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SHORT COMMUNICATION

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A lycoperdaceous fungus, *Arachnion album* (Agaricales, Arachniaceae), newly found in Japan

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Abstract *Arachnion album* was collected in Osaka and Hyogo Prefectures, western Honshu, Japan. This is a new record of this genus for Japan. Macro- and microscopic features of the species are described and illustrated based on the Japanese specimens, and comparisons with some related taxa of *A. album* are given.

Key words Arachniaceae · *Arachnion album* · Japan · New record

The genus *Arachnion* Schwein. was monographed by Demoulin (1972), and 7 species are known from Australia (Cunningham 1944), North and South America (Lloyd 1906; Long 1941; Demoulin 1972; Pérez-Silva et al. 1994; Calonge et al. 2004), South Africa (Bottomley 1948), and southern Europe (Demoulin 1972; Quadraccia 1996; Calonge 1998). Recently, some specimens of lycoperdaceous fungi were collected in Osaka and Hyogo prefectures, western Honshu, Japan. These are identified as *Arachnion album* Schwein., the generitype species of the genus. This species was hitherto known only from United States (Lloyd 1906; Coker and Couch 1928; Lander 1934; Long 1941; Demoulin 1972), and Mexico (Pérez-Silva et al. 1994; Calonge et al. 2004). Therefore, this is a new record for Japanese mycobiota. In this article, we describe and illustrate morphological characters of *A. album* based on the Japanese specimens. We also compare the present species with some related taxa.

The specimens examined in this study are deposited in the National Science Museum, Tokyo (TNS), Natural History Museum and Institute, Chiba (CBM), Osaka Prefectural Museum of Natural History (OSA), and the private herbarium of T. Orihara. Macroscopic characters were described by observations on fresh and dried materials. For light microscopic observations, free-hand sections of the gleba and peridium were mounted in water, 5% KOH (w/v), and 1% cotton-blue lactophenol on glass slides. Forty or 50 randomly selected basidiospores were measured for each specimen under a light microscope. For scanning electron microscope (SEM) observations of the basidiospores and glebal peridioles, a small portion of a gleba was rehydrated by 25% aqueous ammonia, fixed by osmium acid, coated with platinum-palladium in an ion sputter (Hitachi E-1030; Hitachi, Tokyo, Japan), and observed under an SEM (Hitachi S-800) operating at 15.0 kV.

Arachnion album Schwein., Schrift. Naturforsch. Ges. Leipzig 1:59, 1822.

Figs. 1–7

Basidiomata depressed globose to subglobose, 8–25 mm broad, 7–12 mm high, with short, white rhizomorphs at the base. Peridium thin, fragile, smooth, but sometimes irregularly areolate at maturity, up to 0.5 mm thick, white to cream when young, later lemon-yellow to ochraceous when mature, finally becoming brown; dehiscence irregular, collapsing quickly at maturity or when dried. Gleba white when young, later ochraceous to ash grayish-brown, composed of peridioles resembling minute sand grains, becoming pulverulent at maturity. Subgleba absent. Odor unpleasant, similar to that of *Vascellum pratense* (Pers.: Pers.) Kreisel.

Basidiospores ovoid to broadly ellipsoid, brown, smooth, (2.5–)3–4.5(–5) μm × 4–5.5(–6) μm in diameter, with hyaline pedicels 0.5–2 μm long. Basidia cylindro-clavate, 12–25 × 3–6 μm, with long sterigmata occasionally up to 35 μm long.

