Bambusicolous polypores collected in Central Thailand

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The following seven polypores were recorded on bamboo culms in Central Thailand: Flavodon flavus, Grammothele fuligo, Irpex lacteus, Perenniporia bambusicola sp. nov., Piptoporus roseovinaceus sp. nov., Rigidoporus cf. lineatus, and Serpula similis. Perenniporia bambusicola is characterized by orange pores turning dark violet to black in KOH, orange mycelial strands and sheet and oblong, apically truncate basidiospores. A key to the world species of Perenniporia with resupinate basidiocarps and bright colored pore surface is provided. Piptoporus roseovinaceus is compared to P. soloniensis, but its hyphal system is monomitic in the trama while the latter has dimitic tubes.

Key words: Bambusoideae, basidiomycetes, host specificity, Polyporaceae, wood-inhabiting fungi

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Introduction

Bamboos are widely distributed in Thailand in several forest types, especially mixed deciduous forest and as understory shrubs and in bamboo forests. Eighty two species of bamboo belonging to 15 genera are documented in Thailand with Dendrocalamus brandisii, Dendrocalamus sp., Bambusa blumeana, Thrysostachys oliveri, and Cephalostachyum pergracilis being the most common species (Rungnapha et al., 2001). Hyde et al. (2002) based on literature search and scanning the “Index of Fungi” (http://nt.ars-grin.gov.fungaldatabase) listed more than 1,100 species reported on bamboo worldwide including 630 ascomycetes, 150 basidiomycetes and 330 anamorphic fungi. Many basidiomycetes were rusts of the genera Puccinia, Stereotrystratum and Uredo causing spots on leaves.

Boidin et al. (1986) and Sotome et al., (2007) have reported polypores on bamboo, while Coelho et al. (2006) list 56 worldwide. Only limited information is available on Thai polypores (e.g. Rungjindamai et al., 2008), while in this study 124 basidiomycete collections were made on bamboo.

The purpose of this study is to describe two new polypore species collected on bamboo, in the genera Perenniporia and Piptoporus and to present a key to Perenniporia species with resupinate basidiocarps with a yellow to orange pore surface.

Materials and methods

Intensive collections of polypores and other basidiomycetes on bamboo culms were made mainly in Central Thailand. Main
collecting sites were as follows: Prachin Buri Prov.: The Bamboo Park; Wang Bon. Nakhon Ratchasima Prov.: Khao Yai National Park. Nan Prov.: Phu Fa Phatta na Centre (Huai Pha Phueng); Huai Pla Pung. Nakhon Si Thammarat Prov.: Khao Luang National Park.

Macroscopic characters were described based on fresh and dried specimens. Microscopic characters were made from dried specimens, examining free-hand cut sections mounted in Melzer’s reagent or in 5% (w/v) KOH solution after staining in 1% (w/v) phloxine solution. A non-amyloid and non-dextrinoid reaction was described as IKI-. Basidiospores were measured mounted in Melzer’s reagent. The following abbreviations are used in the text: L, mean spore length; W, mean spore width (side view); r, the ratio of length/width of a basidiospore; R, mean of r. The term (n = x/y) means x measurements of basidiospores from y specimens. In presenting the spore size, 5% of the measurements at each end are given in parentheses (Dai and Niemelä 1997). Examined specimens were deposited in BBH or TFM.

Taxonomy


*Specimens examined:* THAILAND, Prachin Buri Prov., The Bamboo Park, 27 September 2005, coll. R. Choeyklin (BBH 19092); the same place, 20 September 2006, coll. R. Choeyklin (BBH 19090); the same place, 6 December 2006, coll. R. Choeyklin (BBH 19091; 19283).

*Remarks:* This is a common species in SE Asia, frequently found on hardwood trees, but also occasionally reported on bamboo in Papua New Guinea (Quanten, 1997). For a detailed description, see Ryvarden and Johansen (1980).


*Specimens examined:* THAILAND, Prachin Buri Prov., The Bamboo Park, 6 December 2006, coll. R. Choeyklin (BBH 19763).

*Remarks:* This species is restricted to monocotyledons (Ryarden and Johansen, 1980), and has been recorded on bamboo in India (Virdi, 1990) and Costa Rica (Carranza-Morse, 1991). For a detailed description, see Ryvarden and Johansen (1980).

