

*Fistulinella aurantioflava*



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***Fistulinella aurantioflava* T.H.G. Pham, A.V. Alexandrova & O.V. Morozova, sp. nov.**

*Etymology.* The epithet refers to bright yellow colour of the basidiomata and orange margin of tubes, from Latin '*aurantius*' (orange) and '*flavus*' (yellow).

Classification — *Boletaceae*, *Boletales*, *Agaricomycetes*.

*Basidiomata* medium sized, boletoid. *Pileus* 25–50 mm diam, hemispherical to convex; the surface is mucous to sticky when wet, smooth; the edge overhanging the hymenophore, even, strongly inflexed in young basidiomata; yellow, bright yellow or yellow-orange to orange and dark orange (3A6–8, 4A6–8, 4B5–6; Kornerup & Wanscher 1978). *Hymenophore* poroid, adnate-emarginate, decurrent with a short tooth on the stipe, slightly depressed around the apex of the stipe, 3–8 mm thick, 1.5–2 times thicker than the context; tubes yellowish to cream, do not change colour if damaged; the pores are rounded to angular, 0.5–1 mm diam, with bright orange drops of exudate on the margin. *Stipe* 40–90 × 3–7 mm, cylindrical, fusiform or slightly widening towards the base, pale yellow with orange dots above (drops of exudate), bright yellow below the annular zone (if present), smooth, mucous to sticky, solid in upper part, becomes hollow in the lower part. *Context* yellowish, not changing in the pileus and in the upper part of the stipe, in the lower half turns slightly blue. *Smell* weak, *taste* not reported. *Basidiospores* (10–)11.5–12.5(–14) × (3.5–)4(–4.5) μm, Q = (3.0–)3.1(–3.3), fusiform or nearly cylindrical with weak supra-hilar depression in lateral projection, fusiform in the ventral projection, from yellowish to brownish yellow in KOH, smooth. *Basidia* 24–36 × 7–10 μm, 4-spored, clavate. *Cheilocystidia* 45–70 × 4–6 μm, forming a sterile margin, cylindrical, flexuous, thin-walled, with pale yellow content. *Pleurocystidia* 35–75 × 5–10 μm, fusiform or narrowly lageniform, with bright yellow or yellow-brown contents. *Hymenophoral trama* divergent, boletoid. *Pileipellis* ixotrichoderm, consisting of yellowish or brownish, cylindrical gelatinised intertwined hyphae, 2.5–5 μm wide with both yellow-brown intracellular and additionally incrusting pigments, and scattered dermatocystidia, 10–25 × 3–4 μm. *Stipitipellis* is a cutis of hyaline parallel hyphae, 2–5 μm thick. *Caulocystidia* 68–130 × 11–16 μm, in the form of cylindrical, septate hairs with narrowly clavate end cells, sometimes diverticulate. *Clamp connections* absent.

*Typus.* VIETNAM, Dak Lak Province, Kon Ka Kinh National Park, 35 km east of the city of Kon Tum Ayun, N14.217129° E108.310132°, 1220 m a.s.l., on slopes on a tropical mountain polydominant soil forest with the participation of representatives of the families *Anacardiaceae*, *Fagaceae*, *Meliaceae*, *Myrtaceae* and *Theaceae*, 16 May 2016, A. V. Alexandrova (holotype LE 315616, ITS, LSU and mtSSU GenBank sequences MW784159, MW760388 and MW776411, MycoBank MB 839260).

*Colour illustrations.* Vietnam, Dak Lak Province, Kon Ka Kinh National Park (type locality). Spores, cheilocystidium; pleurocystidium; pileipellis; stipitipellis with caulocystidia (all from holotype); young basidioma *in situ*, hymenophore with orange drops in the tube edges (LE 315617); longitudinal section through the basidioma (from holotype). Scale bars = 1 cm (basidiomata), 10 μm (spores and microstructures).

*Additional materials examined.* VIETNAM, Dak Lak Province, Krong Bong District, Chu Yang Sin National Park, Krong Kmar Commune, 7 km north-west of Chu Yang Sin Mt, N12.421139° E108.373722°, 1196 m a.s.l., on the soil on the trail in the mountain primary evergreen polydominant tropical forest, 28 May 2014, A. V. Alexandrova & T. H. G. Pham (LE 315617, ITS, LSU and mtSSU GenBank sequences MW784160, MW760389 and MW776412).

*Notes* — *Fistulinella aurantioflava* is characterised by a bright yellow colouration of basidiomata, a smooth, strongly glutinous surface of pileus and stipe in a wet state, a strongly involved pileus margin, covering the hymenophore of young basidiomata, and a wide hymenophore. Microscopically, smooth fusiform, almost cylindrical spores and lageniform pleurocystidia with yellow content are characteristic. Due to macromorphological features, *F. aurantioflava* resembles *Pulveroboletus curtisii*, described from North America and distributed there. However, the surface of the pileus of the true *Pulveroboletus* species is pulverulent, and distinct pileal margin veil covers the hymenophore when young. Contrary, the strongly glutinous covering of the pileus and stipe makes our species similar to representatives of the pink-spored genus *Fistulinella* (*Austroboletoidae*), originally described based on a species from Cameroon (Hennings 1901). Preliminary molecular analyses suggested this genus to be polyphyletic. Vasco-Palacios et al. (2014), Magnago et al. (2017) and Gelardi et al. (2021) showed that American species of *Fistulinella* cluster in a statistically strongly supported separate clade with respect to those described from Australia, New Zealand and Asia. However, molecular analyses are required on the generic type, the African taxon *F. staudtii* to clarify the delimitation of *Fistulinella* s.str.

According to the data of the phylogenetic analysis, our specimens are nested within the *Austroboletoidae* clade, close to *Austroboletus*, *Veloporphyrellus* and the Asian branch of *Fistulinella*. Despite the presence of some morphological differences (the absence of a pronounced pink colour of the spores, the presence of yellow-coloured pleurocystidia, and the unusual bright yellow colour of basidiomata), we attribute this species to the genus *Fistulinella*.

*Fistulinella aurantioflava* differs from *Pulveroboletus curtisii* (the systematic position of which also requires clarification) by its smaller and narrower spores ((10–)11.5–12.5(–14) × (3.5–)4(–4.5) μm vs (10.5–)11.2–15(–19) × 4.3–6.5 μm (Singer 1947)), the presence of a bluish discolouration in the lower part of the stem, and geographical distribution. In the GenBank database *Pulveroboletus curtisii* is represented only by mtSSU and LSU sequences. Our sequences of these markers are very distant from them (mtSSU: 5.35%; LSU: 7.29–7.39%).

**Supplementary material**

**FP1251** Phylogenetic tree derived from Bayesian analysis, based on ITS1-5.8S-ITS2 data. Analysis was performed under GTR model of evolution, for 3 M generations, using MrBayes v. 3.2.1 (Ronquist et al. 2012). Posterior probability (PP > 0.95) values from the Bayesian analysis are added at the nodes. The scale bar represents the number of nucleotide changes per site. Sequences derived from type material is indicated with (T) and the tree was rooted to two sequences of *Gyroporus*.

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