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Wood-inhabiting fungi in southern China 2. Polypores from Sichuan Province

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250 specimens of polypores were collected in the Jiuzhaigou and Huanglong nature reserves, and the Qingcheng and Ermei Mountains in Sichuan Province of southwestern China in October 2002. Of the 132 poroid species identified, 92 are here reported for the first time from Sichuan, and 14 are new to China. Two new species, *Megasporoporia rhododendri* Y.C. Dai & Y.L. Wei and *Oxyporus macroporus* Y.C. Dai & Y.L. Wei are described and illustrated. The first-mentioned species is characterized by resupinate or rarely effused-reflexed basidiocarps with pale greyish cream pore surface, large and ellipsoid basidiospores, and by its living exclusively on *Rhododendron*. *Oxyporus macroporus* is distinguished from the other species in the genus by its extensive basidiocarps, perennial habit, large pores, and by its occurrence on coniferous hosts. A new combination, *Haploporus nepalensis* (T. Hattori) Y.C. Dai is proposed. A checklist of Sichuan polypores, including their substrates and collecting data, is provided, based on our own materials. The major component of the northern Sichuan polypore flora are widely distributed circumpolar, temperate and boreal species, found at higher elevations in the two nature reserves. Some East Asian and subtropical polypore species occur at lower elevations in the Qingcheng and Ermei Mountains of central and southwestern Sichuan.

Key words: Basidiomycota, *Haploporus*, *Oxyporus*, *Megasporoporia*, polypores, taxonomy

Introduction

Poroid and corticioid Aphyllophorales are the two major groups of wood-rotting fungi, sharing a similar ecology in forest environments. Wood-rotting fungi play an important role of wood decomposition in forest ecosystem. Polypores and cortiaceous species in northeast China are well documented (Hjortstam & Ryvarden 1988, Dai 2000, Núñez & Ryvarden 2000, 2001). Sichuan Province is an important source of forest products, having the third largest forest area in the country. The first professional study on wood-inhabiting fungi in Sichuan was made by Maekawa *et al*. (2002); in it 113 corticioid fungi were reported.

Polypore studies in Sichuan Province were started by Teng (1934, 1939), and thereafter about 104 names of poroid species have been recorded from the province (Teng 1963, Zhao 1989, Zhao

Fig. 1. Locations of the research area.

& Zhang 1992, Yuan & Sun 1995). However, these records are scattered in the general books on fungi, and knowledge of the polypores of Sichuan is highly fragmented. Many of the names in previous reports are synonyms, and the identification of the collections is often dubious.

A project to study the diversity and ecology of wood-rotting fungi in the temperate and boreal forest ecosystems has been carried out with the support of the Chinese Academy of Sciences. In October 2002, a team of mycologists from the Institute of Applied Ecology, Chinese Academy of Science (Shenyang) investigated polypores in four different forest areas of Sichuan Province, southwestern China. Laboratory study yielded 132 identified poroid species. In the present paper, we only list the species identified so far from our own collections. Previously reported taxa, in the absence of voucher specimens, are excluded.

Study areas

Sichuan Province lies in southwestern China, roughly between 26°01´–34°21´N and 97°22´–108°29´E. It has a total land area of nearly 480 000 km^2. The eastern part of the province is lowland area, called Sichuan Basin. However, most of the territory of the province is mountainous. Sichuan Province borders Tibet in the west, and the mountains are usually very high, e.g. the highest one, Gongga Mt., reaches an altitude of 7556 m. The original vegetation in the lowland area was mostly evergreen broad-leaved forest, but now most of Sichuan Basin is agricultural land. There are warm temperate, temperate and boreal forests growing in the mountain areas of the province. The species diversity of both plants and animals is very high because of less severe glaciations. More than 3000 species of vascular plants have been found in the Ermei Mts. (Luo & Tang 1992), and both the famous panda (*Ailuropoda melanoleuca*) and the giant tree species Dawn Redwood (*Metasequoia glyptostroboides*) live in the province.

Most of the collections were made in the Jiuzhaigou Nature Reserve (Jiuzhai County) and in the Huanglong Nature Reserve (Songpan County), both located in northern Sichuan (Fig. 1). Most of the collecting localities were either cool temperate forests at 1800–2500 m or boreal forests and scrub at 2500–3600 m. The main genera of gymnosperm trees are *Abies*, *Larix*, *Picea*, *Pinus* and *Tsuga*, and the common angiosperm tree genera are *Acer*, *Betula*, *Populus*, *Rhododendron* and *Salix*. *Hippophae*, *Juniperus*, *Lonicera*, *Quercus*, *Sorbus* and *Ulmus* are occasionally seen. The forests in the two reserves are mostly in a seminatural state, although slightly influenced by human activities. Virgin forests were found only in deep valleys. Topographic features, climate and a detailed description of the vegetation of Jiuzhaigou and Huanglong natural reserves were given by Stenroos *et al.* (1994).

The Qingcheng Mts. and Ermei Mts. at the altitudes of about 400 to 1100 m and 500 to 3100 m respectively, are located in central and southern Sichuan (Fig. 1). The vegetation of the Qingcheng Mts. and lower parts of the Ermei Mts. belongs to warm temperate zone, forests being dominated by various species of the Lauraceae and Fagaceae. The flora higher up on the Ermei Mts. comprises temperate to boreal forests with the main gymnosperm tree genera of *Abies* and *Tsuga*, and the common angiosperm tree genera of *Betula*, *Populus* and *Rhododendron*.

Materials and methods

Nearly 250 specimens were collected from two forest reserves and two other natural forests in Sichuan Province. The studied materials are deposited at the Herbarium of the Institute of Applied Ecology, Chinese Academy of Sciences (IFP). Some duplicates are preserved at the Botanical Museum of the University of Helsinki (H).

The microscopic methods used in the study are as presented by Dai and Niemelä (1997). In the text the following abbreviations are used: L = mean spore length (arithmetical mean of all spores), W = mean spore width (arithmetical mean of all spores), Q = variation in the L/W ratios between the specimens studied (quotient of the mean spore length and the mean spore width of each specimen), $n = (x/y)$ means the number (x) of spores (or other structures) measured from given number (y) of specimens. In presenting the variation in the size of spores, pores, hyphae, cystidia and basidia, 5% of the measurements were excluded from each end of the range, these measurements being given in parentheses. IKI stands for Melzer's reagent, KOH for 5% potassium hydroxide, and CB is the abbreviation of Cotton Blue. CB+ means cyanophilous and CB– acyanophilous; IKI– means both inamyloid and indextrinoid.

