

Changbai wood-rotting fungi 14. A new pleurotoid species *Panellus edulis*

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A new species of pleurotoid agaric, *Panellus edulis* Y.C. Dai, Niemelä & G.F. Qin, is described from NE and SW China, Japan and the Russian Far East. It is closely related to *P. serotinus* (Schrad. : Fr.) Kühner, with which it was previously confused. The new species differs from *P. serotinus* mainly by its larger size, ventricose cystidia, and, in particular, mild taste; the European *P. serotinus* is bitter-tasting. *Panellus edulis* is one of the best-ranked edible mushrooms in NE Asia.

Key words: Agaricales, *Panellus edulis*, taxonomy, wood-rotting fungi

Introduction

Panellus serotinus (Schrad. : Fr.) Kühner has been considered as one of the common edible mushrooms in Northeast Asia. Many Chinese and Japanese books dealing with edible mushrooms (Imazeki *et al.* 1988, Anonymous 1991, Li 1991, Pan 1995) describe this as a good-tasting fungus. The senior author has eaten material named as such several times during field trips in NE China, and the taste was mild and delicious.

The autumn of 2001 was exceptionally good for the growth of *Panellus serotinus* in Finland, and Y.C.D. collected plenty of basidiomes of the species for food in late September. However, after preparing the dish, the Finnish mushrooms turned out to be terribly bitter, making them totally inedible. After this unpleasant episode, the Chinese specimens of the so-called *Panellus*

serotinus were carefully reexamined and compared with the Finnish material.

Several striking differences were found between the collections from the two areas. It became evident that the East Asian edible mushroom called *P. serotinus* is not conspecific with the European *P. serotinus*. The species was originally described from Europe (Germany), and a new name has to be given to the East Asian taxon. In this paper we describe it as a new species.

Materials and methods

The material for this study was collected by the authors during field trips to NE China in 1993 and 1998, and the tested, and tasted, Finnish material was collected by Y.C.D. from Helsinki in 2001. Some further European material was studied to

