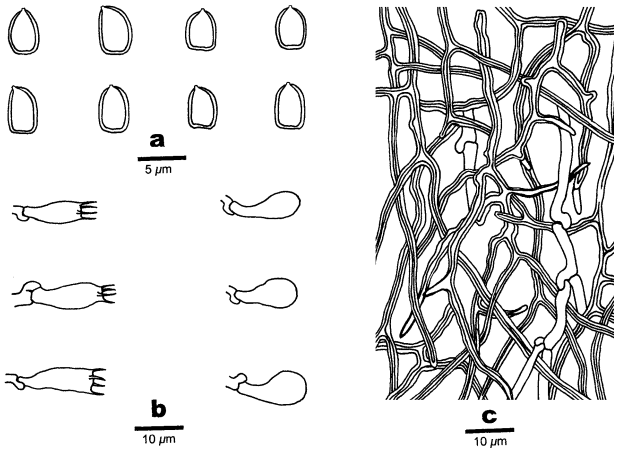

Fig. 263 Microscopic structures of *Perenniporia russeimarginata* (drawn from *Yuan 1225*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 μm; **b–c** = 10 μm

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, unbranched, 1–1.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled, branched, interwoven, 1–2 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 11–12.5 × 2.5–3 µm. Basidia pear-shaped, with four sterigmata and a basal clamp connection, 9 × 6–7 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, truncate, hyaline, thick-walled, smooth, dextrinoid, CB +, (3.5–)4–5 × (2.5–)3–4 µm, L = 4.4 µm, W = 3.3 µm, Q = 1.31–1.36 (n = 90/3).

Notes. — *Perenniporia alboferruginea* Decock was described from Cameroon in Africa, and it is similar to *P. russeimarginata* with its ferruginous red upper margin of basidiocarps and a dimitic hyphal system, but it differs from *P. russeimarginata* in having annual basidiocarps, bigger pores (5–6 per mm), and non-dextrinoid basidiospores (4.5–5.8 × 3–4 µm, Decock et al. 2011). *Perenniporia medulla-panis* is similar to *P. russeimarginata* in having resupinate basidiocarps with a white to cream pore surface when fresh, a dimitic hyphal system, and truncate basidiospores. However, *P. medulla-panis* differs by its bigger pores (4–6 per mm), non-dextrinoid but variable amyloid skeletal hyphae, and larger basidiospores (4.5–5.5 × 3.5–4.5 µm, Decock and Stalpers 2006).

Specimens examined: **CHINA**. **Yunnan**, Chuxiong, Zixishan Nature Reserve, on fallen angiosperm trunk, 1 August 2005, *Yuan 1225* (holotype, IFP), *Yuan 1244, 1262* (paratypes, IFP).

Perenniporia straminea (Bres.) Ryvarden, *Mycotaxon* 33: 323 (1988) (Figs. 264, 265)
MycoBank: MB 135271
Basidium: *Poria straminea* Bres., *Hedwigia* 51: 316 (1912).

Fig. 264 Basidiocarps of *Perenniporia straminea*

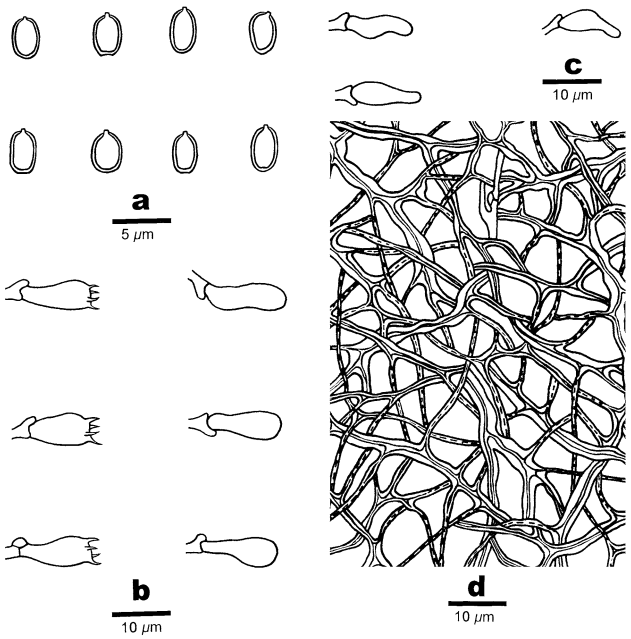

Fig. 265 Microscopic structures of *Perenniporia straminea* (drawn from Cui 7445). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 µm; **b–d** = 10 µm

Fruiting body. — Basidiocarps annual, resupinate, easily separated from substrate, corky, without odor or taste when fresh, hard corky and fragile upon drying, up to 12 cm long, 4 cm wide and 3.3 mm thick at center. Pore surface cream to pale buff when fresh, turning to yellowish-brown with age or when bruised; pores angular, 6–7 per mm; dissepiments thin, entire. Subiculum corky, thin, up to 0.2 mm thick. Tubes concolorous with pore surface, hard corky, up to 3.1 mm long.

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

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, unbranched, 2.2–3 µm in diam; skeletal hyphae dominant, hyphae, thick-walled with a narrow lumen to subsolid, frequently branched, flexuous, interwoven, 1.2–5 µm in diam. Irregular bright yellow crystals present among the hyphae.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1–1.8 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, frequently branched, interwoven, 0.7–3.2 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 10.4–16 × 3.3–4.2 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 10–12.5 × 5–6 µm; basidioles dominant, in shape similar to basidia, but slightly smaller. Irregular bright yellow crystals present in trama.

Spores. — Basidiospores ellipsoid to broadly ellipsoid, slightly truncate or not, hyaline, thick-walled, smooth, slightly dextrinoid, CB + , (3.1–)3.2–4(–4.3) × (2.2–)2.4–3(–3.1) µm, L = 3.73 µm, W = 2.76 µm, Q = 1.35 (n = 30/1).

Notes. — *Perenniporia straminea* is similar to *P. tenuis* (Schwein) Ryvarden by sharing resupinate basidiocarps, cream to pale buff pore surface, slightly dextrinoid skeletal hyphae, and slightly dextrinoid basidiospores. However, *P. tenuis* is distinguished from *P. straminea* by having bigger pores (4–5 per mm) and larger basidiospores (6–7.5 × 4–6 µm, Núñez and Ryvarden 2001). Moreover, *P. tenuis* distributes in temperate areas, while *P. straminea* has subtropical to tropical distribution.

Specimens examined: **CHINA**. **Guangdong**, Shixing County, Chebaling Nature Reserve, on fallen angiosperm trunk, 14 September 2009, *Cui 7445, 7470* (BJFC); 23 November 2010, *Cui 8717* (BJFC); 26 June 2010, *Cui 8841, 8857* (BJFC). **Yunnan**, Jinghong, Sanchahe Nature Reserve, on fallen angiosperm trunk, 7 June 2011, *Dai 12314* (BJFC); Mengla County, Wangtianshu Park, on fallen angiosperm trunk, 3 November 2009, *Cui 8627, 8632* (BJFC).

Perenniporia subacida (Peck) Donk, *Persoonia* 5: 76 (1967) (Figs. 266, 267)
MycoBank: MB 335816
Basionym: *Polyporus subacidus* Peck, *Ann. Rep. N.Y. St. Mus. nat. Hist.* 38: 92 (1885).

Fruiting body. — Basidiocarps perennial, resupinate, soft corky when fresh, becoming corky when dry, up to 50 cm long, 25 cm wide and 17 mm thick at center. Pore surface white to cream when fresh, becoming cream to buff-yellowish when dry; pores round to angular, 4–6 per mm; dissepiments thin, entire. Subiculum thin, cream to buff, up to 1 mm thick. Tubes concolorous with pore surface, corky, up to 16 mm thick.

Fig. 266 Basidiocarps of *Perenniporia subacida*

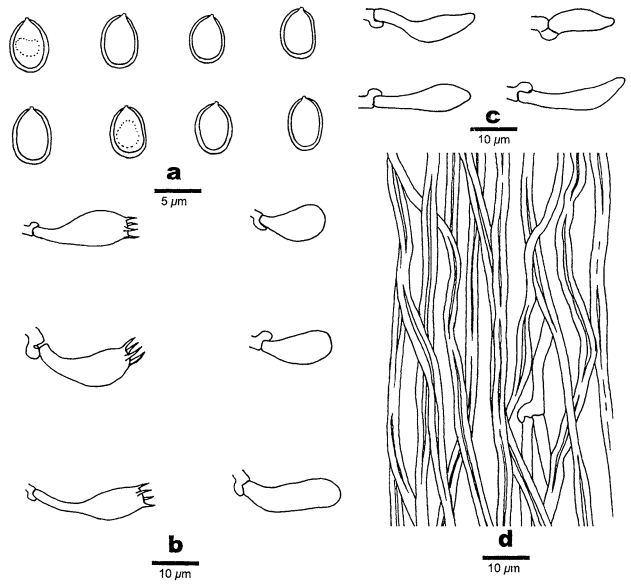

Fig. 267 Microscopic structures of *Perenniporia subacida* (drawn from *Dai 7316*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 µm; **b–d** = 10 µm

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae strongly dextrinoid, CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, 2.5–4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, unbranched, interwoven, 3–5.5 µm in diam; binding hyphae hyaline, thick-walled, frequently branched, flexuous, interwoven, 1–2 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, 2.5–3.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, unbranched, interwoven, 3–4.5 µm in diam; binding hyphae hyaline, thick-walled, frequently branched, flexuous, interwoven, 0.7–1.7 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 10–18 × 4–6 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 20–22.5 × 7–8 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, non-truncate, hyaline, thick-walled, smooth, non-dextrinoid, CB + , (4.5–)5–5.8(–6) × (3.5–)4–4.5(–4.7) µm, L = 5.5 µm, W = 4.2 µm, Q = 1.29–1.32 (n = 120/4).

Notes. — *Perenniporia ellipsospora* is similar to *P. subacida* by having resupinate basidiocarps, unbranched skeletal hyphae, but it differs from the latter by having bigger pores (3–4 per mm) and dextrinoid basidiospores (Gilbertson and Ryvarden 1987).

Specimens examined: **CHINA**. **Fujian**, Wuyishan County, Wuyishan Nature Reserve, on fallen angiosperm

trunk, 21 October 2005, *Dai 7316* (IFP). **Guizhou**, Jiangkou County, Fanjingshan Nature Reserve, on fallen angiosperm trunk, 21 August 2010, *Yuan 5511* (IFP). **Heilongjiang**, Yichun, Fenglin Nature Reserve, on fallen angiosperm trunk, 2 August 2011, C*ui 9849, 9853* (BJFC). **Jilin**, Antu County, Changbaishan Nature Reserve, on fallen angiosperm trunk, 10 August 1997, *Dai 2367* (IFP); 25 August 2005, *Dai 6955* (IFP); 28 August 2005, *Dai 7093* (IFP); 29 August 2005, *Dai 7158* (IFP); 8 August 2011, *Cui 9960, 9968, 9990* (BJFC); 9 August 2011, *Cui 10017, 10019, 10027, 10051, 10053, 10057* (BJFC). **Jiangsu**, Nanjing, Zijin Mountain, 1 on fallen angiosperm trunk, 1 October 2003, *Yuan 5287* (IFP). **Jiangxi**, Jiujiang, Lushan County, 9 October 2008, on fallen angiosperm trunk, *Cui 6006, 6004* (BJFC). **Shaanxi**, Zhouzhi County, on fallen angiosperm trunk, 24 October 2006, *Yuan 2702* (IFP). **Yunnan**, Baoshan, Gaoligong Mountain, on fallen angiosperm trunk, 23 September 2007, *Yuan 3854, 3850* (IFP); Chuxiong, Zixishan Forest Park, on fallen angiosperm trunk, 11 November 2011, *Dai 12399, 12411, 12414* (BJFC); Xianggelila County, Pudacuo Forest Park, 24 September 2011, *Cui 10536* (BJFC). **Zhejiang**, Lin'an, Tianmushan Nature Reserve, on fallen angiosperm trunk, 12 October 2005, *Cui 2718, 2733, 2744, 2752, 2762, 2763, 2771, 2775* (IFP); 15 October 2004, *Dai 6315, Cui 6324, 6325, 6329, 6336, 6345, 6348, 6385* (IFP); 9 October 2005, *Cui 2566, 2554, 2568* (BJFC); 10 October 2005, *Cui 2607, 2614, 2613, 2625, 2629, 2644, 2606, 2617, 2660* (BJFC); 11 October 2005, *Cui 2712, 2705* (BJFC).

Perenniporia substraminea B.K. Cui & C.L. Zhao, *Fungal Diversity* 58: 52 (2013) (Figs. 268, 269)
MycoBank: MB 800241

Fruiting body. — Basidiocarps perennial, resupinate, adnate, corky, without odor or taste when fresh, becoming hard corky upon drying, up to 14.5 cm long, 9.5 cm wide and 5 mm thick at center. Pore surface white to cream when fresh, becoming cream to pinkish buff upon drying; pores round, 9–12 per mm; dissepiments thin, entire. Sterile margin narrow, cream, up to 1 mm wide. Subiculum white to cream, thin, up to 0.2 mm thick. Tubes concolorous with pore surface, hard corky, up to 4.8 mm long.

Fig. 268 Basidiocarps of *Perenniporia substraminea*

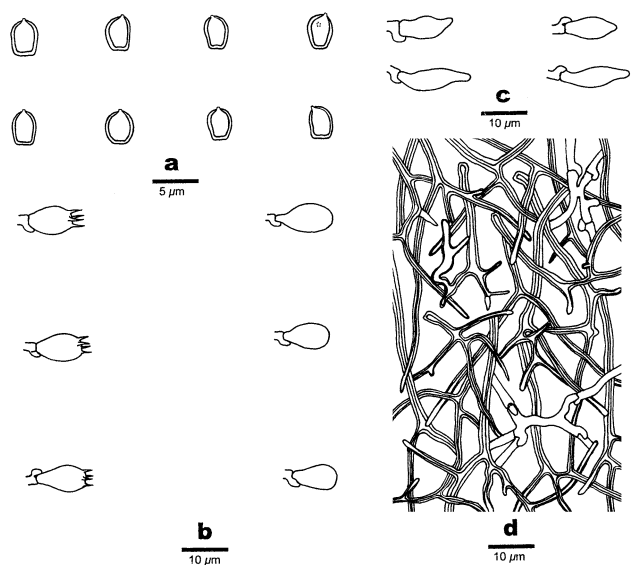

Fig. 269 Microscopic structures of *Perenniporia substraminea* (drawn from *Cui 10177*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 1.5–2.6 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, occasionally branched, interwoven, 2–3.5 μm in diam; binding hyphae hyaline, thick-walled, frequently branched, flexuous, interwoven, 0.8–1.9 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 1.3–2 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, occasionally branched, interwoven, 1.8–2.2 μm; binding hyphae hyaline, thick-walled, frequently branched, interwoven, 0.8–1.5 μm in diam. Dendrohyphidia common at the dissepimental edges. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 8–11.5 × 3–4.9 μm. Basidia mostly pear-shaped, with four sterigmata and a basal clamp connection, 7.9–9.9 × 5.2–7 μm; basidioles dominant, in shape similar to basidia, but slightly smaller. Large rhomboid crystals present.

Spores. — Basidiospores ellipsoid, truncate, hyaline, thick-walled, smooth, strongly dextrinoid, CB + , (3–)3.1–3.8(–3.9) × (2.1–)2.4–3(–3.1) μm, L = 3.43 μm, W = 2.81 μm, Q = 1.22–1.23 (n = 60/2).

Notes. — Morphologically, *Perenniporia substraminea* is similar to *P. straminea* in having small pores (8–9 per mm) and basidiospores (3.3–3.8 × 2.7–3.2 µm), but the latter has straw-colored, pale yellow to yellow pore surface, a dimitic hyphal system, and presence of arboriform skeleton-binding hyphae (Decock 2001a). *Perenniporia medulla-panis* has whitish pore surface, and strongly dextrinoid basidiospores, but it is different in bigger pores (4–6 per mm) and larger basidiospores (4.5–5.5 × 3.5–4.5 µm, Decock and Stalpers 2006).

Specimens examined: **CHINA**. **Zhejiang**, Taishun County, Wuyanling Nature Reserve, on angiosperm stump, 22 August 2011, *Cui 10177* (holotype, BJFC), *Cui 10191* (paratype, BJFC).

Perenniporia subtephropora B.K. Cui & C.L. Zhao, *Mycologia* 105: 951 (2013) (Figs. 270, 271)
MycoBank: MB 800569

Fig. 270 Basidiocarps of *Perenniporia subtephropora*

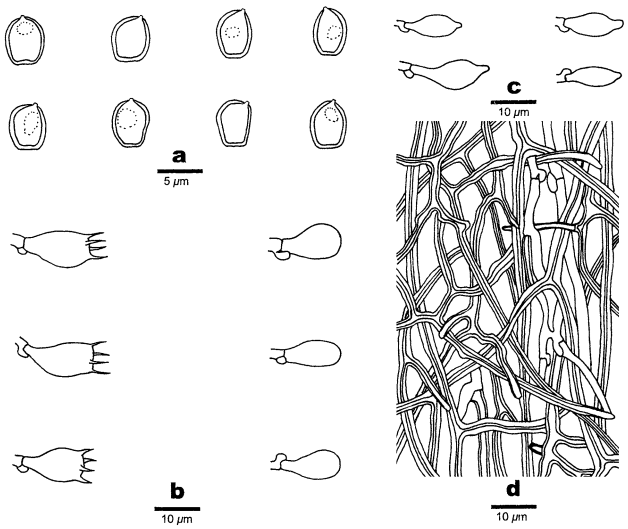

Fig. 271 Microscopic structures of *Perenniporia subtephropora* (drawn from *Dai 10694*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 µm; **b–d** = 10 µm

Fruiting body. — Basidiocarps perennial, resupinate, adnate, corky, corky, without odor or taste when fresh, becoming hard corky upon drying, up to 12 cm long, 6.2 cm wide and 5.5 mm thick at center. Pore surface cream when fresh, becoming cream buff to grayish buff upon drying; pores round, 6–8 per mm; dissepiments thin, entire. Sterile margin grayish brown, up to 1 mm wide. Subiculum clay-buff, thin, up to 1 mm thick. Tubes darker than pore surface, clay-buff, corky, up to 4.5 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB + ; tissues becoming pale olivaceous to brown in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 3–4 µm in diam; skeletal hyphae dominant, hyaline to pale yellowish, thick-walled with a wide lumen, branched, interwoven, 2.5–4 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 3–4 µm in diam; skeletal hyphae dominant, hyaline to pale yellowish, thick-walled with a wide to narrow lumen, branched, interwoven, 2.5–4 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 13–22 × 3.5–5 µm. Basidia clavate to pear-shaped, with four sterigmata and a basal clamp connection, 13–14 × 7–7.5 µm; basidioles in shape similar to basidia, but slightly smaller. Large rhomboid crystals present.

Spores. — Basidiospores ellipsoid to broadly ellipsoid, truncate, hyaline to pale yellowish, thick-walled, smooth, dextrinoid, CB + , 4–5 × (3–)3.5–4.5 µm, L = 4.6 µm, W = 3.8 µm, Q = 1.17–1.26 (n = 60/2).

Notes. — Morphologically, *Perenniporia inflexibilis* is similar to *P. subtephropora* by producing smaller pores (6–8 per mm), a dimitic hyphal system with branched skeletal hyphae, and truncate, hyaline to pale yellowish basidiospores. However, *P. inflexibilis* differs by having pileate basidiocarps and gray to pale brown pore surface (Decock et al. 2002). *Perenniporia centrali-africana* Decock & Mossebo resembles *P. subtephropora* by having similar small pores (7–8 per mm) and basidiospores (4.8–6 × 3.8–5.3 µm), but it differs by the pileate basidiocarps and a trimitic hyphal system (Decock and Mossebo 2001).

Specimens examined: **CHINA**. **Guangdong**, Lianzhou County, Nanling Nature Reserve, on fallen angiosperm trunk, 16 May 2009, *Dai 10962* (holotype, BJFC), *Dai 10964* (paratype, BJFC).

Perenniporia tenuis (Schwein.) Ryvarden, *Norw. J. Bot.* 20: 9 (1973) (Figs. 272, 273)
MycoBank: MB 319337
Basionym: *Polyporus tenuis* Schwein., *Trans. Am. phil. Soc.* 4: 159 (1832).

Fruiting body. — Basidiocarps annual, resupinate, adnate, corky, without odor or taste when fresh, becoming hard corky upon drying, up to 15.5 cm long, 5.5 cm wide and 3.5 mm thick at center. Pore surface cream buff when fresh, buff to buff-yellow upon drying; pores round to angular, 4–6 per mm; dissepiments thin, entire. Sterile margin narrow, cream buff, up to 0.5 mm wide. Subiculum cream to buff, corky, thin, up to 0.5 mm thick. Tubes concolorous with pore surface, corky, up to 3 mm long.

Hyphal structure. — Hyphal system dimitic to trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae dextrinoid, CB + ; tissues unchanged in KOH.

Fig. 272 Basidiocarps of *Perenniporia tenuis*

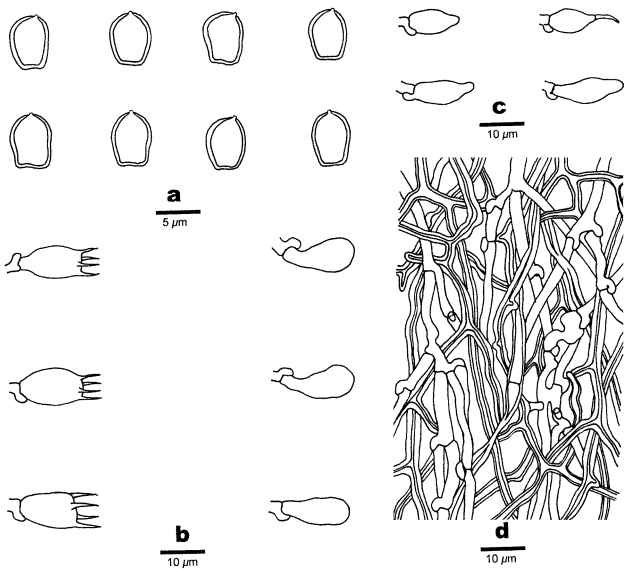

Fig. 273 Microscopic structures of *Perenniporia tenuis* (drawn from *Wei 2783*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, 2.8–3.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, branched, interwoven, 3.9–4.8 μm in diam; binding hyphae hyaline, thick-walled, frequently branched, flexuous, interwoven, 1.5–2.5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2.5–3.1 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, occasionally branched, interwoven, 3.1–3.7 μm in diam; binding hyphae hyaline, thick-walled, frequently branched, flexuous, interwoven, 1.1–2.3 μm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 14.1–23.5 × 4.1–6.1 μm. Basidia barrel-shaped, with four sterigmata and a basal clamp connection, 10.5–11.5 × 6.1–8.1 μm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, truncate, hyaline, thick-walled, smooth, dextrinoid, CB + , (5–)5.5–6.5(–7.1) × (4–)4.2–5(–6) μm, L = 6.2 μm, W = 4.54 μm, Q = 1.2–1.42 (n = 90/3).

Notes. — *Perenniporia subacida* is similar to *P. tenuis* by having resupinate basidiocarps, similar pores and trimitic hyphal system, but *P. subacida* differs in its non-truncate basidiospores (Decock and Stalpers 2006).

Specimens examined: **CHINA**. **Beijing**, Beijing Botanic Garden, on fallen angiosperm trunk, 6 September 2005, *Dai 7176* (IFP); 9 July 2008, *Cui 5523, 5524* (BJFC). **Heilongjiang**, Jiagedaqi, Dongfanghong Forest Farm, on fallen angiosperm trunk, 19 August 2003, *Dai 4798* (IFP); Hulin, Qihulin Forest Farm, 12 September 2004, *Yuan 530* (IFP). **Jilin**, Antu County, Changbaishan Nature Reserve, 14 September 2005, *Wei 2783* (IFP); 20 September 2005, *Wei 2969* (IFP); Changbai County, Wangtiane Park, 17 September 2005, *Wei 2875* (IFP). **Liaoning**, Kuandian County, Baishilazi Nature Reserve, on fallen angiosperm trunk, 28 June 2004, *Wei 1299* (IFP). **Inner Mongolia**, Tongliao, Daqinggou, on fallen angiosperm trunk, 24 September 2002, *Dai 4019* (IFP). **Shanxi**, Qishui County, Lishan Nature Reserve, on fallen angiosperm trunk, 18 September 2006, *Yuan 2403* (IFP). **Yunnan**, Lanping County, Tongdian, Luoguqing, on fallen angiosperm trunk, 20 September 2011, *Cui 10419* (BJFC). **Zhejiang**, Taishun County, Wuyanling Nature Reserve, on fallen angiosperm trunk, 22 August 2011, *Cui 10186* (BJFC).

Perenniporia tephropora (Mont.) Ryvarden, *Norw. J. Bot.* 19: 233 (1972) (Figs. 274, 275)
MycoBank: MB 319338
Basionym: *Polyporus tephroporus* Mont., *Annls Sci. Nat. Bot. sér.* 34: 358 (1845).

Fruiting body. — Basidiocarps perennial, resupinate, corky, without odor or taste when fresh, becoming hard

Fig. 274 Basidiocarps of *Perenniporia tephropora*

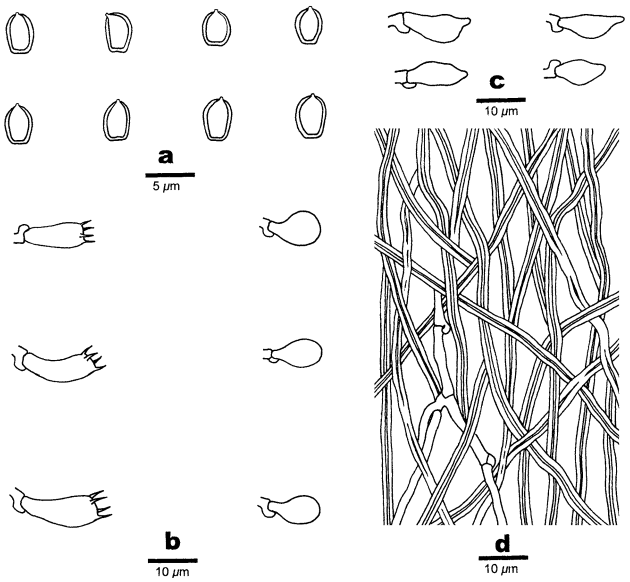

Fig. 275 Microscopic structures of *Perenniporia tephropora* (drawn from *Cui 9029*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

corky upon drying, up to 26 cm long, 7.5 cm wide and 8.1 mm thick at center. Pore surface pale brown when fresh, brown upon drying; pores round to angular, 5–7 per mm; dissepiments thin, entire. Sterile margin narrow, pale brown, up to 0.5 mm wide. Subiculum pale brown, corky, thin, up to 0.5 mm thick. Tubes concolorous with pore surface, corky, up to 8 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae dextrinoid, CB + ; tissues becoming olive brown to black in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, 2–4 μm in diam; skeletal hyphae dominant, pale yellow, thick-walled, unbranched, interwoven, 2.9–4.7 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3.5 μm in diam; skeletal hyphae dominant, pale yellow, thick-walled with a wide to narrow lumen, unbranched, interwoven, 2–4 μm in diam; binding hyphae pale yellow, thick-walled, frequently branched, flexuous, interwoven, 1.5–2.3 μm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 10.1–14.5 × 4.1–4.7 μm. Basidia barrel-shaped, with four sterigmata and a basal clamp connection, 13.8–14.5 × 4.7–5.3 μm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, truncate, hyaline to pale yellow, thick-walled, smooth, dextrinoid, CB + , (4.7–)5–5.5(–6.1) × (3–)3.3–4(–4.2) μm, L = 5.18 μm, W = 3.85 μm, Q = 1.34 (n = 30/1).

Notes. — *Perenniporia inflexibilis* is similar to *P. tephropora* in having resupinate, perennial basidiocarps with pale brown to brown pore surface and trimitic hyphal system, but *P. inflexibilis* differs in its smaller pores (6–10 per mm, Decock and Ryvarden 2000).

Specimens examined: **CHINA**. **Fujian,** Xiamen, Xiamen Botanic Garden, on fallen angiosperm trunk, 8 September 2003, *Dai 5072* (IFP); 23 August 2006, *Cui 4050, 4038, 4034* (BJFC); Wuyishan County, Wuyishan Nature Reserve, Taoyuanyu, on fallen angiosperm trunk, 24 October 2005, *Cui 3328, 3317* (BJFC); Nanputuo, 24 August 2006, *Cui 4077* (BJFC). **Guangdong**, Huizhou, Luofu Mountain, on fallen angiosperm trunk, 14 February 2009, *Dai 10694, 10695* (BJFC); Lianzhou County, Nanling Nature Reserve, on fallen angiosperm trunk, 16 May 2009, *Dai 10960* (BJFC); Guangzhou, Guangdong Forestry Institute, on fallen angiosperm trunk, 17 May 2009, *Dai 10988* (BJFC); Huanan Botanic Garden, on fallen angiosperm trunk, 19 September 2009, *Cui 7708, 7700, 7697, 7693* (BJFC); Baiyun Mountain, on fallen angiosperm trunk, 28 June 2010, *Cui 8873* (BJFC); Fengkai County, Heishiding Nature Reserve, on fallen angiosperm trunk, 1 July 2010, *Cui 9038, 9029* (BJFC); Heyuan, Daguishan Forest Park, on fallen angiosperm trunk, 18 August 2011, *Cui 10126* (BJFC). **Hainan**, Ledong County, Jianfengling Nature Reserve, on fallen angiosperm trunk, 17 November 2007, *Cui 5168* (BJFC); Haikou, Jinniuling Park, on fallen angiosperm trunk, 5 May 2009, *Cui 6191* (BJFC); Changjiang County, Bawangling Nature Reserve, on fallen angiosperm trunk, 7 May 2009, *Cui 6284, 6290, 6344, 6364* (BJFC); 7 May 2009, *Dai 10751* (BJFC); 7 May 2009, *Cui 6331* (BJFC), 8 May 2009, *Cui 6381, Dai 10760* (BJFC); 9 May 2009, *Cui 6511* (BJFC); Qionghai, on fallen angiosperm trunk, 15 May 2009, *Cui 6699, 6727* (BJFC); Wanning, on fallen angiosperm trunk, 14 May 2009, *Cui 6669* (BJFC); 15 May 2009, *Cui 6699* (BJFC). **Jiangxi**, Jinggangshan County, Jinggang Mountain, on fallen angiosperm trunk, 23 September 2008, *Dai 10594* (BJFC); Xinyu, Xiannv Lake, on fallen angiosperm trunk, 20 September 2008, *Dai 10545, 10542* (BJFC); Yiangtan,

Longhu Mountain, on fallen angiosperm trunk, 5 October 2008, *Cui 5949, 5932* (BJFC). **Taiwan**, Hualian County, Tailuge Forest Park, 21 November 2009, *Dai 11548, 11553, 11552* (BJFC); Hualian, on fallen angiosperm trunk, 22 November 2009, *Dai 11555* (BJFC). **Yunnan**, Tengchong County, Gaoligong Mountain, on fallen angiosperm trunk, 24 October 2009, *Cui 8040* (BJFC); Mengla County, Wangtianshu Park, on fallen angiosperm trunk, 2 November 2009, *Cui 8509, 8531* (BJFC); Jinghong, Sanchahe Nature Reserve, on fallen angiosperm trunk, 7 June 2011, *Dai 12323* (BJFC); Pu'er, Laiyanghe Nature Reserve, on fallen angiosperm trunk, 9 June 2011, *Dai 12364, 12375, 12381, 12387* (BJFC). **Zhejiang**, Fuyang County, Wanggongwang Forest Park, on fallen angiosperm trunk, 17 August 2010, *Dai 11836* (BJFC); Taishui County, Wuyanling Nature Reserve, on fallen angiosperm trunk, 22 August 2011, *Cui 10182, 10192* (BJFC).

Perenniporia tianmuensis B.K. Cui & C.L. Zhao, *Mycoscience* 54: 236 (2013) (Figs. 276, 277)
MycoBank: MB 800939

Fruiting body. — Basidiocarps annual, pileate, solitary to imbricate, hard corky when fresh, woody hard upon drying. Pilei usually fan-shaped, projecting up to 4.5 cm, 10 cm wide and 1.5 cm thick at base. Pileal surface clay-buff to orange-brown, concentrically sulcate with distinctly zones, glabrous; margin obtuse. Pore surface buff to buff-yellow upon drying; pores round, 6–8 per mm; dissepiments thin, entire. Sterile margin narrow, cream to buff, up to 1 mm wide. Context cream to buff, corky, about 6 mmm thick. Tubes concolorous with pore surface, woody hard, up to 9 mm thick.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, CB + ; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 3.2–4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, frequently branched, interwoven, 1–5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 2.7–3.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, frequently branched, interwoven, 1–4.5 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 12–17 × 4–6 µm. Basidia clavate to pear-shaped, with four sterigmata and a basal clamp connection, 15–18 × 5.5–7 µm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, non-truncate, hyaline, thick-walled, smooth, dextrinoid, CB + , (4.8–5–5.7(–5.9) × (3.8–)4–4.7(–4.9) µm, L = 5.3 µm, W = 4.31 µm, Q = 1.14–1.25 (n = 90/3).

Fig. 276 A basidiocarp of *Perenniporia tianmuensis*

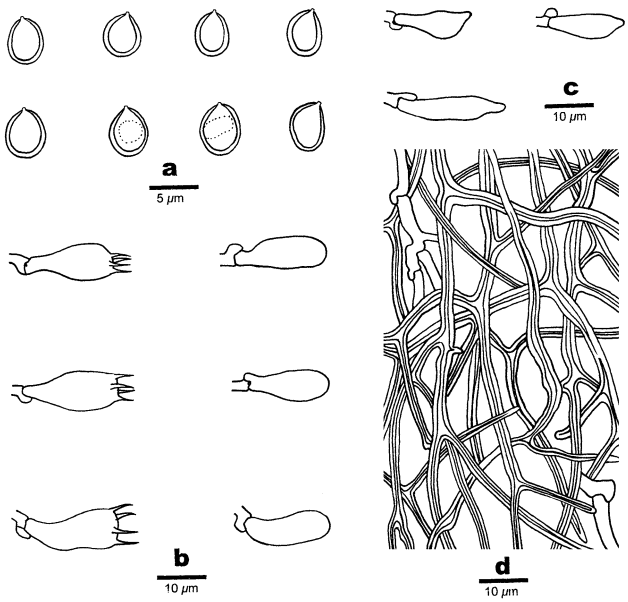

Fig. 277 Microscopic structures of *Perenniporia tianmuensis* (drawn from *Cui 2648*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 µm; **b–d** = 10 µm

Notes. — *Perenniporia subannosa* (Bres.) Decock et al. and *P. tianmuensis* share pileate basidiocarps, similar sized basidiospores (3.7–5.5 × 2.7–4.5 µm). However, the former has bigger pores (4–5 per mm), and non-dextrinoid basidiospores (Decock et al. 2001). *Perenniporia truncatospora* (Lloyd) Ryvarden is similar to *P. tianmuensis*, and both have pileate basidiocarps and similar sized pores (6–8 per mm), but *P. truncatospora* has larger and truncate basidiospores (6.5–8 × 5–6 µm, Núñez and Ryvarden 2001).

Specimens examined: **CHINA**. **Zhejiang**, Lin'an County, Tianmushan Nature Reserve, on base of dead angiosperm tree, 10 October 2005, *Cui 2648* (holotype, BJFC); 11 October 2005, *Cui 2715* (paratype, BJFC); on base of dead bamboo, 12 October 2005, *Cui 2759* (paratype, BJFC).

Perenniporia tibetica B.K. Cui & C.L. Zhao, *Mycoscience* 53: 366 (2012) (Figs. 278, 279)
MycoBank: MB 561648

Fruiting body. — Basidiocarps annual, resupinate, adnate, corky, without odor or taste when fresh, becoming hard corky upon drying, up to 15 cm long, 5 cm wide and 3 mm thick at center. Pore surface cream to cream-buff when fresh, cream buff to pinkish buff upon drying; pores angular, 2–3 per mm; dissepiments thin, entire. Sterile margin distinct, white to cream, up to 1 mm wide, usually with white to cream colored rhizomorphs. Subiculum cream, thin, up to 0.5 mm thick. Tubes concolorous with pore surface, hard corky, up to 2.5 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae weakly dextrinoid, CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 1.5–3.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, occasionally branched, interwoven, 1.5–4 µm in diam; vegetative hyphae as arboriform skeletal hyphae present, hyaline, frequently branched, very thin, 0.1–0.8 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, unbranched, 1.5–2.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, occasionally branched, interwoven, 1.5–3.5 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 17–23 × 5–8.5 µm. Basidia barrel-shaped to capitate, with four sterigmata and a basal clamp

Fig. 278 Basidiocarps of *Perenniporia tibetica*

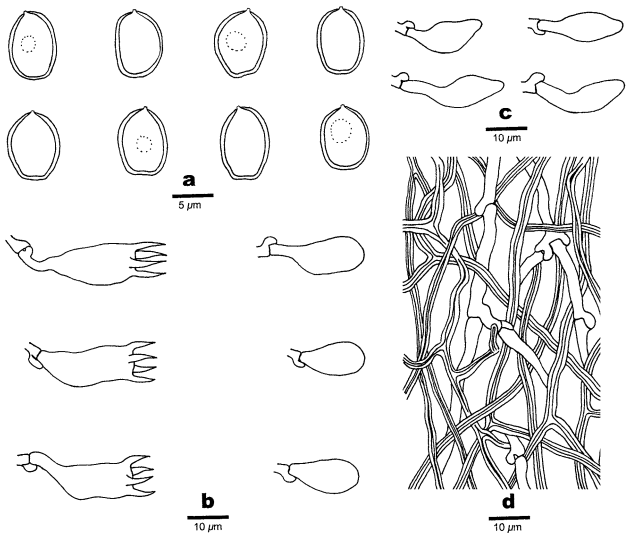

Fig. 279 Microscopic structures of *Perenniporia tibetica* (drawn from *Cui 9457*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 µm; **b–d** = 10 µm

connection, 15–25 × 8–12 µm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, truncate or not, hyaline, thick-walled, smooth, dextrinoid, CB + , (6–)6.7–8.7(–9) × (5–)5.3–6.8(–7) µm, L = 7.61 µm, W = 5.98 µm, Q = 1.23–1.33 (n = 60/2).

Notes. — *Perenniporia roseoisabellina* (Pat. & Gaillard) Ryvarden and *P. tibetica* share similar pores and basidiospores, but the former differs in its isabelline pore surface, non-dextrinoid hyphae, and lacking rhizomorphs (Ryvarden 1983). *Perenniporia subaurantiaca* (Rodway & Cleland) P.K. Buchanan & Ryvarden resembles *P. tibetica* by having resupinate basidiocarps and similar basidiospores, but the former has pale brown pore surface, smaller pores (5–6 per mm), and lacks rhizomorphs (Buchanan and Ryvarden 1993).

Specimens examined: **CHINA**. **Xizang**, Linzhi County, Tongmai, on fallen angiosperm trunk, 16 September 2010, *Cui 9457* (holotype, BJFC), *Cui 9459* (paratype, BJFC).

Perenniporia truncatospora (Lloyd) Ryvarden, *Acta Mycol. Sinica.* 5: 228 (1986) (Figs. 280, 281)
MycoBank: MB 129925
Basionym: *Trametes truncatospora* Lloyd, *Mycol. Writ.* 6: 853 (1919).

Fruiting body. — Basidiocarps annual to biennial, pileate, corky upon drying. Pilei usually semicircle, projecting up to 2.4 cm, 1.1 cm wide and 4 mm thick at base. Pileal surface ochraceous to brown, glabrous; margin obtuse. Pore surface buff upon drying; pores round, 6–7 per mm; dissepiments thin, entire. Sterile margin narrow, cream to buff, up to 1 mm wide. Context pale brown,

Fig. 280 Basidiocarps of *Perenniporia truncatospora*

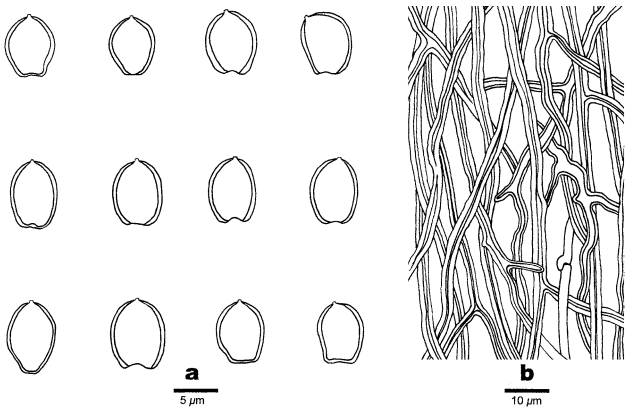

Fig. 281 Microscopic structures of *Perenniporia truncatospora* (drawn from *Cui 6987*). **a**. Basidiospores; **b**. Hyphae from trama. Bars: **a** = 5 μm; **b** = 10 μm

corky, about 1 cm thick. Tubes concolorous with pore surface, woody hard, up to 2.3 cm thick.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae dextrinoid, CB + ; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 1.7–3.4 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, branched, interwoven, 2.4–4.1 μm in diam; binding hyphae pale yellow, thick-walled, frequently branched, flexuous, interwoven, 1.7–2.5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, 1.4–2.9 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, branched, interwoven, 2.1–3.5 μm in diam; binding hyphae pale yellow, thick-walled, frequently branched, flexuous, interwoven, 1.8–2.3 μm in diam. Cystidia and cystidioles absent. Basidia clavate to pear-shaped, with four sterigmata and a basal clamp connection, 12.1–16.5 × 7.5–8.9 μm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, truncate, hyaline, thick-walled, smooth, IKI–, CB + , (6–)6.3–7.3(–8) × (4.4–)5–5.9(–6.5) μm, L = 7 μm, W = 5.35 μm, Q = 1.29–1.32 (n = 60/2).

Notes. — *Perenniporia contraria* is similar to *P. truncatospora* by pileate basidiocarps, similar pores, branched skeletal hyphae and non-dextrinoid basidiospores. However, *P. contraria* is distinguished by its smaller basidiospores (3.4–4 × 2.5–3.1 μm, Decock et al. 2001).

Specimens examined: **CHINA**. **Beijing**, Tanzhe Temple, on fallen angiosperm trunk, 25 September 2003, *Dai 5125* (IFP). **Tianjin**, Ji County, Panshan Forest Park, 1 August 2009, *Cui 6987* (BJFC).

Perenniporia xantha Decock & Ryvarden, *Mycol. Research* 103: 1139 (1999) (Figs. 282, 283)
MycoBank: MB 460670

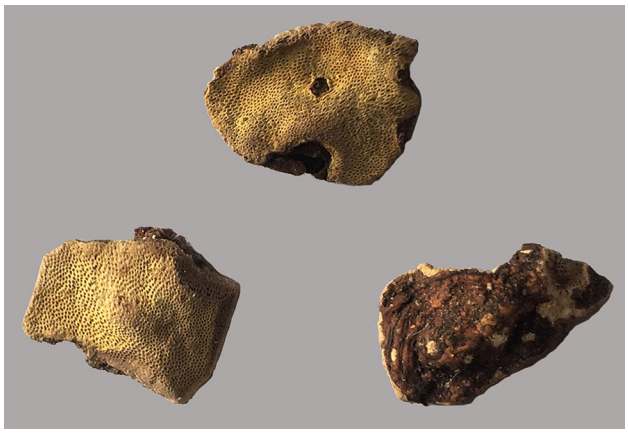

Fig. 282 Basidiocarps of *Perenniporia xantha*

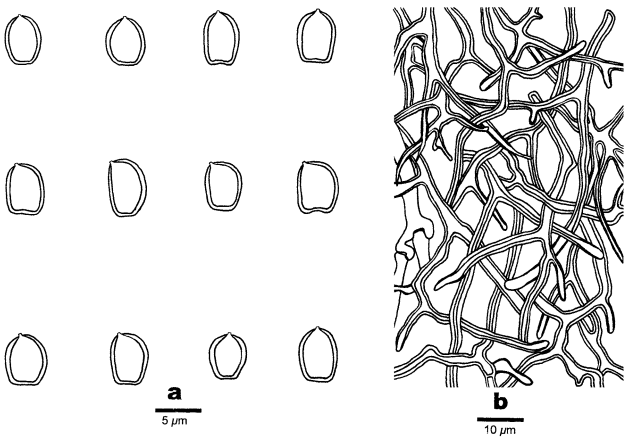

Fig. 283 Microscopic structures of *Perenniporia xantha* (drawn from *Dai 4463*). **a**. Basidiospores; **b**. Hyphal structure. Bars: **a** = 5 μm; **b** = 10 μm

Fruiting body. — Basidiocarps annual, resupinate, adnate, soft corky when fresh, becoming hard corky when dry, up to 5 cm long, 3.5 cm wide and 2 mm thick at center. Pore surface light yellow to brownish yellow when fresh, cinnamon-buff to buff when dry; pores round, tiny, 6–8 per mm; dissepiments thick, entire. Subiculum thin, cream, up to 0.2 mm thick. Tubes concolorous with pore surface, up to 1.8 mm thick.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae IKI–, CB + ; tissues darkening in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, branched, 2.1–2.7 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 2.1–2.5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, branched, 2–2.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 1.9–2.3 µm in diam. Cystidia and cystidioles absent. Basidia barrel- to pear-shaped, with four sterigmata and a basal clamp connection, 10–11.5 × 6.9–7.5 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, truncate, hyaline, thick-walled, smooth, slightly dextrinoid, CB + , (4.4–)4.5–5.5(–5.8) × (3.2–)3.3–4(–4.3) µm, L = 5 µm, W = 3.8 µm, Q = 1.31 (n = 30/1).

Notes. — *Perenniporia corticola* is morphologically similar to *P. xantha* by buff to bright yellow pore surface, a dimitic hyphal system and smaller truncate basidiospores (4.4–5 × 3.4–4 µm). However, the former has thick, rounded, not spreading margin, slightly smaller pores (8–9 per mm) and its tubes are unchanged in KOH (Decock and Ryvarden 1999; Decock 2001a). *Perenniporia aurantiaca* (A. David & Rajchenb.) Decock & Ryvarden may be confused with *P. xantha* by sharing resupinate basidiocarps, similar pores (6–8 per mm) and basidiospores (4.2–5.5 × 3–4 µm), and its tubes becoming dark brown in KOH, but *P. aurantiaca* is a rhizomorphic species, and has orange pore surface when fresh (Decock and Ryvarden 1999).

Specimen examined: **CHINA**. **Hainan**, Ledong County, Jianfengling Nature Reserve, on fallen angiosperm trunk, 22 November 2002, *Dai 4463* (IFP).

Perenniporia yinggelingensis B.K. Cui & Y.C. Dai, **sp. nov.** (Figs. 284, 285)

MycoBank: MB 825664

Differs from other *Perenniporia* species by annual and resupinate basidiocarps, cream to buff pore surface, distinct sterile margin, slightly lacerate and bigger pores (5–6 per mm), ellipsoid basidiospores measuring as 6.2–7.5 × 4.5–5.5 µm, and distributes in tropical areas.

Fig. 284 Basidiocarps of *Perenniporia yinggelingensis*

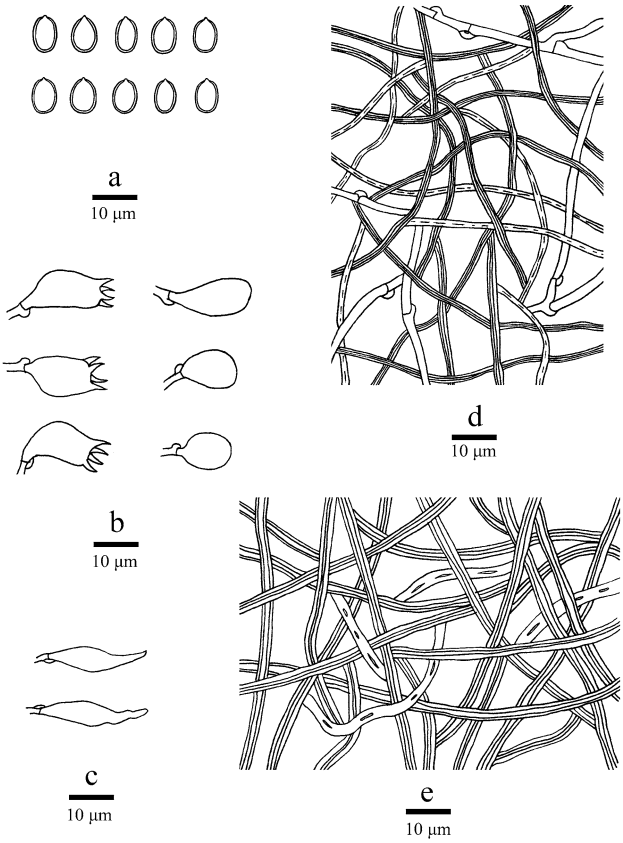

Fig. 285 Microscopic structures of *Perenniporia yinggelingensis* (drawn from *Cui 13625*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **e**. Hyphae from subiculum. Bars: **a–e** = 10 µm

Type. — **CHINA**. **Hainan**, Baisha County, Yinggeling Nature Reserve, on fallen angiosperm trunk, 17 November 2015, *Cui 13625* (holotype, BJFC).

Etymology. — *Yinggelingensis* (Lat.): referring to the locality of the type specimen.

Fruiting body. — Basidiocarps annual, resupinate, adnate, without odor or taste when fresh, becoming corky upon drying, up to 15 cm long, 6 cm wide and 2 mm thick at center. Pore surface cream to pale buff when fresh, cream to olivaceous-buff upon drying; pores angular, 5–6 per mm; dissepiments thin, slightly lacerate. Sterile margin wide, buff, up to 4 mm wide. Subiculum buff, thin, up to 0.2 mm thick. Tubes concolorous with pore surface, corky, up to 1.8 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae weakly dextrinoid, CB + ; tissues unchanged in KOH.

Subiculum. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 1.5–2 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, rarely branched, interwoven, 2–3 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, frequently branched, 1.2–2 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, usually unbranched, interwoven, 1.5–3 µm. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 16–22 × 4–6 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 14–18 × 5–8 µm; basidioles dominant, in shape similar to basidia, but slightly smaller than basidia.

Spores. — Basidiospores broad ellipsoid, truncate or not, hyaline, distinct thick-walled, smooth, dextrinoid, CB + , (6–)6.2–7.5 × (4.2–)4.5–5.5(–5.7) µm, L = 6.77 µm, W = 5 µm, Q = 1.36–1.38 (n = 60/2).

Notes. — Morphologically, *Perenniporia yinggelingensis* may be confused with *P. bannaensis* by producing annual and resupinate basidiocarps with cream to buff pore surface. Phylogenetically, these two species grouped together with high support. However, *P. bannaensis* differs from *P. yinggelingensis* by its smaller pores (6–8 per mm) and smaller basidiospores (5.2–6 × 4–4.6 µm, Zhao et al. 2013a).

Additional specimens (paratypes) examined: **CHINA**. **Hainan**, Baisha County, Yinggeling Nature Reserve, on fallen angiosperm trunk, 17 November 2015, *Cui 13605, 13609, 13615*, *13619, 13627, 13631* (BJFC).

Picipes Zmitr. et Kovalenko, *Int J Med Mushrooms* 18: 35 (2016).

MycoBank: MB 812027

Type species: *Picipes badius* (Pers.) Zmitr. et Kovalenko.

Basidiocarps annual, stipitate. Pilei fan-shaped to circular or infundibuliform, covered with hard cuticle, glabrous; corky to coriaceous when fresh and hard when dry; stipe usually covered with a brownish to black cuticle from the base. Pores round to angular. Hyphal system dimitic; generative hyphae bearing clamp connections or simple septa; skeletal hyphae strongly branched in trama; hyphae in cuticle bearing clamp connections or not, thick-walled with a wide lumen, usually unbranched. Basidiospores oblong to cylindrical or fusiform, smooth, hyaline, less than 13 µm long and 5 µm wide.

Melanopus Pat. was established by Patouillard (1887) to accomodate stipitate polypores with black stipe. Subsequentyl, however, the genus was reduced to a synonym of *Polyporus* P. Micheli ex Adans. (Donk 1960). Núñez and Ryvarden (1995) treated *Melanopus* as an infrageneric group of *Polyporus*. They defined this group with following characters: basidiocarps coriaceous, tough when dry, context thin, stipe with a black cuticle, skeletal hyphae mostly subsolid and narrow when mature, and basidiospores medium size to large (6–12 × 2–4 µm).

Phylogenetically, *Polyporus badius* (Pers.) Schwein., *P. melanopus* (Pers.) Fr. and *P. tubaeformis* (P. Karst.) Ryvarden & Gilb. grouped together in a well-supported clade (Krüger et al. 2006). Krüger et al. (2006) indicated that "*Melanopus*" appeared to be a non-monophyletic assemblage of dark-stipited polypores. Sotome et al. (2008) showed that *P. badius*, *P. dictyopus* Mont. and *P. tubaeformis* cluster together in a single clade with high supports while *P. leprieurii* Mont., *P. varius* (Pers.) Fr., *P. squamosus* (Huds.) Fr. and *Datronia mollis* (Sommerf.) Donk, *D. scutellata* (Schwein.) Domański, *Pseudofavolus cucullatus* (Mont.) Pat. gathered into a related but distinct clade. Zmitrovich and Kovalenko (2016) erected *Picipes* Zmitr. et Kovalenko for the *P. badius* clade according to analyses of nLSU, ITS and EF1-α sequences. Recently, taxonomic and phylogenetic studies on the *Melanopus* group in China were carried out by Zhou et al. (2016), and species in this group distribute into two distinct clades: the *Picipes* clade and the *Squamosus* clade; *Picipes* was confirmed as a distinct genus separated from *Polyporus*.

Key to species of *Picipes* in China

1 Growing on grass roots..... ……*P. rhizophilus*
1 Growing on woods or ground..... ……2
2 Generative hyphae bearing simple septa..... ……3
2 Generative hyphae merely bearing clamp connections.... ..... ……4
3 Pores 2–3 per mm; basidiospores 8–10 × 3–3.9 µm..... ..... ……*P. submelanopus*
3 Pores 5–6 per mm; basidiospores 6.5–8 × 3–3.8 µm..... ..... ……*P. badius*
4 Growing on coniferous woods..... ……5

4 Growing on hardwoods.....8
Pores 2–5 per mm; cystidioles absent.....*P. pseudovarius*
5 Pores ≥ 6 per mm; cystidioles present.....6
6 Basidiospores cylindrical, usually > 6 μm in length.....*P. conifericola*
6 Basidiospores oblong to cylindrical, usually < 6 μm in length.....7
7 Basidiospores mainly oblong; growing in plateau temperate regions.....*P. tibeticus*
7 Basidiospores mainly cylindrical; growing in subtropical regions.....*P. jiajinensis*
8 Pores ≥ 7 per mm.....9
8 Pores < 7 per mm.....10
9 Pileal surface concentrically zonate; cystidioles absent.....*P. pumilus*
9 Pileal surface azonate; cystidioles subulate.....*P. subtropicus*
10 Stipe without a black cuticle; cystidioles absent.....*P. fraxinicola*
10 Stipe with a black cuticle; cystidioles present.....11
11 Cystidioles fusiform; grows on *Rhododendron* woods.....*P. taibaiensis*
11 Cystidioles subulate; grows on other woods.....12
12 Tubes strongly decurrent on one side of the stipe.....*P. subtubaeformis*
12 Tubes slightly decurrent or not.....13
13 Basidiocarps infundibuliform.....*P. baishanzuensis*
13 Basidiocarps irregular circular, semicircular or fan-shaped.....*P. hainanensis*

Picipes badius (Pers.) Zmitr. et Kovalenko, *Int. J. Med. Mushrooms.* 18 (1): 35 (2016) (Figs. 286, 287)
MycoBank: MB 812028
Basionym: *Boletus badius* Pers., *Syn. meth. fung.* 2: 523 (1801.
≡ *Polyporus badius* (Pers.) Schwein., *Trans. Am. phil. Soc., New Series* 4(2): 155 (1832).

Fig. 286 Basidiocarps of *Picipes badius*

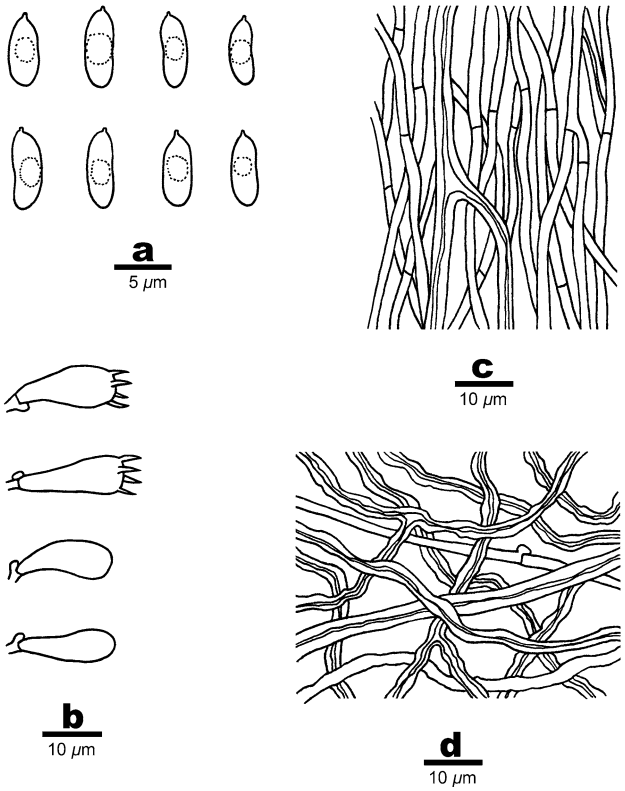

Fig. 287 Microscopic structures of *Picipes badius* (drawn from *Cui 10452*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from contex. Bars: **a–d** = 10 μm

Fruiting body. — Basidiocarps annual, centrally to laterally stipitate, solitary or clustered, soft leathery in juvenile specimens and leathery in mature fresh specimens, becoming fragile in juvenile specimens and hard corky in mature dry specimens. Pilei fan-shaped, semicircular to circular with a depressed center, up to 17 cm in diam and 1.5 cm thick at base. Pileal surface white to gray in juvenile specimens and light brown, reddish-brown, brown, chestnut to blackish brown in mature fresh specimens, becoming to buff to yellowish-brown in juvenile specimens and tan, chestnut to black in mature dry specimens, always darker in the center, glabrous, azonate, occasionally with radial stripes; margin sharp, straight when fresh and straight to incurved upon drying. Pore surface white to cream when fresh and buff yellow when dry; pores round to angular, 6–10 per mm; dissepiments thin, entire to slightly lacerate. Context white when fresh and white to buff when dry, up to 1.3 cm thick. Tubes concolorous with pore surface, decurrent, less than 2 mm long. Stipe covered with a black cuticle, glabrous, up to 3.6 cm long and 1.7 cm in diam.

Hyphal structure. — Hyphal system dimitic; generative hyphae simple septate; skeletal hyphae IKI–, CB + ; tissues unchanged in KOH.

Context. — Generative hyphae hyaline, thin-walled, frequent in juvenile specimens, scaterred in mature ones, occasionally branched, 2.5–8 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen in juvenile specimens while subsolid in mature ones, moderately branched, interwoven, 2–6 μm in diam. Hyphae in cuticle slightly thick-walled with simple septa, unbranched, with ivory to buff inclusion, parallel arranged into a palisade, 4–8.5 μm in diam.

