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## New species of *Clitocybe* and *Crepidotus* (Agaricales) from eastern Honshu, Japan

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**Abstract** Three new species of Agaricales from eastern Honshu, Japan, are described and illustrated. (1) *Clitocybe minutella* sp. nov. (section *Vernae*), having white, very small, clitocyboid basidiomata with white, strigose mycelial tomentum at the base of the stipe and trichodermial elements in the pileipellis, occurs on leaf litter in deciduous oak forests. (2) *Crepidotus longicomatus* sp. nov. (section *Echinospori*), forms very small (up to 3.5 mm in diameter), reniform basidiomata densely covered overall with white to pale yellow, erect, thick-walled, long hairs. It has melleous, echinulate basidiospores, and was found on fallen dead branches in lowland oak forests. (3) *Crepidotus virgineus* sp. nov. (section *Crepidotus*), forming pure white, reniform basidiomata, has smooth, ellipsoid basidiospores, subfusiform-pedicellate to irregularly cylindrical cheilocystidia, and abundant clamp connections. It occurs on fallen dead branches in lowland oak forests.

**Key words** Agaricales · *Clitocybe minutella* · *Crepidotus longicomatus* · *Crepidotus virgineus*

### Introduction

This article reports three new species of Agaricales that occur in the lowland forests of eastern Honshu, Japan. These species are described and illustrated with photographs showing macromorphological features. Specimens cited are preserved in Kanagawa Prefectural Museum of Natural History, Japan (KPM).

### Species descriptions

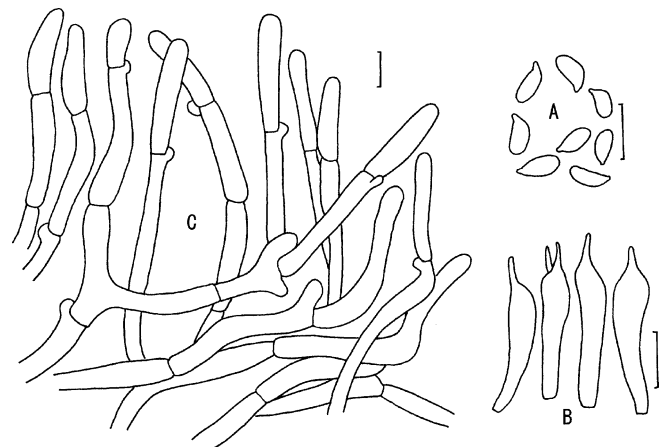
1. *Clitocybe minutella* Har. Takahashi, sp. nov. Figs. 1,2

Pileo 5–16 mm lato, primo convexo, dein planoconvexo et centro depresso, mox concavo, umbonato, tomentosus, albo vel ad centro brunneolo; odore saporeque nullo; stipite 11–25 × 1.5–3.5 mm, subaequali vel ad basim leniter incrassato, cavo, tomentosus vel fibrillosus, albo, mycelio basali albo affixo; lamellis decurrentibus, mediocriter subdistantibus, angustis, albis; basidiosporis 6–7.5 × 3.5–4 μm, ellipsoideis, levibus, hyalinis, inamyloideis; basidiis bisporis; cheilocystidiis et pleurocystidiis nullis; pileipelle ex hyphis trichodermialibus composita; hyphis fibulatis.

Holotypus: Ad folias emortuas arboris frondosae in silva, Izumino-mori, Yamato-shi, Kanagawa-ken, Oct. 26, 2000, H. Takahashi (KPM-NC0008692).

Etymology: from Latin, *minutella* = very small; referring to the relatively small basidiomata.

Pileus 5–16 mm in diameter, at first convex with an incurved margin, then planoconvex, soon depressed at the center, sometimes with a obtuse umbo; surface smooth, tomentose to velvety, white overall or pale brownish at the



**Fig. 1.** *Clitocybe minutella*. **A** Basidiospores. **B** Basidia. **C** Elements of the pileipellis. All figures from the holotype. Bars 10 μm

