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***Cantharellus zangii*, a new subalpine basidiomycete from southwestern China**XIAO-FEI TIAN<sup>1, 2, 3</sup>, BART BUYCK<sup>4</sup>, SHI-CHENG SHAO<sup>1, 2, 3</sup>,  
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ABSTRACT — *Cantharellus zangii* is described and illustrated from subalpine forest (>3000 m) in northwestern Yunnan, China. The diagnostic characteristics of *C. zangii* are the small thin-fleshed fruit bodies with a long tapering fistulose stipe, a bright orange veined hymenophore, thin-thinned clamped hyphae, and large ellipsoid basidiospores. So far it is only known from the type locality and its nearby area.

KEY WORDS — taxonomy, endemic species, ectomycorrhizal, *Cantharellales*

**Introduction**

*Cantharellus* Adans. ex Fr., the type genus of *Cantharellaceae*, was established by Fries (1821) and later typified with *C. cibarius* Fr. by Earle (1905). Thirteen species of *Cantharellus* have previously been reported from China: *C. appalachiensis* R.H. Petersen, *C. buccinalis* Mont., *C. cibarius*, *C. cinereus* (Pers.) Fr., *C. cinnabarinus* (Schwein.) Schwein., *C. friesii* Quél., *C. lateritius* (Berk.) Singer, *C. minor* Peck, *C. patouillardii* Sacc., *C. subalbidus* A.H. Sm. & Morse, *C. tuberculosporus* M. Zang, *C. vaginatus* S.C. Shao et al., and *C. yunnanensis* W.F. Chiu (Teng 1963, Chiou 1973, Zang 1980, Zhuang 2001, 2005, Tian et al. 2009, Shao et al. 2011). However, some of these collections are probably misidentified and need to be verified microscopically and molecularly,

as has been done by Buyck et al. (2011) and Buyck & Hofstetter (2011) for North America. During our *Cantharellus* research, we came across one small species with a very slender stipe in the subalpine mixed forest of Shangri-La (northwestern Yunnan, China), which we determined as distinct from already described species in the genus. It is here described as *Cantharellus zangii*.

### Materials & methods

Macro-morphological fruitbody features were recorded and photographed in the field; color designations and codes follow Kornerup & Wanscher (1961). In basidiospore measurements,  $[n/m/p] = n$  basidiospores measured from  $m$  basidiomata of  $p$  collections in 5% KOH solution, with dimensions given as  $(a-)b-c(-d)$ , where  $a$  and  $d$  are extremes and  $b-c$  represent the interval range of 90% measured values.  $Q$  = basidiospore length/width ratio;  $Q_m$  = average  $Q$  of all basidiospores  $\pm$  standard deviation. Herbarium abbreviation HKAS = Herbarium of Cryptogams, Kunming Institute of Botany, Chinese Academy of Sciences.

### Taxonomy

*Cantharellus zangii* X.F. Tian, P.G. Liu & Buyck, sp. nov.

PLATE 1–5

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Differs from *Craterellus tubaeformis* by a plano-convex pileus and bright orange hymenium and from *Cantharellus queletii* in the fistulose stipe and hymenium with branching veins.

TYPE: China, northwestern Yunnan, Shangri La, Bitahai National Natural Reserve, 9.IX.2008, X.F. Tian 417 (Holotype, HKAS55791).

ETYMOLOGY: *zangii* is in honor of Professor Zang Mu (28 Dec. 1930–10 Nov. 2011), a distinguished Chinese mycologist who founded the Cryptogamic Herbarium in Kunming Institute of Botany, Academia Sinica (KUN-HKAS), and pioneered the study of cryptogam diversity in southwestern China.

**MACROCHARACTERS** — **BASIDIOMATA** small to medium, slender, submembranaceous, campanuliform to infundibuliform. **PILEUS** 2–3 cm in diam, at first umbonate then plane or slightly concave; squamules in the middle; ochre to ochre yellow (4B8–4B6), with tiny cinereous to grey (4B8–4B6); margin hygrophanous, smooth, with streaks, sometimes undulate, incurved at first, then straight. **STIPE** 7–8  $\times$  0.3–0.4 cm, cylindrical to laterally compressed, sometimes slightly curved, attenuate towards base; entirely fistulose; dark orange-yellow (4B5–4B6) to bright orange (4A6). **LAMELLAE** decurrent, golden; 1.5–2 mm high, 1–2 mm apart, with transverse venations, with short branched lamellulae near the edge, seldom anastomosing. **CONTEXT** about 0.2 cm thick in the cap center; dull white (1A2), fibrous. **ODOR** *Osmanthus*-like. **TASTE** mild.