Tubes. — Generative hyphae hyaline, thin-walled, frequent in juvenile specimens while infrequent in mature ones, infrequently branched, 3–5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen in juvenile specimens while subsolid in mature ones, dendritically branched, strongly interwoven, 1.5–6 μm in diam. Cystidia absent; cystidioles infrequent, subulate, hyaline, thin-walled, 13–16.5 × 4.5–5.5 μm. Basidia clavate, with four sterigmata and a basal simple-septum, 11.5–20 × 6–8 μm; basidioles in shape similar to basidia, but smaller.

Stipe. — Generative hyphae hyaline, thin-walled, frequent in juvenile specimens while infrequent in mature ones, occasionally branched, 2.5–8.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen in juvenile specimens while subsolid in mature ones, moderately branched, interwoven, 1.5–9 μm in diam. Hyphae in cuticle thick-walled with a wide lumen, simple septate, occasionally branched, with buff to yellowish-brown inclusion, 4–8.5 μm in diam.

Spores. — Basidiospores oblong to cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (5.2–)5.5–8(–8.6) × (2.8–)3–3.8 μm, L = 6.42 μm, W = 3.13 μm, Q = 1.78–2.7 (n = 150/4).

Notes. — The dark brown pileal surface and simple-septate contextual generative hyphae are the diagnostics of *P. badius*. The simple-septate connections are not easy to observe in trama and context, but they seem to be common in stipe.

Specimens examined: **CHINA. Fujian**, Wuyishan County, Longfenggu Forest Park, on fallen angiosperm branch, 27 August 2006, *Cui 4138* (IFP). **Guangdong**, Shixing County, Chebaling Nature Reserve, on fallen angiosperm branch, 14 September 2009, *Cui 7483* (BJFC). **Hainan**, Changjiang County, Bawangling Nature Reserve, on fallen angiosperm branch, 9 May 2009, *Cui 6492* (BJFC). **Hebei**, Xinglong County, Wulingshan Nature Reserve, on fallen branch of *Populus*, 27 July 2009, *Cui 6867* (BJFC). **Heilongjiang**, Yichun, Fenglin Nature Reserve, on fallen branch of *Picea*, 2 August 2011, *Cui 9893* (BJFC). **Hubei**, Fang County, Shennongjia Nature Reserve, on fallen angiosperm branch, 8 September 2005, *Li 786* (IFP). **Shaanxi**, Zhouzhi County, Houzhenzi, on fallen angiosperm branch, 25 October 2006, *Yuan 2745* (BJFC). **Xizang (Tibet)**, Linzhi County, Bayi, on fallen angiosperm trunk, 9 August 2004, *Yu 97* (IFP). **Xinjiang**, Gongliu County, Xitianshan Nature Reserve, on fallen branch of *Populus*, 13 September 2015, *Dai 15916* (BJFC). **Yunnan**, Weixi County, Laojun Mountain, on fallen angiosperm branch, 22 September 2011, *Cui 10452* (BJFC).

Picipes baishanzuensis J.L. Zhou & B.K. Cui, *Plos One* 11(8): e0159495 (2016) (Figs. 288, 289)
MycoBank: MB 815517

Fruiting body. — Basidiocarps annual, centrally stipitate, solitary, coriaceous when fresh and woody hard when dry. Pilei infundibuliform, up to 5.5 cm wide and 2.5 mm thick at base. Pileal surface glabrous, reddish-brown to black in the center and becoming light ivory to pale-brown towards the edge in juvenile specimens, becoming black in the whole pilei with age, with radially aligned stripes; margin straight when fresh and incurved upon drying. Pore surface white when fresh, cream to buff upon drying; pores round to angular, 3–6 per mm; dissepiments thin, entire to slightly lacerate. Context white to buff, woody hard upon drying, up to 1 mm thick. Tubes concolorous with pore surface, decurrent on the stipe, less than 1.5 mm thick. Stipe slender, bearing a black cuticle, wrinkled, 2.2 cm long and 5 mm in diam.

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

Context. — Generative hyphae frequent, hyaline, thin-walled, frequently branched from clamp connections, 2–5.5 μm in diam, usually inflating at the branching area; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, moderately branched, with arboriform branches and tapering ends, interwoven, 1.7–6.8 μm in diam. Hyphae in cuticle bearing clamp connections, thin-walled with a wide lumen, with buff inclusion, parallel arranged into a palisade, 2.7–6 μm in diam.

Tubes. — Generative hyphae frequent, usually present near hymenium, hyaline, thin-walled, occasionally branched, 2–3.8 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, frequently with dendroid branching, strongly interwoven, 0.9–3.3 μm in diam. Cystidia absent; cystidioles infrequent, subulate, hyaline, thin-walled, 16–21 × 3.2–5.3 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 13.4–27 × 4.6–6.5 μm; basidioles in shape similar to basidia, smaller than basidia.

Stipe. — Generative hyphae frequent, hyaline, thin-walled, occasionally branched, 1.9–5.5 μm in diam; skeletal hyphae hyaline, thick-walled with a wide to narrow lumen, moderately branched, interwoven, 1.9–4.3 μm in diam. Hyphae in cuticle bearing clamp connections, thick-

Fig. 288 Basidiocarps of *Picipes baishanzuensis*

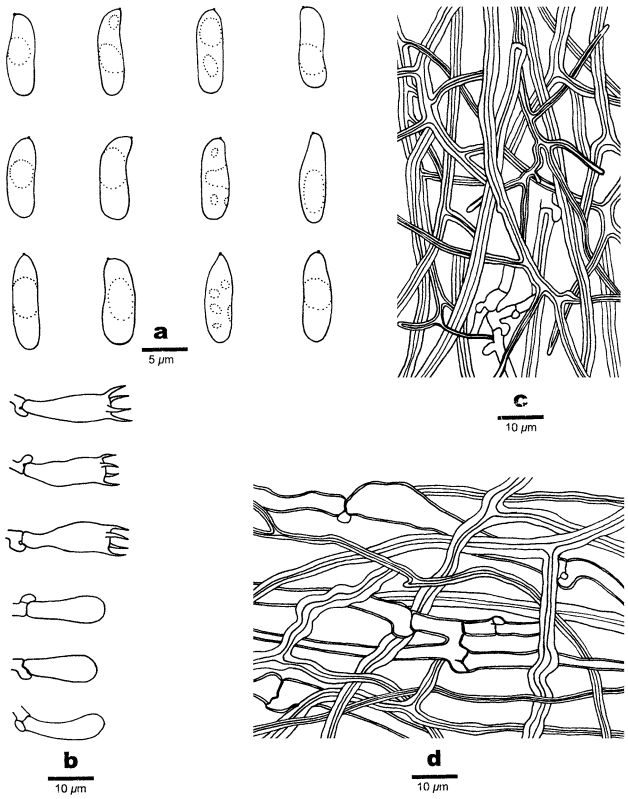

Fig. 289 Microscopic structures of *Picipes baishanzuensis* (drawn from *Dai 13418*). **a**. Basidiospores; **b**. Basidia and basidioles; **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from context; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

walled with a wide lumen, with buff to brown inclusion and arranged in a palisade, 3–6 μm in diam.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, usually with one to three guttules, IKI–, CB–, (5.8–)6.6–7.9(−8) × (2.4–)2.5–3.1(−3.3) μm, L = 7.04 μm, W = 2.82 μm, Q = 2.14–2.84 (n = 90/3).

Notes. — *Picipes baishanzuensis* was collected from subtropical areas of China. It is characterized by its radially striped infundibuliform pilei with a slender black stipe (Zhou et al. 2016). Morphologically, *P. virgatus* (Berk. & M.A. Curtis,) J.L. Zhou & B.K. Cui and *P. baishanzuensis* share infundibuliform pilei, similar pore size, decurrent tubes and wrinkled dark stipe. However, the basidiospores of *P. virgatus* are much larger (9–12.5 × 4–5 μm, Núñez and Ryvarden 1995).

Specimens examined: **CHINA. Zhejiang**, Qingyuan County, Baishanzu Nature Reserve, on dead angiosperm tree, 14 August 2013, *Dai 13418* (holotype, BJFC); on fallen angiosperm branch, 14 September 2012, *Cui 11392*, *11395* (paratypes, BJFC).

Picipes conifericola (H.J. Xue & L.W. Zhou) J.L. Zhou & B.K. Cui, *Plos One* 11(8): e0159495 (2016) (Figs. 290, 291)

MycoBank: MB 817139

Basionym: *Polyporus conifericola* H.J. Xue & L.W. Zhou, *Fungal Diversity*, 64: 139 (2014).

Fruiting body. — Basidiocarps annual, centrally or eccentrically stipitate, solitary or in clusters, coriaceous when fresh, becoming hard corky upon drying. Pilei circular to infundibuliform, up to 7 cm wide and 3 mm thick. Pileal surface orange brown to fuscous, glabrous, with a cuticle bearing indistinctly concentric zones when fresh, azonate and more or less radially wrinkled upon drying; margin sharp, straight when fresh and straight to incurved upon drying. Pore surface white to cream when fresh and ivory to light brown when dry; pores round to angular, 7–10 per mm; dissepiments thin to fairly thick, entire to slightly lacerate. Context white to cream when fresh, cream to buff when dry, up to 2 mm thick. Tubes concolorous with pore surface, decurrent, up to 1 mm long. Stipe slender, bearing a fuscous to black cuticle, glabrous, up to 5 cm long and 6 mm in diam.

Fig. 290 Basidiocarps of *Picipes conifericola*

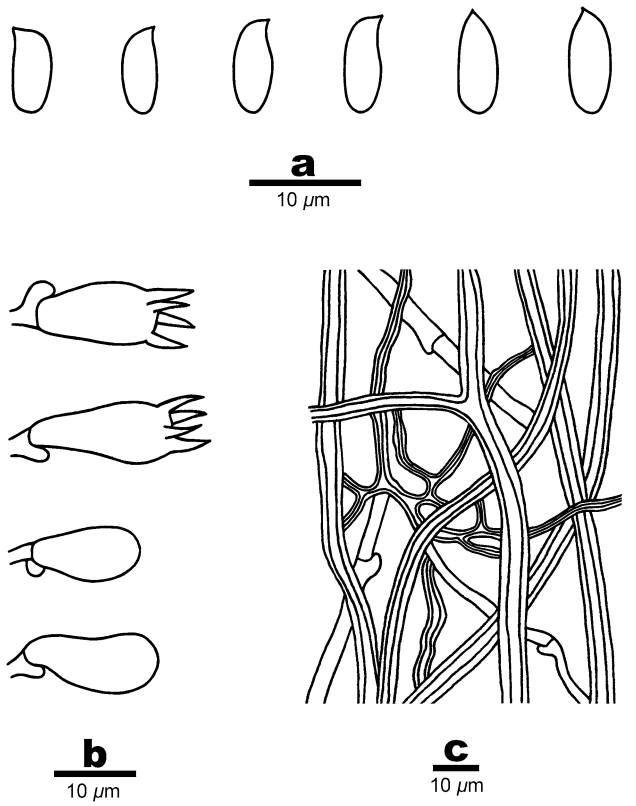

Fig. 291 Microscopic structures of *Picipes conifericola* (drawn from *Dai 11114*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a–c** = 10 μm

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

Context. — Generative hyphae frequent in juvenile specimens while infrequent in mature ones, hyaline, thin-walled, infrequently branched, 2–5.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, moderately branched, strongly interwoven, 1.5–6 μm in diam.

Tubes. — Generative hyphae frequent in juvenile specimens while infrequent in mature ones, hyaline, thin-walled, infrequently branched, usually present near the hymenium, 2–4.5 μm in diam; skeletal hyphae dominant, thick-walled to subsolid, with arboriform branches, strongly interwoven, 1–5.5 μm in diam. Cystidia absent; cystidioles infrequent, subulate, hyaline, thin-walled, 11.5–18.5 × 5–7.5 μm. Basidia clavate, rarely pear-shaped, with four sterigmata and a basal clamp connection, 13.5–19 × 7.5–8.5 μm; basidioles in shape similar to basidia, smaller than basidia.

Stipe. — Generative hyphae frequent, hyaline, thin-walled, infrequently branched, 2–7.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, moderately branched, strongly interwoven, 1.5–5.5 μm in diam. Hyphae in cuticle bearing clamp connections, thick-walled with a wide lumen, with buff to brown inclusion, 3.5–9 μm in diam.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, occasionally with one or two guttules, IKI–, CB–, (6.1–)6.5–8.3(−9.1) × (2.6–)2.9–3.5(−3.7) μm, L = 7.39 μm, W = 3.16 μm, Q = 2–2.68 (n = 65/2).

Notes. — *Picipes conifericola* is morphologically similar to *P. tubaeformis*, both species sharing infundibuliform and orange brown to reddish brown basidiocarps, straw yellow to ochraceous pore surface, commonly gelatinized and interwoven tramal hyphae, and presence of cystidioles. However, *P. tubaeformis* has bigger pores (5–7 per mm, Ryvarden and Gilbertson 1994) and slightly larger basidiospores (7–9 × 3–3.5 μm in Ryvarden and Gilbertson 1994; 7–9 × 2.5–3.5 μm in Krüger et al. 2006). Moreover, *P. tubaeformis* mostly grows on angiosperm wood and very rarely on *Picea* (Ryvarden and Gilbertson 1994), while *P. conifericola* is exclusively found on gymnosperm wood.

Specimens examined: **CHINA. Inner Mongolia**, Genhe, on fallen trunk of *Larix*, 29 August 2009, *Dai 11114* (holotype, IFP). **Jilin**, Antu County, Changbaishan Nature Reserve, on rotten wood of *Picea*, 1 August 2008, *Dai 10091* (paratype, IFP); on fallen gymnosperm trunk, 7 August 2011, *Cui 9950* (BJFC).

Picipes fraxinicola (L.W. Zhou & Y.C. Dai) J.L. Zhou & B.K. Cui, *Plos One* 11(8): e0159495 (2016) (Figs. 292, 293)

MycoBank: 817140

Basionym: *Polyporus fraxinicola* L.W. Zhou & Y.C. Dai, *Fungal Diversity* 64(1): 141 (2014).

= *Polyporus fraxineus* (Bondartsev & Ljub.) Y.C. Dai, *Fungal Science*, 14(3, 4): 69 (1999).

Fruiting body. — Basidiocarps annual, laterally stipitate, solitary or clustered, soft corky when fresh, corky when dry. Pilei dimidiate, up to 25 cm in diam and 3 cm thick at center. Pileal surface cream when fresh, becoming pale gray to olive brown upon drying, rough or glabrous with a thin grayish cuticle, azonate; margin sharp, straight. Pore surface white when fresh, becoming brownish when bruised, pale yellowish to brown when dry; pores angular to round, 2–4 per mm; dissepiments thin, entire. Context cream when fresh, becoming gray beige to pale gray upon drying, up to 2.6 cm thick. Tubes white and corky when fresh, buff and fragile when dry, up to 4 mm long. Stipe short, cream when fresh, pale ochraceous when dry, velutinate or glabrous, up to 2 cm long, 1.5 cm in diam.

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

Context. — Generative hyphae frequent, hyaline, thin-walled, occasionally branched, 2.5–11.7 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a

Fig. 292 Basidiocarps of *Picipes fraxinicola*

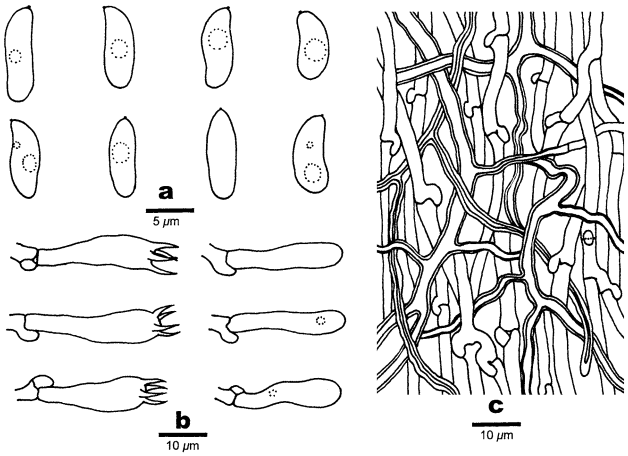

Fig. 293 Microscopic structures of *Picipes fraxinicola* (drawn from *Dai 2494*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 μm; **b–c** = 10 μm

distinct wide lumen, moderately branched, interwoven, 2.5–6 μm in diam.

Tubes. — Generative hyphae frequent, hyaline, thin-walled, occasionally branched, 2.4–4.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, with arboriform branches, strongly interwoven, 1.5–5 μm in diam. Cystidia absent; cystidioles infrequent, subulate or sickle-shaped, hyaline, thin-walled, 20–42 × 5–8.7 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 20.5–34.5 × 7–8.5 μm; basidioles in shape similar to basidia, but smaller than basidia.

Stipe. — Hyphae in stipe similar to those in context.

Spores. — Basidiospores cylindrical, rarely oblong, hyaline, thin-walled, smooth, with one or two guttules, IKI–, CB–, (6.7–)7.2–8.5(–8.8) × (2.8–)3.2–4(–4.2) μm, L = 7.73 μm, W = 3.45 μm, Q = 2.25 (n = 30/1).

Notes. — *Picipes fraxinicola* was treated as a synonym of *P. admirabilis*, but phylogenetic analysis indicates that they are different although closely related species (Dai et al. 2014). Morphologically, *P. fraxinicola* differs from *P. admirabilis* in having entire dissepiments, shorter basidiospores, and absence of cystidioles; while *P. admirabilis* has lacerate dissepiments, longer basidiospores (7.8–9 × 3–3.5 μm, Dai 1999), and presence of cystidioles.

Specimen examined: **CHINA. Jilin**, Antu County, Changbaishan Nature Reserve, on living tree of *Quercus*, 15August 1997, *Dai 2494* (IFP).

Picipes hainanensis J.L. Zhou & B.K. Cui, **sp. nov.** (Figs. 294, 295)

MycoBank: MB 825665

Differs form other *Picipes* species by its laterally to eccentrically basidiocarps with a short black stipe or base, tan to blackish-brown pilei, cylindrical basidiospores (6–6.7 × 2.3–2.6 μm), and distribution in tropical China.

Type. — **CHINA. Hainan**, Lingshui County, Diaoluoshan Forest Park, on fallen angiosperm trunk, 21 November 2007, *Cui 5327* (holotype, BJFC).

Etymology. — *Hainanensis* (Lat.) referring to the locality of the type specimen in Hainan Province.

Fruiting body. — Basidiocarps annual, laterally stipitate, solitary or scattered, corky when fresh, woody hard when dry. Pilei irregular circular, semicircular or fan-shaped, projecting up to 2.5 cm, 3.5 cm wide and 1.2 mm thick. Pileal surface blackish brown towards the stipe, tan to pale brown towards the margin when dry, glabrous, wrinkled upon drying, with faintly radial stripes; margin incurved upon drying. Pore surface tan upon drying; pores angular, 4–5 per mm; dissepiments thin, slightly lacerate. Context buff, woody hard upon drying, up to 0.5 mm thick. Tubes concolorous with pore surface, decurrent, up to 0.7 mm thick. Stipe short or with a flattened base, with a black cuticle, 2–5 mm long and 3–4 mm in diam.

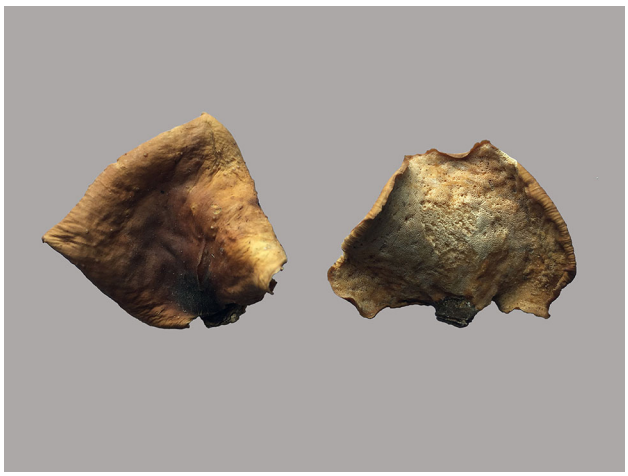

Fig. 294 Basidiocarps of *Picipes hainanensis*

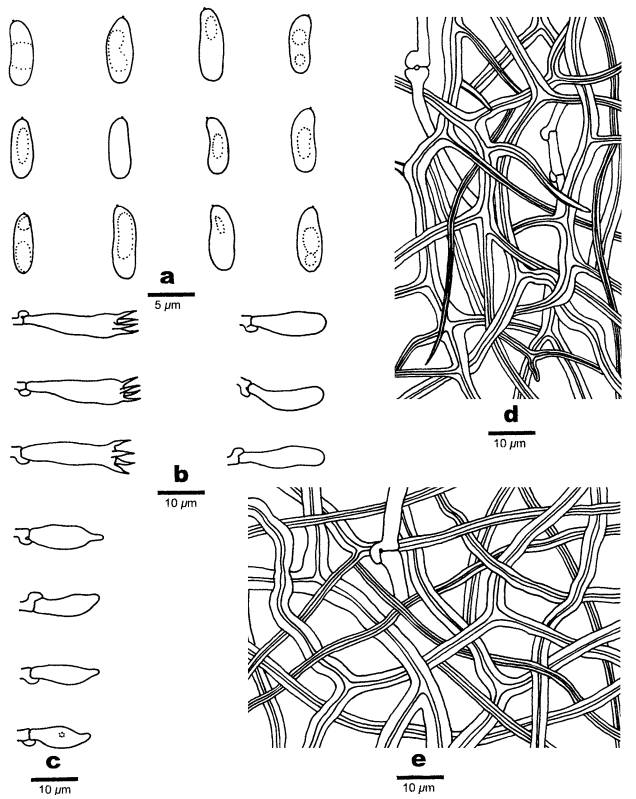

Fig. 295 Microscopic structures of *Picipes hainanensis* (drawn from *Cui 5324*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **e**. Hyphae from context. Bars: **a** = 5 μm; **b–e** = 10 μm

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

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2.8–5.3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, frequently branched, interwoven, 1.8–5 μm in diam. Hyphae in cuticle bearing clamp connections, thin-walled with a wide lumen, with buff inclusion, 3.1–6.9 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, 1.6–3.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, frequently dendroid branched, strongly interwoven, 1–4.6 μm in diam. Cystidia absent; cystidioles frequent, subulate, hyaline, thin-walled, 12.5–18 × 3.5–5.8 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 11.5–15.6 × 4–5.7 μm; basidioles in shape similar to basidia, but smaller than basidia.

Stipe. — Generative hyphae infrequent, hyaline, thin-walled, 3.3–6.3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, frequently branched, interwoven, 1.8–3.8 μm in diam. Hyphae in cuticle thick-walled with a wide lumen and clamp connections, with buff inclusion, 2.5–5.6 μm in diam.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, usually with one to three guttules, IKI–, CB–, (5.6–)5.7–6.5(−6.8) × (2.1–)2.2–2.6 μm, L = 6.16 μm, W = 2.38 μm, Q = 2.59 (n = 49/1).

Notes. — *Picipes hainanensis* was collected in tropical areas of China. It can be identified by its laterally to eccentrically short black stipe or base with tan to blackish-brown pilei and cylindrical basidiospores (6–6.7 × 2.3–2.6 μm). *Picipes austroandinus* (Rajchenb. & Y.C. Dai) J.L. Zhou & B.K. Cui is similar to *P. hainanensis* by the laterally to eccentrically black stipe, but the former has much larger basidiocarps (up to 13 × 18 × 0.9 cm), longer stipes (up to 4 cm long and 1.6 cm in diam) and larger basidiospores (9–11.5 × 3–3.8 μm, Dai et al. 2014). *Polyporus jianfenglingensis* (G. Y. Zheng) H.D. Zheng & P.G. Liu is another species to be found in Hainan; it also has yellowish pilei in dried specimens, but the larger basidiospores (7.2–9 × 2.8–3.3 μm, Zheng and Liu 2005), smaller pores (6–7 per mm, Zheng and Liu 2005) and pale colored stipe distinguish it from *P. hainanensis*.

Picipes jiajinensis J.L. Zhou & B.K. Cui, **sp. nov.** (Figs. 296, 297)

MycoBank: MB 825666

Differs form other *Picipes* species by its reddish-brown to black pileal surface, lateral stipe with a black cuticle, oblong to cylindrical basidiospores (5.4–6.1 × 2.5–2.9 μm), growing on coniferous wood and distribution in high altitude area.

Type. — **CHINA. Sichuan**, Xiaojin County, Jiajin Mountain, on fallen trunk of *Abies*, 17 October 2012, *Cui 10748* (holotype, BJFC).

Etymology. — *Jiajinensis* (Lat.) referring to the type locality in Jiajin Mountain.

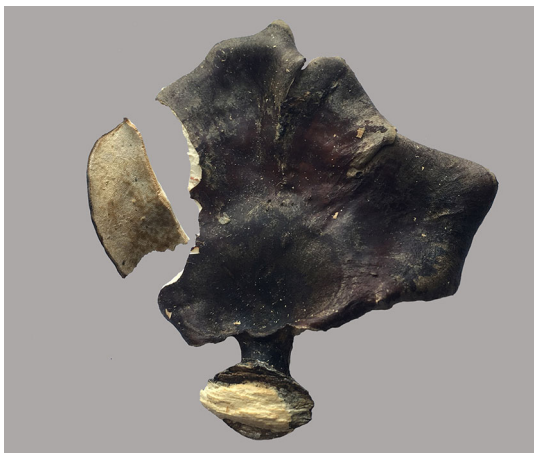

Fig. 296 A basidiocarp of *Picipes jiajinensis*

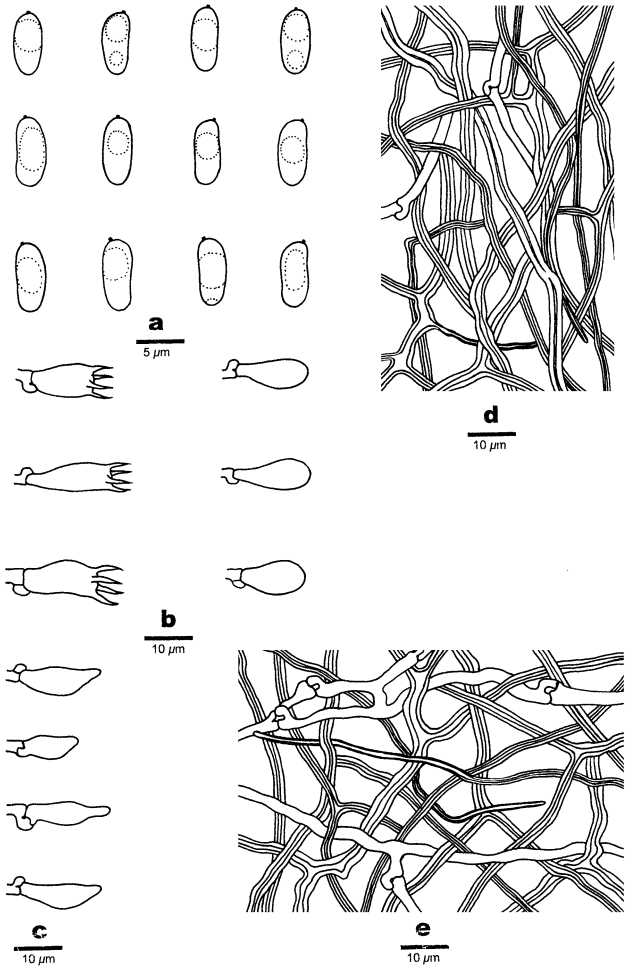

Fig. 297 Microscopic structures of *Picipes jiajinensis* (drawn from *Cui 10748*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **e**. Hyphae from context. Bars: **a** = 5 μm; **b–e** = 10 μm

Fruiting body. — Basidiocarps annual, laterally stipitate, solitary, woody hard when dry. Pilei irregular semicircle, projecting up to 3.3 cm, 5 cm wide and 1 mm thick at base. Pileal surface reddish-brown to black when dry, glabrous, azonate; margin incurved upon drying. Pore surface buff to honey yellow upon drying, shining; pores subcircular, 7–9 per mm; dissepiments thin, entire. Context white to cream, woody hard upon drying, thin, less than 1 mm thick. Tubes concolorous with pore surface, less than 1 mm thick, decurrent to one side of the stipe. Stipe short, bearing a black cuticle, glabrous, up to 5 mm long and 5 mm in diam.

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

Context. — Generative hyphae frequent, hyaline, thin-walled, rarely branched, 2.3–4.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, frequently branched, interwoven, 1–3 μm in diam. Hyphae in cuticle thin-walled bearing clamp connections, with brownish inclusion, 3–5 μm in diam.

Tubes. — Generative hyphae frequent, hyaline, thin-walled, rarely branched, 1.4–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, dendroid branched, strongly interwoven, 1–3 μm in diam. Cystidia absent; cystidioles frequent, subulate, hyaline, thin-walled, 11–16.1 × 4.3–5.1 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 11–16 × 5.7–6.8 μm; basidioles in shape similar to basidia, but smaller than basidia.

Stipe. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2–3.4 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, frequently branched, strongly interwoven, 1.7–4 μm in diam. Hyphae in cuticle thick-walled with a wide lumen and clamp connections, with brownish inclusion, 2.5–5 μm in diam.

Spores. — Basidiospores mainly cylindrical, occasionally oblong, hyaline, thin-walled, smooth, usually with one or two guttules, (4.8–)5.4–6.1(−6.3) × 2.5–2.9(−3.2) μm, L = 5.7 μm, W = 2.82 μm, Q = 2.03 (n = 30/1).

Notes. — *Picipes jiajinensis* is a temperate species growing on coniferous wood in high elevation forest of Jiajin Mountains. It is morphologically similar to *P. dictyopus* in having a dark pileus and a black stipe, but the later has larger pores (5–7 per mm) and basidiospores (7–8.5 × 2.5–4 μm, Núñez and Ryvarden 1995), and grows on hardwoods in tropical areas.

Picipes pseudovarius J.L. Zhou & B.K. Cui, **sp. nov.** (Figs. 298, 299)

MycoBank: MB 825667

Differs form other *Picipes* species by its grayish-brown to black laterally stipitate basidiocarps, tan to blackish-brown pilei and cylindrical basidiospores (7.7–9.3 × 2.6–3.4 μm), and distribution in high altitude area.

Type. — **CHINA. Yunnan**, Shangrila County, Potatso Forest Park, on fallen trunk of *Abies*, 24 September 2011, *Cui 10548* (holotype, BJFC).

Etymology. — *Pseudovarius* (Lat.) referring to the species is morphologically similar to *Polyporus varius*.

Fruiting body. — Basidiocarps annual, laterally stipitate, solitary, woody hard when dry. Pilei irregularly fan-shaped, projecting up to 2 cm, 3.3 cm wide and 2 mm thick. Pileal surface grayish-brown to blackish brown when dry, glabrous, azonate; margin incurved or not upon drying. Pore surface light yellowish-brown to light orange when dry; pores angular, 2–5 per mm; dissepiments thin, slightly lacerate. Context white, woody hard upon drying, up to 1 mm thick. Tubes concolorous with pore surface, decurrent on one side of stipe, up to 1 mm thick. Stipe short,

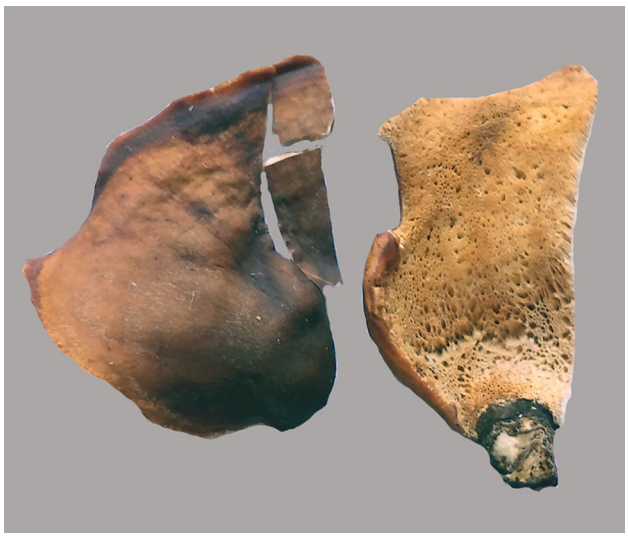

Fig. 298 A basidiocarp of *Picipes pseudovarius*

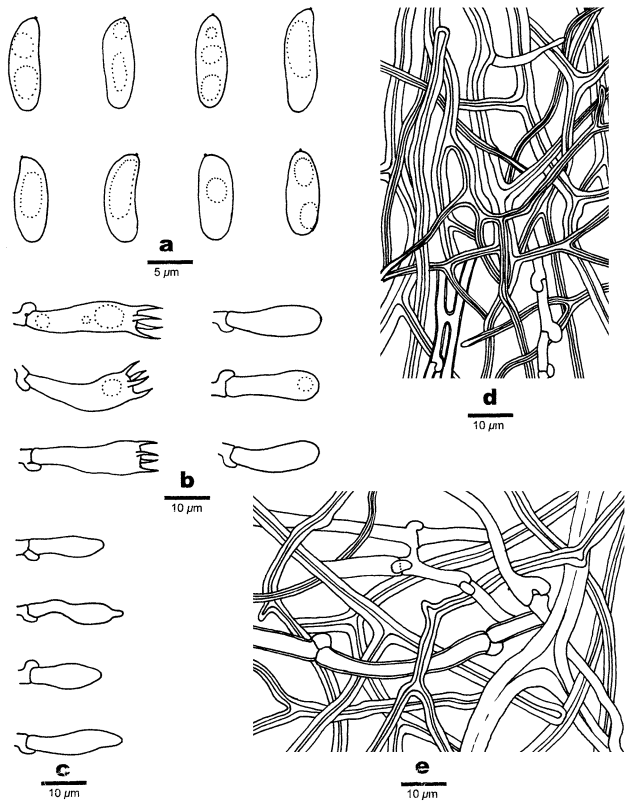

Fig. 299 Microscopic structures of *Picipes pseudovarius* (drawn from *Cui 10548*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **e**. Hyphae from context. Bars: **a** = 5 μm; **b**–**e** = 10 μm

bearing a black cuticle, up to 5 mm long and 5 mm in diam.

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

Context. — Generative hyphae frequent, hyaline, thin-walled, 2.3–5.2 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, frequently branched, strongly interwoven, 2.4–7.8 μm diam. Hyphae in cuticle thin-walled, bearing clamp connections, with buff inclusion, 2.3–6.7 μm in diam.

Tubes. — Generative hyphae frequent, hyaline, thin-walled, 1.8–2.6 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, frequently dendroid branched, strongly interwoven, 1.1–5 μm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 12.7–21 × 6–7 μm; basidioles in shape similar to basidia, but smaller than basidia.

Stipe. — Generative hyphae infrequent, hyaline, thin-walled, 1.9–4.3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to solid, frequently branched, interwoven, 1.7–4.2 μm in diam. Hyphae in cuticle thick-walled with a wide lumen and clamp connections, with buff to brown inclusion, 2.4–5 μm in diam.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, usually with one or two guttules, IKI–, CB–, (6.7–)7.7–9.3(−9.6) × 2.6–3.4(−3.7) μm, L = 8.3 μm, W = 3.08 μm, Q = 2.71 (n = 32/1).

Notes. — *Picipes pseudovarius* is a temperate species found in Potatso Forest Park of Shangrila, where the elevation is more than 3200 m. Morphologically, *P. taibaiensis* has similar stipe and pore size (3–5 per mm, Dai et al. 2009b) to *P. pseudovarius*, but *P. taibaiensis* has fusoid cystidioles and grows on hardwood. *P. jiajinensis* was also collected on coniferous woods in high altitude area of Southwest China, but its smaller pores (7–9 per mm) and basidiospores (5.4–6.1 × 2.5–2.9 μm) and presence of cystidioles are different from *P. pseudovarius*.

Picipes pumilus (Y.C. Dai & Niemelä) J.L. Zhou & B.K. Cui, **comb. nov.** (Figs. 300, 301)
MycoBank: MB 825668
Basionym: *Polyporus pumilus* Y.C. Dai & Niemelä, *Ann. bot. fenn.* 40(6): 387 (2003).

Fruiting body. — Basidiocarps annual, laterally stipitate or with a constricted base (substipitate), solitary, leathery when fresh, woody hard when dry. Pilei semicircular, projecting up to 1.3 cm, 2 cm wide and 2.5 mm thick. Pileal surface cream, buff to pale straw when dry, glabrous, zonate, with radially aligned stripes; margin acute. Pore surface cream when fresh, beige gray to yellowish-brown when dry; pores subcircular, 6–8 per mm; dissepiments thin, entire. Context cream when fresh, buff to buff yellow when dry, hard corky upon drying, up to 1 mm thick.

Fig. 300 A basidiocarp of *Picipes pumilus*

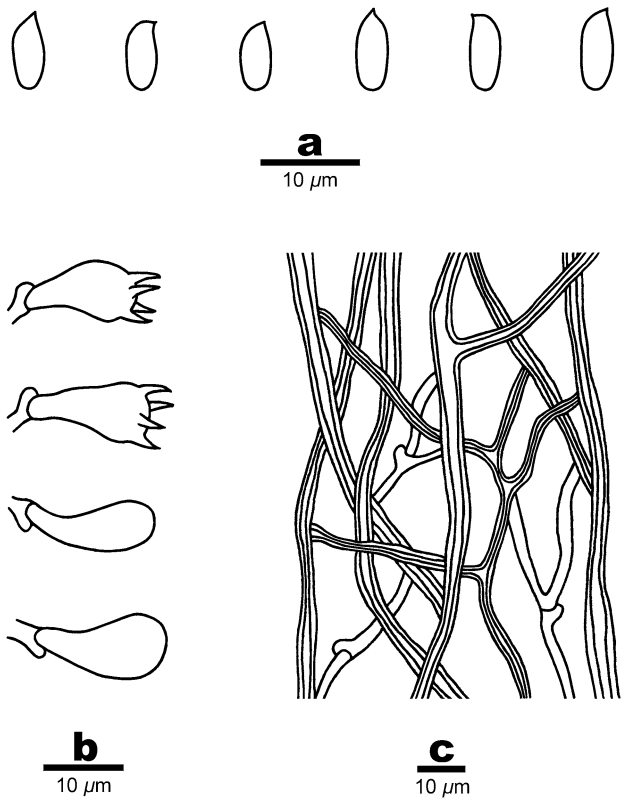

Fig. 301 Microscopic structures of *Picipes pumilus* (drawn from *Yuan 4205*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a–c** = 10 μm

Tubes concolorous with pore surface, woody hard, up to 1.5 mm thick. Stipe short or attached to the substrate by a flattened base, concolorous to the pileal surface, up to 5 mm long and 5 mm in diam.

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

Context. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–6.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to solid, frequently branched, strongly interwoven, 1.3–7.4 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–4.2 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to solid, dendroid branched, strongly interwoven, 1.5–5.5 μm in diam. Cystidia and cystidioles absent. Basidia infrequent, clavate, with four sterigmata and a basal clamp connection, 13–16.5 × 7–8.5 μm; basidioles in shape similar to basidia, but smaller than basidia.

Stipe. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2.5–5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, frequently branched, strongly interwoven, 1.5–4.8 μm in diam.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, usually with one or two guttules, IKI–, CB–, (6–)6.3–8.4(–9.2) × (2.5)2.6–3.6 μm, L = 7.29 μm, W = 2.97 μm, Q = 1.97–2.89 (n = 177/4).

Notes. — *Picipes pumilus* is a special species with small basidiocarps and a constricted base. Its leathery (when fresh) to woody hard (when dry) basidiocarps, uninflated generative hyphae and strongly interwoven skeletal hyphae are typical characters of *Picipes*. *Picipes subtropicus* J.L. Zhou & B.K. Cui was also described from subtropical regions of China, its substipitate basidiocarps, small pores (8–9 per mm when juvenile) and tramal hyphae are similar to *P. pumilus* (Zhou et al. 2016), but *P. subtropicus* has much darker colored pileal surface, subulate cystidioles and a black cuticle on stipe (Zhou et al. 2016).

Specimens examined: **CHINA. Hainan**, Changjiang County, Bawangling Nature Reserve, on fallen angiosperm branch, 11 November 2007, *Yuan 4205* (IFP); Wuzhishan County, Wuzhishan Nature Reserve, on fallen angiosperm branch, 26 November 2007, *Cui 5464* (BJFC). **Hunan**, Xinning County, Shunhuangshan Forest Park, Zhengjiang Valley, on fallen angiosperm twig, 24 September 2001, *Härkönen 1442* (holotype, IFP); Nanyue County, Hengshan Park, on fallen angiosperm twig, 1 July 2002, *Dai 3531b* (paratype, IFP). **Taiwan**, Taizhong, on fallen angiosperm branch, 15 November 2009, *Dai 11502* (BJFC). **Yunnan**, Jinghong, Menglun, Lvshilin Park, on fallen angiosperm branch, 4 August 2005, *Dai 6705* (IFP); Xishuangbanna Nature Reserve, on fallen angiosperm branch, 5 August 2005, *Dai 6851* (IFP).

Picipes rhizophilus (Pat.) J.L. Zhou & B.K. Cui, *Plos One* 11(8): e0159495 (2016) (Figs. 302, 303)
MycoBank: MB 817141

Basionym: *Polyporus rhizophilus* Pat., *J. Bot.,* 8: 219 (1894).

Fruiting body. — Basidiocarps annual, centrally stipitate, solitary on the grass ground, soft leathery when fresh, corky when dry. Pilei circular, up to 2.5 cm in diam and 4 mm thick at center. Pileal surface yellowish-brown to tan when fresh, grayish brown upon drying, azonate, glabrous, wrinkled when dry; margin acute, straight. Pore surface ivory to yellowish-brown when fresh, tan to grayish brown upon drying; pores angular, 1–3 per mm; dissepiments thin, entire to lacerate. Context white to buff, corky, up to 2 mm thick. Tubes concolorous with pore surface, slightly decurrent, corky, up to 2 mm thick. Stipe grayish to dark brown from the pilei to the expanded base, up to 3 cm long and 3 mm in diam.

Fig. 302 Basidiocarps of *Picipes rhizophilus*

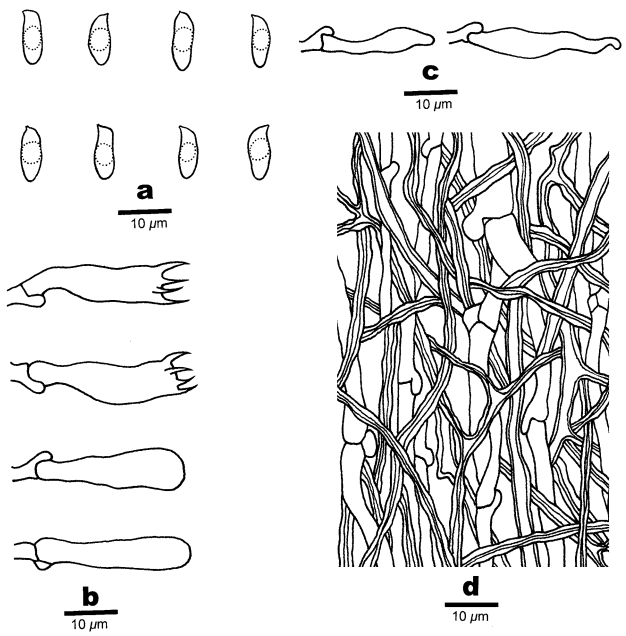

Fig. 303 Microscopic structures of *Picipes rhizophilus* (drawn from *Tolgor 22127*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 μm

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

Context. — Generative hyphae dominant, hyaline, thin-walled, frequently branched, 2–8 μm in diam; skeletal hyphae frequent, hyaline, thick-walled with a wide lumen, moderately branched, interwoven, 2–6.5 μm in diam. Hyphae in cuticle thin-walled bearing clamp connections, occasionally branched, with grayish beige inclusion, 3–5.5 μm in diam.

Tubes. — Generative hyphae frequent, hyaline, thin-walled, frequently branched, 2–4.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, frequently branched, 1.5–6 μm in diam. Cystidia absent; cystidioles infrequent, subulate, hyaline, thin-walled, 21–26.5 × 4.5–5.5 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 19–32 × 6.5–8.5 μm; basidioles in shape similar to basidia, but smaller than basidia.

Stipe. — Generative hyphae frequent, hyaline, thin-walled, frequently branched, 2–9 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, moderately branched, interwoven, 1.5–4.5 μm in diam.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, usually with one or two guttules, IKI–, CB–, (7.7–)8.1–9.8(–10.9) × (3.4–)3.5–4.2(–4.5) μm, L = 8.81 μm, W = 3.79 μm, Q = 2.33 (n = 40/1).

Notes. — *Picipes rhizophilus* is special species growing on steppe grass, which is quite different from other species of *Picipes* and *Polyporus*.

Specimens examined: **CHINA. Inner Mongolia**, Hulunbuir, Chen Barag Banner, on root of grass, 11 August 2009, *Dai 11599* (BJFC); Chifeng, Saihanwula Nature Reserve, on root of grass, 16 August 2007, *Dai 16082* (BJFC).

Picipes submelanopus (H.J. Xue & L.W. Zhou) J.L. Zhou & B.K. Cui, *Plos One* 11(8): e0159495 (2016) (Figs. 304, 305)

MycoBank: MB 817142

Basionym: *Polyporus submelanopus* H.J. Xue & L.W. Zhou, *Mycotaxon* 123: 436 (2012).

Fruiting body. — Basidiocarps annual, centrally stipitate, rarely with a lateral stipe, solitary, hard corky to slightly fragile when dry. Pilei circular, sometimes slightly infundibuliform, projecting up to 6.2 cm in diam and 8 mm thick. Pileal surface cinnamon-buff to pale mouse-gray when dry, glabrous, wrinkled; margin acute, incurved when dry. Pore surface ivory to straw-yellow when dry; pores round to angular, 2–4 per mm; dissepiments thin, entire to lacerate.

Fig. 304 Basidiocarps of *Picipes submelanopus*

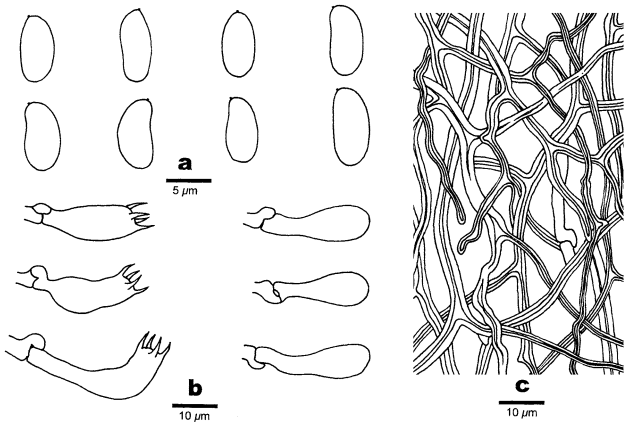

Fig. 305 Microscopic structures of *Picipes submelanopus* (drawn from *Dai 13294*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 μm; **b–c** = 10 μm

Context white to cream, up to 6 mm thick. Tubes concolorous with pore surface, decurrent, up to 2 mm long. Stipe cylindrical, glabrous, bearing a fuscous to black cuticle, corky and slightly fragile, up to 7 cm long and 8 mm in diam.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing both simple septa and clamp connections; skeletal hyphae IKI–, weakly CB + ; tissues unchanged in KOH.

Context. — Generative hyphae frequent, hyaline, thin-walled, occasionally branched, 4–10 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, moderately branched, interwoven, 1.5–15 μm in diam.

Tubes. — Generative hyphae frequent, hyaline, thin-walled, occasionally branched, 2–11.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen or subsolid, with dendroid branches, strongly interwoven, 1.5–6 μm in diam. Cystidia absent; cystidioles infrequent, subulate to sickle-shaped, hyaline, thin-walled, 22–36.5 × 5.5–7 μm. Basidia clavate to pear-shaped, bearing four sterigmata and a basal clamp connection, 17–34 × 7–10.5 μm; basidioles in shape similar to basidia, but smaller than basidia.

Stipe. — Generative hyphae frequent, hyaline, thin-walled, occasionally branched, 2.5–12 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, moderately branched, interwoven, 2–9 μm in diam.

Spores. — Basidiospores mostly cylindrical, occasionally oblong, hyaline, thin-walled, smooth, frequently bearing a big guttule or several small guttules, IKI–, CB–, (6.9–)7.4–8.7(–9.4) × 3.3–4.3(–4.4) μm, L = 7.97 μm, W = 3.76 μm, Q = 1.82–2.47 (n = 74/2).

Notes. — *Picipes submelanopus* is characterized by a terrestrial habit, centrally or laterally black-stipitate basidiocarps, straw-yellow to honey-yellow pore surface, generative hyphae bearing both simple septa and clamp connections, and cylindrical basidiospores (Xue and Zhou 2012). *Picipes melanopus* is closely related to *P. submelanopus* by sharing similar morphology and a terrestrial habit. The specimens of *P. melanopus* from Europe were studied, and they have smaller pores (5–6 per mm), generative hyphae bearing clamp connections only and slightly smaller basidiospores (7–9 × 2.5–3.1 μm).

Picipes badius, a species with simple-septate generative hyphae, is distinguished from *P. submelanopus* in darker pilei and smaller pores (6–10 per mm). In addition, *P. badius* is a wood-inhabiting species rather than a terrestrial one. Macroscopically, *P. submelanopus* resembles *P. tubaeformis* by sharing similar infundibuliform pilei, straw-yellow to honey-yellow pore surface and sharp margin, but the latter species has cystidioles, smaller pores (5–7 per mm, Núñez and Ryvarden 1995). Besides, *P. tubaeformis* has no simple septa on its generative hyphae and grows on wood rather than ground.

Specimens examined: **CHINA. Gansu**, Shandan County, Nianzhishan Forest Park, on ground, 27 July 2013, *Dai 13291, 13294, 13296* (BJFC). **Hebei**, Xinglong County, Wulingshan Nature Reserve, on groud, 30 July 2009, *Cui 6896* (BJFC). **Inner Mongolia**, Chifeng, Saihan Wula Nature Reserve, on ground, 21 July 2008, *Dai 16081* (BJFC). **Qinghai**, Huzhu County, Beishan Forest Farm, on ground, 1 September 2003, *Dai 4997, 5015* (IFP).

Picipes subtropicus J.L. Zhou & B.K. Cui, *Plos One* 11(8): e0159495 (2016) (Figs. 306, 307)
MycoBank: MB 815518

Fruiting body. — Basidiocarps annual, laterally stipitate, gregarious, coriaceous when fresh, woody hard when dry. Pilei fan-shaped to semicircular, projecting up to 4.8 cm in diam and 2.5 mm thick at base. Pileal surface black towards the base, reddish-brown to orange-brown towards the edge when fresh, becoming black to chestnut,

Fig. 306 Basidiocarps of *Picipes subtropicus*

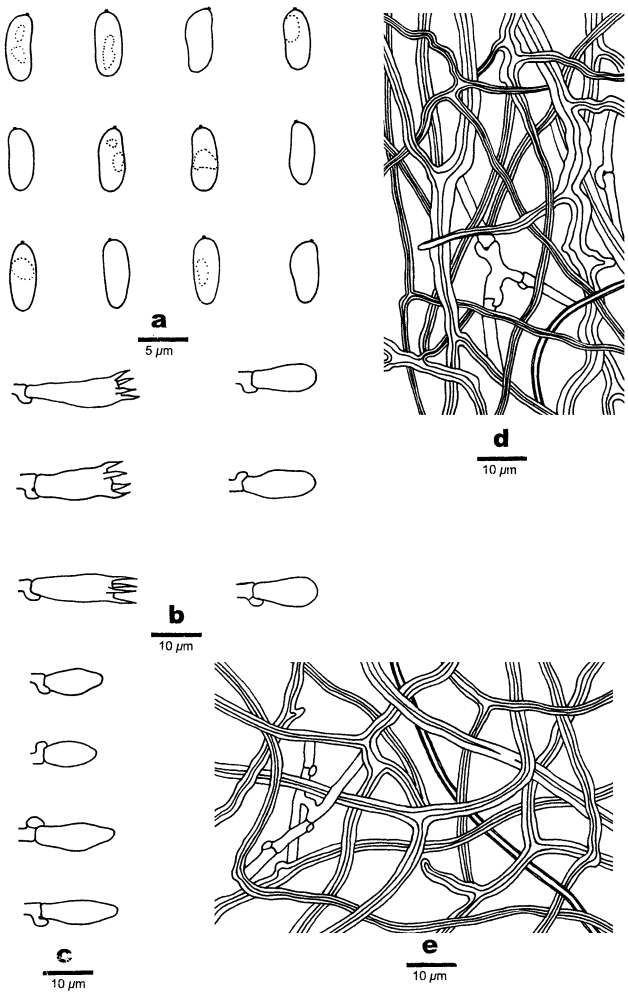

Fig. 307 Microscopic structures of *Picipes subtropicus* (drawn from *Cui 2662*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **e**. Hyphae from context. Bars: **a** = 5 μm; **b–e** = 10 μm

sometimes brown-beige or pastel-yellow towards the edge when dry, glabrous; margin acute, straight when fresh and straight or slightly incurved upon drying. Pore surface white when fresh, white to brown-beige when dry; pores angular to subcircular, 8–9 per mm when juvenile and becoming 5–7 per mm with age; dissepiments thin, entire to slightly lacerate. Context white to buff, woody hard when dry, up to 2 mm thick. Tubes white when fresh, white to brown-beige upon drying, less than 1 mm thick, decurrent on one side of the stipe. Stipe very short or forming a flattened base, bearing a black cuticle, up to 5 mm long and 5 mm in diam.

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

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.9–4.7 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, moderately branched, interwoven, 1.7–4.4 μm in diam. Hyphae in cuticle bearing clamp connections, thin-walled with a wide lumen, with buff to yellowish-brown inclusion, parallel arranged into a palisade, 1.6–3.2 μm in diam.

Tubes. — Generative hyphae frequent, hyaline, thin-walled, 1.5–3.6 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, frequently with dendroid branching, strongly interwoven, 1.2–4.2 μm in diam. Cystidia absent; cystidioles frequent, subulate, hyaline, thin-walled, 14.5–22.8 × 3.2–5.1 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 12.5–27 × 4.8–6.4 μm; basidioles in shape similar to basidia, but smaller than basidia.

Stipe — Generative hyphae infrequent, hyaline, thin-walled, 2–4.5 μm in diam; skeletal hyphae hyaline, thick-walled with a narrow lumen to subsolid, moderately branched, interwoven, 1–5.3 μm in diam. Hyphae in cuticle bearing clamp connections, thick-walled with a narrow lumen, with dark brown inclusion and arranged into a palisade, 2.5–5.6 μm in diam.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, occasionally with one or two guttules, IKI–, CB–, (4.7–)5.1–6.2(–6.6) × 2.2–2.7(−2.9) μm, L = 5.6 μm, W = 2.5 μm, Q = 1.92–2.96 (n = 120/4).

Notes. — *Picipes subtropicus* was found in subtropical areas of China. It can be identified by a continuous variation in pore size, bright pileal surface, short black stipe-like base and medium cylindrical basidiospores (5.1–6.2 × 2.2–2.7 μm, Zhou et al. 2016). *Picipes badius* share similar basidiocarps and pore size with *P. subtropicus*; but it differs in its larger basidiospores (5.5–8 × 3–3.8 μm), and simple-septate generative hyphae. *Picipes baishanzuensis* was also found in subtropical areas of China, but its infundibuliform pilei, slender stipe and lager basidiospores (6.6–7.9 × 2.5–3.1 μm) are quite different from *P. subtropicus*.

Specimens examined: **CHINA. Guangdong**, Fengkai County, Heishiding Nature Reserve, on fallen angiosperm branch, 3 April 2014, *Li 1611*, *1928* (paratypes, BJFC). **Zhejiang**, Lin'an County, Tianmushan Nature Reserve, on fallen angiosperm branch, 10 October 2005, *Cui 2662* (holotype, BJFC); Qingyuan County, Baishanzu Nature Reserve, on fallen angiosperm branch, 14 September 2013, *Cui 11393* (paratype, BJFC).

Picipes subtubaeformis J.L. Zhou & B.K. Cui, *Plos One* 11(8): e0159495 (2016) (Figs. 308, 309)
MycoBank: MB 815519

Fruiting body. — Basidiocarps annual, centrally to laterally stipitate, solitary, coriaceous when fresh, woody hard when dry. Pilei irregularly semicircular, with shallow central depression, projecting up to 7.8 cm, 8 cm wide and 2 mm thick at base. Pileal surface reddish-brown to chestnut in the center, turning to signal-orange to clay-brown towards the edge upon juvenile specimen drying, becoming reddish-brown to chestnut in mature ones, glabrous, with radially aligned stripes; margin acute, incurved upon drying. Pore surface buff to fettuccine when dry, shining; pores round to angular, 4–6 per mm; dissepiments thin, entire to lacerate. Context white to buff, woody hard upon drying, up to 1 mm thick. Tubes concolorous with pore surface, less than 1.5 mm thick, sometimes decurrent on one side of stipe. Stipe bearing a terra-brown to black cuticle, up to 1.2 cm long and 3.5 mm in diam.

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

Context. — Generative hyphae infrequent, hyaline, thin-walled, frequently branched, 1.6–4.3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to solid, moderately branched, interwoven, 1.4–4.8 µm in diam. Hyphae in cuticle bearing clamp connections, thick-walled with a wide lumen, with buff inclusion, parallel arranged into a palisade, 1–3.5 µm in diam.

Fig. 308 Basidiocarps of *Picipes subtubaeformis*

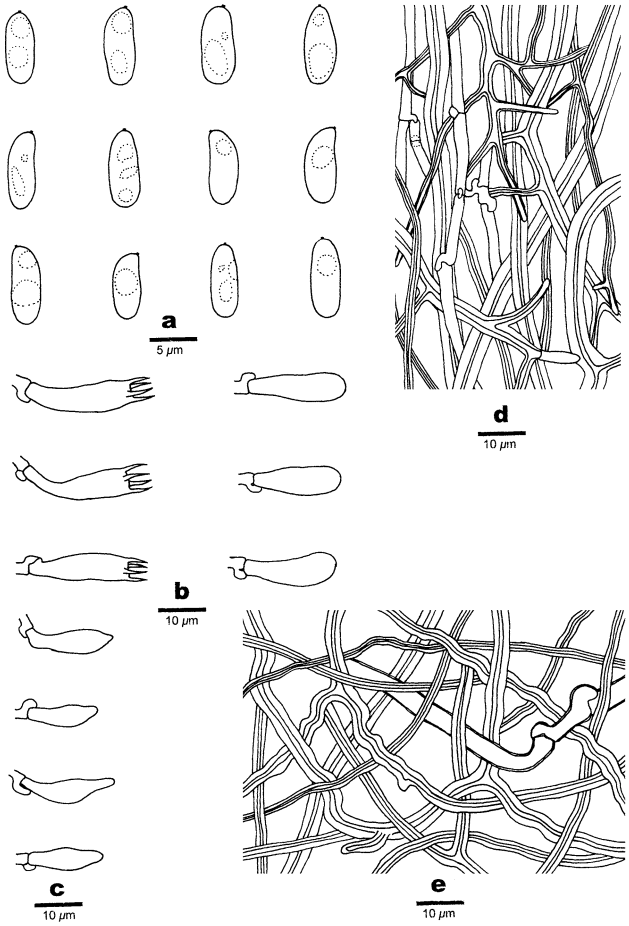

Fig. 309 Microscopic structures of *Picipes subtubaeformis* (drawn from *Dai 11870*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **e**. Hyphae from context. Bars: **a** = 5 µm; **b–e** = 10 µm

Tubes. — Generative hyphae frequent, hyaline, thin-walled, branched, 1.5–3.4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, frequently with dendroid branching, strongly interwoven, 1.2–3.6 µm in diam. Cystidia absent; cystidioles frequent, subulate, hyaline, thin-walled, 16.7–25 × 3.5–5.5 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 15.7–29 × 5.1–6.2 µm; basidioles in shape similar to basidia, but smaller than basidia.

