Notes on Some New Species of *Psathyrella*

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This study contains descriptions and illustrations of three new and noteworthy taxa of the genus *Psathyrella* from Korea. Among them, *Psathyrella pervelatoid*, *P. koreana*, and *P. utriformcystis* are new to science. All collections cited here are deposited in the Herbarium Conservation Center of National Academy of Agricultural Sciences.

KEYWORDS : New species, *Psathyrella koreana*, *Psathyrella pervelatoid*, *Psathyrella utriformcystis*

The genus *Psathyrella* is a decomposer characterized by medium size, a membranous, hygrophanous, straight margined pileus, not extending beyond the gills, an inconspicuous veil, and sooty black spores. Ten species and one variety of *Psathyrella* are presently known in Korea. For the Korean agaric flora, 65 exsiccata have been recorded as *Psathyrella* spp., were deposited in the Herbarium Conservation Center of National Academy of Agricultural Sciences (HCCN), and investigated. The descriptions and photographs of the fruiting bodies, which were taken primarily during a mushroom survey, were restudied. For the microscopic features, the segments of dried basidiocarps were transferred in vials with 70% alcohol or distilled water, until the cells swelled to near their original size and shape. Then, the gill sections or trama were placed on a slide glass, stained with staining reagents, covered with a coverslip, and observed under a microscope. The macro and microscopic features are described in detail and illustrated with their habits and habitats. Three of the taxa are new to science. In the following descriptions, color names given in quotations and color notations, e.g., 4A2~8F4, are from those of Kornerup and Wanscher [1].

***Psathyrella* (Fr.) Quél., Mém. Soc. Émul. Montbéliard, Sér. 2 5: 152 (1872)**

Position in classification. Psathyrellaceae, Agaricales, Agaricomycetidae, Agaricomycetes, Basidiomycota, Fungi.

Type species. *Psathyrella gracilis* (Fr.) Quél. (1872).

***Psathyrella pervelatoid* S. J. Seok & Y. S. Kim, sp. nov. (Korean name: teolmagaenunmul beoseos)**

Pileo 15~35 mm lato, hemispherico dein convexo et obtuse umbonato, cinereo-aurantiaco (5B4, 6B4, 5B5, 6B5) vel cinereo-rubero (7B4~7B5), tecto cum albo fibrilloso vel

strigoso-squamuloso, dein glabratuso, margine cum velovestige; carne albido vel bruneoloso; lamellis adnexis vel adnatis, cinereo brunneus (7E3~7F3, 8E3~8F3), dein fusco brunneus (7F4~8F4), acie fimbriatus; stipite 35~54 mm longo, 1.5~2.5 mm crasso, aequali, sed ad basin subbulbosus, aureo-albo (4A2), omnino tectuso cum albo strigoso-floccoso, apice pruinoso, e farcto cavo; sporis in cumulo purpureo-atris; sporis ellipsoid, 7.3~8.2 × 4.1~4.7 µm, cum poro germinativo; basidiis 25.5~26.4 × 9.0~9.5 µm, tetrasporis; cheilocystidis 38.2~41 × 11.8~13.7 µm, lageniform, tenui-tunicatis, hyalinis, densis; pleurocystidiis nullis; trama hymenophoralis regularis; Cuticula pilei cellularis.

Holotypus. Naewonsa, Yangsan-gun, Gyeongsangnam-do, June 7, 2000 (HCCN08154).

Macroscopic features (Fig. 1A and 1B).

Pileus: 15~35 mm across, hemispherical to hemispheric-conic when young and then becoming broadly campanulate to convex with low umbonate; surface dry greyish orange (5B4, 6B4, 5B5, 6B5), to greyish red (7B4~7B5), pastel red (7A4~7A5), covered with radially and irregularly well developed whitish fibrillose scales (2~3 mm) to strigose-squamulose or flocci when young, usually glabrescent when old, margin hanging with whitish veil remnants for a long time, especially strongly appendiculate when young, context thin, whitish to pale brown, odor indistinctively fragrant, taste mild.

Lamellae: Adnexed to narrowly adnate, subcrowded, grey beige when young, later light to greyish brown (7D3~7D4) to dark brown (7E3~7F3, 8E3~8F3) when old, edges whitish, fimbriate, lamellulae 3-tiers to multi-tiers.