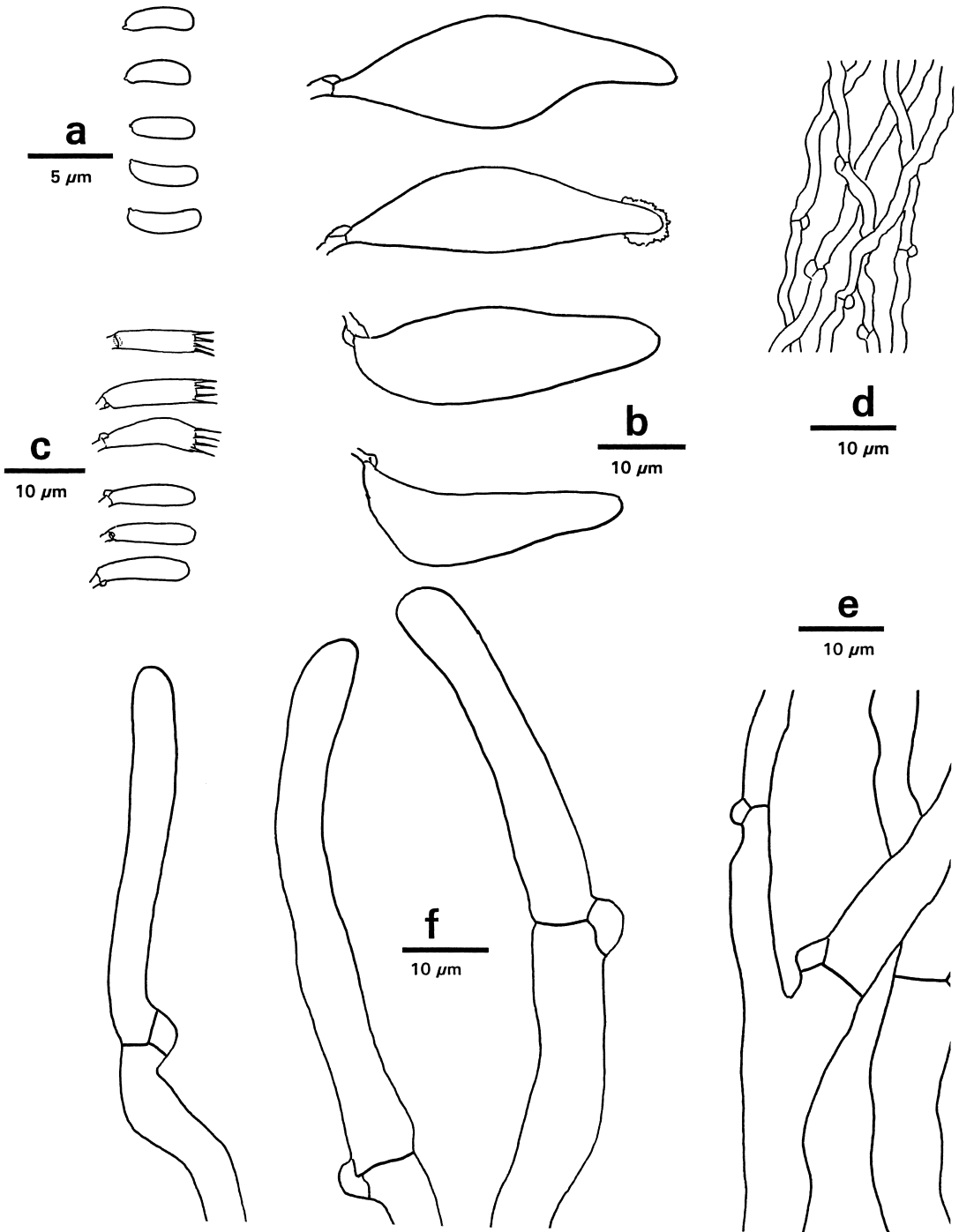


Fig. 1. Microscopical structures of *Panellus edulis* (from holotype). — **a**: Basidiospores. — **b**: Cystidia. — **c**: Basidia and basidioles. — **d**: Tramal hyphae near to subhymenium. — **e**: Hyphae from context. — **f**: Hyphae from upper surface.

support our results. All the studied specimens are listed. The microscopic routine used in the study

is as presented by Holec and Niemelä (2000). In the text the following abbreviations are used: *L*



Fig. 2. *Panellus edulis*. A fresh pileate basidiome, specimen Dai 2936b. Photograph Y.C.D., *in situ*, ca. $\times 0.6$.

= mean spore length (arithmetical mean of all spores), W = mean spore width (arithmetical mean of all spores), Q = variation in the L/W ratios between the specimens studied (quotients of the mean spore length and the mean spore width; smallest and biggest value given), n = the number of spores measured from given number of specimens. In presenting the variation in the size of the spores, 5% of the measurements were excluded from each end of the range, and are given in parentheses; IKI stands for Melzer's reagent, KOH for 5% potassium hydroxide, and CB is the abbreviation of Cotton Blue. CB+ means cyanophilous and CB– acyanophilous; IKI+ means amyloid and IKI– means both inamyloid and indextrinoid.

Taxonomy

Panellus edulis Y.C. Dai, Niemelä & G.F. Qin, *sp. nova* (Figs. 1 and 2)

Carpophorum robustum, *substipitatum*. *Pileus*

pallido-ochraceus vel *ochraceobrunneus*, *laevigatus*; *lamellae confertae*, *ochraceae*; *cystidia ventricosa*, *pariete tenui*, $27\text{--}42 \times 9\text{--}15 \mu\text{m}$, *spores pallidae*, *cylindricae* vel *allantoideae*, $4.7\text{--}6 \times 1.1\text{--}1.3 \mu\text{m}$.

HOLOTYPE: China. Jilin Prov., Antu County, Changbaishan Nat. Res., on fallen *Populus* trunk, 15.IX.1998 Y.C. Dai 2934, G.F. Qin & T. Niemelä (H; isotypes IFP, TNM).

ETYMOLOGY. — *edulis* (Lat., adj.): edible.

Basidiocarps. Pileate to substipitate. Pilei imbricate, 3–20 cm across, up to 1 cm at the thickest part, slightly convex to nearly plane, dimidiate to reniform or fan-shaped, varying from yellowish ochraceous to ochraceous brown, sometimes slightly purplish brown or greenish brown, viscid; pellicle at first velvety, becoming glossy or sometimes glabrous when old, slimy after rain or in moist environment, easily peeling off from context. Stipe lateral, very short to almost lacking, ochraceous, velvety. Lamellae yellowish ochraceous, crowded, slightly decurrent, 15–20 per cm; context white or cream-coloured; taste mild.



Fig. 3. *Panellus serotinus*, growing on dead *Salix* sp. in Viljakkala, Finland (no specimen). Photograph T.N., *in situ*, ca. $\times 1$.