Stipe. — Generative hyphae frequent, hyaline, thin-walled, 1.8–6.5 µm in diam; skeletal hyphae hyaline, thick-walled with a narrow lumen, 1–6.4 µm in diam. Hyphae in cuticle bearing clamp connections, thick-walled with a wide lumen, with brown to dark brown inclusion and arranged into a palisade, 1.5–4.3 µm in diam.

Spores. — Basidiospores oblong to cylindrical, hyaline, thin-walled, smooth, usually with one or two guttules, (5.3–

)5.7–6.8(–7.1) × (2.4–)2.7–3.1(−3.4) μm, L = 6.18 μm, W = 2.91 μm, Q = 1.88–2.5 (n = 60/2).

Notes. — *Picipes subtubaeformis* was described from temperate zone of China. It can be distinguished by the irregularly semicircular or elliptical pilei, terra-brown to black stipe, and oblong to cylindrical basidiospores (5.7–6.8 × 2.7–3.1 μm). Morphologically, both *P. subtubaeformis* and *P. tubaeformis* have orange to reddish-brown pilei and dark stipe, but *P. tubaeformis* differs in its slender stipe and basidiospores (7–9 × 3–3.5 μm, Núñez and Ryvarden 1995). Both *P. virgatus* and *P. subtubaeformis* have reddish-brown or chestnut basidiocarps with centrally to laterally dark stipe, but the former one has bigger pores (3–4 per mm) and larger basidiospores (9–12.5 × 4–5 μm, Núñez and Ryvarden 1995). Moreover, *P. virgatus* lacks cystidioles.

Specimens examined: **CHINA. Anhui**, Huangshan, Huangshan Mountain, on fallen angiosperm branch, 20 October 2010, *Dai 11870* (holotype, BJFC). **Sichuan**, Luding County, Hailuogou Forest Park, on dead angiosperm tree, 20 September 2012, *Cui 10793* (paratype, BJFC).

Picipes taibaiensis (Y.C. Dai) J.L. Zhou & B.K. Cui, *Plos One* 11(8): e0159495 (2016) (Figs. 310, 311)
MycoBank: MB 817143
Basionym: ***Polyporus taibaiensis*** Y.C. Dai, *Mycoscience* 53: 43 (2012).
= *Polyporus rhododendri* Y.C. Dai & H.S. Yuan, *Annales Botanici Fennici* 46 (1): 58 (2009).

Fruiting body. — Basidiocarps annual, with a laterally flattened base attached to the substrate, solitary or a few fused at the base, corky when fresh, woody hard upon drying. Pilei semicircular, flabelliform or spathulate, projecting up to 2.5 cm, 3.5 cm wide and 5 mm thick at center. Pileal surface cinnamon buff to yellowish brown when fresh, dark brown to pale chestnut brown when dry, finely velutinate when juvenile, then rough to glabrous with age, with indistinctly radially

Fig. 310 Basidiocarps of *Picipes taibaiensis*

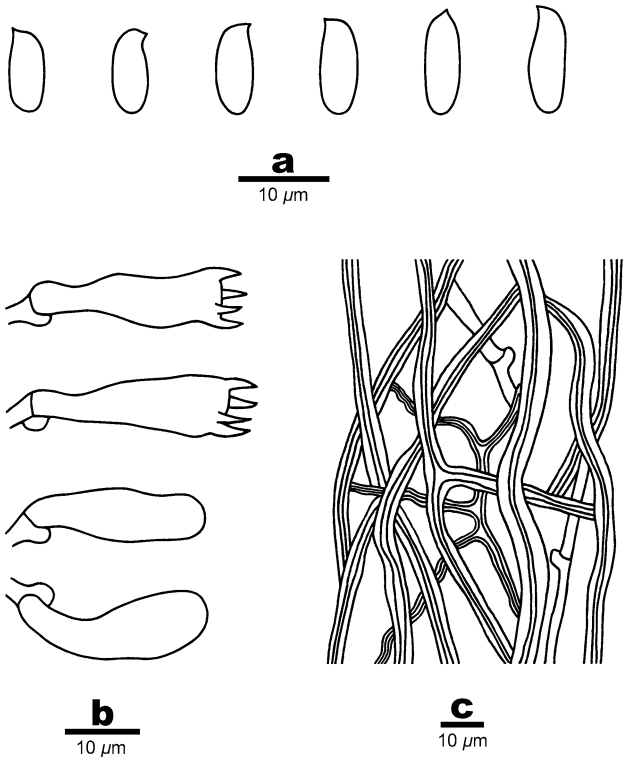

Fig. 311 Microscopic structures of *Picipes taibaiensis* (drawn from *Dai 5746*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a–c** = 10 μm

aligned stripes; margin acute, straight when fresh and incurved when dry. Pore surface cream when fresh, yellowish when bruised, light brown upon drying; pores round to angular, 3–5 per mm; dissepiments thin, entire to slightly lacerate. Context white when fresh, white to cream upon drying, up to 3 mm thick. Tubes concolorous with pore surface, hard corky, up to 2 mm long. Stipe or flattened base very short, bearing a very thin black cuticle, up to 5 mm long and 4 mm in diam.

Hyphal structure. — Hyphal system dimitic; generative hyphae mostly bearing clamp connections, rarely with simple-septa in trama; skeletal hyphae IKI–, CB + ; tissues unchanged in KOH.

Context. — Generative hyphae frequent, hyaline, thin- to slightly thick-walled, occasionally branched, 2.5–7 μm in diam; skeletal hyphae dominant, hyaline, thick-walled, with a narrow lumen to almost solid, moderately branched, flexuous, strongly interwoven, 2–8 μm in diam.

Tubes. — Generative hyphae frequent, hyaline, thin-walled, occasionally branched, 2–4 μm in diam; skeletal hyphae dominant, thick-walled with a wide to narrow lumen or subsolid, with dendroid branching, strongly interwoven, 1.5–5 μm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal

clamp connection, 18–30 × 6.5–9 µm; basidioles in shape similar to basidia, but slightly smaller.

Stipe. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 3–6 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to almost solid, with dendroid branching, strongly interwoven, 1–6 µm in diam.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, with one or two guttules, IKI–, CB–, (6.9–)7.6–10.8(–11.4) × 3.3–4.1(–4.3) µm, L = 9 µm, W = 3.71 µm, Q = 2.43 (n = 30/1).

Notes. — *Picipes taibaiensis* resembles *P. leptocephalus* (Jacq.) Fr. (= *P. varius*) in the field, and both occur in boreal forests. However, the later has distinctly radial stripes at pileal surface, and its pores are smaller (5–9 per mm). The main difference is the shape of basidiospores; fusiform (tapering at apex) in *P. taibaiensis*, while cylindrical (not tapering at apex) in *P. leptocephalus*. In addition, *P. leptocephalus* grows mostly on fallen trunk of *Populus* (Niemelä and Kotriranta 1991), while *P. taibaiensis* was found on *Rhododendron* so far.

Specimens examined: **CHINA. Shannxi**, Mei County, Taibaishan Nature Reserve, alt. 2800 m, on fallen branch of *Rhododendron*, 7 August 2004, *Dai 5746* (holotype, IFP); on dead tree of *Rhododendron*, 7 September 2004, *Dai 5739*, *5741* (paratypes, IFP).

Picipes tibeticus J.L. Zhou & B.K. Cui, *Plos One* 11(8): e0159495 (2016) (Figs. 312, 313)
MycoBank: MB 815520

Fruiting body. — Basidiocarps annual, centrally to laterally stipitate, solitary or scattered, coriaceous when fresh, woody hard when dry. Pilei irregular fan-shaped or semicircular, usually shallow towards the stipe, projecting up to 10.5 cm, 11 cm wide and 1 mm thick. Pileal surface

Fig. 312 Basidiocarps of *Picipes tibeticus*

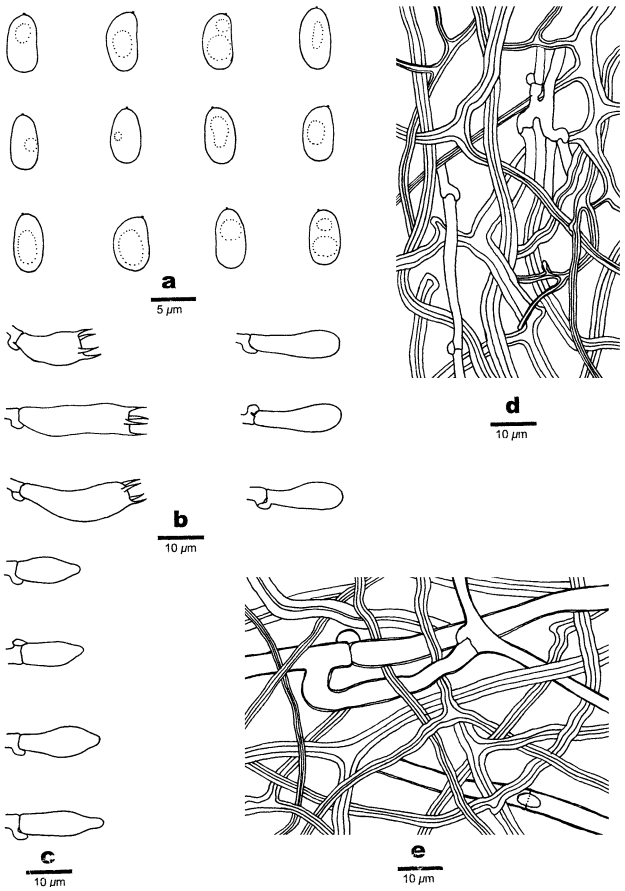

Fig. 313 Microscopic structures of *Picipes tibeticus* (drawn from *Cui 12215*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **e**. Hyphae from context. Bars: **a** = 5 µm; **b–e** = 10 µm

orange-brown to brown when fresh, becoming orange-brown to reddish-brown or blackish-brown upon drying, glabrous, more or less radially wrinkled when dry; margin acute, straight or slightly incurved when fresh and incurved upon drying. Pore surface white when fresh, becoming buff to yellow-orange when dry; pores angular to subcircular, 6–9 per mm; dissepiments thin, entire to slightly lacerate. Context white when fresh, becoming woody hard upon drying, up to 0.5 mm thick. Tubes concolorous with pore surface, less than 0.9 mm thick, decurrent. Stipe bearing a black cuticle, wrinkled, up to 4.5 cm long and 9 mm in diam.

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

Context. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2.4–7 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, moderately branched, interwoven, 1.6–4.4 µm in diam. Hyphae in cuticle bearing clamp connections, thin-

walled with a wide lumen, with buff inclusion, parallel arranged into a palisade, 1.6–10 μm in diam.

Tubes. — Generative hyphae frequent, hyaline, thin-walled, occasionally branched, 1.8–3.2 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to solid, frequently with dendroid branching, strongly interwoven, 0.9–4.5 μm in diam. Cystidia absent; cystidioles infrequent, subulate, hyaline, thin-walled, 14.5–21 × 4–5.3 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 15.3–20 × 5.7–6.8 μm; basidioles in shape similar to basidia, but smaller than basidia.

Stipe. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2.2–5.1 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, moderately branched, interwoven, 1.9–6.6 μm in diam. Hyphae in cuticle bearing clamp connections, thick-walled with a wide lumen, with buff to brown inclusion and arranged into a palisade, 2.5–5.4 μm in diam.

Spores. — Basidiospores mainly oblong, few cylindrical, hyaline, thin-walled, smooth, usually bearing one or two guttules, IKI–, CB–, (4.8–)5–5.9(−6.2) × (2.5–)2.8–3.3(−3.5) μm, L = 5.48 μm, W = 3.01 μm, Q = 1.6–2.07 (n = 90/3).

Notes. — *Picipes tibeticus* is a special species found from eastern Tibetan Plateau. It can be identified by its reddish-brown to blackish-brown, fan-shaped or semicircular basidiocarps, small angular pores (6–9 per mm), oblong basidiospores (5–5.9 × 2.8–3.3 μm) and growth on coniferous woods. Morphologically, *P. conifericola* and *P. badius* have similar basidiocarps and substrates as *P. tibeticus*, but the former two have larger basidiospores (6.5–8.3 × 2.9–3.5 μm for *P. conifericola*; 5.5–8 × 3–3.8 μm for *P. badius*). *Picipes submelanopus* resembles *P. tibeticus* in having dark pileal surface, black-stipitate basidiocarps and buff pore surface, but it differs from *P. tibeticus* in terrestrial habit, bigger pores (2–3 per mm) and larger basidiospores (7.4–8.7 × 3.3–4.3 μm). In addition, *P. submelanopus* has both simple septate and clamped generative hyphae.

Specimens examined: **CHINA**. **Xizang (Tibet)**, Medog County, on fallen branch of *Abies*, 20 September 2014, *Cui 12215* (holotype, BJFC), *Cui 12225* (paratype, BJFC); Linzhi County, Lulang, on fallen branch of *Picea*, 24 September 2010, *Cui 9651* (paratype, BJFC).

Polyporus P. Micheli ex Adans., *Familles des plantes* 2: 10 (1763).
MycoBank: MB 18334
Type species: *Polyporus tuberaster* (Jacq. ex Pers.) Fr.

Basidiocarps annual, centrally to laterally stipitate, soft to corky when fresh, usually fragile to hard when dry. Pileal surface cream to deep brown, smooth to squamulose. Pore surface white to cream, cream to yellowish brown when dry; pores round to angular, small to large. Context white to cream, corky. Tubes cream to pale tan, fragile to corky. Stipe surface varying from white to black, glabrous to finely tomentose. Hyphal system dimitic; generative hyphae usually bearing clamp connections, thin-walled, hyaline; skeletal hyphae thick-walled to subsolid, moderately branched with tapering ends, IKI–, CB + . Cystidia absent; cystidioles frequent, often subulate. Basidia clavate, with four sterigmata and a basal clamp connection. Basidiospores mainly oblong to cylindrical, sometimes navicular, hyaline, thin-walled, smooth, IKI–, CB–.

Polyporus was established by Micheli (1729) and validated by Adanson (1763). Most subsequent authors consider *P. tuberaster* as the lectotype of this genus (Donk 1960; Cunningham 1965; Singer 1986; Niemelä and Kotiranta 1991; Ryvarden 1991; Núñez and Ryvarden 1995; Silveira and Wright 2005; Sotome et al. 2008; Lee et al. 2010; Dai et al. 2014; Zhou et al. 2016), but several other species are also supported by others, such as *P. squamosus* (= *P. ulmi* Paulet) (Murrill 1903, 1904; Corner 1984; Ryvarden and Gilbertson 1994; Zhao 1998; Ryvarden and Melo 2014), *P. brumalis* (Pers.) Fr. (Clements and Shear 1931; Krüger and Gargas 2004), *P. arcularius* (Batsch) Fr. (Cunningham 1948). In order to maintain nomenclatural stability, we agree with Donk (1960) in this study.

Polyporus was divided into six infrageneric groups according to morphological characters by Núñez and Ryvarden (1995) as follows: group *Admirabilis*, group *Dendropolyporus* [= *Dendropolyporus* (Pouzar) Jülich], group *Favolus* (= *Favolus* Fr.), group *Melanopus* (= *Melanopus* Pat.), group *Polyporellus* (= *Polyporellus* P. Karst.) and group *Polyporus*. Phylogenetic analysis revealed that *Polyporus* is polyphyletic (Ko and Jung 2002), and this attitude has been demonstrated by others (Krüger 2002; Krüger and Gargas 2004; Krüger et al. 2006; Sotome et al. 2008; Binder et al. 2013; Dai et al. 2014; Zmitrovich and Kovalenko 2016). Six major clades were proposed based on molecular analyses, but these clades did not conform to the six morphological groups (Sotome et al. 2008; Zhou et al. 2016). Sotome et al. (2013) segregated group *Favolus* into two different genera, *Favolus* typified by *F. brasiliensis* (Fr.) Fr. and *Neofavolus* Sotome & T. Hatt. typified by *N. alveolaris* (DC.) Sotome & T. Hatt., according to phylogenetic and morphological analyses. Besides, group *Melanopus* was divided into two distinct clades: picipes clade and squamosus clade (Zhou et al. 2016), and the picipes clade has been described as genus *Picipes* Zmitr. et Kovalenko (Zmitrovich and Kovalenko 2016). Hence, the so called *Polyporus* is treated as four

distinct genera: *Favolus*, *Neofavolus*, *Picipes* and *Polyporus* in this study.

Key to species of *Polyporus* in China

1 Stipe bearing black cuticle 2
1 Stipe white to ochraceous 6
2 Pileal surface covered with dark-brown to reddish-brown squamules .....*P. squamosus*
2 Pileal surface glabrous 3
3 Pores more than 5 per mm 4
3 Pores less than 5 per mm 5
4 Pileal surface concentrically zonate; basidiospores 5.4–7.6 × 2.9–3.8 µm .....*P. hemicapnodes*
4 Pileal surface azonate; basidiospores 7.5–9 × 2.5–3.3 µm .....*P. varius*
5 Pores 3–5 per mm .....*P. mangshanensis*
5 Pores 1–2 per mm .....*P. subvarius*
6 Stipes numerous and branched .....*P. umbellatus*
6 Stipes usually single and not branched 7
7 Basidiospores < 8 µm in length 8
7 Basidiospores > 8 µm in length 10
8 Basidiocarps imbricate .....*P. hapalopus*
8 Basidiocarps solitary 9
9 Pores angular, 2–3 per mm .....*P. brumalis*
9 Pores round, 4–5 per mm .....*P. ciliatus*
10 Pileal surface with distinctly radial stripes .....*P. cuticulatus*
10 Pileal surface without radial stripes 11
11 Basidiospores smaller, 6–8.3 × 2.2–3 µm .....*P. arcularius*
11 Basidiospores larger, 9.7–16.3 × 4.3–7.2 µm .....*P. tuberaster*

Polyporus arcularius (Batsch) Fr., *Syst. mycol.* (Lundae) 1: 342 (1821) (Figs. 314, 315)
MycoBank: MB 176922
Basionym: *Boletus arcularius* Batsch, *Elench. fung.* (Halle): 97 (1783).

Fig. 314 Basidiocarps of *Polyporus arcularius*

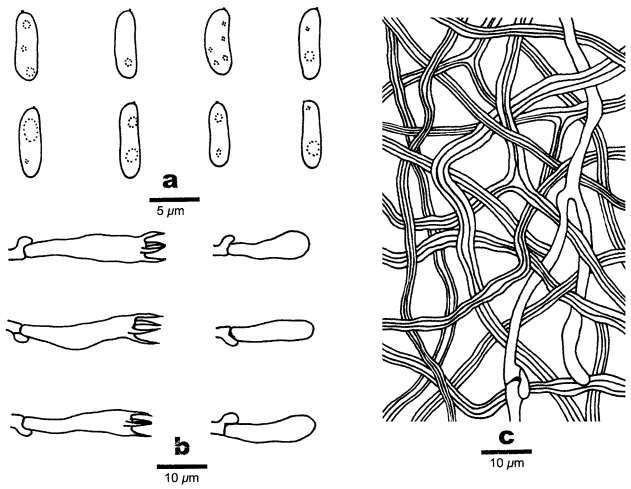

Fig. 315 Microscopic structures of *Polyporus arcularius* (drawn from *Cui 11398*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 µm; **b–c** = 10 µm

Fruiting body. — Basidiocarps annual, centrally stipitate, solitary, flesh when fresh, becoming crumbly leathery when dry, light in weight upon drying. Pilei circular with a shallow center, 1–2 cm in diam and up to 3 mm thick at center. Pileal surface cream when fresh, becoming clay brown to tan when dry, glabrous or covered with dark-brown to reddish-brown squamules; margin sharp, slightly incurved when dry. Pore surface white to buff when fresh, buff to orange when dry; pores angular, 1–4 per mm; dissepiments thin, entire to lacerate. Context white to cream when fresh and white to buff upon drying, crumbly leathery, less than 1 mm thick. Tubes concolorous with pore surface, decurrent, 2 mm long. Stipe concolorous with pileal surface, glabrous, wrinkled when dry, up to 3 cm long and 2 mm in diam.

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

Context. — Generative hyphae frequent, hyaline, thin-walled, frequently branched, 1.5–7 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, moderately branched, interwoven, 1.5–11.5 µm in diam.

Tubes. — Generative hyphae frequent, hyaline, thin-walled, frequently branched, 2–4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled, moderately branched, interwoven, 2–5.5 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 15.5–24 × 4.5–7 µm; basidioles in shape similar to basidia, but smaller.

Stipe. — Generative hyphae frequent, hyaline, thin-walled, occasionally branched, 3–12.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled, moderately

branched, interwoven, 2–7 μm in diam, occasionally inflated up to 11.5 μm in diam.

Spores. — Basidiospores cylindrical, sometimes slightly curved, hyaline, thin-walled, smooth, IKI–, CB–, (5.6–)6–8.3(–8.7) × (2.1–)2.2–3(–3.1) μm, L = 6.91 μm, W = 2.59 μm, Q = 2–3.26 (n = 230/5).

Notes. — *Polyporus arcularius* is distinguished by the small basidiocarps with a slender stipe, large pores and squamous infundibuliform pilei. *Neofavolus alveolaris* also has large pores and squamous pilei, but it has shorter stipe (up to 1 cm long) and larger basidiospores (8–11.8 × 2.8–3.8 μm).

Specimens examined: **CHINA. Beijing**, Haidian, Xiangshan Park, on fallen angiosperm branch, 11 July 2010, *Cui 9153* (BJFC). **Fujian**, Wuyishan County, Wuyi Mountain, Tianyoufeng, on fallen angiosperm trunk, 26 August 2006, *Cui 4111* (BJFC). **Guangdong**, Ruyang County, Nanling Nature Reserve, on fallen angiosperm branch, 16 September 2009, *Cui 7538* (BJFC). **Hainan**, Ledong County, Jianfengling Nature Reserve, on fallen angiosperm branch, 1 June 2008, *Dai 9908* (IFP). **Henan**, Neixiang County, Baotianman Nature Reserve, on fallen angiosperm trunk, 29 August 2005, *Li 351* (IFP). **Heilongjiang**, Ning'an County, Jingbohu Park, on fallen angiosperm branch, 8 September 2007, *Dai 8343b* (IFP). **Hubei**, Fang County, Shennongjia Nature Reserve, on fallen angiosperm branch, 24 September 2004, *Dai 5868* (IFP). **Hunan**, Zhangjiajie, Zhangjiajie Forest Park, on fallen angiosperm branch, 17 August 2010, *Dai 11690* (BJFC). **Inner Mongolia**, Aershan, Tianchi Forest Farm, on fallen angiosperm branch, 30 July 2005, *Cui 1993* (IFP). **Xizang (Tibet)**, Linzhi County, on fallen angiosperm branch, 18 September 2010, *Cui 12256* (BJFC). **Yunnan**, Pu'er, Taiyanghe Forest Park, on fallen angiosperm branch, 8 July 2013, *Cui 10998* (BJFC).

Polyporus brumalis (Pers.) Fr., *Observationes mycologicae* 2: 255 (1818) (Figs. 316, 317)
MycoBank: MB 142023
Basionym: *Boletus brumalis* Pers., *Neues Mag. Bot.* 1: 107 (1794).

Fruiting body. — Basidiocarps annual, centrally stipitate, rarely eccentrically stipitate, solitary to gregarious, leathery when fresh, becoming corky upon drying. Pilei circular with a shallow center, 2–8 cm in diam and up to 10 mm thick at base. Pileal surface olive brown to reddish-brown or blackish-brown when fresh and becoming bronze to reddish-brown or purplish black upon drying, glabrous or covered with dark hairs; margin sharp, straight when fresh and incurved when dry. Pore surface white, cream to ivory when fresh and becoming to buff to straw-colored upon drying; pores angular, radially aligned, 2–4 per mm, occasionally elongated up to 1 mm long and 0.5 mm wide; dissepiments thin, entire to slightly lacerate. Context white, up to 8 mm thick. Tubes concolorous with pore surface or slightly paler than pore surface, slightly decurrent, up to 3 mm long. Stipe cream to pale straw-colored, glabrous or covered with dark hairs, 0.8–4.1 cm long and 2.5–17 mm in diam.

Fig. 316 Basidiocarps of *Polyporus brumalis*

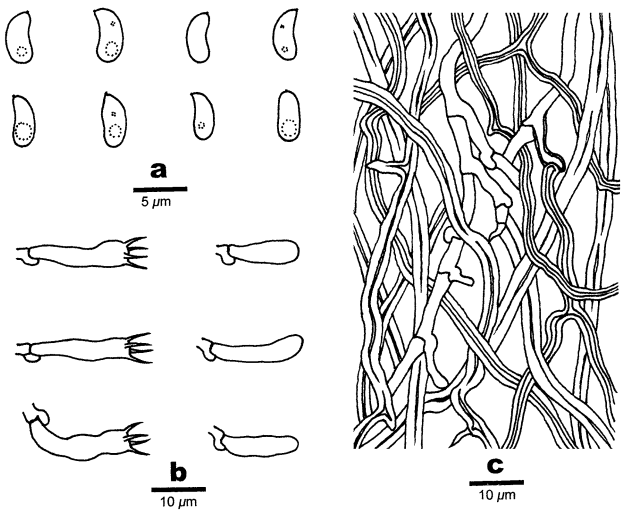

Fig. 317 Microscopic structures of *Polyporus brumalis* (drawn from *Cui 10508*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 μm; **b–c** = 10 μm

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

Context. — Generative hyphae frequent, hyaline, thin-walled to slightly thick-walled, occasionally branched, 3.5–6.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, moderately branched, interwoven, 2–6.6 µm in diam.

Tubes. — Generative hyphae frequent, hyaline, thin-walled, rarely branched, 2–4.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, moderately branched, interwoven, 2–6 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 16–22.5 × 5–7 µm; basidioles in shape similar to basidia, but slightly smaller.

Stipe. — Generative hyphae frequent, hyaline, thin-walled to slightly thick-walled, occasionally branched, 3–6.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, frequent branched, interwoven, 2–10.5 µm in diam.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (4.8–)5.2–6.3(–6.8) × 2–2.5 µm, L = 5.77 µm, W = 2.17 µm, Q = 2.2–3.09 (n = 69/2).

Notes. — The hyphal structure and basidiospores of *Polyporus brumalis* are very similar to those of *P. ciliatus* Fr., but the later has smaller pores (5–6 per mm), long and hard hairs on the pileal surface. *Polyporus brumalis* is similar to *P. longiporus* Audet, Boulet & Sirard by the dark pileal surface, central stipe and inflated hyphae. However, *P. longiporus* has glabrous pileal surface, larger pores and longer basidiospores (6.3–8.6 × 1.8–2.3 µm, Sotome et al. 2009a).

Specimens examined: **CHINA. Heilongjiang**, Sunwu County, Xunbielahe Nature Reserve, on fallen trunk of *Populus*, 24 August 2014, *Dai 14069* (BJFC). **Jilin**, Antu County, Changbaishan Nature Reserve, on fallen branch of *Tilia*, 7 September 1993, *Dai 1146b* (IFP). **Qinghai**, Xunhua County, Mengda Nature Reserve, on fallen trunk of *Betula*, 30 August 2005, *Cui 2291* (IFP). **Shanxi**, Qinshui County, Lishan Nature Reserve, on fallen trunk of *Betula*, 18 September 2006, *Yuan 2383* (IFP). **Sichuan**, Xiaojin County, Jiajin Mountain, on fallen branch of *Betula*, 17 October 2012, *Cui 10750* (BJFC). **Xizang (Tibet)**, Linzhi County, Sejila Mountain, 25 September 2010, *Cui 9673* (BJFC). **Xinjiang**, Gongliu County, Kurdishning Nature Reserve, on fallen trunk of *Picea*, 21 August 2004, *Wei 1601* (IFP). **Yunnan**, Lushui County, Gaoligongshan Nature Reserve, on fallen angiosperm branch, 29 November 2015, *Dai 16385* (BJFC). **Zhejiang**, Lin'an County, Tianmushan Nature Reserve, 12 October 2005, *Cui 2769* (BJFC).

Polyporus ciliatus Fr., *Observ. mycol.* 1: 123 (1815) (Figs. 318, 319)
MycoBank: MB 179557

Fruiting body. — Basidiocarps annual, centrally stipitate, solitary, leathery when fresh, becoming corky upon drying. Pilei circular, up to 4 cm in diam and 4 mm thick at center. Pileal surface light brown to clay brown when dry, azonate, glabrous or velutinate; margin sharp, straight when fresh, becoming straight or slightly incurved upon drying. Pore surface cream to straw-colored; pores round,

Fig. 318 Basidiocarps of *Polyporus ciliatus*

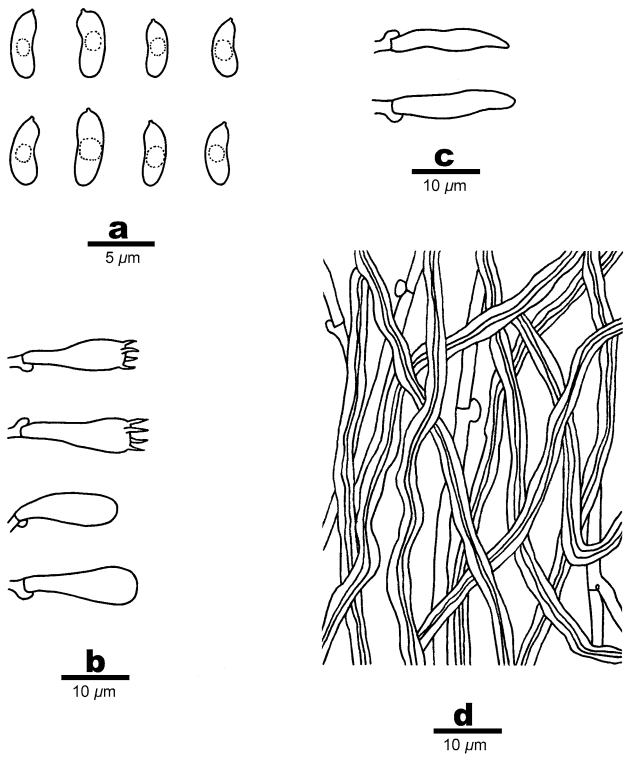

Fig. 319 Microscopic structures of *Polyporus ciliatus* (drawn from *Dai 1212*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphal structure. Bars: **a** = 5 µm; **b–d** = 10 µm

5–6 per mm; dissepiments thin, entire to slightly lacerate. Context white, corky, up to 2 mm thick. Tubes concolorous with pore surface, less than 1 mm long. Stipe short, with an inflated base, brownish, tomentose, up to 1.5 cm long and 5 mm in diam.

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

Context. — Generative hyphae frequent, hyaline, thin-walled, frequently branched, 2–5.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, moderately branched, interwoven, 1.5–6.5 µm in diam.

Tubes. — Generative hyphae frequent, hyaline, thin-walled, rarely branched, 2–4.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, moderately branched, interwoven, 1.5–5.5 µm in diam. Cystidia absent; cystidioles occasionally present. Basidia clavate, with four sterigmata and a basal clamp connection, 12.5–23.5 × 5–6.5 µm; basidioles in shape similar to basidia, but slightly smaller.

Stipe. — Generative hyphae frequent, hyaline, thin-walled to slightly thick-walled, occasionally branched, 2.5–7 µm in diam; skeletal hyphae dominant, hyaline, thick-walled, moderately branched, interwoven, 2–7 µm in diam, occasionally inflated up to 12.5 µm in diam.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (5.3–)5.6–7(–7.4) × (1.9–)2–2.5(–2.7) µm, L = 6.13 µm, W = 2.21 µm, Q = 2.39–3.33 (n = 66/2).

Notes. — *Polyporus ciliatus* is very close to *P. brumalis* for their similar hyphal structure and basidiospores, but the former has small pores (5–6 per mm) and more or less ciliate pileal surface while the latter has big pores (2–4 per mm) and glabrous pileal surface.

Specimens examined: **CHINA. Jilin**, Antu County, Changbaishan Nature Reserve, on fallen branch of *Betula*, 11 September 1993, *Dai 1212* (BJFC). **Xinjiang**, Gongliu County, Kurdishning Nature Reserve, on fallen gymnosperm branch, 21 August 2004, *Wei 1582* (IFP).

Polyporus cuticulatus Y.C. Dai, Jing Si & Schigel, *Mycosystema* 35(3): 275 (2016) (Figs. 320, 321)
MycoBank: MB 811143

Fruiting body. — Basidiocarps annual, laterally stipitate, solitary to gregarious, fleshy, watery and without odor or taste when fresh, becoming brittle and light in weight upon drying. Pilei semicircular to flabelliform, projecting up to 16 cm, 20 cm wide and 1.1 cm thick at base. Pileal surface pale gray to grayish brown with distinctly radial stripes when fresh, buff-yellow, cinnamon to fawn and wrinkled with radial stripes when dry, glabrous, azonate, bearing a papery cuticle; margin sharp, straight when fresh and incurved when dry. Pore surface white to cream when fresh, becoming cream to orange brown upon drying; pores round to angular, 2–5 per mm; dissepiments thin, entire to lacerate. Context white when fresh, white to buff when dry, up to 8 mm thick. Tubes concolorous with pore surface, decurrent, very brittle when dry, up to 3.5 mm long. Stipe cinnamon to fawn, glabrous, up to 2 cm long and 1.5 cm in diam.

Fig. 320 A basidiocarp of *Polyporus cuticulatus*

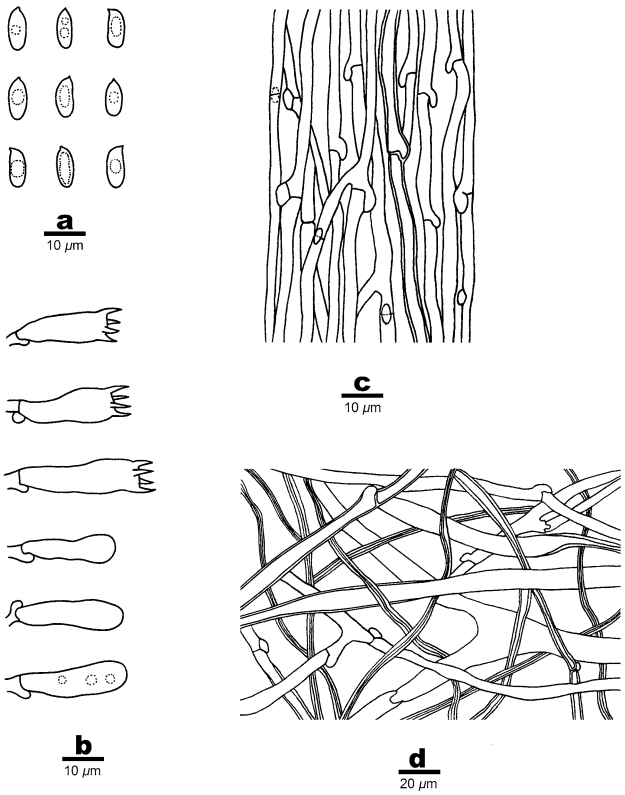

Fig. 321 Microscopic structures of *Polyporus cuticulatus* (drawn from *Dai 13101*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a–d** = 10 µm

Hyphal structure. — Hyphal system monomitic in trama, dimitic in context and stipe; generative hyphae bearing clamp connections; skeletal hyphae IKI–, CB + ; tissues unchanged in KOH.

Context. — Generative hyphae frequent, hyaline, thin-walled to slightly thick-walled, frequently branched, 4–12 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a distinct wide lumen, moderately branched, sometimes collapsed, interwoven, 2–15.5 µm in diam.

Tubes. — Generative hyphae hyaline, thin-walled, occasionally branched, parallel arranged, 2–6 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 17.5–29.5 × 6.5–9 µm, basidioles in shape similar to basidia, but slightly smaller.

Stipe. — Generative hyphae frequent, hyaline, thin-walled to slightly thick-walled, frequently branched, 4–10.5 µm in diam; skeletal hyphae dominant, thick-walled with a distinct wide lumen, moderately branched, sometimes collapsed, interwoven, 2–15.5 µm in diam, frequently inflated up to 23 µm in diam.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, usually with one guttule, IKI–, CB–, (7.3–)7.7–10.4(–11.5) × (3–)3.2–4.5(–4.8) µm, L = 8.86 µm, W = 3.76 µm, Q = 2.03–2.92 (n = 179/4).

Notes. — *Polyporus varius* resembles *P. cuticulatus* by sharing radial stripes on its pileal surface, but the former has a black stipe, smaller basidiospores (7.2–9.6 × 3.1–4.1 µm), and has a distribution in temperate and boreal forests. *Polyporus udus* Jungh. is similar to *P. cuticulatus* by thick context, grayish pileal surface with a papery cuticle, and almost monomitic tramal hyphae. However, it has bigger pores (1–2 per mm) and larger basidiospores (10–15 × 4–6 µm, Núñez and Ryvarden 1995).

Specimens examined: **CHINA. Hainan**, Ledong County, Jianfengling Nature Reserve, on fallen angiosperm branch, 12 December 2008, *Dai 10665* (BJFC). **Yunnan**, Yingjiang County, Tongbiguan Nature Reserve, on fallen trunk of *Castanopsis*, 29 October 2012, *Dai 13101* (holotype, BJFC); on fallen trunk of *Castanopsis*, 30 October 2012, *Dai 13138, 13141* (BJFC); Mengla County, Wangtianshu Park, on fallen angiosperm branch, 3 November 2009, *Cui 8637* (BJFC); Ruili, Moli Tropical Rain Forest, on rotten angiosperm stump, 1 November 2012, *Dai 13164* (paratype, BJFC); Mengla County, Wangtianshu Park, on fallen angiosperm branch, 19 October 2013, *Dai 13588* (BJFC); Jinghong, Primary Forest Park, on fallen angiosperm branch, 23 September 2008, *Yuan 3565* (BJFC).

Polyporus hapalopus H.J. Xue & L.W. Zhou, *Mycol. Prog.* 13(3): 814 (2014) (Figs. 322, 323)
MycoBank: MB 802658

Fruiting body. — Basidiocarps annual, laterally stipitate, imbricate, fleshy, with grapefruit odor when fresh, becoming corky and light in weight upon drying, slightly fragile. Pilei fan-shaped to semicircular, projecting up to 25 cm, 40 cm wide and 7 mm thick at base. Pileal surface pale mouse gray to gray beige when fresh and cinnamon-buff to clay-buff upon drying, glabrous, with slightly radial stripes, azonate, wrinkled when dry; margin sharp, straight when fresh and straight to slightly incurved when dry. Pore surface white to cream when fresh, becoming cinnamon-buff to honey yellow upon drying; pores angular, 4–6 per mm; dissepiments thin, lacerate. Context white when fresh and buff to straw-yellow when dry, up to 6 mm thick. Tubes white when fresh and brownish-orange when dry, decurrent along one side of the stipe, less than 1 mm long. Stipe concolorous with the pileal surface, glabrous, up to 2 cm long and 2.5 cm in diam.

Fig. 322 Basidiocarps of *Polyporus hapalopus*

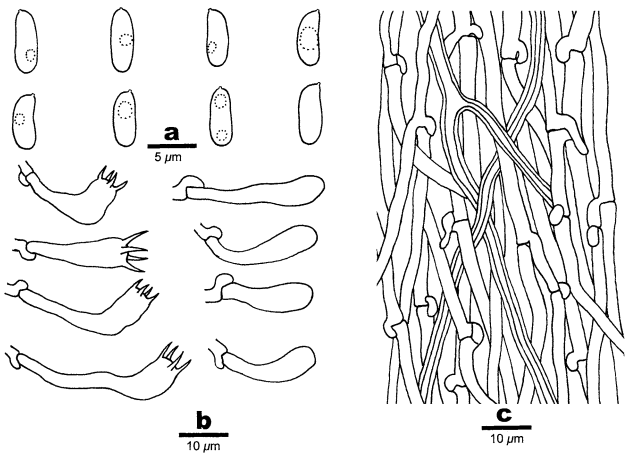

Fig. 323 Microscopic structures of *Polyporus hapalopus* (drawn from *Yuan 5809*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 µm; **b–c** = 10 µm

Hyphal structure. — Hyphal system dimitic in context and stipe, monomitic in trama; generative hyphae bearing clamp connections; skeletal hyphae IKI–, CB + ; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 4–5 µm in diam; skeletal hyphae dominant, hyaline, slightly thick-walled with a distinct wide lumen, interwoven, 2–10 µm in diam.

Tubes. — Generative hyphae hyaline, thin-walled, rarely branched, subparallel along the tubes, 2.6–4 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 18–30.5 × 5.5–10 µm; basidioles in shape similar to basidia, but smaller.

Stipe. — Generative hyphae frequent, hyaline, thin-walled, rarely branched, 4–9.5 µm in diam; skeletal hyphae dominant, slightly thick-walled with a wide to narrow lumen, moderately branched, interwoven, 1.5–10.5 µm in diam.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, usually with one or two guttules, IKI–, CB–, (5.4–)6–6.9(–7.5) × (2.3–)2.6–3(–3.1) µm, L = 6.31 µm, W = 2.78 µm, Q = 2.27 (n = 60/1).

Notes. — *Polyporus hapalopus* is characterized by its laterally stipitate, imbricate and large basidiocarps (up to 40 cm in diam) with grapefruit odor when fresh, angular pores, soft (when fresh) to tough (when dry) context, a dimitic hyphal system in context and stipe with variable wide skeletal hyphae, a monomitic hyphal system in trama, and cylindrical basidiospores (Xue and Zhou 2014). *Polyporus udus* resembles *P. hapalopus* in sharing glabrous pilei and a wrinkled pileal surface when dry, angular pores, and generative hyphae dominant (or exclusive) in trama, but *P. udus* has much bigger pores (1–2 per mm), smooth and grayish-brown cuticle with pink tints when fresh, and cylindrical to broadly ellipsoid basidiospores (10–15 × 4–6 µm, Núñez and Ryvarden 1995).

Specimen examined: **CHINA. Guangxi**, Jinxiu County, Dayaoshan Nature Reserve, on fallen angiosperm trunk, 23 August 2011, *Yuan 5809* (holotype, IFP).

Polyporus hemicapnodes Berk. & Broome, *J. Linn. Soc., Bot.* 14: 47 (1875) (Figs. 324, 325)
MycoBank: MB 151735

Fruiting body. — Basidiocarps annual, mainly centrally stipitate, occasionally laterally to eccentrically stipitate, solitary to gregarious, woody hard and somewhat fragile when dry. Pilei flat with a depressed center or infundibuliform, up to 5.8 cm in diam and 1.5 mm thick at base. Pileal surface buff to orangish-brown in dried condition, blackish-brown to black at center, glabrous and concentrically zonate, with slightly radial stripes; margin incurved or not upon drying. Pore surface pale mouse-gray to clay buff when dry; pores round, 6–9 per mm; dissepiments thin, entire. Context buff, woody hard upon drying, up to 1 mm thick. Tubes concolorous with pore surface, slightly decurrent, up to 0.5 mm. Stipe glabrous and solid, slender, bearing a black cuticle, up to 3.3 cm long and 5 mm in diam.

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

Context. — Generative hyphae frequent, hyaline, thin-walled, rarely branched, 1.5–4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, moderately branched, interwoven, 1–5 µm in diam, occasionally inflated up to 11 µm in diam at the branching area.

Tubes. — Generative hyphae frequent, hyaline, thin-walled, rarely branched, 1.5–4 µm in diam; skeletal hyphae

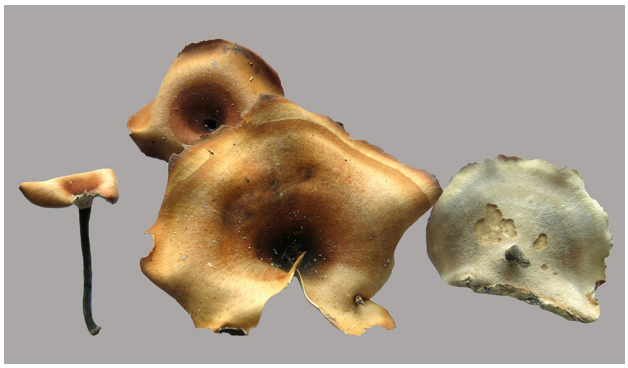

Fig. 324 Basidiocarps of *Polyporus hemicapnodes*

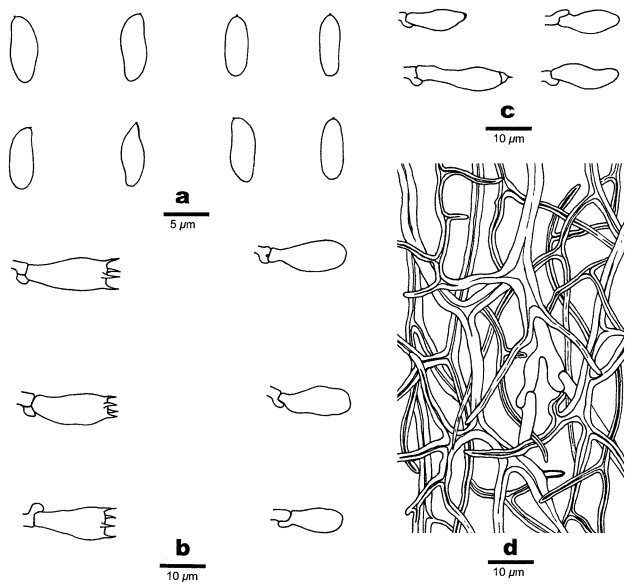

Fig. 325 Microscopic structures of *Polyporus hemicapnodes* (drawn from *Dai 13404*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphal structure. Bars: **a** = 5 µm; **b–d** = 10 µm

dominant, hyaline, thick-walled with a wide to narrow lumen, with arboriform branches, interwoven, 1–5.5 µm in diam. Cystidia absent; cystidioles occasionally present. Basidia clavate, with four sterigmata and a basal clamp connection, 17–21 × 6.4–8.8 µm; basidioles in shape similar to basidia, but smaller.

Stipe. — Generative hyphae frequent, hyaline, thin-walled, rarely branched, 2–4.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, moderately branched, interwoven, 1.2–4.5 µm in diam. Hyphae in cuticle with brown beige to light brown inclusion, thick-walled with a wide lumen, bearing clamp connections, 1.5–5 µm in diam.

Spores. — Basidiospores oblong to cylindrical, rarely ellipsoid, hyaline, thin-walled, smooth, occasionally with small guttules, IKI–, CB–, (5.1–)5.4–7.6(–7.9) × (2.7)2.9–3.8(−4) µm, L = 6.41 µm, W = 3.35 µm, Q = 1.5–2.5 (n = 106/3).

Notes. — *Polyporus hemicapnodes* was initially described from Dolosbagey (Sri Lanka) by Berkeley and Broome and then treated as a synonymy of *P. leprieurii* Mont. for a long time. Although both species have grayish pore surface, similar pore size and black stipe, but *P. leprieurii* separates by having flabelliform to spathulate pilei, azonate pileal surface, larger basidia (20–30 × 8–10 µm), narrower basidiospores (4.5–7 × 2–2.5 µm) and yellowish to dark-brown skeletal hyphae (Núñez and Ryvarden 1995). Morphologically, *P. hemicapnodes* may be confused with *P. varius* as their similar color, pore size (5–9 per mm) and black stipe. However, *P. varius* has larger basidiospore (7.2–9.6 × 3.1–4.1 µm) and azonate pilei.

Specimens examined: **CHINA. Fujian**, Jiangle County, Longqishan Nature Reserve, on fallen angiosperm branch, 23 October 2013, *Cui 11259* (BJFC). **Zhejiang**, Kaihua County, Gutianshan Nature Reserve, on fallen angiosperm trunk, 12 August 2013, *Dai 13401, 13403, 13404* (BJFC).

Polyporus mangshanensis B.K. Cui, J.L. Zhou & Y.C. Dai, *Fungal Diversity* 81: 249 (2016) (Figs. 326, 327)
MycoBank: MB 552159

Fruiting body. — Basidiocarps annual, eccentrically to almost laterally stipitate, solitary, corky and slightly fragile when dry. Pilei reniform, projecting up to 5.8 cm, 10.5 cm wide and 2.5 mm thick at base. Pileal surface beige, saffron yellow to yellowish-orange when dry, azonate, with slightly radial stripes, smooth and glabrous; margin sharp and incurved upon drying. Pore surface brown beige to olive brown when dry; pores angular, 3–5 per mm, occasionally elongated to 1 mm long and 0.5 mm wide; dissepiments thin, entire to lacerate. Context buff when dry, up to 1.2 mm thick. Tubes concolorous with pore surface, slightly decurrent on the stipe, fragile when dry, up to 1.5 mm long. Stipe cylindrical, context of stipe buff when dry, bearing a dark brown cuticle, becoming tan towards the tuber layer, glabrous, curvy and wrinkled upon drying, up to 2 cm long and 7 mm in diam.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing both clamp connections and simple septa; skeletal hyphae IKI–, CB + ; tissues unchanged in KOH.

Context. — Generative hyphae frequent, hyaline, thin-walled, bearing clamp connections, frequently branched,

Fig. 326 A basidiocarp of *Polyporus mangshanensis*

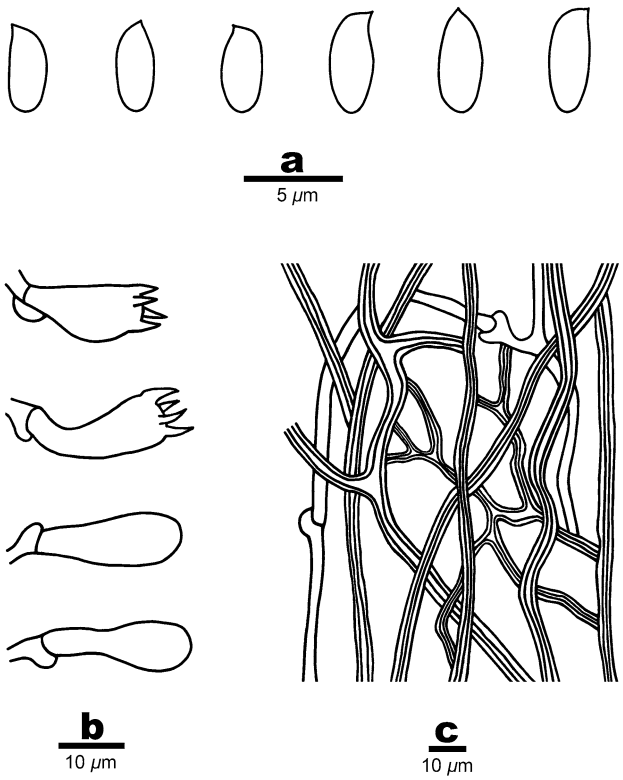

Fig. 327 Microscopic structures of *Polyporus mangshanensis* (from *Dai 15151*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 µm; **b–c** = 10 µm

2.5–8 µm in diam, usually inflated at the branching areas or clamping areas, up to 14 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, frequently branched, flexuous, interwoven, 2.5–6.5 lm diam, occasionally inflated up to 11 µm in diam; contextual cuticle hyphae simple septate, thin-walled, frequently branched, interwoven, 1.5–4.5 µm in diam.

Tubes. — Generative hyphae frequent, hyaline, thin-walled, bearing both clamp connections and simple septa, occasionally branched, 2.5–4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, frequently branched, flexuous, interwoven, 1.3–4 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 16.5–24 × 9.7–10 µm; basidioles in shape similar to basidia, but smaller.

Stipe. — Generative hyphae frequent, hyaline, thin-walled, bearing clamp connections, occasionally branched, 1.5–6 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen or subsolid, moderately branched, flexuous, interwoven, 2.5–6 µm in diam; generative hyphae dominant in cuticle of stipe, hyaline, with buff inclusion, thick-walled with a wide lumen, bearing clamp connections; skeletal hyphae in cuticle of stipe hyaline, with light brown to orange brown inclusion, thick-walled with a narrow lumen, occasionally branched, 2.4–4.5 µm in diam.

Spores. — Basidiospores mostly cylindrical, few oblong, hyaline, thin-walled, smooth, with guttules, IKI–, CB–, (6.5–)7.5–10.5(–11) × 3.5–4.5(–5) µm, L = 8.7 µm, W = 4.07 µm, Q = 2.14 (n = 60/1).

Notes. — *Polyporus mangshanensis*, *P. leprieurii* and *P. guianensis* Mont. produce similar pileal surface, pore surface and dark stipe. However, *P. mangshanensis* differs from the latter two species by producing both clamped and simple-septate generative hyphae, contextual generative hyphae and skeletal hyphae usually inflated over 10 µm in diam. Moreover, pores and basidiospores of *P. mangshanensis* are smaller than those of *P. guianensis* (pores 1–2 per mm, basidiospores 8–12 × 2.5–4 µm, Núñez and Ryvarden 1995), while larger than those of *P. leprieurii* (pores 5–8 per mm, basidiospores 4.5–7 × 2–2.5 µm; Núñez and Ryvarden 1995). *Polyporus subvarius* C.J. Yu & Y.C. Dai has a similar pileal and pore surface to *P. mangshanensis*, but the former has bigger pores (1–2 per mm) and larger basidiospores (10.2–12.5 × 4.2–5 µm, Dai et al. 2007e). *Polyporus admirabilis* Peck resembles *P. mangshanensis* in having a laterally dark stipe, tan pileal surface and similar pore size, but it differs in its subulate cystidioles, and slender basidiospores (7.8–9 × 3–3.5 µm, Dai 1999).

Specimen examined: **CHINA. Hunan Province**, Yizhang County, Mangshan Nature Reserve, on fallen angiosperm branch, 17 August 2014, *Dai 15151* (holotype, BJFC).

Polyporus squamosus (Huds.) Fr., *Syst. mycol.* 1: 343 (1821) (Figs. 328, 329)
MycoBank: MB 186284
Basionym: *Boletus squamosus* Huds., *Fl. Angl.*: 626 (1778).

Fruiting body. — Basidiocarps annual, centrally to laterally stipitate, usually gregarious or imbricate, fleshy when juvenile and soft leathery when mature and fresh, fragile to woody hard upon drying. Pilei fan-shaped to circular, up to 40 cm in diam and 4 cm thick at center.

Fig. 328 Basidiocarps of *Polyporus squamosus*

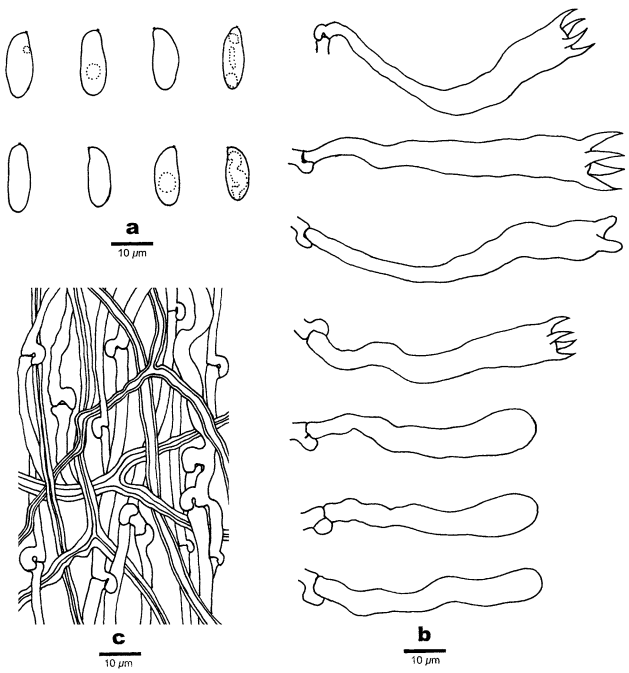

Fig. 329 Microscopic structures of *Polyporus squamosus* (drawn from *Cui 10595*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a–c** = 10 µm

Pileal surface cream to buff when fresh, becoming light brown when dry, covered with dark-brown to reddish-brown squamules; margin sharp, straight to slightly incurved when fresh, incurved when dry. Pore surface white to cream when fresh and buff to pale brown, orange brown when dry; pores angular, decurrent, 0.5–2 per mm; dissepiments thin, entire to lacerate. Context white when fresh and cream to buff when dry, corky upon drying, up to 3 cm thick. Tubes concolorous with pore surface, very fragile when dry, up to 1 cm long. Stipe bearing a black cuticle at base, tomentose, up to 5 cm long and 3 cm in diam.

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

Context. — Generative hyphae frequent, hyaline, thin-walled, frequently branched, 2–15.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a distinct wide lumen, moderately branched, interwoven, 2–8.5 μm in diam. Hyphae in squamules slightly thick-walled bearing clamp connections, rarely branched, 3–8 μm in diam.

Tubes. — Generative hyphae frequent, hyaline, thin-walled, frequently branched, 2.5–4.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, occasionally branched, interwoven, 1.5–6.5 μm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 26–60 × 9–12.5 μm; basidioles in shape similar to basidia, but slightly smaller.

Stipe. — Generative hyphae frequent, hyaline, thin-walled, frequently branched, 3–11.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, moderately branched, interwoven, 2.5–14 μm in diam. Hyphae in cuticle simple septate, thick-walled with a wide lumen and with light brown to yellowish-brown inclusion, 4–7 μm in diam.

Spores. — Basidiospores mostly cylindrical, few oblong, hyaline, thin-walled, smooth, CB–, IKI–, (9–)10–16.3(–17.7) × (4–)4.1–6.7(–7.4) μm, L = 13.49 μm, W = 5.3 μm, Q = 1.75–2.85 (n = 300/10).

Notes. — The basidiocarps and basidiospore sizes of *P. squamosus* are rather variable, but the woody hard basidiocarps, the light-colored pilei with dark-brown to reddish-brown squamules and the blackish stipe are different from other species in the genus.

Specimens examined: **CHINA. Shanxi**, Jiaocheng County, Panquangou Nature Reserve, on dead tree of *Prunus*, 10 August 2013, *Dai 13354* (BJFC). **Shaanxi**, Lantian County, Tangyu, on dead angiosperm tree, 20 September 2005, *Wang 555* (IFP). **Sichuan**, Jiuzhaigou County, Jiuzhaigou Nature Reserve, on living angiosperm tree, 11 October 2012, *Cui 10595* (BJFC); Daocheng County, Yading Nature Reserve, on living tree of *Hippophae*, 5 November 2015, *Cui 12482*, *12483, 12484* (BJFC). **Yunnan**, Lanping County, Tongdian, Luoguqing, on living angiosperm tree, 19 September 2011, *Cui 10394* (BJFC).

Polyporus subvarius C.J. Yu & Y.C. Dai, *Ann. Bot. Fenn.* 44(2): 142 (2007) (Figs. 330, 331)
MycoBank: MB 529976

Fruiting body. — Basidiocarps annual, laterally stipitate, solitary to imbricate, soft leathery and watery when fresh, without odor or taste, becoming hard corky upon drying. Pilei circular, up to 15 cm in diam and 2 cm thick at center. Pileal surface clay-buff, darker with age, color unchanged when bruised or drying, glabrous, with radial stripes; margin undulating, acute. Pore surface clay-buff; pores angular, radially arranged, 1–2 per mm; dissepiments thin, entire to lacerate. Context cream and soft when fresh, pinkish buff and hard corky when dry, up to 16 mm thick. Tubes concolorous with pore surface, brittle when dry, up to 5 mm long. Stipe short and thick, bearing a black cuticle at the lower part, velutinate to glabrous, corky, up to 2.5 cm long and 1.5 cm in diam.

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

Context. — Generative hyphae frequent, hyaline, thin-walled, occasionally branched, 2.5–11 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, moderately branched, flexuous, interwoven, 2–6.5 μm in diam, occasionally inflated up to 10.5 μm in diam.

