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Inocybe (Agaricales, Inocybaceae) Collected in the Islands of Iturup and Kunashir

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Abstract This paper considers four species of *Inocybe* occurring in Iturup or Kunashir as new records: (1) *Inocybe maculipes* (Section *Tardae*) has smooth basidiospores and caulocystidia at stipe apex; (2) *Inocybe splendens* var. *splendens* (Section *Splendentes*) has smooth spores and caulocystidia throughout; (3) *Inocybe taxocystis* (Section *Inocybe*) has nodulose spores and caulocystidia at stipe apex; and (4) *Inocybe intricata* var. *pallidistipata* (Section *Marginatae*) has nodulose spores and caulocystidia throughout.

Key words: Basidiomycetes, *Inocibium*, *Inocybe*, Systematics

Introduction

The genus *Inocybe* consists of a large number of species. In northern island of Japan, Hokkkaido, Imai (1938) reported several taxa of *Inocybe*.

During taxonomic studies on the genus *Inocybe*, the authors encountered various apparently hitherto unknown taxa. Several of these have been reported from Hokkaido, Japan by the senior author (Kobayashi 1993, 2002a,b, 2003, 2009 ; Obase et al. 2006).

The mycobiota of *Inocybe* in Iturup and Kunashir Islands where are near to Hokkaido, are almost unknown except Kobayashi (2013). Four new records from Iturup or Kunashir Islands are given.

Materials and Methods

The specimens cited in this paper are deposited in the herbarium of the Hokkaido University Museum, Sapporo (SAPA). In the following descriptions, color names or notations cited in double quotation marks are those of the Royal Botanic Garden, Edinburgh (1969). Dried specimens were rehydrated in 10% NH_4OH and microscopically examined. For the length measurements on the apiculus and sterigmata were excluded in the case of basidiospores and basidia, respectively. Sections of the central area of the pileus were cut along the surface, through the pileipellis.

Taxonomy

Inocybe maculipes J. Favre, Rés. Rech. scient. entrepr. Parc Nat. suisse 5(33): 201. 1955. Fig.1

Pileus 29-41 mm broad, convex to hemispherical, umbonate, with white velipellis on umbo, surface smooth, rimulose at margin, satiny, “fulvous” to “bay”. Lamellae adnexed, subdistant, with fimbriate white edges, “umber”. Stipe < 33 × 4.0-8.5 mm, somewhat swollen toward base (< 10.5 mm), satiny, striate, pruinose at the apex, solid, “white” to slightly yellow “e”. Context in pileus thin, white “b”, in stipe striate, strongly satiny, white “b”. Odor strong, fish-like, unpleasant. Taste grassy.

Basidiospores 8.3-11.0 × 4.5-5.5 µm (average value 9.4 × 5.0 µm), Q = 1.6-2.1 (average value 1.9), subamygdaliform, phaseoliform, with subconical apex. Basidia 28-35 × 7.5-9.5 µm,

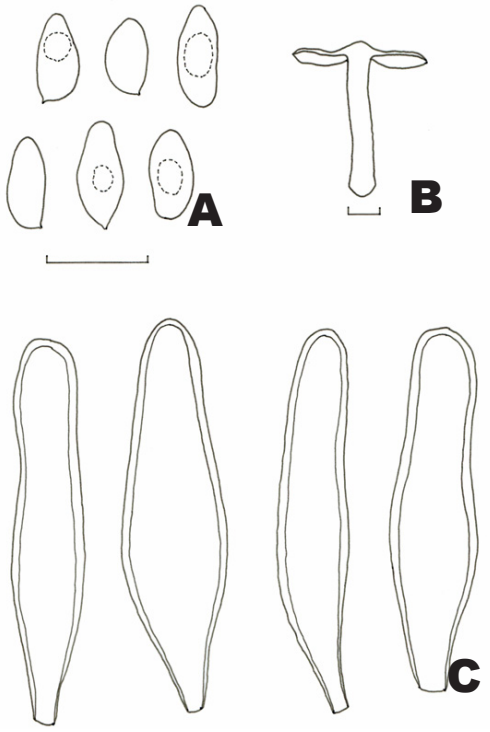

Figure 1.
Inocybe maculipes. A. Basidiospores. B. Section of basidiocarp. C. Pleurocystidia. Scale bars: A: 10 µm, B: 10 mm., C: 20 µm.

