

## AN UNDESCRIBED SPECIES OF AMANITA SECTION LEPIDELLA FROM JAPAN

C. BAS\* &amp; S.-I. HATANAKA\*\*

*Amanita miculifera*, spec. nov., belonging to *Amanita* section *Lepidella* subsection *Solitariae* and resembling the North American *A. onusta* is described from central Japan where it was found under *Abies*.

A rather large, deeply rooting, pale grey *Amanita* with small much darker grey volval warts and crumbs on the pileus and a lanose-floccose partial veil falling apart was found in the middle of Japan and was subjected to chemical analyses by the second author and his colleagues. Material of it was sent for identification to the first author, who in the beginning thought it to represent a luxuriant form of *A. onusta*, a species known thus far only from eastern North America. Careful examination, however, revealed quite a few differences which together warrant the description of the Japanese fungus as a species in its own right.

*Amanita miculifera* Bas & Hatanaka, sp. nov. — Figs. 1–4

Pileus c. 70–120 mm latus, conicus vel plano-conicus, margine laevis appendiculatusque, pallide griseus, fragmentis volvae griseis, verruciformibus vel miculiformibus ornatus; verrucae volvae apice albae. Lamellae liberae, confertae, angustae, albae vel albae; lamellulae attenuatae. Stipes c. 140–240 × 15–25 mm, bulbo ventricoso, profunde radicans, exannulatus, albidus vel griseolus, fragmentis volvae inconspicuis. Velum parziale album vel albido-griseolum, floccoso-lanosum, friabile. Sporae 10–12.5 × 6.5–8 μm, late ellipsoideae vel oblongo-ellipsoideae, amyloideae. Fragmenta volvae cellulis globosis vel clavatis, 25–80 × 20–80 μm, terminalibus vel subcatenulatis, inconditis vel suberectis composita. Fibulae praesentes. Typus: 'S.-I. Hatanaka, 26.VIII.1975, Karuizawa, Nagano Prefecture. Honshu, Japan' (L).

E t y m o l o g y: micula, small crumb; -fer, carrying.

Pileus 70–120 mm, conical with obtuse apex to plano-conical, with inflexed, non-sulcate, (at first rather strongly) appendiculate margin, pearl grey (whitish-greyish, Munsell c. 10 YR 8/1 slightly tending towards 7.5 YR 8/0, Methuen between 1A1 and 1B1), probably subviscid, decorated at centre with small and low subpyramidal volval warts with moderately dark grey base (Munsell 7.5 YR 6/2–5/2) and pale apex, towards margin passing gradually into small moderately dark grey volval crumbs or, near outer margin, thin, subfelted-subflocculose disintegrating patches. Lamellae free, crowded, rather narrow, whitish or white, with edges greyish or whitish pulverulent at first; lamellulae very gradually attenuate. Stipe 140–240 mm long (inclusive of pseudorrhiza) and 15–25 mm thick, subcylindrical with ventricose-bulbose, 35–40 mm thick, strongly rooting

\* Rijksherbarium, Leiden.

\*\* Dept. of Biology, College of General Education, University of Tokyo, Komaba, Meguro-ku, Tokyo 153, Japan.