Tubes. — Generative hyphae frequent, hyaline, thin-walled, occasionally branched, 2.5–5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 1.5–5 μm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 25–40 × 8–12.2 μm; basidioles in shape similar to basidia, but slightly smaller.

Stipe. — Generative hyphae frequent, hyaline, thin-walled, occasionally branched, 3–10 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, moderately branched, interwoven, 2–6 μm in diam.

Spores. — Basidiospores cylindrical, slightly tapering at apex, hyaline, thin-walled, smooth, usually with one guttule, IKI–, CB–, (9–)10.2–12.5(–12.9) × (3.8–)4.2–5(–5.5) μm, L = 11.12 μm, W = 4.58 μm, Q = 2.43 (n = 64/1).

Notes. — *Polyporus subvarius* is closely related to *P. varius*, but the latter species has smaller pores (5–9 per mm) and smaller basidiospores (7.2–9.6 × 3.1–4.1 μm). Macroscopically, *P. subvarius* resembles *P. squamosus* by sharing lateral stipitate basidiocarps with big pores, but the latter has dark brown flecks at its pileal surface, and especially it has larger basidiospores (mainly 10.6–16.3 × 4.1–6.7 μm).

Fig. 330 Basidiocarps of *Polyporus subvarius*

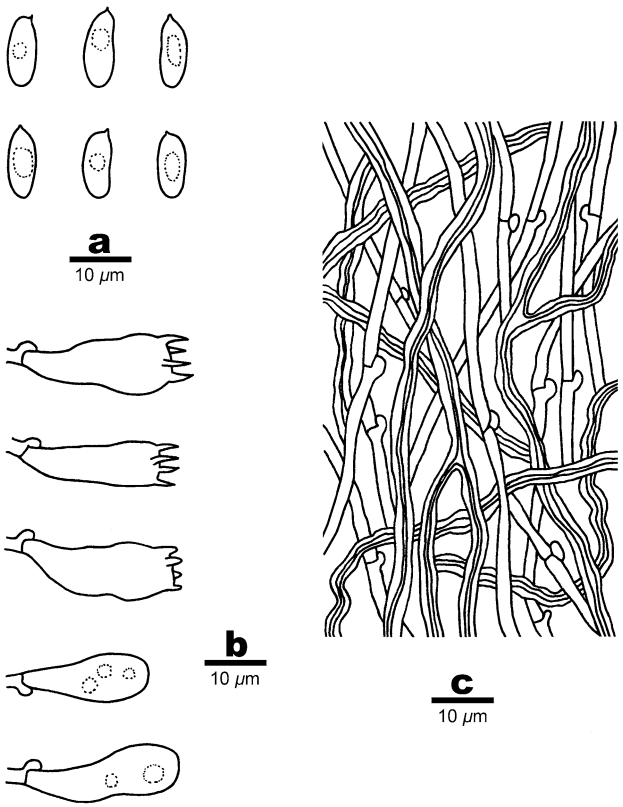

Fig. 331 Microscopic structures of *Polyporus subvarius* (drawn from *Yu 2*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a–c** = 10 μm

Picipes admirabilis is a laterally stipitate species with large basidiocarps (up to 18 cm wide and 1 cm thick at center, Dai 1999), but it differs from *P. subvarius* by having both smaller pores (3–4 per mm) and basidiospores (7.8–9 × 3–3.5 μm, Dai 1999). Furthermore, it lacks radial stripes at pileal surface, and has subulate cystidioles.

Specimen examined: **CHINA. Xizang (Tibet)**, Lasha, Luobulinka Park, on living tree of *Salix*, 2 August 2004, *Yu 2* (holotype, IFP).

Polyporus tuberaster (Jacq. ex Pers.) Fr., *Syst. mycol. (Lundae)* 1: 347 (1821) (Figs. 332, 333)
MycoBank: MB 201272
Basionym: *Boletus tuberaster* Jacq. ex Pers., *Syn. meth. fung. (Göttingen)*, 2: 514 (1801).

Fruiting body. — Basidiocarps annual, centrally to laterally stipitate, solitary when growing on wood and

Fig. 332 Basidiocarps of *Polyporus tuberaster*

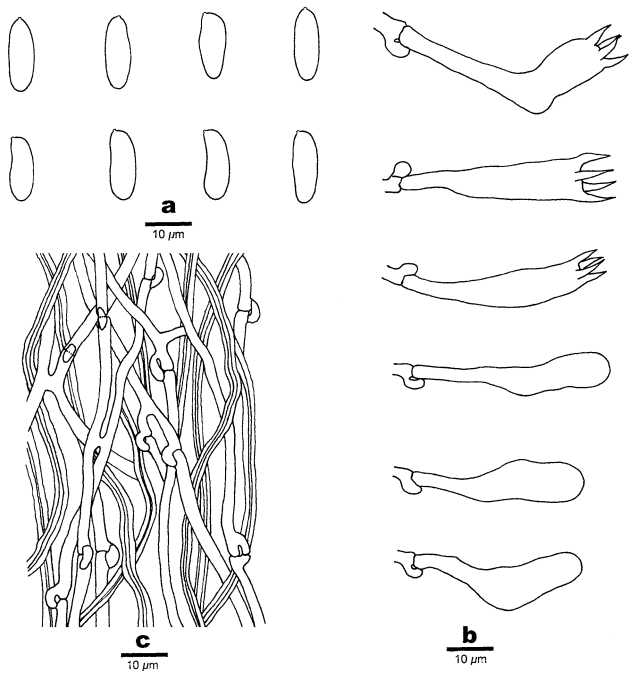

Fig. 333 Microscopic structures of *Polyporus tuberaster* (drawn from *Dai 11271*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a–c** = 10 μm

solitary to caespitose when growing on the ground from a black sclerotium, fleshy when fresh and fragile upon drying. Pilei circular to semicircular, infundibuliform, up to 8.5 cm in diam and 8 mm thick. Pileal surface covered with small yellowish-brown to reddish-brown scales, radially aligned; margin thin, straight when fresh and incurved when dry. Pore surface white to cream when fresh, light brown upon drying; pores angular, 0.5–2 per mm; dissepiments thin, entire to lacerate. Context white when fresh and buff upon drying, up to 5 mm thick. Tubes concolorous with pore surface, decurrent, fragile when dry, up to 3 mm long. Stipe white when fresh and buff to ochraceous when dry, up to 2 cm long and 8 mm in diam.

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

Context. — Generative hyphae frequent, hyaline, thin-walled, occasionally branched, 4–12 μm in diam; skeletal hyphae dominant, hyaline, thick-walled, moderately branched, flexuous, tightly interwoven, 2–12 μm in diam.

Tubes. — Generative hyphae frequent, hyaline, thin-walled to slightly thick-walled, 2–6 μm in diam; skeletal hyphae dominant, thick-walled, moderately branched, tightly interwoven, 2–7 μm in diam, occasionally inflated up to 23 μm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 25–48 × 8–13 μm; basidioles in shape similar to basidia, but slightly smaller.

Stipe. — Generative hyphae frequent, hyaline, thin-walled, occasionally branched, 3–8 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, moderately branched, interwoven, 2–7.5 μm in diam.

Spores. — Basidiospores mostly cylindrical, few oblong, hyaline, thin-walled, smooth, usually with one or more guttules, IKI–, CB–, (9.4–)10–16.3(–17) × (4.1–)4.5–7.2 (–7.7) μm, L = 13.36 μm, W = 5.86 μm, Q = 1.84–2.76 (n = 300/10).

Notes. — *Polyporus umbellatus* also grows on the ground from a sclerotium, but it differs from *P. tuberaster* by its strongly branched stipe.

Specimens examined: **CHINA. Hainan**, Changjiang County, Bawangling Nature Reserve, on fallen angiosperm branch, 16 June 2014, *Dai 13683* (BJFC); Ledong County, Jianfengling Nature Reserve, on fallen angiosperm branch, 15 November 2007, 11 May 2009, *Cui 6578* (BJFC). **Hebei**, Xinglong County, Wulingshan Nature Reserve, on fallen angiosperm branch, *Cui 6887* (BJFC). **Henan**, Neixiang County, Baotianman Nature Reserve, on fallen branch of *Quercus*, 29 August 2005, *Li 397* (IFP); on fallen angiosperm branch, 22 September 2009, *Dai 11271* (BJFC). **Hunan**, Changsha, Yuelu Mountain, on fallen branch of *Betula*, 14 July 2011, *Dai 12462* (BJFC). **Jilin**, Antu County, Changbaishan Nature Reserve, on fallen angiosperm branch, 27 July 2005, *Wei 2577* (IFP). **Liaoning**, Kuandian County, Baishilazi Nature Reserve, on fallen branch of *Betula*, 29 June 2004, *Wei 1308* (IFP). **Shaanxi**, Mei County, Honghegu Forest Park, on fallen angiosperm branch, 10 September 2013, *Cui 11176* (BJFC). **Zhejiang**, Qingyuan County, Baishanzu Nature Reserve, 14 August 2013, *Dai 13419* (BJFC).

Polyporus umbellatus (Pers.) Fr., *Systema Mycologicum* 1: 354 (1821) (Figs. 334, 335)
MycoBank: MB 240963
Basionym: *Boletus umbellatus* Pers., *Synopsis methodica fungorum*: 519 (1801).

Fruiting body. — Basidiocarps annual, stipitate, caespitose, arising from an underground sclerotium with numerous centrally stipitate pilei, fleshy when fresh, fragile when dry. Pilei sub-circular or infundibuliform, 1–4 cm in diam and 1.5–4 mm thick, total width and height up to 20 cm. Pileal surface pale gray to grayish-brown when fresh and clay brown when dry, covered with small grayish-brown scales, azonate, wrinkled when dry; margin sharp and flexuous, straight when fresh and incurved when dry. Pore surface white to cream when fresh and orange brown when dry; pores round to angular, 2–3 per mm; dissepiments thin, lacerate. Context white to cream when fresh and buff when dry, up to 2.5 mm thick. Tubes concolorous with pore surface, decurrent, 0.5–1.5 mm long. Stipe white to cream when fresh and clay brown when dry, strongly branched, covered with small grayish-brown scales or not, up to 7 cm long and 2.5 cm in diam.

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

Context. — Generative hyphae dominant, hyaline, thin-walled, frequently branched, 3–15 μm in diam; skeletal

Fig. 334 Basidiocarps of *Polyporus umbellatus*

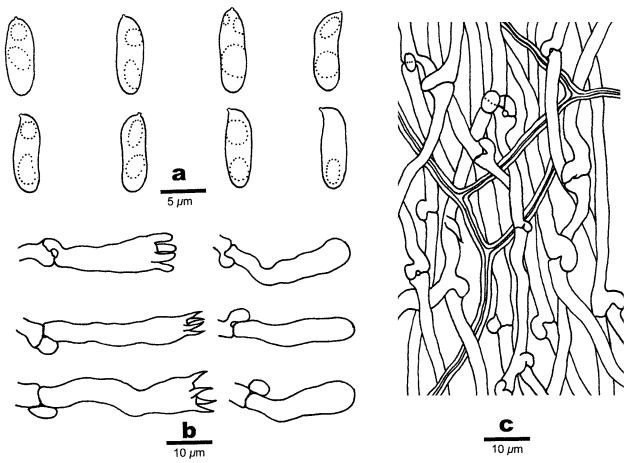

Fig. 335 Microscopic structures of *Polyporus umbellatus* (drawn from *Penttilä 13513*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 μm; **b–c** = 10 μm

hyphae frequent, hyaline, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 1.5–6.5 μm in diam, occasionally inflated up to 14 μm in diam.

Tubes. — Generative hyphae dominant, hyaline, thin-walled, rarely branched, 3–19.5 μm in diam; skeletal hyphae frequent, hyaline, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 1.5–6 μm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 20–31 × 6.5–8.5 μm; basidioles in shape similar to basidia, but smaller.

Stipe. — Generative hyphae dominant, hyaline, thin-walled, frequently branched, 3.5–10.5 μm in diam; skeletal hyphae frequent, hyaline, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 1.5–5.5 μm in diam, occasionally inflated up to 8.5 μm in diam.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (7.4–)7.6–10(–11) × (2.7–)2.8–3.8 μm, L = 8.53 μm, W = 3.2 μm, Q = 2.67 (n = 30/1).

Notes. — *Polyporus umbellatus* is unique for its multiple subcircular pilei arising from a sclerotium.

Specimen examined: **CHINA. Heilongjiang**, Yichun, Fenglin Nature Reserve, on the ground of angiosperm forest, 14 August 2000, *Penttilä 13513* (BJFC).

Polyporus varius (Pers.) Fr., *Syst. mycol.* 1: 352 (1821) (Figs. 336, 337)
MycoBank: MB 225640
Basionym: *Boletus varius* Pers., *Observ. mycol.* 1: 85 (1796).

Fruiting body. — Basidiocarps annual, laterally to centrally stipitate, solitary or clustered, leathery when fresh, hard corky when dry. Pilei fan-shaped to circular or infundibuliform, up to 5 cm in diam and 5 mm thick at base. Pileal surface buff to pale brown, glabrous, azonate, usually with radially stripes; margin sharp, straight when fresh and straight to slightly incurved upon drying. Pore surface buff to brown; pores round to angular, decurrent, 5–9 per mm; dissepiments thin, entire to lacerate. Context white when fresh and white to buff when dry, corky, up to 3 mm thick. Tubes concolorous with pore surface, slightly fragile upon drying, up to 2 mm long. Stipe usually covered with decurrent tubes at the upper portion and covered with dark brown to black cuticle at the lower portion, up to 2.5 cm long and 7 mm in diam.

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

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2.5–4 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow

Fig. 336 Basidiocarps of *Polyporus varius*

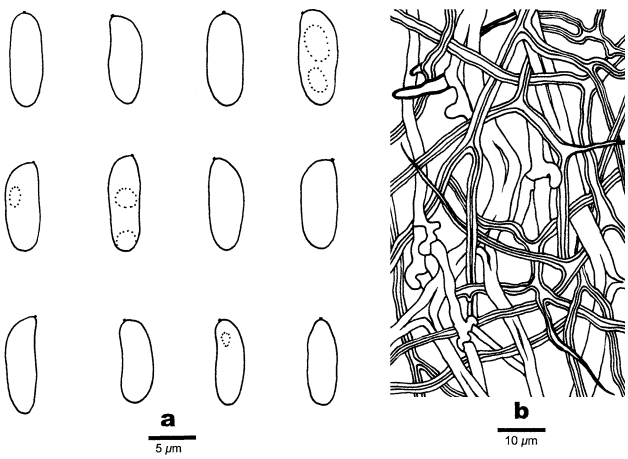

Fig. 337 Microscopic structures of *Polyporus varius* (drawn from *Cui 10327*). **a**. Basidiospores; **b**. Hyphae from trama. Bars: **a** = 5 μm; **b** = 10 μm

lumen or subsolid, frequently branched, interwoven, 1.5–5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–4 µm in diam; skeletal hyphae dominant, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 1.5–5.5 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 19–28.5 × 6.5–8.5 µm; basidioles in shape similar to basidia, but smaller.

Stipe. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2–4.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen or subsolid, frequently branched, interwoven, 1.5–5.5 µm in diam.

Spores.— Basidiospores mostly cylindrical, rarely oblong, hyaline, thin-walled, smooth, usually with one to several guttules, IKI–, CB–, (6.5–)7.2–9.6(–10.4) × (3–)3.1–4.1(–4.5) µm, L = 8.32 µm, W = 3.65 µm, Q = 1.82–2.71 (n = 102/3).

Notes. — *Polyporus varius* is very variable in its shape and size of basidiocarps, pileal surface and stipes. It is recognized by its radially striates in pileal surface and black stipe base. *Polyporus leprieurii* is somewhat similar to *P. varius* in the pileal surface, but its pore surface is grayish-brown. In addition, the basidiospores of *P. leprieurii* (4.5–7 × 2–2.5 µm, Núñez and Ryvarden 1995) are smaller than those of *P. varius*. *Polyporus elegans* (Bull.) Trog is another species similar to *P. varius*, but differs by the bigger pores (3–5 per mm) and presence of cystidioles.

Specimens examined: **Sichuan**, Xiaojin County, Jiajin Mountain, on fallen angiosperm branch, 17 October 2012, *Cui 10735, 10746* (BJFC). **Xizang (Tibet)**, Motuo County, on fallen branch of *Abies*, 21 November 2014, *Cui 12230, 12249* (BJFC). **Yunnan**, Nanhua County, Dazhongshan Nature Reserve, on fallen angiosperm branch, 15 July 2013, *Cui 11121* (BJFC).

Pseudofavolus Pat., *Essai Tax. Hyménomyc.* (Lons-le-Saunier): 80 (1990).
MycoBank: MB 18394
Type species: *Pseudofavolus miquelii* (Mont.) Pat.

Basidiocarps annual or biennial, solitary or imbricate, flabelliform to spathulate, usually with a stipe-like base. Pilei glabrous, smooth or tesselated, sometimes radially striate; pores angular to hexagonal; dissepiments thin to moderately thick. Context thin. Tubes short. Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae arboriform, hyaline, thick-walled, with a variable dextrinoid reaction, almost non-dextrinoid in the context and lower part of tube walls, more distinct dextrinoid towards the dissepiments. Cystidia absent, but dendrohyphidia may be present among the basidia, especially towards the dissepiments. Basidiospores cylindrical, smooth, non-dextrinoid and large.

Pseudofavolus cucullatus (Mont.) Pat., *Essai Tax. Hyménomyc.* (Lons-le-Saunier): 81 (1900) (Figs. 338, 339)
MycoBank: MB 451845
Basionym: *Favolus cucullatus* Mont., *Annls Sci. Nat., Bot., sér. 2* 17: 125 (1842).

Fruiting body. — Basidiocarps annual, pileate or with a lateral short stipe, usually fascicular, leathery when fresh, hard corky upon drying. Pilei semicircular, projecting up to 4 cm, 3.5 cm wide and 1.5 cm thick at base. Pileal surface cream when fresh, finely radiate-striate, light yellow brown

Fig. 338 A basidiocarp of *Pseudofavolus cucullatus*

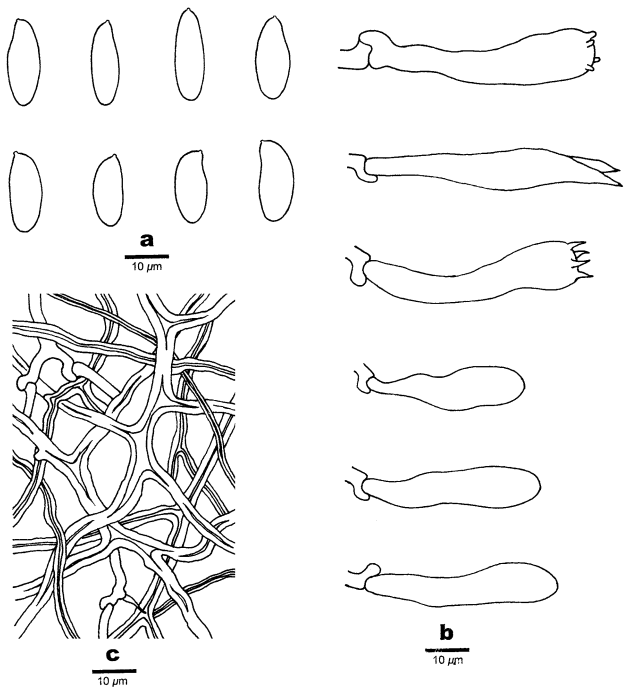

Fig. 339 Microscopic structures of *Pseudofavolus cucullatus* (drawn from *Dai 10771*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a–c** = 10 µm

upon dying; margin sharp, undulating, incurved upon drying. Pore surface cream when fresh, light yellowish brown upon drying; pores angular, 2–3 per mm; dissepiments thin, entire to slightly lacerate. Context light yellowish brown, up to 0.5 mm thick. Tubes concolorous with pore surface, up to 1 mm long. Stipe concolorous with pilei, smooth, up to 0.5 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae variable dextrinoid, CB + ; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2.5–3.5 µm in diam, occasionally inflated up to 9 µm; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, often branched, tightly interwoven, 2.5–4 µm in diam, occasionally inflated up to 10 µm.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2.5–3.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, strongly arboriform with tapering branches, interwoven, 2–4 µm in diam. Cystidia and cystidioles absent. Basidia broad clavate, with four sterigmata and a basal clamp connection, 20–35 × 12–15 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (13–)14–16(–17) × (5.5–)6–6.5(–7) µm, L = 15.6 µm, W = 6.5 µm, Q = 2.4 (n = 30/1).

Notes. — *Pseudofavolus cucullatus* is a widespread pantropical species. It is characterized by finely radiate-striate pileate or lateral stipitate basidiocarps, sharp and undulating margin, cream pore surface, a dimitic hyphal system with clamped generative hyphae, cyanophilous and variable dextrinoid skeletal hyphae, and cylindrical basidiospores. Only one species was found from China.

Specimens examined: **CHINA. Hainan**, Changjiang County, Bawangling Nature Reserve, on fallen trunk of *Ficus*, 8 May 2009, *Dai 10771* (BJFC); Ledong County, Jianfengling Nature Reserve, on living angiosperm tree, 4 September 2008, *Dai 10325* (BJFC).

Pyrofomes Kotl. & Pouzar, *Reprium nov. Spec. Regni veg*. 69: 140 (1964).
MycoBank: MB 18434
Type species: *Pyrofomes demidoffii* (Lév.) Kotl. & Pouzar.

Basidiocarps perennial to annual, pileate to resupinate. Pilei buff to brick or blackish brown. Pore surface buff to reddish brown; pores round to angular; dissepiments thin to thick, entire. Context buff to reddish brown. Tubes concolorous with pore surface, hard corky. Hyphal system dimitic to trimitic; generative hyphae bearing clamp connections; skeletal hyphae dominant, yellowish brown, slightly dextrinoid to non-dextrinoid, cyanophilous or not, unchanged in KOH. Cystidia absent; cystidioles variably present. Basidia clavate, with four sterigmata and a basal clamp connection. Basidiospores usually ellipsoid, truncate, yellowish to brownish, thick-walled, smooth, IKI–, CB + .

Pyrofomes was established by Kotlaba and Pouzar (1964), and the species of the genus usually have colored (especially reddish to reddish brown) basidiocarps, a dimitic to trimitic hyphal system, clamped generative hyphae, slightly dextrinoid to non-dextrinoid skeletal hyphae, and thick-walled, colored and truncate basidiospores (Ryvarden and Johansen 1980; Gilbertson and Ryvarden 1987; Corner 1989; Ryvarden 1991; Ryvarden and Gilbertson 1994; Wright et al. 1996). *Pyrofomes* is closely related to *Perenniporia*, separated mainly by its reddish basidiocarps and colored basidiospores. *Pyrofomes albomarginatus* (Zipp. ex Lév.) Ryvarden was reported from Hainan Province of southern China (Dai and Cui 2010), it was included in this genus mainly by its reddish basidiocarps, but its generative hyphae are simple-septate and covered by crystals, its basidiospores are allantoid, hyaline, thin-walled and negative in Melzer's reagent and cotton blue (Dai and Cui 2010), which are quite different from other species in the genus, it should be moved to other genus. Thus, *P. albomarginatus* is not included in the current study.

Key to species of *Pyrofomes* in China

1 On *Juniperus*, basidiocarps distinctly pileate ..... *P. demidoffii*
1 On *Castanopsis*, basidiocarps resupinate to effused-reflexed ..... *P. castanopsidis*

Pyrofome*s *castanopsidis B.K. Cui & Y.C. Dai, *Nova Hedwigia* 93: 438 (2011) (Figs. 340, 341)
MycoBank: MB 560940

Fruiting body. — Basidiocarps perennial, mostly resupinate, occasionally effused-reflexed, corky, without odor or taste when fresh, hard corky upon drying. Pilei dark brown, concentrically sulcate, glabrous, projecting up to 2 cm, 7 cm

Fig. 340 Basidiocarps of *Pyrofomes castanopsidis*

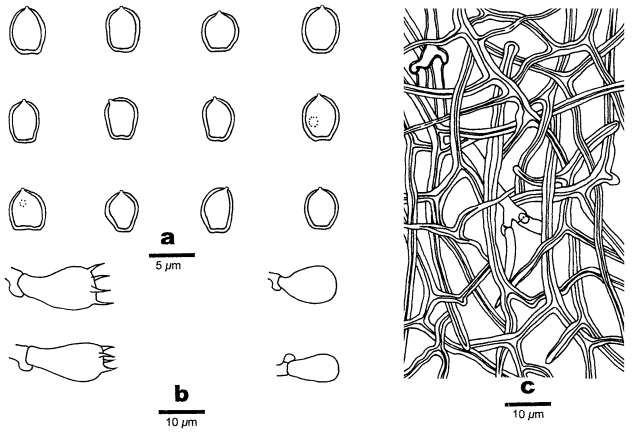

Fig. 341 Microscopic structures of *Pyrofomes castanopsidis* (drawn from *Cui 8904*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 μm; **b–c** = 10 μm

wide and 0.5 cm thick at base; resupinate part up to 12 cm long, 6 cm wide and 12 mm thick at center. Pore surface cinnamon-buff to orange-brown; pores round to angular, 5–6 per mm; dissepiments thin, entire. Context yellowish brown to rusty reddish brown, corky, azonate, up to 1 mm thick. Tubes yellowish brown to reddish brown, distinctly stratified, hard corky, up to 2 mm long in each layer.

Hyphal structure. — Hyphal system dimitic to trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB + ; tissues darkening in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.5–3 μm in diam; skeletal hyphae dominant, pale yellowish brown, thick-walled with a wide to narrow lumen, branched, strongly interwoven, 2–5.5 μm in diam; binding hyphae pale yellowish brown, thick-walled to subsolid, often branched, interwoven, 1–2.5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, unbranched, 1.5–2.3 μm in diam; skeletal hyphae dominant, pale yellowish brown, thick-walled with a narrow lumen to subsolid, branched, interwoven, 1.5–4.7 μm in diam; binding hyphae pale yellowish brown, thick-walled to subsolid, often branched, interwoven, 0.8–2 μm in diam. Cystidia absent; fusoid to clavate cystidioles present, hyaline, thin-walled, 11–14 × 4–5 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 15–18 × 5–8 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores broadly ellipsoid, truncate, pale yellowish, thick-walled, smooth, IKI–, CB + , (4.7–)5–6(–6.7) × (3–)3.7–4.7(–5) μm, L = 5.34 μm, W = 4.22 μm, Q = 1.22–1.31 (n = 60/2).

Notes. — Macroscopically, *Pyrofomes castanopsidis* may be easily treated as a species of *Phellinus* Quél. in the field, because of its orange-brown to reddish brown basidiocarps. However, it separated from *Phellinus* by having clamped generative hyphae, cyanophilous skeletal hyphae and truncate basidiospores.

Pyrofomes castanopsidis may be confused with *P. perlevis* (Lloyd) Ryvarden and *P. lateritius* (Cooke) Ryvarden by having similar basidiospores, but the latter two species are distinctly pileate and lack of cystidioles. In addition, *P. perlevis* has larger and whitish to fulvous pores (2–3 per mm, Ryvarden and Johansen 1980); *P. lateritius* has smaller and yellowish brown pores, occurs in the neotropics (7–9 per mm, Ryvarden 1988a). *Pyrofomes tricolor* (Murrill) Corner has similar basidiospores in shape and dimension with *P. castanopsidis*, but it differs from the latter by having distinctly pileate basidiocarps and smoky brown basidiospores (Corner 1989).

Specimens examined: **CHINA. Guangdong**, Huizhou, Luofushan Forest Park, on living tree of *Castanopsis*, 14 February 2009, *Dai 10700* (holotype, BJFC), *10702* (paratype, BJFC); Zhaoqing, Dinghuashan Nature Reserve, on living tree of *Castanopsis*, 29 June 2010, *Cui 8904*, *8909*, *8916*, *8921*, *8924*, *8929*, *8931*, *8934*, *8936* (BJFC).

Pyrofomes demidoffii (Lév.) Kotl. & Pouzar, *Reprium nov. Spec. Regni veg.* 69: 140 (1964) (Figs. 342, 343)
MycoBank: MB 338105
Basionym: *Polyporus demidoffii* Lév., *Voyage dans la Russie Meridionale et la Crimeé, par la Hongrie, la Valachie et la Moldavie* 2: 92 (1842).

Fruiting body. — Basidiocarps perennial, pileate. Pilei solitary or a few imbricate, corky, without odor or taste when fresh, becoming woody hard upon drying. Pilei ungulate, projecting up to 12 cm, 15 cm wide and 14 cm thick at base. Pileal surface yellowish brown to ash gray, distinctly becoming paler from base towards margin, tomentose or matted when juvenile, becoming grayish black and rimose with age, sometimes covered by mosses, indistinctly concentrically zonate or sulcate; margin blunt, cream to pinkish buff when actively growing. Pore surface

Fig. 342 Basidiocarps of *Pyrofomes demidoffii*

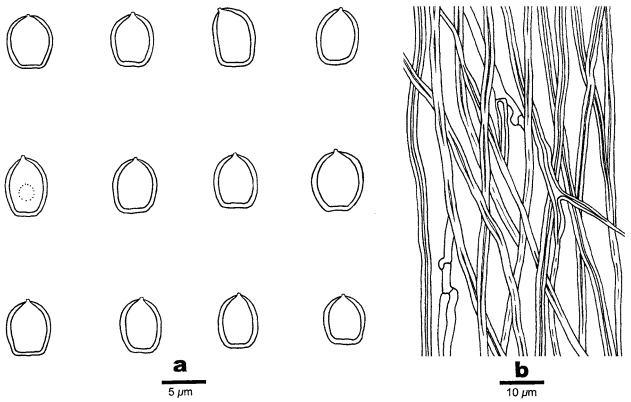

Fig. 343 Microscopic structures of *Pyrofomes demidoffii* (drawn from *IFP 015337*). **a**. Basidiospores; **b**. Hyphae from trama. Bars: **a** = 5 μm; **b** = 10 μm

ochraceous buff to buff when fresh, cinnamon brown to fulvous when dry; pores round, 3–4 per mm; dissepiments fairly thick, matted, entire to slightly lacerate. Context cinnamon to brick-red when fresh, yellowish brown to rusty tawny and hard corky when dry, concentrically zonate, up to 4 cm thick; usually with a thick cuticle present at the upper surface, dark gray. Tubes concolorous with pore surface, paler than context, corky to brittle, azonate, indistinctly stratified, up to 5 cm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae weakly dextrinoid (especially in mass) to non-dextrinoid, weakly CB + ; tissues darkening or pinkish darkening in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3 μm in diam; skeletal hyphae dominant, brownish, thick-walled, mostly with a wide lumen, occasionally branched, straight, regularly arranged, 3.5–5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 1.8–2.8 μm in diam; skeletal hyphae dominant, brownish, thick-walled with a wide to narrow lumen, occasionally branched, straight, subparallel along the tubes, 3–4 μm in diam. Hymenium usually collapsed. Cystidia absent; fusoid cystidioles occasionally present, 20–26 × 3–5 μm. Basidia usually infrequent, pear-shaped, with four sterigmata and a basal clamp connection, 20–24 × 8–9 μm; basidioles in shape similar to basidia, but slightly smaller. Rhomboid crystals frequently present in hymenium.

Spores. — Basidiospores ellipsoid, mostly truncate, pale brownish, thick-walled, smooth, slightly dextrinoid (especially in mass) and weakly CB + , (6–)6.5–7.8(–8.4) × (5–)5.1–6.2(–6.9) μm, L = 7.04 μm, W = 5.6 μm, Q = 1.26 (n = 30/1).

Notes. — *Pyrofomes demidoffii* is readily distinguished from species of *Perenniporia* by the bright rusty red color of context and its restriction to *Juniperus*. Previously, *P. demidoffii* has been recorded on junipers in Africa, North America, Central Europe and China (Ryvarden and Johansen 1980; Gilbertson and Ryvarden 1987; Ryvarden and Gilbertson 1994; Dai and He 2009). It grows exclusively on *Juniperus* spp., and always causes a white trunk rot of living junipers. It is a serious parasite in old stands of *Juniperus* sp., and is a major deacy fungus in junipers in western North America (Scharpf 1993).

Specimen examined: **CHINA. Sichuan**, Dujiangyan County, Wolong Nature Reserve, on living tree of *Juniperus formosana*, 23 August 2006, He Xin-Sheng, *IFP 015337* (IFP).

Sparsitubus L.W. Hsu & J.D. Zhao, *Acta microbiol. sin.* 20(3): 236 (1980).
MycoBank: MB 18567
Type species: *Sparsitubus nelumbiformis* L.W. Hsu & J.D. Zhao.

Basidiocarps annual to biennial, effused-reflexed to pileate, hard corky when dry. Pileal surface dark vinaceous gray, indistinctly concentrically zonate, glabrous. Pore surface ash-gray brown when dry; pores developed by the development of an apical pore which isolated and separated each other by a distinct distance, circular; hymenophores among tubes pale gray, subtomentose. Context pinkish buff, hard corky to woody hard when dry, concentrically zonate; a distinct black cuticle present on the pileal surface. Tubes mouse gray, darker than hymenophore among tubes, hard corky when dry. Hyphal system dimitic; generative hyphae mostly bearing clamp connections, sometimes with simple septa; skeletal hyphae dominant, dextrinoid, cyanophilous; contextual tissues unchanged in KOH; tubes and upper surface darkening in KOH. Cystidia and cystidioles absent. Basidiospores broadly ellipsoid to subglobose, yellowish, fairly thick- to thick-walled, asperulate but mostly collapsed when mature, IKI–, CB + .

Currently, only one species, *Sparsitubus nelumbiformis*, was recorded in the genus. This species was first described from southern China with unusual morphology (Xu and Zhao 1980). Its pores look like aggregated mini-volcanoes in a shallow basin. A few discussions were made on its generic relationship after its publication (Jülich 1981; Ryvarden 1991; Zhao 1998; Dai et al. 2007f).

Sparsitubus nelumbiformis L.W. Xu & J.D. Zhao, *Acta Microbiol. Sinica* 20: 237, (1980) (Figs. 344, 345)
MycoBank: MB 113107

Fruiting body. — Basidiocarps annual to biennial, effused-reflexed to pileate, hard corky when dry. Pilei irregular, projecting up to 1.5 cm, 3 cm wide and 2 cm thick at base. Pileal surface dark vinaceous gray, indistinctly concentrically zonate, glabrous. Sterile margin

Fig. 344 Basidiocarps of *Sparsitubus nelumbiformis*

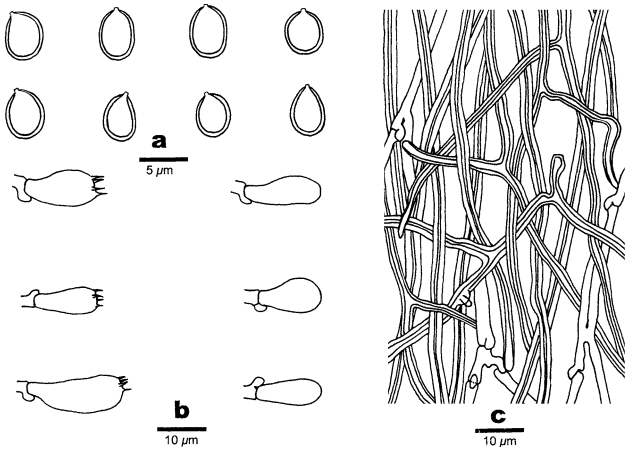

Fig. 345 Microscopic structures of *Sparsitubus nelumbiformis* (drawn from *Dai 6590*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 μm; **b–c** = 10 μm

wide, cream, distinctly paler than other part, acute, wavy and curved down when dry, even to incised. Pore surface ash-gray brown when dry; margin distinct, cream, up to 4 mm wide; pores developed by the development of an apical pore which isolated and separated each other by a distinct distance, circular, 2–4 per mm; dissepiments thin, entire; hymenophores among tubes pale gray, subtomentose. Context pinkish buff, hard corky to woody hard when dry, up to 10 mm thick, concentrically zonate; a distinct black zone present between two layers of context when biennial; a distinct black cuticle present on the pileal surface. Tubes mouse gray, hard corky when dry, up to 1 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae mostly bearing clamp connections, sometimes with simple septa; skeletal hyphae dextrinoid, CB + ; contextual tissues unchanged in KOH; tubes and upper surface darkening in KOH.

Context. — Generative hyphae hyaline, thin-walled, occasionally bearing clamp connections, very rarely with simple septa, rarely branched, 2–3 μm in diam; skeletal hyphae hyaline to yellowish brown, thick-walled, flexuous, interwoven, 2.5–3.7 μm in diam. Generative hyphae in upper cuticle mostly with simple septa; skeletals in upper cuticle golden yellow, thick-walled with a distinct lumen, flexuous, strongly gelatinized, 2.5–4 μm in diam.

Tubes. — Generative hyphae hyaline, thin-walled, occasionally bearing clamp connections, unbranched, 1.5–2.5 μm in diam; skeletal hyphae hyaline to yellowish brown, thick-walled with a narrow lumen, skeletal part subparallel along the tubes, 2–3 μm in diam. Cystidia and cystidioles absent. Basidia barrel-shaped, with four sterigmata and a basal clamp connection, 15–17 × 6.5–7.5 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores broadly ellipsoid to subglobose, yellowish, fairly thick- to thick-walled, asperulate, mostly collapsed when mature, IKI–, CB + , (4.2–)4.5–5.5(–6) × (3.7–)4–4.5(–5) μm, L = 5 μm, W = 4.2 μm, Q = 1.15–1.27 (n = 60/2).

Notes. — *Sparsitubus nelumbiformis* was originally described from subtropical China (Xu and Zhao 1980). The basidiospores of this species in the original description was mentioned as hyaline, 5.5–6.2 × 4.5–5 μm, but after re-examined its type specimen and more recently collections, we found its basidiospores are thick-walled, yellowish, 4.5–5.5 × 4–4.5 μm, which are distinctly smaller than its original description. *Sparsitubus nelumbiformis* has very unique characters: tubes separated from each other, a dimitic hyphal structure with strongly dextrinoid and cyanophilous skeletal hyphae, basidiospores yellowish, thick-walled, asperulate and cyanophilous. *Sparsitubus nelumbiformis*, *Cryptoporus volvatus*, and *Ganoderma* species share similar hyphal structure, especially they all have cyanophilous skeletal hyphae, and cyanophilous basidiospores. However, macroscopically, *S. nelumbiformis* has well-developed tubes, while *Ganoderma* and *Cryptoporus* have tubes separated only by thin wall context. In addition, basidiospores of *S. nelumbiformis* are thin, single-walled and asperulate, while basidiospores are either thick-walled in *C. volvatus* or double-walled in *Ganoderma* species (Dai et al. 2007f).

Specimens examined: **CHINA**. **Hainan**, Ledong County, Jianfengling Nature Reserve, 16 November 2007, *Dai 9244* (BJFC); 17 November 2007, *Cui 5182* (BJFC); 18 November 2007, *Cui 5217* (BJFC); 11 May 2009, *Cui 6590* (BJFC). **Yunnan**, Mengla County, Wangtianshu Park, 2 November 2009, *Cui 8497, 8567* (BJFC); Simao County, on fallen angiosperm trunk, 13April 1957, *L.W. Xu 623* (holotype, HMAS 41035).

Theleporus Fr., *Öfvers. K. Svensk. Vetensk.-Akad. Förhandl.* 4: 106 (1847).

MycoBank: MB 18643

Type species: *Theleporus cretaceus* Fr.

Basidiocarps annual, resupinate. Pore surface cream, white, pale colored. Pores round to angular. Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae IKI– or weakly dextrinoid, CB–. Dendrohyphidia present. Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–.

Theleporus is one of the oldest genus names among polypores and corticioid fungi. Species in the genus have poroid basidiocarps, but are treated as corticioid fungi because the hymenium is restricted to the base of the pores (Ryvarden and Johansen 1980). Previously three species were accepted in *Theleporus*: *T. ajovalliensis* Gilb. & M. Blackw., *T. calcicolor* (Sacc. & P. Syd.) Ryvarden and *T. cretaceus* Fr. (Ryvarden and Johansen 1980; Gilbertson and Blackwell 1982; Rajchenberg 1987). And two additional species, *T. membranaceus* Y.C. Dai & L.W. Zhou and *T. minisporus* Y.C. Dai & L.W. Zhou, were recently described from China (Zhou and Dai 2012).

Key to species of *Theleporus* in China

1 Hymenium present at tube-walls and bases of pores. ..... *T. minisporus*

1 Hymenium restricted to bases of the pores ..... *T. membranaceus*

Theleporus membranaceus Y.C. Dai & L.W. Zhou, *Mycologia* 104(4): 918 (2012) (Figs. 346, 347)
MycoBank: MB 561972

Fruiting body. — Basidiocarps annual, resupinate, inseparable, soft when fresh, becoming corky up on drying, up to 15 cm long, 5 cm wide and 0.12 mm thick at center. Pore surface white when fresh, becoming cream when dry; pores angular, 7–10 per mm; dissepiments thin, entire to slightly lacerate. Hymenium restricted to the bases of the pores. Sterile margin very narrow to almost lacking. Subiculum almost absent, white to cream when dry, up to 0.02 mm thick. Tubes concolorous with pore surface, up to 0.1 mm long.

Fig. 346 Basidiocarps of *Theleporus membranaceus*

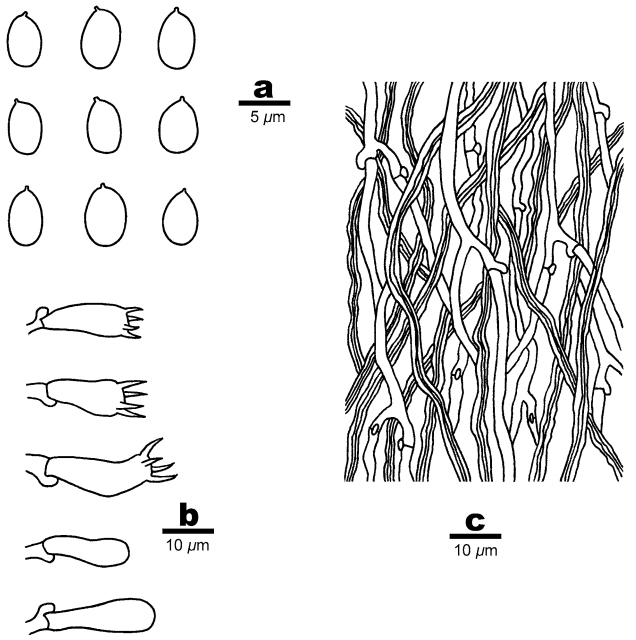

Fig. 347 Microscopic structures of *Theleporus membranaceus* (drawn from *Dai 12075*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 μm; **b–c** = 10 μm

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

Subiculum. — Generative hyphae hyaline, thin-walled, occasionally branched, 2–3 μm in diam; skeletal hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 1.5–2.8 μm in diam. Large cubic to irregular crystals present.

Tubes. — Generative hyphae hyaline, thin-walled, frequently branched, 1.8–2.5 μm in diam; skeletal hyphae dominant, thick-walled to subsolid, rarely branched, loosely interwoven, commonly encrusted with fine crystals, 1.5–2.4 μm in diam. Cystidia and cystidioles absent. Dendrohyphidia frequently present in the hymenium and dissepimental edge. Basidia short clavate, with four sterigmata and a basal clamp connection, 14–20 × 5–7 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid to broadly ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, (5–)5.2–6.2(–6.5) × (3–)3.2–4.2(–4.4) μm, L = 5.63 μm, W = 3.8 μm, Q = 1.46–1.5 (n = 90/3).

Notes. — *Theleporus membranaceus* is characterized by its extremely thin basidiocarps, small pores (7–10 per mm), a dimitic hyphal system and ellipsoid to broadly ellipsoid basidiospores. *Theleporus calcicolor* is similar to *T. membranaceus* by white to cream pores and presence of dendrohyphidia (Zhou and Dai 2012). However, the former species has relatively bigger pores (5–7 per

mm), thicker basidiocarps (up to 5 mm thick) and wider basidiospores (5–7.5 × 4–5 µm, Ryvarden and Johansen 1980).

Specimens examined: **CHINA. Guangdong**, Shixing County, Chebaling Nature Reserve, on fallen angiosperm trunk, 12 September 2009, *Cui 7337* (paratype, BJFC). **Hainan**, Changjiang County, Bawangling Nature Reserve, on fallen twig of *Symplocos*, 26 November 2010, *Dai 12075* (holotype, BJFC); on fallen trunk of *Cratoxylon ligustrinum*, 8 May 2009, *Cui 6348* (paratype, BJFC); on fallen branch of *Symplocos laurina*, 8 May 2009, *Cui 6386, 6401* (paratypes, BJFC); Ledong County, Jianfengling Nature Reserve, on angiosperm branch, 4 September 2006, *Dai 7969* (paratype, BJFC).

Theleporus minisporus Y.C. Dai & L.W. Zhou, *Mycologia* 104(4): 919 (2012) (Figs. 348, 349)
MycoBank: MB 561973

Fruiting body. — Basidiocarps annual, resupinate, inseparable, soft when fresh, becoming corky upon drying, up to 40 cm long, 6 cm wide and 0.6 mm thick at center. Pore surface white to cream, with many irregular thin cracks when dry; pores angular, 5–8 per mm; dissepiments thick, entire. Hymenium present at both the vertical tube-walls and the bases of the pores. Sterile margin very narrow to almost lacking. Subiculum white to cream, soft corky when dry, up to 0.3 mm thick. Tubes concolorous with pore surface, up to 0.3 mm long.

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

Subiculum. — Generative hyphae hyaline, thin-walled, occasionally branched, 2–3.5 µm in diam; skeletal hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 2–3.2 µm in diam. Large octahedral crystals present.

Fig. 348 Basidiocarps of *Theleporus minisporus*

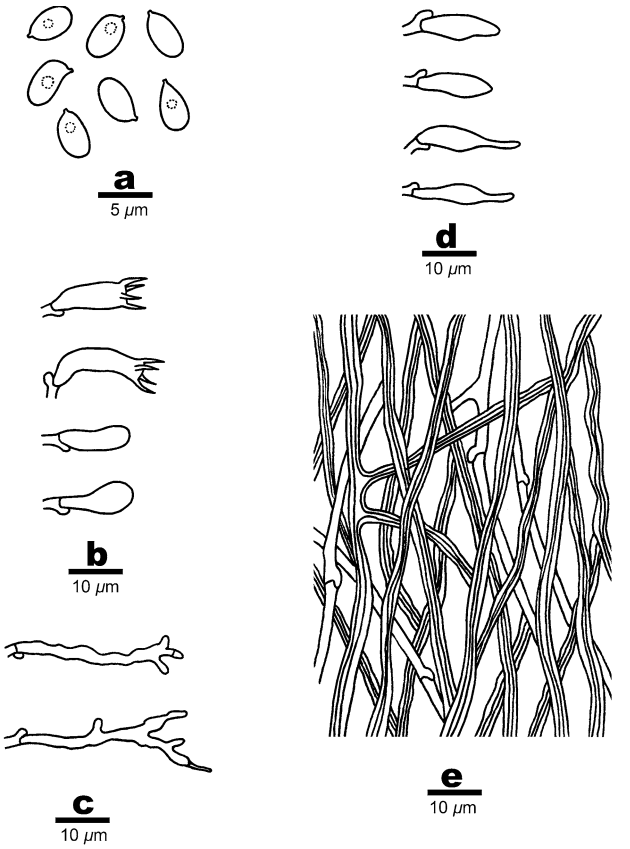

Fig. 349 Microscopic structures of *Theleporus minisporus* (drawn from *Dai 12011*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Dendrohyphidia; **d**. Cystidioles; **e**. Hyphae from trama. Bars: **a** = 5 µm; **b–e** = 10 µm

Tubes. — Generative hyphae hyaline, thin-walled, occasionally branched, 1.8–2.8 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, rarely branched, loosely interwoven, 2–3.2 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 11.5–17 × 3.2–4.5 µm. Dendrohyphidia only present at dissepiment edge. Basidia short clavate to barrel-shaped, with four sterigmata and a basal clamp connection, 13–20 × 3.5–5 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid to oblong-ellipsoid with tapering apex, hyaline, thin-walled, smooth, IKI–, CB–, (3.7–)4–5(–5.3) × (2.2–)2.4–3.1(–3.3) µm, L = 4.39 µm, W = 2.74 µm, Q = 1.6 (n = 60/1).

Notes. — *Theleporus minisporus* is a distinctly poroid species, because its hymenia are present at both the vertical tube-walls and the bases of the pores (Zhou and Dai 2012). This character and small basidiospores (4–5 × 2.4–3.1 µm) make *T. minisporus* distinct from other species in the genus. However, *T. minisporus* has other characters of *Theleporus*. *Theleporus calcicolor* and *T. minisporus* have similar pore sizes, but the former has broadly ellipsoid to

subglobose basidiospores (5–7.5 × 4–5 μm, Ryvarden and Johansen 1980).

Specimen examined: **CHINA**. **Hainan**, Changjiang County, Bawangling Nature Reserve, on rotten angiosperm wood, 24 November 2010, *Dai 12011* (holotype in BJFC, isotype in IFP).

Trametes Fr., *Fl. Scan.*: 339 (1836).
MycoBank: MB 18663

Type species: *Trametes suaveolens* (L.) Fr. 1838.

Basidiocarps usually annual, pileate, dimidiate to flabelliform. Hymenophores poroid, daedaleoid to lamellate. Pilei variable in color, white to cream, yellowish to reddish, brownish or blackish brown. Pore surface white, cream, grayish, pale brown to red; pores round to angular; dissepiments thin, entire to slightly lacerate. Context white to yellowish or reddish brown. Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal hyphae hyaline, yellowish-brown to reddish orange, IKI–, CB–. Basidiospores cylindrical to ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–.

Trametes is mainly characterized by the pileate basidiocarps, a trimitic hyphal system with clamped generative hyphae, cylindrical to ellipsoid and thin-walled basidiospores (Núñez and Ryvarden 2001). *Lenzites* Fr. has lamellate to daedaleoid hymenophores, which are different from *Trametes*. *Pycnoporus* P. Karst. is separated from *Trametes* solely based on the orange-red colors of the basidiocarps. However, phylogenetically, these two genera grouped together with *Trametes*; thus they were treated as synonyms of *Trametes* (Justo and Hibbett 2011).

Key to species of *Trametes* in China

1 Basidiocarps orange red to brick red 2
1 Basidiocarps white, cream, yellowish brown to blackish but without reddish color 4
2 Pores 2–4 per mm ..... *T. cinnabarina*
2 Pores 5–8 per mm 3
3 Pores 5–6 per mm ..... *T. sanguinea*
3 Pores 6–8 per mm ..... *T. coccinea*
4 Hymenophore lamellate 5
4 Hymenophore poroid 7
5 Pileal surface usually tomentose; basidiospores 1.4–2 μm in width ..... *T. betulina*
5 Pileal surface usually glabrous; basidiospores 2.3–3.5 μm in width 6
6 Basidiospores 6–7 μm in length ..... *T. acuta*
6 Basidiospores 3.8–4.8 μm in length ..... *T. vespacea*
7 Basidiocarps usually with a discoid sterile structure at base ..... *T. conchifer*
7 Basidiocarps without a discoid sterile structure at base 8
8 Basidiocarps with a pleasant odor when fresh 9
8 Basidiocarps without a pleasant odor when fresh 10
9 Context homogenous ..... *T. suaveolens*
9 Context duplex ..... *T. manilaensis*
10 Basidiospores usually ellipsoid to oblong-ellipsoid 11
10 Basidiospores usually cylindrical to allantoid 18
11 Basidiocarps with a short stipe at base ..... *T. stiptica*
11 Basidiocarps without a short stipe at base 12
12 Context duplex ..... *T. duplexa*
12 Context homogenous 13
13 Pores 1–2 per mm 14
13 Pores 3–6 per mm 15
14 Basidiospores usually > 4.5 μm in length; hyphal pegs present ..... *T. pocas*
14 Basidiospores usually < 4.5 μm in length; hyphal pegs absent ..... *T. ellipsoidea*
15 Cystidia present ..... *T. ellipsospora*
15 Cystidia absent 16
16 Basidiocarps glabrous ..... *T. maxima*
16 Basidiocarps velutinate to tomentose 17
17 Basidiocarps velutinate; basidiospores usually > 5.5 μm in length ..... *T. ljubarskyi*
17 Basidiocarps hirsute to tomentose; basidiospores usually < 5.5 μm in length ..... *T. pavonia*
18 Grows on trees of Cupressaceae ..... *T. thujae*
18 Grows on other trees 19
19 Pores radially arranged 20
19 Pores not radially arranged 21
20 Basidiospores usually > 5 μm in length, hyphal pegs present ..... *T. elegans*
20 Basidiospores usually < 5 μm in length, hyphal pegs absent ..... *T. gibbosa*
21 Context duplex ..... *T. subsuaveolens*
21 Context homogenous 22
22 Pores 1–2 per mm 23
22 Pores 3–6 per mm 24
23 Pores surface grayish black ..... *T. tephroleuca*
23 Pore surface cream to pale yellowish-brown ..... *T. lactinea*
24 Cystidioles present 25
24 Cystidioles absent 26
25 Pores 2–3 per mm; basidiospores 6.6–9.2 × 2.4–3 μm ..... *T. cystidiolophora*
25 Pores 3–5 per mm; basidiospores 5–7 × 2–2.8 μm ..... *T. ochracea*
26 Pileal surface tomentose to hirsute 27
26 Pileal surface glabrous to velutinate 30
27 Pileus with different colored multi-zones ..... *T. versicolor*
27 Pileus azonate or with almost concolorous zones 28
28 Context pale yellowish brown ..... *T. polyzona*
28 Context white to cream 29
29 Pore surface usually grayish with age ..... *T. hirsuta*

29 Pore surface usually cream to yellowish buff with age ..... *T. pubescens*
30 Basidiospores usually > 10 μm in length ..... *T. mimetes*
30 Basidiospores usually < 10 μm in length 31
31 Basidiospores usually < 5 μm in length ..... *T. ectypa*
31 Basidiospores usually > 5 μm in length 32
32 Pores usually azonate ..... *T. orientalis*
32 Pileus usually concentrically zonate 33
33 Pores usually lacerate, grows in tropical areas ..... *T. menziesii*
33 Pores usually entire, grows in temperate areas ..... *T. velutina*

Trametes acuta (Berk.) Imazeki, *Bull. Tokyo Sci. Mus.* 6: 73 (1943) (Figs. 350, 351)
MycoBank: MB 282909
Basionym: *Lenzites acuta* Berk., *London J. Bot.* 1(3): 146 (1842).

Fruiting body. — Basidiocarps annual, pileate, sometimes with a small stipe-like base, without odor or taste when fresh, corky and light in weight upon drying. Pilei semicircular to fan-shaped, projecting up to 7 cm, 15 cm wide and 12 mm thick at base. Pileal surface cream white to buff, glabrous, concentrically zonate and sulcate; margin cream to pale buff, acute. Pore surface cream buff to pale yellowish-brown; pores irregular, poroid to daedaleoid to lamellate, about 0.5–1 per mm; dissepiments thin, entire to lamellate. Context white to cream, corky, up to 6 mm thick. Tubes or lamellae white to cream buff, corky, up to 6 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae frequent, hyaline, thin-walled, moderately branched, 2–4 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, fairly straight, occasionally branched, regularly arranged, 4–6 μm in diam; binding hyphae hyaline, thick-walled with a narrow lumen to subsolid, flexuous, frequently branched, interwoven, 1.8–3.3 μm in diam.

Fig. 350 Basidiocarps of *Trametes acuta*

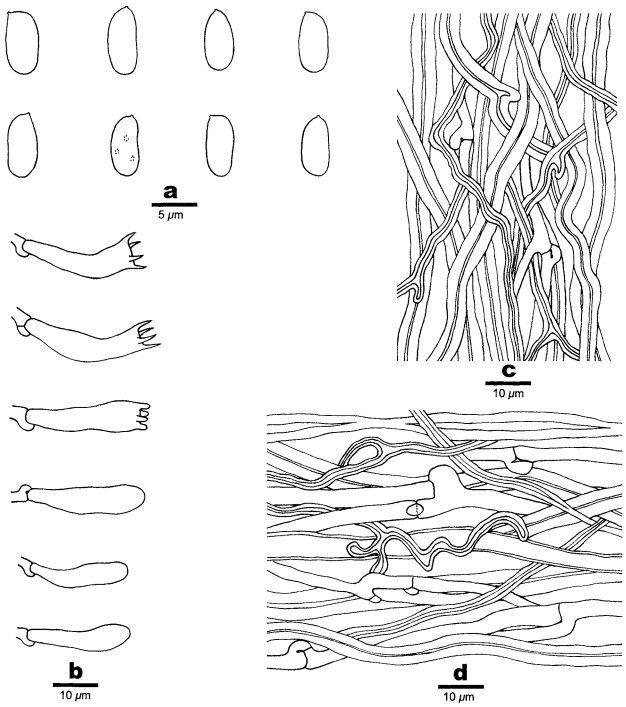

Fig. 351 Microscopic structures of *Trametes acuta* (drawn from *Dai 12397*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 μm; **b–d** = 10 μm

Tubes or lamellae. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2–2.8 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, occasionally branched, flexuous, interwoven, 3.5–5 μm in diam; binding hyphae hyaline, thick-walled with a narrow lumen to subsolid, flexuous, frequently branched, 1.5–3.2 μm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 18–24 × 4–6 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (5.8–)6–7(–8) × (2.8–)2.9–3.5(–3.6) μm, L = 6.67 μm, W = 3.08 μm, Q = 2.1–2.12 (n = 29/2).

Notes. — *Trametes acuta* is mainly characterized by its cream buff and glabrous pilei, lamellate hymenophores with sparse lamellae. It mostly distributes in tropical and subtropical areas.

Specimens examined: **CHINA**. **Yunnan**, Yuangjiang County, on living angiosperm tree, 9 June 2011, *Dai 12397* (BJFC); Mengla County, Wangtianshu Park, on fallen angiosperm trunk, 2 November 2009, *Cui 8520* (BJFC).

Trametes betulina (L.) Pilát, *Atlas Champ. l'Europe, III, Polyporaceae (Praha)* 1: 262 (1939) (Figs. 352, 353)
MycoBank: MB 493466
Basionym: *Agaricus betulinus* L., *Sp. pl.* 2: 1176 (1753).
≡ *Lenzites betulina* (L.) Fr., *Epicr. syst. mycol.* (Upsaliae): 405, 1838.

Fruiting body. — Basidiocarps annual, pileate, single or imbricate, leathery, without odor or taste when fresh, corky and light in weight when dry. Pilei semicircular to flabelliform, projecting up to 5 cm, 7 cm wide and 1.5 cm thick at base. Pileal surface white cream, grayish white, yellowish brown to pale grayish brown, hirsute to tomentose, concentrically zonate; margin sharp. Pore surface cream, pale brown, pale yellowish-brown to grayish brown; pores lamellate, about 0.5–2 per mm; dissepiments thin, lamellate. Context cream buff, corky, up to 3 mm thick. Lamellae cream, cream buff to pale yellowish brown or grayish brown, corky, up to 12 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 3–4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, occasionally branched, interwoven, 3–5 µm in diam; binding hyphae hyaline, thick-walled to almost solid, frequently branched, flexuous, interwoven, 2–3 µm in diam.

Lamellae. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, occasionally branched, interwoven, 2.5–4 µm in diam; binding hyphae hyaline, thick-walled to almost solid, frequently branched, flexuous, interwoven, 2–3 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 16–18 × 6–7 µm; basidioles in shape similar to basidia, but slightly smaller.

