

## Short Communication

Three species of *Marasmius* new to Japan

Toshizumi Miyamoto, Tsuneo Igarashi\* and Kunihide Takahashi

Department of Forest Science, Faculty of Agriculture, Hokkaido University, Sapporo 060-8589, Japan

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Three species of *Marasmius* from Japan are described and illustrated here for the first time: *M. glabellus*, *M. pallidocephalus* and *M. wettsteinii*. The specimens were collected in Hokkaido.

Key Words—basidiomycetes; Japan; *Marasmius glabellus*; *Marasmius pallidocephalus*; *Marasmius wettsteinii*.

During a study of litter-decomposing basidiomycetes in Hokkaido, three species of *Marasmius* were collected. This is the first report of these species from Japan. *Marasmius wettsteinii* (section *Marasmius*) was not previously known to occur outside Europe. *Marasmius glabellus* (section *Sicci*) and *M. pallidocephalus* (section *Androsacei*) had only been reported in North America. They are described and illustrated in this report.

For microscopic observations, dried basidiomata were placed in 95% ethanol for about 1 h, and then transferred to distilled water until they became pliable. Free-hand sections of the rehydrated basidiomata were examined in 5% KOH, 10% NH<sub>4</sub>OH plus congo red and phloxine. Names of colors and codes in parentheses are taken from Munsell (1990). The voucher specimens have been deposited at SAPA (Herbarium of the Faculty of Agriculture, Hokkaido University, Sapporo, Japan).

***Marasmius glabellus*** Peck, Bull. Buffalo Soc. Nat. Sci. 1: 58. 1873 (1874). Figs. 1A–B, 2

Pileus 12–39 mm in diam, convex to broadly campanulate when young, then plane and obtusely umbonate or shallowly depressed, surface dry, smooth at first, then rugulose sulcate, minutely velutinous, margin entire to crenate, dark brown (7.5YR4/4) at center, strong brown (7.5YR5/6), dark yellowish brown (10YR4/6) or yellowish brown (10YR5/6), fading to yellow (10YR7/6) or very pale brown (10YR8/4). Context thin, whitish, pliant, but cracking on the surface when bent; odor and taste indistinctive. Lamellae emarginate to adnexed, distant (L=12–19, I=1–3), narrow at first, moderately broad in age, rarely forked, faintly intervenose at first, strongly so in age, whitish to very pale brown (10YR8/4), edges entire, concolorous with side or very pale brown. Stipe 18–49 × 1–3.4 mm, terete or sometimes compressed, slightly broadened at the apex or not, straight or curved, hollow, smooth, glabrous, shining, white at the apex at

first, then very pale brown (10YR8/4), strong brown (7.5YR5/6) or dark olive brown (2.5Y2.5/3–3/3) towards base; basal mycelium tomentum whitish to light brown (7.5YR6/4), brownish yellow (10YR6/6).

Basidiospores 7.9–10.8 × 4.2–5.1(–5.3) μm, ellipsoid or subfusiform. Basidia 26–34.5 × 7.2–6 μm, clavate to cylindric-clavate, 4-spored, clamped. Basidioles 20.8–32.5 × 4.2–6.2 μm, subclavate. Cheilocystidia in forms of broom cells, 14–26.8 × 7.8–14.9 μm, cylindrical, obovate or clavate, with rod-like, usually roughened, sometimes short-branched projections 4.6–7.3 × 1–1.9 μm, with hyaline to very pale yellow walls, up to 0.7 μm thick at the apex, nonamyloid. Pleurocystidia 29.5–38.2 × 4.7–10.5 μm, fusoid, cylindric-clavate, capitulate, strangulated, with one or more knob-like protuberances on the upper portion, thin-walled, nonamyloid, rare. Hyphae of hymenophoral trama interwoven, branched, cylindrical, 3.7–11 μm across, hyaline, slightly dextrinoid. Pileipellis hymeniform, made up of broom cells, 11.2–33 × 7.2–17.5 μm, similar to cheilocystidia. Hypphae of the cortical layer of the stipe parallel, smooth, 2.7–5.5 μm across, with yellowish to greenish brown walls 0.7–1.6 μm thick. Stipe trama parallel, smooth, 5.5–11 μm across, thin, hyaline walls, dextrinoid. Caulocystidia absent. Clamps present.