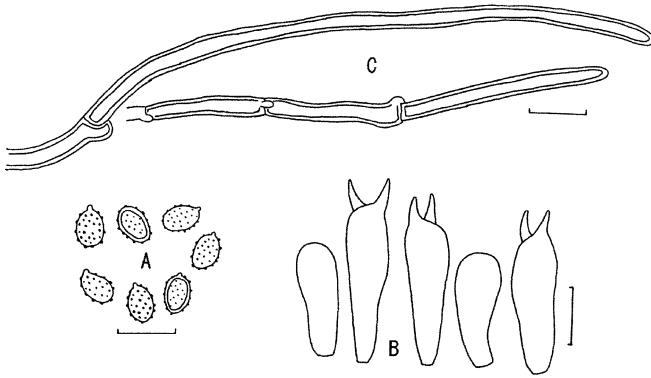
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**Fig. 2.** Basidiomata of *Clitocybe minutella*. **A,C,D** Mature basidioma. **B** Immature basidiomata. All figures from the holotype. Bars **A,B** 3 mm; **C,D** 1.5 mm



center. Flesh up to 1 mm, white; odor and taste not distinctive. Stipe 11–25 × 1.5–3.5 mm, almost equal or somewhat thickened toward the base, central, slender, terete, hollow; surface tomentose to fibrillose, entirely white; base covered with white, strigose mycelial tomentum attached to an extensive mycelial mat in the leaf litter. Lamellae deeply decurrent, subdistant (18–24 reach the stipe), with 0–2 series of lamellulae, up to 1 mm broad, white; edges concolorous.

Basidiospores 6–7.5 × 3.5–4 μm (Q = length/breadth: 1.7–1.9,  $n = 20$  spores per two specimens), ellipsoid, smooth, colorless, inamyloid, thin-walled. Basidia 35–53 × 7–10 μm, clavate, one- or two-spored. Cheilocystidia and pleurocystidia absent. Hymenophoral trama irregular; hyphae similar to those of the pileitrama. Pileipellis a trichodermium of vertically arranged, cylindrical cells 4–7 μm wide, smooth, colorless, or with pale brown intracellular pigment, thin-walled, occasionally with clamped septa.



**Fig. 3.** *Crepidotus longicomatus*. **A** Basidiospores. **B** Basidia and basidioles. **C** Hairs of the pileus. All figures from the holotype. Bars 10  $\mu$ m

Hyphae of pileitrama 4–8  $\mu$ m wide, horizontally arranged, parallel to each other, monomitic, colorless, inamyloid, thin-walled, occasionally with clamped septa. Stipitipellis a cutis of parallel, repent hyphae 2.5–4  $\mu$ m wide, cylindrical, sometimes with finger-like projections, colorless, inamyloid, thin-walled, occasionally with clamped septa. Hyphae of stipe trama 3.5–7  $\mu$ m wide, longitudinally running, monomitic, unbranched, cylindrical, smooth, colorless, inamyloid, thin-walled, occasionally with clamped septa.

Known distribution: Japan (Kanagawa).

Habitat: Solitary to scattered, on leaf litter in deciduous oak forests, from October to November.

Specimens examined: KPM-NC0008692 (holotype), Izumino-mori, Yamato-shi, Kanagawa-ken, Oct. 26, 2000, collected by H. Takahashi; KPM-NC0008693 same place, Nov. 1, 2000, collected by H. Takahashi.

Japanese name: Ochiba-sakazukitake.

Notes: This species is characterized by its white, very small, clitocyboid basidiomata with a nonhygrophanous pileus and a white strigose mycelial tomentum at the base of stipe, the relatively small basidiospores, the lack of cystidioid cells in the hymenium and cortical layer, the trichodermial elements in the pileipellis, and its habitat on leaf litter in deciduous oak forests. Its small clitocyboid habit, the nonhygrophanous pileus, and the slender stipe with white rhizoids from the base place this species in the genus *Clitocybe* section *Vernae* Singer (Singer 1986). Within the section, *C. minutella* seems to be closely related to *Clitocybe pruinosa* (Lasch in Fries) P. Kumm. (Bigelow 1982; Harmaja 1969), which differs in having much larger basidiomata, grayish-brown to brown pileus, two- to four-spored basidia, and horizontally arranged pileipellis elements. North American *Clitocybe fusipes* Peck (Bigelow 1982), which belongs in the section *Candicantes* (Quél.) Konrad and Maubl., bears some resemblance to *C. minutella* because of its small, whitish basidiomata. This North American species, however, differs in having a hygrophanous pileus, four-spored basidia, farinaceous odor, and habitat under conifers. The European *Clitocybe collina* (Velen.) Klán (Klán 1979) is also similar to *C. minutella*, but the former has a whitish-gray to grayish-

brown pileus, light cream-colored lamellae, and four-spored basidia.

