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Inonotus niveomarginatus and *I. tenuissimus* spp. nov. (*Hymenochaetales*), resupinate species from tropical China

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Abstract — Two new species are described from tropical Yunnan, southwestern China. *Inonotus niveomarginatus* is characterized by resupinate basidiocarps with distinct white margins, a monomitic hyphal structure, absence of hymenial and hyphoid setae, and yellowish, thick-walled, ovoid to subglobose basidiospores. *Inonotus tenuissimus* can be distinguished from other *Inonotus* species by the combination of resupinate habit, a mono- to dimitic hyphal structure, absence of the hymenial and hyphoid setae, and yellowish thick-walled ellipsoid basidiospores.

Key words — *Hymenochaetaceae*, polypore, taxonomy, wood-inhabiting fungi

Introduction

Yunnan Province in southwestern China is one of the biodiversity "hotspots" in the world and rich with many vascular plants and fungi. Many wood-decaying fungi have been described from this province (Chen & Cui 2012; Cui et al. 2009; Dai 2010, 2011; Dai et al. 2002, 2009; He & Dai 2012; Li & Cui 2010, 2013; Yuan & Dai 2008; Zhao et al. 2013). During a systematic survey of *Inonotus* P. Karst. species in southwestern China, two resupinate species were found that lacked hymenial and hyphoid setae and possessed yellowish thick-walled ovoid to subglobose or ellipsoid basidiospores. These prominent characters distinguish the two species from all other known *Inonotus* species, and they are described here as new.

Materials & methods

The studied specimens were deposited at the herbarium of Institute of Microbiology, Beijing Forestry University (BJFC). The microscopic procedures were follows as in Cui & Decock (2013). Sections were studied at magnifications up to 1000× using a Nikon Eclipse 80i microscope with phase contrast illumination. Drawings were made with the aid of a drawing tube. Microscopic features, measurements, and illustrations were made

from the slide preparations stained with Cotton Blue and Melzer's reagents. Spores were measured from sections cut from the tubes. To present the spore size variation, the 5% of measurements excluded from each end of the range are given in the parentheses; spine lengths are not included in the basidiospore measurements. Abbreviations include IKI = Melzer's reagent, IKI– = negative in Melzer's reagent, KOH = 5% potassium hydroxide, CB = Cotton Blue, 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, and n = number of spores measured from the given number of specimens. Special color terms follow Petersen (1996).

Taxonomy

Inonotus niveomarginatus H.Y. Yu, C.L. Zhao & Y.C. Dai, **sp. nov.** Figs 1–2

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Differs from other *Inonotus* species by its resupinate growth habit, absence of hymenial and hyphoid setae, and yellowish, thick-walled, ovoid to subglobose basidiospores.

Type: China, Yunnan Province, Xishuangbanna, Jinghong County, Sanchahe Nature Reserve, on fallen angiosperm trunk, 7.VI.2011, Dai 12318 (**holotype**, BJFC).

Etymology: *niveomarginatus* (Lat.): refers to the white margin of the basidiocarp.

Fruitbody — Basidiocarps annual, resupinate, cushion-shaped, adnate, without odor or taste when fresh, becoming corky upon drying, ≤4 cm long, 2.5 cm wide, 4 mm thick at centre. Pore surface deep olive and margin white when fresh, dark brown to yellowish brown upon drying; pores circular, 6–8 per mm; dissepiments thin, entire. Subiculum brown, corky, ≤1 mm thick. Tubes dull brown to blackish brown, corky, ≤3 mm long.

Hyphal structure — Hyphal system monomitic; generative hyphae simple septate; tissues darkening in KOH.

Subiculum — Generative hyphae yellow, thin- to thick-walled with a wide lumen, frequently septate, very rarely branched, more or less straight, interwoven, 3–4.5 μm in diam.

Tubes — Generative hyphae yellowish, thin- to thick-walled, frequently branched and septate, more or less straight, subparallel along the tubes, 2.5–3.5 μm in diam. Basidia barrel-shaped, with four sterigmata and a basal simple septum, 13–16 × 6–8.5 μm; basidioles in shape similar to basidia, but slightly smaller than basidia.

