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Revision of some Japanese *Crepidotus*: A new species, a new record and type studies of two species described by Sanshi Imai

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Crepidotus byssinus is described as new from warm-temperate area of eastern Japan. It is placed in the subgenus *Dochmiopus*, section *Dochmiopus*, series *Caspari* and is morphologically similar to *C. caspari* var. *caspari*. *Crepidotus calolepis* var. *calolepis* is reported as a new record from warm-temperate broad-leaved forests of Honshu, central Japan. Type specimens of *C. badiofloccosus* and *C. longistriatus*, both originally described from Hokkaido, northern Japan, were reexamined. Based on the morphological features, *C. badiofloccosus* is confirmed as a synonym of *C. crocophyllus*. *Crepidotus longistriatus*, a morphologically poorly known species, is revealed as the distinct species belonging to the subgenus *Dochmiopus*, section *Sphareuli*, series *Applanatus*. Descriptions, illustrations and discussions of these species are provided.

Keywords: Cortinariaceae, mycobiota, new synonymy, wood-inhabiting fungi.

Crepidotus (Fr.) Staude is a distinct, well-defined genus of the Cortinariaceae having pleurotoid basidiomata and being distributed almost throughout of the world. Worldwide, more than 200 species of this genus have been described (Kirk *et al*. 2009). Several monographic studies, regional mycobiotas, and taxonomic revisions of *Crepidotus* have been published mainly based on materials from Europe (Pilát 1948, Nordstein 1990, Watling & Gregory 1990, Senn-Irlet 1995, Gonou-Zagou & Delivorias 2005, Consiglio & Setti 2008), North America (Hesler & Smith 1965), Latin America (Singer 1973, Senn-Irlet & De Meijer 1998, Bandala & Montoya 2000ab 2004, Bandala *et al*. 2006, 2008ab, Capelari 2007, 2011), Hawaiian Islands (Ueki & Smith 1973) and China (Zang & Yuan 1999, Wei & Yao 2009). The diversity of *Crepidotus* spp. in Japan, however, has been poorly known so far, and hitherto, only 18 species of this genus have been recognized (Yasuda 1922, Matsuura & Kanada 1931, Imai 1938, 1939, Ito & Imai 1940, Imazeki &

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Toki 1954, Murata 1978, Hongo 1982, Takahashi 2003), though there are a few fragmentary publications of taxonomic revisions of Japanese *Crepidotus* (Hongo 1959, Neda & Doi 2000, Horak & Desjardin 2004). The most comprehensive studies on Japanese *Crepidotus* were published by Sanshi Imai in his monographic works on agarics of Hokkaido, northern Japan (Imai 1938, 1939). Seven species known from Japan were newly reported in these works, and four of which were described as new species. Other noteworthy studies on Japanese *Crepidotus* were published based on materials from Bonin Islands, southeastern Japan (Ito & Imai 1940, Hongo 1982, Horak & Desjardin 2004).

As parts of a taxonomic study of Japanese *Crepidotus*, we examined some specimens of the genus collected from warm-temperate forests of Honshu, Japan. As a result, we describe here a new species belonging to subgenus *Dochmiopus* (Pat.) Pilát, section *Dochmiopus* Consiglio & Setti, series *Caspari* Consiglio & Setti (2008). Further, we recognized *C. calolepis* (Fr.) P. Karst., which was previously not known from Japan.

Moreover, we have reexamined type specimens of *C. badiofloccosus* S. Imai (1939) and *C. longistriatus* S. Imai (1938), both originally described from Hokkaido. Recently, Bandala *et al.* (2008a) treated *C. badiofloccosus* as a probable synonym of *C. crocophyllus* (Berk.) Sacc. based on the original description by Imai (1939). However, Bandala *et al.* (2008a) have not examined any type material of *C. badiofloccosus*. Also, *C. longistriatus* is a morphologically poorly known fungus and no new records have been reported since the original description (Imai 1938). Therefore, we clarify the taxonomic status of these two species by morphological observations of Japanese specimens including holotypes. Consequently, *C. badiofloccosus* is confirmed as a synonym of *C. crocophyllus* and *C. longistriatus* is revealed as distinct species belonging to the section *Sphaeruli* Hesler & A.H. Sm. (1965).

In this article, we provide descriptions and illustrations of macro- and microscopic characters of the four species mentioned above; their taxonomic status and the results of comparisons with some related taxa are also discussed. The infrageneric classification of *Crepidotus* follows Consiglio & Setti (2008).

Materials and Methods

Specimens examined in this study are deposited in the mycological herbaria of Hokkaido University Museum, Sapporo, Hokkaido, Japan (SAPA), Ibaraki Nature Museum, Bando, Ibaraki, Japan (INM), National Museum of Nature and Science, Tsukuba, Ibaraki, Japan (TNS) and Natural History Museum and Institute, Chiba, Japan (CBM). Macroscopic characters were described by observations on dried or fresh materials. For light microscopic observations (LM), free-

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hand sections of dried or fresh specimens were mounted in water, 3 % (w/v) KOH, 10 % NH_4OH, Congo red or phloxine B solution on glass slides. More than forty randomly selected basidiospores from lamellae fragments of dried basidiomata were measured using a Leica DM LB microscope (Leica Microsystems CMS GmbH, Wetzlar, Germany) at 1000× magnification with Nomarski interference contrast. The abbreviation 'Q' refers to the length/width ratio of basidiospores. The surface features of basidiospores were also observed by scanning electron microscopy (SEM). For SEM, small sections of lamellae of dried basidiomata were put onto double-sided adhesive tape on a specimen holder and coated with platinum-palladium using an E-1030 Ion Sputter Coater (Hitachi, Tokyo, Japan). They were examined with a S-4200 SEM (Hitachi, Tokyo, Japan) operating at 20 kV.

Taxonomy

A new species from Japan

Crepidotus byssinus **T. Kasuya & Takah. Kobay., sp. nov.** – Figs. 1–2. MycoBank no.: MB 563582

Pileus 5–20 mm latus, campanulatus vel flabellatus, convexus dein planoconvexus, albens, dein cremeus vel flavidus, sericeus, byssinus vel villosus, raro glabratus, involutus dein incurvatus ad marginem translucidusostrigosum. Lamellae adnatae, primo confertae, dein subdistantes, tenuis, primo cremeae, dein pudorinae vel flavidae, tandem brunneae. Stipe et pseudostipe nulli. Caro tenuis, fragilis. Sapore gramineae, aliquanto acerbae. Odor aliquanto gramineae. Pileipellis ex hyphis hyalinis, cylindraceis vel subcylindraceis, intertextis, cutem formantibus, pigmento albidus vel cremeus plasmatico impletis. Pleurocystidia nulli. Cheilocystidia 20–52.5 × 5.5–11.5 µm, cylindrata, clavata vel subclavata, leviter utriformia, flexuosa, apices 6.5–11.5 µm diameteri, rotundata, subcapitata, hyalina. Basidia 18–30.5 × 6.5–10.5 µm, clavata vel subclavata, tetraspora, hyalina. Basidiosporae 6.5–8.3 × 4.6–5.5 µm, ellipsoideae vel aliquanto amygdalinae, flavidobrunneae vel ferrugineae, asperratae vel crasse rugosoverrucosae, apices conspicuae, truncatae.