An alphabetical checklist is given of polypores found in this investigation, and the authors of scientific names are according to the second edition of Authors of Fungal Names (http://www.indexfungorum.org/AuthorsOfFungalNames.htm). Substrate and collecting data are supplied after the name of each polypore, and the hosts are listed alphabetically. The concept of polypores circumscribed here is in a wide sense, including the Polyporaceae, Ganodermataceae, and poroid species in the Hymenochaetaceae and Corticiaceae.

Results

Checklist

Species printed in bold are new to Sichuan Province; the names marked with an asterisk (*) are new to China; those with an octothorp (#) are new to science.

Anomoporia albolutescens (Romell) Pouzar, *Abies*, *Dai 4032*

Anomoporia *cf.* ***flavissima*** Niemelä, *Tsuga*, *Dai 4031*, *Dai 4160*

Anomoporia myceliosa (Peck) Pouzar, *Pinus*, *Dai 4090 & Wei 501*, *Dai 4120*, *Dai 4127 & Wei 538*, *Dai 4129 & Wei 540*, *Dai 4147 & Wei 558*, *Dai 4210 & Wei 621*; *Populus Dai 4145 & Wei 556*; *Salix*, *Dai 4122 & Wei 533*

Antrodia cf. albida (Fr. : Fr.) Donk, *Betula*, *Dai 4162 & Wei 573*

Antrodia heteromorpha (Fr. : Fr.) Donk, *Picea*, *Dai 4030 & Wei 441*, *Dai 4089 & Wei 500*; *Pinus*, *Dai 4117 & Wei 528*, *Dai 4142 & Wei 553*, *Dai 4157 & Wei 568*, *Dai 4206 & Wei 617*, *Dai 4285a*

Antrodia leucaena Y.C. Dai & Niemelä, *Populus*, *Dai 4209 & Wei 620*

Antrodia malicola (Berk. & M.A. Curtis) Donk, *Ailanthus*, *Dai 4244 & Wei 655*; angiosperm, *Dai 4316 & Wei 727*

Antrodia serialis (Fr.) Donk, *Pinus*, *Dai 4110 & Wei 521*

Antrodia sitchensis (Baxter) Gilb. & Ryvarden, *Picea*, *Dai 4039 & Wei 450*; *Tsuga*, *Dai 4085 & Wei 496*

Antrodia **sp. 1**, angiosperm, *Dai 4067 & Wei 478*

Antrodia **sp. 2**, gymnosperm, *Dai 4240 & Wei 651*

Antrodia xantha (Fr. : Fr.) Ryvarden, *Cryptomeria*, *Dai 4238 & Wei 649*, *Dai 4271 & Wei 682*; *Pinus*, *Dai 4096 & Wei 507*, *Dai 4100 & Wei 511*, *Dai 4179 & Wei 590*, *Dai 4195 & Wei 606*

Antrodiella albocinnamomea Y.C. Dai & Niemelä, angiosperm, *Dai 4259 & Wei 670*, *Dai 4277 & Wei 688*

Antrodiella *cf.* ***fragrans*** (A. David & Tortić) A. David & Tortić, *Cinnamomum*, *Dai 4301 & Wei 712*

Antrodiella romellii (Donk) Niemelä, angiosperm, *Dai 4250 & Wei 661*

Antrodiella **sp. 1**, *Betula*, *Dai 4150 & Wei 561*

Antrodiella ussurii Y.C. Dai & Niemelä, angiosperm, *Dai 4038 & Wei 449*; *Populus, Dai 4074 & Wei 485*

Antrodiella zonata (Berk.) Ryvarden, angiosperm, *Dai 4317 & Wei 728*

Bjerkandera adusta (Willd. : Fr.) P. Karst., *Betula*, *Dai 4200 & Wei 611*; *Cryptomeria*, *Dai 4325 & Wei 736*, *Dai 4332 & Wei 743*

Castanoporus castaneus (Lloyd) Ryvarden, *Pinus*, *Dai 4107 & Wei 519*, *Dai 4109 & Wei 520*

Ceriporia *cf.* ***spissa*** (Schwein. : Fr.) Rajchenb., angiosperm, *Dai 4155 & Wei 566*

Ceriporia tarda (Berk.) Ginns, angiosperm, *Dai 4330 & Wei 741*

Ceriporiopsis mucida (Pers. : Fr.) Gilb. & Ryvarden, *Cunninghamia*, *Dai 4300 & Wei 711*; *Tsuga*, *Dai 4218 & Wei 629*

Cerrena unicolor (Bull. : Fr.) Murrill, angiosperm, *Dai 4270 & Wei 681*

Cyclomyces tabacinus (Mont.) Pat., angiosperm, *Dai 4252 & Wei 663*

Cyclomyces xeranticus (Berk.) Y.C. Dai & Niemelä, angiosperm, *Dai 4091 & Wei 502*

