

## Short Communication

Notes on three species of *Mycena* new to Japan from *Picea* forests of Hokkaido

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Three species of *Mycena*, viz. *M. aurantiidisca*, *M. clavicularis*, and *M. oregonensis* are recorded for the first time in Japan. Macro- and microscopical descriptions and illustrations are given for each species.

Key Words—basidiomycetes; *Mycena aurantiidisca*; *Mycena clavicularis*; *Mycena oregonensis*; *Picea* forests.

During our investigation of the genus *Mycena* in Hokkaido from 1991 to 1997, three species previously unknown in Japan were collected from *Picea* forests. Subsequent studies revealed that they were *M. aurantiidisca* (Murrill) Murrill (section *Adonideae* (Fr.) Quélet (Quélet, 1872)), *M. clavicularis* (Fr.) Gillet (section *Cinerellae* Singer ex Maas G. (Maas Geesteranus, 1980)), and *M. oregonensis* A. H. Smith (section *Oregonenses* Maas G. (Maas Geesteranus, 1990)). The first species has previously been reported in the United States (Maas Geesteranus, 1990), and the latter two species from North America and Europe (Maas Geesteranus, 1986, 1990), growing in coniferous forests. The three species are described and illustrated in this report based on the Japanese material.

The methods used to observe material follow Miyamoto et al. (1996). Names of colors and codes in parentheses are taken from Kornerup and Wansher (1978), cited as "K & W", or Munsell (1990), cited as "M". The voucher specimens have been deposited in SAPA (Herbarium of the Faculty of Agriculture, Hokkaido University, Sapporo, Japan).

***Mycena aurantiidisca*** (Murrill) Murrill, *Mycologia* 8: 220. 1918.

≡ *Prunulus aurantiidiscus* Murrill, *North Amer. Fl.* 9: 336. 1916. Figs. 1A, B, 2

Pileus 3.5–10 mm in diam, conic when young, campanulate or broadly conic, not expanding, umbonate, margin entire, sometimes somewhat rimose, translucent-striate when moist, pruinose when young (under hand lens) then glabrous, orange (K & W: 5-6A8) at center, yellow (K & W: 4A6-5A7) at margin, fading to pale yellow (K & W: 4A6) with age. Flesh thin, watery, fragile, concolorous with pileus surface. Odor and taste in-

distinctive. Lamellae 14–17 reaching the stipe, tender, up to 1.6 mm broad, somewhat ventricose, adnate, adnexed or decurrent with a tooth, whitish, edges concolorous, even. Stipe 18–55 × 0.5–1 mm, hollow, fragile, equal, terete, smooth, pruinose above, glabrous below, whitish to very pale yellow (K & W: 2A5), with whitish fibrils at the base.

Basidiospores 6.2–7.9 × 3–3.8 μm, elongated ellipsoid, almost cylindrical, smooth, inamyloid. Basidia 20–35 × 5–7 μm, clavate, clamped, with 4 sterigmata up to 4 μm long. Cheilocystidia 37–55 × 7–21 μm, fusoid with a long narrow neck 1.7–3.2 μm wide. Pleurocystidia similar to cheilocystidia. Lamellar trama slightly dextrinoid (pale brown in Melzer's reagent). Hyphae of the pileipellis parallel, 2–5 μm wide, in the uppermost layer with simple to furcate or sometimes branched, rod-like excrescences 1.5–12 × 1–1.8 μm, overlaying a hypoderm of broad and elongated hyphae, 4–14 μm wide. Hyphae of the cortical layer of the stipe 1.3–3.5 μm wide, smooth. Caulocystidia 7–41 × 7–12 μm, globose or clavate. Clamps frequent.

Habitat and phenology: Solitary to gregarious or in small groups, on needle litter in coniferous forests of *Picea glehnii* Mast. and *Picea abies* Karst. from July to September.

Distribution: New to Japan (Hokkaido). Known from the United States.

Specimens examined: HUMY94015, 29 Aug. 1994, in *P. abies* plantation forest, elev. 300 m, Uryu Experimental Forest of Hokkaido University, Horokanai-cho, Uryu-gun, Hokkaido; HUMY96033, 1 Aug. 1996, in *P. glehnii* forest, the same locality; HUMY96041, 6 Sept. 1996, the same habitat and locality. HUMY96042, 5 Sept. 1996, in *P. glehnii* plantation forest, elev. 25 m, Ebetsu-shi, Hokkaido. All specimens were collected by T. Miyamoto.