Holotypus. – Japan, Chiba, Funabashi, T. Kobayashi (SAPA 1221).

Basidiomata (Fig. 1A) pleurotoid. – Pileus 5–20 mm in diam., sometimes campanulate when young, later hemispheric to flabelliform, finally convex to plano-convex, with inflexed, often lobate, translucent-striate margin, laterally to dorsally attached, surface whitish, cream to pale yellow, silky, cottony to woolly, rarely glabrous; at the basal point of pileus ciliate, whitish to cream, brittle when dried. – Lamellae crowded when young, later subdistant, subventricose, adnate, thin, cream when young, then slightly pinkish to pale yellow, finally brownish, edges fimbriate, whitish to cream, sometimes irregular. – Stipe and pseudostipe sessile. – Context thin, fragile. – Taste grassy, unpleasant, slightly bitter. – Odor indistinct to slightly grassy.

Pileipellis a cutis composed of more or less compactly arranged, cylindrical to subcylindrical, interwoven, almost hyaline or

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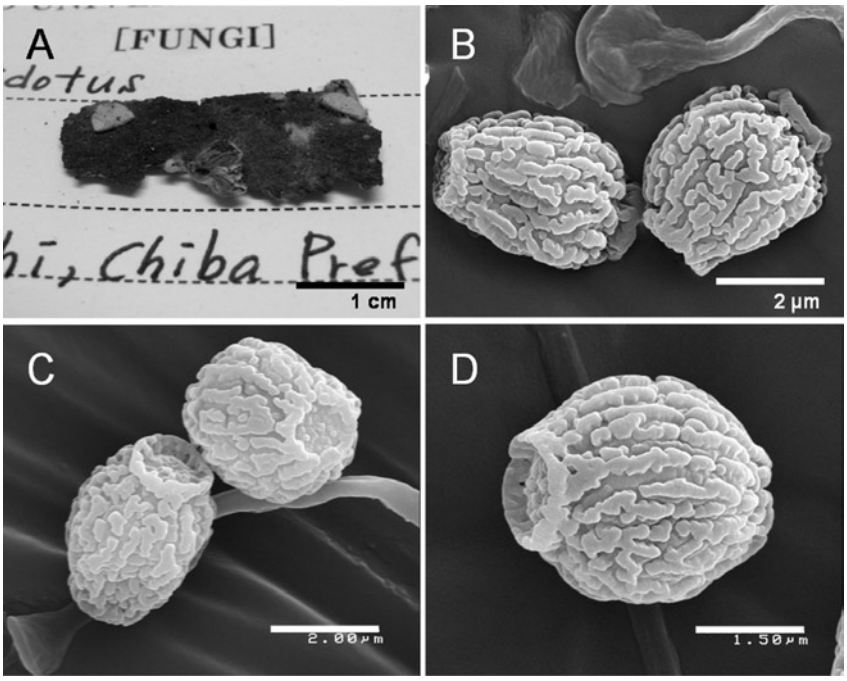

Fig. 1. – *Crepidotus byssinus* from SAPA 1221 (holotype): **A.** Basidiomata. **B–D.** SEM micrographs of basidiospores.

with whitish to cream intercellular pigments, thin-walled hyphae, 2.5–10 µm in diam., terminal element scarce, mostly undifferentiated. – Hymenophoral trama irregular, not gelatinized, hyphae 6.5–25 µm in diam., cylindrical to subventricose, hyaline or slightly pale yellow, thin-walled. – Pleurocystidia not seen. – Cheilocystidia (Fig. 2D) 20–52.5 × 5.5–11.5 µm, numerous, cylindrical, clavate, subclavate to somewhat utriform, flexuous, apex 6.5–11.5 µm in diam., rounded, subcapitate, hyaline, thin-walled. – Basidia (Fig. 2B) 18–30.5 × 6.5–10.5 µm, 4–spored, clavate to subclavate, hyaline, thin-walled, clamped at the base. – Basidioles (Fig. 2C) smaller than basidia. – Basidiospores (Figs. 1B–D, 2A) 6.5–8.3 × 4.6–5.5 µm (mean = 7.6 × 5.1 µm), Q = 1.34–1.76 (mean = 1.53), ellipsoid to slightly amygdaliform, yellowish brown to rusty brown, slightly rough to asperulate, thick-walled under LM, when observed with SEM, surface thickly rugulose-verruculose, apex visibly truncate. – Clamp-connections present in all hyphal tissues.

Etymology. – *byssinus,* referring to the cottony surface of the pileus.

Habitat. – Gregarious on decayed trunks and fallen branches of broad-leaved trees or conifers.

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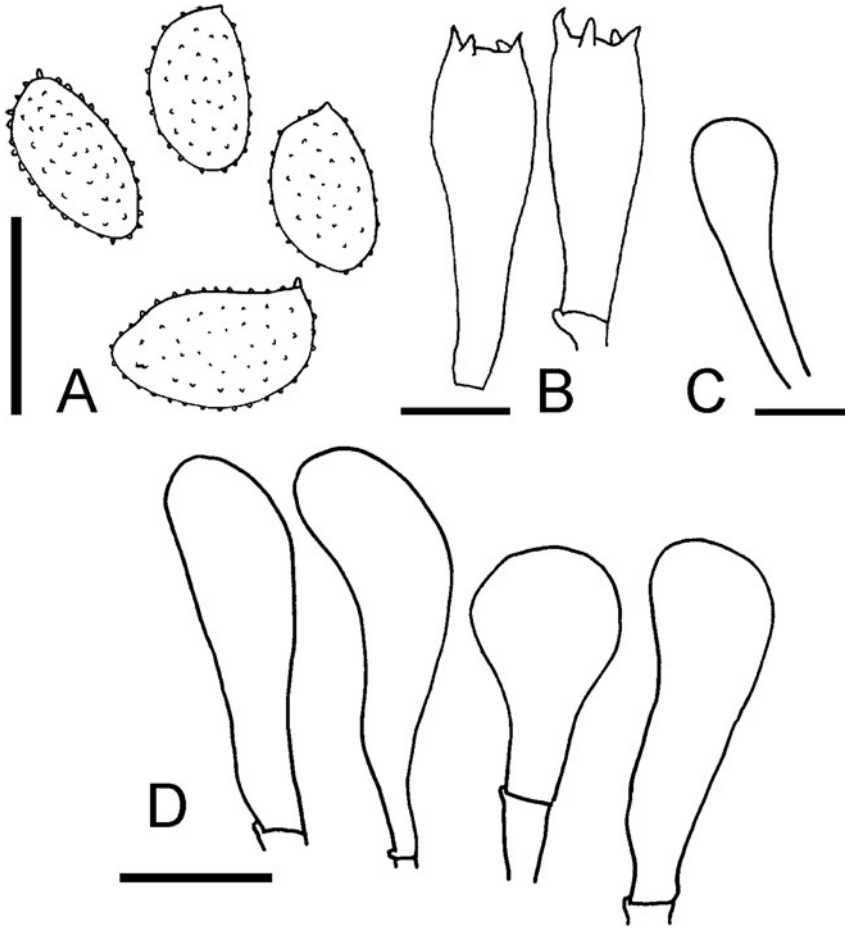

Fig. 2. – Microscopic features of *C. byssinus* from SAPA 1221 (holotype): **A.** Basidiospores (bar = 8 µm). **B.** Basidia (bar = 9 µm). **C.** Basidiole (bar = 6 µm). **D.** Cheilocystidia (bar = 10 µm).

