

Two onygenalean fungi from Russian Far East soil

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Two onygenalean fungi isolated from forest soil in the Sikhote-Alin reserve, Russian Far East (east Siberia), are described and illustrated: *Gymnostellatospora parvula* as a new species and *Aphanoascus canadensis* as a new record. *Gymnostellatospora parvula* is characterized by psychrophilic growth, pale yellow to pale cinnamon ascomata with a hyphal peridium, small, hyaline discoid ascospores with an equatorial rim and more or less longitudinally ridged wall.

Key Words—ascomycetes; Onygenales; Russian Far East; soil fungi; systematics.

As part of a series of studies on cold-climatic Asian mycoflora, two onygenalean fungi were isolated from forest soil in the Russian Far East (east Siberia). One of them is a psychrophilic species of *Gymnostellatospora* Udagawa et al. (Udagawa et al., 1993; Uchiyama et al., 1995; Udagawa, 1997). It shows a significant feature of the genus in the development of pale-colored, barely differentiated ascomata with an incomplete envelope of more or less thick-walled hyphae and hyaline one-celled ascospores, which are ornamented by longitudinal or somewhat irregular ridges. However, the present fungus is distinguished within the genus by its small discoid ascospores, the walls of which bear an equatorial rim or thickening. The second species was identified as *Aphanoascus canadensis* Currah, a rare fungus known only from carnivore dung in Alberta as the original collection and from Pyrenean forest soil (Currah, 1985; Cano and Guarro, 1990). In this communication, we describe them as a new species and a new record.

Taxonomy

Gymnostellatospora parvula Udagawa et Uchiyama, sp. nov. Figs. 1–7

Coloniae in “PCA” 15°C restrictae, velutinae vel floccosae, planae, ex mycelio basali coacto tenuiter constantes, primum stramineae, deinde brunneo-aurantiacae vel cinnamomeae, ascomatibus abundantibus formantes; reversum rubro-brunneum vel badium.

Ascomata superficialia, discreta vel saepe confluentia, globosa vel aliquantum irregularia, 180–300 µm diam, dilute flava, ad maturitatem dilute cinnamomea, tarde maturescentia. Hyphae peridii hyalinae vel dilute flavo-brunneae, paulo incrassatae, asperulatae, septatae, usque 2.5 µm diam, ramosae et anastomosantes, telaperidio formantes, in extremitates hyalinas sinuosas leves terminantes; appendix nulla. Asci octospori, non-

catenulati, globosi vel subglobosi vel ovoidei, 5–6.5 × 5–5.5 µm, evanescentes. Ascosporae disciformes, cum uno labro aequatorio, 2.8–3.5 × 1.5–2 µm, hyalinae, longitudinaliter vel irregulariter porcatae sub SEM.

Mycelio vegetativo ex hyphis hyalinis, ramosis, levibus, septatis, 1–2.5 µm diam composito. Anamorphosis abest.

Holotypus: SUM 3081, colonia exsiccata in cultura ex solo sylvae, Ust-Serebreny, Sikhote-Alin, in Rossia orientali, 11.VII.1994, a S. Uchiyama isolata et ea collectione fungorum Musei et Instituti Historiae Naturalis Chiba (Natural History Museum and Institute, Chiba, Japan, CBM) conservata.

Etymology: Latin, *parvula* = very small, referring to the small size of ascospores.