Habit, habitat: Solitary, in small groups or gregarious, on needles and twigs of *Picea glehnii* (Fr. Schmidt) Mast. in closed coniferous forests, or on mixed litter of leaves and needles in mixed deciduous-coniferous woods.

Specimens examined: HUMA96004, 18 Aug. 1996, in *P. glehnii* plantation forest, elev. 25 m, Ebetsu-shi, Hokkaido; HUMA96007, 19 Aug. 1996, the same habitat, the same locality; HUMA97027, 3 Sept. 1997, the same habitat, the same locality. HUMA97029, 5 Sept. 1997, in mixed deciduous-coniferous woods, elev. 25 m, the same locality. All specimens were collected by T. Miyamoto.

Japanese name: Shiwa-ochibatake (new name).

*Marasmius glabellus* is characterized by the presence

\*Present address: 3–7–5, Koyo-cho, Kitahiroshima-shi, Hokkaido 061-1134, Japan.

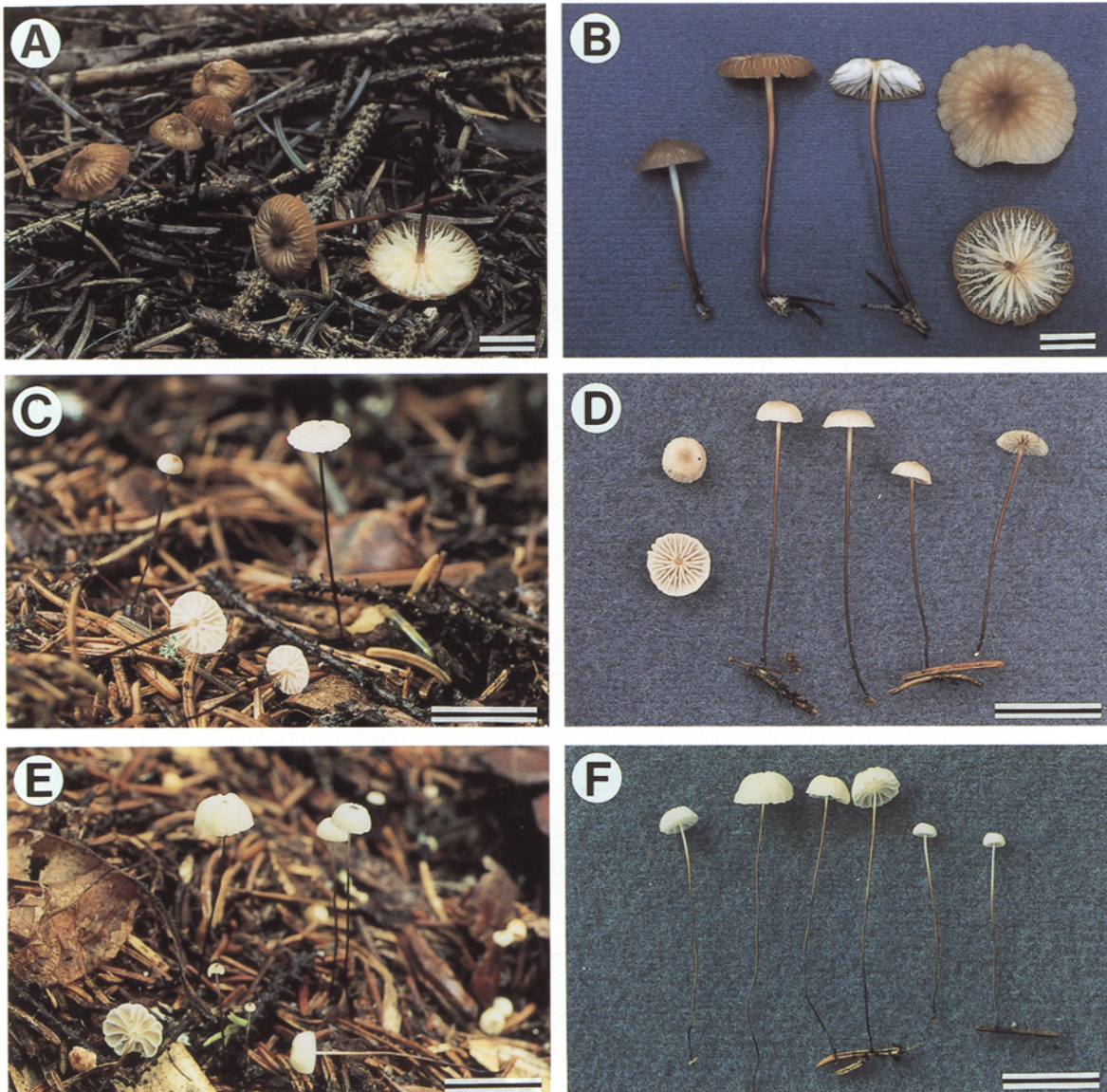


Fig. 1. A, B: *Marasmius glabellus* (A=HUMA96004, B=HUMA96007). C, D: *M. pallidocephalus* (HUMA94003). E, F: *M. wettsteinii* (HUMA94001). All scale bars = 10 mm.

of grooves on the yellowish brown-colored pileus, and by distant and rather broad lamellae. *Marasmius glabellus* in the young stage could be confused with *M. cohaerens* (Pers.: Fr.) Cooke & Quélet and *M. sullivantii* Montagne (at present this species is not known in