Distribution. – Japan (warm-temperate region of eastern Honshu).

Japanese name. – Menmo-cha-hiratake (newly proposed here).

Material examined: Holotype. – ***Crepidotus byssinus*** T. Kasuya & Takah. Kobay.: JAPAN, Chiba Pref., Funabashi-shi, 11 Jul 1998, *leg.* & *det.* T. Kobayashi (SAPA 1221). Paratype. – Chiba Pref., Chosei-gun, Ichinomiya-machi, 9 Jul 1994, *leg.* Foray of Chiba Mycological Club, *det.* T. Kasuya (CBM-FB-11226).

Remarks. – Remarkable characteristics of *C. byssinus* are: (1) whitish, cream to pale yellowish pileus with silky, cottony to woolly surface, (2) slightly pinkish to pale yellowish lamellae when mature, (3) ellipsoid to slightly amygdaliform (mean of Q = 1.53), rugulose-ver-

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ruculose (SEM; Fig. 1B–D) basidiospores with visibly truncate apices. Moreover, the present fungus has clamp-connections in all hyphal tissues. These morphological characteristics clearly show that *C. byssinus* belongs to the subgenus *Dochmiopus*, section *Dochmiopus*, series *Caspari*.

Crepidotus byssinus is morphologically similar to the European species, *C. caspari* Velen. var. *caspari*. However, *C. byssinus* is easily distinguishable from *C. caspari* var. *caspari* by surface feature of the pileus and thickly rugulose-verruculose basidiospores with remarkably truncate apices. Pouzar (2005) recognized one variety of *C. caspari* var. *caspari* in Ukrainian specimens, i.e., *C. caspari* var. *subglobisporus* (Pilát) Pouzar. This variety is clearly different from *C. byssinus* by smaller (5.6–6.6 × 4.4–5.3 µm), more broadly ellipsoid and less elongate basidiospores than those of *C. byssinus*. Macroscopically, the present fungus is similar to *C. fusisporus* Hesler & A.H. Sm. and *C. subverrucisporus* Pilát, respectively. However, the present fungus is clearly distinguishable from the latter two species by the shapes of basidiospores and cheilocystidia (Consiglio & Setti 2008). *Crepidotus luteolus* (Lamb.) Sacc. is morphologically very similar to the present fungus, but its basidiospores are more elongated than those of *C. byssinus*. Furthermore, shapes of cheilocystidia of *C. luteolus* are very different (Consiglio & Setti 2008) from those of *C. byssinus*.

A new record for Japan

Crepidotus calolepis (Fr.) P. Karst. var. ***calolepis***, Bidr. Känn. Finl. Nat. Folk., 32: 414. 1879. – Figs. 3–4.

Basionym. – *Agaricus calolepis* Fr., Öfvers. K. Vetensk. -Akad. Förh., 30: 5. 1873. – *Crepidotus mollis* var. *calolepis* (Fr.) Pilát, Ann. Hist. -Nat. Mus. Natl. Hung., n.s. 2B: 74. 1940. – *Crepidotus mollis* subsp. *calolepis* (Fr.) Nordstein, Synopsis Fungorum, 2: 67. 1990.

Misapplied name. – *Crepidotus mollis* (Fr.) Staude var. *mollis* sensu Hesler & Smith, North American Species of *Crepidotus*, 29. 1965.

Basidiomata (Fig. 3A) pleurotoid. – Pileus 10–35 mm in diam., hemispheric, flabelliform to orbiculate, campanulate when young, later convex to plano-convex, with incurved margin, mostly laterally attached, surface sordid or pallid, densely covered with brownish, tomentose scales when young, later scales pale brown to ochraceous, appressed to fibrillose, finally scales often washed off and the pileus becoming hygrophanous, pale ochraceous to yellowish brown; at the basal point of pileus tomentose, white to cream. – Lamellae crowded, arcuate, adnexed, thin, cream when young, later pale yellow, ochraceous to brown, edges somewhat fimbriate, whitish, sometimes irregular. – Stipe sessile. – Pseudostipe sometimes recognized when young, eccentric, lateral, reduced, slightly pruinose, rudimentary (< 2.5 mm long), absent in mature stage. – Context

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thin, elastic, partly gelatinized, fragile. – Taste unpleasant, slightly bitter. – Odor indistinct.

Pileipellis a cutis composed of radially arranged, cylindrical to subcylindrical or sometimes ventricose, hyaline to pale yellowish, thin-walled hyphae, 3.5–6 µm in diam., terminal element scarce, undifferentiated. – Hymenophoral trama gelatinized, irregular, hyphae 4.5–10 µm in diam., cylindrical to subventricose, hyaline to pale yellowish, thin-walled. – Scales composed of bundles of ochraceous to brownish, 5–15 µm broad hyphae and botuliform, short cells. – Pleurocystidia not seen. – Cheilocystidia (Fig. 4C) 23–42.5 × 4.5–8.5 µm, numerous, cylindrical, utriform to lageniform, somewhat subclavate or rarely clavate, apex 10–13.5 µm in diam., rounded, subcapitate, hyaline, septate, thin-walled. – Basidia (Fig. 4B) 22.8–37.5 × 5.4–7.8 µm, 4–spored, clavate to subclavate, hyaline, thin-walled. – Basidiospores (Figs. 3B–D, 4A) 6.8–9.8 × 5–6.4 µm (mean = 8.3 × 5.4 µm), Q = 1.3–1.7 (mean = 1.53), ellipsoid to slightly amygdaliform, smooth, yellowish brown to rusty brown, thick-walled. – Clamp-connections not seen (all tissues).

Habitat. – Gregarious on decayed trunks and fallen branches of broad-leaved trees.

Distribution. – Japan (new record, warm-temperate region of central Honshu), North Korea (Wojewoda *et al.* 2004), China (Wei & Yao 2009), Europe (Senn-Irlet 1995, Gonou-Zagou & Delivorias 2005, Consiglio & Setti 2008), North Africa (Senn-Irlet 1995), North America (Hesler & Smith 1965, as a misapplied name "*C. mollis* var. *mollis* (Fr.) Staude") and Latin America (Bandala & Montoya 2004).

Japanese name. – Uroko-cha-hiratake (newly proposed here).

Material examined. – JAPAN, Wakayama Pref., Higashimuro-gun, Kozagawa-cho, Hirai, Wakayama experimental forest of Hokkaido University, 28 Mar 1955, *leg.* Y. Otani, *det.* T. Kasuya (SAPA 1199); same locality, 28 March 1955, *leg.* Y. Otani, *det.* T. Kasuya (SAPA 1200).