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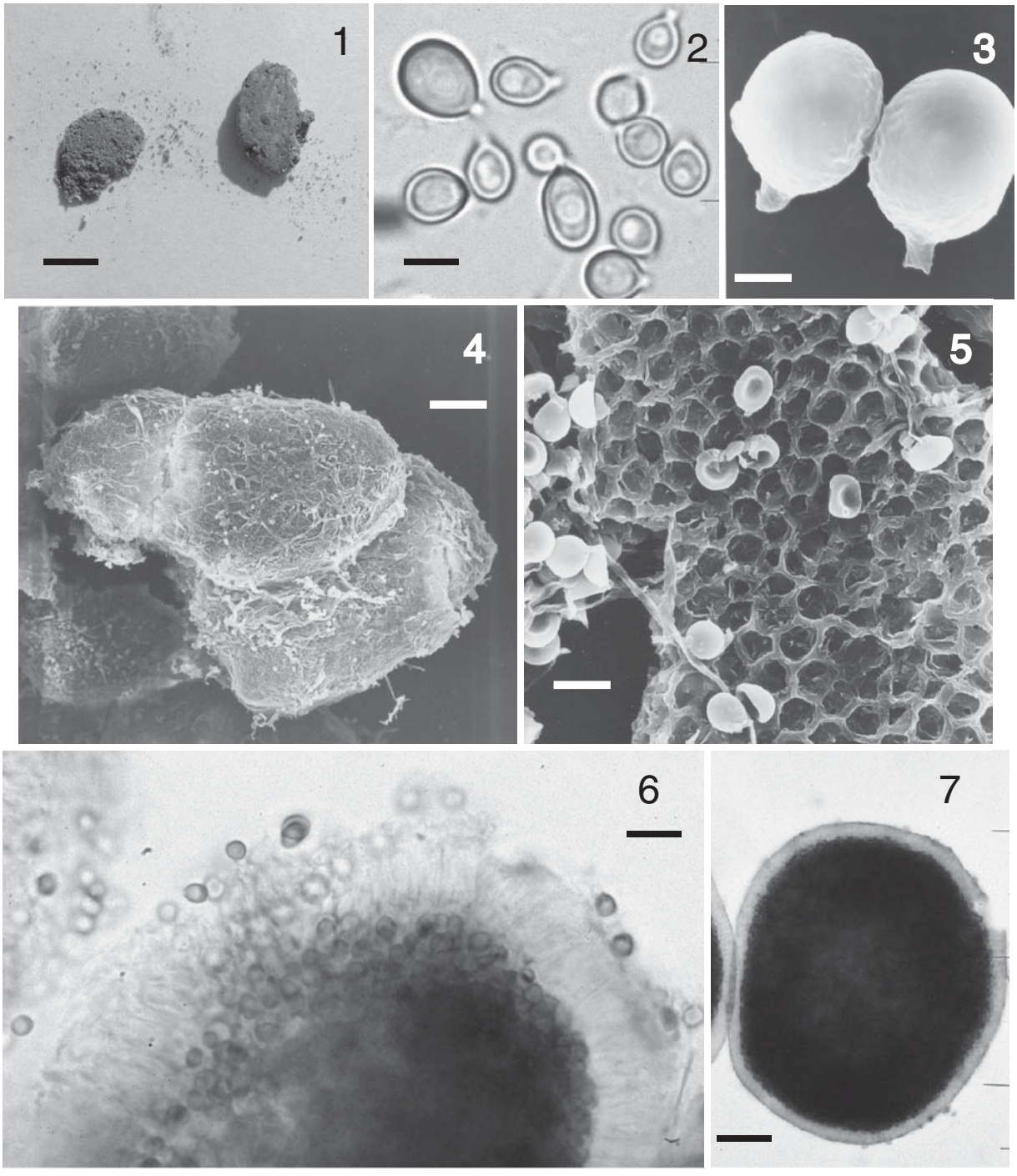

Figs. 1–7. *Arachnion album*. **1** Mature basidiomata (CBM-FB-14556). **2** Mature and immature basidiospores by light microscope (OSA-MY-4075). **3** Mature basidiospores by scanning electron microscopy (SEM) (CBM-FB-14556). **4** Glebal peridioles by SEM (CBM-FB-14556). **5** Hymenial cavity of inner layer of a peridiole by SEM (CBM-FB-14556). **6** Cross section of a glebal peridiole by light microscope (OSA-MY-4075). **7** Cross section of gleba by light microscope (OSA-MY-4075). *Bars* **1** 10 mm; **2** 4 µm; **3** 2.5 µm; **4** 50 µm; **5** 6.5 µm; **6** 20 µm; **7** 10 µm

Capillitium and paracapillitium absent. Hymenium forming almost hyaline, minute locules at immaturity, these locules becoming paridioles at maturity. Glebal peridioles 100–300 µm in diameter, depressed-globose, around which basidia densely arranged, forming hymenium; at first interwoven to subparallel filamentous hyphae 2–4 µm broad unite each peridiole, but these collapse at maturity, separating each peridiole. Peridium made of pseudoparenchymatous or filamentous hyphae, 100–200 µm thick, occasionally divided into two layers; outer of loosely interwoven filamentous hyphae, 2–4 µm broad, grading to inner; inner of interwoven filamentous hyphae 2–10 µm broad or pseudoparenchymatous hyphae. Clamp connections absent at all septa.

