

## ***Boletus reticuloceps*, a new combination for *Aureoboletus reticuloceps***

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Q. B. Wang & Y. J. Yao (2005): *Boletus reticuloceps*, a new combination for *Aureoboletus reticuloceps*.- Sydowia 57 (1): 131–136.

A new combination, *Boletus reticuloceps*, originally described as *Aureoboletus reticuloceps* from Yunnan, China, is proposed and illustrated. Based on the dry pileus, white hymenophore when young (becoming yellow when mature), olive brown to brown basidiospores, the lack of gelatinised veil remnants on both the pileus and the stipe, and the absence of gold-yellow pigment in tramal hyphae, this species must be considered as a member of the genus *Boletus*. The ochraceous brown to ochraceous pileus densely covered with brown granular squamules and its conspicuously reticulate stipe distinguish this species from any other taxon within *Boletus*. The distinction between this species and its related taxa, *A. thibetanus*, *B. castanopsidis* and *B. mottiae*, is also discussed.

Key words: Basidiomycetes, Boletales, China.

Zang et al. (1993) recorded nine boletes from China with two new species, *Aureoboletus reticuloceps* M. Zang, M. S. Yuan & M. Q. Gong and *Boletus nigricans* M. Zang, M. S. Yuan & M. Q. Gong. Among them, *A. reticuloceps* is a species readily recognised in the field by its ochraceous brown to ochraceous, rugose pileus densely covered with granular squamules and its conspicuously reticulate stipe. The genus *Aureoboletus* Pouzar is characterised by a viscid pileus, golden yellow pores, golden yellow pigment in tramal hyphae, non-reticulate stipe and viscid remains of veil on the pileus and the stipe (Pouzar, 1957; Li & Song, 2002). Singer (1975, 1986) and Hawksworth et al. (1995) regarded *Aureoboletus* as a synonym of *Pulveroboletus* Murrill, but *Aureoboletus* is accepted in Kirk et al. (2001). Neither macro- nor micro-characters of *A. reticuloceps* fit the concepts of *Aureoboletus* or *Pulveroboletus*. In fact, the dry pileus, the reticulate stipe, the white hymenophore when young, and the lack of veil on both the pileus and the stipe, and the absence of golden yellow pigment in tramal hyphae in *A. reticuloceps* conform to the characters found in the genus *Boletus* Fr. Further studies (e.g. Wang et al., 2003; Wang & Yao, 2004) showed that such a species has not

been described previously within *Boletus*. Therefore, a new combination for this fungus is proposed.

Because the original description by Zang et al. (1993) was written in Chinese and the Latin diagnose was brief, a full description of the fungus is provided here. The species is compared with *A. thibetanus* (Pat.) Hongo & Nagas., *B. castanopsidis* Hongo and *B. mottiae* Thiers.

### Material and methods

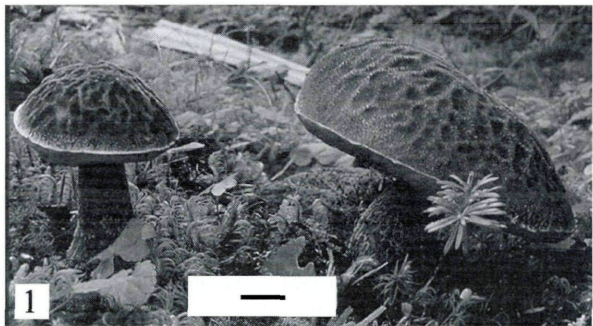
Material cited in this paper is deposited in HKAS (Herbarium of Kunming Institute of Botany, Chinese Academy of Sciences). The macro-characters at fresh stage were recorded in the field before the specimens were dried using an electronic air-ventilation drier. Micro-characters were studied by mounting material in a 5 % KOH solution in laboratory. Thirty basidiospores were measured from a basidioma for each specimens studied. All spore measurements include both the mean and the standard deviation for both the length and the width, together with the quotient, Q (mean length/width ratio). The line drawings of basidia and basidiospores were drawn using a camera lucida. For colour description was mainly based on Royal Botanic Garden Edinburgh (1969).

### Taxonomy

***Boletus reticuloceps*** (M. Zang, M. S. Yuan & M. Q. Gong) Q. B. Wang & Y. J. Yao, **comb. nov.** (Figs. 1 & 2.)

Basionym: *Aureoboletus reticuloceps* M. Zang, M. S. Yuan & M. Q. Gong *Acta Mycol. Sin.* 12: 277 (1993).