Fig. 352 Basidiocarps of *Trametes betulina*

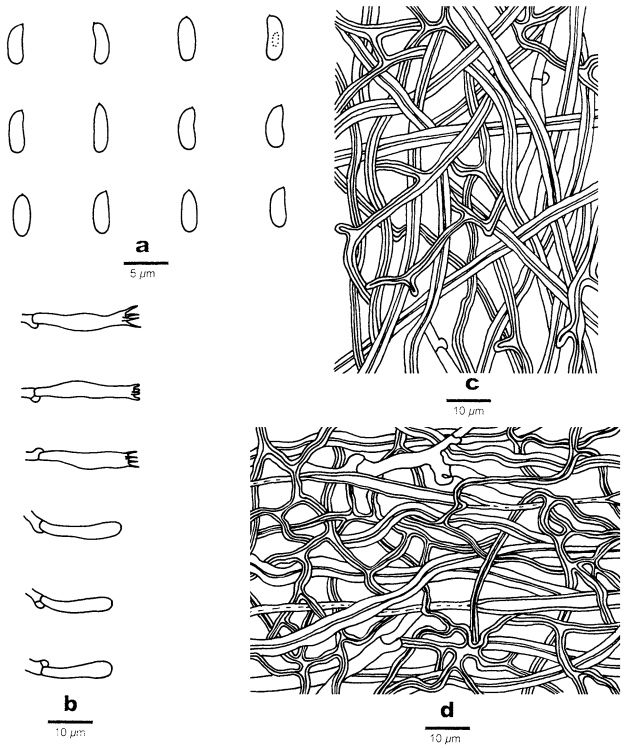

Fig. 353 Microscopic structures of *Trametes betulina* (drawn from *Cui 7234*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 µm; **b–d** = 10 µm

Spores. — Basidiospores cylindrical to slightly allantoid, hyaline, thin-walled, smooth, IKI–, CB–, 4.5–5 × 1.4–2 µm, L = 4.82 µm, W = 1.5 µm, Q = 3.21 (n = 30/1).

Notes. — *Trametes betulina* is characterized by its hirsute to tomentose pileus, lamellate hymenophores, and usually grows on birch wood in temperate areas.

Specimens examined: **CHINA**. **Beijing**, Yanqing County, Songshan Nature Reserve, on fallen trunk of *Betula*, 27 July 2005, *Dai 6660* (IFP & BJFC). **Hebei**, Xinglong County, Wulingshan Nature Reserve, on fallen trunk of *Betula*, 29 July 2009, *Cui 6876* (BJFC). **Heilongjiang**, Yichun, Wuying, Fenglin Nature Reserve, on fallen trunk of *Betula*, 1 August 2011, *Cui 9814* (BJFC). **Jilin,** Hunchun, Hadamen, on fallen trunk of *Betula*, 7 August 2009, *Cui 7095* (BJFC). **Liaoning**, Kuandian County, Tianhuashan Forest Park, on fallen trunk of *Betula*, 29 July 2008, *Cui 5617* (BJFC). **Inner Mongolia**, Aershan, Wuchagou Forest Farm, on fallen trunk of *Betula*, 24 July 2005, *Cui 1752* (IFP). **Shanxi**, Jiaocheng County, Pangquangou Nature Reserve, on fallen trunk of *Betula*, 12 October 2004, *Yuan 850* (IFP); Qinshui County, Lishan Nature Reserve, on fallen trunk of *Betula*, 18 October 2004, *Yuan 967* (IFP). **Xinjiang**, Buerjin County, Kanasi Nature Reserve, on fallen trunk of *Betula*, 11 August 2004, *Wei 1375* (IFP).

Trametes cinnabarina (Jacq.) Fr., *Hymenomyc. eur. (Upsaliae)*: 583 (1874) (Figs. 354, 355)
MycoBank: MB 204756
Basionym: *Boletus cinnabarinus* Jacq., *Fl. austriac.* 4: 2 (1776).
≡ *Pycnoporus cinnabarinus* (Jacq.) P. Karst., *Revue mycol., Toulouse* 3(no. 9): 18 (1881).

Fruiting body. — Basidiocarps annual, pileate, single or imbricate, leathery, without odor or taste when fresh, corky and light in weight when dry. Pilei semicircular, usually elongated; projecting up to 5 cm, 8.5 cm wide, and 14 mm thick at base. Pileal surface reddish orange to brick red when fresh, becoming pale with age, glabrous, azonate; margin acute to slightly obtuse. Pore surface reddish orange to brick red when fresh, color almost unchanged when dry; pores round to angular, 2–4 per mm; dissepiments thin, entire. Sterile margin distinct, coral red, up to 2 mm wide. Context reddish orange to pale reddish brown, leathery when fresh, corky when dry, up to 10 mm thick. Tubes concolorous with pore surface, leathery to fibrous when fresh, corky when dry, up to 4 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues darkening in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2–5 µm in diam; skeletal hyphae dominant, yellowish-brown to reddish orange, thick-walled with a wide to narrow lumen, occasionally branched, interwoven, 3–7 µm in diam; binding hyphae pale yellowish-brown, thick-walled to subsolid, frequently branched, flexuous, interwoven, 1.5–3.5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, frequently branched, 1.8–2.5 µm in diam; skeletal hyphae dominant, yellowish-brown to reddish orange, thick-walled with a wide to narrow lumen, occasionally branched, interwoven, sometimes with secondary septa, 2.5–4 µm in diam; binding hyphae pale yellowish-brown, thick-walled to subsolid, frequently branched, flexuous, interwoven, 1.5–3.2 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 12–20 × 4–5.5 µm; basidioles in shape similar to basidia, but slightly smaller.

Fig. 354 Basidiocarps of *Trametes cinnabarina*

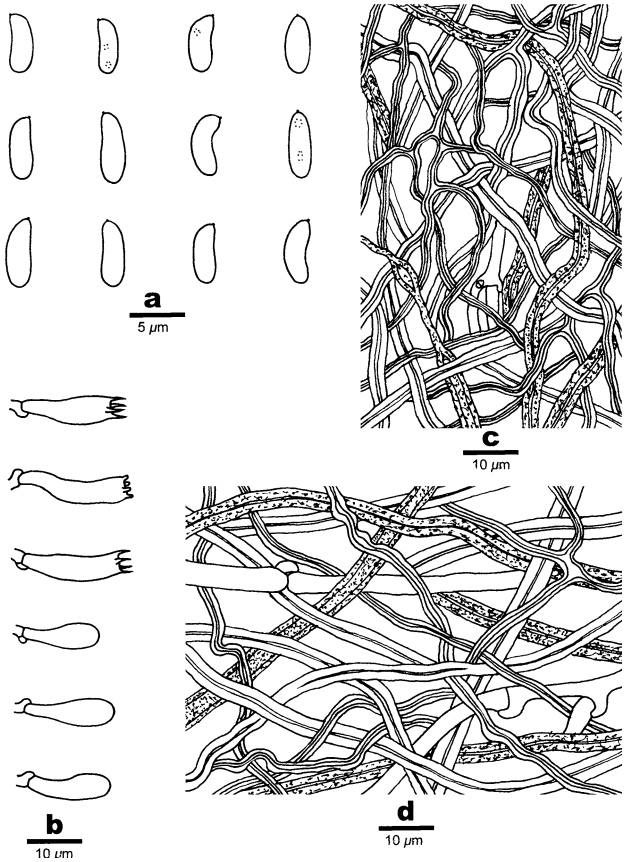

Fig. 355 Microscopic structures of *Trametes cinnabarina* (drawn from *Dai 7795*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 µm; **b–d** = 10 µm

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, 5–6.8(–7) × 2–2.4 µm, L = 5.75 µm, W = 2.12 µm, Q = 2.71 (n = 30/1).

Notes. — *Trametes cinnabarina* is characterized by its reddish basidiocarps and bigger pores (2–4 per mm). It usually grows on wood in dried and open environment of temperate areas.

Specimens examined: **CHINA**. **Fujian**, Wuyishan County, Wuyi Mountain, on fallen angiosperm trunk, 18 October 2005, *Dai 7206* (IFP). **Heilongjiang**, Jiagedaqi, Huzhong, on fallen trunk of *Betula*, 17 August 2003, *Dai 4712, 4885* (IFP). **Hubei**, Fang County, Shennongjia Nature Reserve, on fallen angiosperm trunk, 29 August 2006, *Li 1239* (IFP). **Jilin**, Hunchun, Hadamen, on fallen trunk of *Quercus*, 6 August 2009, *Cui 7075, 7091* (BJFC). **Inner**

Mongolia, Aershan, Wuchagou Forest Farm, on fallen trunk of *Populus*, 24 July 2005, *Cui 1728* (IFP). **Qinghai**, Huzhu County, Beishan Forest Farm, on fallen trunk of *Betula*, 1 September 2004, *Dai 5048* (IFP). **Shaanxi**, Zhouzhi County, Louguantai Forest Park, on fallen trunk of *Castanea*, 19 September 2005, *Wang 542* (IFP). **Sichuan**, Jiuzhaigou County, Jiuzhaigou Nature Reserve, on fallen trunk of *Betula*, 13 October 2002, *Dai 4134* (IFP). **Tianjin**, Ji County, Panshan Forest Park, on fallen trunk of *Quercus*, 1 August 2009, *Cui 6980* (BJFC). **Xizang (Tibet)**, Linzhi, Bayi, on fallen trunk of *Betula*, 3 August 2004, *Dai 5665* (IFP). **Xinjiang**, Gongliu County, Kuerdening Nature Reserve, on fallen angiosperm trunk, 21 August 2004, *Wei 1602* (IFP). **Yunnan**, Pu'er, Taiyanghe Nature Reserve, on fallen trunk of *Alnus*, 9 June 2011, *Dai 12366* (BJFC); Lanping County, Changyanshan Nature Reserve, on fallen angiosperm trunk, 18 September 2011, *Cui 10295* (BJFC).

Trametes coccinea (Fr.) Hai J. Li & S.H. He, *Mycosystema* 33(5): 972 (2014) (Figs. 356, 357)
MycoBank: MB 804886
Basionym: *Polyporus coccineus* Fr., *Nova Acta R. Soc. Scient. upsal.,* Ser. 3 1(1): 67 (1851).
≡ *Pycnoporus coccineus* (Fr.) Bondartsev & Singer, *Annls mycol.* 39(1): 59 (1941).

Fruiting body. — Basidiocarps annual, effused-reflexed to pileate, single or imbricate, without odor or taste when fresh, corky and light in weight when dry. Pilei semicircular, flabelliform, kidney shaped to almost circular, projecting up to 7 cm, 8 cm wide and 1 cm thick at base. Pileal surface pale orange-yellow, pale brownish red, red to scarlet, glabrous, azonate; margin sharp or obtuse. Pore surface red to scarlet, not shiny; pores round to angular, 6–8 per mm; dissepiments thin, entire. Sterile margin pale orange-yellow to pale brownish red, up to 3 mm wide. Context orange-yellow to pale red, distinctly zonate, with white to cream zones, corky, up to 9 mm thick. Tubes red to scarlet, corky, up to 1 mm long.

Fig. 356 Basidiocarps of *Trametes coccinea*

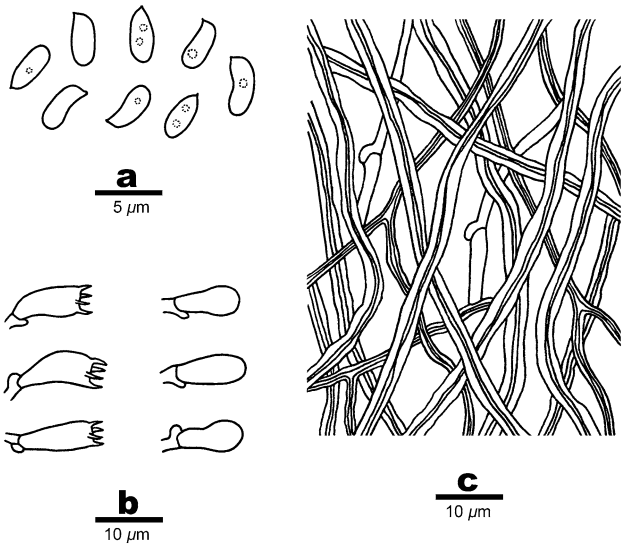

Fig. 357 Microscopic structures of *Trametes coccinea* (drawn from *Cui 7096*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 μm; **b–c** = 10 μm

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues darkening in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.8–4 μm in diam; skeletal hyphae dominant, orange-yellow, thick-walled with a wide to narrow lumen, occasionally branched, sometimes collapsed, and some finely incrusted with scarlet crystals, interwoven, 4–5 μm in diam; binding hyphae pale yellowish, thick-walled to almost solid, frequently branched, interwoven, 1.8–3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, and some finely incrusted with scarlet crystals, 1.4–2 μm in diam; skeletal hyphae dominant, orange-yellow, thick-walled with a wide to narrow lumen, occasionally branched, occasionally collapsed when dry, and some finely incrusted with scarlet crystals, interwoven, 2.2–3 μm in diam; binding hyphae pale yellowish, thick-walled to almost solid, frequently branched, interwoven, 1.4–2.5 μm in diam. Cystidia and cystidioles absent. Basidia clavate to barrel-shaped, with four sterigmata and a basal clamp connection, 10–13 × 4–5 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical to slightly allantoid, tapering at apiculus, hyaline, thin-walled, smooth, with one or two small guttules, IKI–, CB–, 4–5 × 1.8–2.2 μm, L = 4.55 μm, W = 2.01 μm, Q = 2.26 (n = 40/1).

Notes. — *Trametes coccinea* is characterized by its orange to reddish and glabrous pileal surface, smaller pores (6–8 per mm), distinctly zonate context, and small, cylindrical to slightly allantoid basidiospores.

Specimen examined: **CHINA**. **Jilin**, Hunchun, Hademen, on stump of *Quercus*, 7 August 2009, *Cui 7096* (BJFC).

Trametes conchifer (Schwein.) Pilát, *Atlas Champ. l'Europe, III, Polyporaceae (Praha)* 1: 264 (1939) (Figs. 358, 359)
MycoBank: MB 261599
Basionym: *Boletus conchifer* Schwein., *Schr. naturf. Ges. Leipzig* 1: 98 (72 of repr.) (1822).

Fruiting body. — Basidiocarps annual, pileate, sometimes with a short stipe-like base connected to the substrate, leathery, without odor or taste when fresh, corky and light in weight upon drying. Pilei dimidiate to circular, projecting up to 3 cm, 4 cm wide and 5 mm thick at base; often with a discoid or cupulate sterile structure at base, the sterile structure formed before the pileus at the base and connected to the substrate, pale yellowish, yellowish-brown to dark brown, up to 5 mm in diam. Pileal surface cream when juvenile, cream, pale yellowish to pale brown with age, glabrous, concentrically zonate, usually slightly radially winkled when dry; margin acute, pale yellowish, wavy. Pore surface cream when juvenile, turning to pale yellowish with age, yellowish buff to orange-yellow when dry; pores angular, 2–4 per mm; dissepiments thin, slightly lacerate, and sometimes dentate with age. Context cream, corky, up to 1 mm thick. Tubes concolorous with the pore surface, coriaceous, up to 2 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2–4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, occasionally branched, interwoven, 3–6.5 µm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 1.5–2.5 µm in diam.

Fig. 358 Basidiocarps of *Trametes conchifer*

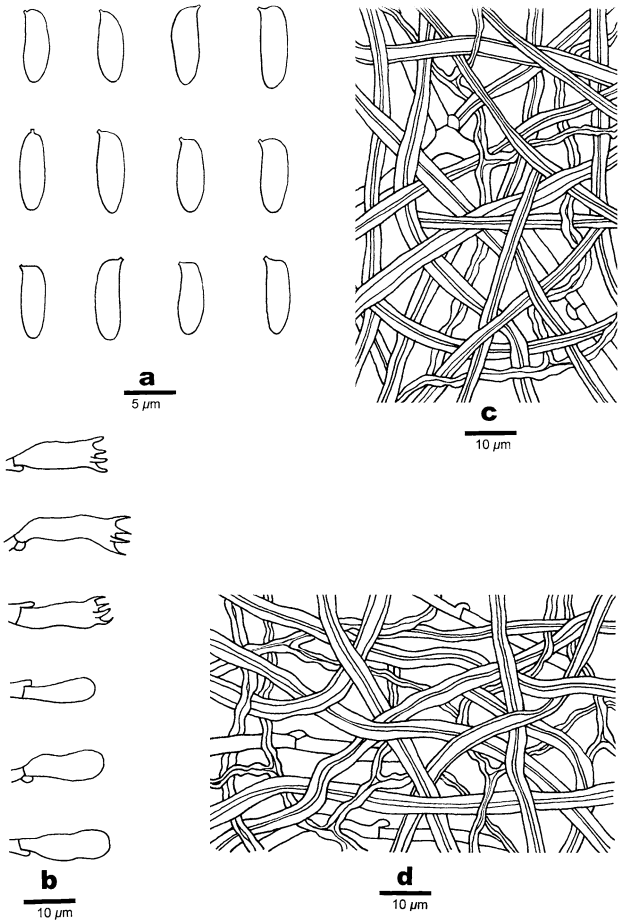

Fig. 359 Microscopic structures of *Trametes conchifer* (drawn from *Dai 3670*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 µm; **b–d** = 10 µm

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, occasionally branched, interwoven, 2.5–4 µm; binding hyphae hyaline, thick-walled to subsolid, frequently branched, flexuous, 1.4–2.2 µm. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 15–20 × 4.5–5.5 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical to slightly allantoid, hyaline, thin-walled, smooth, with one or two small guttules, IKI–, CB–, 6.1–8 × 2–2.9 µm, L = 7.17 µm, W = 2.24 µm, Q = 3.2 (n = 30/1).

Notes. — *Trametes conchifer* is unique in the genus by its sterile discoid or cupulate structure.

Specimens examined: **CHINA**. **Heilongjiang**, Jiagedaqi, Huzhong, on fallen branch of *Chosenia arbutifolia*,

17 August 2003, *Dai 4669* (IFP); Yichun, Dailing, Liangshui Nature Reserve, on fallen branch of *Acer*, 1 September 2008, *Yuan 5250* (IFP); on fallen angiosperm branch, 2 September 2008, *Yuan 5278* (IFP); Hulin, Qihulin Forest Farm, on fallen angiosperm branch, 11 September 2004, *Yuan 455* (IFP); Ning'an County, Jingpohu Park, on fallen angiosperm branch, 8 September 2007, *Dai 8367a* (IFP); on fallen branch of *Ulmus*, 8 September 2007, *Dai 8359* (IFP); Yichun, Wuying, Fenglin Nature Reserve, on fallen angiosperm branch, 8 September 2002, *Dai 3670* (IFP). **Inner Mongolia**, Tongliao, Daqinggou Nature Reserve, on fallen angiosperm branch, 24 September 2002, *Dai 3966* (IFP). **Jilin**, Antu County, Changbaishan Nature Reserve, on fallen angiosperm branch, 12 September 2007, *Dai 9069* (IFP); 24 August 2007, *Wei 3055* (IFP); on fallen branch of *Populus*, 24 August 2007, *Wei 3142* (IFP); Huadian County, Dongxing, on fallen branch of *Ulmus*, 16 October 1993, *Dai 1637* (IFP); Huinan County, Honqi, on fallen branch of *Acer*, 9 October 1993, *Dai 1456* (IFP).

Trametes cystidiolophora B.K. Cui & Hai J. Li, *Mycotaxon* 113: 264 (2010) (Figs. 360, 361)
MycoBank: MB 518544

Fruiting body. — Basidiocarps annual, pileate, usually imbricate, without odor or taste when fresh, corky and light in weight when dry. Pilei dimidiate to semicircular, projecting up to 4.2 cm, 7.3 cm wide and 7 mm thick at base. Pileal surface pale grayish brown to pale cinnamon-buff when dry, glabrous, distinctly concentrically zonate and radially veined; margin sharp, wavy or incised in rounded lobes, incurved with age. Pore surface cream-buff to pinkish buff when dry, slightly shiny; pores round to angular, 2–3 per mm; dissepiments thin, entire at margin and dentate to hydnoid with age. Sterile margin white to cream, up to 2.5 mm wide. Context cream, corky, up to 3 mm thick. Tubes cream to cream-buff, corky, up to 4 mm long.

Fig. 360 Basidiocarps of *Trametes cystidiolophora*

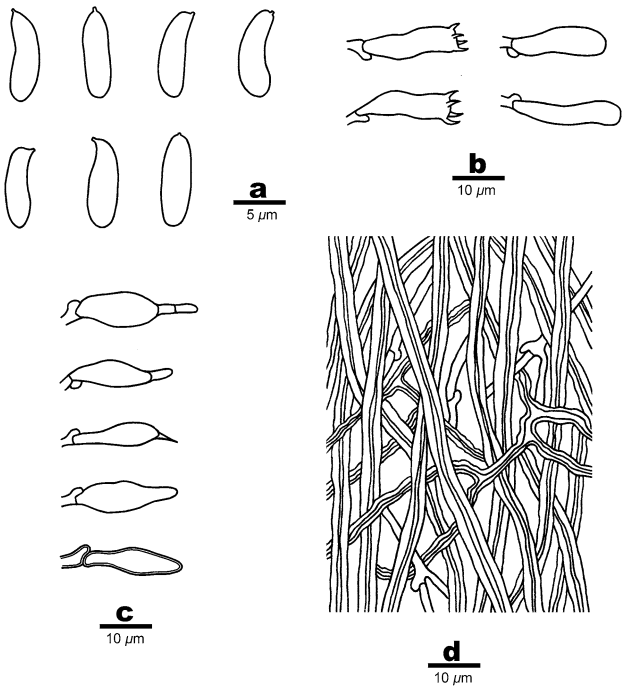

Fig. 361 Microscopic structures of *Trametes cystidiolophora* (drawn from *Dai 8084*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–, swollen in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2–3.7 μm in diam; skeletal hyphae dominant, hyaline, slightly thick-walled to subsolid, frequently branched, and the slightly thick-walled skeletal hyphae often collapsed, interwoven, 2.8–6.2 μm in diam; binding hyphae hyaline, thick-walled to almost solid, frequently branched, interwoven, 1.7–3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, frequently branched, 1.7–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, occasionally branched, interwoven, 2.3–5 μm; binding hyphae hyaline, thick-walled to almost solid, frequently branched, flexuous, interwoven, 1.6–3.1 μm. Cystidia absent; cystidioles abundant in the hymenium, fusoid, hyaline, mostly thin-walled, occasionally slightly thick-walled, some with one or two septa, 16–24 × 4–6 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 16–18.2 × 5–7.8 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, occasionally slightly curved to more or less allantoid, hyaline, thin-walled, smooth, IKI–, CB–, (6–)6.6–9.2(–10) × (2.2–)2.4–3(–3.3) μm, L = 8.1 μm, W = 2.79 μm, Q = 2.78–3.04 (n = 60/2).

Notes. — *Trametes cystidiolophora* is characterized by its pale grayish brown to pale cinnamon-buff pileal surface with distinctly concentric zones and radial veins, uneven

pore surface, cylindrical to more or less allantoid basidiospores (6.6–9.2 × 2.4–3 μm), and abundant cystidioles present in the hymenium. Moreover, its skeletal and binding hyphae becoming swollen in KOH.

Specimens examined: **CHINA**. **Yunnan**, Baoshan, Gaoligongshan Nature Reserve, on dead angiosperm tree, 25 October 2009 *Cui 8084* (holotype, BJFC); *Cui 8087* (paratype, BJFC); Gaoligongshan Nature Reserve, Baihualing, on fallen trunk of *Alnus*, 28 October 2012, *Dai 13086* (BJFC).

Trametes duplexa Hai J. Li, Y.C. Dai & B.K. Cui, **sp. nov.** (Figs. 362, 363)
MycoBank: MB 825669

Differs from other *Trametes* species by its black pileal surface, duplex context, big pores, small oblong-ellipsoid basidiospores, and skeletal and binding hyphae swollen in KOH.

Type. — **CHINA**. **Hainan**, Lingshui County, Diaoluoshan Nature Reserve, on living angiosperm tree, 20 November 2007, *Dai 9343* (holotype in BJFC, isotype in IFP).

Etymology. — *Duplexa* (Lat.): referring to its duplex context.

Fruiting body. — Basidiocarps annual, pileate, without odor or taste when fresh, single, corky and distinctly light in weight when dry. Pilei semicircular to flabelliform, projecting up to 4 cm, 7.5 cm wide and 12 mm thick at base. Pileal surface dark brown to black, glabrous, concentrically zonate and sulcate; margin sharp, yellowish-brown to dark brown. Pore surface cream to pale yellow, slightly shining; pores round, 2–3 per mm; dissepiments thin to slightly thick, entire. Sterile margin pale yellow to pale yellowish-brown, up to 1 mm. Context duplex, the upper layer near pileal surface dark brown to black, corky, up to 1 mm thick; the lower layer white, corky, up to 4 mm thick. Tubes cream to white, corky, up to 7 mm long.

Fig. 362 Basidiocarps of *Trametes duplexa*

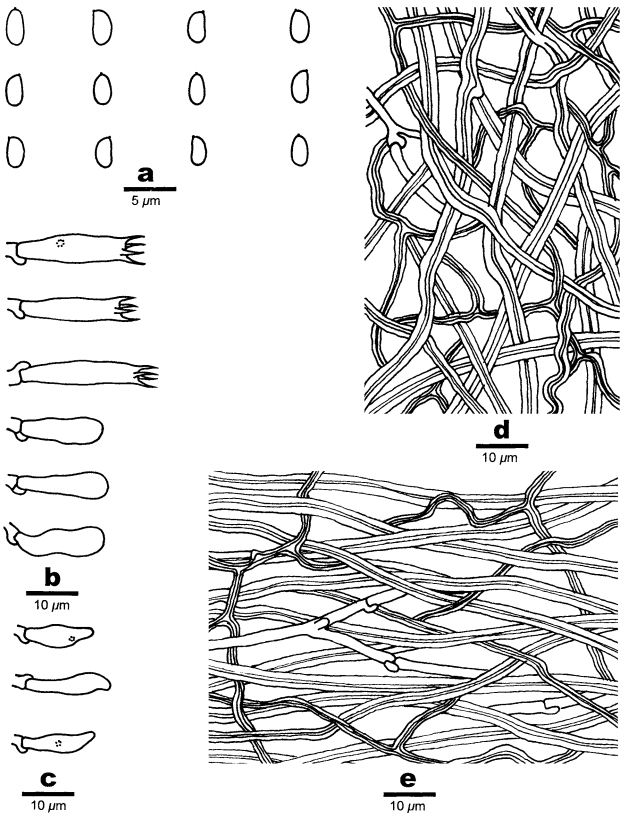

Fig. 363 Microscopic structures of *Trametes duplexa* (drawn from *Dai 9343*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **e**. Hyphae from context. Bars: **a** = 5 μm; **b–e** = 10 μm

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae dominant, IKI–, CB–, swollen in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2–2.8 μm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, usually collapsed when dry, occasionally branched, 2.8–4 μm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 1.2–2.3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.8–2.4 μm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, occasionally branched, interwoven, 3–4 μm in diam; binding hyphae hyaline, thick-walled to almost solid, frequently branched, interwoven, 1–2 μm in diam. Cystidia absent; cystidioles present, fusoid, hyaline, thin-walled, 13–16 × 3.5–5 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 15–24 × 4–6 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores oblong-ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, 3–3.8(–3.9) × 1.8–2(–2.1) µm, L = 3.4 µm, W = 1.95 µm, Q = 1.74 (n = 32/1).

Notes. — *Trametes duplexa* is characterized by its black pileal surface, duplex context, big pores, small oblong-ellipsoid basidiospores, skeletal and binding hyphae swollen in KOH, and presence of fusoid cystidioles.

Additional specimen (paratype) examined: **CHINA. Hainan**, Changjiang County, Bawangling Nature Reserve, on fallen trunk of *Alseodaphne*, 25 November 2010, *Dai 12039* (BJFC).

Trametes ectypa (Berk. & M.A. Curtis) Gilb. & Ryvarden, *North American Polypores* 2: 740 (1987) (Figs. 364, 365)
MycoBank: MB 132932
Basionym: *Polyporus ectypus* Berk. & M.A. Curtis, *Grevillea* 1(no. 4): 52 (1872).

Fruiting body. — Basidiocarps annual, pileate, usually with a short lateral stipe, single, without odor or taste when fresh, corky and light in weight when dry. Pilei semicircular to flabelliform, projecting up to 1 cm, 1 cm wide and 1.5 mm thick at base. Pileal surface cream, pale yellowish to pale yellowish-brown, glabrous, slightly concentrically zonate and sulcate, and radially winkled; margin thin and sharp. Pore surface cream to pale yellowish; pores angular, 5–6 per mm; dissepiments thin, entire. Context white to cream, soft corky, up to 0.5 mm thick. Tubes concolorous with pore surface, soft corky, up to 1 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.8–4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, occasionally branched, fairly straight, 3.2–5.5 µm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 1.8–4.5 µm in diam.

Fig. 364 Basidiocarps of *Trametes ectypa*

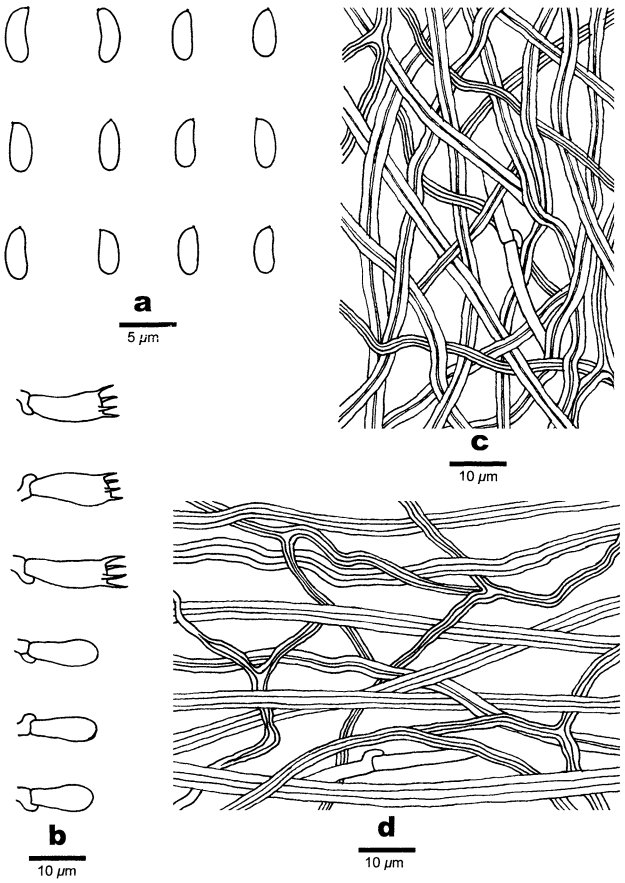

Fig. 365 Microscopic structures of *Trametes ectypa* (drawn from *Cui 2580*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 µm; **b–d** = 10 µm

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.5–3.4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, occasionally branched, fairly straight, subparallel along the tubes, 2.7–5.3 µm in diam; binding hyphae hyaline, thick-walled to almost solid, moderately branched, flexuous, 1.6–3 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 9–15 × 4–5.5 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores mostly cylindrical, sometimes slightly curved to more or less allantoid, hyaline, thin-walled, smooth, IKI–, CB–, 3.8–4.8(–6) × 1.8–2.2 µm, L = 4.2 µm, W = 2 µm, Q = 2.1 (n = 30/1).

Notes. — *Trametes ectypa* is characterized by its short lateral stipe, cream, pale yellowish to pale yellowish-brown, glabrous pileal surface, small pores and basidiospores.

Specimens examined: **CHINA**. **Zhejiang**, Lin'an County, Tianmushan Nature Reserve, on fallen angiosperm branch, 9 October 2005, *Cui 2580* (BJFC).

Trametes elegans (Spreng.) Fr., *Epicr. syst. mycol.* (Upsaliae): 492 (1838) (Figs. 366, 367)
MycoBank: MB 178276
Basionym: *Daedalea elegans* Spreng., *K. svenska Vetensk-Akad. Handl., ser. 3* 41: 51 (1820).
≡ *Lenzites elegans* (Spreng.) Pat., *Essai Tax. Hyménomyc.* (Lons-le-Saunier): 89 (1900).

Fruiting body. — Basidiocarps annual, pileate, usually single, rarely imbricate, coriaceous, without odor or taste when fresh, corky and light in weight when dry. Pilei semicircular to flabelliform, projecting up to 6 cm, 10 cm wide and 15 mm thick at base. Pileal surface white to cream when juvenile, turning to pale gray with age, glabrous, slightly concentrically zonate and sulcate, sometimes with irregular warts near the base; margin sharp, entire. Pore surface cream when fresh, turning to cinnamon with age, and pale yellowish when dry; pores very variable, partly poroid, round to angular, 2–3 per mm, partly sinuous-daedaleoid and radially split, and partly lamellate with straight to sinuous lamellae; dissepiments thin to thick, entire. Sterile margin distinct to indistinct, up to 2 mm wide. Context white to cream, corky, up to 9 mm thick. Tubes cream, slightly paler than pore surface, corky, up to 6 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2.5–5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, occasionally branched, interwoven, 3–5.5 µm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 1.5–3.5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 1.8–4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, occasionally branched, interwoven, 2.5–5 µm in diam; binding hyphae hyaline, thick-walled to almost solid, frequently branched, flexuous, 1.5–3.3 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 18–23.5 × 4.2–6 µm; basidioles in shape similar to basidia, but slightly smaller.

Fig. 366 Basidiocarps of *Trametes elegans*

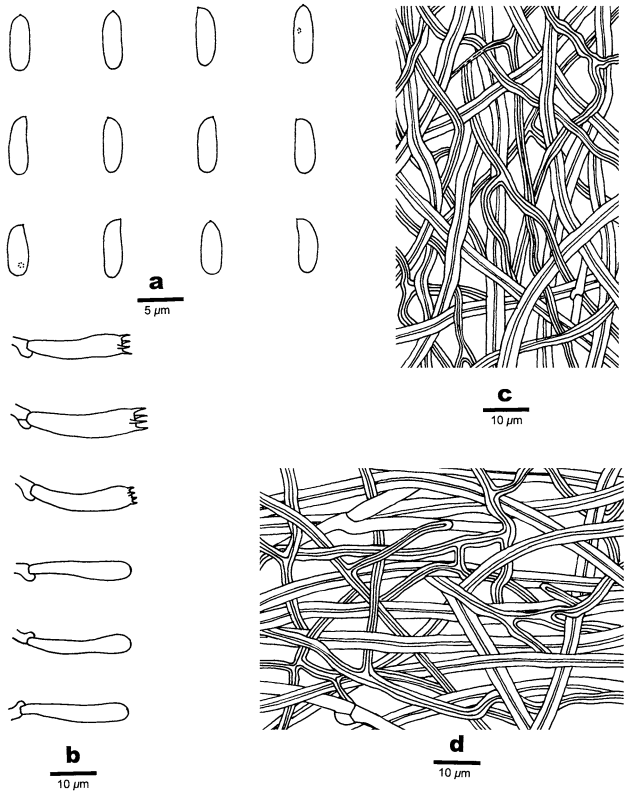

Fig. 367 Microscopic structures of *Trametes elegans* (drawn from *Dai 10748*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 µm; **b–d** = 10 µm

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (5–)5.8–7(–7.3) × (2.1–)2.3–3 µm, L = 6.32 µm, W = 2.77 µm, Q = 2.28–2.29 (n = 60/2).

Notes. — *Trametes elegans* is characterized by its white, cream to pale gray, glabrous pileal surface, variable pores which partly poroid, sinuous-daedaleoid and radially split, and partly lamellate.

Specimens examined: **CHINA**. **Fujian**, Wuyishan County, Longfenggu Forest Park, on fallen angiosperm trunk, 17 October 2005, *Cui 2970* (IFP). **Guangdong**, Liannan County, on fallen angiosperm trunk, 16 May 2009, *Dai 10974* (BJFC); Shixing County, Chebaling Nature Reserve, on fallen angiosperm trunk, 13 September 2009, *Cui 7398*, *7432* (BJFC); 24 June 2010, *Cui 8724* (BJFC). **Guangxi**, Longzhou County, Nonggang Nature Reserve, on fallen angiosperm trunk, 3 July 2007, *Zhou 107* (IFP); 5 July 2007, *Zhou 228* (IFP); Guilin, Maoershan Nature Reserve, on fallen angiosperm trunk, 20 August 2011,

Yuan 5686, *5724* (IFP). **Guizhou**, Jiangkou County, Fanjingshan Nature Reserve, on fallen angiosperm trunk, 22 August 2010, *Yuan 5544* (IFP). **Hainan**, Qiongzhong County, Limushan Nature Reserve, on fallen angiosperm trunk, 23 November 2010, *Dai 11998* (BJFC); Baoting County, Tropical Botanic Garden, on stump of *Hevea brasiliensis*, 27 May 2008, *Dai 9730* (IFP); Changjiang County, Bawangling Nature Reserve, on fallen trunk of *Elaeocarpus*, 9 May 2009, *Cui 6493* (BJFC); on fallen angiosperm trunk, 10 May 2009, *Cui 6540* (BJFC); Chengmai County, on fallen angiosperm trunk, 6 May 2009, *Cui 6217* (BJFC); Danzhou, on fallen angiosperm trunk, 7 May 2009, *Cui 6293* (BJFC); Ledong County, Jianfengling Nature Reserve, on fallen angiosperm trunk, 11 May 2009, D*ai 10855* (BJFC); Qionghai County, Jiuqujiang, on fallen angiosperm trunk, 15 May 2009, *Cui 6715* (BJFC); Qiongzhong County, on stump of *Hevea brasiliensis*, 6 May 2009, *Dai 10745*, *10748* (BJFC); Qiongzhong County, Limushan Nature Reserve, on fallen angiosperm trunk, 24 May 2008, *Dai 9546, 9555, 9558, 9569* (IFP); Wuzhishan County, Wuzhishan Nature Reserve, on fallen angiosperm trunk, 26 November 2007, *Cui 5472* (IFP). **Hunan**, Zhangjiajie, Zhangjiajie Forest Park, on fallen angiosperm trunk, 17 August 2010, *Dai 11678* (BJFC). **Jiangxi**, Fenyi County, Dagangshan Nature Reserve, on fallen branch of *Alnus*, 21 September 2009, *Cui 7716, 7718, 7730, 7738* (BJFC); on fallen angiosperm trunk, 22 September 2009, *Cui 7776* (BJFC); on fallen trunk of *Cyclobalanopsis*, 22 September 2009, *Cui 7783* (BJFC). **Taiwan**, Yilan County, Linmei Road, 20 November 2009, *Dai 11526* (BJFC). **Yunnan**, Mengla County, Wangtianshu Park, on fallen angiosperm trunk, 2 November 2009, *Cui 8499* (BJFC); Jinghong, Menglun, Lvshilin Park, on fallen angiosperm trunk, 4 August 2005, *Dai 6706, 6716, 6719* (IFP); Pingbian County, Daweishan Nature Reserve, on fallen angiosperm trunk, 4 June 2011, *Dai 12177* (BJFC); Tengchong County, Gaoligong Mountain, on fallen angiosperm trunk, 24 October 2009, *Cui 8043* (BJFC); Yinghuagu, on fallen angiosperm trunk, 28 October 2009, *Cui 8295* (BJFC).

Trametes ellipsoidea Hai J. Li, Y.C. Dai & B.K. Cui, **sp. nov.** (Figs. 368, 369)
MycoBank: MB 826672

Differs from other *Trametes* species by its effused-reflexed to pileate basidiocarps, velutinate pileal surface, big pores, small ellipsoid basidiospores, and discovered from tropical China.

Type. — **CHINA**. **Yunnan**, Xishuangbanna, Jinghong, on fallen angiosperm trunk, 11 September 2007, *Yuan 3453* (holotype in BJFC, isotype in IFP).

Etymology. — *Ellipsoidea* (Lat.): referring to its ellipsoid basidiospores.

Fig. 368 Basidiocarps of *Trametes ellipsoidea*

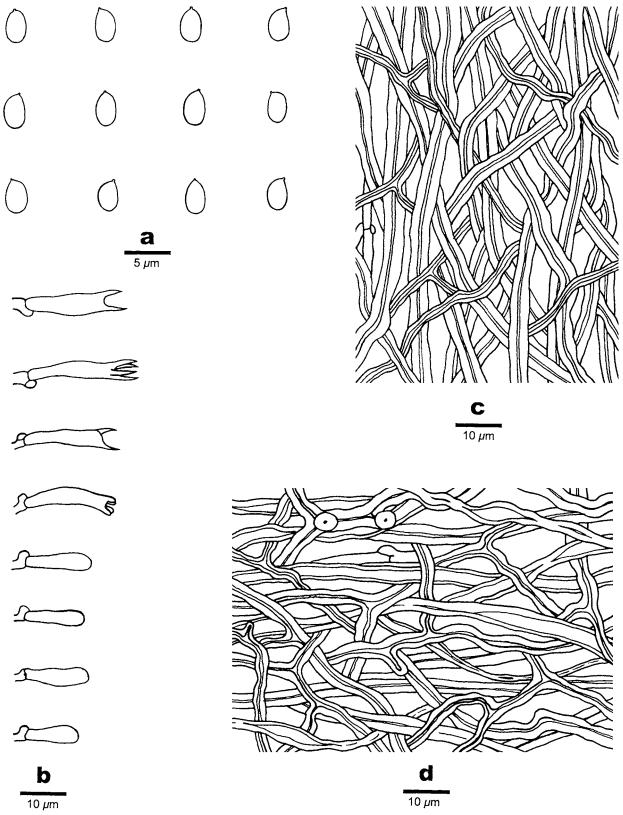

Fig. 369 Microscopic structures of *Trametes ellipsoidea* (drawn from *Yuan 3453*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 μm; **b–d** = 10 μm

Fruiting body. — Basidiocarps annual, effused-reflexed to pileate, without odor or taste when fresh, usually imbricate, soft corky and distinctly light in weight when dry. Pilei semicircular to circular, projecting up to 2.5 cm, 3.5 cm wide and 2.2 mm thick at base. Pileal surface cream, pale yellowish-brown to pale gray, velutinate, slightly concentrically zonate and sulcate; margin sharp.

Pore surface cream to pale yellow; pores round to angular, 1.5–2 per mm; dissepiments thin, entire to slightly lacerate. Sterile margin indistinct. Context white, corky, up to 1 mm thick. Tubes cream to white, corky, up to 1.2 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae dominant, IKI–, CB–, swollen in KOH.

Context. — Generative hyphae infrequent, hyaline, thin- to slightly thick-walled, occasionally branched, 2–2.8 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, usually collapsed when dry, occasionally branched, more or less regualrly arranged, 2.8–4.7 µm in diam; binding hyphae infrequent, hyaline, thick-walled to subsolid, frequently branched, interwoven, 2–3.2 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 1.5–2.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, occasionally branched, interwoven, 2.2–3.8 µm in diam; binding hyphae hyaline, thick-walled to almost solid, frequently branched, interwoven, 1.4–2.5 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 12–17 × 3.5–5 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, 3–4(–5) × 2–2.9(–3) µm, L = 3.68 µm, W = 2.5 µm, Q = 1.74–1.51 (n = 94/3).

Notes. — *Trametes ellipsoidea* is characterized by its effused-reflexed to pileate basidiocarps, velutinate pileal surface, big pores, small ellipsoid basidiospores, and discovered from tropical China. *Trametes ellipsospora* Ryvarden also has similar ellipsoid basidiospores (3.2–4.6 × 2.6–3.2 µm), but it differs from *T. ellipsoidea* by having smaller pores (4–6 per mm), and presence of both cystidia and cystidioles.

Additional specimens (paratypes) examined: **CHINA. Hainan**, Lingshui County, Diaoluoshan Nature Reserve, on fallen angiosperm trunk, 24 November 2002, *Dai 4522* (IFP). **Yunnan**, Xishuangbanna, Jinghong, on fallen angiosperm trunk, 11 September 2007, *Yuan 3451* (IFP).

Trametes ellipsospora Ryvarden, *Mycotaxon* 28(2): 539 (1987) (Figs. 370, 371)
MycoBank: MB 131491

Fruiting body. — Basidiocarps annual, pileate to effused-reflexed, usually imbricate, without odor or taste when fresh, soft coriaceous and light in weight when dry. Pilei semicircular to circular with an umbilicate base, projecting up to 2.5 cm, 3 cm wide and 2 mm thick at base. Pileal surface cream, clay-buff to pale gray when dry, velutinate, slightly concentrically zonate and sulcate, irregular warts or protuberances occasionally present near the base; margin thin and sharp. Pore surface cream to straw-colored, glancing; pores round to angular, 4–6 per mm; dissepiments thin, entire. Context cream, coriaceous, up to 1.3 mm thick. Tubes cream to pale straw-colored, coriaceous, up to 0.7 mm long.

Fig. 370 A basidiocarp of *Trametes ellipsospora*

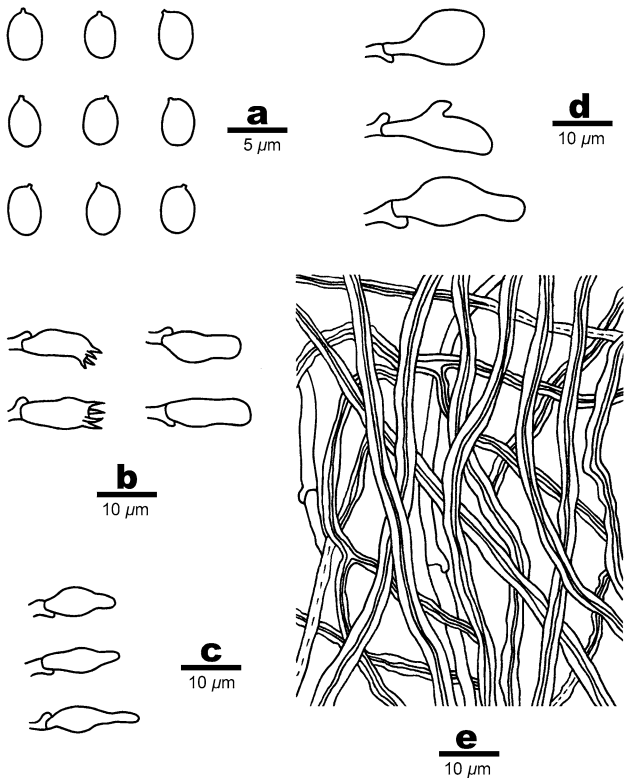

Fig. 371 Microscopic structures of *Trametes ellipsospora* (drawn from *Cui 8343*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Cystidia; **e**. Hyphae from trama. Bars: **a** = 5 µm; **b–e** = 10 µm

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3 µm in diam; skeletal

hyphae dominant, hyaline, thick-walled to subsolid, occasionally branched, sometimes collapsed, interwoven, 2.8–5 µm in diam; binding hyphae hyaline, thick-walled to subsolid, frequentlybranched, interwoven, 1.5–3.2 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.5–3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, occasionally branched, interwoven, 2–3.5 µm in diam; binding hyphae hyaline, thick-walled to almost solid, frequently branched, flexuous, 1.6–3.2 µm in diam. Cystidia occasionally present, pear-shaped, clavate to fusoid, hyaline, thin-walled, 11–25 × 7–10.5 µm; fusoid cystidioles occasionally present in the hymenium, hyaline, thin-walled, 13–19 × 3–4.5 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 9–17 × 3.7–5 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, (3–)3.2–4.6(–5.1) × (2.1–)2.6–3.2(–3.5) µm, L = 3.86 µm, W = 2.98 µm, Q = 1.29–1.31 (n = 90/3).

Notes. — *Trametes ellipsospora* is characterized by its small ellipsoid basidiospores. Our collections fit all the characters except its upper surface, which was originally described as glabrous (Ryvarden 1987). However, we examined one specimen collected by Ryvarden, it is in fact velutinate. One specimen collected from Yunnan Province, Southwest China seems to be very special, because different kinds of cystidia are present at dissepiment edges, although cystidia are usually absent in *Trametes*. *Trametes ellipsospora* resembles *T. marianna* (Pers.) Ryvarden. However, the latter species has cylindrical basidiospores (6–7 × 2–2.5 µm; Ryvarden and Johansen 1980); *T. pavonia* (Hook.) Ryvarden is similar to *T. ellipsospora* by its velutinate pilei, small pores (5–6 per mm), but it has bigger basidiospores (5–6 × 3–4 µm; Gilbertson and Ryvarden 1987).

Specimens examined: **CHINA**. **Yunnan**, Mengla County, Xishuangbanna Botanic Garden, on fallen angiosperm trunk, 31 October 2009, *Cui 8343* (BJFC); Jinghong, Menglun, Lvshilin Park, on fallen angiosperm trunk, 4 August 2005, *Dai 6714* (IFP). **Hainan**, Chengmai County, on fallen angiosperm trunk, 6 May 2009, *Cui 6259* (BJFC); Wanning County, Tianmao, on fallen angiosperm trunk, 14 May 2009, *Cui 6665* (BJFC).

Trametes gibbosa (Pers.) Fr., *Epicr. syst. mycol.* (Upsaliae): 492 (1838) (Figs. 372, 373)
MycoBank: MB 151431
Basionym: *Merulius gibbosus* Pers., *Ann. Bot. (Usteri)* 15: 21 (1795).

Fruiting body. — Basidiocarps annual, pileate, single or imbricate, with pleasant odor and coriaceous when fresh, corky and light in weight when dry. Pilei semicircular to flabelliform, flat, projecting up to 10 cm, 15 cm wide and 20 mm thick at base. Pileal surface cream when juvenile, turning to cream to pale yellowish-brown with age, velutinate and glabrous, concentrically zonate or azonate; margin sharp, pale yellowish-brown, entire. Pore surface cream when fresh, turning to pale yellowish with age, and pale cream yellowish to straw-colored when dry, slightly shining. Sterile margin indistinct. Pores distinctly radially elongated, angular partly sinuous, labyrinthine to lamellate,

Fig. 372 Basidiocarps of *Trametes gibbosa*

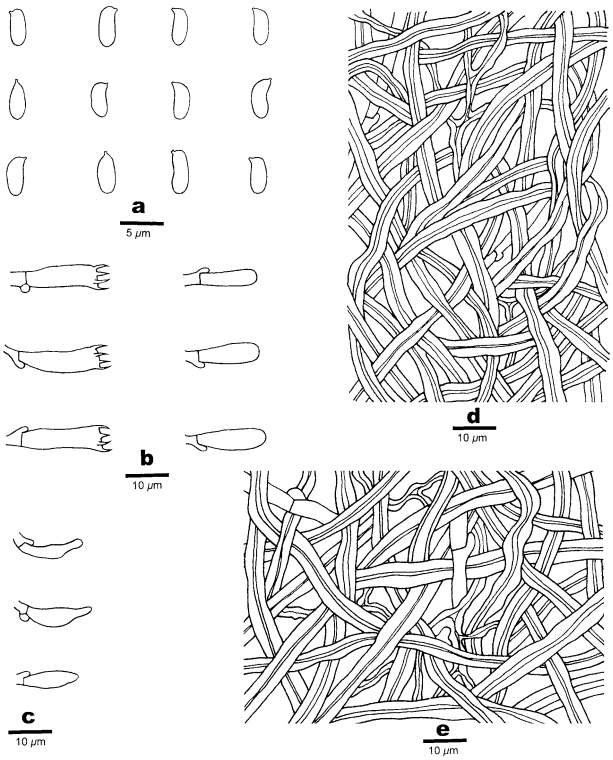

Fig. 373 Microscopic structures of *Trametes gibbosa* (drawn from *Cui 2524*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **e**. Hyphae from context. Bars: **a** = 5 µm; **b–e** = 10 µm

about 1–2 per mm, 1–6 mm long measured radially; dissepiments thick, entire to slightly lacerate. Context white to cream, coriaceous when fresh and corky when dry, up to 10 mm thick. Tubes cream to pale yellowish, slightly paler than the pore surface, corky, coriaceous when fresh and corky when dry, up to 10 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2.5–4 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, occasionally branched, interwoven, 3–6 μm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 1.5–3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, occasionally branched, strongly interwoven, 2.5–4 μm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 1.5–2.8 μm in diam. Cystidia absent; fusoid cystidioles present in the hymenium, hyaline, thin-walled, 13–15 × 3–5 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 15.5–18 × 4.5–6 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, 3.1–4.9 × 1.9–2.5 μm, L = 4.05 μm, W = 2.08 μm, Q = 2.05–2.1 (n = 60/2).

Notes. — *Trametes gibbosa* is characterized by its flat pilei, cream to pale yellowish-brown, velutinate to glabrous, and concentrically zonate pileal surface, distinctly radially elongated pores. It is a widespread species all over the world.

Specimens examined: **CHINA**. **Chongqing**, Beibei, Jinyunshan Forest Park, on fallen angiosperm trunk, 7 November 2006, *Yuan 3051* (IFP). **Fujian**, Wuyishan County, Wuyishan Nature Reserve, Taoyuanyu, on fallen angiosperm trunk, 22 October 2005, *Dai 7435* (IFP). **Guangdong**, Fengkai County, Heishiding Nature Reserve, on fallen angiosperm trunk, 1 July 2010, *Cui 9026* (BJFC); Shixing County, Chebaling Nature Reserve, on fallen angiosperm trunk, 12 September 2009, *Cui 7390, 7451* (BJFC); Ruyang County, Daqiao, on fallen angiosperm trunk, 18 September 2009, *Cui 7685* (BJFC). **Hainan**, Baoting County, on fallen angiosperm trunk, 25 September 2002, *Dai 4588* (IFP). **Henan**, Neixiang County, Baotianman Nature Reserve, on fallen trunk of *Quercus*, 22 September 2009, *Dai 11307* (BJFC). **Heilongjiang**, Ning'an County, Jingbohu Park, on fallen trunk of *Tilia*, 10 September 2007, *Dai 8923* (IFP). **Hubei**, Fang County, Shennongjia Nature Reserve, on fallen angiosperm trunk, 7 September 2005, *Li 771* (IFP); Muyu, on fallen trunk of *Celtis sinensis*, 25 September 2004, *Dai 5955* (IFP). **Hunan**, Yizhang County, Mangshan Nature Reserve, on fallen angiosperm trunk, 27 June 2007, *Li 1804* (IFP). **Jilin**, Antu County, Changbaishan Nature Reserve, Huangsongpu, on fallen trunk of *Betula*, 19 September 2002, *Dai 3811* (IFP); on fallen trunk of *Tilia*, 12 August 2007, *Dai 9026* (IFP); on fallen angiosperm trunk, 8. VIII. 2011, *Cui 9970, 9984* (BJFC); Changchun, Jingyuetan Forest Park, on fallen trunk of *Pinus*, 5 August 2011, *Cui 9920* (BJFC). **Jiangsu**, Nanjing, Zijin Mountain, on fallen trunk of *Liquidambar formosana*, 11 October 2003, *Dai 5256* (IFP). **Jiangxi**, Fenyi County, Dagang Mountain, on fallen trunk of *Liquidambar formosana*, 17 September 2008, *Dai 10371* (BJFC); Jinggangshan County, Jinggangshan Nature Reserve, on fallen trunk of *Acer*, 22 September 2008, *Dai 10558* (BJFC); on fallen angiosperm trunk, 22 September2008, *Dai 10565* (BJFC); on fallen trunk of *Alnus*, 21 September 2009, *Cui 7713, 7736, 7742, 7743* (BJFC). **Liaoning**, Kuandian County, Tianhua Mountain, on fallen trunk of *Betula*, 29 July 2008, *Cui 5600* (BJFC); Huanren County, Laotudingzi Nature Reserve, on fallen trunk of *Quercus*, 31 July 2008, *Cui 5710* (BJFC). **Shannxi**, Zhouzhi County, Taibai Mountain, Houzhenzi, on fallen angiosperm trunk, 25 October 2006, *Yuan 2715, 2739* (IFP). **Shanxi**, Jiaocheng County, Pangquangou Nature Reserve, on fallen trunk of *Populus*, 12 October 2004, *Yuan 842* (IFP). **Sichuan**, Mianning County, Lingshansi Park, on fallen trunk of *Betula*, 18 September 2012, *Dai 12968* (BJFC); Mianyang, Longmen, on fallen trunk of *Camptotheca*, 11 November 2009, *Cui 8656* (BJFC); Jiangyou County, Jiuling, on fallen trunk of *Camptotheca*, 11 November 2009, *Cui 8658* (BJFC). **Xizang (Tibet)**, Bomi County, on fallen trunk of *Populus*, 19 September 2010, *Cui 9485* (BJFC). **Xinjiang**, Gongliu County, Kuerdening Nature Reserve, on fallen trunk of *Populus*, 20 August 2004, *Wei 1533* (IFP). **Yunnan**, Lianping County, Tongdian, Luogujing, on fallen trunk of *Betula*, 19 September 2011, *Cui 10356, 10387, 10388* (BJFC); Lijiang, Baishui River, on fallen trunk of *Populus*, 31 August 2010, *Dai 11769* (BJFC); Tengchong County, Gaoligong Mountain, on fallen angiosperm trunk, 23 October 2009, *Cui 7979, 7983, 8001* (BJFC). **Zhejiang**, Hangzhou, Jiuxi Forest Park, on fallen angiosperm trunk, 17 October 2010, *Dai 11817* (BJFC); Lin'an County, Tianmushan Nature Reserve, on fallen angiosperm trunk, 8 October 2005, *Cui 2516* (IFP); on fallen trunk of *Liquidambar*, 8 October 2005, *Cui 2524* (IFP).

Trametes hirsuta (Wulfen) Lloyd, *Mycol. Writ.* 7 (Letter 73): 1319 (1924) (Figs. 374, 375)

MycoBank: MB 531523

Basionym: *Boletus hirsutus* Wulfen, *Collnea bot.* 2: 149 (1791).

Fruiting body. — Basidiocarps annual, rarely biennial, pileate to effused-reflexed, single to imbricate, coriaceous and without odor or taste when fresh, corky and light in weight when dry. Pilei semicircular, flabelliform to almost circular, projecting up to 4 cm, 10 cm wide and 8 mm thick at base. Pileal surface cream when fresh, cream, pale yellowish-brown, gray to gray-brown after drying, hirsute to tomentose, concentrically zonate or azonate and sulcate; margin thin and sharp. Pore surface cream to grayish when fresh, cream buff to pale grayish brown; pores round to angular, 3–5 per mm; dissepiments thin to thick, entire to lacerate. Sterile margin distinct or indistinct, up to 1 mm. Context white to cream, coriaceous when fresh, corky when dry, up to 5 mm thick. Tubes cream to pale cream yellow, coriaceous when fresh, corky when dry, up to 3 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2.5–4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, occasionally branched, interwoven, 2.4–5 µm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 1.5–2.5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3.3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid occasionally branched, strongly interwoven, 2–3.5 µm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 1.5–2.3 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 13–20 × 4–6 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (5–)5.3–8(–10.8) × (2.1–)2.5–3.2(–4) µm, L = 6.65 µm, W = 2.95 µm, Q = 2.06–2.92 (n = 390/13).