Stipe: 35~54 × 1.5~2.5 mm, cylindric, almost equal, sometimes enlarged downward, base slightly subbulbous and covered with white tomentose, surface yellow white (4A2) to orange white (5A2~6A2), covered with entirely

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Fig. 1. A, B, Carphophores of *Psathyrella pervelatoid*; C, D, *P. koreana*; E, *P. utriformcystis*.

white strigose-floccose, at apex with whitish pruinose, annulus floccose, annular zone indistinct when old, solid when young, hollow when old.

Microscopic features (Fig. 2). Spore print purple-black, spores $7.3\sim 8.2 \times 4.1\sim 4.7 \mu\text{m}$, ellipsoid, smooth, with a germ pore, sometimes indistinct. Basidia $25.5\sim 26.4 \times 9.0\sim 9.5 \mu\text{m}$, clavate, with 4-spores and some with a basal

clamp connection. Cheilocystidia, $38.2\sim 41 \times 11.8\sim 13.7 \mu\text{m}$, lageniform, thin-walled, hyaline numerous or often bundles. Pleurocystidia absent. Pileipellis composed of irregular epithelium of globose to subglobose cells, $22.5\sim 31.5 \mu\text{m}$, hyaline, thin-walled, veil hymenophoral trama distinctly brown, septa with clamps. Caulocystidia present.

Holotypus. Naewonsa, Yangsan-gun, Gyeongsangnam-do,

Fig. 2. Microscopic structures of *Psathyrella pervelatoid*. a, Spores ($\times 1,000$); b, Basidia ($\times 1,000$); c, Cheilocystidia ($\times 1,000$); d, Pileipellis; e, Stipeipellis ($\times 400$); f, Hair ($\times 250$).

June 7, 2000 (HCCN 08154).

Habit & Habitat. In groups to a few clustered in rich humus soils, buried remains of wood and associated with woody debris in forests.

Specimens examined. Naewonsa, Yangsan-gun Gyeongsangnam-do, HCCN08154 (holotype), June 7, 2000.

Remarks. This species is characterized by very small fruiting bodies, a well developed white veil composed of pulverulent or mealy fibrillose scales, spores not longer than $10\ \mu\text{m}$, lacking pleurocystidia, hymenophoral trama strongly pigmented, and cheilocystidia usually lageniform. It is closest to *P. pervelata* in which the cheilocystidia are utriform to subutriform and pleurocystidia are present. *P. sacchariolen*s is also similar, but it has a striking, sweetish odor, the cheilocystidia utriform to subutriform, cheilocystidioid pleurocystidia and the presence of caulocystidia. The description of the macroscopical and microscopical characters for this taxon is based on dried holotype specimens (HCCN08154).

***Psathyrella koreana* S. J. Seok & Y. S. Kim, sp. nov.**
(Korean name: teolbonunmulbeoseos)

Pileo 25–48 mm lato, hemispherico dein convexo et obtuse umbonato, postremo expanso, cinereo-aurantiaco vel brunneo-aurantiaco, oblecta cum albo longorum villosus vel

fibrilloso (8–12 mm longo) dein glabratuso, margine cum albido velum vestige; carne albido vel bruneoloso; lamellis adnexis vel adnatis, cinereus aurantiacus, dein brunneus, acie albo-fimbriata; stipite 35–65 mm longo, 1.5–2.5 mm crasso, aequali, ad basim subbulboso, albo, sericeum, omnino tectuso cum albo fibrilloso vel villosus, apice albo-pruinoso, annulo albo membraceo, e farcto cavo; sporis in cumulo atrobrunneo; sporis ellipsoideis, $7.3\text{--}8.2 \times 4.1\text{--}4.7\ \mu\text{m}$, cum poro germinativo; basidiis $25.5\text{--}26.4 \times 9\text{--}9.5\ \mu\text{m}$, tetrasporis; cheilocystidis $38.2\text{--}41 \times 11.8\text{--}13.7\ \mu\text{m}$, lageniforme vel utriforme, encrust apoud apocis, densis; pleurocystidiis nullis.

Holotypus. Choam-myeon Whasong-gun, Kyonggi-do, August 30, 1999 (HCCN 07796).

Macroscopic features (Fig. 1C and 1D).