## 2. *Crepidotus longicomatus* Har. Takahashi, sp. nov.

Figs. 3,4

Pileo 1–3.5 mm lato, minutalis, reniformi vel semiorbiculari, cum flocculis flavido obducto, sessili; odore nullo; stipite nullo; lamellis distantibus, angustis, flavidis; basidiosporis 6–8  $\times$  4.5–5  $\mu$ m, late ellipsoideis, echinulatis, melleis; basidiis bisporis; cheilocystidiis et pleurocystidiis nullis; pilis pilei cylindraccis, hyalinis vel melleis, crassitunicatis; hyphis fibulatis.

Holotypus: In ramulis arboris delapsis in silva, Mt. Takao, Hachiouji-shi, Tokyo, Japan, June 20, 2000, H. Takahashi (KPM-NC0008716).

Etymology: from Latin, *longicomatus* = with long hairs; referring to the long hairs covering the whole pileus.

Basidiomata very small (1–3.5 mm in diameter), soft, sessile or with a short stipe, lateral or sometimes dorsal, reniform to semiorbicular. Pileus densely covered overall with white to pale yellow, erect, long hairs; margin at first incurved then straight. Flesh up to 0.2 mm thick, white to pale yellow; odor indistinctive. Lamellae distant (6–10 reach the base), with 1–3 series of lamellulae, up to 0.5 mm broad, pale yellow; edges concolorous.

Basidiospores 6–8  $\times$  4.5–5  $\mu$ m ( $Q$  = length/breadth: 1.3–1.6,  $n$  = 20 spores per two specimens), broadly ellipsoid, melleous in water, thick-walled, surface distinctly echinulate, with concolorous spines 0.5–1  $\mu$ m long. Basidia 20–35  $\times$  7–8.5  $\mu$ m, clavate, two-spored. Cheilocystidia and pleurocystidia none. Hymenophoral trama subregular to irregular; hyphae similar to those of the pileitrama. Pileipellis composed of vertically arranged, parallel, long hairs up to 1000  $\mu$ m long, 3.5–8(–10)  $\mu$ m wide, cylindrical, colorless or with pale melleous, intracellular, granular pigments, with thickened walls up to 1.5  $\mu$ m, occasionally with clamped septa. Hyphae of pileitrama 4–10  $\mu$ m wide, parallel to each other, cylindrical or sometimes irregularly inflated, colorless or with pale melleous intercellular pigments, thin- or slightly thick-walled.

Known distribution: Japan (Tokyo).