Daedalea dickinsii Yasuda, *Quercus*, *Dai 4069 & Wei 480*
Daedaleopsis confragosa (Bolton : Fr.) J. Schröt., *Salix*, *Dai 4064 & Wei 475*
Daedaleopsis tricolor (Bull. : Mérat) Bondartsev & Singer, angiosperm, *Dai 4269 & Wei 680*
Datronia mollis (Sommerf.) Donk, *Castanea*, *Dai 4333 & Wei 744*
***Dichomitus* sp. 1**, angiosperm, *Dai 4242 & Wei 653*
Dichomitus squalens (P. Karst.) D.A. Reid, *Pinus*, *Dai 4112 & Wei 523*
Diplomitoporus crustulinus (Bres.) Domański, *Picea*, *Dai 4104 & Wei 515*
Diplomitoporus lindbladii (Berk.) Gilb. & Ryvarden, *Pinus*, *Dai 4154 & Wei 565*, *Dai 4156 & Wei 567*
Favolaschia nipponica Kobayasi, *Bambusa*, *Dai 4272 & Wei 683*
Fomitiporia hippophaeicola (H. Jahn) Fiasson & Niemelä, *Hippophae*, *Dai 4055*
Fomitiporia punctata (P. Karst.) Murrill, angiosperm, *Dai 4243 & Wei 654*
Fomitopsis feei (Fr.) Kreisel, angiosperm, *Dai 4262 & Wei 673*; *Cunninghamia*, *Dai 4264 & Wei 675*
Fomitopsis pinicola (Sw. : Fr.) P. Karst., *Picea*, *Dai 4040 & Wei 451*
Fomitopsis rosea (Alb. & Schwein. : Fr.) P. Karst., *Picea*, *Dai 4070 & Wei 481*, *Dai 4077 & Wei 488*
Funalia trogii (Berk.) Bondartsev & Singer, *Betula*, *Dai 4203 & Wei 614*; *Salix*, *Dai 4106 & Wei 517*
Ganoderma australe (Fr.) Pat., angiosperm, *Dai 4275 & Wei 686*; *Cinnamomum*, *Dai 4299 & Wei 710*
Ganoderma lipsiense (Batsch) G.F. Atk., *Populus*, *Dai 4073 & Wei 484*
Ganoderma tsugae Murrill, *Tsuga*, *Dai 4274 & Wei 685*
Gloeophyllum protractum (Fr.) Imazeki, *Pinus*, *Dai 4136 & Wei 547*, *Dai 4148 & Wei 559*
Gloeophyllum sepiarium (Wulfen : Fr.) P. Karst., *Picea*, *Dai 4061 & Wei 472*; *Pinus*, *Dai 4099 & Wei 510*
Gloeophyllum trabeum (Pers. : Fr.) Murrill, *Prunus*, *Dai 4304 & Wei 715*
Haploporus alabamae (Berk. & Cooke) Y.C. Dai & Niemelä, angiosperm, *Dai 4285 & Wei 696*
Haploporus nepalensis (T. Hattori) Y.C. Dai, *Prunus*, *Dai 4222 & Wei 633*
***Haploporus* sp. 1**, *Betula*, *Dai 4052 & Wei 463*
Heterobasidion insulare (Murrill) Ryvarden *sensu lato*, *Tsuga*, *Dai 4211 & Wei 622*
Heterobasidion parviporum Niemelä & Korhonen, *Picea*, *Dai 4020 & Wei 431*, *Dai 4027 & Wei 438*, *Dai 4029 & Wei 440*; *Tsuga*, *Dai 4045 & Wei 456*, *Dai 4051*, *Dai 4084 & Wei 495*, *Dai 4214 & Wei 625*, *Dai 4224 & Wei 635*
Inonotus radiatus (Sowerby : Fr.) P. Karst., *Betula*, *Dai 4215 & Wei 626*; *Prunus*, *Dai 4227 & Wei 638*
Irpex lacteus (Fr. : Fr.) Fr., angiosperm, *Dai 4254 & Wei 665*; *Castanea*, *Dai 4341 & Wei 752*
Ischnoderma benzoinum (Wahlenb. : Fr.) P. Karst., *Picea*, *Dai 4187 & Wei 598*
Junghuhnia collabens (Fr.) Ryvarden, *Thuja*, *Dai 4137 & Wei 548*
Junghuhnia nitida (Pers. : Fr.) Ryvarden, *Populus, Dai 4114 & Wei 525*
Lenzites betulinus (L. : Fr.) Fr., *Betula*, *Dai 4116 & Wei 527*
Leptoporus mollis (Pers. : Fr.) Quél., *Pinus*, *Dai 4202 & Wei 613*
#Megasporoporia rhododendri Y.C. Dai & Y.L. Wei, *Rhododendron*, *Dai 4226*, *4229 & 4235a*
Microporus affinis (Blume & Nees) O. Kuntze, *Phoebe*, *Dai 4319 & Wei 730*
Oligoporus serciceomollis (Romell) Bondartseva, *Picea*, *Dai 4041*, *Dai 4047 & Wei 452*
Oxyporus corticola (Fr.) Ryvarden, angiosperm, *Dai 4128 & Wei 539*; *Picea*, *Dai 4021 & Wei 432*, *Dai 4056 & Wei 467*; *Tsuga*, *Dai 4023 & Wei 434*, *Dai 4024 & Wei 435*
Oxyporus cuneatus (Murrill) Aoshima, *Cryptomeria*, *Dai 4308 & Wei 719*, *Dai 4311 & Wei 722*, *Dai 4339 & Wei 750*, *Dai 4340 & Wei 751*
#Oxyporus macroporus Y.C. Dai & Y.L. Wei, *Tsuga*, *Dai 4044 & Wei 455*, *Dai 4146 & Wei 557*
Oxyporus obducens (Pers. : Fr.) Donk, angiosperm, *Dai 4138 & Wei 549*
***Oxyporus* sp. 1**, *Cryptomeria, Dai 4313 & Wei 724*
***Oxyporus* sp. 2**, *Picea, Dai 4232 & Wei 643*
Perenniporia piceicola Y.C. Dai, *Tsuga*, *Dai 4181 & Wei 592*
Perenniporia subacida (Peck) Donk, *Pinus*, *Dai 4161 & Wei 572*
Phaeolus schweinitzii (Fr. : Fr.) Pat., *Picea*, *4021a*
Phellinus collinus Y.C. Dai & Niemelä, angiosperm, *Dai 4273 & Wei 684*; *Cyclobalanopsis, Dai 4253 & Wei 664*
Phellinus conchatus (Pers. : Fr.) Quél., *Quercus*, *Dai 4086 & Wei 497*
Phellinus contiguus (Pers. : Fr.) Pat., angiosperm, *Dai 4059 & Wei 470*, *Dai 4095 & Wei 506*, *Dai 4123 & Wei 534*
Phellinus ferreus (Pers.) Bourdot & Galzin, *Abelia*, *Dai 4208 & Wei 619*; angiosperm, *Dai 4053 & Wei 464*, *Dai 4068 & Wei 479*
Phellinus gilvus (Schwein. : Fr.) Pat., *Betula*, *Dai 4072 & Wei 483*; *Castanopsis*, *Dai 4260 & Wei 671*; *Kalopanax*, *Dai 4257 & Wei 668*; *Prunus*, *Dai 4344 & Wei 755*
Phellinus himalayensis Y.C. Dai, *Picea*, *Dai 4057 & Wei 468*
Phellinus igniarius (L. : Fr.) Quél., *Salix*, *Dai 4231 & Wei 642*
Phellinus laevigatus (P. Karst.) Bourdot & Galzin, angiosperm, *Dai 4035 & Wei 446*
Phellinus lonicericola Parmasto, *Lonicera*, *Dai 4233 & Wei 644*
Phellinus lundellii Niemelä, *Betula*, *Dai 4066 & Wei 477*
Phellinus mcgregorii (Bres.) Ryvarden, *Lonicera*, *Dai 4230 & Wei 641*
Phellinus rhabarbarinus (Berk.) G. Cunn., angiosperm, *Dai 4256 & Wei 667*
Phellinus tremulae (Bondartsev) Bondartsev & Borisov, *Populus*, *Dai 4198 & Wei 609*; *Ulmus*, *Dai 4082 & Wei 493*
Phellinus tuberculosus (Baumg.) Niemelä, *Prunus*, *Dai 4228 & Wei 639*
Phellinus viticola (Schwein. : Fr.) Donk, *Pinus*, *Dai 4131 & Wei 542*
Phellinus yamanoi (Imazeki) Parmasto, *Picea*, *Dai 4235 &*