Fig. 374 Basidiocarps of *Trametes hirsuta*

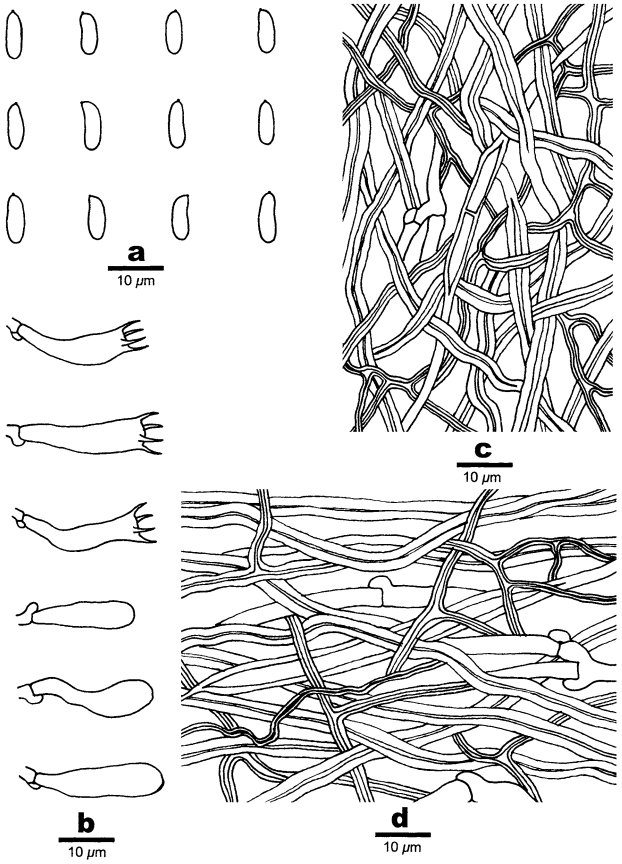

Fig. 375 Microscopic structures of *Trametes hirsuta* (drawn from *Dai 9586*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a–d** = 10 µm

Notes. — *Trametes hirsuta* is characterized by its cream, pale yellowish-brown, gray to grayish brown, hirsute to tomentose pileal surface and cream to grayish brown pore surface.

Specimens examined: **CHINA**. **Anhui**, Huangshan, Yellow Mountain, on fallen trunk of *Prunus*, 10 October 2004, *Dai 6034* (IFP); 22 October 2010, *Dai 11922* (BJFC). **Beijing**, Fangshan, Shidu, Donghugang, on fallen angiosperm trunk, 11 June 2009, *Cui 6147* (BJFC); Haidian, campus of Beijing Forest University, on fallen angiosperm branch, 3 September 2008, *Cui 5895* (BJFC); Beijing Botanical Garden, on fallen trunk of *Prunus*, *Cui 5547, 5548, 5549, 5550* (BJFC). **Fujian**, Wuyishan County, Wuyishan Nature Reserve, Taoyuanyu, on fallen angiosperm trunk, 22 October 2005, *Dai 7432* (IFP); Xiamen, Nanputuo, on fallen angiosperm trunk, 24 August 2006, *Cui 4068, 4072* (BJFC). **Gansu**, Lingtai County, Xinji, on fallen angiosperm trunk, 10 August 2009, *Cui 7324* (BJFC). **Guangdong**, Ruyuan County, Nanling Nature Reserve, on fallen trunk of *Castanopsis*, 14 May 2009,

Dai 10883, 10889 (BJFC); Shixing County, Chebaling Nature Reserve, on fallen angiosperm trunk, 12 September 2009, *Cui 7380* (BJFC). **Guangxi**, Wuming County, Damingshan Nature Reserve, on fallen angiosperm trunk, 10 July 2007, *Zhou 464* (IFP); Tianlin County, Cenwanglaoshan Nature Reserve, Longping, on fallen angiosperm trunk, 17 July 2012, *Yuan 6082, 6116* (IFP). **Hainan**, Changjiang County, Bawangling Nature Reserve, on fallen trunk of *Mangifera indica*, 9 May 2009, *Cui 6508* (BJFC); Chengmai County, on fallen angiosperm trunk, 6 May 2009, *Cui 6238, 6239, 6241* (BJFC); Danzhou, on fallen angiosperm trunk, 7 May 2009, *Cui 6292, 6296* (BJFC); Qiongzhong County, Limushan Forest Park, on fallen angiosperm trunk, 24 May 2008, *Dai 9586* (BJFC); Wanning County, Jianling, on fallen angiosperm trunk, 14 May 2009, *Cui 6681* (BJFC); Tianmao, on fallen angiosperm trunk, 14 May 2009, *Cui 6658* (BJFC); Wuzhishan County, Wuzhishan Nature Reserve, on fallen angiosperm trunk, 24 November 2007, *Cui 5379* (BJFC). **Hebei**, Laishui County, Beixinzhuang, on fallen trunk of *Ulmus*, 22 August 2008, *Cui 5879* (BJFC); Xinglong County, Wulingshan Nature Reserve, on fallen branch of *Populus*, 29 July 2009, *Cui 6852* (BJFC). **Henan**, Neixiang County, Baotianman Nature Reserve, on fallen angiosperm branch, 28 August 2005, *Li 312, 325* (IFP); Xinyang, Jigongshan Nature Reserve, on fallen angiosperm branch, 23 August 2005, *Li 123* (IFP). **Heilongjiang**, Tangyuan County, Daliangzihe Forest Park, on fallen angiosperm trunk, 27 August 2008, *Yuan 4976, 4989* (IFP). **Hubei**, Shiyan, Wudang Mountain, on fallen angiosperm branch, 2 September 2005, *Li 472* (IFP). **Hunan**, Changsha, Yuelu Mountain, on fallen angiosperm branch, 25 September 2009, *Cui 7943* (BJFC); Yizhang County, Mangshan Nature Reserve, on fallen angiosperm branch, 17 September 2009, *Cui 7650, 7652, 7662* (BJFC). **Jilin**, Antu County, Changbaishan Nature Reserve, on fallen trunk of *Tilia*, 12 September 2007, *Dai 9026* (IFP); Tumen, Xiaohelong Forest Farm, on fallen trunk of *Alnus*, 10 October 2009, *Dai 11432* (BJFC). **Jiangxi**, Fenyi County, Dagang Mountain, on fallen trunk of *Tilia*, 22 September 2009, *Cui 7784* (BJFC); on fallen trunk of *Alnus*, 18 September 2008, *Dai 10494* (BJFC); Yingtan, Longhu Mountain, on fallen angiosperm branch, 5 October 2008, *Cui 5953* (BJFC); Yushan County, Sanqing Mountain, on fallen angiosperm branch, 2 October 2008, *Cui 5904* (BJFC). **Liaoning**, Shenyang, Beiling Park, on fallen trunk of *Cladoptosis*, 21 September 2003, *Wei 1150* (IFP); Huanren County, Laotudingzi Nature Reserve, on fallen angiosperm trunk, 30 July 2008, *Cui 5652, 5663* (BJFC); on fallen trunk of *Prunus*, *Cui 5656* (BJFC). **Inner Mongolia**, Hohhot, Qingcheng Park, on fallen trunk of *Prunus*, 2 April 2009, *Cui 6154* (BJFC). **Shandong**, Linyi, Linyi Botanical Garden, on fallen angiosperm branch, 17 July 2009, *Cui 6774* (BJFC); Mengyin County, on living tree of *Prunus persica*, 27 July 2007, *Cui 5018* (BJFC); Mengshan Forest Park, on fallen branch of *Pinus*, 6 August 2007, *Cui 5106, 5108* (BJFC); Tai'an, Taishan Mountain, on fallen branch of *Populus*, 26 September 2005, *Cui 2489, 2506* (IFP). **Shanghai**, Shanghai Botanical Garden, on fallen angiosperm trunk, 9 October 2004, *Dai 6006* (IFP). **Shannxi**, Foping County, Foping Nature Reserve, on fallen angiosperm trunk, 27 October 2006, *Yuan 2805* (IFP). **Shanxi**, Qinshui County, Lishan Nature Reserve, on fallen angiosperm trunk, 19 September 2006, *Yuan 2425* (IFP). **Sichuan**, Dayi County, Anren, on fallen branch of *Prunus*, 29 November 2010, *Dai 12136* (BJFC); Luding County, Hailuogou Forest Park, on fallen angiosperm branch, 20 October 2012, *Cui 10805* (BJFC); Xiaojin County, Siguniangshan Nature Reserve, on fallen angiosperm branch, 16 October 2012, *Cui 10707* (BJFC). **Taiwan**, Taizhong, on fallen angiosperm branch, 15 November 2009, *Dai 11507* (BJFC); Yilin County, Linmei, on fallen angiosperm branch, 20 November 2009, *Dai 11535* (BJFC). **Tianjin**, Ji County, Panshan Forest Park, on fallen branch of *Quercus*, 1 August 2009, *Cui 6994, 7001, 7023* (BJFC). **Xizang (Tibet)**, Linzhi County, Bayi, on fallen branch of *Salix*, 15 September 2010, *Cui 9232* (BJFC); Lulang, on fallen angiosperm branch, 16 September 2010, *Cui 9260, 9284, 9305, 9306, 9310* (BJFC). **Xinjiang**, Gongliu County, Kuerdening Nature Reserve, on fallen branch of *Populus*, 20 August 2004, *Wei 1537* (IFP). **Yunnan**, Tengchong County, Gaoligong Mountain, on fallen angiosperm branch, 24 October 2009, *Cui 8013* (BJFC). **Zhejiang**, Hangzhou, Jiuxi Forest Park, on fallen angiosperm trunk, 17 October 2010, *Dai 11810, 11820* (BJFC); Lin'an County, Tianmushan Nature Reserve, on fallen trunk of *Liquidambar formosana*, 8 October 2005, *Cui 2524* (IFP); on fallen angiosperm trunk, 14 October 2004, *Dai 6216* (IFP).

Trametes lactinea (Berk.) Sacc., *Syll. fung. (Abellini)* 6: 343 (1888) (Figs. 376, 377)

MycoBank: MB 190274

Basionym: *Polyporus lactineus* Berk., *Ann. Mag. nat. Hist.*, Ser. 1 10: 373 (1843).

≡ *Leiotrametes lactinea* (Berk.) Welti & Courtec., *Fungal Diversity* 55(1): 60 (2012).

Fruiting body. — Basidiocarps annual, pileate, solitary, without odor or taste when fresh, hard corky to corky and distinctly light in weight when dry. Pilei semicircular to shell-shaped, projecting up to 5.3 cm, 8 cm wide and 37 mm thick at base. Pileal surface cream when fresh, gray to yellowish-brown after drying, glabrous, azonate, irregular warts usually present near the base; margin dull, thick and entire. Pore surface cream to pale yellowish-brown, glancing; pores round to angular, 1.5–2 per mm; dissepiments thin, entire. Context cream, soft corky, with distinct

Fig. 376 Basidiocarps of *Trametes lactinea*

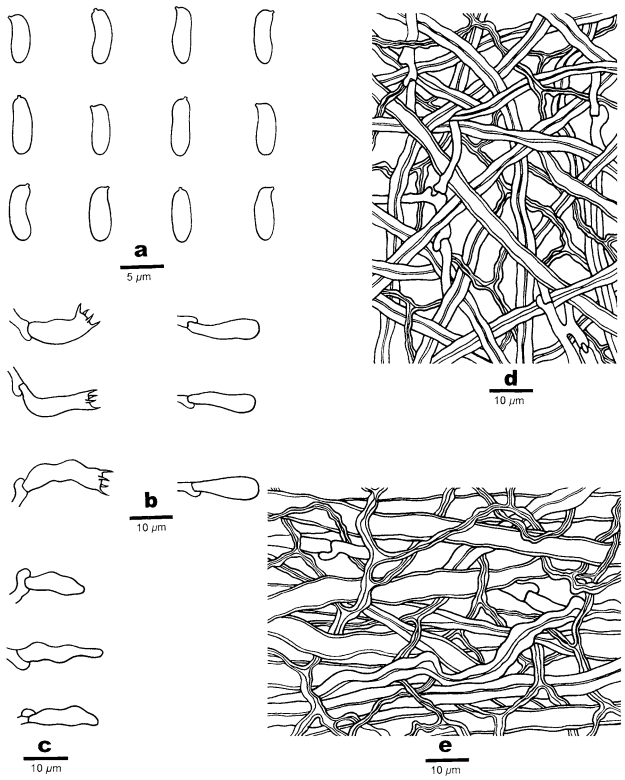

Fig. 377 Microscopic structures of *Trametes lactinea* (drawn from *Cui 7084*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **e**. Hyphae from context. Bars: **a** = 5 μm; **b–e** = 10 μm

to indistinct concentric zones, up to 32 mm thick. Tubes white to cream, soft corky, up to 5 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2.5–5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen to subsolid occasionally branched, sometimes collapsed when dry, interwoven, 3.8–7 μm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 1.2–2.3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2.3–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen to subsolid, interwoven, 2.5–5.5 μm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 1–1.7 μm in diam. Cystidia absent; fusoid cystidioles present in the hymenium, hyaline, thin-walled, 13.5–16.8 × 4.3–5 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 14.3–17.6 × 4–5.6 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (5–)5.2–6.7(–7) × (2–)2.1–2.8(–3) μm, L = 6.04 μm, W = 2.32 μm, Q = 2.6 (n = 30/1).

Notes. — *Trametes lactinea* is characterized by its cream, grayish to yellowish-brown, glabrous, azonate pileal surface and big pores.

Specimen examined: **CHINA**. **Jilin**, Hunchun, Hadamen, on fallen trunk of *Quercus*, 7 August 2009, *Cui 7084* (BJFC).

Trametes ljubarskyi Pilát, *Bull. trimest. Soc. mycol. Fr.* 52(3): 309 (1937) (Figs. 378, 379)
MycoBank: MB 493468

Fruiting body. — Basidiocarps annual, pileate, solitary or imbricate, without odor or taste when fresh, corky and distinctly light in weight when dry. Pilei semicircular to flabelliform, projecting up to 5 cm, 3 cm wide and 5 mm thick at base. Pileal surface cream, turning to buff, pale yellowish-brown to ochraceous with age, slightly velutinate, slightly concentrically zonate and sulcate; margin cream to ochraceous, entire. Pore surface cream to pale yellowish-brown; pores angular, 3–5 per mm; dissepiments thin, entire. Context white, cream to pale gray, corky, up to 2 mm thick. Tubes concolorous with pore surface, corky, up to 3 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–, swollen in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2–3.5 μm in diam; skeletal hyphae dominant, hyaline, usually thick-walled with a narrow lumen to subsolid, occasionally branched, often collapsed when dry, interwoven, 2.5–5 μm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 1.5–3.3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 1.8–2.7 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a

Fig. 378 Basidiocarps of *Trametes ljubarskyi*

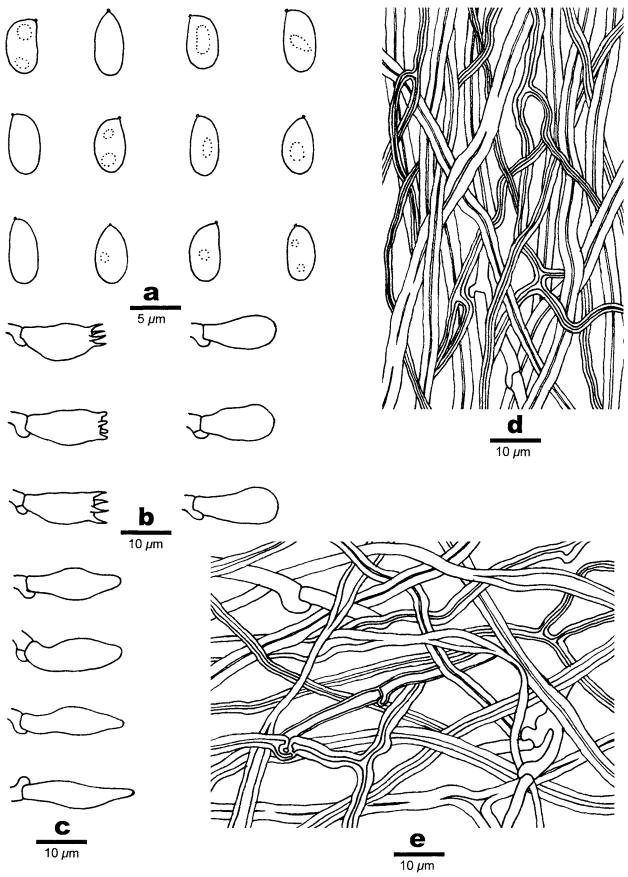

Fig. 379 Microscopic structures of *Trametes ljubarskyi* (drawn from *Wei 1653*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **e**. Hyphae from context. Bars: **a** = 5 μm; **b–e** = 10 μm

narrow lumen to subsolid, occasionally branched, interwoven, 2.5–4 μm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 1.5–2.5 μm. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 13–22 × 4–6 μm. Basidia barrel-shaped, with four sterigmata and a basal clamp connection, 16–25 × 6–8 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, hyaline, thin-walled, smooth, sometimes with one to two guttules, IKI–, CB–, (4.5–)5.5–7.2(–8) × (2.9–)3–4(–4.2) μm, L = 5.84 μm, W = 3.45 μm, Q = 1.5–1.89 (n = 87/2).

Notes. — *Trametes ljubarskyi* is characterized by its cream, buff, pale yellowish-brown to ochraceous, slightly velutinate basidiocarps and ellipsoid basidiospores.

Specimens examined: **CHINA**. **Henan**, Neixiang County, Baotianman Nature Reserve, on fallen angiosperm branch, 28 August 2005, *Li 286* (IFP). **Xinjiang**, Xinyuan County, Nalati, on fallen angiosperm trunk, 2 August 2004, *Wei 1653* (IFP).

Trametes manilaensis (Lloyd) Teng, *Chung-kuo Ti Chen-chun, [Fungi of China]*: 763 (1963) (Figs. 380, 381)
MycoBank: MB 340200
Basionym: *Polyporus manilaensis* Lloyd, *Mycol. Writ.* 5(Letter 68): 12 (1918).

Fruiting body. — Basidiocarps annual, pileate, usually solitary, sometimes imbricate, with pleasant odor when fresh, corky and distinctly light in weight when dry. Pilei semicircular to flabelliform, projecting up to 7.5 cm, 11 cm wide and 25 mm thick at base. Pileal surface white to cream when fresh, pale yellow to ash-gray, first slightly hirsute, turning to glabrous with age, azonate, irregular warts present near the base, slightly radially wrinkled when dry; margin dull, entire, wavy, white to cream. Pore surface white to cream when fresh, pale yellow to orange-yellow when dry; pores round to angular, 3–4 per mm; dissepiments thin, entire. Sterile margin cream, up to 2 mm wide. Context duplex, upper layer pale gray, lower context white, corky, azonate, up to 15 mm thick.

Fig. 380 Basidiocarps of *Trametes manilaensis*

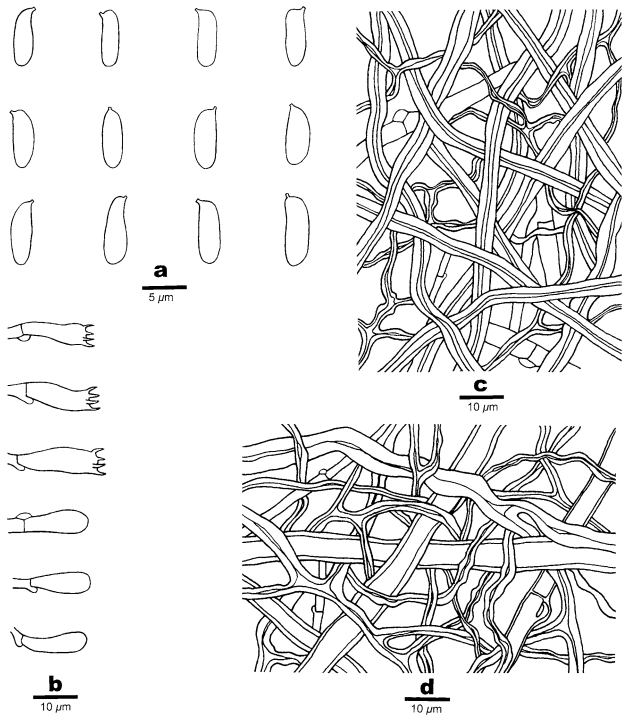

Fig. 381 Microscopic structures of *Trametes manilaensis* (drawn from *Dai 10747*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 μm; **b–d** = 10 μm

Tubes cream to pale yellow, slightly paler than pore surface, corky, up to 10 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin- to slightly thick-walled, occasionally branched, 2–7 μm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, occasionally branched, interwoven, 4.5–7.5 μm in diam; binding hyphae common, hyaline, thick-walled to subsolid, frequently branched, interwoven, 0.8–3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–5.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, occasionally branched, interwoven, 2.8–5 μm in diam; binding hyphae rare, hyaline, thick-walled to subsolid, frequently branched, interwoven, 1–2.5 μm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 13.6–18 × 3.9–5.3 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical to oblong-ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, 5–7.8(–8) × (2.1–)2.2–3(–3.2) μm, L = 6.28 μm, W = 2.51 μm, Q = 2.5 (n = 30/1).

Notes. — *Trametes manilaensis* is characterized by its cream to ash-gray pileal surface with irregular warts near the base, duplex context, and its binding hyphae is common in the context.

Specimens examined: **CHINA**. **Hainan**, Chengmai County, on stump of *Hevea brasiliensis*, 6 May 2009, *Cui 6212* (BJFC); Danzhou, on fallen trunk of *Albizzia julibrissn*, 7 May 2009, *Dai 10747* (BJFC).

Trametes maxima (Mont.) A. David & Rajchenb., *Mycotaxon* 22(2): 315 (1985) (Figs. 382, 383)
MycoBank: MB 105833
Basionym: *Irpex maximus* Mont., *Annls Sci. Nat., Bot.*, sér. 2 8: 364 (1837).

Fruiting body. — Basidiocarps annual, pileate, solitary or imbricate, without odor or taste when fresh, corky and light in weight when dry. Pilei semicircular to dimidiate, projecting up to 2.5 cm, 3.4 cm wide and 2 mm thick at base. Pileal surface buff-yellow to cinnamon-buff after drying, glabrous, concentrically zonate and sulcate; margin thin, entire or slightly wavy. Pore surface cinnamon-buff to cinnamon; pores angular, 3–4 per mm; dissepiments thin, slightly lacerate. Context cream, corky, up to 1.2 mm thick, a black line present towards the upper surface. Tubes concolorous with pore surface, corky, up to 0.8 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.9–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, occasionally branched, interwoven, 3–5.5 μm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 1.2–3.2 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.6–2.4 μm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, occasionally branched, interwoven, 2.5–3.8 μm in diam;

Fig. 382 Basidiocarps of *Trametes maxima*

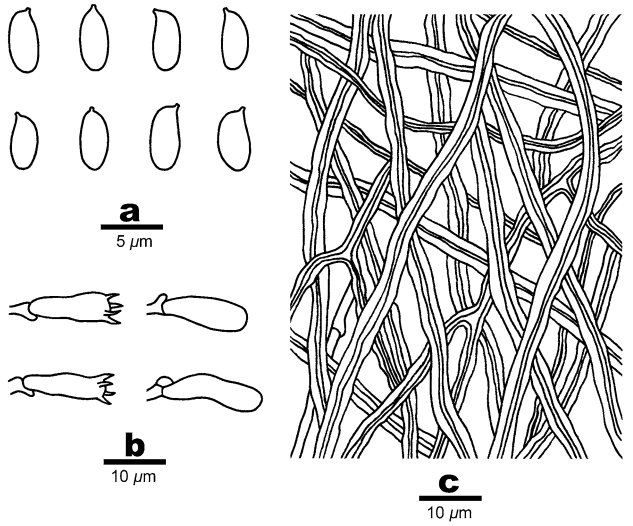

Fig. 383 Microscopic structures of *Trametes maxima* (drawn from *Dai 6865*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 μm; **b–c** = 10 μm

binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 0.8–2.5 μm in diam. Cystidia and cystidioles absent. Hyphal pegs occasionally present. Basidia clavate, with four sterigmata and a basal clamp connection, 10–15 × 3–5 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores oblong-ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, (4.1–)4.2–5.1(–5.8) × 2–2.4(–2.5) μm, L = 4.78 μm, W = 2.18 μm, Q = 2.19 (n = 30/1).

Notes. — *Trametes maxima* is characterized by its buff-yellow to cinnamon-buff, glabrous, concentrically zonate and sulcate pilei, lacerate pores, and presence of the black line in the context towards the upper surface. *Trametes cystidiolophora* is similar to *T. maxima* by sharing similar uneven pore surface and pore size (2–3 per mm), but the former species differs by its pale grayish brown to pale cinnamon-buff pileal surface with distinctly concentric zones and radial veins, and its basidiospores (6.6–9.2 × 2.4–3 μm, Li and Cui 2010) are larger. Black zone is also present in *Trametes hirsuta* and *T. versicolor* (L.) Lloyd, but they have distinctly cylindrical basidiospores.

Specimens examined: **CHINA**. **Guangxi**, Longzhou County, Nonggang Nature Reserve, on fallen angiosperm trunk, 2 July 2007, *Zhou 13* (IFP); 4 July 2007, *Zhou 147* (IFP); 8 July 2007, *Zhou 394* (IFP). **Hainan**, Haikou, Qiongshan, Dazhipo, on fallen trunk of *Casuarina equisetifolia*, 27 November 2002, *Dai 4617* (IFP). **Yunnan**, Mengla County, Menglun, Xishuangbanna Botanical Garden, on fallen angiosperm trunk, 6 August 2005, *Dai 6865* (BJFC); 7 June 2011, *Dai 12274, 12298* (BJFC).

Trametes menziesii (Berk.) Ryvarden, *Norw. Jl Bot.* 19(3-4): 236 (1972) (Figs. 384, 385)

MycoBank: MB 324802

Basionym: *Polyporus menziesii* Berk., *Ann. Mag. nat. Hist.*, Ser. 1 10: 378 (1843).

Fig. 384 Basidiocarps of *Trametes menziesii*

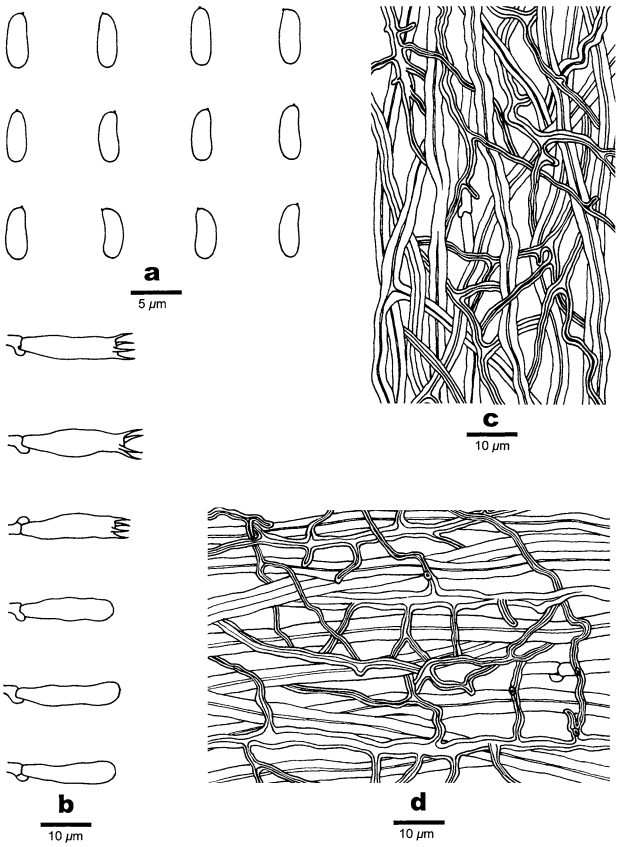

Fig. 385 Microscopic structures of *Trametes menziesii* (drawn from *Yuan 3555*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 μm; **b–d** = 10 μm

Fruiting body. — Basidiocarps annual, dimidiate or with a short lateral stipe, single or imbricate, without odor or taste when fresh, coriaceous and light in weight when dry. Pilei semicircular to flabelliform, projecting up to 4 cm, 5 cm wide and 2 mm thick at base. Pileal surface white, pale gray to grayish-brown when dry, glabrous or with irregular warts, concentrically zonate and sulcate, and slightly radially wrinkled; margin thin and sharp, even and slightly wavy. Pore surface white to cream when fresh, buff to straw-colored when dry, slightly paler towards margin; pores angular, slightly radially arranged, 3–5 per mm; dissepiments thin, usually lacerate. Sterile margin distinct, white to cream, up to 2 mm. Context white to cream, coriaceous, up to 0.9 mm thick. Tubes cream, buff to buff-yellow, corky, up to 1.1 mm long. Stipe short, upper surface concolorous with pileal surface, the lower surface cream to buff, up to 1.2 mm long and 5 mm in diam.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–, swollen in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2.5–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, occasionally branched, regularly arranged, 4–7 μm in diam; binding hyphae common, hyaline, thick-walled to almost solid, frequently branched, interwoven, 2–2.8 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, occasionally branched, interwoven, 3–4.5 μm in diam; binding hyphae common, hyaline, thick-walled to almost solid, frequently branched, flexuous, interwoven, 1.8–3.2 μm in diam. Cystidia and cystidioles absent. Hyphal pegs occasionally present. Basidia clavate, with four sterigmata and a basal clamp connection, 14–18 × 4–5.5 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (4.8–)5–6(–6.4) × 1.9–2.3(–2.4) μm, L = 5.43 μm, W = 2.09 μm, Q = 2.6 (n = 40/1).

Notes. — *Trametes menziesii* is characterized by its white, pale gray to grayish-brown, glabrous, concentrically zonate pileal surface, angular, lacerate and lightly radially arranged pores, and skeletal and binding hyphae swollen in KOH.

Specimens examined: **CHINA**. **Guangxi**, Longzhou County, Nonggang Nature Reserve, on fallen angiosperm trunk, 3 July 2007, *Zhou 72* (IFP). **Yunnan**, Mengla County, Menglun, Lvshilin Park, on fallen angiosperm trunk, 30 August 2006, *Dai 6782* (IFP).

Trametes mimetes (Wakef.) Ryvarden, *Norw. Jl Bot.* 19: 236 (1972) (Figs. 386, 387)
MycoBank: MB 324804

Basionym: *Polystictus mimetes* Wakef., *Kgl. norske vidensk. Selsk. Forh.* 9(13): 47 (1935).

Fruiting body. — Basidiocarps annual, pileate to effused-reflexed, usually imbricate, without odor or taste when fresh, coriaceous to corky and light in weight when dry. Pilei semicircular to dimidiate, projecting up to 1.1 cm, 2.7 cm wide and 3.5 mm thick at base. Pileal surface cream to buff when dry, glabrous, narrowly concentrically zonate and sulcate, and radially wrinkled; margin thin and sharp, entire or slightly lobed and incised. Pore surface buff to buff-yellow, glancing; pores round, 3–4 per mm; dissepiments thin, entire. Context cream, corky, up to 0.8 mm thick. Tubes buff to buff-yellow, corky, up to 2.7 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2.5–3.5 μm in diam; skeletal hyphae dominant, hyaline to pale yellowish, thick-walled with a wide lumen, occasionally branched, interwoven, 2.5–5 μm in diam; binding hyphae hyaline to pale yellowish, thick-walled to almost solid, frequently branched, interwoven, 1.2–3.5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.8–2.5 μm in diam; skeletal hyphae dominant, hyaline to pale yellowish, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 2–3.3 μm in diam; binding hyphae hyaline to pale yellowish, thick-walled to almost solid, frequently branched, flexuous, interwoven, 1–3 μm in diam. Cystidia and cystidioles absent. Hyphal pegs occasionally present. Basidia clavate, with four sterigmata and a basal clamp connection, 16–20 × 6–7 μm; basidioles in shape similar to basidia, but slightly smaller.

Fig. 386 Basidiocarps of *Trametes mimetes*

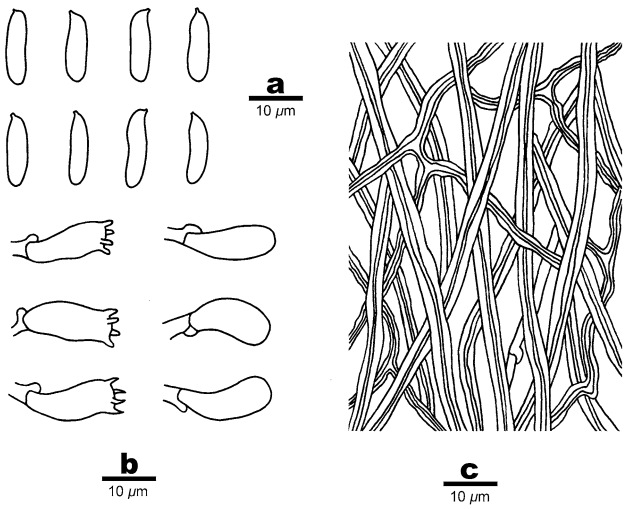

Fig. 387 Microscopic structures of *Trametes mimetes* (drawn from *Dai 10608*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a–c** = 10 μm

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (10–)10.2–12.8(–14) × 3–4 μm, L = 11.56 μm, W = 3.53 μm, Q = 3.27 (n = 30/1).

Notes. — *Trametes mimetes* is characterized by its glabrous, concentrically zonate and sulcate, and radially wrinkled pilei, and large cylindrical basidiospores.

Specimen examined: **CHINA**. **Jiangxi**, Jinggangshan County, Jinggangshan Nature Reserve, on fallen angiosperm trunk, 23 September 2008, *Dai 10608* (BJFC).

Trametes ochracea (Pers.) Gilb. & Ryvarden, *North American Polypores*, 2: 752 (1987) (Figs. 388, 389)
MycoBank: MB 132931
Basionym: *Boletus ochraceus* Pers., *Ann. Bot. (Usteri)* 11: 29 (1794).

Fruiting body. — Basidiocarps annual, pileate to effused-reflexed, usually imbricate, coriaceous, without odor or taste when fresh, corky and distinctly light in weight when dry. Pilei semicircular, flabelliform; projecting up to 2.5 cm, 4.5 cm wide and 20 mm thick at base. Pileal surface cream when fresh, turning to buff, yellowish-brown, reddish-brown to grayish-brown with age, with distinctly brown concentric zones, velutinate or glabrous, sometimes with irregular warts near the base; margin obtuse, cream to pale gray. Pore surface cream, turning to buff to grayish-brown with age; pores round to angular, 3–5 per mm; dissepiments thick, entire. Sterile margin distinct, concolorous with pore surface or lightly paler, up to 3 mm. Context cream, corky when dry, up to 3 mm thick. Tubes concolorous with pore surface or slightly paler, corky when dry, up to 15 mm long.

Fig. 388 Basidiocarps of *Trametes ochracea*

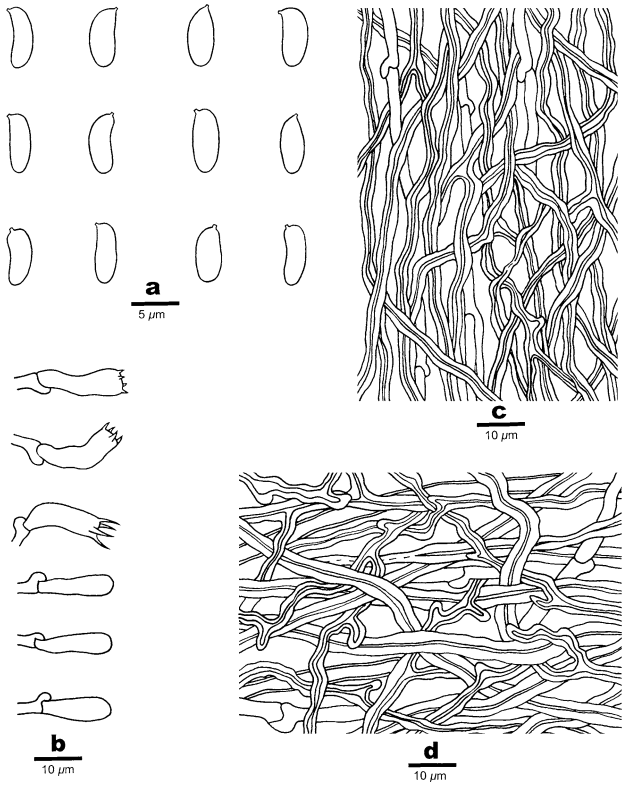

Fig. 389 Microscopic structures of *Trametes ochracea* (drawn from *Dai 2005*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 μm; **b–d** = 10 μm

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–, swollen in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2.5–4 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, occasionally branched, interwoven, 3–6 μm in diam; binding hyphae hyaline, subsolid, frequently branched, strongly interwoven, 1.5–3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 1.8–3.5 μm in diam; skeletal

hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, occasionally branched, interwoven, 2–5 µm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, strongly interwoven, 1.5–2.8 µm in diam. Cystidia absent; fusoid cystidioles occasionally present, 16–19 × 3–4.5 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 11–27 × 4–6 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (4.8–)5–7(–8) × (1.7–)2–2.8(–3) µm, L = 5.97 µm, W = 2.39 µm, Q = 2.2–2.77 (n = 180/6).

Notes. — *Trametes ochracea* is characterized by its yellowish-brown to reddish-brown, velutinate to almost glabrous pileal surface. It differs from *T. versicolor* (L.) Lloyd by rather thick basidiocarps, and less strongly zonate pileus.

Specimens examined: **CHINA**. **Hebei**, Xinglong County, Wulingshan Nature Reserve, on fallen trunk of *Populus*, 30 July 2009, *Cui 6888* (BJFC); on fallen trunk of *Pinus*, 29 August 2009, *Cui 7175* (BJFC). **Jiangsu**, Nanjing, Zijin Mountain, on fallen trunk of *Xylosma racemosum*, 3 June 2005, *Dai 6571* (IFP). **Jilin**, Antu County, on stump of *Betula*, 9 September 1995, *Dai 2005* (IFP); Changbai Nature Reserve, on fallen angiosperm trunk, 12 October 2007, *Dai 9070* (IFP); Baihe, on fallen trunk of *Betula*, 31 August1993, *Dai 898* (IFP). **Shannxi**, Zhouzhi County, Houzhenzi, Taibao, on angiosperm stump, 24 October 2006, *Yuan 2695* (IFP). **Shanxi**, Jiaocheng County, Pangquangou Nature Reserve, on fallen trunk of *Betula*, 22 September 2006, *Yuan 2477* (IFP); Qinshui County, Lishan Nature Reserve, on fallen trunk of *Betula*, 18 October 2004, *Yuan 964* (IFP). **Zhejiang**, Lin'an County, Tianmushan Nature Reserve, on angiosperm stump, 12 October 2005, *Cui 2757* (IFP).

Trametes orientalis (Yasuda) Imazeki, *Bull. Tokyo Sci. Mus.* 6: 73 (1943) (Figs. 390, 391)
MycoBank: MB 306966
Basionym: *Polystictus orientalis* Yasuda, *Bot. Mag., Tokyo* 32: 135 (Jap. sect.) (1918).

Fruiting body. — Basidiocarps annual, pileate, usually imbricate, without odor or taste when fresh, hard corky and distinctly light in weight when dry. Pilei semicircular to flabelliform to almost circular, projecting up to 7 cm, 10 cm wide and 17 mm thick at base. Pileal surface white to cream when fresh, turning to buff, pale yellowish-brown, grayish-brown to gray when dry, irregular warts present near the base, glabrous, slightly concentric zonate and sulcate; margin cream, ochraceous to yellowish-brown, entire. Pore surface white to cream when fresh, turning to buff to pale yellowish-brown when dry; pores round, 3–4 per mm; dissepiments thin, entire. Context cream, corky, up to 12 mm thick. Tubes cream, concolorous with pore surface, corky, up to 5 mm long.

Fig. 390 Basidiocarps of *Trametes orientalis*

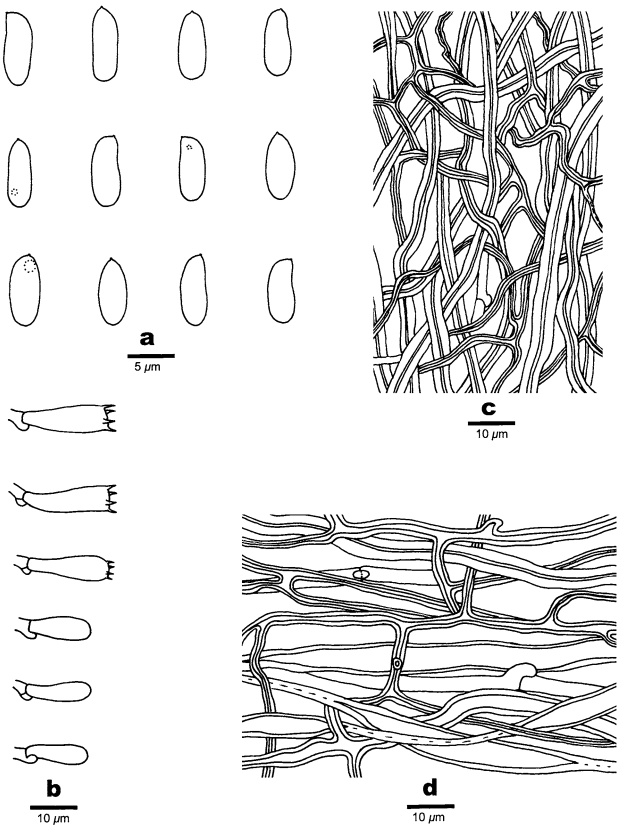

Fig. 391 Microscopic structures of *Trametes orientalis* (drawn from *Cui 6320*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 µm; **b–d** = 10 µm

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2.5–3.3 µm in diam; skeletal hyphae dominant, hyaline, mostly thick-walled with a narrow lumen to subsolid, occasionallybranched,

4–6.5 µm in diam; binding hyphae common, hyaline, thick-walled to subsolid, frequently branched, interwoven, 2–2.8 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2–2.8 µm in diam; skeletal hyphae dominant, hyaline to pale yellow, thick-walled with a narrow lumen to subsolid, occasionally branched, interwoven, 3.5–5 µm in diam; binding hyphae rare, hyaline to pale yellow, thick-walled to subsolid, frequently branched, interwoven, 1.8–2.5 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 14–20 × 4–6 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical to oblong-ellipsoid, hyaline, thin-walled, smooth, sometimes with a small guttule, IKI–, CB–, (5–)5.2–7.8(–8.4) × (2.3–)2.5–3.1(–3.2) µm, L = 6.48 µm, W = 2.79 µm, Q = 2.18–2.46 (n = 60/2).

Notes. — *Trametes orientalis* is characterized by its white to cream, buff, pale yellowish-brown, grayish-brown to gray, glabrous pileal surface and distributed in tropical to subtropical areas.

Specimens examined: **CHINA**. **Fujian**, Wuyishan County, Longfenggu Forest Park, on fallen angiosperm trunk, 9 October 2005, *Dai 7229* (IFP). **Guangdong**, Lianzhou County, Nanling Nature Reserve, on fallen angiosperm trunk, 15 May 2009, *Dai 10948* (BJFC); 17 September 2009, *Cui 7642* (BJFC). **Hainan**, Danzhou, on fallen trunk of *Albizzia julibrissn*, 7 May 2009, *Cui 6300* (BJFC); Changjiang County, on fallen angiosperm trunk, 7 May 2009, *Cui 6319*, *6320* (BJFC); Haikou, Jinniuling Park, on fallen angiosperm trunk, 5 May 2009, *Cui 6184* (BJFC); on fallen trunk of *Podocarpus macrophyllus*, 5 May 2009, *Cui 6187* (BJFC); Qiongzhong County, Limushan Forest Park, on fallen angiosperm trunk, 6 June 1980, HMAS 42347 (HMAS); Wuzhishan County, Wuzhishan Nature Reserve, on fallen angiosperm trunk, 24 November 2007, *Cui 5392* (BJFC). **Jiangxi**, Jiujiang, Lushan Mountain, on fallen angiosperm trunk, 9 October 2008, *Cui 6037* (BJFC). **Yunnan**, Yuanjiang County, on fallen angiosperm trunk, 9 June 2011, *Dai 12393* (BJFC).

Trametes pavonia (Berk.) Fr., *Nova Acta R. Soc. Scient. upsal.*, Ser. 3 1(1): 98 (1851) (Figs. 392, 393)
MycoBank: MB 213370
Basionym: *Daedalea pavonia* Berk., *London J. Bot.* 6: 507 (1847).

Fruiting body. — Basidiocarps annual, pileate, single to imbricate, without odor or taste when fresh, soft corky and light in weight when dry. Pilei semicircular, projecting up to 1.3 cm, 2.8 cm wide and 2 mm thick at base. Pileal surface cream, yellowish-brown to cinnamon after drying, hirsute to tomentose; margin thin, entire. Pore surface cream to pale yellowish-brown; pores angular, about 5 per mm; dissepiments thin, entire when juvenile, dentate with age. Context white to cream, soft corky, up to 1 mm thick. Tubes cream to pale cream yellow, soft corky, up to 1 mm long.

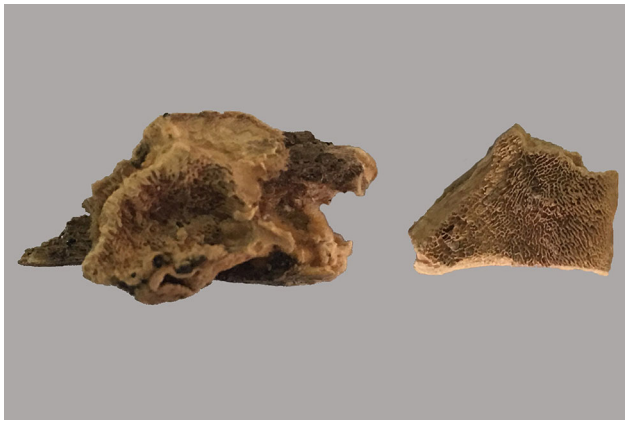

Fig. 392 Basidiocarps of *Trametes pavonia*

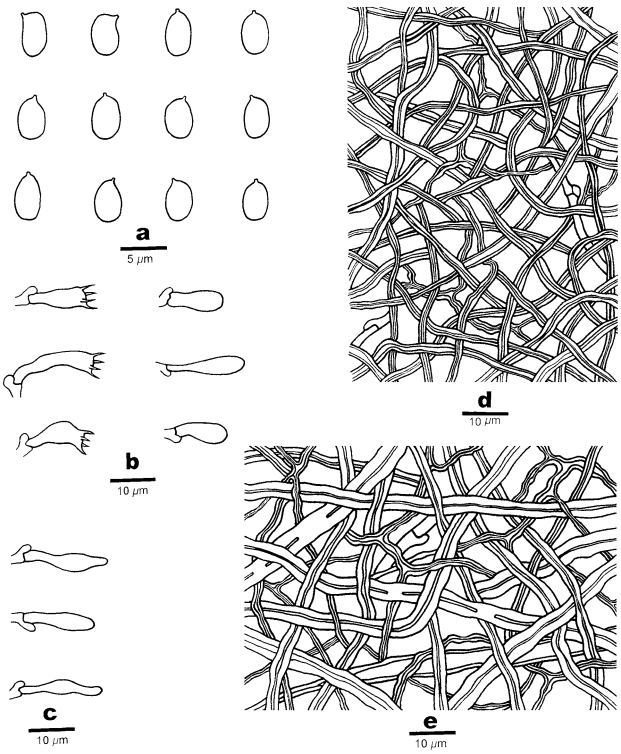

Fig. 393 Microscopic structures of *Trametes pavonia* (drawn from *Dai 11596*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **e**. Hyphae from context. Bars: **a** = 5 µm; **b–e** = 10 µm

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2.2–4 µm in diam; skeletal hyphae

dominant, hyaline, thick-walled with a wide to narrow lumen to subsolid, occasionally branched, interwoven, 2.5–4.5 µm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 1–1.8 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 1.5–3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, occasionallybranched, interwoven, 2–5 µm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 1.3–2.1 µm in diam. Cystidia absent; fusoid cystidioles occasionally present, hyaline, thin-walled, 13–18.5 × 3–4.3 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 11–17.5 × 4.5–6 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid to broadly ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, (4–)4.4–5.2(–5.4) × (2.7–)2.9–3.3(–3.4) µm, L = 4.88 µm, W = 3.04 µm, Q = 1.61 (n = 30/1).

Notes. — *Trametes pavonia* is characterized by its cream, yellowish-brown to cinnamon, hirsute to tomentose pileal surface, and ellipsoid to broadly ellipsoid basidiospores.

Specimen examined: **CHINA**. **Taiwan**, 14 December 2009, *Dai 11596* (BJFC).

Trametes pocas (Berk.) Ryvarden, *Mycotaxon* 20(2): 351 (1984) (Figs. 394, 395)
MycoBank: MB 106580
Basionym: *Polyporus pocas* Berk., *J. Linn. Soc., Bot.* 16(no. 89): 51 (1878).

Fruiting body. — Basidiocarps annual, pileate, single to imbricate, without odor or taste when fresh, hard coriaceous and distinctly light in weight when dry. Pilei semicircular to flabelliform, sometimes almost circular with an umbilicate base, projecting up to 3 cm, 8 cm wide and 9 mm thick at base. Pileal surface cream white when fresh, cream when dry, hirsute to tomentose, slightly concentrically zonate and sulcate; margin thin, white. Pore surface cream, turning to buff and cream yellow with age; pores angular, about 1–2 per mm; dissepiments thin, entire. Context white to cream, coriaceous, up to 1 mm thick. Tubes slightly paler than pore surface, soft corky, up to 8 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2–3.3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen to subsolid, occasionally branched, interwoven, 3–6 µm in diam; binding hyphae indistinct, hyaline, thick-walled to subsolid, frequently branched, interwoven, 2–4 µm in diam.

Fig. 394 Basidiocarps of *Trametes pocas*

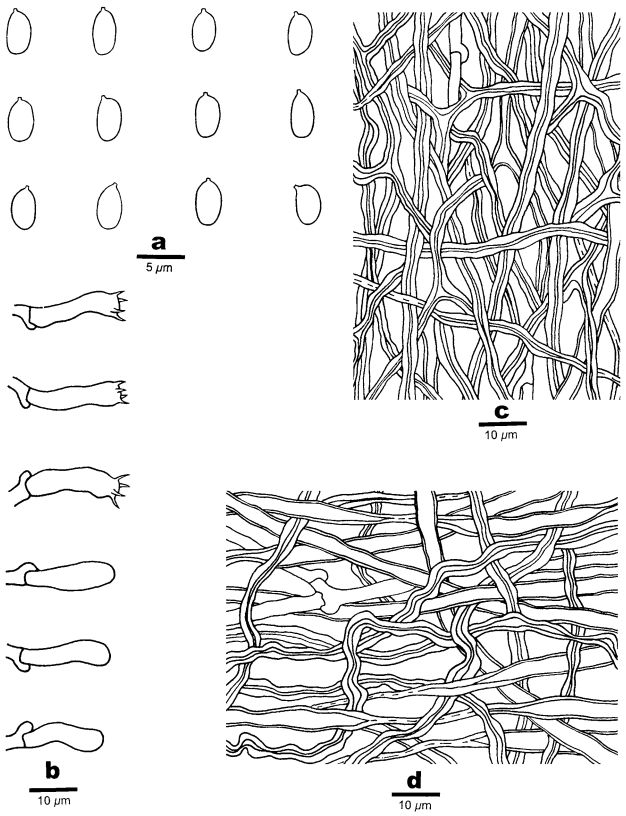

Fig. 395 Microscopic structures of *Trametes pocas* (drawn from *Dai 11577*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 µm; **b–d** = 10 µm

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.5–2.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, frequently branched, interwoven, 2.5–4.5 µm; binding hyphae common, hyaline, thick-walled to subsolid, frequently branched, interwoven, 1.6–3.5 µm in diam. Cystidia and cystidioles absent. Hyphal pegs present in the hymenium. Basidia clavate, with four sterigmata and a basal clamp

connection, 9–20 × 4–6 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, (4–)4.6–6(–7) × (2.1–)2.3–3(–3.1) µm, L = 5.01 µm, W = 2.66 µm, Q = 1.79–1.99 (n = 30/1).

Notes. — *Trametes pocas* is characterized by its cream white to cream, hirsute to tomentose pileal surface, big pores and small ellipsoid basidiospores.

Specimens examined: **CHINA**. **Beijing**, on fallen angiosperm trunk, 7 December 2009, *Dai 11577* (BJFC). **Yunnan**, Mengla County, Lvshilin Park, on fallen angiosperm trunk, 1 November 2009, *Cui 8418* (BJFC).

Trametes polyzona (Pers.) Justo, *Taxon* 60(6): 1580 (2011) (Figs. 396, 397)

MycoBank: MB 561896

Basionym: *Polyporus polyzonus* Pers., *Freycinet, Voy. Uranie., Bot.*: 171 (1827).

≡ *Coriolopsis polyzona* (Pers.) Ryvarden, *Norw. Jl Bot.* 19: 230 (1972).

Fruiting body. — Basidiocarps annual, pileate to effused-reflexed, usually imbricate, without odor or taste, coriaceous when fresh, corky and light in weight upon drying. Pilei semicircular to flabelliform, up to 6 cm long, 10 cm wide and 8 mm thick at base. Pileal surface buff to pale yellowish-brown when fresh, yellowish-brown when dry, hirsute to tomentose, mostly concentrically sulcate; margin sharp, entire. Pore surface white, cream, buff, pale yellow to pale yellowish-brown, glancing; pores angular, about 2–4 per mm; dissepiments thin to moderate thick, entire. Sterile margin pale yellowish-brown when dry, up to 2 mm wide. Context pale yellowish-brown, soft corky when dry, up to 4 mm thick near the base. Tubes white to cream when fresh, cream to pale yellowish-brown when dry, corky, up to 4 mm long.

Fig. 396 Basidiocarps of *Trametes polyzona*

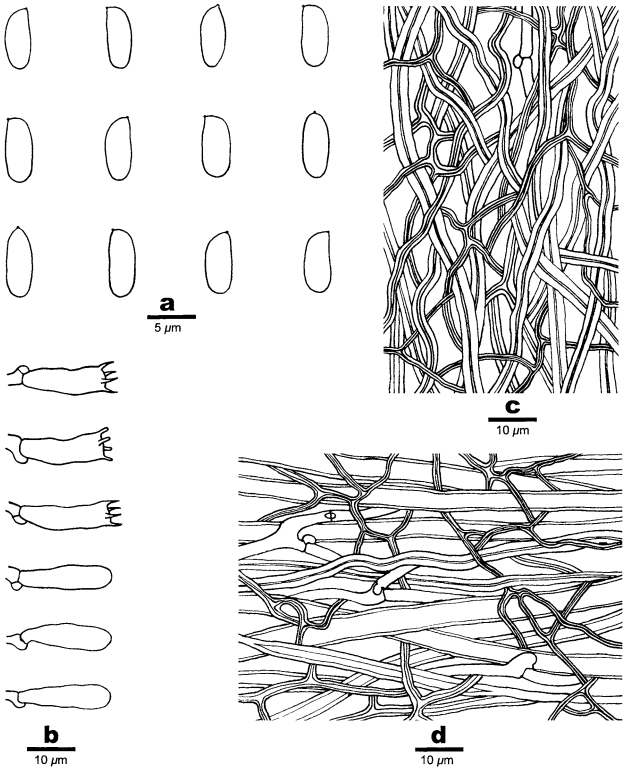

Fig. 397 Microscopic structures of *Trametes polyzona* (drawn from *Cui 6739*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 µm; **b–d** = 10 µm

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–, swollen in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2–3.2 µm in diam; skeletal hyphae dominant, hyaline to pale yellowish-brown, thick-walled with a wide lumen, occasionally collapsed when dry, occasionally branched, straight, 4–8 µm in diam; binding hyphae hyaline to pale yellowish-brown, thick-walled, frequently branched, flexuous, 1.5–3.3 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.5–2.7 µm in diam; skeletal hyphae dominant, hyaline to pale yellowish-brown, thick-walled with a narrow lumen to subsolid, occasionally-branched, occasionally covered with large crystals, interwoven, 3.5–5 µm in diam; binding hyphae hyaline to pale yellowish-brown, thick-walled, frequently branched, flexuous, 1.7–3 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 13–18 × 4.5–6 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical to slightly allantoid, hyaline, thin-walled, smooth, usually with a guttule, IKI–, CB–, (6–)6.2–8(–9) × (2.4–)2.8–3.5(–4) µm, L = 7.12 µm, W = 3.01 µm, Q = 2.23–2.48 (n = 100/3).

Notes. — *Trametes polyzona* is characterized by its yellowish-brown, hirsute to tomentose and distinctly zonate basidiocarps with pale yellowish-brown context.

Specimens examined: **CHINA**. **Fujian**, Wuyishan County, Wuyishan Nature Reserve, Taoyuanyu, on fallen angiosperm trunk, 22 October 2005, *Dai 7376* (BJFC). **Guangdong**, Guangzhou, campus of South China Agricultural University, on living tree of *Albizzia julibrissn*, 17 May 2009, *Dai 10980* (BJFC). **Guangxi**, Longzhou County, Nonggang Nature Reserve, on fallen angiosperm trunk, 2 July 2007, *Zhou 3* (IFP); 4 July 2007, *Zhou 169*, *181* (IFP). **Hainan**, Changjiang County, Bawangling Nature Reserve, on fallen trunk of *Mangifera indica*, 9 May 2009, *Dai 10816* (BJFC); Chengmai County, on fallen angiosperm trunk, 6 May 2009, *Cui 6225*, *6232* (BJFC); Qionghai County, Jiuqujiang, on fallen angiosperm trunk, 15 May 2009, *Cui 6718* (BJFC); Qiongzhong County, Limushan Forest Park, on fallen angiosperm trunk, 24 May 2008, *Dai 9573* (IFP); Wenchang County, Maihao, on fallen angiosperm trunk, 15 May 2009, *Cui 6739* (BJFC). **Hunan**, Shimen County, Huping Nature Reserve, on fallen angiosperm trunk, 16 September 2009, *Dai 11360* (BJFC). **Jiangxi**, Fenyi County, Dagang Mountain, on fallen trunk of *Cyclobalanopsis*, 18 September 2008, *Dai 10419*, *10420* (BJFC). **Yunnan**, Mangla County, Menglun, Lvshilin Park, on fallen angiosperm trunk, 4 August 2005, *Dai 6680* (IFP); Mengla County, Wangtianshu Park, on fallen angiosperm trunk, 2 November 2009, *Cui 8525* (BJFC); Yuanjiang County, on fallen angiosperm trunk, 9 June 2011, *Dai 12395* (BJFC).

Trametes pubescens (Schumach.) Pilát, *Atlas Champ. l'Europe, III, Polyporaceae (Praha)* 1: 268 (1939) (Figs. 398, 399)
MycoBank: MB 275567
Basionym: *Boletus pubescens* Schumach., *Enum. pl. (Kjbenhavn)* 2: 384 (1803).