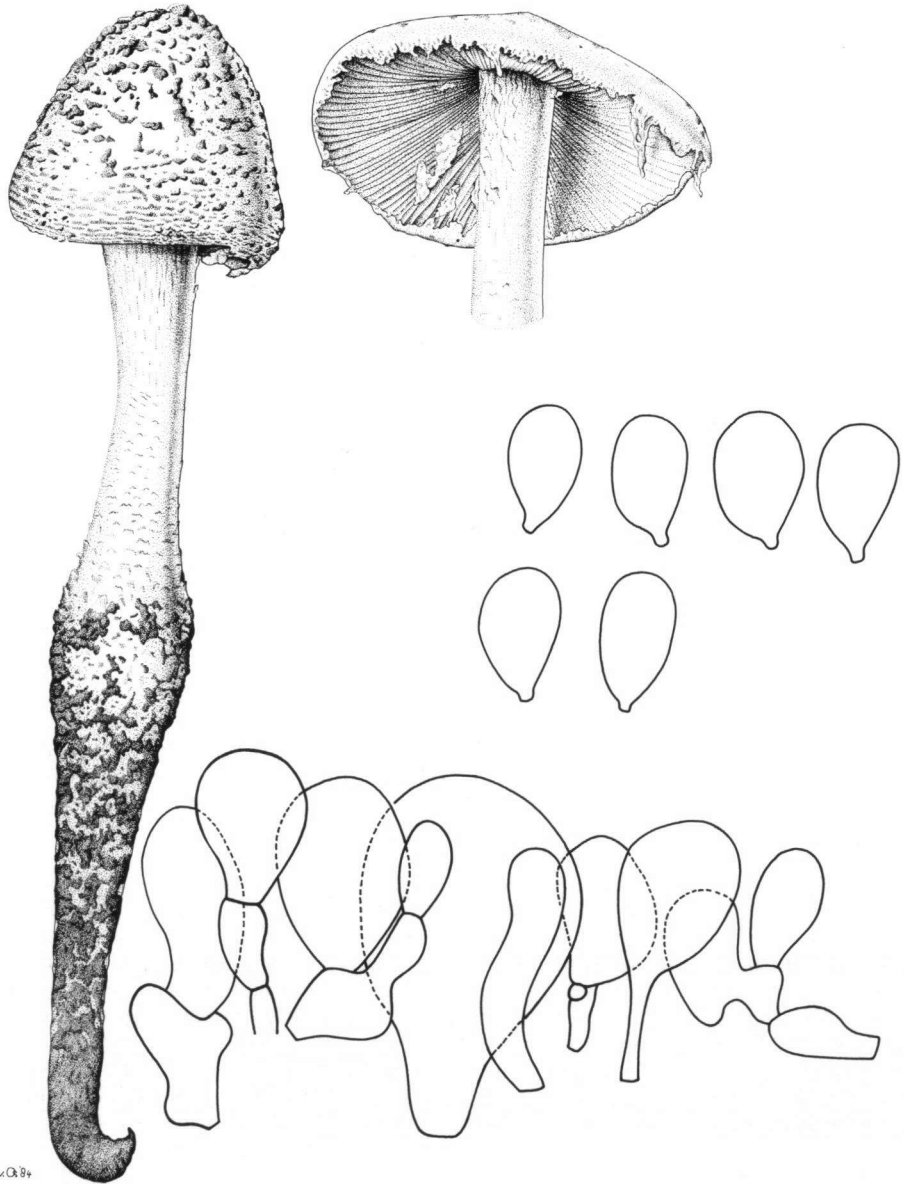


Fig. 1. *Amanita miculifera*. — Habit ( $\times 0.5$ ), spores ( $\times 1500$ ), and marginal tissue of lamella ( $\times 1000$ ). (All figs. from type.)

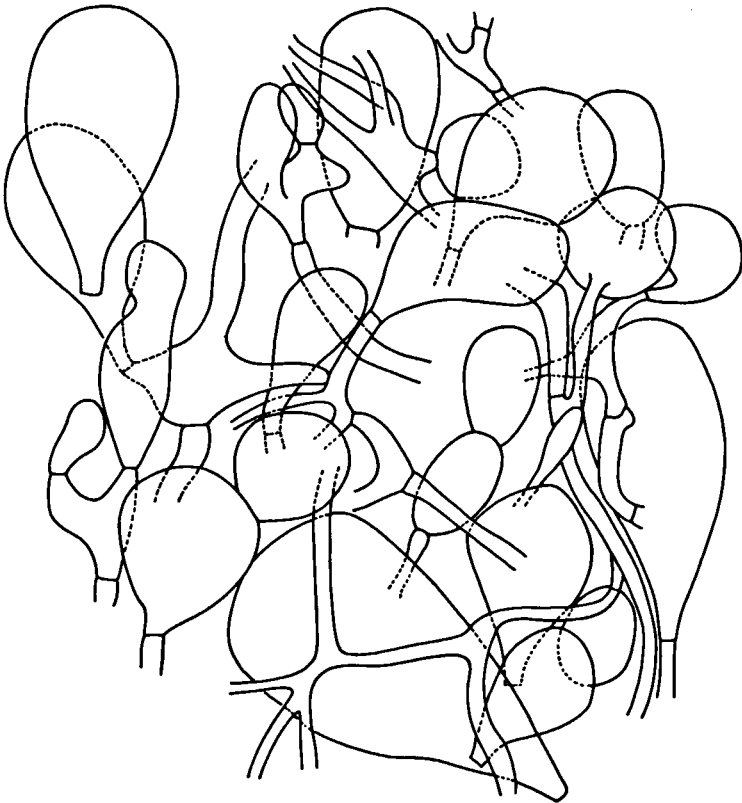


Fig. 2. *Amanita miculifera*. — Tissue of volval wart from near centre of pileus of type ( $\times 500$ ).

base (pseudorrhiza about as long or slightly longer than bulb and part of stipe above bulb together), probably solid, exannulate, greyish-whitish to pale grey, upper c. 30–40 mm whitish floccose-lanose from partial veil, lower down appressedly subfelted-subtomentose to somewhat pale grey flocculose-subsquamulose, with inconspicuous floccose-felted remnants of volva only here and there provoking formation of small recurving scales on upper part of bulb. Partial veil incoherent, whitish to greyish whitish, lanose-floccose, at first forming rags at edge of pileus and on apex of stipe, later practically disappearing, probably never forming an annulus. Characters of context, smell, taste and spore print not recorded.