Japanese name: Oubai-take (new name).

*Mycena aurantiidisca* is very close to *M. adonis*

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Fig. 1. *Mycena aurantiidisca*, *M. clavicularis*, *M. oregonensis*, and *M. acicula*.

A: Basidiomata of *M. aurantiidisca* in *Picea abies* forest (HUMY94015). B: Basidiomata of *M. aurantiidisca* collected from *P. glehnii* forest (HUMY96041). C: Basidiomata of *M. clavicularis* in *P. glehnii* forest (HUMY94014). D: Basidiomata of *M. clavicularis* collected from *P. glehnii* forest (HUMY96025). E: *M. oregonensis* collected from *P. glehnii* forest (HUMY96044). F: *M. acicula* collected from deciduous forest (HUMY96014). All scale bars = 10 mm.

(Bull.: Fr.) S. F. Gray, but the latter is distinguishable in having pilei which are scarlet to orange-red at first, fading to whitish with age and lacking a yellow tint. Further, *M. adonis* often has 2-spored basidia, unlike *M. aurantiidisca* with 4-spored basidia. *Mycena acicula* (Schaeff.: Fr.) Kummer (Fig. 1F) also has a red-orange pileus and could be confused with *M. aurantiidisca* in the field. However, *M. acicula* has a more flexuous or curved stipe and is usually found on fallen twigs and decayed wood of

deciduous trees (Maas Geesteranus, 1990). In Hokkaido, *M. aurantiidisca* occurs in *P. glehnii* and *P. abies* forests with rather thick and damp humus. Microscopically, *M. acicula* is distinctive in its pseudoparenchymatous hypoderm, in contrast to *M. aurantiidisca*, which has a hypoderm consisting of inflated hyphae (Fig. 2G).

***Mycena clavicularis*** (Fr.) Gillet, Les Hymen. 257. 1874.  
 ≡ *Agaricus clavicularis* Fr., Syst. mycol. 1: 158. 1821.