Remarks. – The size of the cheilocystidia of the Japanese specimens somewhat deviate from those of European and American ([26–] 32–52 [–76] × 5–8 µm; Senn-Irlet 1995, and [21–] 23–90 [–110] × [3–] 4–10 [–11] µm; Bandala & Montoya 2004). All other morphological characteristics of the specimens examined are in full agreement with the previous descriptions of *C. calolepis* var. *calolepis* (Senn-Irlet 1995, Bandala & Montoya 2004, Gonou-Zagou & Delivorias 2005, Consiglio & Setti 2008).

Crepidotus calolepis var. *calolepis* belongs to subgenus *Crepidotus*, section *Crepidotus*. It is closely related to *C. mollis* (Schaeff.) Staude and was considered as a variety or a subspecies of the latter by Pilát (1948) and Nordstein (1990), respectively. However, the present

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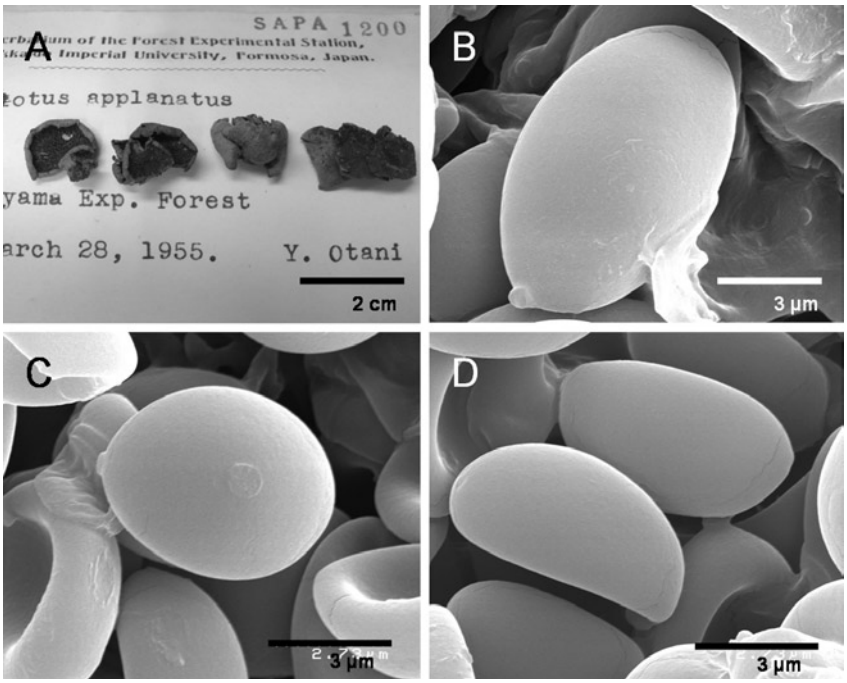

Fig. 3. – *Crepidotus calolepis* var. *calolepis*: **A.** Basidiomata from SAPA 1200. **B–D.** SEM micrographs of basidiospores from SAPA 1199.

fungus is clearly distinguishable from *C. mollis* by the somewhat broader basidiospores and the presence of brownish to ochraceous scales on the pileal surface (Gonou-Zagou & Delivorias 2005). Since the pileal surface of *C. mollis* is almost glabrous (Senn-Irlet 1995, Gonou-Zagou & Delivorias 2005), the presence of scales is recognized as an important taxonomic characteristic of *C. calolepis* var. *calolepis*. Therefore, we accept that *C. calolepis* var. *calolepis* is a distinct species in the section *Crepidotus* following the arguments by Senn-Irlet (1995), Bandala & Montoya (2004), Gonou-Zagou & Delivorias (2005), and Consiglio & Setti (2008).

Senn-Irlet (1995) recognized one variety of the present fungus based on specimens collected from southwestern Mediterranean areas, i.e., *C. calolepis* var. *squamulosus* (Cout.) Senn-Irlet. This variety is characterized by somewhat larger basidiospores (8.5–12 × 6–7.5 µm) and broader scale-forming hyphae (up to 22 µm broad, Senn-Irlet 1995). Sizes of basidiospores (6.8–9.8 × 5–6.4 µm) and scale-forming hyphae (up to 15 µm broad) of Japanese specimens almost fit with the previous descriptions of those of var. *calolepis* (Senn-Irlet 1995, Bandala & Montoya 2004, Gonou-Zagou & Delivorias 2005, Consiglio & Setti 2008).

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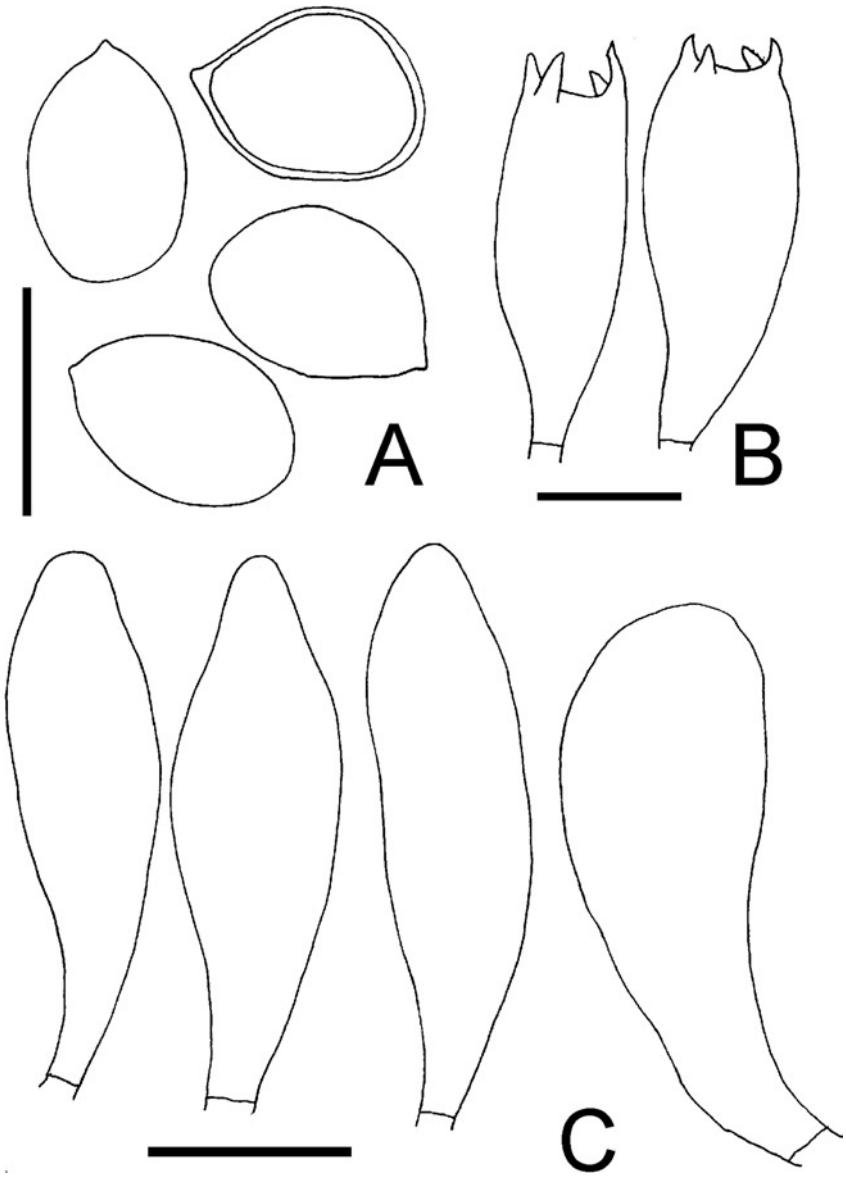

Fig. 4. – Microscopic features of *C. calolepis* var. *calolepis* from SAPA 1199: **A.** Basidiospores (bar = 9 µm). **B.** Basidia (bar = 8 µm). **C.** Cheilocystidia (bar = 8 µm).