Japan). However, microscopically, *M. glabellus* does not possess the hymenial setae that characterize *M. cohaerens*. *Marasmius sullivantii* has close to crowded lamellae, unlike *M. glabellus* which has distant lamellae. Microscopically, the stipe of *M. sullivantii* is covered with caulocystidia, but this feature is only observed at the juncture of pileus and stipe in *M. glabellus* (Gilliam, 1976). Morphological differences exist in the basidiomata of *M. glabellus* depending on whether the specimens are derived from materials in the young or old

stage of growth. For this reason, it is difficult to identify this species without collecting the mature basidiomata.

***Marasmius pallidocephalus*** Gilliam, *Mycologia* **67**: 818. 1975. Figs. 1C–D, 3

Pileus 3.7–10 mm in diam, hemispherical to convex and slightly umbonate when young, then plano-convex, finally plane to umbilicate, surface smooth or faintly rugulose, glabrous; margin at first entire, then crenate to undulating, dark brown (7.5YR4/3), light yellowish brown (10YR6/4) or light brown (7.5YR6/4) on the disk, pink (7.5YR8/4), very pale brown (10YR7/3–7/4) or white on the margin. Context membranous, whitish to very pale brown (10YR8/3), odor and taste indistinctive. Lamellae narrow to moderately broad, distant, L = 10–15,