Colonies on potato-carrot agar (PCA) growing restrictedly, attaining a diam of 20–22 mm in 28 d at 15°C, velvety to floccose, plane, consisting of a thin basal felt, producing abundant ascomata on the felt, overgrown by a loose network of aerial hyphae, at first Light Yellow (M. 3A4, Kornerup and Wanscher, 1978) or Straw (Rayner, 1970), becoming Brownish Orange (M. 6C4) or Cinnamon (R) in about 28 d; margins irregularly dissected and submerged; exudate scattered, clear; reverse Reddish Brown (M. 9D5) or Bay (R). Colonies on cellulose agar (Udagawa et al., 1993) as on PCA but growing somewhat more rapidly up to 25 mm in 28 d at 15°C, floccose, thin, vegetative mycelium submerged, with aerial hyphae sparse and Pale Yellow (M. 3A3); ascomata abundantly produced on the substratum, when massed appearing granular and Greyish Orange (M. 5B4) or Cinnamon (R) in color; reverse Pale Yellow (M. 4A3) or Buff (R). Colonies on phytone yeast extract agar (PYE, Carmichael, 1962) growing restrictedly, attaining a diam of 16–17 mm in 21 d at 15°C, more or less funiculate, almost plane, consisting of a thin mycelial felt, white to Light Yellow (M. 4A4); ascomata not produced; reverse Dark Ruby (M. 12F) or Chestnut (R).

Ascomata superficial, discrete or often confluent,

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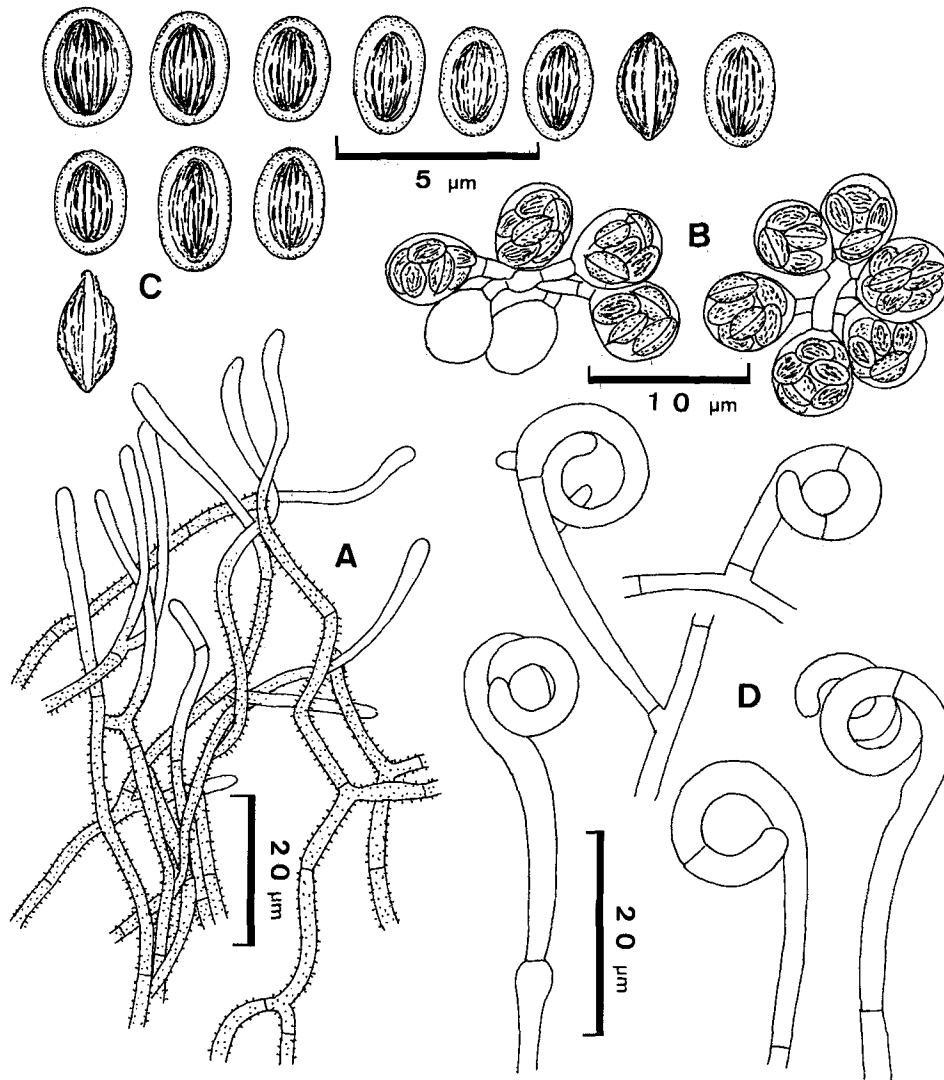