Crepitodus viticola S. Imai, originally described from Hokkaido, Northern Japan (Imai 1938), is morphologically similar to *C. calolepis* var. *calolepis* because the former species has somewhat tomentose, yellowish surface of basidiomata and smooth, broadly ellipsoid basidiospores (7.5–9 × 5–6 µm; Imai 1938). However, *C. calolepis* var.

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calolepis is distinguishable from *C. viticola* by more densely covered scales on basidiomata and more slender basidiospores. Also, *C. viticola* is clearly different from *C. calolepis* var. *calolepis* because the context of its basidiomata is not gelatinized (Imazeki & Hongo 1987).

Type studies of two species described by Sanshi Imai

Crepidotus badiofloccosus S. Imai, Bot. Mag. Tokyo, 53: 399. 1939. – Figs. 5–7.

Type material examined. – JAPAN, Hokkaido, Prov. Ishikari, Sapporo, 2 Sep 1937, *leg.* & *det.* S. Imai (SAPA 1194, holotype!).

Information from other collections from Japan (see "Additional material examined", indicated below) is also incorporated in the description given below.

Basidiomata (Fig. 5) pleurotoid. – Pileus 10–50 mm in diam., campanulate when young, then spathulate, later hemispheric, reniform to flabelliform, finally convex to plano-convex, with incurved, later straight, not sulcate-striate margin, laterally to dorsally attached, surface pallid, pale yellow to ochraceous, densely covered with yellowish, ferruginous to orange squamules when young, later squamules brownish orange to pale brown, subsquamulose, fibrillose to somewhat appressed; at the basal point of pileus tomentose to villose, ferruginous to brownish orange, brittle when dried. – Lamellae crowded, subventricose, adnexed, thin, cream when young, later pale yellow, ferruginous to orange, edges fimbriate, whitish, sometimes irregular. – Stipe sessile. – Pseudostipe rarely recognized when young, eccentric, lateral, reduced, slightly pruinose, rudimentary (< 1.5 mm long), absent in mature stage. – Context thin, white, fragile. – Taste mild to slightly bitter. – Odor indistinct to slightly grassy.

Pileipellis a cutis composed of more or less compactly arranged, repent, interwoven, cylindrical to subcylindrical or rarely subventricose, hyaline to pale yellow, 3.5–6 µm in diam., thin-walled hyphae, mixed with bundles of ascending, yellowish, 10–20 µm, often incrusted, thick-walled hyphae; terminal element of scale-forming hyphae cylindrical, somewhat flexuous, thick-walled. – Hymenophoral trama subregular to irregular, not gelatinized, hyphae 4–6 µm in diam., cylindrical to subventricose, hyaline to pale yellowish, thin-walled. – Pleurocystidia not seen. – Cheilocystidia (Figs. 7E–F) (8–) 20–45.5 × (3.2–) 4.5–9 µm, numerous, variable in shape, clavate, subclavate to somewhat utriform or lageniform, rarely subcylindrical to almost cylindrical, apex 8–20 µm in diam., flexuous, subcapitate, hyaline, thin-walled. – Basidia (Figs. 7C–D) 25–40.5 × 4.5–8 µm, 4–spored, evanescent, clavate to subclavate, hyaline, thin-walled, clamped at the base, transformed into amorphous globose to subglobose materials or cystidioid-like structures when mature. – Basidiospores (Figs. 6, 7A–B) 5–6.5 × 5–6 µm (mean = 5.8 × 5.3 µm), Q

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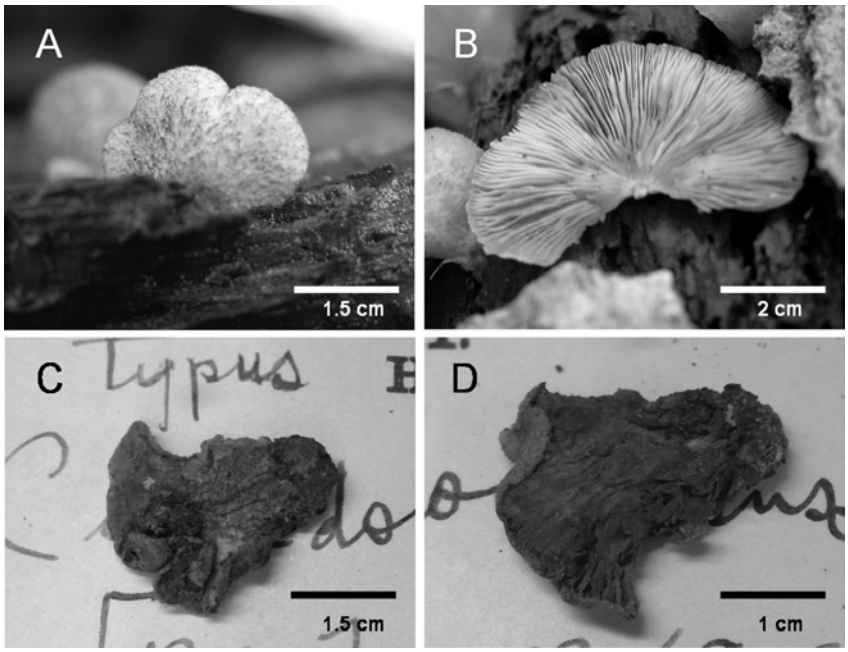

Fig. 5. – Basidiomata of *C. crocophyllus*: **A–B.** Mature basidiomata in natural habitat from INM-2-59841. **C–D.** Holotype of *C. badiofloccosus* from SAPA 1194.

= 1.0–1.07 (mean = 1.04), globose to subglobose, warty to spinulose-verruculose, yellowish brown to rusty brown, thick-walled under LM, when observed under SEM, surface baculate, roughly covered with baculiform to somewhat echinulate spines up to 0.5 µm long. – Clamp-connections present in all tissues.

Habitat. – Gregarious or solitary on decayed trunks and fallen branches of broad-leaved trees.

Distribution. – Japan (Hokkaido and Honshu) and China (Wei & Yao 2009).

