

## VOLVOLEPIOTA AND MACROLEPIOTA – MACROLEPIOTA VELOSA, A NEW SPECIES FROM CHINA

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A new volvate *Macrolepiota* species from China, *M. velosa*, is described, and *Volvolepiota* is synonymized with *Macrolepiota*. Two new names in *Macrolepiota* are proposed, viz. *M. pulchella* for *V. brunnea*, and *M. brunnescens* for *V. albida*.

Keywords: distribution, taxonomy, systematics

While studying the agarics in the province of Yunnan, in southwestern China, the second author collected a peculiar species of the genus *Macrolepiota* Singer. The slender basidiocarps are provided with a volva, and veil remnants are present as whitish patches on the pileus on top of the dark brown squamules.

These characters, especially the presence of a volva, were used by Rick (1938) to distinguish the genus *Lepiotella*. Unfortunately, *Lepiotella* Rick is a homonym of *Lepiotella* (E.J. Gilbert) Konrad described in 1934. Singer (1953) examined Rick's specimens of *L. brunnea*, the type species, and at that time called these 'merely a volvate *Macrolepiota* (*Lepiotes* of the *procera*-type).' Later, Singer (1959) proposed the new name *Volvolepiota* for *Lepiotella* Rick. Heinemann & de Meijer (1996) also concluded that '*Volvolepiota* may not be fundamentally different from *Macrolepiota* by virtue of the volva, which is only more conspicuous in the former genus', but nevertheless retained *Volvolepiota* as a separate genus.

Molecular investigations of the ITS-regions have shown that species with a volvate base and velar remnants on the pileus do indeed form a separate clade, but this clade is situated either within *Macrolepiota* in the strict sense or at the base of the *Macrolepiota* clade (Vellinga et al., 2003, the clade with *Macrolepiota* spec. nov. 1 and 4). The most obvious morphological difference between *Volvolepiota* and *Macrolepiota* is the presence of a volva in the former. Cylindrical cheilocystidia are found in *Volvolepiota* species and in *M. clelandii* Grgur. The spores in *Volvolepiota* are relatively small, not exceeding 15 µm, whereas *Macrolepiota* species (*Macrolepiota* is taken in the emended sense of Vellinga et al., 2003) have spores 11 µm and longer (up to 28.5 µm long in *M. clelandii*). The apparent absence of clamp-connections in *Volvolepiota* (though they are reported to be present in the stipe context (Singer, 1953)), is not unique; clamp-

connections are difficult to find in *M. mastoidea* as well. More important are the similarities between the two: the trichodermal pileus covering (though with clavate and hyphal elements in *Volvolepiota brunnea* (Rick) Singer), the germ pore which is an interruption of the episporium, and the presence of a stipe covering. The differences do not warrant a separate genus, and *Volvolepiota* is accordingly considered a synonym of *Macrolepiota*, and the present new taxon is described as a member of the genus *Macrolepiota*.

A new name in *Macrolepiota* is necessary for *Volvolepiota brunnea*; *Macrolepiota pulchella* de Meijer & Vellinga, nom. nov., is proposed (basionym: *Lepiotella brunnea* Rick in Lilloa 2: 251. 1938, non *Macrolepiota brunnea* (Farlow & Burt) Wasser, 1993).

*Macrolepiota brunnescens* Vellinga, nom. nov., is proposed for *V. albida* Singer (basionym: *Volvolepiota albida* Singer in Bol. Soc. arg. Bot. 8: 12. 1959, non *Macrolepiota albida* (Beeli) Heinem., 1969). The name refers to the fact that the species is said to discolour brown in all parts (Singer, 1959).

Volvate *Macrolepiota* species appear to be widespread, and are now known from northeast Australia, southwestern China, and South America. They seem to have a more tropical distribution than the other *Macrolepiota* species. *Macrolepiota procera* (Vittad.) Singer and allies are widespread in temperate regions, and so are species of the complex around *M. mastoidea* (Fr.: Fr.) Singer.

The macroscopic description of the new species from China is based on the field notes of the second author and his photographs of the material. For microscopic examination the material was revived in Congo Red in 10 % ammonia solution. The notation [36, 3, 2] indicates that measurements were made on 36 spores in three samples in two collections. The following abbreviations are used: avl for average length, avw for average width, Q for quotient of length and width, and avQ for average quotient.