4-spored, cylindrical to clavate, thin-walled, almost colorless to very pale yellow. Pleurocystidia 54-78 × 13.8-25.8 µm, cylindrical to fusiform, thick-walled (< 2.0 µm), very pale yellow, with usually colorless intracellular contents. Cheilocystidia similar to pleurocystidia, thick-walled. Paracystidia present along with cheilocystidia, often catenate with terminal cells cylindrical, thin-walled, almost colorless to yellow. Hymenophoral trama subregular; hyphae 7.0-10.0 µm diam, sometimes swollen (< 20.0 µm), almost colorless to yellow. Caulocystidia present at the apex only, similar to pleurocystidia, sublageniform, thick-walled. Cauloparacystidia present along with caulocystidia, similar to paracystidia. Pileipellis a subregularly arrayed cutis, duplex; the upper layer < 65 µm thick, with hyphae 3.8-6.3 µm diam and agglutinating at the surface, almost colorless; the subtending layer < 43 µm thick, with hyphae 5.0-11.3 µm diam, rusty brown. Clamp connections abundant in all tissues, but not at all septa.

Collection examined: Iturup, Shana, in *Larix gmelinii* var. *japonica* and *Betula ermanii* forest, 30 Aug. 2012, leg. K. Kawai, TAKK 12.8.30.1 in SAPA.

Japanese name: Kawai-tomaya-take (Takahito Kobayashi).

This species belongs to the subgenus *Inocibium* (Earle) Singer, section *Tardae* Bon, because it posses metuloid caulocystidia only at the apex, and subamygdaliform basidiospores.

Present collection coincides well with *I. maculipes* reported by Favre (1955) and Kuyper (1986) from Switzerland, although the latter lacks caulocystidia at stipe apex (Kuyper 1986).

Inocybe maculipes is close to *I. ovoidea* Takah. Kobay. from Hokkaido, Japan (Kobayashi 2003), but the latter is different from the former in having larger basidiocarps, narrow metuloids and longer spores.

Inocybe splendens R. Heim, Genre *Inocybe*: 328. 1931 var. ***splendens***. Figs. 2, 3

Pileus 27 mm broad, when young hemispherical with involved margin, umbonate, surface smooth, rimulose to rimose, “sinnamon”, on umbo “snuff brown”. Lamellae sinuate to free, close, with fimbriate white edges, brown. Stipe 29 × 7.0 mm, equal above a marginately bulbous base (< 10.5 mm broad), naked, striate, pruinose wholly, solid, white “b”. Context in pileus thin, pure white, in stipe striate, strongly satiny, white “b”. Odor strong, spermatic. Taste indistinct, grassy.

Chemical reactions. *Pileus*: $FeCl_3$ • $6H_20$ (20%) olive within 1 min. *Lamellae*: $FeCl_3$ • $6H_20$ (20%) gradually pale olive within 15 min. *Stipe*: $FeCl_3$ • $6H_20$ (20%) negative.

Basidiospores 7.3-10.1 × 4.5-5.8 µm (average value 8.7 × 5.2 µm), Q = 1.5-2.1 (average value 1.7), oblong to subamygdaliform. Basidia 31-34 ×8.3-9.5 µm, 4-spored, clavate, thin-walled, pale lemon. Pleurocystidia 58-83 × 10.8-18.8 µm, ventricose to fusiform, thick-walled (< 1.8 µm), very pale yellow, with colorless intracellular contents. Cheilocystidia similar to pleurocystidia, thick-walled. Paracystidia present along with cheilocystidia, often catenate with terminal cells 23-29 × 5.8-7.5 µm, broadly clavate to narrowly cylindrical, thin-walled, very pale yellow to yellow. Hymenophoral trama subregular; hyphae 5.0-8.8 µm diam, almost colorless. Caulocystidia descending to base, similar

Figure 2.
Basidiocarp of *Inocybe splendens* var. *splendens*. Scale bar: 10 mm.