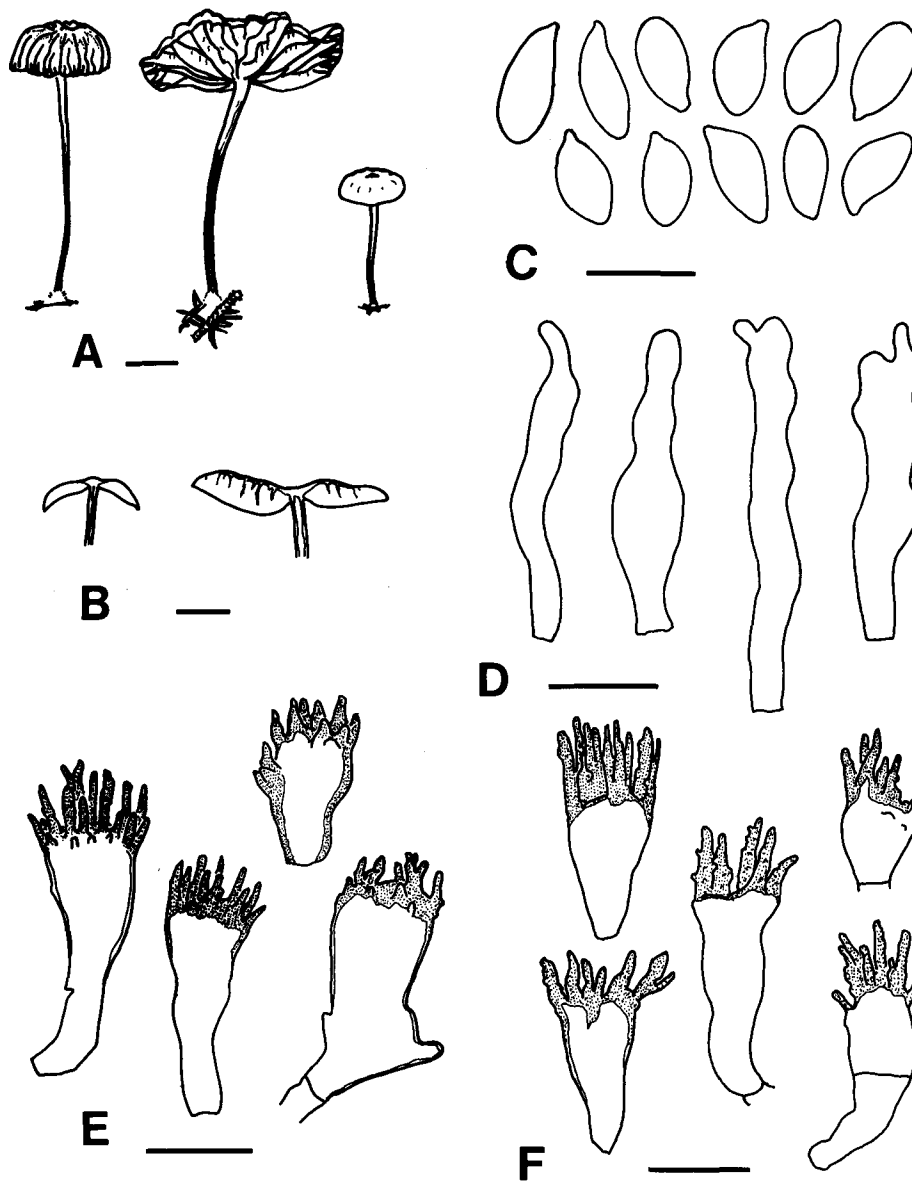


Fig. 2. *Marasmius glabellus*.

A: Basidiomata. B: Sections of pilei. C: Basidiospores. D: Pleurocystidia. E: Broom cells of pileipellis. F: Cheilocystidia. Scale bars: A, B = 10 mm; C-F = 10  $\mu$ m.

l = 1-2, adnate at first, becoming adnexed in age, sometimes forming a collar, very pale brown (10YR8/4), edges entire. Stipe 19-25  $\times$  0.3-0.7 mm, terete, filiform, equal or slightly broadened at apex, often twisted on drying, straight or slightly curved, white, light yellowish brown (10YR 6/4), light reddish brown (5YR6/4) or light brown (7.5YR6/3) at the apex, dark reddish brown (5YR3/2) downward, smooth, glabrous, shining, hollow, insititious. Rhizomorphs usually present, arising from the substrate near the basidiome or rarely from the stipe near the base, very thin.