Spores [20/1] (9.0–)10–12.5(–13.5)  $\times$  (6.0–)6.5–8  $\mu\text{m}$ , Q (1.2–)1.3–1.8, average Q 1.6, broadly ellipsoid, ellipsoid or oblong-ellipsoid, thin-walled, colourless, with relatively large and broad apiculus, amyloid. Basidia c. 45–60  $\times$  8.5–12  $\mu\text{m}$ , 4-spored (but quite a few irregularly shaped), with distinct clamp. Marginal tissue a rather narrow sterile strip of rather small, narrowly to broadly clavate, thin-walled, colourless cells, 12–36 (–48)  $\times$  6.5–17.5(–32)  $\mu\text{m}$ , partly in short chains and then second cell much smaller than top-cell. Hymenophoral trama bilateral with scarce acrophysalides; most larger inflated elements (e.g. 70  $\times$  15  $\mu\text{m}$ ) connected with subhymenium; with scarce oleiferous

hyphae; subhymenium c. 15–20  $\mu\text{m}$  thick, (still?) densely ramose. Pileipellis made up of a 140–180  $\mu\text{m}$  wide gelatinized suprapellis and a greyish non-gelatinized subpellis with abundant oleiferous hyphae. Volval warts on pileus consisting of abundant ellipsoid, ovoid, piriform, clavate and fairly abundant (sub)globose cells, 25–80(–95)  $\times$  20–80  $\mu\text{m}$ , single or in rows of two on fairly abundant broad-celled, branching hyphae, 4–15  $\mu\text{m}$  wide; elements irregularly disposed but rows and elongate cells often in a more or less erect position; inflated cells fairly dark brown in lower part to almost colourless in upper part of warts. Trama of stipe acrophysalidic; cells up to 45  $\mu\text{m}$  wide and up to 410  $\mu\text{m}$  long observed; with scarce oleiferous hyphae. Clamps present.

**Habitat & distribution.**—Under *Abies homolepis* at 1000 m alt. Known only from the type-locality in Central Japan.

**Collections examined.**—Japan, Honshu, Nagano Prefecture, Karuizawa, 26 Aug. 1975 (type, L), 26 Aug.–6 Sept. 1976 (L), 12 Oct. 1976 (TNS: F 198224, F 198225), all leg. *S.-I. Hatanaka* L.

The macroscopic description above is based on a series of excellent, very detailed colour photographs and observations on the well-dried specimens.

*Amanita miculifera* is rather closely related to *A. onusta* (Howe) Sacc. from eastern and north-eastern North America (see Bas, 1959: 428). Just as the latter species it has a grey, friable volva forming warts on the pileus, an incoherent, lanose-floccose, finally disappearing partial veil, clamped basidia and in addition it has spores of about the same size and with the same length-width ratio.

Nevertheless, the outward appearance of *A. miculifera* is rather different from that of *A. onusta*. Besides in the somewhat larger size, the more conical pileus and the more prominent pseudorrhiza, the reasons for this difference are to be found mainly in the properties of the volva:

1. The volval layer of *A. miculifera* is thinner than that in *A. onusta* and therefore the volval warts on the pileus are smaller and less prominent and do not give an echinate look to the pileus.

2. The volval layer of *A. miculifera* consists, at least at the centre of the pileus, of a grey inner layer and a paler to almost whitish outer layer; accordingly the volval warts have a grey base and a pale apex. Under the microscope the inflated cells of the volva of *A. onusta* are darker than those of *A. miculifera* and are just as dark or even darker in the tips of the volval warts.

3. The arrangement of the elements in the volva of *A. miculifera* is quite irregular (see Fig. 2) and the inflated cells are not arranged in rather long, parallel, erect rows as in *A. onusta* (see Bas, 1969: fig. 157); consequently the volval warts are not so neatly conical as those in *A. onusta*.

4. The volval remnants at the base of the stipe of *A. miculifera* are inconspicuous and white to whitish and do not or hardly form recurving scales, whereas in *A. onusta* the coloured volval warts and/or scales at the base of the stipe are very characteristic.

In the key to the stirps of subsection *Solitariae* of *Amanita* section *Lepidella* published by Bas (1969: 386), *A. miculifera* does not key out with *A. onusta* in stirps *Microlepis*, but in stirps *Virgineoides* which has to be emended in order to include also species with a coloured volva.

Paper chromatographic survey revealed a specific pattern of non-protein amino acids in *A. miculifera* and two closely related new amino acids have been isolated and characterized. These results will be published in the near future.

#### REFERENCES

- BAS, C. (1969). Morphology and subdivision of *Amanita* and a monograph of its section *Lepidella*. In *Persoonia* 5: 285–579.
- KORNERUP, A. & WANSCHER, J. H. (1978). Methuen handbook of colour, Ed. 3. London ['Methuen'].
- MUNSELL COLOR COMPANY (1975). Munsell soil color charts. Baltimore ['Munsell'].