Spores — Basidiospores ovoid to subglobose, yellowish, thick-walled, smooth, occasionally bearing a guttule, IKI–, CB–, (4.5–)4.9–5.7(–6) × (4.2–)4.5–5.2(–5.5) μm, L = 5.35 μm, W = 4.95 μm, Q = 1.06 (n = 30/1).

Remarks — Four other *Inonotus* species — *I. costaricensis* Ryvarden, *I. rigidus* B.K. Cui & Y.C. Dai, *I. truncatisporus* Corner, and *I. venezuelicus* Ryvarden — also are characterized by resupinate basidiocarps, thick-walled colored spores,

Figure 1. *Inonotus niveomarginatus* (holotype). Basidiocarp.

and a lack of both hymenial and hyphoid setae (Corner 1991; Cui et al. 2011; Ryvarden 1987, 2005). *Inonotus costaricensis* differs from *I. niveomarginatus* by having globose and longer basidiospores (5.5–6.5 μm long; Ryvarden 1987). *Inonotus rigidus* differs from *I. niveomarginatus* by its ellipsoid and smaller

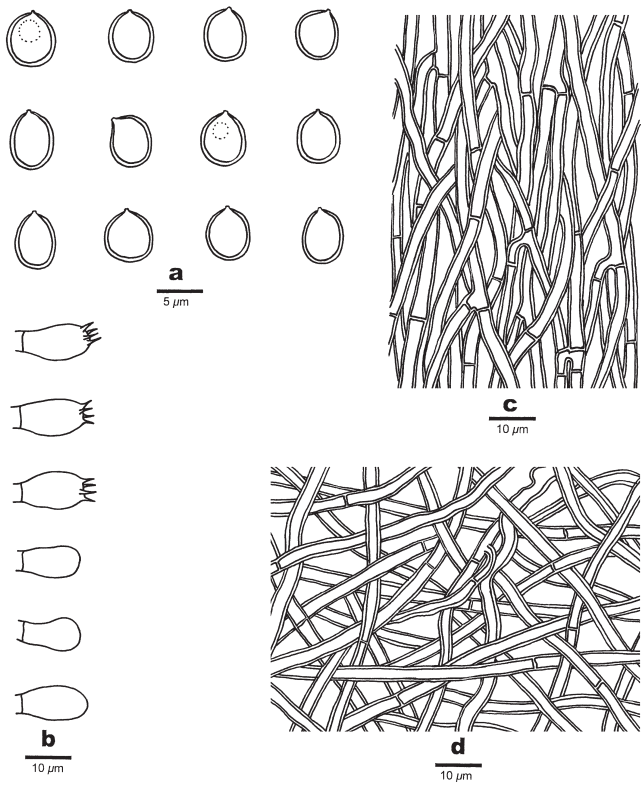

Figure 2. *Inonotus niveomarginatus* (holotype) microscopic structures. a: Basidiospores. b: Basidia and basidioles. c: Hyphae from trama. d: Hyphae from subiculum.

spores (3.9–4.5 × 2.9–3.7 μm; Cui et al. 2011). *Inonotus truncatisporus* is distinguished from *I. niveomarginatus* by its larger pores (4–6 per mm) and truncate basidiospores (Corner 1991). *Inonotus venezuelicus* has larger pores (3–4 per mm), ellipsoid basidiospores (5–6 × 4.5–5 μm), and has been found only in South America (Ryvarden 1987).

Inonotus tenuissimus H.Y. Yu, C.L. Zhao & Y.C. Dai, **sp. nov.** Figs 3–4

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Differs from other *Inonotus* species by its resupinate basidiocarps, a mono- to dimitic hyphal structure, absence of hymenial and hyphoid setae, and yellowish, thick-walled, ellipsoid basidiospores.

Type: China, Yunnan Province, Puer County, Laiyanghe Forest Park, on fallen angiosperm trunk, 6.VI.2011, Dai 12365 (**holotype**, BJFC).

Etymology: *tenuissimus* (Lat.): refers to the very thin subiculum.