**Irpex lacteus** (Fr.) Fr., Elench. Fung. 1: 142 (1828).


*Remarks:* This species occurs most frequently on hardwood trees (Gilbertson and Ryvarden, 1986), but has also been recorded on bamboo by Coelho et al. (2006). For a detailed description, see Gilbertson and Ryvarden (1986).

**Perenniporia bambusicola** Choeyklin, T. Hatt. & E.B.G. Jones, sp. nov. (Figs 2, 3-6) MycoBank: 511874

*Etymology:* bambusicola (Latin), growing on bamboo.

*Hyphal system* dimitic. *Tramal* generative hyphae with clamp-connections, occasionally branched, hyaline, 1.2–2.2 µm wide. *Tramal* vegetative hyphae arboriform with stalk and side branches, thick-walled, hyaline, IKI- to slightly dextrinoid in mass, with granules discoloring into violet in KOH solution, up to 2.0 µm wide at the base. *Hyphae* composing mycelial strands similar to *P. aurantiaca*, see Decock and Ryvarden (1999). *Basidia* only one seen, clavate, 13 µm long, 7.8 µm wide. Cystidia absent. *Basidiospores* flat, oblong ellipsoid in the side view, ellipsoid and truncate in the front view, thick-walled, hyaline, slightly dextrinoid, (3.5–)3.8–5.8 × (1.5–)1.8–2.5(–2.8) µm (side view) × (2.2–)2.5–3.6(–3.9) µm (front view), L = 4.7 µm, W₁ = 2.0 µm (side view), W₂ = 3.1 µm (front view), R = 2.3 µm (n = 60/2).
A key to the worldwide of Perenniporia with resupinate basidiocarps and yellow-orange pores

1. Basidiospores shorter than 5.5 µm on average…….2
2. Basidiospores longer than 5.5 µm on average…….6

2. Pore surface unchanged or slightly darker with KOH solution......................................................... 3
3. Pore surface violet to almost black with KOH solution; basidiospores IKI- to weakly dextrinoid…4

3. Pore surface bright yellow to light brown, 7–9/mm. Vegetative hyphae arboriform, IKI- to slightly dextrinoid in mass. Basidiospores ovoid to truncate, slightly thick walled, weakly to moderately dextrinoid, 4–5 × 3–4 µm. Known from SE Asia, on Dipterocarpaceae trees (Hattori and Lee, 1999 as ’P. dipterocarpicola’, Decock, 2001).................................


5. Pores bright yellow when fresh, 6–8/mm, without mycelial strands. Vegetative hyphae arboriform, IKI- to slightly dextrinoid. Basidiospores ellipsoid, truncate, thick-walled, IKI- to slightly dextrinoid, 4.2–5.8 × 3.2–4.2 µm. Known from S America and SE Asia. On hardwoods. (Decock and Ryvarden, 1999).................................P. xantha

6. Basidiospores thick-walled, more or less dextrinoid .

7. Pores 4-6/mm, without reddish marginal zone........ 8

8. Vegetative hyphae distinctly arboriform, IKI-.
   Pore surface yellow, 4–5/mm. Basidiospores thick-walled, 
   broadly ellipsoid, dextrinoid, 5.6–7.7 × 4.1–5.9 µm. 
   Known from S America. On dead wood. (Decock 
   and Ryvarden, 1999)..............................................

   *P. chromatica* (Berk. & Cooke) Decock & Ryvarden

8. Vegetative hyphae unbranched to branched, but not 
   arboriform, weakly to strongly dextrinoid. Pore 
   surface bright yellow or cream, 4–6/mm. 
   Basidiospores thick-walled, broadly ellipsoid, weakly 
   to strongly dextrinoid, 5–6.5 × 3.5–4.5 µm. 
   Widespread in N Hemisphere. On hardwoods. 
   (Gilbertson and Ryvarden, 1987).............................

   ..................................................*P. medulla-panis* (Jacq.) Donk

**Piptoporus roseovinaceus** Choeyklin, T. Hatt. 
& E.B.G. Jones, *sp. nov.* (Figs 1, 7–9)

Mycobank: 51875

   Etymology: roseus + vinaceus (Latin), after the 
   rose to wine colored pileus.