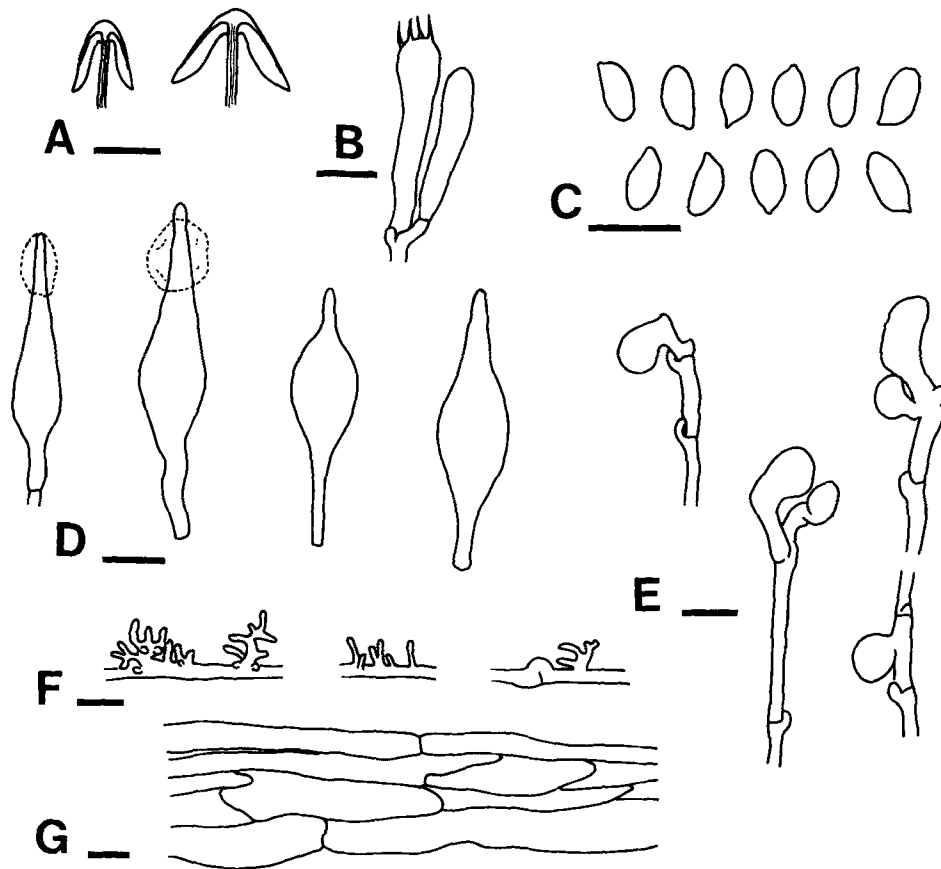


Fig. 2. *Mycena aurantiidisca*.

A: Sections of pileus. B: Basidia and basidioles. C: Basidiospores. D: Cheilocystidia. E: Caulocystidia. F: Hyphae of the pileipellis. G: Hyphae of the hypoderm. A, B, D, and E from HUMY96041; C, F, and G from HUMY96033. Scale bars: A = 5 mm; B–G = 10  $\mu$ m.

≡ *Prunulus clavicularis* (Fr.) Murrill, North Amer. Fl. 9: 330. 1916.

≡ *Mycena epipterygia* f. *clavicularis* (Fr.) Konrad et Maublanc, Ic. sel. Fung. 6: 268. 1937.

Figs. 1C, D, 3

Pileus 6–16 mm in diam, at first convex, flattening with age and becoming broadly convex, with or without small umbo, sometimes depressed at center, sulcate, translucent-striate when moist, glabrous, dry, slightly hygrophanous (at least when young), brown to yellowish brown (M: 10 YR 5/3–5/4) at the center, very pale brown to whitish (M: 10 YR 7/3–10YR 8/2) outward, fading with age, grayish-brown when drying out. Flesh thin, concolorous with pileus surface, odor and taste not distinctive. Lamellae subdistant, 16–21 reaching the stipe, narrow to moderately broad (up to 2.8 mm), somewhat ventricose, broadly adnate, somewhat decurrent with a short tooth, dorsally intervenose, whitish, light gray to whitish (M: 10 YR 7/2–8/2) near pileus, edges even. Stipe 25–50  $\times$  0.7–1.4 mm, equal, terete, straight, elastic but breaking with a snap when bent too far, smooth, shiny when dry, viscid, glutinous when wet, rarely covered in slimy coating, light brownish gray (M: 10 YR 6/2) at apex, dark yellowish brown (M: 10 YR 4/4–5/3)

downward, base covered with whitish fibrils.

Basidiospores 6.5–9.1 (–9.3)  $\times$  3.8–4.8  $\mu$ m, ellipsoid, smooth, amyloid. Basidia 25–32.9  $\times$  6–7.2  $\mu$ m, clavate, clamped, with 4-sterigmata up to 4.1  $\mu$ m long. Cheilocystidia 13.5–37  $\times$  7–17  $\mu$ m, forming sterile lamellar edges, clavate to broadly clavate, sometimes divided into two or more heads, enlarged portion covered with numerous, coarse, rod-like, straight to curved projections 0.9–6  $\times$  0.5–1.9  $\mu$ m. Pleurocystidia few, similar. Lamellar trama dextrinoid. Hyphae of the pileipellis parallel, in the uppermost layer 2–5.3  $\mu$ m wide, covered with simple to branched, rod-like projections 1–20  $\times$  0.6–1.0  $\mu$ m, forming very dense masses, overlaying broad cells 20–70  $\times$  10–30  $\mu$ m. Hyphae of the cortical layer of the stipe 1–4.2  $\mu$ m wide, embedded in gelatinous matter, with sometimes diverticulate projections 1–4  $\times$  0.5–1.2  $\mu$ m. Caulocystidia 1–6  $\mu$ m across, sparsely to very densely diverticulate, projections up to 11.6  $\mu$ m long. Clamps frequent.

Habitat and phenology: In small groups or gregarious, on needle beds of coniferous trees (*Picea glehnii* and *Abies sachalinensis* Mast.), from late June to July.