**MICROCHARACTERS** — **BASIDIOSPORES**  $[85/4/2]$   $(8-)8.5-11 \times (4.5-)5-6.5$  ( $-7$ )  $\mu\text{m}$ ,  $Q = (1.3-)1.4-2(-2.2)$ ,  $Q_m = 1.7 \pm 0.2$ , ellipsoid or adaxially slightly

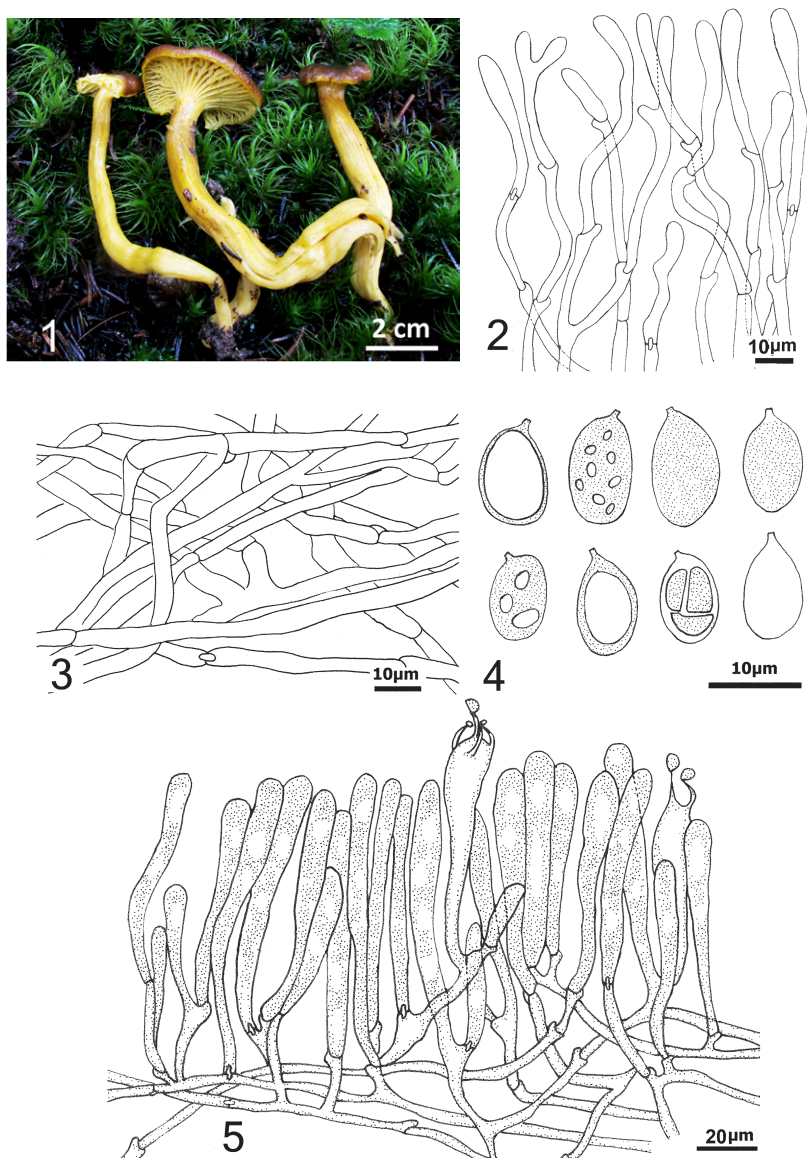


FIGURE 1–5. *Cantharellus zangii* (HKAS 55791, holotype): 1. Fruit bodies. 2. Hyphal extremities at the cap surface. 3. Tramal hyphae with clamps. 4. Basidiospores, often with many tiny oil drops. 5. Hymenium (with lengthening basidioles and basidia).

depressed and more or less reniform; thin-walled, hyaline, nearly colorless, sometimes with tiny oil drops. BASIDIA 75–85 × 6–9 µm, slender, clavate, 5(–6)-spored; sterigmata 5–6 µm long. CYSTIDIA absent. LAMELLAR TRAMA irregular, composed of colorless and loose hyphae, 3–5 µm diam. PILEIPELLIS a layer composed of mostly radially arranged hyphae, slightly brownish, 7–8 µm in diam; the terminal cell more or less clavate; CLAMPS very distinct and abundant in all parts.

ECOLOGY & DISTRIBUTION — Single or in groups on the ground in subalpine (>3000m) mixed forests dominated by *Larix potaninii* var. *macrocarpa* Y.W. Law and *Picea likiangensis* (Franch.) E. Pritz. So far known only from Shangri-La subalpine area, northwestern Yunnan, China.

ADDITIONAL SPECIMENS EXAMINED — CHINA. NORTHWESTERN YUNNAN, Shangri-La: Big Ravine, alt. 3030 m, 16.IX.2007, Y.C. Li 1537 (HKAS 55743); Haba Snowy Mountains, alt. 3000 m, 30.IX.2007, Feng Bang 182 (HKAS 55824).