Hyphal structure. Hyphae in lamellar trama hyaline, thin- to fairly thick-walled, more or less parallel along the lamellae, varying from $3\ \mu\text{m}$ in diam. near subhymenium to $16\ \mu\text{m}$ in diam. in central trama, frequently septate with clamp-connections, occasionally branched, not agglutinated, IKI–, CB– or slightly CB+, unchanged in KOH. Hyphae in context hyaline, thin- to slightly thick-walled, frequently septate with clamp-connections, occasionally branched, not agglutinated, IKI–, CB–, $5\text{--}12\ \mu\text{m}$ in diam., sometimes inflated up to $18\ \mu\text{m}$ in diam. Pileal pellicle made up of two layers, the hyphae in lower layer strongly agglutinated, thin-walled, strongly flexuous, frequently septate with clamp-connections, $3\text{--}5\ \mu\text{m}$ in diam. Hyphae in upper surface not agglutinated, loosely interwoven, frequently septate with clamp-connections, $5\text{--}12\ \mu\text{m}$ in diam. Plenty of basidiospores present on the upper surface between hyphae because of viscid consistency.

Hymenium. Hymenium dominated by basidia and basidioles; basidia clavate, 4-spored, with

basal clamp, $(10\text{--})12\text{--}15\text{--}(17) \times (3.3\text{--})3.5\text{--}4.5\text{--}(4.8)\ \mu\text{m}$ ($n = 24/1$); basidioles similar to basidia, but smaller. Cystidia frequent in hymenium, ventricose, hyaline, thin-walled, some encrusted with fine crystals, $(24\text{--})27\text{--}42\text{--}(45) \times (7\text{--})9\text{--}15\text{--}(17)\ \mu\text{m}$ ($n = 66/4$). Subhymenium distinct and thick, made up of delicate, hyaline, thin-walled, narrow, tortuous, densely interwoven hyphae.

Spores. Basidiospores cylindrical or allantoid, hyaline, thin-walled, smooth, enclosing one or two small guttules, weakly IKI+ (distinctly amyloid in mass), CB–, $(4.2\text{--})4.7\text{--}6\text{--}(6.2) \times (1\text{--})1.1\text{--}1.3\text{--}(1.5)\ \mu\text{m}$, $L = 5.25\ \mu\text{m}$, $W = 1.16\ \mu\text{m}$, $Q = 4.39\text{--}4.72$ ($n = 120/4$).

ADDITIONAL SPECIMENS EXAMINED (paratypes). Russia. Primorye Terr., Terney Dist., Sikhote-Alin Nat. Res., Ust'-Serebryanka, *Populus davidiana*, 11.IX.1987 Parmasto (TAA 126088). Khabarovsk Reg., Nanay, Arsen'ovo, *Tilia*, 23.IX.1979 Vaarma (TAA 121088). **China.** Jilin Prov., Antu County, Changbaishan Nat. Res., on fallen trunk of *Tilia*, 1.IX.1993 Dai 970 (TNM 9487); on fallen *Populus* trunk, mixed forest, 15.IX.1998 Dai 2936b, Qin & Niemelä

(TNM 9489); on fallen trunk of *Quercus*, 20.IX.2002 Dai 3901 (IFP). Heilongjiang Prov., Yichun County, Fenglin Nat. Reserve, *Alnus*, 8.IX.2002 Dai 3654 & Steffen (IFP). Sichuan Prov., Ermer County, Ermei Mts., alt. 3200 m, on dead angiosperm tree, 18.X.2002 Dai 4297 (IFP). **Japan.** Fukushima Pref., Iwaki, Setogarou, 21.XI.1986 Abe (TFM-F 14516).

Discussion

There is no doubt that *Panellus edulis* is closely related to *P. serotinus*: the species share similar ecology, and imbricate basidiocarps occur mostly in late autumn. The spores are cylindrical to allantoid, hyaline, thin-walled and amyloid. The two species have many differences.