Distribution: New to Japan (Hokkaido). Known from Europe, the United States, and Canada.

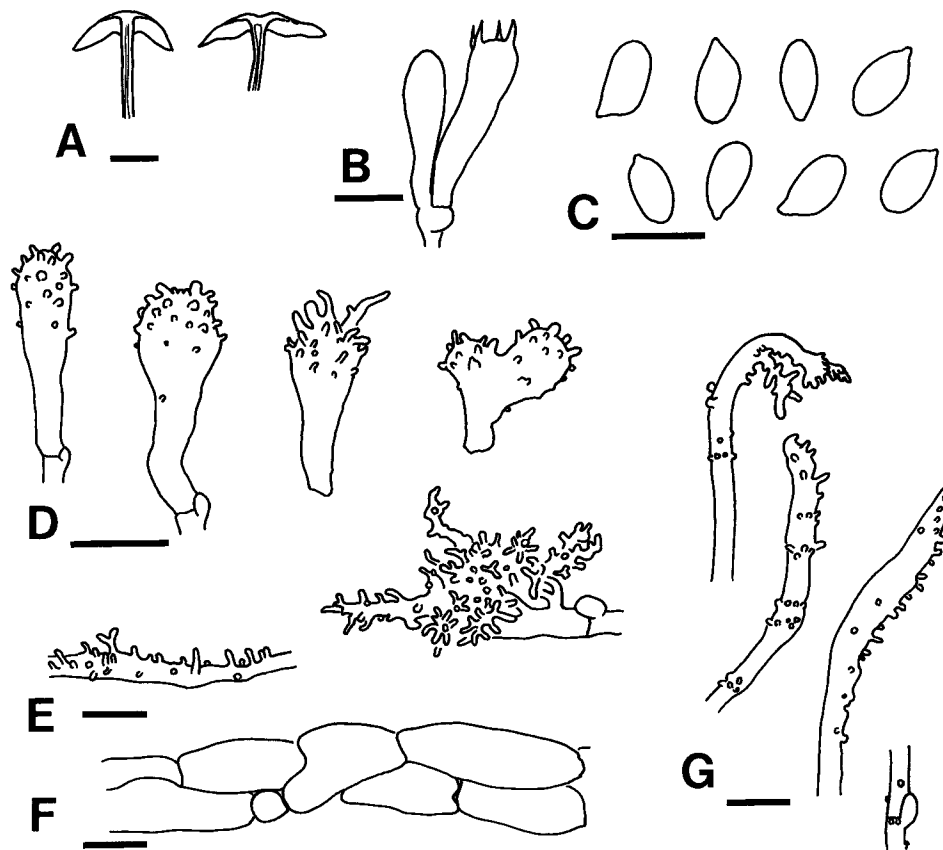


Fig. 3. *Mycena clavicularis*.

A: Sections of pileus. B: Basidia and basidioles. C: Basidiospores. D: Cheilocystidia. E: Hyphae of the pileipellis. F: Hyphae of the hypoderm. G: Caulocystidia. A, B, D, and G from HUMY95001; C, E, and F from HUMY96021. Scale bars: A=5 mm; B-G=10  $\mu$ m.

Specimens examined: HUMY92003, 12 July 1992, in *P. glehnii* and *A. sachalinensis* forest, elev. 300 m, Uryu Experimental Forest of Hokkaido University, Horokanai-cho, Uryu-gun, Hokkaido; HUMY94014, 12 July 1994, the same habitat and locality; HUMY95001, July 1995, the same habitat and locality; HUMY96017, 4 July 1996, the same habitat and locality; HUMY96021, 3 July 1996, the same habitat and locality; HUMY96025, 3 July 1996, the same habitat and locality. HUMY96029, 7 July 1996, in *P. glehnii* plantation forest, elev. 25 m, Ebetsu-shi, Hokkaido. All specimens were collected by T. Miyamoto.

Japanese name: E-numeri-take (new name).