Basidiospores (6.1-)6.9-10.5  $\times$  2.8-4.3(-4.6)  $\mu$ m, narrowly ellipsoid, pip-shaped. Basidia 22-38  $\times$  6-7.5  $\mu$ m, clavate, 4-spored, clamped. Basidioles 18-30  $\times$  4.7-

7.1  $\mu$ m, subfusiform to subclavate. Hymenial cystidia lacking. Hyphae of the hymenophoral trama parallel, 2.1-8.2  $\mu$ m across, hyaline, nonamyloid. Pileipellis hymeniform to irregular trichoderm of diverticulate, bi- or trilobed elements 10-43  $\times$  5.4-29  $\mu$ m, with scattered numerous, hyaline warts or projections up to 5  $\mu$ m long. Pileus subcutis composed of interwoven hyphae 2.3-8.3  $\mu$ m across, hyaline to yellowish brown, often with spirally or irregularly incrustated, nonamyloid. Hyphae of the pileus trama interwoven, inflated, branched, 2.2-7.4  $\mu$ m across, hyaline, nonamyloid. Hyphae of the cortical layer of the stipe parallel, roughened, spirally incrustated or smooth, 1.2-3.7  $\mu$ m across, with brownish yellow to strong brown walls up to 0.7  $\mu$ m