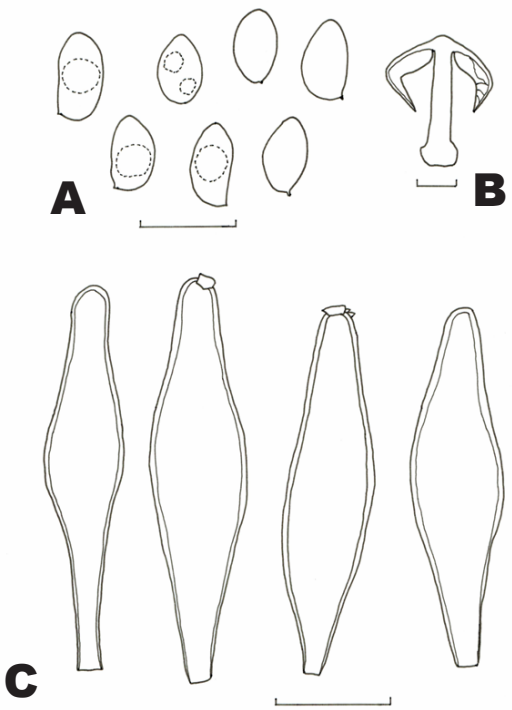

Figure 3.
Inocybe splendens var. *splendens*. A. Basidiospores. B. Section of basidiocarp. C. Pleurocystidia. Scale bars: A: 10 µm, B: 10 mm., C: 20 µm.

to pleurocystidia, thick-walled. Cauloparacystidia present along with caulocystidia, similar to paracystidia, thin-walled. Pileipellis a subregularly arrayed cutis, duplex; the upper layer < 95 µm thick, with hyphae 3.3-10.0 µm diam and agglutinating at the surface, almost colorless; the subtending layer < 48 µm thick, with hyphae 4.5-11.3 µm diam, brown. Clamp connections present.

Collections examined: Iturup, Shana to Rubetsu, in *Quercus crispula* forest, 6 Sep. 2012, leg. Takah. Kobayashi, TAKK 12.9.6.2-1 in SAPA & TAKK 12.9.6.2-2 in SAPA.

Japanese name: Kôtaku-tomaya-take (Takahito Kobayashi).

This species belongs to the subgenus *Inocibium* (Earle) Singer, section *Splendentes* Singer, since it possesses thick-walled caulocystidia throughout, and smooth spores.

Present collection coincides well with *I. splendens* var. *splendens* reported by Heim (1931), Kuyper (1986) and Stangl (1989) from Europe.

Inocybe splendens has been proposed by Heim (1931), recently it is kept by the revision of Kropp et al. (2010).

Inocybe taxocystis (J. Favre) R. Singer, The Agaricales in Modern Taxonomy ed. 4: 604. 1986. Figs. 4, 5

≡ *Inocybe decipientoides* Peck var. *taxocystis* J. Favre, Rés. Rech. scient. entrepr. Parc Nat. suisse 5(33): 202. 1955.

≡ *Astrosporina taxocystis* Favre & E. Horak in E. Horak, in Laursen, Ammirati & Redhead (ed.) Arctic and Alpine Mycology 2: 230. 1987.

≡ *Inocybe taxocystis* (Favre) Stangl, Hoppea 46: 29. 1989.

≡ *Inocybe taxocystis* (Favre & E. Horak) B. Senn-Irlet, Botanica Helvetica 102: 55. 1992.

Figure 4.
Basidiocarps of *Inocybe taxocystis*. Scale bar: 10 mm.