Pileus: 25–48 mm across, hemispherical to hemispheric-conic when young and then becoming broadly campanulate to convex, finally plane, often with low umbonate, surface greyish orange (5B3–6B3, 5B4–6B4), to brownish orange (6C4–6C5), greyish red (7B4–7B5), at first covered somewhat radially with white long villose, ciliate to fibrillose hairs (8–12 mm long), which become aggregated and/or somewhat closed together, and then become gradually worn away from the pileus; glabrescent when old. Margin hanging with whitish veil remnants for a long time; context thin, whitish to pale brown, odor indistinctive, taste mild.

Lamellae: Adnexed to narrowly adnate, subcrowded, whitish to grey beidge (4C2) when young, later light brown (6D4–6D6, 7D4–7D6), brown (6E4–6E6, 7E4–7E6) to dark brown (6F4–6F6, 7F4–7F6) when old, edges whitish, fimbriate, lamellulae usually (2)3-tiers.

Stipe: 35–65 $\times$ 1.5–2.5 mm, cylindric, slightly enlarged toward the base, subbulbous at base, surface white, sericeus, with entirely well developed white fibrillose to villose or somewhat hirsute to hispid, at apex with whitish pruinose, Annulus white, very thin and membranous when young, annular zone indistinct when old, solid when young, hollow when old.

Microscopic features (Fig. 3). Spore print dark brown to brownish grey. Spores $7.1\text{--}8.2 \times 3.2\text{--}4.1\ \mu\text{m}$, ellipsoid and smooth with a germ pore, sometimes indistinct. Basidia, $13.7\text{--}20.9 \times 7.3\text{--}8.6\ \mu\text{m}$, clavate, with 4-spores and with a basal clamp connection. Cheilocystidia, $33.8\text{--}38.3 \times 7.9\text{--}12.4\ \mu\text{m}$, lageniform, ventricose-lageniform to utriform, thin-walled, hyaline, often encrusted at apex, numerous or often bundled. Pleurocystidia, $22.5\text{--}27.0 \times 11.3\text{--}15.8\ \mu\text{m}$, clavate to broadly clavate, thin-walled, hyaline, scattered. Pileipellis composed of irregular epithelium of globose to subglobose cells, $14.6\text{--}31.5\ \mu\text{m}$, hyaline, thin-walled, hymenophoral trama distinctly brown, septa with clamps,

Fig. 3. Microscopic structures of *Psathyrella koreana*. a, Spores (×1,000); b, Basidia (×1,000); c, Cheilocystidia (×400); d, Pleurocystidia (×400); e, Pileipellis (×1,000).

Caulocystidia present.

Habit & Habitat. Solitary to a few groups in humus soils, buried remains of waste cotton or associated with cotton debris in fields.

Specimens examined. Choam-myeon, Whasang-gun, Kyonggi-do, HCCN07796 (holotype), August 30, 1999.

Remarks. This species belongs to the section *Pseudostropharia* by having small spores not longer than 10 µm and a veil composed of short hyphae. It differs from all species in the section *Pseudostropharia* because of its small fruiting bodies, well developed white fibrillose scales, which agglutinate at the tip, erect to recurved squamulose when old, spores less than 4 µm wide, hymenophoral trama not strongly pigmented, cheilocystidia usually lageniform to utriform, often encrusted at apex, and pleurocystidia broadly clavate to clavate. It is very close to *P. pervelatoid*, *P. pervelata*, and *P. sacchariolens* by having the pileus and stipe with a well-developed white veil, but *P. pervelatoid* has broader spores and no pleurocystidia, *P. pervelata* has an easily glabrescent veil and spores broader, while *P. sacchariolens* has a striking sweetish odor. The description of the macroscopical and microscopical characters for this taxon is based on dried holotype specimens (HCCN07796).