Japanese name. – Kurige-no-cha-hiratake (Imai 1939).

Additional material examined. – JAPAN, Ibaraki Pref., Kitaibaraki-shi, Hanazono valley, 23 Sep 2001, *leg.* & *det.* N. Hirai (INM-2-26406); Hitachiomiya-shi, Shimoisehata, 17 Jun 2009, *leg.* T. Kasuya & Y. Kitadate, *det.* T. Kasuya (INM-2-59841); Sakuragawa-shi, Makabe-cho, Mt. Tsukuba, 14 Jun 2008, *leg.* & *det.* H. Neda (INM-2-58043); Tsukuba-shi, Mt. Tsukuba, 26 Sep 1995, *leg.* & *det.* M. Kuramochi (INM-2-37735); Bando-shi, Osaki, 15 Sep 2001, *leg.* & *det.* M. Kuramochi (INM-2-53090); same locality, 23 Aug 2008, *leg.* & *det.* H. Neda (INM-2-58053); same locality, 23 Aug 2008, *leg.* & *det.* H. Neda (INM-2-58057); Metropolitan Tokyo, Bunkyo-ku, Rikugien, 2 Jul 1988, *leg.* & *det.* T. Kobayashi (TAKK 643 in SAPA); Shibuya-ku, Higashi 4-chome, 8 Jul 2002, *leg.* His Imperial Highness Prince Hitachi (Masahito), *det.* T. Kasuya (TNS-F-5726); same locality, 12 Nov 2002, *leg.* His Imperial Highness Prince Hitachi (Masahito), *det.* T. Kasuya (TNS-F-5733); Ome-shi, Kurosawa, 2 Aug 1997, *leg.* Y. Doi, *det.* T. Kasuya (TNS-F-182538).

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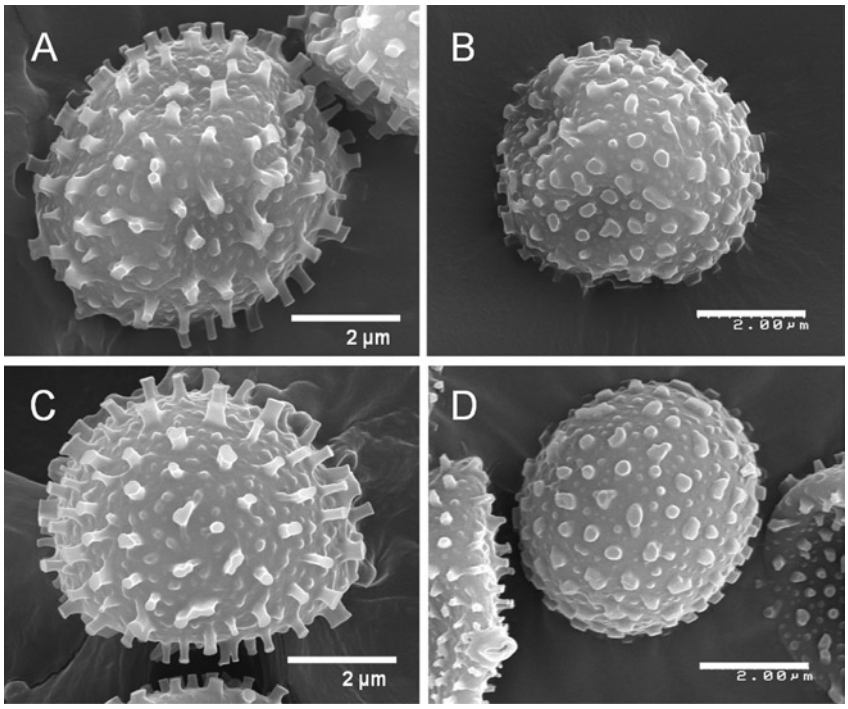

Fig. 6. – SEM micrographs of basidiospores of *C. crocophyllus*: **A–B.** Holotype of *C. badiofloccosus* from SAPA 1194. **C.** From INM-2-37735. **D.** From INM-2-58053.

R e m a r k s . – The holotype of *C. badiofloccosus* consists of only one complete basidioma. For it has been preserved under good conditions, we could provide detailed observation of microscopic characteristics. Remarkable characteristics of the studied Japanese specimens including the holotype are: (1) pilei densely covered with yellowish, ferruginous, orange to brownish squamules, (2) pale yellow, ferruginous to orange lamellae, (3) globose to subglobose, baculate (SEM) basidiospores, (4) pileipellis composed of two types of hyphae, (5) high variability in the shape of cheilocystidia, and (6) evanescent basidia transformed into amorphous globose to subglobose materials or cystidioid-like structures when mature.

Imai (1939) described *C. badiofloccosus* as new based on the "asperulate" surface of basidiospores and briefly compared the latter with those of *C. rubriflavus* Murrill (= *C. crocophyllus*; Hesler & Smith 1965). However, from our detailed macro- and microscopic observations as well as from the aforementioned important characteristics of the studied Japanese specimens (incl. holotype) we see a good agreement with previous descriptions of *C. crocophyllus* (Hesler & Smith 1965, Senn-Irlet 1995, Bandala & Montoya 2008a, Consiglio & Setti 2008). Especially, concerning the surface ornamentation of basidio-

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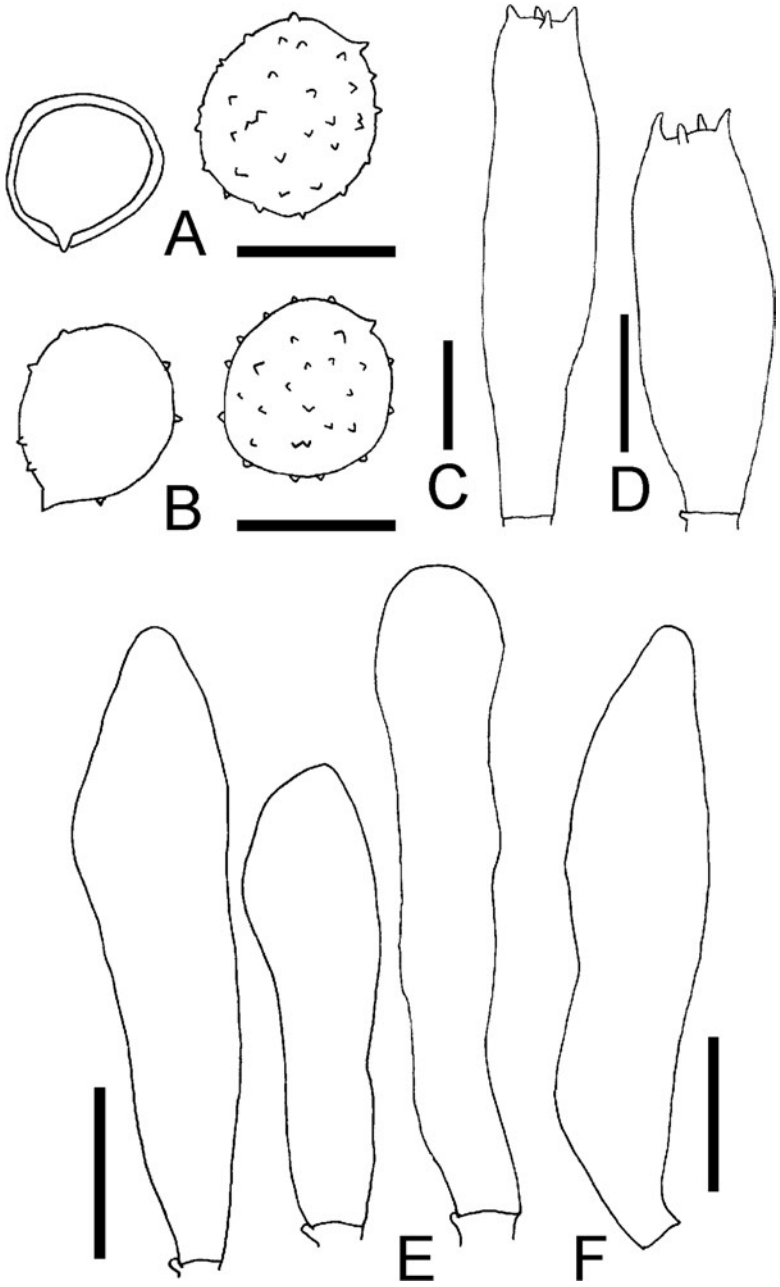