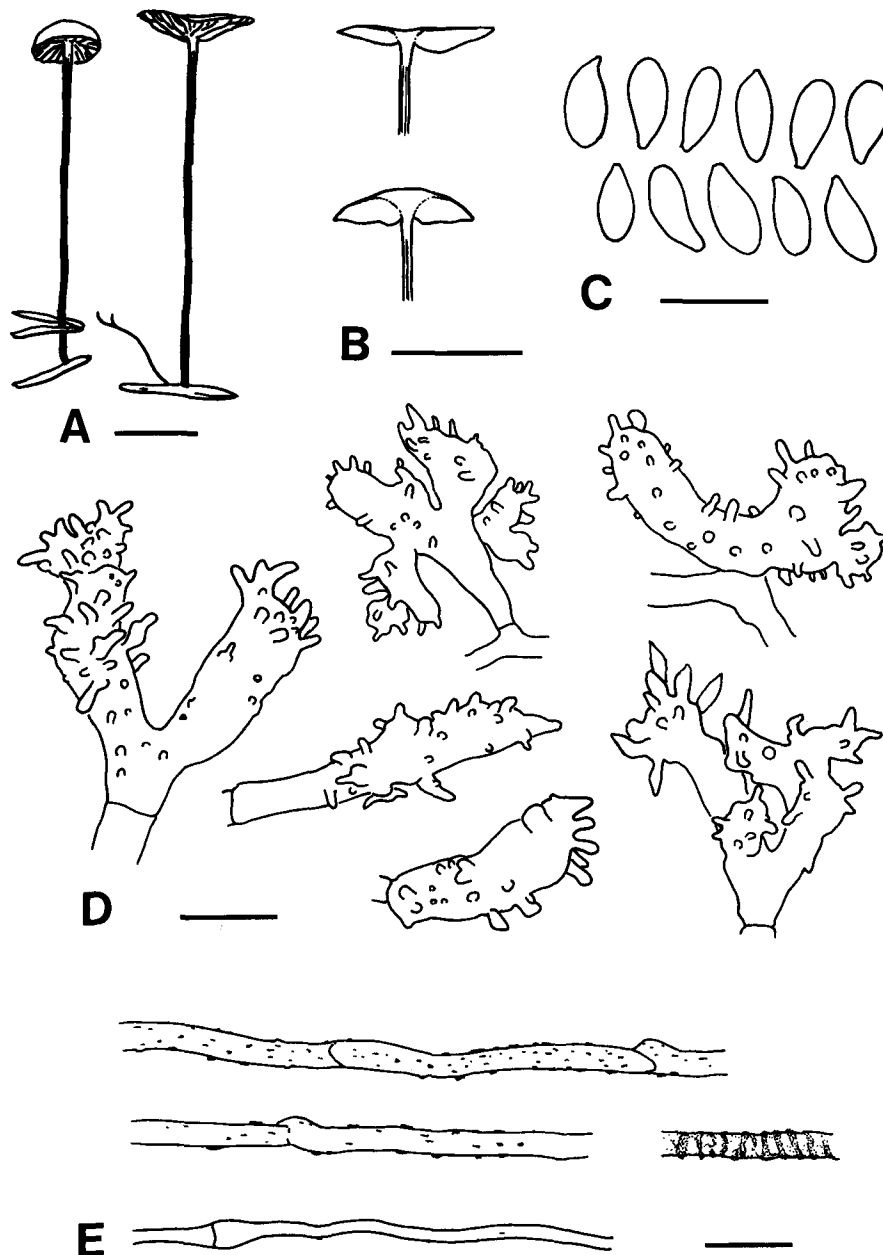


Fig. 3. *Marasmius pallidocephalus*.

A: Basidiomata. B: Sections of pilei. C: Basidiospores. D: Diverticulate cells of pileipellis. E: Hyphae of the cortical layer of the stipe. Scale bars: A, B=5 mm; C-E=10  $\mu$ m.

thick. Hyphae of the stipe trama parallel, 1.9–7.9  $\mu$ m across, walls up to 2  $\mu$ m thick, hyaline, dextrinoid. Caulocystidia absent. Clamps present.

Habit, habitat: Gregarious in large numbers on needles of *P. glehnii* in closed coniferous forests.

Specimens examined: HUMA92001, 26 June 1992, under *P. glehnii*, elev. 300 m, Uryu Experimental Forest of Hokkaido University, Horokanai-cho, Uryu-gun, Hokkaido; HUMA94003, 12 July 1994, the same habitat, the same locality; HUMA95001, 5 July 1995, the same habitat, the same locality. HUMA97001, 7 June 1997,

in *P. glehnii* plantation forest, elev. 25 m, Ebetsu-shi, Hokkaido; HUMA97002 and HUMA97003, 12 June 1997, the same habitat, the same locality. All specimens were collected by T. Miyamoto.

Japanese name: Hime-ochibatake (new name).

*Marasmius pallidocephalus* may be confused with *M. androsaceus* (L.: Fr.) Fr. in the field. The important differences between these taxa are: The pileus of immature *M. pallidocephalus* is paler in color than that of *M. androsaceus*. *Marasmius pallidocephalus* lacks the cystidia seen on the lamella edge of *M. androsaceus*; and the