Pileus 5.0–15.0 cm in diam., hemispherical to convex when young, becoming convex to subconvex when mature; margin incurved when young, becoming decurved and sometimes flared in age, with an obvious band of sterile tissue at the pileus margin; surface dry, ochraceous brown to ochraceous, paler at the margin, distinctly rugose, wrinkles forming a reticulate structure when fresh, densely covered with brown to grey brown granular squamules. – Context 1.0–2.5 cm thick above the stipe, white, often with pinkish tinge, unchanging when bruised, odour and taste mild. Tubes 1.5–2.5 cm long, greenish, becoming greenish yellow to yellow, unchanging when bruised, adnate around the stipe. – Pores round to subangular, 1–2 pores/mm, white and stuffed when young, yellow to ochreous when mature, unchanging when bruised. – Stipe robust, 6.0–10.0 cm long, 1.5–3.0 cm thick, grey brown to ochreous, solid,



Figs 1–2. *Boletus reticulocephus*.  
Fig 1. Basidiomata of *Boletus reticulocephus* (HKAS 36569). Bar = 1 cm.

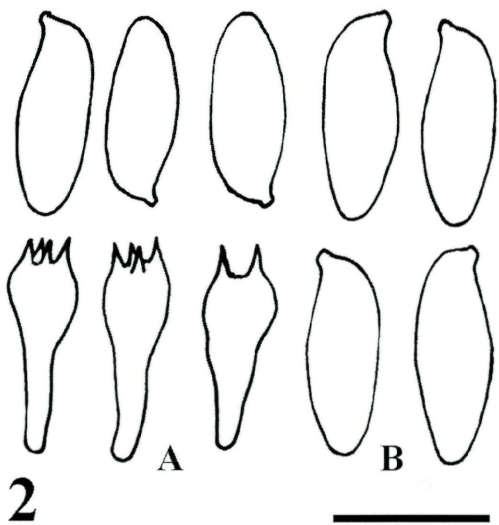


Fig 2. *Boletus reticulocephus* (HKAS 36569). A. – Basidia; B. Basidiospores. Scale bars: A = 30  $\mu$ m; B = 10  $\mu$ m.

enlarging downward, sometimes bulbous; conspicuously reticulate overall with pallid, elongated, raised meshes; basal mycelium pale yellow; flesh of stipe white, unchanging when bruised; veil absent. Basidiospores (13.0–) 15.0–17.5 (–19.5)  $\times$  5.0–6.5 (–7.5) [ $16.0 \pm 1.5 \times 5.8 \pm 0.5$ ]  $\mu$ m,  $Q = 2.8 \pm 0.3$ , long elliptical, pale olive-brown to brown, thin-walled, smooth. – Basidia 30–40  $\times$  12.5–18.0  $\mu$ m, clavate, 2- or 4-spored. – Pleurocystidia rare, 40–64  $\times$  8.0–16.0  $\mu$ m, clavate to fusoid, inflated at centre. – Tube trama of the *Boletus*-type, hyphae divergent from the central strand, pale brownish in KOH, thin-wal-

led, clamp connections absent. – Pileipellis of interwoven hyphae, pale brown to deeply brown in KOH; protruding hyphal clusters of 260–360  $\mu\text{m}$  high, forming granular squamules on the pileus. – Stipitipellis is a palisade-like trichodermium of 11.0–17.0  $\mu\text{m}$  thick, brown to deeply brown elements.

Habit, habitat and distribution. – Solitary to scattered on ground under *Abies* spp., Yunnan and Sichuan Provinces, China.

Specimens examined. – CHINA, Sichuan Province, Hongyuan County, Shuajingsi, 3600 m alt., solitary to scattered under *Abies faxoniana*, 23 Aug. 1991, M. S. Yuan 1662 (HKAS 23856, HOLOTYPE); Sichuan Province, Luding, Moxi, Hailuoguo, 3100 m alt., solitary to scattered under *Abies* sp., 12 Aug. 1997, M. S. Yuan 2916 (HKAS 31366); Yunnan Province, Lijiang, Laojunshan, 3800 m alt., solitary to scattered under *Abies georgei*, 14 Aug. 2000, Z. L. Yang 2918 (HKAS 36573); Yunnan, Lijiang, Laojunshan, 3500 m alt., solitary to scattered under *Abies georgei*, 15 Aug. 2000, Z. L. Yang 2932 (HKAS 36567); Yunnan, Zhongdian, Tianchi, 3900 m alt., solitary to scattered under *Abies* sp., 20 Aug. 2000, Z. L. Yang 2950 (HKAS 36569).