   *Basidiocarps* sessilia. *Pilei* dimidiati vel 
   flabelliformes, velutini vel hirsuti, rosei vel vinacei. *Pori* 
   rosei, angulares, 3–4/mm. *Systema hypharum* dimiticum 
   in contextu, monomiticum in tramate. *Hyphae 
   generativae* fibulatae. *Hyphae* *skeletal* *hyphae* *hyalinae*, IKI-
   *Basidiosporae* prelate ellipsoidae vel ellipsoideae, IKI-
   4.8–6.0 × 3.8–4.5 µm.

   *Basidiocarps* annual, sessile, single. *Pilei* 
   dimidiate to flabelliform, applanate, to 
   triquetrous, pileus surface velutinous to hirsute 
   drying scurfy, with irregular or radial ridges, 
   azonate, pink to reddish violet in fresh 
   condition, drying light orange to grayish 
   orange; pileus margin undulating, rounded. 
   *Pore surface* even to partly nodulose, pinkish 
   to pink, darker on bruising in fresh condition, 
   drying sordid white to grayish orange; pores 
   angular, 3–4/mm; dissepiments moderately 
   thick and entire. *Context* fleshy in fresh 
   condition, drying fibrous-corky, light in weight, 
   without a crust, white to pale orange, up to 10 
   mm thick. *Tubes* soft in fresh condition drying 
   brittle, sordid white to grayish orange, up to 2 
   mm deep.

   *Hyphal system* dimitic in context, 
   monomitic in trama. *Contextual generative 
   hyphae* with clamp-connections, unbranched to 
   occasionally branched, thin-walled, hyaline, 
   1.5–7 µm wide (in KOH solution). *Contextual 
   skeletal hyphae* straight to sinuous, often 
   irregularly swollen, thick-walled to almost 
   solid, abundantly seen in Melzer’s reagent, but 
   swelled and dissolved in KOH solution, 

   hyaline, IKI-, 3–10 µm wide. *Tramal 
   generative hyphae* with clamp-connections, 
   occasionally branched, hyaline, 1.5–3 µm wide. 
   *Basidia* collapsed. *Cystidia* absent. 
   *Basidiospores* short ellipsoid to ellipsoid, 
   thin-walled, hyaline, IKI-, (4.2–)4.8–6.0(–6.8) × 
   (3.7–)3.8–4.5(–4.8) µm, 1.1 = r = 1.6, L = 5.5 
   µm, W = 4.1 µm, R = 1.4 (n = 50/1).

   *Specimens examined:* THAILAND, Prachin Buri 
   Prov. The Bamboo Park, on dead bamboo culms, 28 

   Other specimens examined: *Piptoporus 
   soloniensis* (Dubois) Pilát, JAPAN, Tottori Pref., Mt. 
   Daisen, 26 September 1986, coll. Y. Abe, (TFM F-
   14485); Kouchi Pref., Monobe, Nishikuma, 13 Nov. 
   1991, coll. T. Hattori (TFM F-16426); Nagano Pref., 
   Kiso, Kaida, 9 September 1994, coll. T. Hattori (TFM F-
   17210).

   Remarks: This species is close to 
   *Piptoporus soloniensis* (Dubois) Pilát, a species 
   with a distribution mainly in the temperate area. 
   It has also vivid coloured pileus surface, hyphal 
   characters in context and short ellipsoid 
   basidiospores, but the latter has orange, cream 
   to whitish pileus surface, buff to pinkish 
   context and fibrous-corky tubes with a dimitic 
   hyphal system as in context (Gilbertson and 
   Ryvarden, 1987).

   *Piptoporus soloniensis* is now widely 
   accepted in *Piptoporus* P. Karst. because of the 
   sessile basidiocarps light in weight when dry, 
   the light colored and corky context, the dimitic 
   hyphal system in the context, the negative 
   reaction with Melzer’s reagent, and the decay 
   type (Ryvarden and Gilbertson, 1994; 
   Gilbertson and Ryvarden, 1987). Kim et al. 
   (2005) suggested that *P. soloniensis* is 
   phylogenetically not related to *P. betulinus* 
   (Bull.) P. Karst., the type species of *Piptoporus*, 
   but no nomenclatural conclusion was made for 
   the placement of *P. soloniensis*. Before 
   emendation of *Piptoporus* and other related 
   genera based on phylogenetic analyses, we 
   prefer to keep *P. soloniensis* and *P. 
   roseovinaceus*, most possibly allied to the 
   former, in this genus.