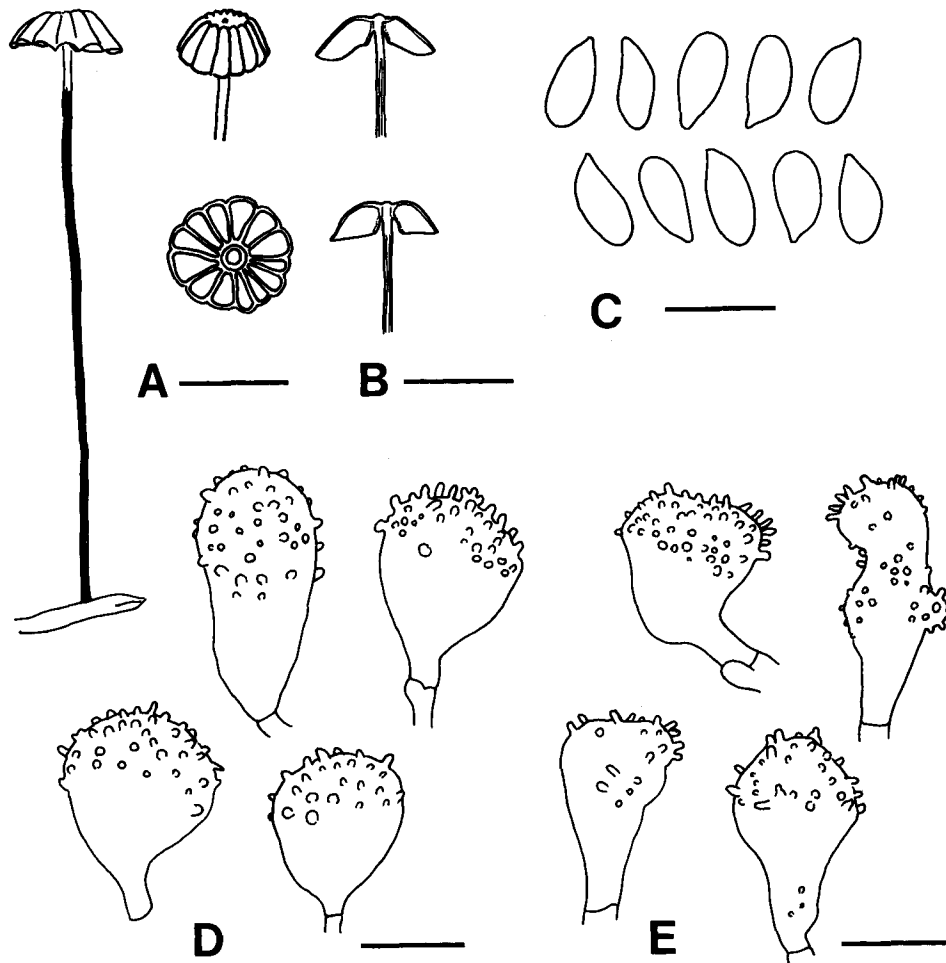


Fig. 4. *Marasmius wettsteinii*.

A: Basidiomata. B: Sections of pilei. C: Basidiospores. D: Broom cells of pileipellis. E: Cheilocystidia. Scale bars: A, B=5 mm; C-E=10  $\mu$ m.

walls of the cortical hyphae of the stipe are incrustated in *M. pallidocephalus* but smooth in *M. androsaceus*.

Gilliam (1976) reported that *M. pallidocephalus* seems to be a common species in spruce and hemlock woods in the United States and Canada. This species may also be commonly found on the needles of *Picea* in Hokkaido. The colonies of this species are often observed to reach 2 m in diam under *P. glehnii* after heavy rain in the early summer.

***Marasmius wettsteinii*** Sacc. & Sydow, Syll. Fung. 14: 117. 1899. Figs. 1E-F, 4

= *Marasmius tenerrimus* Wettstein, S.-B. Kais. Akad. Wiss. 94 (1886): 66. 1887.

= *Marasmius bulliardii* Quélet f. *acicola* (Lundell) Noordeloos, Persoonia 13: 242. 1987.

Pileus 3–8.5 mm in diam, hemispherical, umbilicate with distinct papilla, radially sulcate, glabrous, margin crenate, white to pale cream-colored when young becoming yellow (10YR7/6) or light yellowish brown (10YR6/4) when old, with brown to dark brown (10YR5/3–4/3) papilla, brownish yellow (10YR6/6) to

dark yellowish brown (10YR4/6) on drying. Context membranaceous, odor and taste indistinctive. Lamellae broad, distant, L=11–15, l=0(=1), broadly attached to collar, edges smooth, white, concolorous with pileus. Stipe 16–46  $\times$  0.2–0.5 mm, terete, filiform, equal or slightly broadened at the base, often twisted on drying, straight or slightly curved at the base, white at apex, reddish brown (5YR4/4) to dark reddish brown (5YR3/2) or very dark brown (10YR2/2) downward, smooth, glabrous, shining, insititious. Rhizomorphs usually present, arising from the substrate near the basidiome, very thin.