Fig. 7. – Microscopic features of *C. crocophyllus*: **A–B. Basidiospores (A.** from SAPA 1194, holotype of *C. badiofloccosus*; **B.** from INM-2-26406) (bars = 6 µm). **C–D.** Basidia (**C.** from INM-2-59841; **D.** from SAPA 1194, holotype of *C. badiofloccosus*) (bars = 8 µm). **E–F.** Cheilocystidia (**E.** from INM-2-53090; **F** from SAPA 1194, holotype of *C. badiofloccosus*) (bars = 8 µm).

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spores, all features of the holotype of *C. badiofloccosus* seen in SEM are the same as in *C. crocophyllus* (Fig. 6, see also Fig. 4 of Bandala & Montoya 2008a) exhibiting the same type of surface ornamentation. Therefore, *C. badiofloccosus* cannot be distinguished from *C. crocophyllus*. Consequently, we accept the taxonomic treatment of *C. badiofloccosus* proposed by Bandala & Montoya (2008a), and put it into synonymy of *C. crocophyllus*:

Crepidotus crocophyllus (Berk.) Sacc., Syll. Fung., 5: 886. 1897.

Basionym. – *Agaricus crocophyllus* Berk., Lond. J. Bot., 6: 313. 1847.
Synonym. – *Crepidotus badiofloccosus* S. Imai, Bot. Mag. Tokyo, 53: 399. 1939.

The present fungus belongs to the subgenus *Dochmiopus*, section *Sphaeruli*, series *Crocophyllus* Consiglio & Setti (2008). It is closely related to *C. ehrendorferi* Hauskn. & Krisai which has fibrillose pileus, orange lamellae and globose to subglobose, warty to spinulose basidiospores (Hausknecht & Krisai 1988). However, *C. ehrendorferi* is distinguishable from the present fungus by greyish surface of pileus and more slender, mostly cylindrical to subfusoid cheilocystidia (Hausknecht & Krisai 1988).

Crepidotus crocophyllus has a wide distribution in Europe (Senn-Irlet 1995, Consiglio & Setti 2008), North America (Hesler & Smith 1965), Latin America (Bandala & Montoya 2008a) and South America (Horak 1964, Hesler & Smith 1965). Its distribution expands from cool-temperate areas to tropics; however, it is "rare" in Europe (Senn-Irlet 1995) and "fragmented" in Americas (Bandala & Montoya 2008a). In Japan, *C. crocophyllus* is frequently recorded from broad-leaved forests of warm-temperate areas (Imazeki & Hongo 1987, Imazeki *et al.* 1988; both as *C. badiofloccosus*) and it seems to be one of the most common species of *Crepidotus* in Japan. Previously, well-defined pictures and descriptions of Japanese materials of the present fungus have been published (Imazeki & Hongo 1987, Imazeki *et al.* 1988, Ikeda 2005; each as *C. badiofloccosus*).

Crepidotus longistriatus S. Imai, J. Fac. Agr. Hokkaido Imp. Univ., 43: 242. 1938. – Figs. 8–9.

Type material examined. – JAPAN, Hokkaido, Prov. Ishikari, Nopporo, 9 Jul 1933, *leg.* & *det.* S. Imai (SAPA 1193, holotype!).

Basidiomata (Fig. 8A) pleurotoid. – Pileus 10–20 mm in diam., hemispheric, spathulate or flabelliform, convex to plano-convex, later almost applanate, with sulcate-striate margin, glabrous. – Lamellae crowded, subdecurrent to decurrent, thin, edges somewhat irregular. – Stipe sessile. – Pseudostipe sometimes present, eccentric, slightly pruinose, rudimentary (< 2 mm long). – Con-

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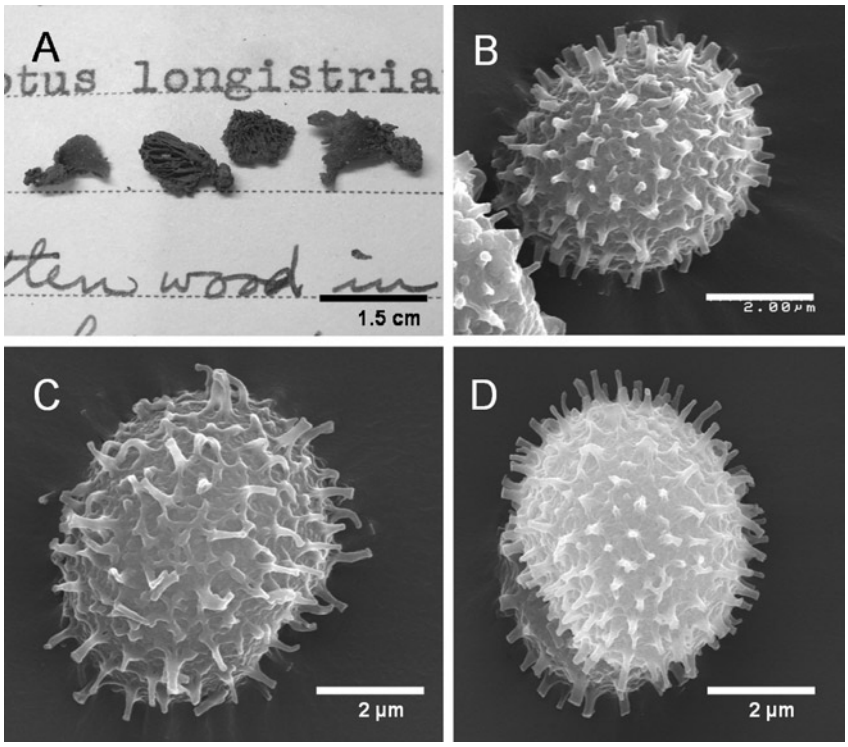

Fig. 8. – *Crepidotus longistriatus* from SAPA 1193 (holotype): **A.** Basidiomata. **B–D.** SEM micrographs of basidiospores.

text thin, fragile. – Taste mild to slightly bitter. – Odor indistinct.