   *Tyromyces armeniacus* (Corner) T. Hatt. 
   and *T. incarnatus* Imazeki (= *T. roseipileus* 
   Corner) also have pink to reddish basidiocarps 
   and fleshy context and were reported from 
   Southeast Asia, but have a monomitic hyphal 
   system in the context (Corner, 1989; Hattori, 
Fungal Diversity


Pileus dimidiate, appplanate, pileus surface glabrous, concentrically sulcate, light brown up to 2 cm wide. Pore surface grayish orange, pores angular, 8–10/mm. Context fleshy-leathery in fresh condition, drying woody, without a crust, up to 1.5 mm thick. Tubes rigid, concolourous with pore surface, up to 1 mm deep. Hyphal system mono-dimitic. Cystidial hyphae abundant in trama, encrusted with crystals. Basidiospores globose to subglobose, thin-walled, hyaline, IKI-, 4–5 × 3.5–4.5 μm.


Remarks: This is similar to R. lineatus, but basidiocarps and basidiospores are smaller than in the typical form. This form was also collected on bamboo in Malaysia and is possibly distinct from R. lineatus. For the time being, we leave this as R. cf. lineatus because there are several names that have been considered synonyms of R. lineatus but some of them have different morphology from the typical form (Hattori, 2001).
= Serpula eurocephala (Berk. & Broome) W.B. Cooke, Mycologia 49:212, 1957; sensu W.B. Cooke, non sensu Berk. & Broome.

Specimens examined: Thailand, Prachin Buri Prov., The Bamboo Park, 27 September 2005, coll. R. Choeyklin (BBH 19087); the same place, 28 June 2006, coll. R. Choeyklin (BBH 19088; 19089).

Remarks: This is widely distributed in SE Asia, and commonly seen on bamboo (Cooke, 1957) but also on hardwoods. For detailed descriptions, see Cooke (1957) as ‘S. eurocephala’ and Ginns (1971).

Discussion

Among the species listed here, *F. flavus* and *I. lacteus* are more frequently reported on hardwood trees (Gilbertson and Ryvarden, 1986; Ryvarden and Johansen, 1980), and these species are suggested to have wide host range. Grammothele fuligo has a peculiar host range,
specific to monocotyledons, and more frequently collected on palms in Thailand. 

_Serpula similis_ is most probably a paleotropical species, frequently collected on bamboo, both in the wild and in buildings, but also on other wood such as _Leucaena glauca_ (Cooke 1957) suggesting that it has a preference for _Bambusoideae_ but is not a specialist.

_Perenniporia bambusicola_ is an outstanding species with a vivid orange pore surface and conspicuous mycelial strands. It is hitherto known only on bamboo, in two localities in Thailand and Yunnan in southern China (Decock, pers. comm.). Therefore, it might be restricted to and a specialist on bamboo. _Perenniporia aurantiaca_, a closely related species, is hitherto known only from South America (David and Rajchenberg, 1985; Decock and Ryvarden, 1999) and so far known only on hardwood trees.

_Rigidoporus_ cf. _lineatus_ can be another species that has specificity or preference for bamboo. This is similar to _R. lineatus_, but its basidiocarps are usually less than 1 cm long, and basidiospores are mostly less than 5 µm long contrasting that they are 4.5–6 µm long in _R. lineatus_ (Gilbertson and Ryvarden, 1987; Ryvarden and Johansen, 1980). Detailed studies are needed to resolve its identity from _R. lineatus_ and its nomenclature. _Piptoporus roseovinaceus_ is hitherto known only from the holotype, and its host range is unclear.

A number of other polypores on bamboo culms in our collections are not discussed here. Some of them may be new to science, but we refrain from describing them as new because of the limited number of specimens and their quality.

After a world comprehensive survey of polypores on bamboo, Coelho _et al._ (2006) suggested that only 14 out of 57 species are specific to bamboo as a substrate. Several polypores growing on bamboo culms are expected from tropical Asia including Thailand, but hitherto limited information is available from this area. More intensive collections and further studies may reveal more polypores specific to bamboo in tropical Asia.

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**References**