***Macrolepiota velosa* Vellinga & Zhu L. Yang, spec. nov. – Fig. 1.**

Pileus squamis brunneis, et pannis volvatis albidis, stipes basi volvatus, sporae 8.0-10.0 x 6.0-7.0  $\mu\text{m}$ , cheilocystidia 44-68 x 4.5-7.5  $\mu\text{m}$ , cylindracea, fibulae non observatae. Typus hic designatus: "China, Yunnan Prov.: Jinghong, Damenglong, 14-VIII-1995, Z. L. Yang 2172 (Holotypus HKAS 29487; isotypus L)".

Pileus 7-9 cm, plano-convex with wide indistinct umbo, dark brown and tufted-plushy at centre, around centre with brown to dark brown squamules, sometimes with purplish tinge, on brownish to pale brownish or grey with purplish tinge, radially fibrillose background, and with white to dirty white membranous volval remnants as patches on the surface. Lamellae free and remote from stipe, not ventricose, whitish, with white cystidioid edge. Stipe 10-17 x 0.4-1.0 cm, cylindrical, widened at utmost base (up to 1.3 cm), brownish to purplish brown, paler at apex, finely fibrillose or squamulose, hollow. Annulus ascending, whitish on upperside with brown rim, and brownish underside. Volva limbate, white, membranous. Context in pileus white, in stipe white, with pinkish to brownish tinge. Smell indistinct. Taste indistinct or mild.

Spores [56, 5, 4] 8.0-10.0(-11.0) x 6.0-7.0  $\mu\text{m}$ , avl x avw = 9.3 x 6.6  $\mu\text{m}$ , Q = 1.3-1.5, avQ = 1.4, amygdaloid-ellipsoid in side-view, ellipsoid in frontal view, with thickened wall, with apical central germ pore, covered by a hyaline cap, congophilous, cyanophilous, dextrinoid, and metachromatic in Cresyl Blue. Basidia 25-30 x 9.5-11.5  $\mu\text{m}$ , 4-spored, without clamp connection. Lamella edge sterile, made up of tightly