This species is not viscid in the pileus but viscid and slippery in the stipe when wet, thus it is difficult to pull the basidiomata from the substrate. *Mycena clavicularis* could be easily confused with *M. epipterygia* (Scop.: Fr.) S. F. Gray, *M. rorida* (Scop.: Fr.) Quél., or *M. vulgaris* (Pers.: Fr.) Kummer in the field because of the viscid stipe. However, *M. epipterygia* and *M. vulgaris* have pilei with a separable elastic pellicle. The pileus is glabrous in *M. clavicularis*, but is very finely furfuraceous to subpruinose in *M. rorida*.

Microscopically, the cheilocystidia of *M. vulgaris* are extensively branched and terminated by a multitude of

fine, gelatinizing excrescences, unlike those of *M. clavicularis*, which are clavate with simple excrescences. The pileipellis of *M. rorida* is composed of vesicular elements. This character is exceptional in the genus *Mycena*, making *M. rorida* easily distinguishable from *M. clavicularis*. Concerning phenology, Smith (1947) observed that *M. clavicularis* fruits in late June to August after rain. The habitat of this species was reported to be on needle beds and the debris of coniferous trees, viz., *Juniperus*, *Larix*, *Picea*, *Pinus* (Maas Geesteranus, 1986). We observed this species mainly on needles of *Picea glehnii* in Hokkaido, but exceptionally under *Abies sachalinensis*, *P. abies*, and *Larix kaempferi* (Lamb.) Carr., although these trees were located only a short distance away from those of *P. glehnii*.

*Mycena oregonensis* A. H. Smith, *Mycologia* **28**: 413. 1936.

= *Mycena siskiyouensis* A. H. Smith, *Mycologia* **28**: 414. 1936. Figs. 1E, 4

Pileus 3–5 mm in diam, obtusely conic to convex, faintly translucent-striate when moist, opaque, pruinose when young, glabrous, not lubricous, yellowish red (K & W: 8A6) to deep orange (K & W: 6A8), hardly fading with age. Flesh thin, brittle, concolorous with pileus surface.

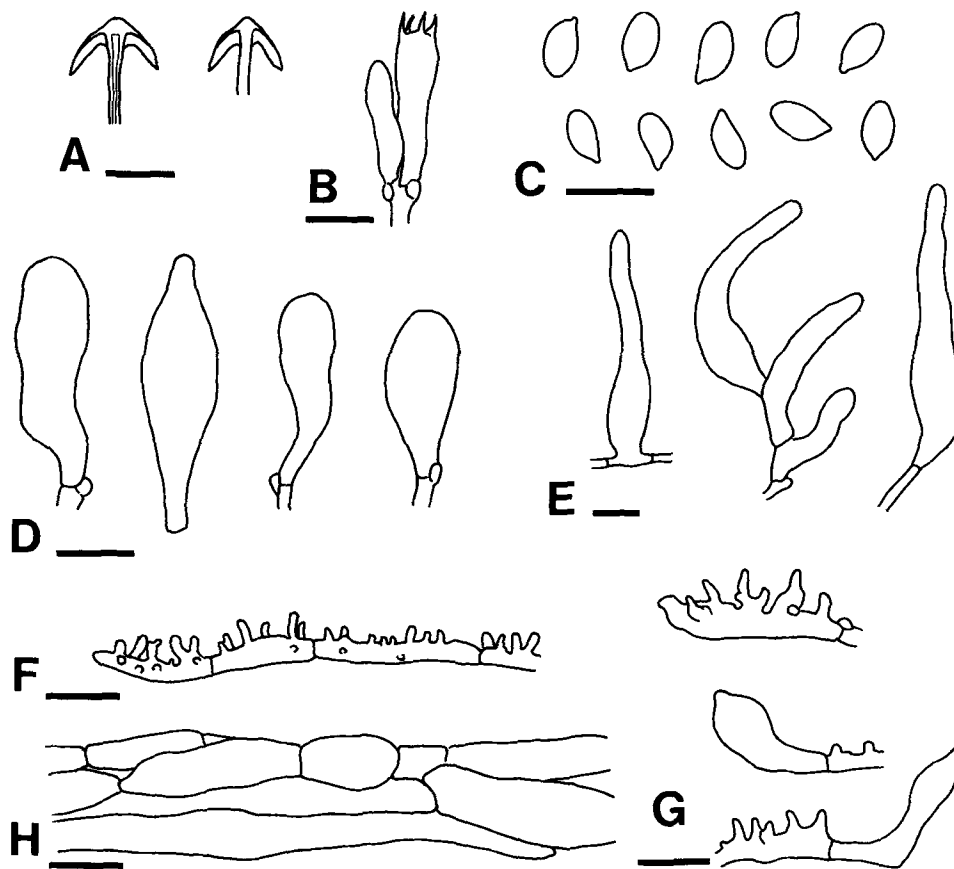


Fig. 4. *Mycena oregonensis*.