Wei 646

Phylloporia ribis (Schumach. : Fr.) Ryvarden, *Abelia, Dai 4197 & Wei 608*; angiosperm, *Dai 4103 & Wei 514*

Physisporinus vitreus (Pers. : Fr.) P. Karst., *Picea*, *Dai 4058 & Wei 469*

Piptoporus betulinus (Bull. : Fr.) P. Karst., *Betula*, *Dai 4149 & Wei 560*

Polyporus badius (Pers. : Gray) Schwein., angiosperm, *Dai 4043 & Wei 454*; *Populus*, *Dai 4115 & Wei 526*

Polyporus mongolicus (Pilát) Y.C. Dai, angiosperm, *Dai 4075 & Wei 486*, *Dai 4292 & Wei 703*; *Betula*, *Dai 4094 & Wei 505*

Polyporus mori (Pollini : Fr.) Fr., angiosperm, *Dai 4028 & Wei 439*

Polyporus teniuculus (Beauv.) Fr., angiosperm, *Dai 4263 & Wei 674*

Polyporus varius Pers. : Fr., *Populus*, *Dai 4140 & Wei 551*; *Salix*, *Dai 4144 & Wei 555*

Poriodontia subvinosa Parmasto, *Abies*, *Dai 4159 & Wei 570*

Postia caesia (Schrad. : Fr.) P. Karst., *Picea*, *Dai 4102 & Wei 513*; *Thuja*, *Dai 4121 & Wei 532*

Postia lactea (Fr. : Fr.) P. Karst., angiosperm, *Dai 4321 & Wei 732*

Postia *cf.* ***subcaesia*** (A. David) Jülich, angiosperm, *Dai 4261 & Wei 672*, *Dai 4276 & Wei 687*, *Dai 4281 & Wei 692*, *Dai 4331 & Wei 742*

Postia tephroleuca (Fr.) Jülich, *Picea, Dai 4022 & Wei 433*; *Pinus*, *Dai 4190 & Wei 601*

Postia undosa (Peck) Jülich, *Picea*, *Dai 4050 & Wei 461*, *Dai 4062 & Wei 473*; *Pinus*, *Dai 4092 & Wei 503*, *Dai 4199 & Wei 610*

Pycnoporus cinnabarinus (Jacq. : Fr.) P. Karst., *Betula*, *Dai 4134 & Wei 545*

Pycnoporus sanguineus (L. : Fr.) P. Karst., angiosperm, *Dai 4248 & Wei 659*

Rigidoporus crocatus (Pat.) Ryvarden, *Abies*, *Dai 4032 & Wei 443*; *Picea*, *Dai 4151 & Wei 562*

Rigidoporus eminens Y.C. Dai, angiosperm, *Dai 4247 & Wei 658*; *Pinus*, *Dai 4141 & Wei 552*

Schizopora flavipora (Cooke) Ryvarden, *Cinnamomum*, *Dai 4239 & Wei 650*

Sistotrema musicola (Pers.) S. Lundell, *Pinus*, *Dai 4105 & Wei 516*

Skeletocutis alutacea (J. Lowe) Jean Keller, angiosperm, *Dai 4063 & Wei 474*, *Dai 4111 & Wei 522*; *Picea*, *Dai 4080 & Wei 491*, *Dai 4188 & Wei 599*; *Pinus*, *Dai 4158 & Wei 569*, *Dai 4169 & Wei 580*, *Dai 4186*, *Dai 4194 & Wei 605*; *Populus*, *Dai 4166 & Wei 577*, *Dai 4172a*; *Tsuga*, *Dai 4213 & Wei 624*

Skeletocutis amorpha (Fr. : Fr.) Kotl. & Pouzar, *Pinus*, *Dai 4130 & Wei 541*

Skeletocutis biguttulata (Romell) Niemelä, angiosperm, *Dai 4192b*; *Pinus, Dai 4093 & Wei 504*

Skeletocutis carneogrisea A. David, *Pinus*, *Dai 4207 & Wei 619*

Skeletocutis lenis (P. Karst.) Niemelä, *Picea*, *Dai 4036 & Wei 447*, *Dai 4060 & Wei 471*

Skeletocutis nivea (Jungh.) Jean Keller, angiosperm, *Dai 4343 & Wei 754*

Skeletocutis odora (Sacc.) Ginns, *Pinus*, *Dai 4092a*

****Skeletocutis percandida*** (Malençon & Bertault) Jean Keller, angiosperm, *Dai 4192a*; *Pinus*, *Dai 4126 & Wei 537*, *Dai 4173 & Wei 584*; *Populus*, *Dai 4172 & Wei 583*

Skeletocutis stellae (Pilát) Jean Keller, *Tsuga*, *Dai 4205 & Wei 616*

Skeletocutis vulgaris (Fr.) Niemelä & Y.C. Dai, *Juniperus*, *Dai 4220 & Wei 631*; *Picea, Dai 4025 & Wei 436*, *Dai 4037 & Wei 448*, *Dai 4046 & Wei 457*

Stromatoscypha fimbriata (Pers. : Fr.) Donk, *Betula*, *Dai 4098 & Wei 509*; *Pinus*, *Dai 4133 & Wei 544*, *Dai 4156a*