Fruiting body. — Basidiocarps annual, pileate, usually imbricate, coriaceous, without odor or taste when fresh, corky and distinctly light in weight when dry. Pilei semicircular to flabelliform, projecting up to 5 cm, 8 cm wide and 7 mm thick at base. Pileal surface cream when fresh, turning to buff, pale gray to gray-brown when dry, hirsute to tomentose, slightly concentrically zonate; margin thin, cream to buff, some specimens slightly involute when dry. Pore surface white to cream, turning to buff to cream yellow with age; pores angular, about 3–5 per mm; dissepiments thin, entire to slightly lacerate. Context white to cream, corky, up to 4 mm thick. Tubes slightly paler than pore surface, corky, up to 3 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Fig. 398 Basidiocarps of *Trametes pubescens*

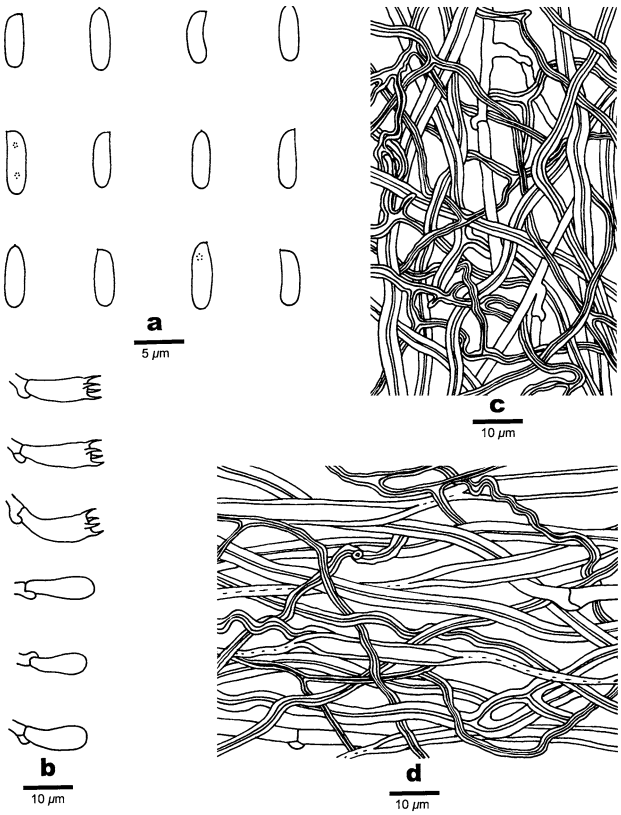

Fig. 399 Microscopic structures of *Trametes pubescens* (drawn from *Cui 7097*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 μm; **b–d** = 10 μm

Context. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2.4–3.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, when with a wide lumen usually collapsed when dry, occasionally branched, interwoven, 4–6 μm in diam; binding hyphae common, hyaline, thick-walled to subsolid, occasionally branched, interwoven, 1.8–3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, frequently branched, interwoven, 3–4.5 μm; binding hyphae common, hyaline, thick-walled to subsolid, frequently branched, interwoven, 2–3.2 μm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 10–20 × 4–6 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical to slightly allantoid, hyaline, thin-walled, smooth, with one or two small guttules, (4–)5–7(–7.6) × (1.6–)1.8–2.3(–2.7) μm, L = 5.75 μm, W = 1.98 μm, Q = 1.56–3.36 (n = 120/4).

Notes. — *Trametes pubescens* is characterized by its cream, buff, pale gray to gray-brown, hirsute to tomentose pileal surface, moderate pores and cylindrical to slightly allantoid basidiospores.

Specimens examined: **CHINA**. **Anhui**, Huangshan, Huangshan Mountain, on fallen angiosperm trunk, 10 October 2004, *Dai 6012* (IFP); 12 October 2004, *Dai 6117* (IFP). **Beijing**, Haidian, campus of China Agricultural University, on living tree of *Populus*, 3 September 2009, *Cui 7327* (BJFC). **Fujian**, Jian'ou County, Wanmulin Nature Reserve, on fallen angiosperm trunk, 31 August 2006, *Cui 4304* (IFP). **Guangdong**, Ruyuan County, Nanling Nature Reserve, on fallen trunk of *Aluerites fordii*, 14 May 2009, *Dai 10889* (BJFC); 15 May 2009, *Dai 10919* (BJFC). **Guangxi**, Longzhou County, Nonggang Nature Reserve, on fallen angiosperm trunk, 3 July 2007, *Zhou 48*, *71* (IFP). **Gansu**, Lingtai County, Shizi, on fallen angiosperm branch, 5 October 2010, *Cui 9800* (BJFC). **Hainan**, Changjiang County, Bawangling Nature Reserve, on fallen angiosperm branch, 13 November 2007, *Yuan 4301* (IFP). **Hebei**, Laishui County, Beixinzhuang, on fallen angiosperm trunk, 22 August 2008, *Cui 5861* (BJFC). **Heilongjiang**, Yichun, Fenglin Nature Reserve, on fallen angiosperm trunk, 2 August 2011, *Cui 9854* (BJFC); on fallen trunk of *Betula*, 2 August 2011, *Cui 9856* (BJFC). **Henan**, Xinyang, Jigongshan Nature Reserve, on fallen angiosperm trunk, 29 August 2005, *Li 358* (IFP). **Hubei**, Fang County, Shennongjia Nature Reserve, on fallen angiosperm trunk, 7 September 2006, *Li 1586* (IFP). **Hunan**, Nanyue County, Hengshan Mountain, on fallen angiosperm trunk, 29 June 2007, *Li 1868* (IFP). **Inner Mongolia**, Arxan, Hamagou Forest Farm, on fallen trunk of *Betula*, 27 July 2005, *Cui 1921* (IFP). **Jilin**, Antu County, Changbaishan Nature Reserve, Huangsongpu, on fallen angiosperm trunk, 19 September 2002, *Dai 6824* (IFP); Hunchun, Hadamen, on fallen angiosperm trunk, 7 August 2009, *Cui 7097* (BJFC); Huinan County, on fallen branch of *Ulmus*, 10 July 1993, *Dai 394* (BJFC). **Jiangxi**, Jiujiang, Lushan Mountain, on fallen angiosperm trunk, 9 October 2008, *Cui 6034* (BJFC). **Liaoning**, Huanren County, Laotudingzi Nature Reserve, on fallen trunk of *Quercus*, 2 August 2008, *Cui 5808* (BJFC). **Qinghai**, Xunhua County, Mengda Nature Reserve, on fallen trunk of *Prunus padus*, 30 August 2005, *Cui 2347* (IFP). **Shandong**, Mengyin County, Mengshan Forest Park, on fallen branch of *Prunus persica*, 27 July 2007, *Cui 5007, 5012, 5017* (BJFC); Tai'an, Taishan Mountain, on fallen trunk of *Robinia pseudoacacia*, 12 October 2003, *Dai 5300* (IFP). **Shannxi**, Zhouzhi County, Louguantai National Forest Park, on grape tree, 19 September 2005, *Wang 537* (IFP). **Shanxi**, Qinshui County, Lishan Nature Reserve, on fallen branch of *Betula*, 18 October 2004, *Yuan 994* (IFP); on fallen branch of *Salix*, 12 October 2004, *Yuan 879* (IFP). **Sichuan**, Puge County, Luoji Mountain, on fallen branch of *Betula*, 19 September 2012, *Dai 12982* (BJFC). **Tianjin**, Ji County, on fallen angiosperm branch, 31 July 2009, *Cui 6966* (BJFC). **Xizang (Tibet)**, Linzhi County, on fallen trunk of *Quercus*, 1 August 2004, *Dai 5489* (IFP). **Zhejiang**, Lin'an County, Tianmushan Nature Reserve, on fallen branch of *Juglans regia*, 15 October 2004, *Dai 6381* (IFP); on fallen angiosperm trunk, 15 October 2004, *Dai 6388* (IFP).

Trametes sanguinea (L.) Lloyd, *Mycol. Writ.* 7(Letter 72): 1291 (1924) (Figs. 400, 401)

MycoBank: MB 473624

Basionym: *Boletus sanguineus* L., *Sp. pl., Edn 2* 2: 1646 (1763).

≡ *Pycnoporus sanguineus* (L.) Murrill, *Bull. Torrey bot. Club* 31(8): 421 (1904).

Fruiting body. — Basidiocarps annual, pileate, single or imbricate, coriaceous, without odor or taste when fresh, soft corky to corky and light in weight when dry. Pilei semicircular, flabelliform to kidney shaped, projecting up to 5 cm, 8 cm wide and 15 mm thick at base. Pileal surface pale reddish-brown to brick-red, fading when old or dead, glabrous, zonate or slightly zonate; margin slightly paler, sharp, entire. Pore surface red to brick-red; pores round, 5–6 per mm; dissepiments thin, entire. Sterile margin pale red to pale orange-red, up to 1 mm wide. Context pale reddish-brown, corky, up to 13 mm thick. Tubes slightly paler than pore surface, corky when dry, up to 2 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues turning to black in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, some finely incrusted with scarlet crystals, 2–3.8 μm in diam; skeletal hyphae dominant, orange-yellow, thick-walled with a wide to narrow lumen, occasionally branched, sometimes collapsed, and some finely incrusted with scarlet crystals, 3.8–5.5 μm in diam; binding hyphae pale yellowish, thick-walled to almost solid, frequently branched, interwoven, 1.8–2.8 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, some finely incrusted with

Fig. 400 A basidiocarp of *Trametes sanguinea*

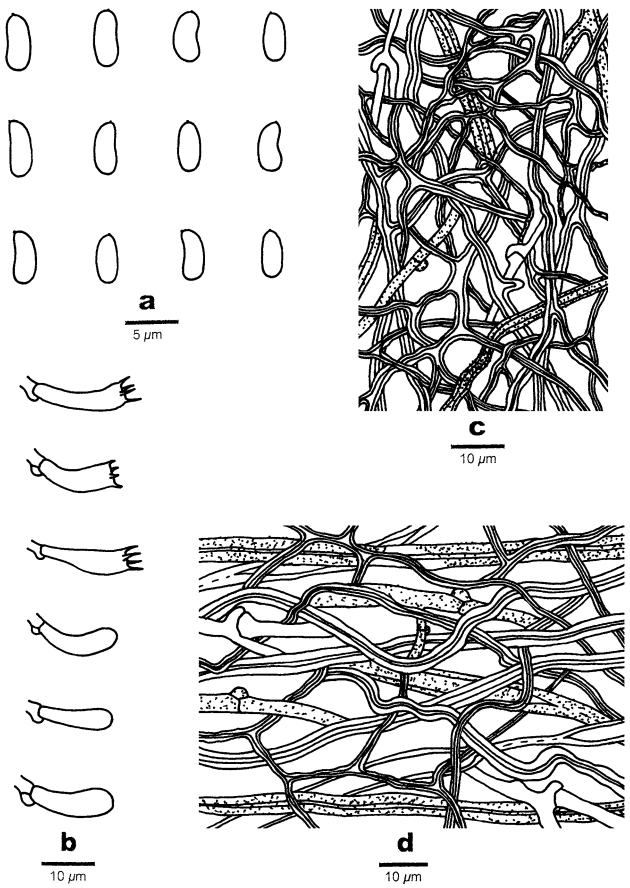

Fig. 401 Microscopic structures of *Trametes sanguinea* (drawn from *Dai 10882*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 μm; **b–d** = 10 μm

scarlet crystals, 1.8–2.3 μm in diam; skeletal hyphae dominant, orange-yellow, thick-walled with a wide to narrow lumen, occasionally branched, and some finely incrusted with scarlet crystals, interwoven, 2.5–3.8 μm in diam; binding hyphae pale yellowish, thick-walled to almost solid, frequently branched, interwoven, 2–2.5 μm in diam. Cystidia and cystidioles absent. Basidia clavate to barrel-shaped, with four sterigmata and a basal clamp connection, 11–15 × 4–5.5 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical to slightly allantoid, tapering at apiculus, hyaline, thin-walled, smooth, bearing one or two small guttules, IKI–, CB–, (3.5–) 3.6–4.4(–4.6) × 1.7–2 (–2.3) μm, L = 3.98 μm, W = 1.85 μm, Q = 2.15 (n = 30/1).

Notes. — *Trametes sanguinea* is characterized by its pale reddish-brown to brick-red, glabrous pileal surface, small pores and cylindrical basidiospores.

Specimens examined: **CHINA**. **Fujian**, Wuyishan County, Longchuan Valley, on fallen angiosperm trunk, 16 October 2005, *Cui 2875* (IFP). **Guangdong**, Ruyuan County, Nanling Nature Reserve, on fallen trunk of *Castanopsis fargesii*, 14 May 2009, *Dai 10882* (BJFC). **Guangxi**, Xing'an County, Maoershan Nature Reserve, on fallen angiosperm trunk, 10 August 2005, *Dai 6912* (IFP); 24 November 2007, *Cui 5386* (BJFC). **Jiangsu**, Nanjing, Zijin Mountain, on fallen trunk of *Castanopsis fargesii*, 10 October 2003, *Dai 5246* (IFP). **Jiangxi**, Yingtan, Longhu Mountain, on fallen trunk of *Castanopsis*, 5 October 2008, *Cui 5942* (BJFC); Nanchang, Meiling Park, on fallen angiosperm trunk, 7 October 2008, *Cui 5983* (BJFC). **Yunnan**, Jinghong, Menglun, Xishuangbanna Botanical Garden, on fallen angiosperm trunk, 6 August 2005, *Dai 6858* (IFP). **Zhejiang**, Lin'an County, Tianmushan Nature Reserve, on fallen angiosperm trunk, 8 October 2005, *Cui 2511, 2539* (IFP).

Trametes stipitata Hai J. Li, Y.C. Dai & B.K. Cui, **sp. nov.** (Figs. 402, 403)

MycoBank: MB 826675

Differs from other *Trametes* species by its stipitate basidiocarps, big pores and basidiospores, skeletal and binding hyphae swollen in KOH, and presence of cystidioles.

Type. — **CHINA**. **Yunnan**, Jingdong County, Ailaoshan Nature Reserve, on fallen angiosperm branch, 3 September 2007, *Yuan 3273* (holotype in BJFC, isotype in IFP).

Etymology. — *Stipitata* (Lat.): referring to its stipitate basidiocarps.

Fruiting body. — Basidiocarps annual, pileate, single, with a short stipe at base, without odor or taste when fresh, corky and distinctly light in weight when dry. Pilei infundibuliform to flabelliform, projecting up to 2.5 cm, 3.2 cm wide and 3 mm thick at base. Pileal surface white to cream when fresh, pale yellowish to pale reddish orange when dry, glabrous, concentrically zonate and sulcate; margin sharp, usually incurved when dry. Pore surface cream to pale yellow; pores angular, 2–3 per mm; dissepiments thin, entire. Context white to cream, corky, up to

Fig. 402 Basidiocarps of *Trametes stiptica*

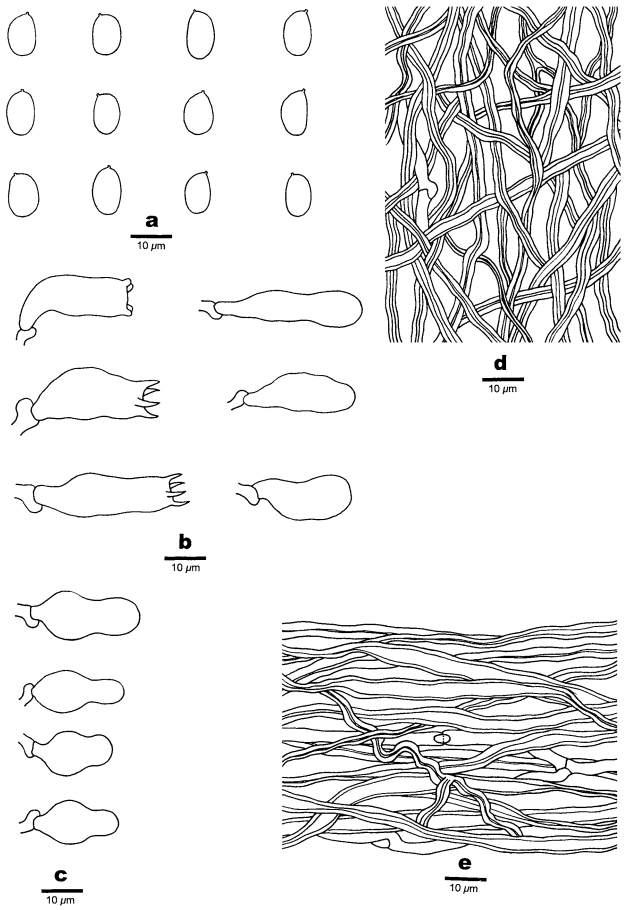

Fig. 403 Microscopic structures of *Trametes stiptica* (drawn from *Yuan 3273*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **e**. Hyphae from context. Bars: **a–e** = 10 μm

1 mm thick. Tubes cream to pale yellow, corky, up to 2 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae dominant, IKI–, CB–, swollen in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2.8–4.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, usually collapsed when dry, occasionally branched, 4–5.5 μm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 3.5–5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2–3.4 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow to wide lumen, occasionally branched, interwoven, 3.5–5 μm in diam; binding hyphae hyaline, thick-walled to almost solid, frequently branched, interwoven, 2–3 μm in diam. Cystidia absent; cystidioles calabash-shaped, hyaline, thin-walled, 11–18 × 9–12 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 20–30 × 8–13 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid to broadly ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, (8.2–)8.8–12 × (5.5–)5.8–7.2(–7.3) μm, L = 10.08 μm, W = 6.57 μm, Q = 1.53 (n = 30/1).

Notes. — *Trametes stiptica* is characterized by its stipitate basidiocarps, large pores and basidiospores, skeletal and binding hyphae swollen in KOH, and presence of calabash-shaped cystidioles.

Trametes suaveolens (L.) Fr., *Epicr. syst. mycol.* (Upsaliae): 491 (1838) (Figs. 404, 405)
MycoBank: MB 203430
Basionym: *Boletus suaveolens* L., *Sp. pl.* 2: 1177 (1753).

Fruiting body. — Basidiocarps annual, effused-reflexed to pileate, solitary or imbricate, with strong anise odor when fresh and gradually disappeared when dry, corky and distinctly light in weight when dry. Pilei semicircular, flabelliform, sometimes ungulate, projecting up to 9 cm, 20 cm wide and 40 mm thick at base. Pileal surface cream to white when fresh, turning to pale yellowish-brown, azonate or fairly zonate, glabrous to slightly velutinate, sometimes with irregular warts near base; margin obtuse. Pore surface cream to white when fresh, turning to yellowish brown to grayish-brown when dry; pores round to near round, 1–2 per mm; dissepiments thick, entire. Sterile margin distinct, cream, up to 5 mm wide. Context white to cream, corky, zonate, up to 30 mm thick. Tubes pale cream buff to grayish-brown, leathery when fresh, corky, up to 10 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2–3.8 μm in diam; skeletal hyphae dominant, hyaline, mostly thick-walled with a narrow lumen, occasionally with a wide lumen and usually collapsed when dry, occasionally branched, interwoven, 3.2–6 μm in diam; binding hyphae hyaline, thick-walled to

Fig. 404 Basidiocarps of *Trametes suaveolens*

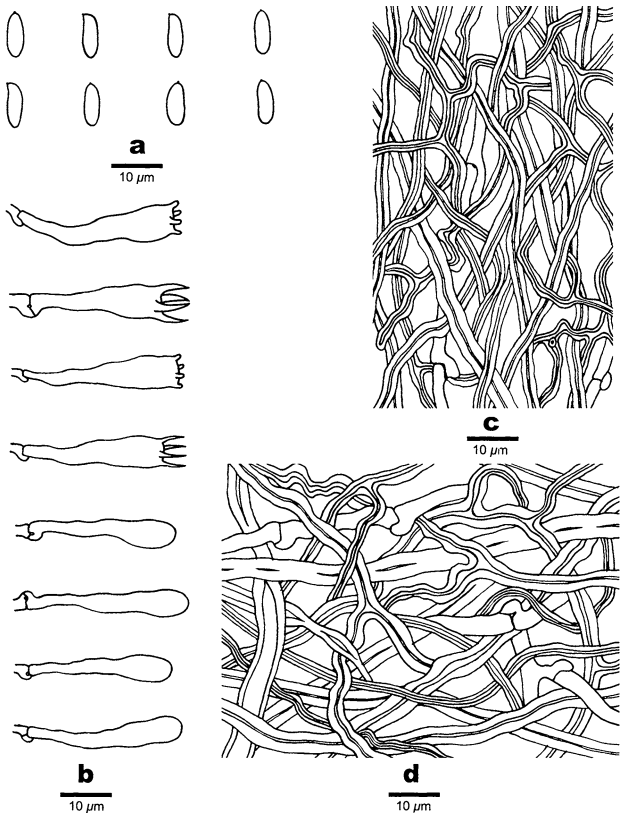

Fig. 405 Microscopic structures of *Trametes suaveolens* (drawn from *Dai 10729*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a–d** = 10 μm

almost solid, frequently branched, flexuous, interwoven, 1.8–3.5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 1.8–3 μm in diam; skeletal hyphae dominant, hyaline, mostly thick-walled with a narrow lumen, occasionally branched, straight, strongly interwoven, 2.5–4 μm in diam; binding hyphae hyaline, thick-walled to almost solid, frequently branched, flexuous, interwoven, 1.4–2.5 μm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 20–35 × 5–7 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (5.9 –)6–9(– 9.2) × (2.7–)3–4(–4.3) μm, L = 7.63 μm, W = 3.39 μm, Q = 2.13–2.4 (n = 120/4).

Notes. — *Trametes suaveolens* is characterized by its white basidiocarps with strong anise odor, and usually discovered on wood of *Populus* or *Salix*.

Specimens examined: **CHINA**. **Beijing**, Beijing Botanical Garden, on living tree of *Salix*, 27 July 2009, *Cui 6799* (BJFC). **Gansu**, Yuzhong County, Xinglongshan Nature Reserve, on living tree of *Populus*, 27 August 2005, *Cui 2232* (IFP). **Hebei**, Xinglong County, Wulingshan Nature Reserve, on dead tree of *Populus*, 30 August 2009, *Cui 7197, 7201, 7202, 7203* (BJFC); on fallen trunk of *Salix*, *Cui 7199* (BJFC). **Heilongjiang**, Mudanjiang, Wenchun, on living tree of *Salix*, 12 August 2009, *Cui 7108* (BJFC); Ning'an County, Jingpohu Park, on fallen trunk of *Betula*, 10 September 2007, *Dai 8888* (IFP); Yichun, Fenglin Nature Reserve, on fallen trunk of *Populus*, 1 August 2011, *Cui 9829* (BJFC). **Henan**, Neixiang County, Baotianman Nature Reserve, on fallen angiosperm trunk, 28 August 2005, *Li 340* (IFP). **Hubei**, Shiyan, Wudang Mountain, on fallen angiosperm trunk, 2 September 2005, *Li 516* (IFP). **Inner Mongolia**, Tongliao, Ganqika, Daqinggou, on living tree of *Salix*, 24 September 2002, *Dai 4011* (IFP). **Jilin**, Antu County, Changbaishan Nature Reserve, Huangsongpu, on fallen angiosperm trunk, 13 September 2007, *Dai 9125* (IFP); Hunchun, Hadamen, on fallen angiosperm trunk, 7 August 2009, *Cui 7082* (BJFC). **Jiangxi**, Fenyi County, Dagang Mountain, on fallen angiosperm trunk, 18 September 2008, *Dai 10436* (BJFC); Jiujiang, Nanhu Park, on fallen trunk of *Salix*, 10 October 2008, *Cui 6092* (BJFC). **Liaoning**, Kuandian County, Qingshangou, on dead tree of *Salix*, 30 July 2008, *Cui 5643*, *Cui 5668* (BJFC); Tianhua Mountain, on fallen trunk of *Fraxinus chinensis*, 28 July 2008, *Cui 5564* (BJFC); Tieling, on living tree of *Salix*, 23 September 1995, *Dai 2163* (IFP). **Qinghai**, Huzhu County, Beishan Forest Farm, on dead tree of *Populus*, 31 August 2003, *Dai 4932* (IFP); Qilian County, Shuigou, on fallen trunk of *Populus*, 9 September 2012, *Yuan 6503* (IFP); Xunhua County, Mengda Nature Reserve, on fallen trunk of *Salix*, 29 August 2005, *Cui 2256* (IFP); 30 August 2005, *Cui 2323* (IFP); on dead tree of *Populus*, 30 August 2005, *Cui 2393* (IFP). **Shandong**, Linyi, on dead tree of *Salix*, 1 August 2007, *Cui 5063* (IFP). **Shannxi**, Ningwu County, Fengxiang Mountain, on dead tree of *Salix*, 8 April 2009, *Dai 10729* (BJFC). **Shanxi**, Jiaocheng County,

Pangquangou Nature Reserve, on dead tree of *Salix*, 13 October 2004, *Yuan 893* (IFP). **Sichuan**, Songpan County, Huanglong, on fallen trunk of *Salix*, 15 October 2002, *Dai 4234* (IFP). **Xizang (Tibet)**, Cuona County, Lezhen, on living tree of *Salix*, 20 August 2004, *Yu 304* (IFP). **Xinjiang**, Xinyuan County, Nalati Nature Reserve, on fallen trunk of *Salix*, 23 August 2004, *Wei 1634* (IFP).

Trametes subsuaveolens B.K. Cui & Y.C. Dai, *Nova Hedwigia* 84(3-4): 517 (2007) (Figs. 406, 407)
MycoBank: MB 530072

Fruiting body. — Basidiocarps annual, pileate, solitary or imbricate, hard corky, without odor or taste when fresh, tough and light in weight when dry. Pilei dimidiate, projecting up to 5 cm, 8 cm wide and 1.5 cm thick at base. Pileal surface pale buff to yellowish brown, azonate or fairly zonate, velutinate; margin obtuse, reddish brown. Pore surface cream when fresh, becoming pale yellowish brown to cinnamon when dry; pores round to angular, 2–3 per mm; dissepiments thin, slightly lacerate. Context white when fresh, becoming cream when dry, upper layer soft, and lower context corky, azonate, up to 0.5 cm thick. Tubes cream to pale yellow, leathery, up to 1 cm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae hyaline, thin- to slightly thick-walled, unbranched, 1.8–4 µm in diam; skeletal hyphae hyaline, thick-walled to subsolid, occasionally branched, fairly straight, interwoven, 2.4–5.8 µm in diam; binding hyphae hyaline, thick-walled to almost solid, frequently branched, flexuous, interwoven, 1.8–3.7 µm in diam.

Tubes. — Generative hyphae hyaline, thin-walled, unbranched, 1.6–3.4 µm in diam; skeletal hyphae hyaline, thick-walled to subsolid, occasionally branched, fairly straight, loosely interwoven, 2–5 µm in diam; binding hyphae hyaline, thick-walled to almost solid, frequently branched, flexuous, interwoven, 1.7–3.5 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 12–18.5 × 4.6–6.5 µm; basidioles in shape similar to basidia, but slightly smaller.

Fig. 406 Basidiocarps of *Trametes subsuaveolens*

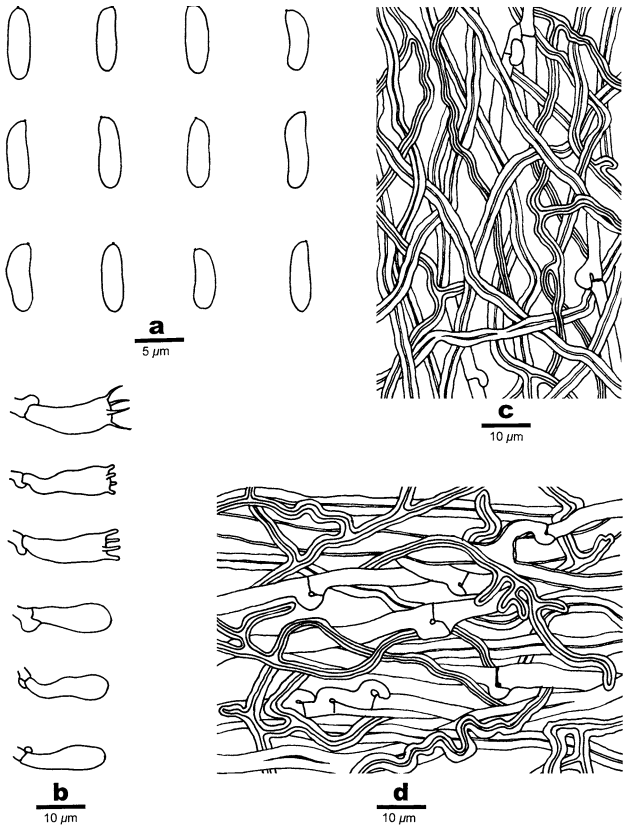

Fig. 407 Microscopic structures of *Trametes subsuaveolens* (drawn from *Cui 269*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 µm; **b–d** = 10 µm

Spores. — Basidiospores cylindrical, slightly curved, hyaline, thin-walled, smooth, IKI–, CB–, (5.2 –)5.6–7.2(–8.2) × (2.2–)2.3–3(– 3.1) µm, L = 6.38 µm, W = 2.56 µm, Q = 2.46–2.52 (n = 60/2).

Notes. — *Trametes subsuaveolens* resembles *T. suaveolens,* but the latter species has bigger pores (1–2 per mm), and larger basidiospores (6–9 × 3–4 µm). In addition, *T. suaveolens* produces a strong anise odor when fresh.

Specimens examined: **CHINA**. **Inner Mongolia**, Chifeng, Baiyinaobao Nature Reserve, on fallen trunk of *Picea*, 19 September 2003, *Cui 269* (holotype, IFP); on stump of *Betula*, *Cui 258* (paratype, IFP).

Trametes tephroleuca Berk., *Hooker's J. Bot. Kew Gard. Misc.* 6: 165 (1854) (Figs. 408, 409)
MycoBank: MB 471941

Fruiting body. — Basidiocarps annual, pileate, solitary or imbricate, corky when dry. Pilei semicircular, dimidiate to flabelliform; projecting up to 5 cm, 7.8 cm wide and 1.2 cm thick at base. Pileal surface cream to pale brown when dry, concentrically sulcate or not, strigose to hirsute; margin obtuse. Pore surface cream to pale buff, becoming gray with age; pores round to angular, 1–2 per mm; dissepiments moderately thick, entire. Context cream, corky when dry, up to 7 mm thick, a black line occasionally present towards the upper surface. Tubes cream when juvenile, becoming gray with age, corky when dry, up to 5 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae hyaline, thin-walled, 1.5–4.8 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, mostly with a narrow lumen, usually collapsed when with a wide lumen, occasionally branched, more or less regularly arranged, 2.3–6.5 µm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, strongly interwoven, 1.2–3 µm in diam.

Tubes. — Generative hyphae hyaline, thin-walled, 1.3–3.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, occasionally branched, interwoven, sometimes projecting into the hymenium with a thin-walled and inflated tip, 2–5 µm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, strongly interwoven, 1–2.3 µm in diam. Cystidia absent; fusoid cystidioles occasionally present, hyaline, thin-walled, 13–17 × 4–6 µm. Basidia clavate to barrel-shaped, with four sterigmata and a basal clamp connection, 12–16 × 4–5.5 µm; basidioles in shape similar to basidia, but slightly smaller.

Fig. 408 Basidiocarps of *Trametes tephroleuca*

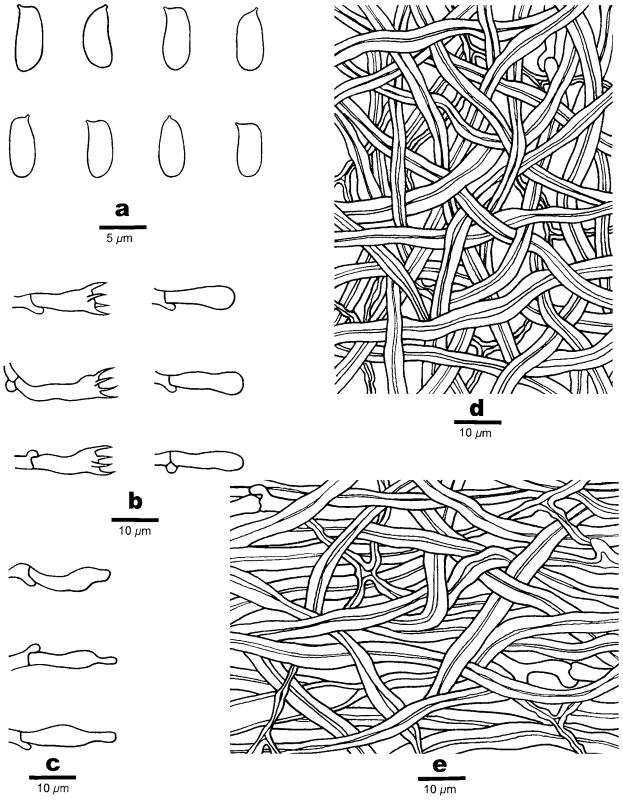

Fig. 409 Microscopic structures of *Trametes tephroleuca* (drawn from *Cui 7977*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **e**. Hyphae from context. Bars: **a** = 5 µm; **b–e** = 10 µm

Spores. — Basidiospores cylindrical to oblong-ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, (4.5–)4.8–7(–9) × (2–)2.5–3.3 µm, L = 5.87 µm, W = 2.88 µm, Q = 1.90–2.19 (n = 60/2).

Notes. — *Trametes tephroleuca* is characterized by its strigose to hirsute pileus, grayish pores with age. It was described from Nepal (Berkeley 1854), and also reported from India previously (Roy and De 1996). It resembles *T. hirsuta*, which shares similar basidiocarps and grayish to blackish pores with age, but differs by having smaller pores (3–4 per mm) and narrower basidiospores (6–9 × 2–2.5 µm, Núñez and Ryvarden 2001).

Specimens examined: **CHINA**. **Yunnan**, Tengchong County, Gaoligong Mountain, on fallen angiosperm trunk, 23 October 2009, *Cui 7977*, *7981*, *7987* (BJFC).

Trametes thujae J.D. Zhao, *Acta Mycol. Sin.* 10(4): 270 (1991) (Figs. 410, 411)
MycoBank: MB 355241
≡ *Funalia thujae* (J.D. Zhao) Y.C. Dai & H.S. Yuan, *Ann. bot. fenn.* 47(2): 115 (2010).

Fruiting body. — Basidiocarps annual to biennial, pileate, sometimes effused-reflexed, rarely resupinate,

mostly solitary, rarely imbricate, coriaceous, without odor or taste when fresh, corky and light in weight when dry. Pilei dimidiate, projecting up to 3 cm, 5 cm wide and 1 cm thick at base. Pileal surface honey yellow to ash gray or grayish brown with age, zonate or concentrically sulcate, pubescent or almost glabrous with age; margin obtuse. Pore surface cream when fresh, becoming grayish cream, olivaceous-buff, or cinnamon brown when dry; pores angular, radically aligned or elongated, 0.5–1 per mm tangentially; dissepiments thin, slightly lacerate. Context white when fresh, becoming cream or clay buff when dry, homogeneous, corky, azonate, up to 1 mm thick. Tubes concolorous with pore surface, leathery, up to 9 mm long; tube layers indistinct.

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

Context. — Generative hyphae frequent, hyaline, thin-walled, frequently branched, 2.5–4.5 µm in diam; skeletal hyphae hyaline, thick-walled with a wide lumen, occasionally branched, fairly straight, sometimes collapsed, interwoven, 4.5–6.5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3.5 µm in diam; skeletal hyphae hyaline, thick-walled with a wide lumen, occasionally branched, fairly straight, loosely interwoven, 2.5–5.5 µm, sometimes encrusted by fine crystals. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 11–15 × 4.5–6 µm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores allantoid, hyaline, thin-walled, smooth, IKI–, CB–, (7–)7.5–9(–9.2) × (2–)2.1–3 µm, L = 8.16 µm, W = 2.46 µm, Q = 3.07–3.63 (n = 71/2).

Notes. — Basidiospores of *Trametes thujae* were reported as 3.5–6 × 1.5–2.5 µm (Zhao and Zhang 1991), after studying the holotype, we found that the basidiospores are bigger than previously reported. *T. junipericola* Manjon, Moreno & Ryvarden described from central Spain (Ryvarden and Gilbertson 1994) may be confused with *T. thujae*. However, it differs from the latter in having smaller pores (2–3 per mm) and bigger basidiospores (8–10 × 3–4 µm).

Fig. 410 Basidiocarps of *Trametes thujae*

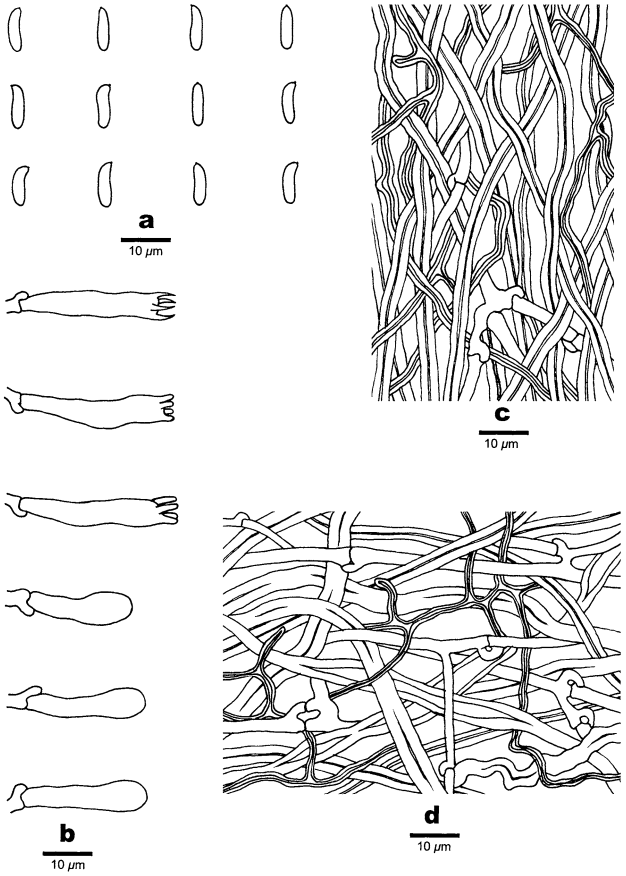

Fig. 411 Microscopic structures of *Trametes thujae* (drawn from *Cui 10699*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a–d** = 10 µm

Specimens examined: **CHINA**. **Gansu**, Zhangye, Qilianshan Naturre Reserve, Sidalong Forest Farm, on fallen trunk of *Thuja*, 20 August 2005, *Cui 2130, 2134* (IFP). **Qinghai**, Huzhu County, Beishan Forest Farm, on fallen trunk of *Thuja*, 31 August 2003, *Dai 4953* (IFP); Menyuan County, Xianmi Forest Farm, on fallen trunk of *Sabina przewalskii*, 31 September 2003, *Dai 5055* (IFP). **Sichuan**, Xiaojin County, Siguniang Mountain, on living tree of *Sabina*, 16 October 2012, *Cui 10699* (BJFC). **Xizang (Tibet)**, Changdu, Xiangda, on fallen branch of *Thuja*, 8 June 1976, *Zang 293* (holotype, HMAS).

Trametes velutina (P. Karst.) G. Cunn., *Bull. N.Z. Dept. Sci. Industr. Res., Pl. Dis. Div.* 164: 173 (1965) (Figs. 412, 413)

MycoBank: MB 340206

Basionym: *Boletus velutinus* Pers., *Ann. Bot. (Usteri)* 11: 29 (1794).

Fruiting body. — Basidiocarps annual, pileate, sometimes with a disc-shaped base, without odor or taste when fresh, usually imbricate, corky and distinctly light in weight when dry. Pilei semicircular to flabelliform, projecting up to 4.6 cm, 4.8 cm wide and 3 mm thick at base. Pileal surface cream when fresh, cream, pale gray to pale reddish orange when dry, finely velutinate or glabrous later, sometimes with irregular warts, distinctly concentrically zonate and sulcate, occasionally radially wrinkled; margin sharp, entire. Pore surface cream when fresh, turning to pale yellow to pale ochraceous, shining; pores angular to irregular, more or less radially arranged, 4–6 per mm; dissepiments thin, entire to lacerate. Context white to cream, corky, up to 1.3 mm thick. Tubes cream to pale yellow, corky, up to 1.7 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin- to slightly thick-walled, occasionally branched, 2.5–4.2 µm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, occasionally branched, 3.5–6 µm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 1.7–3.5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 1.8–3.3 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, occasionally branched, interwoven, 2.5–4 µm in diam; binding hyphae hyaline, thick-walled to almost solid, frequently branched, interwoven, 1–3 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 13–16 × 4–5 µm; basidioles in shape similar to basidia, but slightly smaller.

Fig. 412 Basidiocarps of *Trametes velutina*

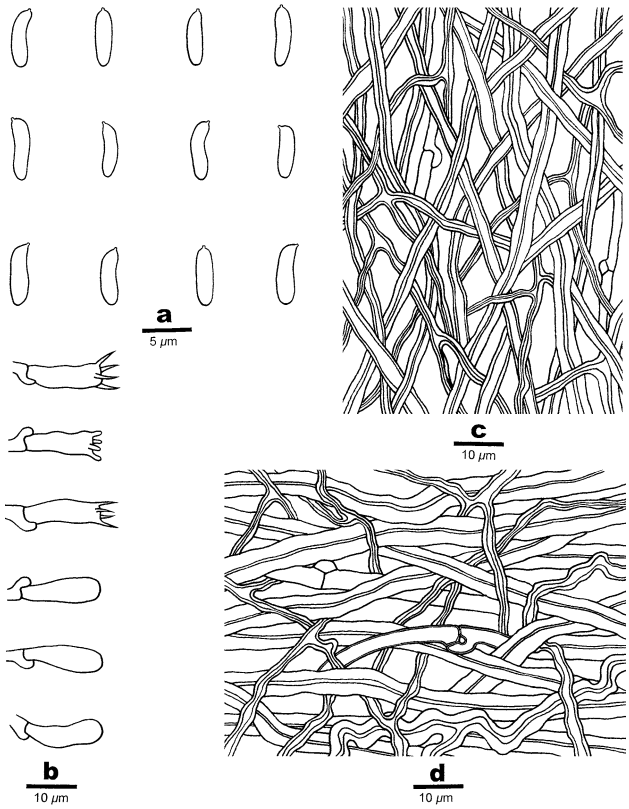

Fig. 413 Microscopic structures of *Trametes velutina* (drawn from *Yuan 2628*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 µm; **b–d** = 10 µm

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (4.2–)5–6(–7) × (1.5–)1.8–2.1(–2.3) µm, L = 5.73 µm, W = 1.93 µm, Q = 2.74–3.25 (n = 180/6).

Notes. — *Trametes velutina* is characterized by its velutinate or glabrous, cream, distinctly concentrically zonate and sulcate pileal surface, pale yellow to pale ochraceus pore surface and cylindrical basidiospores.

Specimens examined: **CHINA**. **Heilongjiang**, Ning'an County, Jingpuohu Park, on fallen angiosperm trunk, 10 September 2007, *Dai 8939* (IFP). **Inner Mongolia**, Genhe County, Great Hinggan Mountains, on fallen trunk of *Betula*, 15 October 2005, *Cui 12790, 12791, 12792, 12793* (BJFC). **Jilin**, Antu County, Changbaishan Nature Reserve, on fallen trunk of *Betula*, 1 September 1993, *Dai 971* (IFP); Antu County, Baihe, on fallen trunk of *Betula*, 15 September 1995, *Dai 2135* (IFP). **Shannxi**, Zhouzhi County, Taizibao, on fallen angiosperm trunk, 24 October 2006, *Yuan 2628* (IFP); Foping County, Foping Nature Reserve, on stump of *Quercus*, 27 October 2006, Yuan 2774 (IFP).

Trametes versicolor (L.) Lloyd, *Mycol. Notes (Cincinnati)* 65: 1045 (1921) (Figs. 414, 415)
MycoBank: MB 281625

Basionym: *Boletus versicolor* L., *Sp. pl.* 2: 1176 (1753).

Fruiting body. — Basidiocarps annual, pileate to effused-reflexed, usually imbricate, sometimes hundreds of basidiocarps clustered together, coriaceous when fresh and corky when dry. Pilei semicircular, dimidiate to flabelliform; projecting up to 8 cm, 10 cm wide and 5 mm thick at base. Pileal surface variable, pale gray, pale yellow, yellowish-brown, brown, reddish-brown, violet to grayish violet, concentrically zonate, densely hirsute to tomentose; margin acute. Pore surface cream to pale ash-gray; pores round to angular, 3–5 per mm; dissepiments thin, entire when juvenile and lacerate with age. Sterile margin distinct, white to cream, up to 2 mm wide. Context cream, coriaceous when fresh and corky when dry, up to 2 mm thick, a black line occasionally present towards the upper surface. Tubes cream when juvenile, becoming ash-gray to grayish brown with age, coriaceous when fresh and corky when dry, up to 3 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–, swollen in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 2–3.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, sometimes collapsed when dry, occasionally branched, strongly interwoven, 2.8–5 μm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, strongly interwoven, 1.5–2.8 μm in diam.

Tubes. — Generative hyphae hyaline, thin-walled, occasionally branched, 1.8–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled to subsolid, moderately branched, sometimes collapsed when dry, interwoven, 2–4.2 μm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, strongly interwoven, 1.5–2.5 μm in diam. Cystidia and cystidioles absent.

Fig. 414 Basidiocarps of *Trametes versicolor*

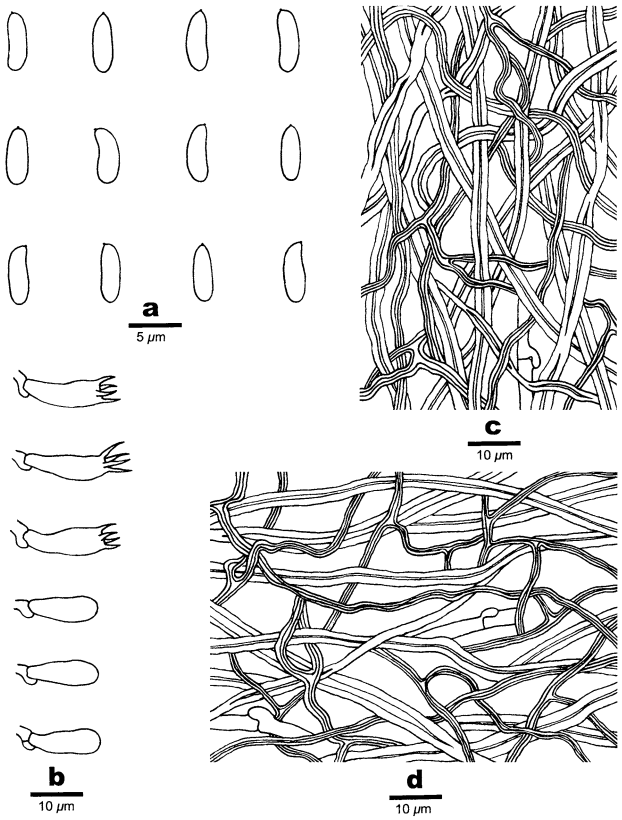

Fig. 415 Microscopic structures of *Trametes Trametes versicolor* (drawn from *Dai 10998*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama; **d**. Hyphae from context. Bars: **a** = 5 μm; **b–d** = 10 μm

Basidia clavate to barrel-shaped, with four sterigmata and a basal clamp connection, 13–18 × 4–6 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (4–)4.1–6(–6.1) × (1.7–)1.8–2.2(–2.3) μm, L = 4.83 μm, W = 1.96 μm, Q = 2.29–2.66 (n = 120/4).

Notes. — *Trametes versicolor* is characterized by its densely hirsute to tomentose and concentrically zonate pileal surface with variable colors, small pores and cylindrical basidiospores.

Specimens examined: **CHINA**. **Anhui**, Huangshan, Huangshan Mountain, on fallen trunk of *Idesia polycarpa*, 22 October 2010, *Dai 11928* (BJFC); on fallen branch of *Platycarya strobilacea*, 10 October 2004, *Dai 6013* (IFP). **Chongqing**, Jinyun Mountain, on fallen angiosperm trunk, 12 November 2007, *Dai 9226* (BJFC). **Fujian**, Jian'ou County, Wanmulin Nature Reserve, on fallen angiosperm trunk, 30 August 2006, *Cui 4217* (IFP). **Gansu**, Pingliang, Kongdong Mountain, on fallen trunk of *Salix*, 12 September 2012, *Yuan 6526* (IFP); Lingtai County, Shizi, on fallen angiosperm trunk, 5 October 2010, *Cui 9798* (BJFC). **Guangdong**, Shixing County, Chebaling Nature

Reserve, on fallen angiosperm trunk, 12 September 2009, *Cui 7374* (BJFC); Ruyang County, Nanling Nature Reserve, on fallen trunk of *Castanopsis fargesii*, 14 May 2009, *Dai 10885* (BJFC). **Guangxi**, Longsheng County, Wenquan Forest Park, on fallen angiosperm trunk, 9 August 2005, *Dai 6895* (IFP). **Hainan**, Haikou, on fallen branch of *Robinia pseudoacacia*, 23 May 2008, *Dai 9485* (BJFC). **Hebei**, Xinglong County, Wulingshan Nature Reserve, on fallen angiosperm trunk, 30 July 2009, *Cui 6915* (BJFC). **Heilongjiang**, Hulin County, Qihulin Forest Farm, on fallen trunk of *Prunus*, 10 September 2004, *Yuan 390* (IFP). **Henan**, Xinyang, Jigongshan Nature Reserve, on fallen angiosperm trunk, 20 August 2005, *Li 55* (IFP). **Hubei**, Shiyan, Wudang Mountain, on fallen angiosperm trunk, 2 September 2005, *Li 523* (IFP). **Hunan**, Yizhang County, Mangshan Nature Reserve, on fallen angiosperm trunk, 25 June 2007, *Li 1724* (IFP). **Jilin**, Antu County, Changbaishan Nature Reserve, Huangsongpu, on fallen angiosperm trunk, 13 September 2007, *Dai 9158* (BJFC). **Jiangsu Province**, Nanjing, Linggusi, on fallen trunk of *Pinus*, 31 July 2003, *Wei 1045* (IFP); Zijin Mountain, on fallen angiosperm trunk, 11 September 2009, *Dai 11223* (BJFC). **Jiangxi**, Yushan County, Sanqing Mountain, on fallen angiosperm trunk, 2 October 2008, *Cui 5922* (BJFC). **Liaoning**, Kuandian County, Qingshangou, on fallen trunk of *Quercus*, 30 July 2008, *Cui 5675* (BJFC); Tongyuanbao, on fallen trunk of *Quercus*, 16 August 2006, *Dai 7762* (IFP); Qingyuan County, Dasuhe Forest Farm, on fallen trunk of *Fraxinus chinensis*, 23 October 2003, *Wei 1189* (IFP). **Inner Mongolia**, Aershan, Wuchagou Forest Farm, on fallen trunk of *Betula*, 24 July 2005, *Cui 1742* (IFP). **Qinghai**, Huzhu County, Beishan Forest Farm, on fallen trunk of *Populus*, 31 August 2003, *Dai 4935* (IFP). **Shandong**, Mengyin County, Mengshan Forest Park, on fallen trunk of *Quercus*, 5 August 2007, *Cui 5043* (IFP); Tai'an, Tai Mountain, on fallen branch of *Fraxinus chinensis*, 13 October 2003, *Dai 5307* (IFP). **Shanghai**, Shanghai Botanical Garden, on fallen trunk of *Cinnamomum camphora*, 9 October 2004, *Dai 6003* (IFP). **Shannxi**, Baoji, Taibaishan Nature Reserve, on fallen angiosperm branch, 22 September 2005, *Wang 574* (IFP); Zhouzhi County, Louguantai Forest Park, on living tree of *Sabina chinensis*, 1 September 2005, *Wang 528* (IFP). **Shanxi**, Jiaocheng County, Pangquangou Nature Reserve, on fallen branch of *Pinus*, 11 October 2004, *Yuan 823* (IFP); Qinshui County, Lishan Nature Reserve, on fallen branch of *Betula*, 18 October 2004, *Yuan 992* (IFP). **Sichuan**, Luding County, Hailuogou Forest Park, on fallen angiosperm trunk, 20 October 2012, *Cui 10804* (BJFC); Jiuzhaigou County, Jiuzhaigou Nature Reserve, on fallen trunk of *Populus*, 12 October 2002, *Dai 4081* (IFP). **Tianjin**, Ji County, Baxianshan Forest Park, on fallen trunk of *Quercus*, 20 September 2003, *Dai 5105* (IFP). **Xizang (Tibet)**, Linzhi County, Lulang, on fallen trunk of *Pinus*, 10 August 2004, *Yu 116* (IFP); Cuona County, Lezhen, on fallen trunk of *Hippophae rhamnoides*, 20 August 2004, *Yu 277* (IFP). **Yunnan**, Kunming, Park of Kunming Insititue of Botany, on fallen trunk of *Prunus*, 22 May 2009, *Dai 10998* (BJFC). **Zhejiang**, Hangzhou, Xihu Park, on fallen angiosperm trunk, 18 October 2004, *Dai 6517* (IFP); Jiuxi Forest Park, on fallen angiosperm trunk, 17 October2010, *Dai 11818* (BJFC); Lin'an County, Tianmushan Nature Reserve, on fallen trunk of *Liquidambar formosana*, 8 October 2005, *Cui 2523* (IFP).

Trametes vespacea (Pers.) Zmitr., Wasser & Ezhov, *International Journal of Medicinal Mushrooms* 14(3): 313 (2012) (Figs. 416, 417)

MycoBank: MB 563001

Basionym: *Polyporus vespaceus* Pers., *Voy. Uranie., Bot.*: 170 (1827).

≡ *Lenzites vespacea* (Pers.) Pat., *Essai Tax. Hyménomyc.* (Lons-le-Saunier): 91 (1900).

Fruiting body. — Basidiocarps annual, pileate, single or imbricate, without odor or taste when fresh, corky and light in weight upon drying. Pilei semicircular to flabelliform, up to 6 cm long, 9 cm wide and 15 mm thick at base. Pileal surface cream to straw-colored, slightly velutinate to glabrous; margin acute, entire and slightly lacerate when dry. Pore surface white to cream when fresh, white to pale yellowish-brown when dry; pores lamellae, 7–8 per cm; dissepiments about 0.2 mm, entire near margin and usually dentate near the base. Context white to cream, corky, up to 4 mm thick. Tubes cream to straw-colored, corky, up to 11 mm long.

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, moderately branched, 2–2.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, usually collapsed when dry, occasionally branched, interwoven, 2.8–3.8 μm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 2–3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–3 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, occasionally branched, interwoven, 2.5–3.5 μm in diam; binding hyphae hyaline, thick-walled to subsolid, frequently branched, interwoven, 1.8–3 μm in diam. Cystidia and cystidioles absent, but many skeletal hyphae ends penetrated into the hymenium. Basidia clavate, with four sterigmata and a basal clamp connection, 16–20 × 4–5 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, (3.6–)3.8–4.8(–5) × (2.1–)2.3–2.8(–

Fig. 416 Basidiocarps of *Trametes vespacea*

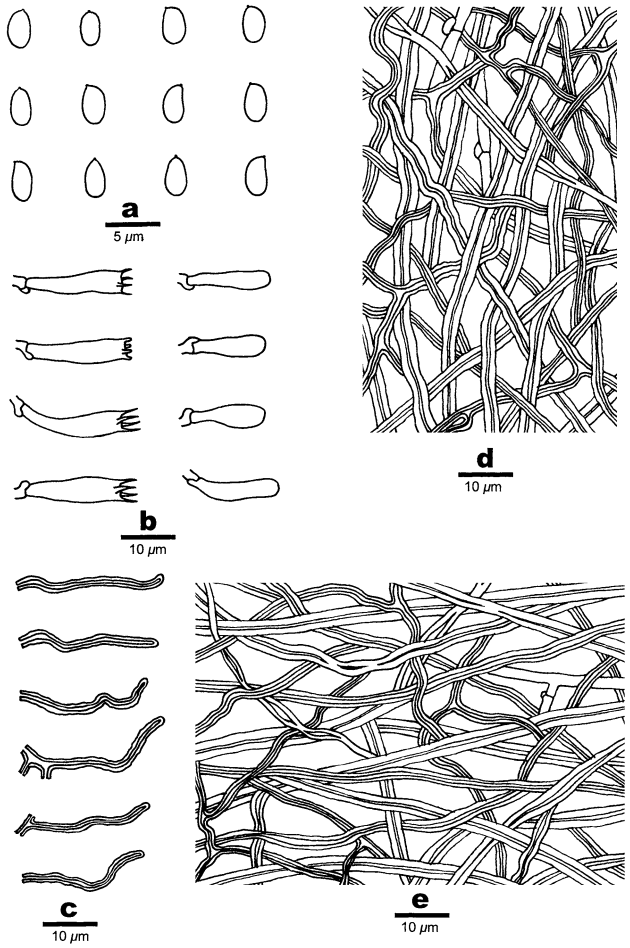

Fig. 417 Microscopic structures of *Trametes vespacea* (drawn from *Cui 7622*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Skeletal hyphae end; **d**. Hyphae from trama; **e**. Hyphae from context. Bars: **a** = 5 μm; **b–e** = 10 μm

2.9) μm, L = 4.21 μm, W = 2.54 μm, Q = 1.55–1.76 (n = 60/2).

Notes. — *Trametes vespacea* is characterized by its cream to straw-colored, slightly velutinate to glabrous pileal surface, lamellae large pores and small ellipsoid basidiospores.

Specimens examined: **CHINA**. **Guangdong**, Ruyang County, Nanling Nature Reserve, on angiosperm stump, 17 September 2009, *Cui 7622* (BJFC); Shixing County, Chebaling Nature Reserve, on angiosperm stump, 24 June 2010, *Cui 8758* (BJFC). **Hainan**, Wuzhishan County, Wuzhishan Nature Reserve, on fallen angiosperm stunk, 25 November 2007, *Cui 5447* (BJFC). **Taiwan**, Yilan County, Linmei Road, on fallen angiosperm trunk, 20 November 2009, *Dai 11525* (BJFC); Hualian County, Tailuge Forest Park, on fallen angiosperm stunk, 21 November 2009, *Dai 11549* (BJFC).

Truncospora Pilát ex Pilát, *Sb. Nár. Mus. v Praze, Rada B, Prír. Vedy* 9(2): 108 (1953).
MycoBank: MB 18685
Type species: *Truncospora ochroleuca* (Berk.) Pilát.

Basidiocarps annual to perennial, pileate. Pilei applanate to ungulate, glabrous, cream to grayish brown. Pore surface white to ochraceous; pores large; dissepiments thick, entire. Context white to ochraceous, corky. Tubes concolorous with pore surface, corky. Hyphal system dimitic; generative hyphae hyaline, thin-walled, rarely branched, bearing clamp connections; skeletal hyphae dominant, hyaline, subsolid to thick-walled with a wide lumen, usually unbranched, interwoven, strongly dextrinoid, cyanophilous; tissues unchanged in KOH. Cystidia absent; cystidioles variably present. Basidiospores ellipsoid, truncate, hyaline, thick-walled, smooth, strongly dextrinoid, CB + .

Truncospora is a cosmopolitan genus with about eleven species accepted worldwide (Pilát 1953; Corner 1989; Decock and Ryvarden 1999; Decock 2011; Zhao and Cui 2013a; Spirin et al. 2015). Morphologically, it is characterized by relatively small, pileate basidiocarps, and truncate, variably (strongly) dextrinoid basidiospores (Zhao et al. 2013a). Phylogenetically, it forms a clade distinct from the *Perenniporia* sensu stricto clade (Zhao and Cui 2013a; Zhao et al. 2013a).

Key to species of *Truncospora* in China

1 Basidiocarps with a distinct crust..... ……*T. macrospora*
1 Basidiocarps without a crust..... ……2
2 Pores 5–7 per mm, pilei light brown to black.....
.....*T. ornata*
2 Pores 2–5 per mm, pilei cream to ochraceous ..... ……
..... *T. ochroleuca*

Truncospora macrospora B.K. Cui & C.L. Zhao, *Phytotaxa* 87: 33 (2013) (Figs. 418, 419)
MycoBank: MB 801932

Fruiting body. — Basidiocarps annual, pileate, solitary, corky to wood hard upon drying. Pilei usually semicircular, projecting up to 1.5 cm, 3.5 cm wide and 0.5 cm thick at base. Pileal surface clay-buff to orange-brown when fresh, reddish brown to grayish brown upon drying, with a distinct dark brownish crust, glabrous; margin obtuse. Pore surface cream to cream buff when fresh, becoming buff upon drying; pores regular, more or less round, 3–4 per mm; dissepiments thick, entire. Sterile margin narrow, cream, up to 1 mm wide. Context cinnamon-buff to buff, soft corky, about 1 mm thick. Tubes concolorous with pore surface, woody hard, up to 4 mm thick.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB + , slightly swollen in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 3–4.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, unbranched, interwoven, 4.5–6.5 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 2–4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, unbranched, interwoven, 3–5.5 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 17–23 × 4–5 µm. Basidia barrel-shaped, with four sterigmata and a basal clamp connection, 20–29 × 11–15.5 µm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, truncate, hyaline, thick-walled, smooth, strongly dextrinoid, CB + , (16–) 16.5–19.5(–20) × (7.5–)8–9.5(–10) µm, L = 18.2 µm, W = 8.67 µm, Q = 2.07–2.11 (n = 60/2).