Pileus 9-16 mm broad, convex, umbonate, surface smooth, rimulose at margin, "date brown", on umbo "fulvous". Lamellae sinuate to adnexed, close, with fimbriate white edges, brown. Stipe 22-33 × 2.0-3.0 mm, equal above a marginately bulbous base (< 5.5 mm broad), surface fibrillose, pruinose at the apex only, solid, "fawn" upward dull white "c" at lower part. Context in pileus thin, pure white, in stipe striate, satiny, cream "d". Odor strong, as butter-like almond. Taste none.

Chemical reactions. *Pileus*: $FeCl_3$ • $6H_20$ (20%) gradually dark olive within 10 min. *Lamellae*: $FeCl_3$ • $6H_20$ (20%) darkening immediately. *Stipe*: $FeCl_3$ • $6H_20$ (20%) gradually olive within 10 min.

Basidiospores 7.0-9.8 × 5.0-7.0 µm (average value 8.1 × 6.1 µm), Q = 1.1-1.6 (average value 1.3), weakly nodulose. Basidia 24-28 × 7.0-11.3 µm, 4-spored, narrowly clavate to broadly clavate, thin-walled, almost colorless to very pale yellow. Pleurocystidia 44-60 × 14.5-17.0 µm, ventricose to fusiform, thick-walled (< 3.3 µm), very pale yellow, with usually colorless intracellular contents. Cheilocystidia similar to pleurocystidia, but with somewhat thicker walls and broader. Paracystidia present along with cheilocystidia, often catenate with terminal cells broadly clavate, thin-walled, with slightly yellowish-brown intercellular contents. Hymenophoral trama subregular; hyphae 3.8-11.3 µm diam, sometimes swollen (< 18.8 µm), almost colorless. Caulocystidia present at the apex only, similar to pleurocystidia but occasionally narrower, thick-walled. Cauloparacystidia present along with caulocystidia, similar to

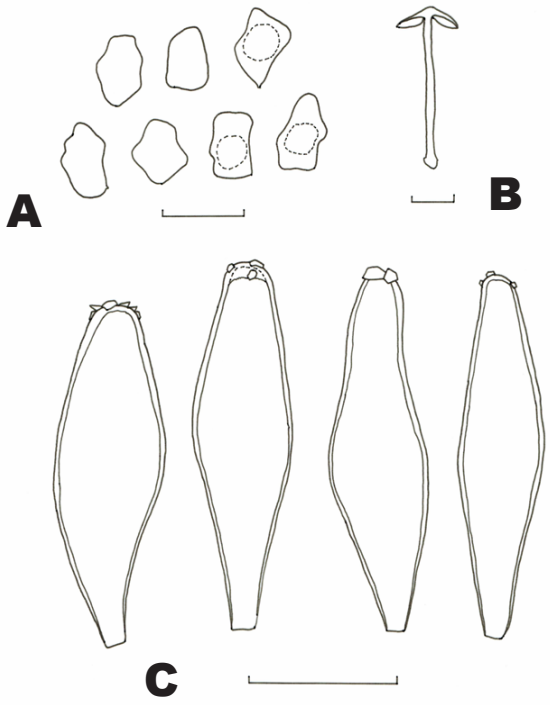

Figure 5.
Inocybe taxocystis. A. Basidiospores. B. Section of basidiocarp. C. Pleurocystidia. Scale bars: A: 10 µm, B: 10 mm., C: 20 µm.

paracystidia. Pileipellis a cutis, simple, the layer < 165 µm thick, with subregular hyphae 4.5-8.3 µm diam and weakly agglutinating at the surface, yellowish brown. Clamp connections abundant in all tissues, but not at all septa.

Collections examined: Iturup, Bettobu, in *Betula ermanii* forest, 30 Aug. 2012, leg. Takah. Kobayashi, TAKK 12.9.1.1 in SAPA & TAKK 12.9.1.2 in SAPA.

Japanese name: Yubari-tomaya-take (Takahito Kobayashi).

This species belongs to the subgenus *Inocybe* [= *Clypeus* Britzelm.] section *Inocybe* [= *Cortinatae* Kühner & Boursier], since it has thick-walled caulocystidia at the apex only, and nodulose spores.