Pileipellis a cutis composed of more or less compactly arranged, cylindrical to subcylindrical or rarely ventricose, interwoven, hyaline to pale yellowish, thin-walled hyphae, 3.5–12 µm in diam., terminal element scarce, undifferentiated. – Hymenophoral trama subregular to irregular, not gelatinized, hyphae 4.5–5.8 µm in diam., cylindrical to subventricose, hyaline to pale yellowish, thin-walled. – Pleurocystidia not seen. – Cheilocystidia (Fig. 9C) 13–42.5 × 4.5–14.5 µm, numerous, clavate, subclavate to capitate or somewhat utriform to rarely lageniform, apex 11–14.5 µm in diam., rounded, subcapitate to capitate, hyaline, thin-walled. – Basidia (Fig. 9B) 11.8–37.5 × 3.4–8.8 µm, 4–spored, clavate to subclavate, hyaline, thin-walled, clamped at the base. – Basidiospores (Figs. 8B–D, 9A) 5.8–6.8 × 5.4–6 µm (average = 6.3 × 5.2 µm), Q = 1.0–1.06 (mean 1.03; n = 40), globose to subglobose, spinulose to spinulose-verruculose, yellowish brown to rusty brown, thick-walled, when observed with SEM, surface baculate, coarsly covered with baculiform to somewhat echinulate

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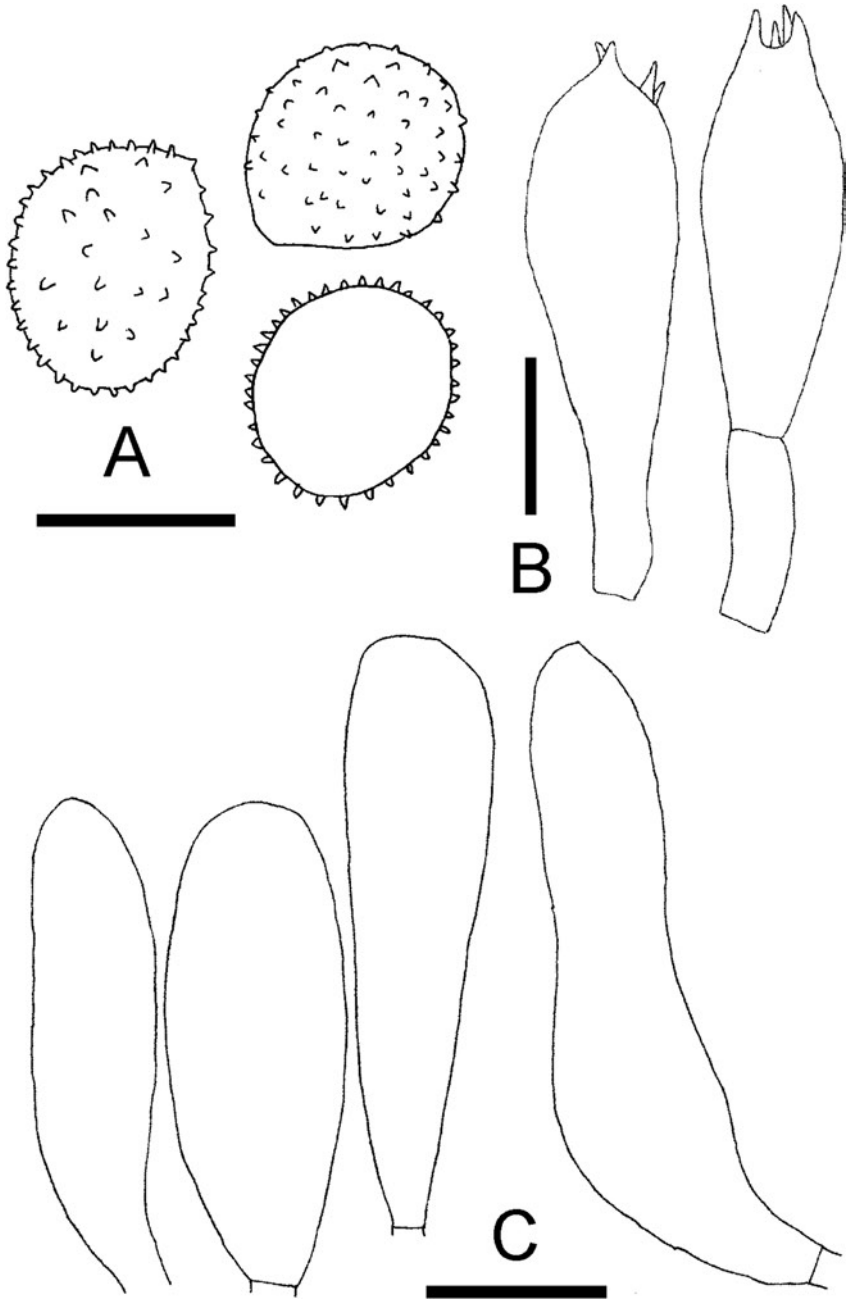

Fig. 9. – Microscopic features of *C. longistriatus* from holotype, SAPA 1193: **A.** Basidiospores (bar = 6 µm). **B.** Basidia (bar = 8 µm). **C.** Cheilocystidia (bar = 10 µm).

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spines up to 1 µm long. – Clamp-connections rare in all tissues.

Habitat. – Gregarious on decayed trunks and fallen branches of broad-leaved trees.

Distribution. – Japan (Hokkaido). Known only from the type locality.

Japanese name. – Zarami-no-cha-hiratake (Imai 1938).

Remarks. – The holotype of *C. longistriatus* consists of a few complete and several fragmental basidiomata. Despite its relatively poor state we were able to observe detailed microscopic characteristics. The present fungus belongs to the subgenus *Dochmiopus*, section *Sphaeruli* by having clamped hyphae and globose to subglobose, baculate basidiospores. Although Imai (1938) described pileal color of the present fungus as "white", we could not clearly recognize it in the holotype. The other characteristics of this fungus, however, particularly the glabrous pileal surface without fibrils, clearly suggest that its placement in the series *Applanatus* Consiglio & Setti (2008). *Crepidotus applanatus* (Pers.) P. Kumm., the type species of the series *Applanatus*, is morphologically similar to *C. longistriatus* because the former has a whitish, glabrous pileus, a translucent-striate pileal margin, globose to subglobose, baculate basidiospores and clavate to capitate cheilocystidia (Senn-Irlet 1995, Consiglio & Setti 2008). *Crepidotus longistriatus* is distinguished from *C. applanatus* and the other taxa belonging to the series *Applanatus* by its sulcate-striate margin of pileus and well-developed baculiform to somewhat echinulate spines (up to 1 µm) of basidiospores (SEM, Fig. 8B–D). Therefore, we newly define *C. longistriatus* as good, distinct species belonging to the series *Applanatus*.

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