Tinctoporellus epimiltinus (Berk. & Broome) Ryvarden, angiosperm, *Dai 4241 & Wei 652*

Trametes gibbosa (Pers. : Fr.) Fr., angiosperm, *Dai 4306 & Wei 717*

Trametes hirsuta (Wulfen : Fr.) Pilát, *Catalpa*, *Dai 4307 & Wei 718*; *Salix*, *Dai 4113 & Wei 524*

Trametes ochracea (Pers.) Gilb. & Ryvarden, angiosperm, *Dai 4295 & Wei 706*, *Dai 4298 & Wei 709*; *Populus*, *Dai 4078 & Wei 489*; *Rhododendron*, *Dai 4291 & Wei 702*

Trametes pubescens (Schumach. : Fr.) Pilát, *Salix, Dai 4108 & Wei 519a*

Trametes suaveolens (Fr. : Fr.) Fr., *Salix*, *Dai 4234 & Wei 645*

Trametes versicolor (L. : Fr.) Pilát, angiosperm, *Dai 4289 & Wei 700*; *Populus*, *Dai 4081 & Wei 492*

Trechispora candidissima (Schwein.) Bondartsev & Singer, *Pinus*, *Dai 4125 & Wei 536*; *Tsuga*, *Dai 4163 & Wei 574*

Trichaptum abietinum (Pers. : Fr.) Ryvarden, *Abies*, *Dai 4168 & Wei 579*; gymnosperm, *Dai 4207a*; *Picea*, *Dai 4042 & Wei 453*; *Pinus*, *Dai 4135 & Wei 546*

Trichaptum perrottetii (Lév.) Ryvarden, angiosperm, *Dai 4284 & Wei 695, Dai 4294 & Wei 705*

****Trichaptum*** *cf.* ***montanum*** T. Hattori, *Abies*, *Dai 4164 & Wei 575*, *Dai 4189 & Wei 600*, *Dai 4204 & Wei 615*

Trichaptum pargamenum (Fr.) G. Cunn., *Castanopsis*, *Dai 4245 & Wei 656*

Tyromyces canadensis Overh. *ex* J. Lowe, *Tsuga*, *Dai 4170 & Wei 581*

Tyromyces chioneus (Fr.) P. Karst., angiosperm, *Dai 4280 & Wei 691, Dai 4287 & Wei 698*; *Betula*, *Dai 4201 & Wei 612*

Descriptions

Megasporoporia rhododendri Y.C. Dai & Y.L. Wei, *sp. nova* (Fig. 2)

Carpophorum annuum, resupinatum. Facies pororum ravido cremea; pori 4–5 per mm. Systema hypharum dimiticum, hyphae generatoriae fibulatae, hyphae skeletales subiculi 3–5 µm in diam. Sporae hyalinae, ellipsoideae, 11–14 × 6.5–8 µm.

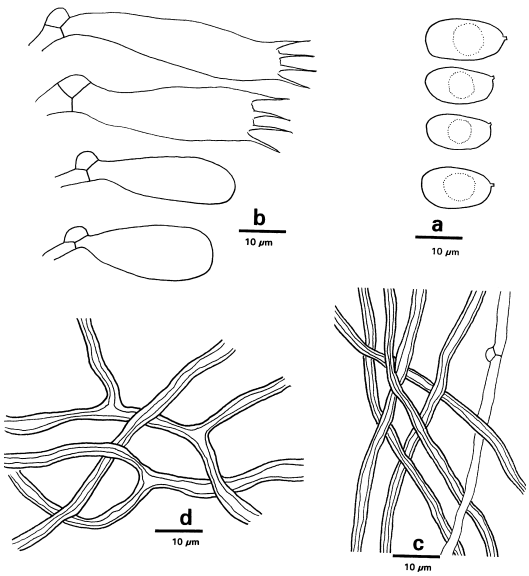

Fig. 2. Microscopical structures of *Megasporoporia rhododendri* (from holotype). — **a**: Spores. — **b**: Basidia and basidioles. — **c**: Hyphae from trama. — **d**: Hyphae from subiculum.

TYPE: China. Sichuan Province, Songpan County, Huanglong Nat. Res., alt. ca. 3300 m, mixed broad-leaved forest with scattered *Larix*, on fallen trunk of *Rhododendron*, 15.X.2002 *Dai 4226 & Wei* (holotype IFP; isotype H). Part of the same collection: *Wei 637* (IFP).

ETYMOLOGY. *Rhododendri* (Lat.) referring to the tree genus *Rhododendron*.

Fruitbody. 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. Pileus 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 greyish cream or smoke grey upon drying, sterile margin distinct, buff, up to 3 mm wide; pores round, freely arranged, (3–)4–5 per mm (n = 40/2); dissepiments thick, entire. Subiculum and context cream to buff, corky, up to 1.5 mm thick. Tube layer concolorous with pore surface, tubes corky, up to 0.5 mm long.

Hyphal structure. Hyphal system dimitic, generative hyphae with clamp connections, hyaline, thin-walled; skeletal hyphae thick-walled with a distinct lumen to subsolid, unchanged in KOH, dextrinoid, CB+.

Context. Hyphae of context strongly interwoven; generative hyphae frequent, occasionally with clamp connections and branched, 2–3.5 μm in diam.; skeletal hyphae thick-walled, flexuous, dentritically branched, 3–5 μm in diam.

Tubes. Tramal hyphae interwoven; generative hyphae dominant, thin-walled, frequently with clamp connections and branched, 2–4 μm in diam.; skeletal hyphae infrequent, thick-walled with a large lumen, dentritically branched, flexuous, 3–4.8 μm in diam. Cystidia absent, clavate cystidioles frequently present. Subhymenium indistinct. Polyhedric crystals absent. Basidia clavate, with a narrow base and a basal clamp, 23–40 × 9–14 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores. Basidiospores ellipsoid, hyaline, thin-walled, smooth, usually bearing 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).

This species has resupinate or effused-reflexed basidiocarps, dimitic hyphal structure with cyanophilous and dentritically branched skeletal hyphae, and it causes a white rot. These characters fit the genus *Dichomitus*. However, the skeletal hyphae in *Dichomitus* are negative in Melzer's reagent, and basidiospores in the genus are distinctly cylindric. The present species has dextrinoid skeletal hyphae and ellipsoid basidiospores, and it is therefore suggested as a new species of *Megasporoporia*.