Fig. 1. *Gymnostellatospora parvula*.
A. Terminal part of peridial hyphae. B. Clusters of asci. C. Ascospores. D. Ascomatal initials.

globose or somewhat irregular in shape, 180–300 μm in diam, pale yellow, becoming pale cinnamon in age, maturing slowly within 28 d or more. Peridial hyphae at first undifferentiated, hyaline to pale yellowish brown, rather thick-walled, asperulate, septate, up to 2.5 μm in diam, branched and anastomosed, forming an incomplete network in age; free ends hyaline, sinuous, smooth-walled, not forming a distinct appendage. Asci 8-spored, singly borne, hyaline, globose to subglobose or ovoid, 5–6.5 \times 5–5.5 μm , short-stipitate, evanescent. Ascospores discoid, fusiform in side view, 2.8–3.5 \times 1.5–2 μm (incl. rim), hyaline, with a prominent equatorial rim, with convex surface ornamented by longitudinal or somewhat irregular ridges (under SEM).

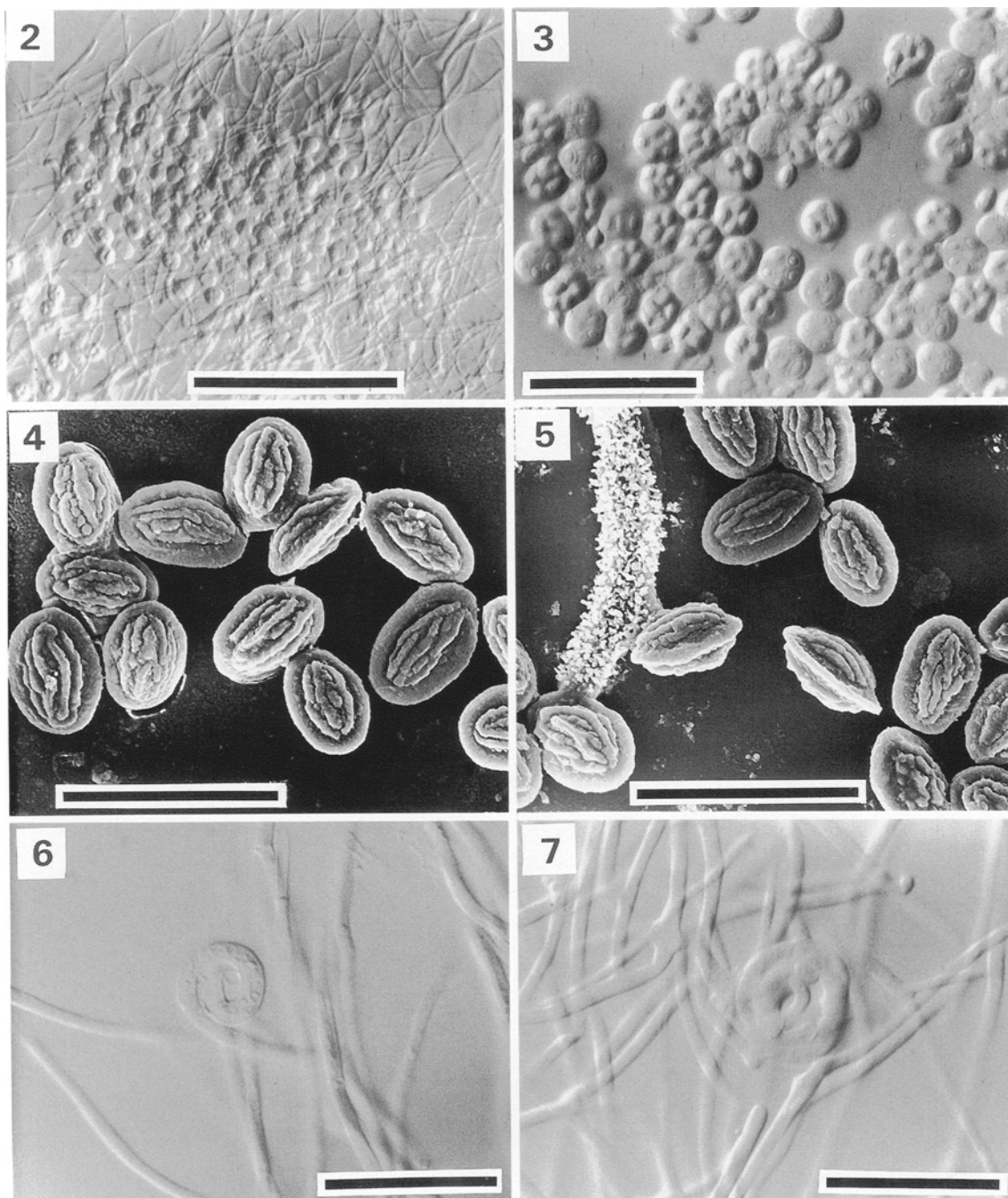
Vegetative mycelium composed of hyaline, branched, smooth-walled, septate, 1–2.5 μm diam hyphae; racquet hyphae present; ascomatal initials arising as a large coiled branch from the hypha; anamorph not seen.