Basidiospores 7.4–9.7  $\times$  3.3–4.5  $\mu$ m, ellipsoid, cylindrical-ellipsoid. Basidia 25–37  $\times$  5.5–8  $\mu$ m, clavate, cylindrical-clavate, 4-spored, clamped. Basidioles 24–34  $\times$  5–6  $\mu$ m, clavate or fusiform. Cheilocystidia 16–25  $\times$  9–16  $\mu$ m, obovate, clavate, sometimes divided into two or more heads, hyaline to pale brown, with wart-like or cylindrical outgrowths 1–3  $\times$  0.7–1  $\mu$ m, nonamyloid or slightly dextrinoid. Hyphae of hymenophoral trama branched, cylindrical, 2.9–8.4  $\mu$ m across, hyaline, thin-walled, nonamyloid or slightly dextrinoid. Pileipellis hymeniform, the cells 15–24  $\times$  10–17  $\mu$ m, obovate, clavate, hya-

line in basal part, pale brown to yellow brown in upper part, with wart-like outgrowths  $0.5\text{--}1.5 \times 0.6\text{--}1 \mu\text{m}$ , nonamyloid or slightly dextrinoid. Hyphae of the cortical layer of the stipe  $2\text{--}6.7 \mu\text{m}$  across, parallel, with smooth, dark green to brown walls  $1\text{--}2 \mu\text{m}$  thick. Hyphae of the stipe trama parallel,  $2.6\text{--}7 \mu\text{m}$  across with smooth, hyaline, thin walls, nonamyloid. Caulocystidia absent. Clamps present.

Habit, habitat: Gregarious, on needles of *Abies sachalinensis* (Fr. Schmidt) Mast. or *P. glehnii* in closed coniferous forests.

Specimens examined: HUMA92003, 10 July 1992, under *A. sachalinensis* elev. 300 m, Uryu Experimental Forest of Hokkaido University, Horokanai-cho, Uryu-gun, Hokkaido; HUMA92004, 26 July 1992, under *P. glehnii*, elev. 300 m, the same locality; HUMA94001, 12 July 1994, the same habitat, the same locality. HUMA 96001, 19 June 1996, *P. glehnii* plantation forest, elev. 25 m, Ebetsu-shi, Hokkaido; HUMA97010 and HUMA97011, 1 Aug. 1997, the same habitat, the same locality. All specimens were collected by T. Miyamoto.

Japanese name: Yuki-hime-houraitake (new name).

*Marasmius wettsteinii* can be distinguished by the color of the pileus, which changes from white to brown on drying. Other characteristic features are the relatively distant lamellae and the rounded shape with wart-like projections of the broom cells of the lamella edge and pileipellis. The habitat of this species is on the needles of coniferous trees (mainly *Picea*).

*Marasmius rotula* (Scop.: Fr.) Fr. and *M. bulliardii* Quélet could be confused with *M. wettsteinii*. However,

*M. rotula* grows on the decayed wood (branches, bark, trunks) of deciduous or rarely coniferous trees and its lamellae are rather crowded. *Marasmius bulliardii* grows on dead leaves, especially those of *Quercus* and *Fagus*. According to the European collections examined by Antonín (1989), additional diagnostic points between the *M. wettsteinii* and *M. bulliardii* are: 1) *M. bulliardii* has a brownish pileus even when young; 2) the number of lamellae in *M. wettsteinii* is 14–15 on average, compared to the 13–14 found on average in *M. bulliardii*; and 3) projections of broom cells in *M. wettsteinii* are shorter and finer ( $1\text{--}2\text{--}3.5 \mu\text{m}$  long) than those of *M. bulliardii* ( $1\text{--}2\text{--}4\text{--}5 \mu\text{m}$  long).

Our specimens were identical with respect to these characteristics, except for the number of lamellae. The number of the lamellae of our specimens was 11–15 (average 13) which appears to be less than the number of lamellae seen in European collections.

In Hokkaido, *M. wettsteinii* is common species, but we have never collected *M. bulliardii*.

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