A: Sections of pileus. B: Basidia and basidioles. C: Basidiospores. D: Cheilocystidia. E: Caulocystidia. F: Hyphae of the pileipellis. G: Terminal cells of the pileipellis. H: Hyphae of the hypoderm. A, B, E, and G from HUMY96037; C, D, F, and H from HUMY97018. Scale bars: A = 5 mm; B–G = 10  $\mu$ m.

Odor and taste indistinctive. Lamellae 12–16 reaching the stipe, tender, narrow (ca. 0.5 mm broad), broadly adnate, decurrent with a tooth, melon yellow (K & W: 5A7) or persian orange (K & W: 6A6), the edge deep orange (K & W: 6A8) in hand lens. Stipe 15–20  $\times$  0.5–0.8 mm, hollow, terete, straight, fragile, smooth, pruinose, melon yellow (K & W: 5A7) at the apex, deep orange (K & W: 6A8) downward, the base covered with coarse, yellow (K & W: 4A6) fibrils.

Basidiospores 6–7.5  $\times$  3–4 (–4.2)  $\mu$ m, ellipsoid to subcylindrical, smooth, inamyloid. Basidia 22–31  $\times$  5–7  $\mu$ m, clavate, clamped, with 4-sterigmata 2–5  $\mu$ m long. Cheilocystidia 20.8–41  $\times$  6–11  $\mu$ m, clavate, utriform, with broadly rounded apex, with yellow contents. Pleurocystidia similar, infrequent. Lamella trama pale brown in Melzer's reagent. Hyphae of the pileipellis 1.9–5.2  $\mu$ m wide, covered with simple to furcate or somewhat branched, rod-like to irregularly shaped excrescences up to 8  $\mu$ m long, 1.1–4.3  $\mu$ m in diam, overlying broad, elongated hyphae of the hypoderm; terminal cells infrequent to rare, clavate, smooth to diverticulate, 21–46  $\times$  5–14  $\mu$ m. Hyphae of the cortical layer of the stipe 1.2–2.5  $\mu$ m wide, smooth. Caulocystidia 28–78  $\times$  8–12  $\mu$ m, fusiform, subcylindrical, with orange con-

tents, smooth. Clamps abundant.

Habitat and phenology: Solitary or small groups, on needles of *P. glehnii*, from August to September.

Distribution: New to Japan (Hokkaido). Known from the United States and Europe.

Specimens examined: HUMY96037, 18 Aug. 1996; HUMY96043-1, 5 Sept. 1996; HUMY96044, 17 Sept. 1996; HUMY97018, 28 Aug. 1997, all by T. Miyamoto from *P. glehnii* plantation forest, elev. 25 m, in Ebetsushi, Hokkaido.

Japanese name: Kuchiba-take (new name).

*Mycena oregonensis* is characterized by the orange color of its basidiomata, which persists with age, and by the caulocystidia with yellow content.

This species has been reported in North America (Smith, 1947) and Europe (Kühner, 1938; Maas Geesteranus, 1990). The specimens collected in North America have yellow basidiomata and the basidia are either 4-spored or 2-spored (Smith, 1947). The European specimens are said to have orange basidiomata and predominantly 2-spored basidia (Maas Geesteranus, 1990). The present specimens collected in Hokkaido have 4-spored basidia and orange basidiomata, occupying an intermediate position between the two forms.

The basidiomata of our specimens are smaller than those of other specimens previously reported, but the microscopical characteristics conform to the description given by Maas Geesteranus (1990), based on the material from the United States. According to Maas Geesteranus (1990), this species grows inserted on fallen needles of Douglas fir and spruce. Our specimens also were observed on the needles of spruce (*P. glehnii*) and seemed to prefer a damp site for growth.

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