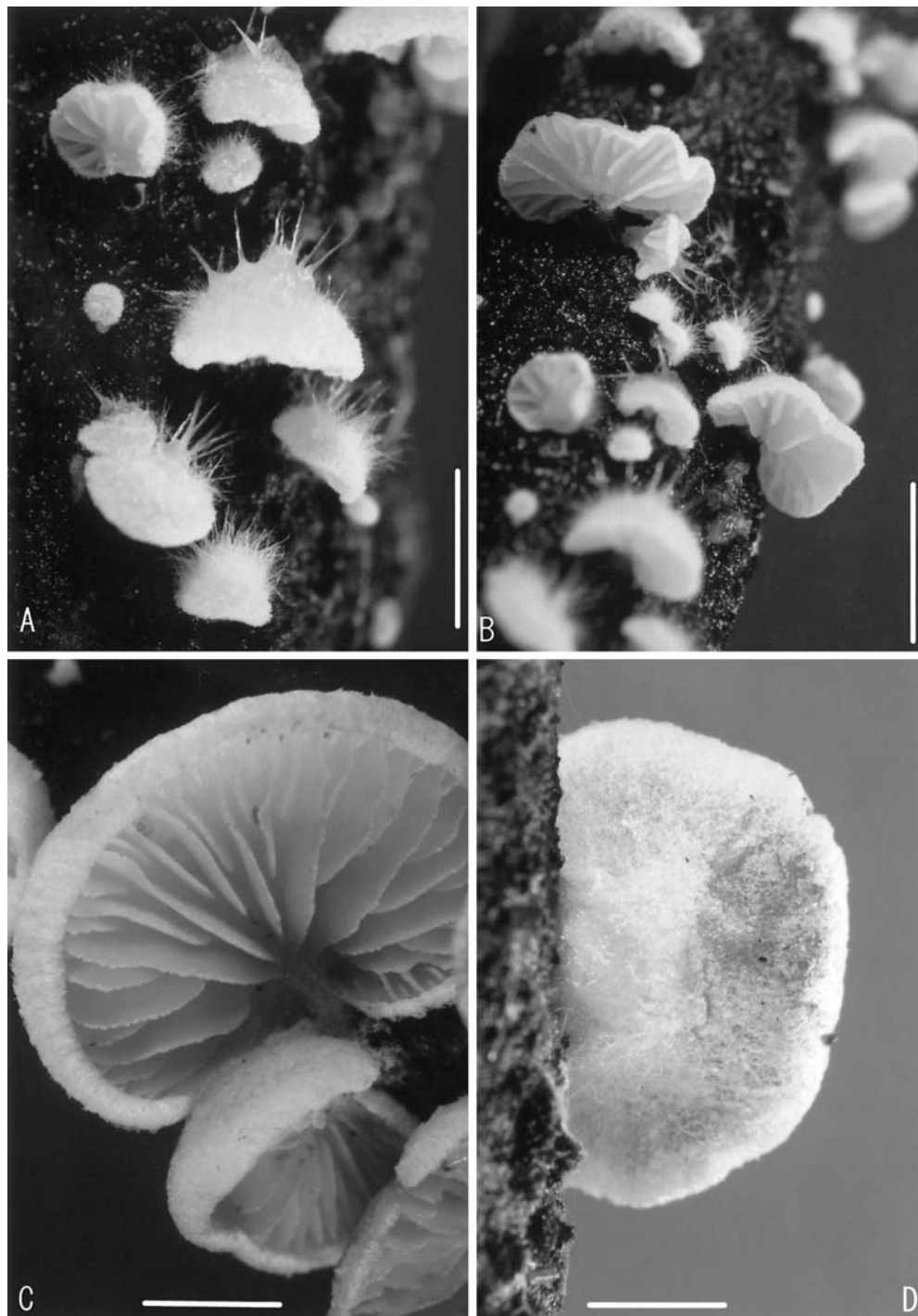
Habitat: Solitary to scattered, on fallen dead twigs in lowland oak forests, from June to July.

Specimens examined: KPM-NC0008716 (holotype), Mt. Takao, Hachiouji-shi, Tokyo, Japan, June 20, 2000, collected by H. Takahashi; the same place, June 23, 2001, collected by H. Takahashi.

Japanese name: Sakage-chahiratake.

Notes: This species is characterized by its very small (up to 3.5 mm in diameter) reniform basidiomata densely covered overall with white to pale yellow, erect, thick-walled, long hairs, the melleous, echinulate basidiospores, the lack of hymenial cystidia, and its basidiome formation on a fallen dead branch. These characteristics suggest that this species belongs to the section *Echinospori* Pilát of the genus *Crepidotus* as defined by Singer (1986). However, this species is distinguished from other known species of the genus by the very small basidiomata with the pileus densely covered overall with erect, thick-walled, long hairs.

**Fig. 4.** Basidiomata of *Crepidotus longicomatus* and *Crepidotus virgineus*. **A,B** *Crepidotus longicomatus*. **C,D** *Crepidotus virgineus*. All figures from the holotype. Bars **A,B** 2 mm; **C,D** 2.5 mm



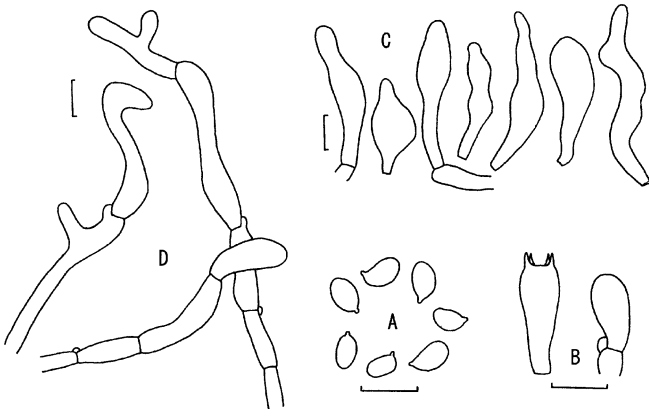
3. *Crepidotus virgineus* Har. Takahashi, sp. nov. Figs. 4,5

Pileo 4–13 mm lato, reniformi vel semiorbiculari, sessili, fibrilloso, albo; odore saporeque nullo; lamellis subdistantibus, angustis, primo albis, dein brunneis; basidiosporis  $6.5\text{--}7.5 \times 3.5\text{--}4.5\ \mu\text{m}$ , ellipsoideis, levibus, melleis; basidiis tetrasporis; cheilocystidiis  $30\text{--}55 \times 5\text{--}13\ \mu\text{m}$ , subclavatis vel irregulariter cylindratis; pleurocystidiis nullis; hyphis fibulatis.