Megasporoporia rhododendri lacks hyphal pegs, dendrohyphidia and polyhedric crystals, which are usually present in *Megasporoporia*. In addition, generative hyphae dominate the tramal structure in the new species, while skeletal hyphae are commoner in the other species of the genus.

The spore dimensions of *Megasporoporia rhododendri* are similar to those of *M. cavernulosa* (10–16 × 5–7 μm; Ryvarden *et al.* 1982), but the latter species has more cylindric basidiospores, and there are dendrohyphidia and polyhedric crystals. Besides, *M. cavernulosa* occurs in tropical America and Africa. *Megasporoporia rhododendri* has more ellipsoid basidiospores; it grows in boreal forests close to the timberline, on fallen trunks and dead trees of *Rhododendron*.

ADDITIONAL SPECIMENS EXAMINED (paratypes). — **China**. Sichuan Province, Songpan County, Huanglong Nat. Res., on *Rhododendron*, 15.X.2002 *Dai 4229 & Wei 640* (IFP), *Dai 4235a* (IFP).

Oxyporus macroporus Y.C. Dai & Y.L. Wei, *sp. nova* (Fig. 3)

Carpophorum perenne, resupinatum, contextum cremeum. Facies pororum cremea vel bubalina; pori 1–2 per mm. Systema hypharum monomiticum, hyphae septatae sine fibulis, hyphae subiculi 2.5–4 µm in diam. Sporae pallidae, ellipsoideae, 7–8 × 3.5–4.1 µm.

TYPE: China. Sichuan Prov., Jiuzhai County, Jiuzhaigou Nat. Res., alt. 3200 m, mixed forest dominated by gymnosperm trees, on fallen trunks of *Tsuga*, 12.X.2002 *Dai 4044* (holotype IFP; isotype H).

ETYMOLOGY. — *Macroporus* (Lat., part.) referring to the large pores.

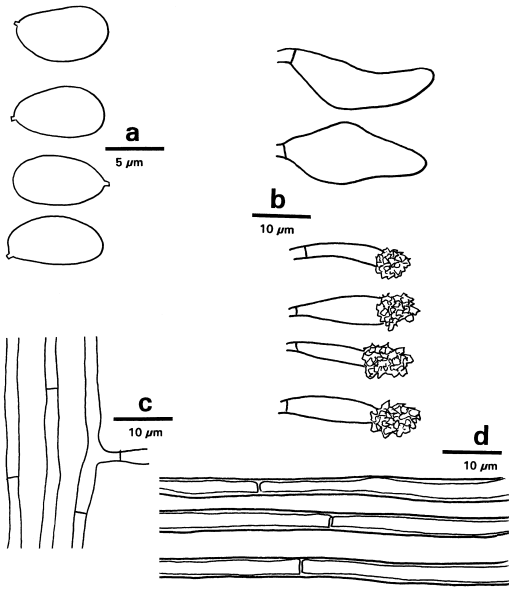

Fig. 3. Microscopical structures of *Oxyporus macroporus* (from holotype). — **a**: Spores. — **b**: Cystidia. — **c**: Hyphae from trama. — **d**: Hyphae from subiculum.

Fruitbody. Basidiocarps perennial, resupinate, pore surface cream to buff, soft and watery when fresh, up to 6 m long, 40 cm wide, and 8 mm thick, without odour or taste, when dry buff to pale brownish and corky. Sterile margin very narrow to almost lacking, pores usually extend to the very edge. Pores round to sinuous, 1–2 per mm, dissepiments thin, strongly lacerate to irpicoid. Subiculum thin, ca. 0.2 mm thick, soft corky, honey-buff coloured. Tube layer concolorous with pore surface, corky, annual layers distinct, tubes up to 7 mm long.

Hyphal structure. Hyphal system monomitic, hyphae simple septate, IKI–, CB+, unchanged in KOH.

Subiculum. Subicular hyphae hyaline, thin- to slightly thick-walled, frequently simple septate and branched, flexuous, interwoven, 2.5–4 µm in diam.

Tubes. Tramal hyphae hyaline, thin-walled, frequently simple septate, occasionally branched, loosely parallel along the tubes, 2–3.5 µm in diam. Cystidia two types, (a) clavate, abundant, thin- to thick-walled, apically encrusted, sometimes without encrustation, arising from subhymenium, 15–25 × 5–10 µm; (b) gloeocystidia frequent, hyaline, thin-walled, clavate to ventricose, CB+, 15–23 × 5–8 µm. Basidia broadly clavate, with four sterigmata and a basal simple septum, 12–15 × 4.5–6 µm, basidioles mostly barrel-shaped, slightly smaller than basidia.

Spores. Basidiospores ellipsoid, hyaline, thin-walled, smooth, usually glued together in tetrads, IKI–, CB–, (6.2–)7–8(–9) × (3.4–)3.5–4.1(–4.2) µm, L = 7.37 µm, W = 3.85 µm, Q = 1.92 (n = 30/1).

Externally *Oxyporus macroporus* is reminiscent of *Antrodia mellita* because of its extensive basidiocarps and large pores. Basidiospores of these two species are similar as well. However, *Antrodia mellita* has a dimitic hyphal structure, and the generative hyphae bear clamp connections (Niemelä & Penttilä 1992). In addition, *Antrodia mellita* causes a brown rot on *Populus*, and is found only in Europe.

Oxyporus macroporus is similar to *Leucophellinus irpicoides* in the perennial habit, large pores, and monomitic hyphal structure without clamp connections. *Leucophellinus irpicoides*, however, has distinctly thick-walled basidiospores and septate cystidia.

The two types of cystidia in *Oxyporus macroporus* bring in mind *Oxyporus corticola*, but the latter species has smaller pores (3–4 per mm)

and smaller basidiospores (4.9–6 × 3–4 μm). *Oxyporus corticola* is usually an annual species.

ADDITIONAL SPECIMENS EXAMINED (paratypes). — **China**. Sichuan Prov., Jiuzhai County, Jiuzhaigou Nat. Res., on *Picea,* 13.X.2002 *Dai 4146* (IFP, H).