## Discussion

Zang et al. (1993) recorded the spores as  $19\text{--}22 \times 5.2\text{--}7 \mu\text{m}$  for this species based on the type material, but re-examinations of the type and other specimens cited above revealed that the spores were  $(13.0\text{--}) 15.0\text{--}17.5 (-19.5) \times 5.0\text{--}6.5 (-7.5) \mu\text{m}$ .

The set of morphological and anatomical characters of *Boletus reticuloceps* show its affiliation with *Boletus* sect. *Boletus* as defined by Singer (1986). *Boletus reticuloceps* is very distinctive within the genus and also the section, but it may be compared with the following species.

*Boletus reticuloceps* was considered by Zang et al. (1993) as similar to *Aureoboletus thibetanus*, which also has a reticulate and rugose pileus. However, the pileus of *A. thibetanus* is strongly viscid when wet and it has a prominent viscid veil when young, compared with the dry pileus and the absence of a veil in *B. reticuloceps*. Moreover, the stipe of *A. thibetanus* is not reticulate (Chiu, 1948, 1957; Yang et al., 2003).

The wrinkled-reticulate pileus and the finely reticulate stipe found in *B. mottiae* (Bessette, 2000) are reminiscent of that in *B. reticuloceps*, but the pileus of the former is cinnamon to cinnamon-brown and lacks granular squamules on its surface. In addition, the basidiospores of *B. mottiae* ( $14\text{--}17 \times 4\text{--}5 \mu\text{m}$ , Bessette et al., 2000) are distinctly narrower than that of *B. reticuloceps*.

*Boletus reticuloceps* is also somewhat close to a Japanese species, *B. castanopsidis*. Both of them are characterised by a wrinkled



pileus, but the pileus of the latter is glabrous. Furthermore, the colour of the pileus of the Japanese species is olivaceous (Hongo, 1973).

Boletes are usually found up to 3000 m a.s.l, but our specimens of *B. reticuloceps* were collected at an altitude of 3100 m to 3900 m. The known distribution of this species is in Sichuan and Yunnan, China. It may be an endemic species in the south-west of China. As *B. reticuloceps* were found always under *Abies* spp., it may form ectomycorrhizal association with this tree.

The rich diversity of boletes, especially *Boletus* species, in Yunnan and Sichuan has attracted much attention of mycologists. Chiu (1948) reported 44 species and two varieties of boletes, including 20 new *Boletus* species. Since then, Zang and his colleagues have reported additional *Boletus* species from Yunnan with a total of 11 new species (Zang, 1999; Zang et al., 1999, 2001; Zang & Huang, 2002). A statistics of *Boletus* species in China shows that 75 % of the species were found in Yunnan and 47 % in Sichuan, corresponding to the species numbers of 96 and 60 respectively, again a sum of 128 in China (see Zang, 1999). Sichuan and Yunnan Provinces lie in the southwest of China with many types of forests and climates, providing favourable conditions for boletes. The studies on *Boletus* in this region are still incomplete and many additional species may still remain to be discovered. Much more work is needed to understand the bolete mycota of the southwest of China.

### Acknowledgements

The authors are grateful to mycologists in Kunming Institute of Botany, Chinese Academy of Sciences, Professor M. Zang for providing reprints of his publications and related information, Dr. Z. L. Yang for the field photograph of *B. reticuloceps* and Ms X. H. Wang for her valuable comments and suggestions. The curator and Mr L. S. Wang of HKAS are thanked for the loan of specimens. This project is supported by the Key Research Project of Innovation Programme (KSCX2-SW-101C) and the scheme of Introduction of Overseas Outstanding Talents operated by the Chinese Academy of Sciences, the National Science Fund for Distinguished Young Scholars (30025002) from the National Natural Science Foundation of China and the Programme for Key International Science and Technology Cooperation Project of China (2001CB711103) from the Ministry of Science and Technology.

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(Manuscript accepted 20 May 2005)

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