Holotypus: In ramulis arboris delapsis in silva, Izumino-mori, Yamato-shi, Kanagawa-ken, May 19, 2001, H. Takahashi (KPM-NC0008717).

Etymology: from Latin, *virgineus* = virginal, pure white; referring to the white basidiomata.

Basidiomata 4–13 mm in diameter, soft, sessile or with a short stipe, lateral or sometimes dorsal, reniform to semiorbicular. Pileus pubescent to fibrillose, white overall, sordid white in age; margin at first incurved then straight. Flesh up to 0.5 mm thick, white; odor and taste not distinctive. Lamellae subdistant (12–16 reach the base), with 1–3 series of lamellulae, up to 1.5 mm broad, at first white, then pinkish, finally becoming brownish; edges concolorous.



**Fig. 5.** *Crepidotus virgineus*. **A** Basidiospores. **B** Basidium and basidiole. **C** Cheilocystidia. **D** Elements of the pileipellis. All figures from the holotype. Bars 10  $\mu$ m

Basidiospores  $6.5\text{--}7.5 \times 3.5\text{--}4.5 \mu\text{m}$  ( $Q = \text{length/breadth}$ : 1.6–1.8,  $n = 20$  spores per two specimens), ellipsoid, smooth, melleous in water, thick-walled. Basidia  $14\text{--}23 \times 5\text{--}7 \mu\text{m}$ , clavate, four-spored. Cheilocystidia  $30\text{--}55 \times 5\text{--}13 \mu\text{m}$ , forming a compact sterile edge, subclavate to subfusiform-pedicellate or irregularly cylindrical, colorless, thin-walled. Pleurocystidia none. Hymenophoral trama subregular; hyphae similar to those of the pileitrama. Pileipellis composed of interwoven, repent hyphae  $4\text{--}13 \mu\text{m}$  wide, cylindrical, occasionally irregularly shaped, colorless, thin-walled. Hyphae of pileitrama  $5\text{--}23 \mu\text{m}$  wide, subparallel to irregularly arranged, cylindrical, sometimes irregularly inflated, colorless, thin-walled. All tissues with clamp connections.

Known distribution: Japan (Honshu).

Habitat: Solitary to scattered, on fallen dead twigs in lowland oak forests, from May to July, common.

Specimens examined: KPM-NC0008717 (holotype), Izumino-mori, Yamato-shi, Kanagawa-ken, May 19, 2001, collected by H. Takahashi; KPM-NC0008718, the same place, May 23, 2001, collected by H. Takahashi; Mt. Takao, Hachioji-shi, Tokyo, Japan, July 7, 1999, collected by H. Takahashi; the same place, June 23, 2000, collected by H. Takahashi.

Japanese name: Shiro-chahiratake.

Notes: This species is characterized by its pure white, reniform basidiomata, the smooth, melleous, ellipsoid basidiospores, the subfusiform-pedicellate or irregularly cylindrical cheilocystidia, and the presence of abundant clamp connections. Its smooth basidiospores suggest the placement of this taxon in the section *Crepidotus* of the genus *Crepidotus* as defined by Singer (1986). Within the section, this species is most similar to neotropical *Crepidotus antillarum* (Pat. apud Duss) Singer (Singer 1973), which differs in having much larger basidiospores ( $7.2\text{--}10.2 \times 4.5\text{--}6.8 \mu\text{m}$ ) and broadly ventricose or vesiculose-clavate cheilocystidia. *Crepidotus virgineus* is also comparable with *Crepidotus epibryus* (Fr.: Fr.) Quél. from Europe (Nordstein 1990; Senn-Irlet 1995) and Mexico (Moreno 1999) and North American *Crepidotus coloradensis* Hesler & A.H.Sm. (Hesler and Smith 1965) in white basidiomata and smooth basidiospores. This species differs in lacking clamp connections. Furthermore, *C. epibryus* has much narrower, amygdaliform basidiospores and narrowly lageniform, often branched cheilocystidia, and *C. coloradensis* has flexuous, subulate cheilocystidia.

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