***Psathyrella utriformcystis* S. J. Seok & Y. S. Kim, sp. nov. (Korean name: seorinunmulbeoseos)**

Pileo 4–12 mm lato, hemispherico vel subglobuloso, dein

obtusum campanulato vel convexo, nullo expanso, aurantiaco-cinereo, cinereo-aurantiaco, oblecta cum albo pulverulento vel furfuraceo, dein glabrato, margine cum albo velum vestige; carne albido vel cremeo; lamellis adnatis, albidus vel cremeus dein argillo-umbrinus, acie albo-fimbriata; stipite 25–45 mm longo, 1–1.5 mm crasso, aequali, interdum deorsum leviter tumorem, pallidus ad basi albo-mycelioso, flavida-albido vel aurantiaco-albo, omnino tectus cum albo furfuraceo vel floccose, apice albo-pruinoso, e farcto cavo; sporis in cumulo atro purpureo-brunneo; sporis ellipsoideis, 8.2–9.1 × 3.9–4.6 µm, cum poro germinativo; basidiis 17.5–19.3 × 6.5–7.3 µm, tetrasporis; cheilocystidis, 27.3–33.7 × 6.8–9.1 µm, utriformis vel sublageniformis, crassipariete, basalis fibulae nullis; pleurocystidiis, 29.1–36.4 × 9.1–10 µm, simillimis sed.

Holotypus. Ilsan, Gyeonggi-do, April 15, 1998 (HCCN06848).

Macroscopic features (Fig. 1E).

Pileus: 4–12 mm across, hemispherical to subglobose when young, and then becoming broadly campanulate to convex, never expanding, surface orange white (5A2), pale orange (5A3), light orange (5A4), orange grey (5B2) to greyish orange (5B3–5B4), with whitish granular mealy-scales to pulverulent or furfuraceous; margin hung with whitish veil remnants for a long time, strongly appendiculate, especially when young. Context thin, fragile, whitish to pale cream, odor indistinctive, taste mild.

Lamellae: Adnate, subcrowded, whitish to pale cream

Fig. 4. Microscopic structures of *Psathyrella utriformcystis*. a, Spores (×1,000); b, Basidia (×1,000); c, Cheilocystidia (×400); d, Pileipellis (×1,000); e, Stipitipellis (×400); f, Hair (×250).

when young, later clay-umber, edges whitish, fimbriate, lamellulae 1-or 2-tiers.

Stipe: 25~45 × 1~1.5 mm, cylindric, equal, base slightly swollen, with white mycelium at the base, surface yellowish white (4A2) to orange white (5A2), longitudinally striate upward 1/3, whitish fibrillose scales, most scale tips upward, fine furfuraceous or floccose remnants of veil when young, white pruinose at apex, hollow.

Microscopic features (Fig. 4). Spore print dark purple-brown; spores 8.2~9.1 × 3.9~4.6 µm, ellipsoid, smooth, with a germ pore. Basidia, 17.5~19.3 × 6.5~7.3 µm, with 4-spores and with a basal clamp connection. Cheilocystidia, 27.3~33.7 × 6.8~9.1 µm, utriform to sublageniform, thick-walled, hyaline, without a basal clamp, abundant or bundles. Pleurocystidia, 29.1~36.4 × 9.1~10 µm, similar to cheilostidia in shape, but slightly larger, thin-walled, hyaline, scattered. Pileipellis composed of sphaerocysts, subglobose to oblong cells, 16.4~20.9 × 10.5~12.7 µm, pale brown, slightly but distinctly irregularly thickened-wall, also encrusted; veil consisting of chains of subcylindric, subfusoid, ellipsoid to somewhat sausage-shaped cells or globose, subglobose to inflated cells, 6.8~31.8 × 5.5~28.7 µm, hyaline to slightly pigmented, often encrusted, often some cells and/or especially terminal cells with thickened walls. Hymenophoral trama brown. Hyphae without clamps

Habit and Habitat. Solitary to a few groups in humus soils, buried remains of waste cotton or associated with cotton debris in fields.

Specimens examined. Ilsan, Gyeonggi-do, HCCN06848 (holotype), April 15, 1998.

Remarks. This taxa is characterized by small fruiting bodies, the pileus and stipe covered with furfuraceous, mealy-pulvulent scales consisting of chains of cylindrical, ellipsoid, oblong and sphaerocysts cells. Cheilocystidia and pleurocystidia utriform with ellipsoid spores. *P. sphaerocystis* is similar to this taxon but differs in having somewhat phaeosoliform in the front view and fusoid-lageniform cheilo- and pleuro-cystidia. *P. caniceps* looks like *P. utriformcystis* because of the small fruiting bodies and is covered with a whitish veil; however; the former differs by having lageniform-ventricose cheilocystidis and no pleurocystidia. The description of the macroscopical and microscopical characters for this taxon is based on dried holotype specimens (HCCN06848).

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