Notes. — *Truncospora ochroleuca* may be confused with *T. macrospora* by sharing pileate basidiocarps, similar pore size (2–4 per mm), dextrinoid skeletal hyphae and ellipsoid, truncate, strongly dextrinoid basidiospores.

Fig. 418 Basidiocarps of *Truncospora macrospora*

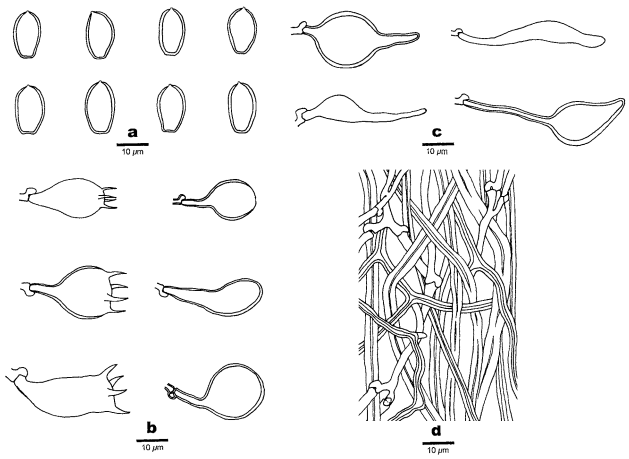

Fig. 419 Microscopic structures of *Truncospora macrospora* (drawn from *Cui 8106*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 µm

However, *T. ochroleuca* is distinguished from *T. macrospora* by having cream to ochraceous pileus, and smaller basidiospores (13.1–15.1 × 7.3–8.7 µm). *Truncospora ohiensis* (Berk.) Ryvarden shares pileate basidiocarps, buff pore surface and dextrinoid basidiospores. However, it differs by its perennial basidiocarps, smaller pores (5–7 per mm), and smaller basidiospores (13–16 × 7–10 µm, Gilbertson and Ryvarden 1987). *Truncospora detrita* (Berk.) Decock is similar to *T. macrospora* in having pileate basidiocarps, similar pores (4–5 per mm) and strongly dextrinoid basidiospores. However, *T. detrita* has perennial basidiocarps and smaller basidiospores (10.3–12.5 × 6.2–7.8 µm, Decock and Ryvarden 1999). *Truncospora oboensis* Decock differs from *T. macrospora* in having white pilei, and smaller basidiospores (11–14 × 6.5–8.5 µm, Decock 2011).

Specimens examined: **CHINA**. **Yunnan**, Baoshan, Gaoligong Mountain, on fallen angiosperm branch, 22 September 2007, *Yuan 3777* (paratype, BJFC); 25 October 2009, *Cui 8106* (holotype, BJFC).

Truncospora ochroleuca (Berk.) Ryvarden, *Nord. J. Bot.* 19: 233 (1972) (Figs. 420, 421)
MycoBank: MB 291632
Basionym: *Polyporus ochroleucus* Berk., *London J. Bot.* 4: 53 (1845).

Fruiting body. — Basidiocarps annual to perennial, pileate, corky to wood corky upon drying. Pilei usually semicircular, projecting up to 1.7 cm, 2.6 cm wide and 1.5 cm thick at base. Pileal surface buff to pale ochraceous when fresh, ochraceous upon drying, glabrous; margin obtuse. Pore surface cream buff when fresh, becoming buff upon drying; pores round, 4–5 per mm; dissepiments thick, entire. Sterile margin narrow, cream, up to 0.5 mm wide.

Context buff, corky, about 1 mm thick. Tubes concolorous with pore surface, woody hard, up to 14 mm thick.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB + ; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, usually unbranched, 1.8–3.1 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, unbranched, interwoven, 3.2–5.2 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, unbranched, 1.5–3.1 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, unbranched, interwoven, 3.1–4.7 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 13.1–17 × 5.5–7.5 µm. Basidia barrel-shaped, with four sterigmata and a basal clamp connection, 20.5–28.1 × 10.6–12.1 µm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, truncate, hyaline, thick-walled, smooth, strongly dextrinoid, CB + , (11.2–)13.1–15.1(–16.7) × (7.1–)7.3–8.7(–9.1) µm, L = 14.7 µm, W = 8.04 µm, Q = 1.78–1.88 (n = 90/3).

Notes. — *Truncospora ohiensis*, *T. detrita* and *T. ochroleuca* share similar characters by having small basidiocarps, a dimitic hyphal system. However, *T. ohiensis* and *T. detrita* differ from *T. ochroleuca* by having brown to blackish-brown pileate basidiocarps (Gilbertson and Ryvarden 1987; Núñez and Ryvarden 2001).

Specimens examined: **CHINA**. **Anhui**, Huangshan, Yellow Mountain, on fallen angiosperm branch, 10 October 2004, *Cui 6022*, *6018* (BJFC); 22 October 2010, *Dai 11923* (BJFC); She County, Qingliangfeng Nature Reserve, on fallen angiosperm branch, 14 December 2009, *Cui 8680* (BJFC). **Fujian**, Xiamen, Xiamen Botanic Garden, on fallen angiosperm branch, 8 September 2003, *Dai 5069* (IFP), 23 August 2006, *Cui 4033, 4037, 4040* (BJFC); Wuyishan County, Wuyi Mountain, on fallen angiosperm branch, 18 October 2005, *Dai 7195* (IFP); Tianyoufeng, on fallen angiosperm branch, 26 August 2006, *Cui 4120, 4102, 4092* (BJFC); Wuyishan Nature Reserve, Taoyuanyu, on fallen angiosperm branch, 28 August 2006, *Cui 4159* (BJFC). **Guangdong**, Huizhou, Luofushan Forest Park, on fallen angiosperm branch, 14 February 2009, *Dai 10693* (BJFC); Shixing County, Chebaling Nature Reserve, on fallen angiosperm branch, 12 September 2009, *Cui 7388* (BJFC); 14 November 2010, *Cui 7482* (BJFC); 23 December 2010, *Cui 8704* (BJFC); 24 December 2010, *Cui 8741, 8748, 8768* (BJFC); 25 December 2010, *Cui 8790, 8805, 8809, 8818, 8826* (BJFC); 26 December 2010, *Cui 8843, 8866* (BJFC); Guangzhou, Baiyun Mountain, on fallen angiosperm branch, 28 June 2010, *Cui 8870, 8876* (BJFC); Zhaoqing, Dinghushan Nature Reserve, on fallen angiosperm branch, 29 June 2010 *Cui 8905, 8902, 8926* (BJFC); Fengkai County, Heishiding Nature Reserve, on fallen angiosperm branch, 1 July 2010, *Cui 9002* (BJFC); Guangzhou, Huanan Botanic Garden, on fallen angiosperm branch, 2 July 2010, *Cui 9138* (BJFC); Maofengshan Forest Farm, on fallen angiosperm branch, 19 August 2011, *Cui 10142* (BJFC). **Guangxi**, Nanning, Qingxiushan Park, on fallen angiosperm branch, 13 August 2005, *Dai 6927* (IFP); 9 November 2009, *Dai 11490, 11486*; Xing'an County, Maoershan Nature Reserve, on fallen angiosperm branch, 20 August 2011, *Cui 10574* (BJFC); Jinxiu County, Shengtang Lake, on fallen angiosperm branch, 25 August 2011, *Cui 10581* (BJFC). **Guizhou**, Guiyang, on fallen angiosperm branch, 25 August 2010, *Cui 9217* (BJFC). **Hunan**, Changsha, Yuelu Mountain, on fallen angiosperm branch, 25 September 2009, *Cui 7939, 7945, 7935* (BJFC);

Fig. 420 Basidiocarps of *Truncospora ochroleuca*

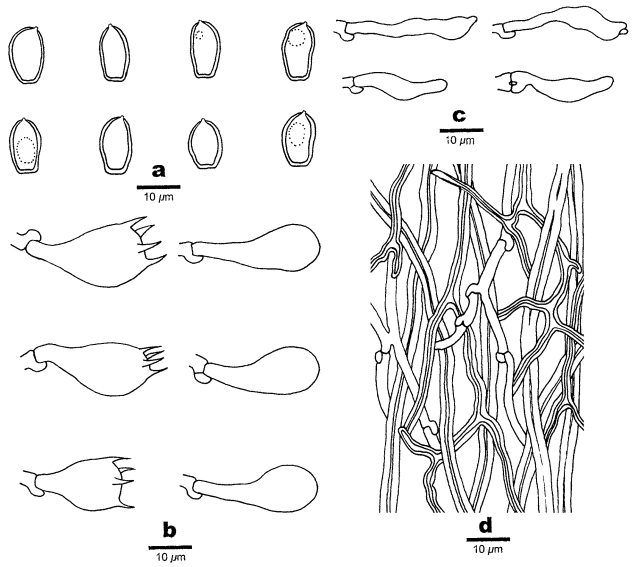

Fig. 421 Microscopic structures of *Truncospora ochroleuca* (drawn from *Cui 5673*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a–d** = 10 µm

Zhangjiajie, Zhangjiajie Forest Park, on fallen angiosperm branch, 17 August 2010, *Dai 11681* (BJFC). **Jiangsu**, Nanjing, Zijin Mountain, Linggusi, on fallen angiosperm branch, 31 July 2003 *Wei 1043, 1042* (IFP); 10 October 2003, *Dai 5241* (IFP); 3 June 2005, *Dai 6593, 6589* (IFP); Zhenjiang, Baohua Mountain, on fallen angiosperm branch, 13 September 2009, *Dai 11241* (BJFC). **Jiangxi**, Fenyi County, Dagang Mountain, on fallen angiosperm branch, 18 September 2008, *Dai 10437* (BJFC); 22 September 2009, *Cui 7826, 7828* (BJFC); Xinyu, Xiannvhu Park, on fallen angiosperm branch, 20 September 2008, *Dai 10547* (BJFC). **Liaoning**, Kuandian County, Qingshangou, on fallen angiosperm branch, 30 July 2008, *Dai 5673, 5671, 5674* (BJFC). **Yunnan**, Baoshan, Gaoligong Mountain, on fallen angiosperm branch, 23 October 2009, *Cui 7985* (BJFC); 25 October 2009, *Cui 8069, 8077* (BJFC); Kunming, Heilongtan Park, on fallen angiosperm branch, 30 October 2009, *Cui 8324, 8329, 8332, 8335* (BJFC); Chuxiong, Zixi Mountain, 28 August 2010, *Dai 11711* (BJFC). **Zhejiang**, Lin'an County, Tianmushan Nature Reserve, on fallen angiosperm branch, 17 October 2004, *Cui 6458* (BJFC); 14 October 2004, *Dai 6281* (IFP); 9 October 2005, *Cui 2562* (BJFC); 10 October 2005, *Cui 2621* (BJFC); 11 October 2005, *Cui 2703* (BJFC); 12 October 2005, *Cui 2780* (BJFC); Hangzhou, Xihu Park, on fallen angiosperm branch, 18 October 2004, *Cui 6523, 6527, 6522* (BJFC); Jiuxi Forest Park, on fallen angiosperm branch, 17 October 2010, *Dai 11809* (BJFC); Yongjia County, Longwan Forest Park, on fallen angiosperm branch, 21 August 2011, *Cui 10170* (BJFC); Taishui County, Wuyanling Nature Reserve, on fallen angiosperm branch, 22 August 2011, *Cui 10209* (BJFC).

Truncospora ornata Spirin & Bukharova, *Nova Hedwigia* 100: 170 (2015) (Figs. 422, 423)
MycoBank: MB 808457

Fruiting body. — Basidiocarps perennial, pileate, corky to wood corky upon drying. Pilei usually semicircular, projecting up to 1.2 cm, 2.2 cm wide and 2.6 cm thick at base. Pileal surface brown to brownish-black when fresh, brown to black upon drying, glabrous; margin obtuse. Pore surface cream to buff when fresh, becoming buff upon drying; pores round, 5–7 per mm; dissepiments thick, entire. Sterile margin narrow, up to 0.5 mm wide. Context buff to brown, corky, about 1 mm thick. Tubes concolorous with pore surface, woody hard, up to 25 mm thick.

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

Context. — Generative hyphae infrequent, hyaline, thin-walled, unbranched, 2.5–3.4 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, unbranched, interwoven, 2.7–3.8 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, unbranched, 1.7–2.8 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, unbranched, interwoven, 2.3–3.5 μm in diam. Cystidia and cystidioles absent. Basidia barrel-shaped, with four sterigmata and a basal clamp connection, 19.5–25 × 11.1–13.5 μm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, truncate, hyaline, thick-walled, smooth, strongly dextrinoid, CB + , (11.1–

Fig. 422 Basidiocarps of *Truncospora ornata*

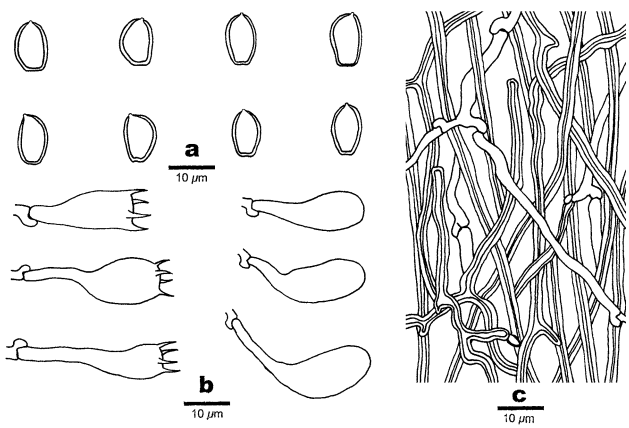

Fig. 423 Microscopic structures of *Truncospora ornata* (drawn from *Cui 5714*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a–c** = 10 μm

)12–13.5(–14.5) × (7–)7.2–9(–9.3) µm, L = 12.91 µm, W = 7.61 µm, Q = 1.64–1.76 (n = 60/2).

Notes. — *Truncospora ornata* is a temperate species distributed in deciduous and mixed forests of Russian Far East (Spirin et al. 2015). It shares similar characters with *T. detrita* by having small pileate basidiocarps and brown to black pilei, but *P. detrita* is endemic to the neotropical (rainforest) areas and often growing on left timbers, fences, or poles (Decock 2011).

Specimens examined: **CHINA**. **Liaoning**, Huanren County, Laotudingzi Nature Reserve, on fallen angiosperm trunk, 31 July 2008, *Cui 5714* (BJFC); on angiosperm stump, 2 August 2008, *Cui 5840* (BJFC).

Vanderbylia D.A. Reid, *Jl S. Afr. Bot.* 39(2): 166 (1973).
MycoBank: MB 18722
Type species: *Vanderbylia vicina* (Lloyd) D.A. Reid.

Basidiocarps annual to perennial, pileate, hard corky to woody hard. Pilei applanate, slightly convex, semicircular; pileal surface slightly to distinctly warted, glabrous. Pore surface white to grayish cream; pores round; dissepiments thick, entire. Hyphal system dimitic; generative hyphae hyaline, thin-walled, rarely branched, bearing clamp connections; skeletal hyphae dominating in the context, hyaline, subsolid to thick-walled with a wide lumen, branched, interwoven, variably dextrinoid, cyanophilous; hyphae occasionally swollen in KOH. Cystidia absent; cystidioles variably present. Basidia clavate, with four sterigmata and a basal clamp connection; basidioles often dominant, in shape similar to basidia, but slightly smaller. Basidiospores subglobose to amygdaliform, non-truncate, hyaline, thick-walled, smooth, strongly dextrinoid, CB + . Dichohyphidia-like (coral-like dendrohyphidia) element present at the dissepiment.

Vanderbylia is similar to *Perenniporia* sensu stricto on the basis of the thick-walled basidiospores, but it differs by its pileate, hard corky basidiocarps and strongly dextrinoid skeletal hyphae and subglobose to amygdaliform, non-truncate basidiospores (Núñez and Ryvarden 2001). Molecular studies showed that this genus is distant from *Perenniporia* sensu stricto (Zhao and Cui 2013b, c; Zhao et al. 2013a).

Key to species of *Vanderbylia* in China

1 Basidiospores > 8 µm in length ..... *V. vicina*
1 Basidiospores < 8 µm in length 2
2 Cystidioles present ..... *V. fraxinea*
2 Cystidioles absent 3
3 Growing on *Robinia*, temperate species ..... *V. robiniophila*
3 Growing on other angiosperms, subtropical species ..... *V. delavayi*

Vanderbylia delavayi (Pat.) B.K. Cui & Y.C. Dai, **comb. nov.** (Figs. 424, 425)
MycoBank: MB 826676
Basionym: *Polyporus delavayi* Pat., *J. Bot., Paris* 3: 257 (1889).
≡ *Perenniporia delavayi* (Pat.) Decock & Ryvarden, *Mycologia* 91: 392 (1999).
= *Perenniporia formosana* Chang, *Mycol. Res.* 98: 934 (1994).

Fruiting body. — Basidiocarps annual, pileate, without odor or taste when fresh, woody hard upon drying. Pilei semicircular to flabelliform, projecting up to 6 cm, 4.5 cm wide and 2.2 cm thick at base. Pileal surface cream to dark reddish brown, concentrically sulcate; margin obtuse, grayish brown to reddish brown. Pore surface grayish orange to grayish brown drying; pores round, 5–6 per mm; dissepiments thin, entire. Context grayish orange, hard corky, up to 9 mm thick. Tubes concolorous with pore surface, corky, up to 13 mm thick.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, CB + , slightly swollen in KOH.

Context.— Generative hyphae infrequent, hyaline, thin-walled, unbranched, 1.5–4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide lumen, frequently branched, interwoven, 4–6 µm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, unbranched, 1.5–3.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, frequently branched, interwoven, 3–5 µm in diam. Cystidia and cystidioles absent. Coral-like dendrohyphidia frequently present. Basidia clavate, with four sterigmata and a basal clamp connection, 13–15.5 × 7.3–8.3 µm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Fig. 424 Basidiocarps of *Vanderbylia delavayi*

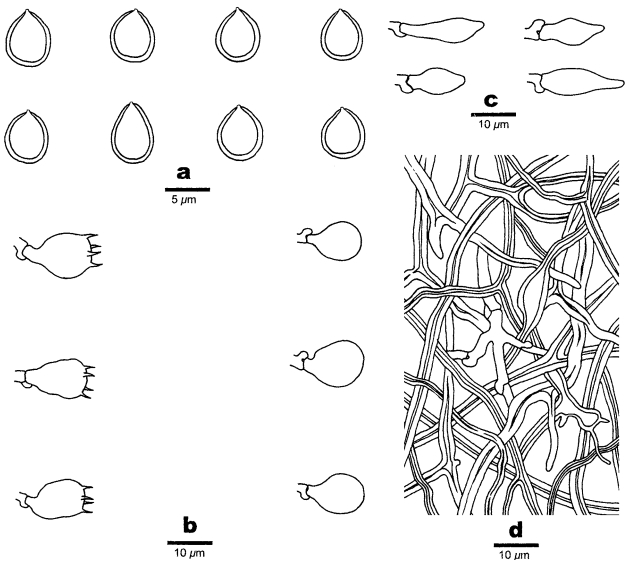

Fig. 425 Microscopic structures of *Vanderbylia delavayi* (drawn from *Dai 6891*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

Spores. — Basidiospores subglobose to drop-shaped, non-truncate, hyaline, thick-walled, smooth, strong dextrinoid, CB + , (5.5–)5.7–7(–7.5) × (4.5–)4.7–6(–7) μm, L = 6.4 μm, W = 5.2 μm, Q = 1.19–1.22 (n = 120/4).

Notes. — Decock and Ryvarden (1999) examined the type material of *Polyporus delavayi* Pat. and proposed that it should be transferred to *Perenniporia* based on strongly dextrinoid, cyanophilous skeletal hyphae and dextrinoid, thick-wall basidiospores. In addition, they examined the type specimen of *Perenniporia formosana* T.T. Chang and considered *P. formosana* as a synonym to *P. delavayi*. In the present study, *P. delavayi* nests into the *Vanderbylia* lineage. The morphological features are consistent with the concept of *Vanderbylia*. Therefore, we transfer this species to *Vanderbylia* based on molecular data and morphological characters.

Specimens examined: **CHINA. Anhui**, Huangshan, Yellow Mountain, on fallen angiosperm trunk, 11 October 2004, *Dai 6064* (IFP). **Fujian**, Wuyishan County, Wuyishan Nature Reserve, Taoyuanyu, on fallen angiosperm trunk, 28 August 2006, *Cui 4155* (BJFC). **Guangxi**, Longsheng County, Wenquan Forest Park, on fallen angiosperm trunk, 9 August 2005, *Dai 6891* (BJFC).

Vanderbylia fraxinea (Bull.) D.A. Reid, *S. Afr. J. Bot.* 39(2): 166 (1973) (Figs. 426, 427)
MycoBank: MB 325394
Basionym: *Boletus fraxineus* Bull., *Herb. Fr. (Paris)* 10: tab. 433, Fig. 2 (1790).
≡ *Perenniporia fraxinea* (Bull.) Ryvarden, *Grundr. Krauterk.* 2: 307 (1978).

Fruiting body. — Basidiocarps perennial, pileate, single to imbricate, hard corky, without odor or taste when fresh, woody hard upon drying. Pilei semicircular, projecting up to 12 cm, 13 cm wide and 3.5 cm thick at base. Pileal surface ochraceous when fresh, brown to grayish black upon drying, velutinate to glabrous, often with reddish spots, usually with a thin crust; margin slightly obtuse, pale brown. Pore surface pale brown; pores round, 4–6 per mm; dissepiments thick, entire. Context ochraceous, cottony, up to 8 mm thick. Tubes concolorous with pore surface, hard corky, up to 27 mm thick.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, CB + , slightly swollen in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, unbranched, 2.5–5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, rarely branched, interwoven, 3.9–8 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, unbranched, 2–4.1 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen, occasionally branched, interwoven, 3–6.1 μm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 12–24 × 5–8.5 μm. Basidia barrel-shaped, with four sterigmata and a basal clamp connection, 15.5–20.5 × 7.9–9.5 μm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. —Basidiospores subglobose to amygdaliform, non-truncate, hyaline, thick-walled, smooth, strongly dextrinoid, CB + , (5.8–)6–6.4(–7.1) × (4.8–)5–5.3(–6) μm, L = 6.17 μm, W = 5.12 μm, Q = 1.16–1.26 (n = 120/4). Chlamydospores usually present in context, variable in shape, hyaline, 10.7–18.3 × 9.5–16 μm.

Notes. — *Vanderbylia delavayi* and *V. fraxinea* share pileate basidiocarps and non-truncate, strongly dextrinoid basidiospores. However, *V. delavayi* differs by its coral-like dendrohyphidia (Decock and Ryvarden 1999).

Fig. 426 Basidiocarps of *Vanderbylia fraxinea*

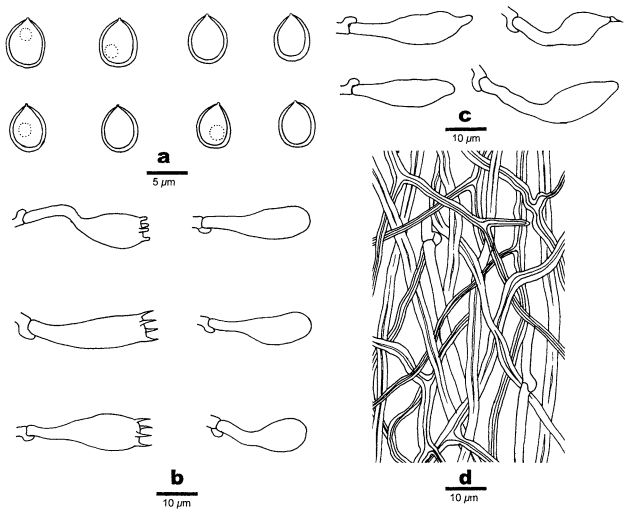

Fig. 427 Microscopic structures of *Vanderbylia fraxinea* (drawn from *Cui 8885*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

Vanderbylia fraxinea is widely distributed in subtropical areas of China.

Specimens examined: **CHINA. Anhui**, Huangshan, Yellow Mountain, on angiosperm stump, 13 October 2004, *Cui 6176* (BJFC); 22 October 2010, *Dai 11930* (BJFC). **Fujian**, Wuyishan County, Wuyi Mountain, on angiosperm stump, 18 October 2005, *Dai 7182* (IFP); Taoyuanyu, on angiosperm stump, 22 October 2005, *Dai 7410, 7404* (IFP); Jian'ou County, Wanmulin Nature Reserve, on angiosperm stump, 31 August 2006, *Cui 4276, 4303* (BJFC). **Guangdong**, Guangzhou, campus of Huanan Agricultural University, on angiosperm stump, 5 July 2010, *Cui 9102, 9106, 9107, 9123* (BJFC); Baiyun Mountain, on angiosperm stump, 28 June 2010, *Cui 8894* (BJFC); Foshan, Xiqiaoshan Forest Park, on angiosperm stump, 13 February 2009, *Dai 10681* (BJFC). **Jiangsu**, Nanjing, Zijin Mountain, on angiosperm stump, 10 October 2003, *Dai 5245* (IFP); 11 October 2003, *Dai 5260* (IFP). **Jiangxi**, Jiujiang, Nanhu Park, on angiosperm stump, 10 October 2008, *Cui 6111, 6087* (BJFC); Yingtan, Longhu Mountain, on angiosperm stump, 5 October 2008, *Cui 5937* (BJFC); Fenyi County, Dagang Mountain, on angiosperm stump, 18 September 2008, *Dai 10416, 10440* (BJFC). **Sichuan**, Mianyang, on angiosperm stump, 28 November 2009, *Dai 11603* (BJFC). **Yunnan**, Kunming, Heilongtan Park, on angiosperm stump, 30 October 2009, *Cui 8322* (BJFC); Dali, Hudiequan Park, on angiosperm stump, 30 August 2010, *Dai 11740* (BJFC); Dali, on angiosperm stump, 16 September 2011, *Cui 10264* (BJFC). **Zhejiang**, Lin'an County, Tianmushan Nature Reserve, on angiosperm stump, 17 October 2004 *Cui 6481, 6467* (BJFC); 13 October 2005, *Cui 2799* (BJFC); Hangzhou, Hangzhou Botanic Garden, on angiosperm stump, 19 October 2010, *Dai 11851* (BJFC).

Vanderbylia robiniophila (Murrill) B.K. Cui & Y.C. Dai, **comb. nov.** (Figs. 428, 429)
MycoBank: MB 826677
Basionym: *Trametes robiniophila* Murrill, *N. Amer. Fl. (New York)* 9(1): 42 (1907).
≡ *Perenniporia robiniophila* (Murrill) Ryvarden, *Mycotaxon* 17: 517, 1983.

Fruiting body. — Basidiocarps annual, pileate, solitary or imbricate, corky to hard corky, without t odor or taste when fresh, woody hard upon drying. Pilei applanate, semicircular, projecting up to 7.5 cm, 8.5 cm wide and 1.7 cm thick at base. Pileal surface white to ochraceous or reddish brown when fresh, pale gray to dirty brown upon drying, usually with a thin cuticle and slightly warted; margin slightly thick, pale brown. Pore surface white to wood-color when fresh, becoming light brown when bruised or dry; pores round, 4–6 per mm; dissepiments thick, entire. Context ochraceous to wood-color, cottony to corky, up to 4 mm thick. Tubes concolorous with pore surface, woody hard, up to 1.3 cm thick.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae strongly dextrinoid, CB + , slightly swollen in KOH.

Context.— Generative hyphae infrequent, hyaline, thin-walled, unbranched, 2–4.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide t lumen, unbranched, interwoven, 3.5–5 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, unbranched, 2.2–3.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, occasionally branched, interwoven, 3–4.5 μm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection,

Fig. 428 Basidiocarps of *Vanderbylia robiniophila*

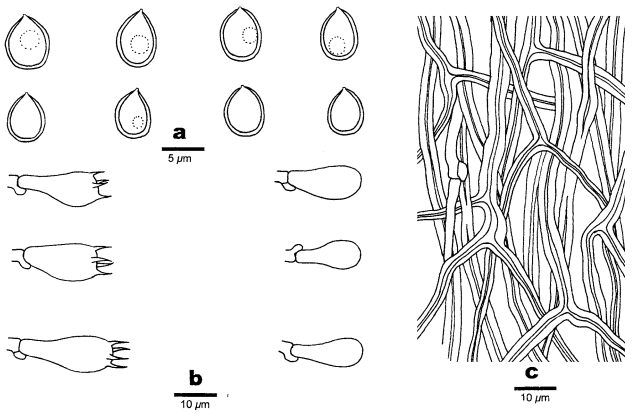

Fig. 429 Microscopic structures of *Vanderbylia robiniophila* (drawn from *Cui 5093*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Hyphae from trama. Bars: **a** = 5 μm; **b–c** = 10 μm

13.5–16 × 8–9 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores subglobose to amygdaliform, non-truncate, hyaline, thick-walled, smooth, strongly dextrinoid, CB + , (6–)6.7–7.6(–8) × (5.3–)5.5–6.5(–7) μm, L = 7.1 μm, W = 6 μm, Q = 1.17–1.20 (n = 90/3).

Notes. — *Vanderbylia robiniophila* was originally described in *Trametes* by Murrill (1907), and later was transferred to *Perenniporia* by Ryvarden (1983). In the current study, it is transferred from *Perenniporia* to *Vanderbylia*. *Vanderbylia robiniophila* is quite similar to *V. fraxinea* and difficult to separate from each other in morphology. However, *V. robiniophila* usually has an annual habit and grows on *Robinia* in temperate to warm temperate areas; while *V. fraxinea* mostly has a perennial habit and grows on different angiosperm wood in subtropical areas.

Specimens examined: **CHINA. Beijing**, Beijing Botanical Garden, on living tree of *Robinia*, 6 September 2005, *Dai 7167* (IFP); 27 September 2008, *Dai 10653*, *10656* (BJFC); 4 September 2011, *Cui 10241* (BJFC). **Jiangsu**, Najing, Zijin Mountain, on living tree of *Robinia*, 13 October 2004, *Cui 1663* (BJFC); 3 May 2005, *Dai 6576* (IFP); 21 August 2006, *Cui 4009* (BJFC); 22 August 2006, *Cui 4011* (BJFC). **Liaoning**, Shenyang, Shenyang Botanical Garden, on living tree of *Robinia*, 21 August 2005, *Dai 6928* (IFP); Kuandian County, Baishilazi Nature Reserve, on living tree of *Robinia*, 30 July 2008, *Dai 5644* (IFP). **Shandong**, Tai'an, Taishan Mountain, on living tree of *Robinia*, 12 October 2003, *Dai 5302* (IFP); 13 October 2003, *Dai 5326a* (IFP); 3 August 2010, *Cui 9175, 9176, 9171, 9179* (BJFC); Mengyin County, Mengshan Forest Park, on living tree of *Robinia*, 28 July 2007, *Cui 5023, 5028* (BJFC); 17 August 2009, *Cui 7152, 7154* (BJFC); Pingyi County, Mengshan Forest Park, on living tree of *Robinia*, 5 August 2007, *Cui 5093, 5094* (BJFC); 10 August 2007, *Cui 5124, 5128, 5142, 5144, 5146, 5147* (BJFC); Rizhao, Haibin Forest Park, on living tree of *Robinia*, 13 August 2009, *Cui 7146, 7148, 7145* (BJFC); Junan County, on stump of *Robinia*, 19.VIII.2009, *Cui 7144* (BJFC). **Shaanx**i, Xi'an, Xian Botanical Garden, on living tree of *Robinia*, 8 August 2004, *Dai 5753* (IFP).

Vanderbylia vicina (Lloyd) D.A. Reid, *Jl S. Afr. Bot.* 39(2): 166 (1973) (Figs. 430, 431)
MycoBank: MB 325399
Basionym: *Polyporus vicinus* Lloyd, *Mycol. Writ.* 7 (Letter 74): 1331 (1924).
≡ *Perenniporia vicina* (Lloyd) Decock & Ryvarden, *Mycologia* 91: 390 (1999).

Fruiting body. — Basidiocarps perennial, pileate, solitary, corky, without t odor or taste when fresh, woody hard upon drying. Pilei applanate, semicircular, smooth to occasionally slightly warted, projecting up to 4.5 cm, 7.9 cm wide and 3 cm thick at base. Pileal surface brown to dark brown when fresh, dark brown when dry. Pore surface pale ochraceous to pinkish- ochraceous when fresh, becoming brown when bruised, buff-yellow to orange-brown upon drying; pores tiny, round, 5–6 per mm; dissepiments thin, entire. Context buff-yellow to buff, woody hard, about 2 mm thick, with a thin dark brown to blackish crust. Tubes concolorous with pore surface, woody hard, up to 2.8 cm thick.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae dextrinoid, CB + ; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin-walled, 2.2–4.2 μm in diam; skeletal hyphae dominant, hyaline, thick-walled, flexuous, interwoven, 3.3–6.1 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, 2–3.5 μm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, flexuous, interwoven, 3.5–5.7 μm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 12–28 × 5–8 μm.

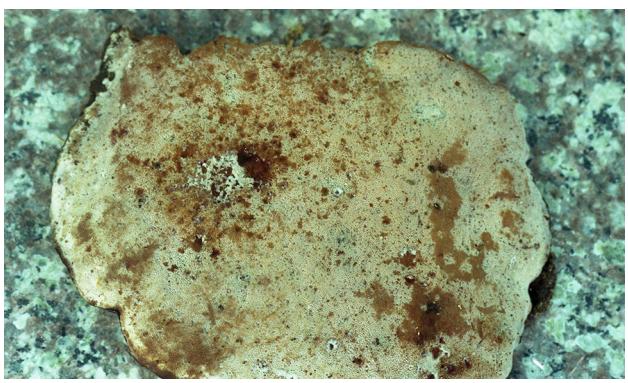

Fig. 430 A basidiocarp of *Vanderbylia vicina*

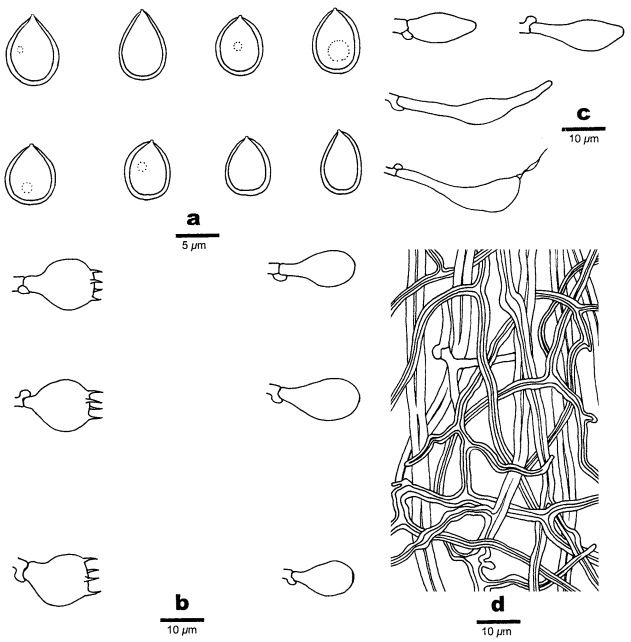

Fig. 431 Microscopic structures of *Vanderbylia vicina* (drawn from *Dai 9377*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 μm; **b–d** = 10 μm

Arboriform hyphae present, 1.5–6 μm wide, branching at the dissepimental edges. Basidia clavate, with four sterigmata and a basal clamp connection, 12–17 × 8–15 μm; basidioles in shape similar to basidia, but smaller.

Spores. — Basidiospores subglobose to obovoid or drop-shaped, hyaline, thick-walled, smooth, strongly dextrinoid, CB +, 8 − 8.9 × (6.1 −)6.9 − 7.5(−8) μm, L = 8.4 μm, W = 7.09 μm, Q = 1.18 (n = 30/1).

Notes. — *Vanderbylia vicina* is similar to *V. fraxinea* by having pileate basidiocarps and smaller pores. However, the latter species has smaller basidiospores (6–6.4 × 5–5.3 μm).

Specimen examined: **CHINA.** Hainan Province, Ledong County, Diaoluoshan Nature Reserve, on fallen angiosperm trunk, 21 November 2007, *Dai 9377* (BJFC).

Whitfordia Murrill, *Bull. Torrey Bot. Club* 35: 407 (1908).
MycoBank: MB 18747

Type species: *Fomes warburgianus* Henn.

Basidiocarps annual, pileate, usually laterally stipitate with a short stipe. Pileal surface cream buff to cinnamon brown, usually with a thin cuticle developed from the base. Pore surface cream buff to cinnamon brown; pores round to angular; dissepiments thin, entire. Context pale yellowish-brown. Tubes slightly darker than pore surface, hard corky. Hyphal system trimitic; generative hyphae hyaline, thin- to slightly thick-walled, occasionally branched, bearing clamp connections; skeletal hyphae dominant, hyaline to pale yellowish-brown, thick-walled with a wide to narrow lumen, occasionally branched, interwoven, IKI–, CB–. Cystidia absent; cystidioles variably present. Basidia clavate, with four sterigmata and a basal clamp connection. Basidiospores cylindrical to slightly allantoid, hyaline, thin-walled, smooth, IKI–, CB–.

Morphologically, *Whitfordia* resembles *Trametes* and *Coriolopsis* because of the trimitic hyphal system and clamped generative hyphae. It separates from the latter two genera mainly by its lateral stipitate and brownish basidiocarps with a thin cuticle (Núñez and Ryvarden 2001).

Whitfordia scopulosa (Berk.) Núñez & Ryvarden, *Syn. Fungorum* 14: 497 (2001) (Figs. 432, 433)
MycoBank: MB 383975
Basionym: *Polyporus scopulosus* Berk., *Hooker's J. Bot. Kew Gard. Misc.* 6: 143 (1854).
≡ *Trametes scopulosa* (Berk.) Bres., *Hedwigia* 31: 317 (1912).

Fruiting body. — Basidiocarps annual to perennial, pileate, sometimes with a short lateral stipe, solitary and rarely imbricate, coriaceous, with pleasant odor when fresh, hard corky and distinctly light in weight when dry. Pilei semicircular to shell-shaped, projecting up to 5 cm, 9 cm wide and 15 mm thick at base. Pileal surface cream buff to cinnamon brown when fresh, pale buff to pale grayish brown or cinnamon brown with age, black near the base or the short stipe, glabrous, with a cuticle developed from the base, usually with distinct concentric zones and indistinct sulcate zones; margin obtuse, entire and slightly wavy, cream to yellowish-brown. Pore surface white to cream when fresh, turning to grayish-brown when bruised, pale grayish-brown to cinnamon brown when dry; pores round to angular, 4–6 per mm; dissepiments thin, entire. Sterile margin distinct, up to 1.5 mm wide. Context pale yellowish-brown, corky, usually with distinct zones reflecting stages of age, up to 9 mm thick. Tubes pale yellowish-brown to yellowish-brown, darker than pore surface, delimited by a thin dark yellowish-brown layer between context, corky, each tube layer up to 3 mm thick.

Fig. 432 Basidiocarps of *Whitfordia scopulosa*

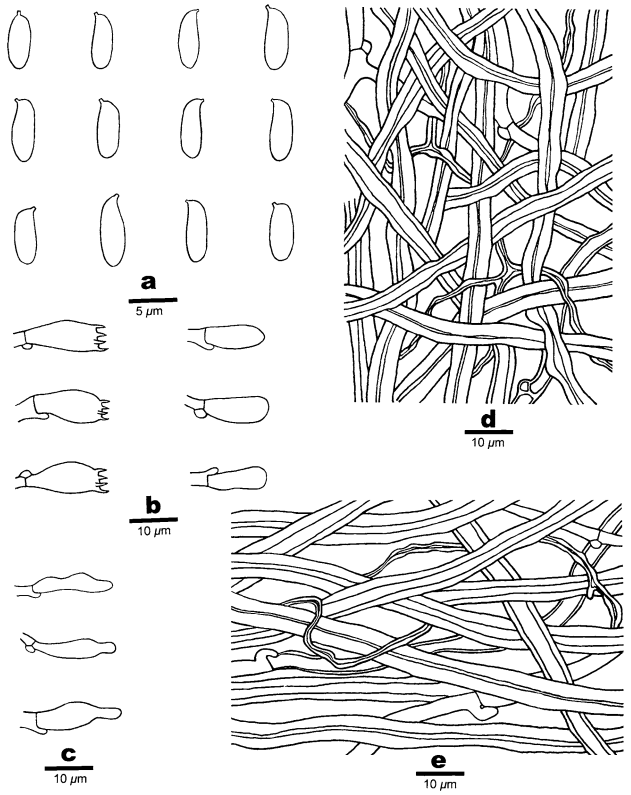

Fig. 433 Microscopic structures of *Whitfordia scopulosa* (drawn from *Cui 11038*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama; **e**. Hyphae from context. Bars: **a** = 5 μm; **b–e** = 10 μm

Hyphal structure. — Hyphal system trimitic; generative hyphae bearing clamp connections; skeletal and binding hyphae IKI–, CB–; tissues unchanged in KOH.

Context. — Generative hyphae infrequent, hyaline, thin- to slightly thick-walled, occasionally branched, 2.2–4 μm in diam; skeletal hyphae dominant, hyaline to pale yellowish-brown, thick-walled to subsolid, occasionally branched, straight, 4–11 μm in diam; binding hyphae infrequent, hyaline to pale yellowish-brown, thick-walled with a narrow lumen to subsolid, flexuous, frequently branched, 1–2.3 μm in diam.

Tubes. — Generative hyphae infrequent, hyaline, thin-walled, occasionally branched, 2–4 μm in diam; skeletal hyphae dominant, hyaline to pale yellowish-brown, thick-walled with a wide to narrow lumen, occasionally branched, straight, interwoven, 3–5 μm in diam; binding hyphae hyaline to pale yellowish-brown, thick-walled with a narrow lumen to subsolid, frequently branched, flexuous, 1–2 μm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 14.2–18.5 × 3–5.5 μm. Basidia clavate, with four sterigmata and a basal clamp connection, 13.3–15.5 × 6–7 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores cylindrical to slightly allantoid, hyaline, thin-walled, smooth, IKI–, CB–, (6.7–) 7.2–9(–9.3) × (1.8–)2–2.5(–3) μm, L = 8.12 μm, W = 2.28 μm, Q = 3.56 (n = 94/3).

Notes. — *Whitfordia scopulosa* is characterized by its cream, white to pale gray, glabrous pileal surface with a black base or a short stipe and small pores. It usually distributes in subtropical to tropical areas.

Specimens examined: **CHINA. Hainan**, Baoting County, on fallen angiosperm trunk, 27 May 2008, *Dai 9729* (BJFC); Changjiang County, Bawangling Nature Reserve, on fallen angiosperm trunk, 26 November 2010, *Dai 12100* (BJFC); Chenmai County, on fallen angiosperm trunk, 6 May 2009, *Cui 6209* (BJFC); Tunchang County, on fallen angiosperm trunk, 6 May 2009, *Dai 10739* (BJFC); Poxin, on fallen angiosperm trunk, 23 November 2010, *Dai 11979* (BJFC). **Yunnan**, Pingbian County, Daweishan Forest Park, on fallen angiosperm trunk, 4 June 2011, *Dai 12179* (BJFC); Cangyuan County, Banlao, on fallen angiosperm trunk, 11 July 2013, *Cui 11038* (BJFC).

Yuchengia B.K. Cui & K.T. Steffen, *Nordic J. Bot.* 31(3): 333 (2013).

MycoBank: MB 563490

Type species: *Yuchengia narymica* (Pilát) B.K. Cui, C.L. Zhao & K.T. Steffen.

Basidiocarps annual, resupinate. Pore surface cream to yellowish buff; pores angular; dissepiments thin, entire. Subiculum cream to buff, thin. Tubes concolorous with pore surface, hard corky. Hyphal system dimitic; generative hyphae hyaline, thin-walled, rarely branched, bearing clamp connections; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, usually unbranched, interwoven, weakly to distinctly amyloid, acyanophilous, dissolving in KOH. Cystidia absent; cystidioles variably present. Basidia clavate, with four sterigmata and a basal clamp connection. Basidiospores ellipsoid, non-truncate, hyaline, thick-walled, smooth, IKI–, CB + .

Yuchengia was recently proposed by Zhao et al. (2013b). Only one species, *Y. narymica* was included in this genus. The taxonomic position of *Y. narymica* has long been debated. The species was firstly described as *Trametes narymica* Pilát (Pilát 1936). Later, Pouzar (1984) proposed it as *Perenniporia narymica*, and this was widely accepted (Gilbertson and Ryvarden 1987; Ryvarden and Gilbertson 1994; Núñez and Ryvarden 2001; Dai et al. 2002). Decock and Stalpers (2006) mentioned that the species does not belong to *Perenniporia*, and suggested it might belong to *Diplomitoporus* Domański because of its non-branched skeletal hyphae and thin-walled basidiospores. However, the study of the type specimen reveals that the basidiospores are distinctly thick-walled. This

character would exclude both of these genera, thus, *Yuchengia* was proposed to accommodate *P. narymica* (Zhao et al. 2013b).

Yuchengia narymica (Pilát) B.K. Cui, C.L. Zhao & K.T. Steffen, *Nordic J. Bot.* 31(3): 333 (2013) (Figs. 434, 435)
MycoBank: MB 563491
Basionym: *Trametes narymica* Pilát, *Bull. Trimest. Soc. Mycol. Fr.* 51: 364 (1936).
≡ *Perenniporia narymica* (Pilát) Pouzar, *Ceská Mykol.* 38: 204 (1984).

Fruiting body. — Basidiocarps annual, resupinate, corky, without odor or taste when fresh, becoming hard corky upon drying, up to 16 cm long, 7 cm wide and 1 cm thick at center. Pore surface cream when fresh, light buff to cream buff upon drying; pores angular, 4–5 per mm; dissepiments thin, entire. Sterile margin narrow, cream to cream buff, up to 1 mm wide. Subiculum cream, thin, up to 0.5 mm thick. Tubes concolorous with pore surface, hard corky, up to 9.5 mm long.

Hyphal structure. — Hyphal system dimitic; generative hyphae bearing clamp connections; skeletal hyphae weakly to distinctly IKI + , CB–, dissolving in KOH.

Subiculum. — Generative hyphae hyaline, thin-walled, occasionally branched, 2.3–4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, unbranched, interwoven, 1.9–4.8 µm in diam.

Tubes. — Generative hyphae hyaline, thin-walled, rarely branched, 2–3.5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, unbranched, interwoven, 1.8–4.6 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 14.2–20.7 × 3.6–6.3 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 16.8–19.2 × 5.8–8.8 µm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores ellipsoid, non-truncate, hyaline, thick-walled, smooth, IKI–, CB + , (4.1–)4.2–5.2(–5.3) × (3.1–)3.2–4(–4.1) µm, L = 4.83 µm, W = 3.74 µm, Q = 1.24–1.33 (n = 120/4).

Fig. 434 Basidiocarps of *Yuchengia narymica*

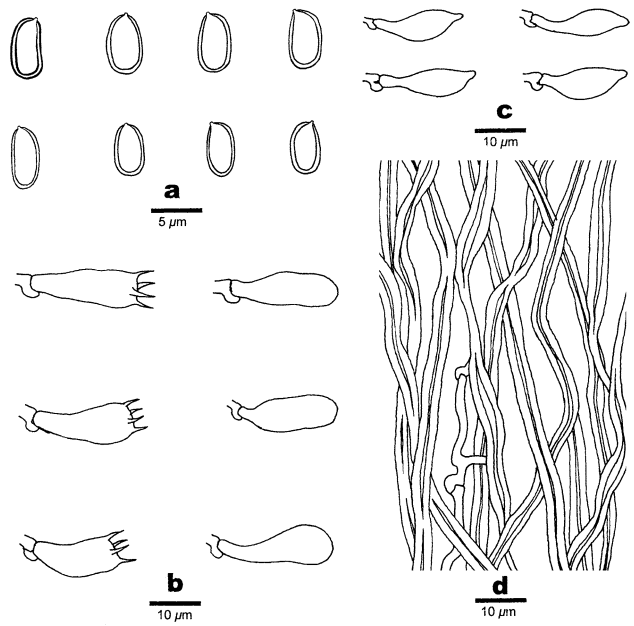

Fig. 435 Microscopic structures of *Yuchengia narymica* (drawn from *Dai 6998*). **a**. Basidiospores; **b**. Basidia and basidioles; **c**. Cystidioles; **d**. Hyphae from trama. Bars: **a** = 5 µm; **b–d** = 10 µm

Notes. — *Yuchengia narymica* is characterized by acyanophilous and amyloid skeletal hyphae that dissolve in KOH, and thick-walled basidiospores that are cyanophilous and negative in Melzer's reagent. The taxonomic position of *Y. narymica* has been resolved based on morphological characters and phylogenetic analysis of rDNA sequences by Zhao et al. (2013b).

Specimens examined: **CHINA. Jilin,** Antu County, Changbaishan Nature Reserve, on rotten stump of *Populus*, 26 August 2005, *Dai 6989* (BJFC); 27 August 2005, *Dai 7050* (BJFC); on fallen trunk of *Quercus*, 26 August 2005, *Dai 6998* (BJFC). **Jiangxi,** Fenyi County, Dagang Mountain, on fallen angiosperm trunk, 19 September 2008, *Dai 10510* (BJFC).

Discussions

Polyporaceae is a worldwide family belonging to Polyporales and all the species in this family cause a white-rot. In the current study, 42 genera are dealt with in Polyporaceae, including *Abundisporus, Amylosporia, Coriolopsis, Cryptoporus, Daedaleopsis, Datronia, Datroniella, Dichomitus, Earliella, Echinochaete, Favolus, Flammeopellis, Fomes, Funalia, Grammothele, Grammothelopsis, Haploporus, Hexagonia, Hornodermoporus, Lignosus, Megasporia, Megasporoporia, Megasporoporiella, Melanoderma, Microporellus, Microporus, Murinicarpus, Neodatronia,*

Neofavolus, Neofomitella, Perenniporia, Picipes, Polyporus, Pseudofavolus, Pyrofomes, Sparsitubus, Theleporus, Trametes, Truncospora, Vanderbylia, Whitfordia and *Yuchengia*. Although 69 genera of Polyporaceae have been reported from China by Zhao (1998), among those genera, *Coriolopsis, Cryptoporus, Daedaleopsis, Datronia, Dichomitus, Earliella, Echinochaete, Fomes, Funalia, Hexagonia, Microporellus, Microporus, Perenniporia, Polyporus, Sparsitubus* and *Trametes* are accepted in our current concept of Polyporaceae; *Lenzites* and *Pycnoporus* are treated as synonyms of *Trametes*, and *Pachykytospora* is treated as a synonym of *Haploporus*. Other genera previously treated in Polyporaceae have been transferred to different families, such as *Abortiporus* Murrill belongs to Podoscyphaceae D.A. Reid of Polyporales (Justo et al. 2017); *Albatrellus* Gray belongs to Albatrellaceae Nuss of Russulales (Chen et al. 2017a); *Anomoporia* Pouzar belongs to Amylocorticiaceae Jülich of Amylocorticiales (Binder et al. 2010; Song et al. 2016b); *Antrodia* P. Karst., *Daedalea* Pers., *Fomitopsis* P. Karst. and *Laetiporus* Murrill belong to Fomitopsidaceae of Polyporales (Song et al. 2014; Chen and Cui 2016; Han et al. 2016; Chen et al. 2017b; Song and Cui 2017); *Antrodiella* Ryvarden & I. Johans. belongs to Steccherinaceae Parmasto of Polyporales (Justo et al. 2017); *Bjerkandera* P. Karst. belongs to Phanerochaetaceae Jülich of Polyporales (Justo et al. 2017); *Boletopsis* Fayod belongs to Bankeraceae Donk of Thelephorales (Kirk et al. 2008); *Bondarzewia* Singer and *Wrightoporia* Pouzar belong to Bondarzewiaceae of Russulales (Chen et al. 2016a, b; Song et al. 2016a); *Byssoporia* M.J. Larsen & Zak belongs to Atheliaceae Jülich of Atheliales (Kirk et al. 2008); *Ceriporia* Donk belongs to Irpicaceae Spirin & Zmitr. of Polyporales (Justo et al. 2017); species of *Ceriporiopsis* Domański are scaterred into the phlebia clade, the residual polyporoid clade, the tyromyces clade and the gelatoporia clade of Polyporales (Zhao and Cui 2014); *Cerrena* Gray belongs to Cerrenaceae Miettinen, Justo & Hibbett of Polyporales (Justo et al. 2017); *Gloeophyllum* P. Karst. belongs to Gloeophyllaceae of Gloeophyllales (Garcia-Sandoval et al. 2011).

Ganodermataceae and Haddowiaceae were treated as synonyms of Polyporaceae, and *Amauroderma*, *Ganoderma* and *Tomophagus* were included in Polyporaceae by Justo et al. (2017). In our study, *Amauroderma, Ganoderma* and *Tomophagus* are excluded in Polyporaceae because their double-walled basidiospores are quite different from Polyporaceae. *Lentinus* Fr. was included in Polyporaceae by Justo et al. (2017), some *Polyporus* species was transferred to *Lentinus* by Zmitrovich (2010) and 41 species of *Lentinus* were accepted in Polyporaceae by Zmitrovich and Kovalenko (2016), which include both polyporoid species and agaricoid species. The polyporoid species of *Lentinus* are remained in *Polyporus* and other *Lentinus* species are excluded in Polyporaceae in our current study. Some species of the corticioid fungi such as *Dendrodontia* Hjortstam & Ryvarden, *Dentocorticium* (Parmasto) M.J. Larsen & Gilb., *Epithele* (Pat.) Pat. and *Lopharia* Kalchbr. & MacOwan were also accepted in Polyporaceae by Justo et al. (2017), but taxonomic studies of these corticioid fungi from China are very limited, their species diversity and phylogeny remained uncertain. Thus, those corticioid fungi are excluded in Polyporaceae in our study.

In recent years, systematic studies on the taxonomy and phylogeny of some genera of Polyporaceae from China have been carried out, molecular data have been widely used in these studies, such as *Abundisporus* (Zhao et al. 2015), *Datronia* (Li et al. 2014a), *Haploporus* (Shen et al. 2016), *Megasporoporia* (Li and Cui 2013a), *Perenniporia* sensu lato (Zhao and Cui 2013a, b, c; Zhao et al. 2013a, b, 2014b) and *Polyporus* sensu lato (Dai et al. 2014; Zhou et al. 2016; Zhou and Cui 2017). In addition, the taxonomic and phylogenetic studies on different genera of Polyporaceae also have been carried out by many mycologists all over the world (Hibbett and Donoghue 1995; Ko and Jung 1999a, b, 2002; Krüger and Gargas 2004; Krüger et al. 2006; Tomšovský et al. 2006; Sotome et al. 2007, 2008, 2009a; Choeyklin et al. 2009; Robledo et al. 2009; Justo and Hibbett 2011; Lesage-Meessen et al. 2011; Welti et al. 2012; Sotome et al. 2013; Seelan et al. 2015; Zmitrovich and Kovalenko 2016). But no comprehensive studies on the family level of Polyporaceae have been carried out. Although Justo et al. (2017) presented a systematic revision of Polyporales at order level, but only limited taxa of Polyporaceae were included in their analyses.

In our study, all available sequences of each species are provided, and phylogenetic analyses of Polyporaceae are inferred from multi-gene sequences of selected taxa (Fig. 1). Species previously belonging to *Lenzites* and *Pycnoporus* cluster together with *Trametes* and form a well- supported lineage, thus, *Lenzites* and *Pycnoporus* are treated as synonyms of *Trametes*. *Hexagonia, Whitfordia, Fomes* and *Earliella* cluster together; *Daedaleopsis, Hexagonia* and *Coriolopsis* cluster together. These two groups then cluster into a moderate supported lineage. All these genera have similar features including pileate and hard basidiocarps, a dimitic hyphal system with clamped generative hyphae, cylindrical to ellipsoid, hyaline and thin-walled basidiospores. These morphological characters are also typical for *Trametes*, further studies are needed to address the correlations of morphology and phylogeny for these morphological similar genera based on more taxa and sequences. Both *Amylosporia* and *Murinicarpus* segregated from *Perenniporia* sensu lato are supported in the

phylogenetic analyses, other genera divided from *Perenniporia* sensu lato including *Hornodermoporus*, *Truncospora*, *Vanderbylia*, *Whitfordia* and *Yuchengia* are also supported in our phylogeny (Fig. 1). *Abundisporus, Amylosporia, Cryptoporus, Flammeopellis, Grammothelopsis, Haploporus, Hornodermoporus, Microporellus, Murinicarpus, Perenniporia, Pyrofomes* and *Sparsitubus* have thick-walled basidiospores, which are different from other genera of Polyporaceae. These genera cluster with *Dichomitus* and *Megasporia* which have thin-walled basidiospores into a lineage with no distinct support. *Grammothele* and *Theleporus* group together with moderate support, both have shallow pores, thin-walled basidiospores and presence of dendrohyphidia. The separation of *Megasporia* and *Megasporoporiella* from *Megasporoporia* based on ITS and nLSU sequences by Li and Cui (2013a) are confirmed in the current multi-gene phylogeny, but these three genera have quite similar and overlapped morphological features and are very difficult to separate from each other in morphology. *Polyporus* is a big and widespread genus of Polyporaceae, it was divided into six morphological groups: *Polyporus* group, *Favolus* group, *Melanopus* group, *Polyporellus* group, *Admirabilis* group and *Dendropolyporus* group by Núñez and Ryvarden (1995); phylogenetically, *Polyporus* was proved to be polyphyletic (Ko and Jung 2002; Krüger and Gargas 2004; Krüger et al. 2006; Sotome et al. 2008; Dai et al. 2014; Zmitrovich and Kovalenko 2016; Zhou et al. 2016), it clusters with *Echinochaete*, *Pseudofavolus*, *Datronia*, *Lentinus*, *Dichomitus* and some other genera in the core polyporoid clade (Binder et al. 2005; Garcia-Sandoval et al. 2011; Binder et al. 2013). In our current phylogenetic analyses, the separation of *Favolus*, *Neofavolus* and *Picipes* from *Polyporus* is confirmed, but other *Polyporus* species are still polyphyletic and cluster with several morphologically divergent genera, such as *Datronia*, *Datroniella*, *Neodatronia*, *Echinochaete* and *Pseudofavolus*, for the time being, those species are remained in *Polyporus*, unless stable morphological characteristics could be found in accordance with phylogenetic analyses.

In summary, we performed a comprehensive study on the species diversity, taxonomy and phylogeny of Polyporaceae in China, and 217 species belonging to 42 genera are described, including twelve new species and two new genera. The GenBank numbers of sequences for most species are provided. However, the DNA sequences data of some species of Polyporaceae are not available, some genera are remained as polyphyletic which need to be classified in future studies, such as *Polyporus* and *Perenniporia*; while some genera are monophyletic in phylogeny but very difficult to separate from each other in morphology, such as *Megasporia*, *Megasporoporia* and *Megasporoporiella* have quite similar morphological characters. There are many different sequences deposited in GenBank for some species of Polyporaceae, the identifications of Polyporaceae species from China were mainly based on morphological characters, maybe some sequences used in this study did not represent the accurate taxa, the species name may be changed when more reliable evidence could be found.

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