Basidiomes of *Panellus edulis* vary from small to large, up to 20 cm in widest dimension, and become brittle when dry. In contrast, the pilei of *Panellus serotinus* (Fig. 3) are usually small to middle size only, seldom over 10 cm wide, and dry pilei are corky or fragile. Both species have hymenial cystidia, but in *Panellus edulis* they are ventricose, sometimes encrusted with fine crystals, $(24\text{--})27\text{--}42\text{--}(45) \times (7\text{--})9\text{--}15\text{--}(17) \mu\text{m}$ ($n = 66/4$), and in *P. serotinus* clavate, smooth, $(24\text{--})26\text{--}45\text{--}(47) \times (5\text{--})6\text{--}10\text{--}(10.5) \mu\text{m}$ ($n = 30/1$; Fig. 4). The subhymenial layer is more distinct in *P. edulis* than in *P. serotinus*, and the hyphae on the upper surface of *P. edulis* are not agglutinated as they are in the other species. Basidiospores of *P. edulis* are slightly longer than in *P. serotinus*, $4.7\text{--}6 \times 1.1\text{--}1.3 \mu\text{m}$, $L = 5.28 \mu\text{m}$, $W = 1.16 \mu\text{m}$, $Q = 4.39\text{--}4.72$ ($n = 120/4$) vs. $(3.8\text{--})4.1\text{--}5.5\text{--}(5.7) \times 1\text{--}1.3\text{--}(1.5) \mu\text{m}$, $L = 4.79 \mu\text{m}$, $W = 1.19 \mu\text{m}$, $Q = 3.76\text{--}4.32$ ($n = 60/2$).

The most dramatic difference is in the taste: the old European species is very bitter, not at all suitable for human consumption. The new species, on the other hand, is mild-tasting and highly appreciated in East Asian kitchens (Imazeki *et al.* 1988, Anonymous 1991). Nian-Lai Huang and Li-Ping Shao describe the species in Anonymous (1991): "Edible mushroom, pleasant to the palate, tender, delicious, rich in proteins, fats, carbon hydrates, vitamins and minerals. One of the famous edible mushrooms in north-eastern and south-western China" (translated from Chinese).

Panellus edulis is widely distributed in NE China, and it is one of the most common edible

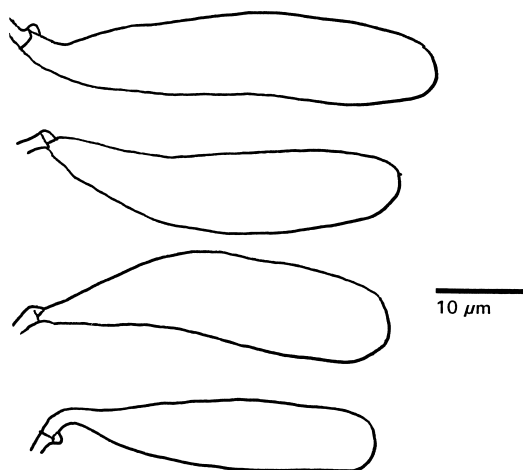


Fig. 4. Hymenial cystidia of *Panellus serotinus* (from Dai 3510).

mushrooms, but all Chinese literature (Teng 1963, Tai 1979, Anonymous 1991, Li 1991, Pan 1995) have previously treated it as *Hohenbuehelia serotina* (Schrad. : Fr.) Singer (= *Panellus serotinus*). The species is very common in the Changbaishan Nature Reserve from August to October, and plenty of pilei often emerge on big, fallen trunks.

Panellus serotinus was reported from the Russian Far East (Lyubarsky & Vasilyeva 1975) and Japan (Imazeki *et al.* 1988). It was considered as an edible mushroom in Japan (Imazeki *et al.* 1988), where it is never reported to be bitter (T. Hattori pers. comm.). Material from Japan was studied, and it is identical with the Chinese specimens.

The type of the genus *Panellus* is *P. stipticus* (Bull. : Fr.) P. Karst. A recent phylogenetic study (Jin *et al.* 2001) shows that *Panellus serotinus* is rather distant from *P. stipticus*. *Sarcomyxa* P. Karst. was typified by *S. serotina* (Fr.) P. Karst. (= *Agaricus serotinus* Fr.), and it would be the generic name for the species discussed here, if *Panellus sensu lato* is split. However, Jin *et al.* (2001) did not make any proposal on the division of the *Panellus* complex, and we are waiting for further studies.

OTHER SPECIMENS STUDIED. *Panellus serotinus*: **Estonia.** Tallinn, Mustamäe, on *Alnus glutinosa*, 11.X.1998 Salo 5711 (H). **Finland.** Uusimaa, Helsinki, Harakka, on *Sorbus aucuparia*, 11.X.1995 Venäläinen (H). **Norway.** Troms, Storfjord, Helligskogen, 17.VIII.1992 Kytövuori 92-380 (H).

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