Present collection coincides well with *I. decipientoides* var. *taxocystis* reported by Favre (1955) from Switzerland, although the latter possesses longer basidiospore. Also, Horark (1987) described that *Astrosporina taxocystis* as having longer basidiospores. However, intermediate basidiospore characters were shown by Kobayasi et al. (1971) from Greenland, Kobayashi (2002a) in Hokkaido, Japan and Solak et al. (2014) in Deliosman, Turkey. Ferrari (2006) drew *Inocybe taxocystis* as having short basidiospores which are similar to present collection.

Inocybe taxocystis is close to *I. napiformis* Takah. Kobay. from Hokkaido, Japan (Kobayashi 2009), but the latter has a napiform-bulbous base of stipe, thicker pleurocystidia, narrow-type cheilocystidia, and a trichoderm cuticle.

Inocybe intricata Peck var. ***pallidistipata*** Grund & Stuntz, Mycologia 75: 261. 1983. Figs. 6, 7

Pileus 13-20 mm broad, convex, subumbonate, surface with fine, appressed-longitudinal scales, rimulose to rimose, satiny, rusty yellow to "fulvous", on umbo "cinnamon". Lamellae adnate, adnexed to sinuate, close, with fimbriate to serrate white edges, grayish brown, "cinnamon" to "snuff brown". Stipe 24-32 × < 3.0 mm, equal above a marginately bulbous base (< 6.0 mm broad), striate, pruinose wholly, solid, cream to slightly yellow "e". Context in pileus thin, white "b", in stipe striate, satiny, white "d", "pink clay" to "peach" near the surface. Odor weak, grassy to salty. Taste none.

Chemical reactions. *Pileus*: $FeCl_3$ • $6H_20$ (20%) gradually dark olive within 15 min. *Lamellae*: $FeCl_3$ • $6H_20$ (20%) olive immediately. *Stipe*: $FeCl_3$ • $6H_20$ (20%) with green tings within 15 min.

Basidiospores 9.5-12.0 × 7.0-10.8 µm (range of average value 10.5-11.0 × 8.5-9.2 µm), Q = 1.1-1.5 (average value 1.2), prominently nodulose. Basidia 24-33 × 9.5-14.5 µm, 4-spored, narrowly clavate, thin-walled, pale lemon. Pleurocystidia 61-78 × 14.5-19.5 µm, cylindrical to fusiform, thick-walled (< 4.5 µm), very pale yellow, with usually colorless intracellular contents. Cheilocystidia similar to pleurocystidia, thick-walled. Paracystidia present along with cheilocystidia, often catenate with terminal cells < 24 × 13.8 µm, broadly clavate to spherical, thin-walled, almost colorless. Hymenophoral trama subregular to regular; hyphae 3.8-8.3 µm diam, sometimes swollen (< 15.0 µm), filled with slightly yellow contents. Caulocystidia descending to base, similar to

Figure 6.
Basidiocarp of *Inocybe intricata* var. *pallidistipata*. Scale bar: 10 mm.