## Discussion

Based on its almost membranous pileus and veins as well as the hollow stipe, *Cantharellus zangii* could be taken for *Craterellus tubaeformis* (Fr.) Quél. (Redhead et al. 2002) at first glimpse. However, *C. zangii* often has an umbrella-shaped slender fruit body with a centrally plane or protruding pileus, whereas *Cr. tubaeformis* is horn-shaped with centrally depressed caps and has a grey or grey-white hymenium, never bright orange like *C. zangii*.

The membranous cap and slender stipe of *Cantharellus zangii* are also similar to the European *C. queletii* (Ferry) Corner (Corner 1966), which differs in a somewhat solid stipe and the absence of branching veins in the hymenium.

*Cantharellus zangii* also has some striking similarities with a few of the smaller American species (Petersen & Ryvarden 1971; Feibelman et al. 1996; Buyck et al. 2010). The yellow *C. minor*, for instance, shares the exceptional character of the fistulose stipe and thin-walled, voluminous hyphae in the pileipellis. However, its overall size is smaller, it also has slightly smaller spores, and the terminal cells in the pileipellis usually narrow at the extreme tips. The yellowish brown *C. tabernensis* Feib. & Cibula is similar in size to *C. zangii* with a very similar pileipellis, but the stipe is not hollow and the spores are much smaller. The same is true for *C. appalachiensis*, a more brownish and slightly more robust sister-species of *C. tabernensis*, possessing an identical microscopy.

The small size and abundant clamps together with the thin-walled hyphal extremities in the cap place this species in *C.* subgenus *Parvocantharellus* as defined by Eyssartier & Buyck (2001), where it is further diagnosed by its large spores and clavate terminal cells in the pileipellis.

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## Literature cited

- Buyck B, Hofstetter V. 2011. The contribution of *TEF-1* sequences to species delimitation in the *Cantharellus cibarius* complex in the southeastern USA. *Fungal Diversity* 49: 35–46. <http://dx.doi.org/10.1007/s13225-011-0095-z>
- Buyck B, Lewis DP, Eyssartier G, Hofstetter V. 2010. *Cantharellus quercophilus* sp. nov. and its comparison to other small, yellow or brown American chanterelles. *Cryptogamie, Mycologie* 31: 17–33.
- Buyck B, Cruaud C, Couloux A, Hofstetter V. 2011. *Cantharellus texensis* sp. nov. from Texas, a southern lookalike of *C. cinnabarinus* revealed by *tef-1* sequence data. *Mycologia* 103: 1037–1046. <http://dx.doi.org/10.3852/10-261>
- Chiou WF. 1973. Ten new species of *Agaricales* from Yunnan, China. *Acta Microbiologica Sinica* 13(2): 129–135.
- Corner EJJH. 1966. A monograph of cantharelloid fungi. Oxford University Press. London. 255 p.
- Earle FS. 1905. The genera of the North American gill fungi. *Bulletin of the New York Botanical Garden* 5: 373–383.
- Eyssartier G., Buyck B. 2001. Novitates. Note nomenclaturale et systématique sur le genre *Cantharellus*. *Documents mycologiques* 31(121): 55–56.
- Feibelman TP, Bennett JW, Cibula WG. 1996. *Cantharellus tabernensis*: a new species from the southeastern United States. *Mycologia* 88: 295–301. <http://dx.doi.org/10.2307/3760934>
- Fries EM. 1821. *Systema Mycologicum*. Vol.1. Lundae.
- Kornerup A, Wanscher JH. 1961. *Farver i Farver*. Politikens Forlag. København.
- Petersen R, Ryvarde L. 1971. Notes on cantharelloid fungi. IV. Two new species of *Cantharellus*. *Svensk Botanisk Tidskrift* 65: 399–405.
- Redhead SA, Norvell LL, Danell E, Ryman S. 2002. Proposals to conserve the names *Cantharellus lutescens* Fr.: Fr. and *C. tubaeformis* Fr.: Fr., *Basidiomycota* with conserved types. *Taxon* 51: 559–562. <http://dx.doi.org/10.2307/1554875>
- Shao SC, Tian XF, Liu PG. 2011. *Cantharellus* in southwestern China: a new species and a new record. *Mycotaxon* 116: 437–446. <http://dx.doi.org/10.5248/116.437>
- Teng SC. 1963. *Fungi of China*. Science Press, Beijing, China.
- Tian XF, Shao SC, Liu PG. 2009. Two notable species of the genus *Cantharellus* Adans (*Cantharellales*, *Basidiomycota*) new to China. *Edible Fungi of China* 28(4):10–11
- Zang M. 1980. Some new species of Basidiomycetes from the Xizang autonomous region of China. *Acta Microbiologica Sinica* 20: 29–34.
- Zhuang WY. 2001. *Higher fungi of tropical China*. Mycotaxon Ltd., Ithaca, New York.
- Zhuang WY. 2005. *Fungi of northwestern China*. Mycotaxon Ltd., Ithaca, New York.