Discussion

The cool temperate to boreal forest vegetation in Jiuzhaigou and Huanglong natural reserves is rich in the tree genera *Abies*, *Larix*, *Picea*, *Pinus*, *Tsuga*, *Acer*, *Betula*, *Populus* and *Salix*, which make the landscape resemble the forests in northern Eurasia. Polypore genera, such as *Anomoporia*, *Antrodia*, *Antrodiella*, *Daedaleopsis*, *Diplomitoporus*, *Fomitopsis*, *Heterobasidion*, *Ischnoderma*, *Phaeolus*, *Phsisporinus* and *Skeletocutis* are the typical fungal elements in this type of woody vegetation. Many species in these polypore genera were found in the two Chinese reserves. Diversity of tree species is higher in Sichuan than in northeastern China and North Europe. Trees, such as *Tsuga* and *Juniperus*, are rather common in the boreal forests of Sichuan, but they do not occur in the similar forests of northern Eurasia.

In contrast to the polypore flora in northeastern China, some species, e.g. *Amylocystis lapponica*, *Antrodia sinuosa*, *Gloeophyllum odoratum*, *Postia fragilis*, *Inonotus obliquus*, *Postia guttulata* and *Trichaptum fuscoviolaceum* were not found in northern Sichuan. *Antrodia serialis* is among the commonest species in the forests of northern Eurasia, but it was encountered only once during the 10 days of investigation. Interestingly, although *Abies*, *Larix*, *Pinus* and *Tsuga* dominate in the boreal forests of northern Sichuan, species of *Phellinus* are fairly rare on these trees and only *Phellinus himalayensis*, *P. viticola* and *P. yamanoi* were found. *Phellinidium ferrugineofuscum*, *Fomitiporia hartigii* and *Phellinus nigrolimitatus* were not found.

The vegetation of the Qingcheng Mts. and the lower part of the Ermei Mts. belongs to the warm temperate zone. Although *Cunninghamia lanceolata* and *Cryptomeria fortunei* occur in these forests, the dominant trees are angiosperms. Some subtropical polypores were found in these mountains, e.g. *Antrodiella zonata*, *Cyclomyces tabacinus*, *Favolaschia nipponica*, *Fomitopsis feei*, *Microporus affinis*, *Phellinus rhabarbarinus* and *Trichaptum perrottetii*. The excursion made in the warm temperate forests of Sichuan was short, and only a minor part of polypores were found. Given the richness of plants in those areas, more species of polypores are expected after further studies. Several books on polypores have been published from subtropical or tropical Pacific Asia, (Corner 1983, 1984, 1987, 1989, 1991, Quanten 1997, Chang *et al*. 2001), and the detailed studies are available on the species described from tropical Asia and the West Pacific archipelago (Hattori 2000, 2001a, 2001b, 2002, 2003a, 2003b).

In our study seven taxa in *Antrodia*, *Antrodiella*, *Dichomitus*, *Oxyporus* and *Pachyckytospora* were identified at the genus level only, because we could not find suitable existing names for them: they are most probably undescribed species. Only one specimen for each taxon was collected at the moment, and we are waiting for further collections before naming them. Condensed descriptions of these seven taxa are given below, and their taxonomic relationships are discussed.

Notes on selected species

Anomoporia cf. flavissima

This taxon has resupinate basidiocarps, yellow pores (4–6 per mm) and rhizomorphs. Its hyphal structure is monomitic with frequent clamp connections, and its basidiospores are ellipsoid, amyloid and CB–, 4.6–5.4 × 3.3–4 μm, L = 5.01 μm, W = 3.75 μm, Q = 1.34–1.36 (n = 60/2). It is very similar to *Anomoporia flavissima*, which has distinctly smaller basidiospores, 3.2–4.1 × 2.4–3.1 μm, L = 3.66 μm, W = 2.79 μm, Q = 1.26–1.36 (n = 540/6, Niemelä 1994).

Antrodia sp. 1

Basidiocarps annual, resupinate, very tough; pore surface cream when fresh, becoming greyish cream upon drying; pores round, 3–5 per

mm. Hyphal system dimitic, generative hyphae with clamp connections, skeletal hyphae strongly agglutinated, IKI–, CB–, Cystidia absent. Basidiospores cylindric, somewhat fusiform, hyaline, thin-walled, smooth, IKI–, CB–, 6–9 × 2.2–3 μm, L = 7.22 μm, W = 2.68 μm, Q = 2.69 (n = 36/1). Growing on fallen trunks of an angiosperm tree.

This taxon is similar to *Antrodia serialis*, which has larger pores (2–3 per mm) and more fusiform basidiospores. Besides, *A. serialis* grows on gymnosperm trees. Some generative hyphae within trama and hymenial elements in *Antrodia* sp. 1 bear fine crystals, which are similar to those in the genus of *Skeletocutis*. No crystals were observed in *A. serialis*.

Antrodia sp. 2

Basidiocarps perennial, resupinate, corky; pore surface yellow; pores 7–8 per mm. Hyphal structure dimitic, generative hyphae with clamp connections, skeletal hyphae amyloid, CB–. Cystidia absent. Basidiospores ellipsoid, tapering towards the apiculus, hyaline, thin-walled, IKI–, CB–, 2.8–3.8 × 1.5–2 μm, L = 3.08 μm, W = 1.84 μm, Q = 1.67 (n = 38/1). Growing on fallen trunk of gymnosperm.

Antrodia sp. 2 is similar to *Antrodia xantha* in having yellow pores and amyloid skeletal hyphae, but differs by having allantoid and narrower basidiospores: in *A. xantha* they are 4–5 × 1.2–1.5 μm. Another yellow-pored *Antrodia*, *A. alpina*, has tissue becoming purple with KOH, its skeletal hyphae are IKI–, and basidiospores are longer (4–5 × 2–2.5 μm; Ryvarden & Gilbertson 1993).

Antrodiella cf. fragrans

The Chinese collection was found on a fallen trunk of *Cinnamomum*. Its pore surface is cinnamon, and its basidiospores are broadly elliposid to subglobose (3.1–4.4 × 2.9–3.5 μm, L = 3.78 μm, W = 3.11 μm, Q = 1.22, n = 35/1). Our material is therefore close to *A. fragrans*, but the Chinese taxon has completely resupinate basidiocarps with relatively larger pores (4–5 per mm). Furthermore, no scent of coumarin was detected in our material. *Antrodiella fragrans* was originally described from Europe (the Balkans), and its has a distinct pileate basidiocarp, smaller pores (6–7 per mm), and a strong scent of coumarin or aniseed (Ryvarden & Gilbertson 1993).