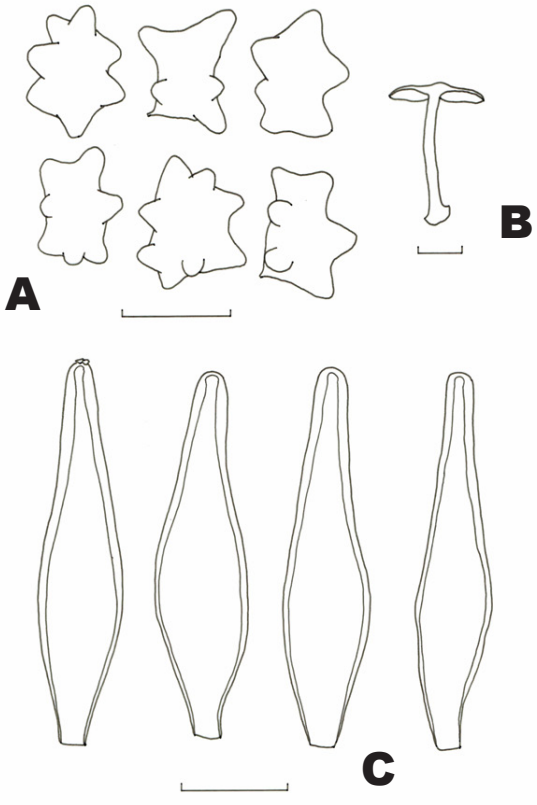

Figure 7.
Inocybe intricata var. *pallidistipata*. A. Basidiospores. B. Section of basidiocarp. C. Pleurocystidia. Scale bars: A: 10 µm, B: 10 mm., C: 20 µm.

pleurocystidia, fusiform to broadly ventricose with a cylindrical neck, thick-walled. Cauloparacystidia present along with caulocystidia, similar to paracystidia. Pileipellis a subregularly arrayed cutis, duplex; the upper layer < 70 µm thick, with hyphae 3.3-8.8 µm diam and agglutinating at the surface, almost colorless to slightly gray; the subtending layer < 40 µm thick, with hyphae 6.3-10.8 µm diam, rusty brown. Clamp connections present.

Collections examined: Kunashir, near the river Andreevka, in *Alnus* forest, 20 Aug. 2012, leg. Takah. Kobayashi & A. Bobyr, TAKK 12.8.20.1-1 in SAPA, TAKK 12.8.20.1-2 in SAPA, TAKK 12.8.20.2 in SAPA & TAKK 12.8.20.4 in SAPA.

Japanese name: Kunashir-tomaya-take (Takahito Kobayashi).

Inocybe intricata var. *pallidistipata* belongs to the subgenus *Inocybe* [= *Clypeus* Britzelm.], section *Marginatae* Kühner, since it possesses thick-walled caulocystidia throughout, and nodulose spores.

Present collection coincides well with *I. intricata* var. *pallidistipata* reported by Grund and Stuntz (1983) from Washington, although the latter was described as having polyhedral spores (Grund and Stuntz 1983).

Inocybe vulpina Takah. Kobay. from central Honshu, Japan (Kobayashi 2002a) is close to *I. intricata* var. *pallidistipata*, but the latter is different from the former in having square nodules of spores, thinner pleurocystidia and caurocystidia only apex (Kobayashi 2002a).

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小林孝人・寺嶋芳江：北方四島で採集されたアセタケ属（ハラタケ目、アセタケ科）菌について

本報告においては，2012 年に国後・択捉島で採集した，北方四島から未報告のアセタケ属菌 4 種を載録した．

(1) *Inocybe maculipes* J. Favre カワイトマヤタケ（小林孝人）

Section *Tardae* コウキトマヤタケ節に所属する．平滑な担子胞子を持ち，側シスチジアは厚壁。柄シスチジアが柄の頂部にのみ存在する．

(2) *Inocybe splendens* R. Heim var. *splendens* コウタクトマヤタケ（小林孝人）

Section *Splendentes* コウタクトマヤタケ節に所属する．平滑な担子胞子を持ち，側シスチジアは厚壁．柄シスチジアが柄の全面に存在する．

(3) *Inocybe taxocystis* (J. Favre) R. Singer ユウバリトマヤタケ（小林孝人）

Section *Inocybe* [=*Cortinatae*] クロニセトマヤタケ節に所属する．コブがある担子胞子を持ち，側シスチジアは厚壁．柄シスチジアが柄の頂部にのみ存在する．

(4) *Inocybe intricata* Peck var. *pallidistipata* Grund & Stuntz クナシリトマヤタケ（小林孝人）

Section *Marginatae* カブラアセタケ節に所属する．コブがある担子胞子を持ち，側シスチジアは厚壁．柄シスチジアが柄の全面に存在する．

（琉球大学熱帯生物圏研究センター西表研究施設）