Cellulolytic.

At 25°C, colonies scarcely grow, mostly not exceeding 4 mm in diam in 14 d. At 37°C, growth is nil.

Specimen examined: a dried culture isolated from forest soil, Ust-Serebreny, Primorsk Kray region, Sikhote Alin reserve, Russian Federation, 11 July 1994, isol. S. Uchiyama, SUM 3081, holotype. The type specimen has been deposited in the CBM.

Note: *Gymnostellatospora parvula* is somewhat similar to *G. alpina* (Müller et von Arx) Udagawa and *G. frigida* Uchiyama, Kamiya et Udagawa, because these species are typically psychrophilic and their ascomata are less highly differentiated than the disarticulated mesh-like structures which characterize the type species of *Gymnostellatospora* (Müller and Arx, 1982; Udagawa et al., 1993; Uchiyama et al., 1995). *Gymnostellatospora parvula* differs from the latter two species principally in the character of its ascospores. Ascospores of *G. alpina* are navicular-fusiform, 3–4.5 \times 1.5–2 μm , one side flattened, and with usually three longitudinal rims; those of



Figs. 2–7. *Gymnostellatospora parvula*.

2. A part of ascoma. 3. Asci. 4. Ascospores (SEM). 5. Ascospores and a part of peridial hypha, showing an asperulate wall (SEM). 6, 7. Ascomatal initials. Scale bars: 2=50 μm ; 3, 6, 7=20 μm ; 4, 5=5 μm .

G. frigida are ellipsoid-fusiform, $4\text{--}5 \times 2\text{--}2.5 \mu\text{m}$, more or less acuminate at both ends, and with roughly striate surface by low irregular ridges.