Figure 3. *Inonotus tenuissimus* (holotype). Basidiocarp.

Fruitbody — Basidiocarps annual, resupinate, adnate, becoming corky upon drying, ≤15 cm long, 7 cm wide, 1.5 mm thick at centre. Pore surface vinaceous grey to greyish brown when fresh, pale brown upon drying; pores angular, 3–4 per mm; dissepiments thin, entire. Subiculum brown, corky, up to 0.2 mm thick. Tubes dull brown, corky, ≤1.3 mm long.

Hyphal structure — Hyphal system mono- to dimitic; generative hyphae, simple septate; tissues darkening in KOH.

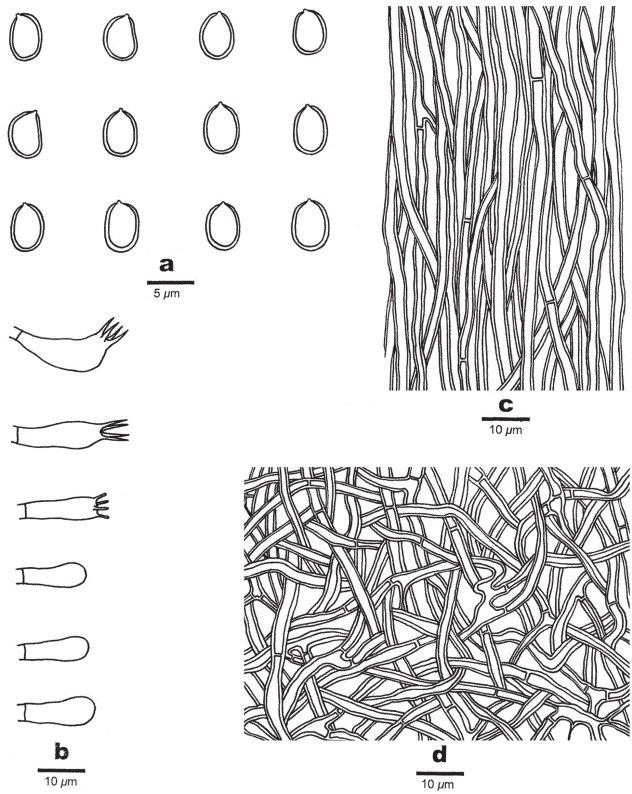

Figure 4. *Inonotus tenuissimus* (holotype) microscopic structures.
a: Basidiospores. b: Basidia and basidioles. c: Hyphae from trama.
d: Hyphae from subiculum.

Subiculum — Generative hyphae yellow, thick-walled, frequently septate, more or less straight, interwoven, 2.5–4.5 μm in diam. Some skeletal-like hyphae similar to generative hyphae, rarely septate.

Tubes — Generative hyphae yellowish, thick-walled, occasionally branched, rarely septate, subparallel along the tubes, 3–4 μm in diam. Some skeletal-like hyphae similar to generative hyphae, rarely septate. Basidia clavate to barrel-shaped, with four sterigmata and a basal simple septum, 12–18 × 4.5–6.5 μm; basidioles barrel-shaped, smaller than basidia.

Spores — Basidiospores ellipsoid, yellowish, thick-walled, smooth, IKI–, CB–, (4–)4.3–5(–5.2) × (3–)3.2–4(–4.2) μm, L = 4.8 μm, W = 3.6 μm, Q = 1.31–1.38 (n = 90/3).

Additional specimens examined: **CHINA. Yunnan Province**, Puer County, Laiyanghe Forest Park, on fallen angiosperm branch, 6.VI.2011, Dai 12245 & Dai 12255 (BJFC); 9.VI.2011, Dai 12330 (BJFC).

Remarks — *Inonotus tenuissimus* resembles *I. venezuelicus* in its resupinate basidiocarps, similar pores, thick-walled and colored spores, and absence of both hymenial and hyphoid setae. However, *I. venezuelicus* has greyish pores when dry, a distinctly monomitic hyphal structure, larger and ellipsoid to ovoid basidiospores (5–6 × 4.5–5 μm), and has been found only in South America (Ryvarden 2005).

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