Antrodiella sp. 1

Basidiocarps annual, resupinate; hymenophore poroid when juvenile, becoming irpicoid or dentate with age, cream to yellowish cream when dry; pores or spines 3–5 per mm. Hyphal system dimitic, generative hyphae with clamp connections, skeletal hypahe dominant, IKI–, CB+. Cystidia absent. Basidiospores oblong ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, 3–3.9 × 1.8–2.1 μm, L = 3.34 μm, W = 1.98 μm, Q = 1.69 (n = 36/1). Growth on fallen trunk of *Betula*.

Antrodiella sp. 1 is similar to *Antrodiella foliaceo-dentata* and *A. zonata* in having a poroid to irpicoid hymenophore, but *A. foliaceo-dentata* and *A. zonata* have pileate basidiocarps. Basidiospores of *A. foliaceo-dentata* are cylindric, 3–4 × 1–1.5 μm (Ryvarden & Gilbertson 1993). *Antrodiella zonata* has a yellow or yellowish-brown hymenophore, and its basidiospores are larger, 4.4–6 × 3–4 μm.

Dichomitus sp. 1

Basidiocarps perennial, effused-reflexed, hard corky; upper surface black; pore surface greyish; pores round, 4–6 per mm. Hyphal system dimitic, generative hyphae with clamp connections, skeletal hypahe dentritically branched, IKI–, distinctly CB+. Cystidia absent. Basidiospores cylindric, hyaline, thin-walled, smooth, IKI–, CB–, 7.8–11.5 × 3–3.8 μm, L = 8.90 μm, W = 3.14 μm, Q = 2.83 (n = 35/1). Growth on fallen branch of angisperm.

This taxon has similar basidiospores as *Dichomitus squalens*, which is usually an annual species with white or cream coloured upper surface and pores. In addition, *D. squalens* grows on dead gymnosperm trees.

Haploporus nepalensis (T. Hattori) Y.C. Dai, *comb. nova*

Basionym: *Pachykytospora nepalensis* T. Hattori, Bull. Nat. Sci. Mus., Tokyo, Ser. B 28: 29. 2002.

This species was recently described from Nepal (Hattori *et al*. 2002), and the Chinese collection is its second record. *Pachykytospora* was merged in *Haploporus* by Dai *et al*. (2002), and accordingly the above combination is proposed.

***Haploporus* sp. 1**

Basidiocarps perennial, resupinate, corky; pore surface cream to pale ochraceous; pores round, 3–4 per mm. Hyphal system dimitic, generative hyphae with clamp connections, both generative and skeletal hyphae common, skeletal hyphae branched, fairly thick-walled with a wide lumen, interwoven in both trama and subiculum, very weakly dextrinoid to almost IKI–, distinctly CB+. Cystidia absent, dendrohyphia abundant. Basidiospores oblong ellipsoid, hyaline, thick-walled, ornamented with echinulate ornamentations, IKI–, CB+, 7.8–11.1 × 5–7 μm, L = 8.96 μm, W = 5.87 μm, Q = 1.53 (n = 30/1). Growth on dead tree of *Betula*.

Basidiospores of this taxon are similar as those of *Haploporus alabamae,* which has an annual habit and those skeletal hyphae are distinctly dextrinoid.

***Oxyporus* sp. 1**

Basidiocarps annual, resupinate, corky; pore surface white; pores round, 4–6 per mm. Hyphal system monomitic, hyphae simple septate, slightly dextrinoid, more or less CB+, unchanged in KOH. Two kinds of cystidia, (a) hyphoid cystidia clavate, arising from trama, apically encrusted with coarse crystals, up to 100 μm long, and 8–12 μm in diam at the apical part, crystals slightly IKI+; (b) gloeocystidia frequent, clavate to ventricose, hyaline, thin-walled, CB+, 15–25 × 5–10 μm. Basidiospores oblong ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, 3.4–4.2 × 2–2.3 μm, L = 3.85 μm, W = 2.14 μm, Q = 1.80 (n = 30/1). Growth on stump of *Cryptomeria*.

This taxon resembles *Oxyporus obducens*, a species with hyphoid cystidia only, and with ellipsoid to ovoid basidiospores. *Oxyporus corticola* has two types of cystidia, but it differs from the new species by having larger basidiospores (4.9–6.2 × 3–4 μm).

***Oxyporus* sp. 2**

Basidiocarps annual, resupinate, corky; pore surface white; pores round, 2–3 per mm. Hyphal system monomitic, hyphae simple septate, IKI–, CB+, unchanged in KOH. Hyphoid cystidia clavate, arising from trama, apically encrusted with coarse crystals, 32–48 × 8–12 μm. Basidiospores broadly ellipsoid, hyaline, thin-walled, smooth, usually bearing a large guttule, IKI–, CB–, 4.6–5.5 × 3.4–4 μm, L = 5.17 μm, W = 3.76 μm, Q = 1.38 (n = 30/1). Growth on stump of *Picea*.

This taxon is similar to *Oxyporus cuneatus* which, however, has subglobose basidiospores, and cystidia that originate from the subhymenium.

Perenniporia piceicola

This species was described from the Yunnan Province of China (Dai *et al*. 2002), found on fallen *Picea* trunks from east foothills of the Himalayas. The new record of the species from Sichuan is the second locality for the species, collected from fallen trunks of *Tsuga* at alt. ca. 2900 m. Cystidia were found, but not frequently, in the type material of *Perenniporia piceicola*. The specimen from Sichuan lacks cystidia, but all the other characters fit the type well.

Trichaptum cf. montanum

Three specimens collected on *Abies* and *Tsuga* are tentatively identified as *Trichaptum montanum*, which was originally described from Nepal (Hattori *et al*. 2002). An isotype of *Trichaptum montanum* was studied, and the Chinese collections show similar hyphal structure and basid-

iospores as in the type. However, *Trichaptum montanum sensu typi* has a pale brown pore surface, and larger pores (3–5 per mm), while the Chinese materials have a purplish-brown pore surface, and small pores (5–7 per mm).

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