Habitat: Epigenous or sometimes subhypogenous, gregarious or sparse, growing on the ground among grass, occasionally on coastal sand dunes.

Distribution: Japan (Osaka and Hyogo), United States, and Mexico.

Specimens examined: Japan, Osaka Prefecture, Tsurumi-ku, Tsurumi-ryokuchi, on the ground among grass, September 3, 2005, collected by T. Orihara, *Orihara 294*; same place, September 15, 2005, collected by T. Orihara, *Orihara 295*; Hyogo Prefecture, Akashi-shi, Akashi Park, on the ground among grass, July 8, 1995, collected by M. Komurasaki, CBM-FB-14556; same place, October 8, 2005, collected by M. Komurasaki, OSA-MY-4075 (= *Orihara 308*); same place, June 28, 2006, collected by T. Kasuya, TNS-F-12085; Hyogo Prefecture, Minami-awaji-shi, Keinomatsubara, on coastal sand dune among grass, June 27, 2006, collected by M. Nabe, TNS-F-12094.

Japanese name: Shiro-kumonokotake (newly named).

Japanese specimens of *A. album* are macro- and microscopically nearly identical with the earlier descriptions of this species (Long 1941; Lloyd 1906; Demoulin 1972) with the exception of peridium morphology. Demoulin (1972) and Long (1941) described the peridium of *A. album* as consisting of one layer, and they considered it is the main taxonomic character of *Arachnion*. In several Japanese materials, we recognized the peridium to consist of two layers. However, all other morphological features were identical with those of *A. album*. Therefore, we think that the number of layers of the peridium is variable for this species.

Arachnion album is morphologically similar to *A. drummondii* Berk., *A. iulii* Quadraccia, and *A. tener* (Berk.) Long by the lack of endoperidium and capillitium. Lloyd (1906) and Cunningham (1944) put *A. drummondii* into synonymy with *A. album*, but Demoulin (1972) treated the former as a distinct species from *A. album* by its globose, large basidiospores (4.8–5 µm in diameter) and yellowish gleba. *Arachnion iulii*, described from Italy, has greenish gleba and larger basidiospores (4.5–6.5 µm in diameter) than *A. album* (Quadraccia 1996). *Arachnion tener*, known from South Africa, was treated as a synonym of *A. album* by Lloyd (1906) and Bottomley (1948) because of its small basidiospores (3.7–4 µm in diameter) and ash-grayish gleba. However, *A. tener* is now considered to be a distinctive species from *A. album* because of its glebal peridioles that consist of hyaline hyphae (Long 1941; Demoulin 1972). Although Sarasini (2005) put *A. album* into synonymy with *A. lloydianum* Demoulin, the microscopic characters of these two species are quite different. Basidiospores of *A. lloydianum* are globose to ovoid and warty under the SEM (Calonge 1998); those of *A. album* are ovoid to subglobose and smooth under the SEM (see Fig. 3). Moreover, *A. lloydianum* has capillitia (Demoulin 1972; Calonge 1998) whereas *A. album* lacks capillital threads. Therefore, *A. album* and *A. lloydianum* are clearly distinct species.

The family Arachniaceae including *Arachnion* differs from Lycoperdaceae mainly in its gleba consisting of peridioles, which separate and form ash-gray to yellowish particles resembling small sand grains at maturity, and occasionally the capillitium and paracapillitium are absent (Demoulin 1972; Miller and Miller 1988). A similar structure of the gleba is rarely observed in some species of the genus *Morganella*, a member of Lycoperdaceae growing on dead trunks (Kreisel and Dring 1967; Suãrez and Wright 1996). Although some species of *Morganella* have a paracapillitium, the capillitium is absent (Kreisel and Dring 1967; Suãrez and Wright 1996). These morphological characters suggest the relationships between Arachniaceae and Lycoperdaceae. Recently, Kirk et al (2001) put *Arachnion* into Lycoperdaceae. However, Arachniaceae are separated from Lycoperdaceae by the basidiospores, which are liberated in clusters at maturity, whereas those of Lycoperdaceae are dispersed individually.

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