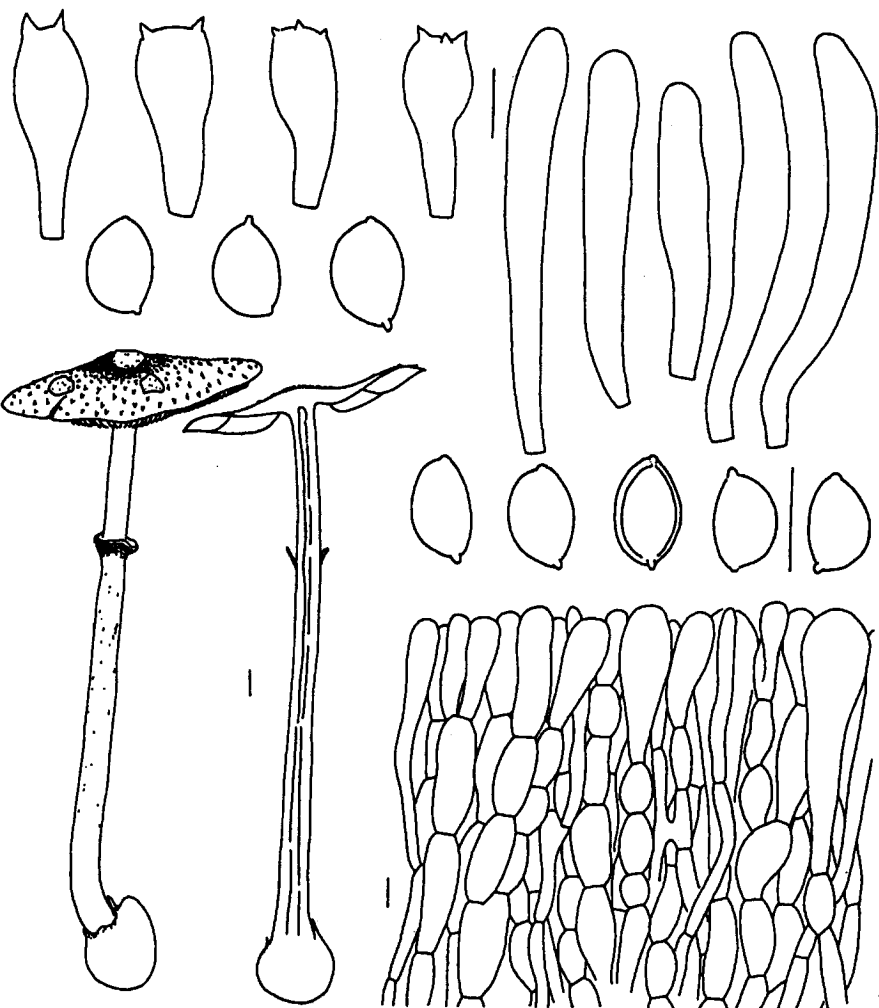


Fig. 1. *Macrolepiota velosa* – Habitus, spores, basidia, cheilocystidia and pileus covering at centre of pileus. All from holotype. Bar 1 cm (habitus), 10  $\mu$ m (microscopic structures).

packed cheilocystidia. Cheilocystidia 44-68  $\times$  4.5-7.5  $\mu$ m, cylindrical, some slightly widened at apex, with rounded apex, with greyish-granular contents, and refractive patch at apex. Pleurocystidia absent. Squamules on pileus made up of ellipsoid to subglobose brown-walled elements in chains; terminal elements up to 100  $\times$  25  $\mu$ m, often clavate or broadly clavate; some brown cylindrical hyphae, 5-8  $\mu$ m in diameter present as well; squamules at centre rather regular (see Fig. 1), close to pileus margin more irregularly arranged, with a wider range of cell sizes. Velar patches made up of hyaline, non-coloured, cylindrical narrow hyphae, c. 2-4  $\mu$ m wide. Stipitipellis a cutis of

brown-coloured hyphae with irregular loose-lying, cylindrical hyphae, c. 5-10  $\mu\text{m}$  in diameter. Clamp-connections not observed at base of basidia, cheilocystidia, nor in pileus covering and velum remnants.

Habitat & distribution. – Solitary, terrestrial in dry monsoon forest, in tropical limestone monsoon forest, and in tropical seasonal forest, 600-800 m a.s.l. Probably not uncommon in Yunnan.

Collections examined: China, Yunnan Prov., Jinghong, Damenglong, 14-VIII-1995, Z.L. Yang 2172 (Holotype HKAS 29487, isotype L) (nrITS sequence GenBank accession number AF482853); Mengla County, Menglun Nature Reserve, 12-VIII-1988, Z.L. Yang 381 (HKAS 21808); *ibidem*, 2-IX-1990, Z.L. Yang 1271 (HKAS 23312); Mengla County, Menglun, Botanical Garden, 21-X-1989, Z.L. Yang 767 (HKAS 22131).

*Macrolepiota pulchella* resembles *M. velosa*, but differs in forming longer spores (10-14.5 x 6.0-7.5  $\mu\text{m}$ , personal observations), shorter cheilocystidia (23-42  $\mu\text{m}$  long), and pileus squamules made up of clavate elements and long, colourless emerging hyphae. Heinemann & de Meijer (1996) gave an extensive description of *M. pulchella* (as *V. brunnea*).

*Macrolepiota eucharis* Vellinga & Halling, described from the rainforest of northeastern Australia, differs in bigger spores (10.8-15.5 x 7.0-9.0  $\mu\text{m}$ ), wider and shorter cheilocystidia (25-53 x 5.0-12  $\mu\text{m}$ ), and a different structure of the pileus covering, lacking ellipsoid to globose or clavate elements.

The basidiocarps of *Macrolepiota brunnescens*, described from Argentina (as *V. albida*), are less slender than those of *M. velosa*; both species have velar patches on the pileus. The spores of *M. brunnescens* are 9.5-11 x 6.5-8.5(-10)  $\mu\text{m}$  (Heinemann & de Meijer, 1996), versus 8.0-10.0 x 6.0-7.0  $\mu\text{m}$  in *M. velosa*. In addition, *M. brunnescens* is said to discolour brown in all parts (Singer, 1959).

*Macrolepiota clelandii* Grgur. superficially resembles *M. velosa* because of the slender habit and the brown squamose pileus, but differs in the absence of a volva, the predominantly 2-spored basidia and the much bigger spores; even spores of 4-spored basidia measure 12.5-16.5 x 8.5-10  $\mu\text{m}$ ; spores from 2-spored basidia are up to 28.5 x 15.5  $\mu\text{m}$ .

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