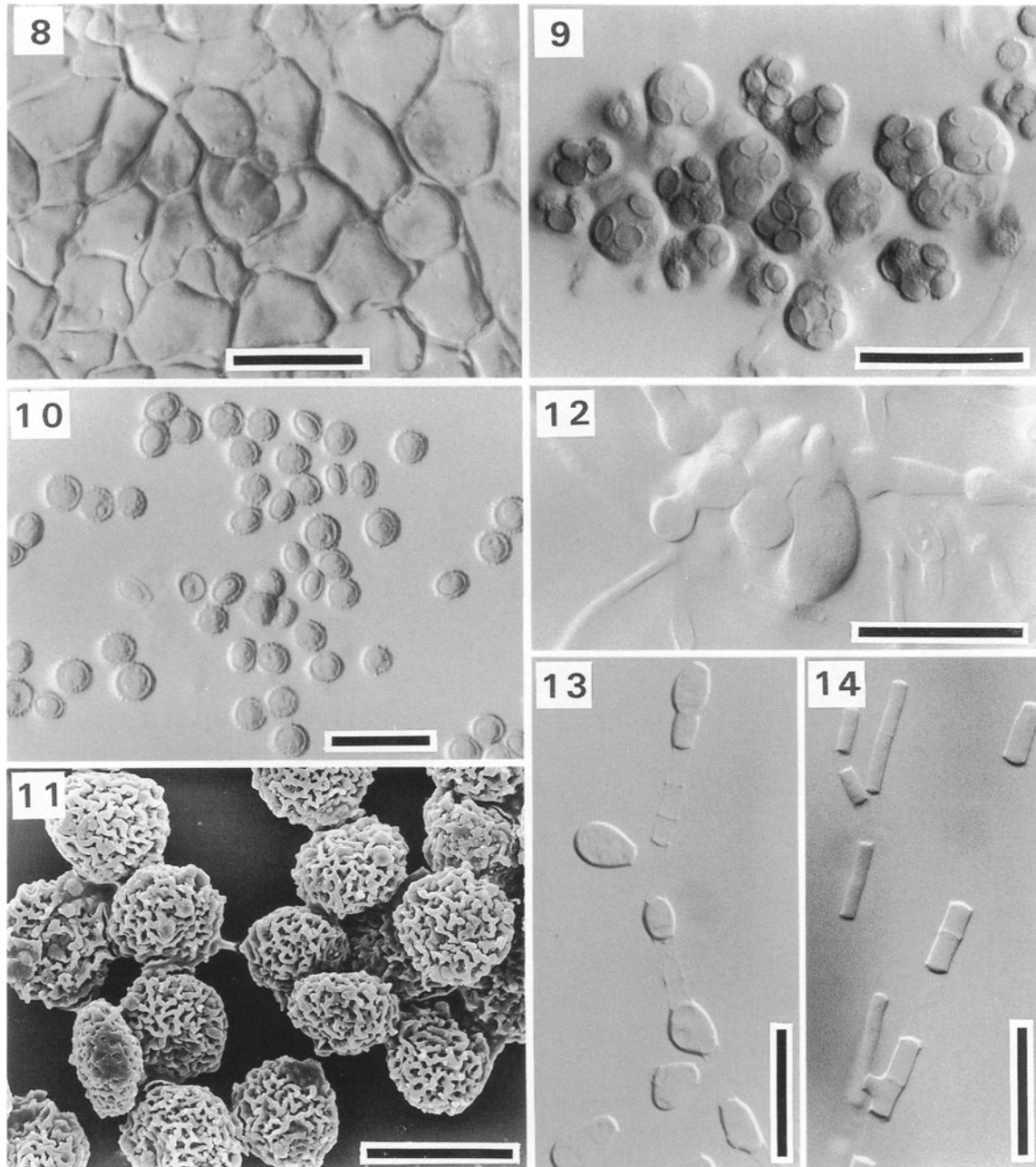
Aphanoascus canadensis Currah, Mycotaxon **24**: 139. 1985; Cano and Guarro, Mycol. Res. **94**: 358. 1990.

Figs. 8–14

Colonies on PCA spreading rapidly, attaining a diam of 70 mm or more in 28 d at 25°C, floccose, plane, con-

sisting of a thin basal mycelium, white to Yellowish White (M. 4A2); ascomata slowly developing on the mycelium, Brownish Grey (M. 10E2) or Mouse Grey (R) in color, overgrown by white aerial hyphae and conidia; reverse uncolored to Greyish Orange (M. 5B4) or Pale Luteous (R).

Ascomata globose to subglobose, 230–540 μm in diam, dark brown, glabrous, non-ostiolate; peridium yellowish brown, opaque, thin, membranaceous, com-



Figs. 8–14. *Aphanoascus canadensis*.

8. Membranaceous peridium. 9. Asci. 10. Ascospores. 11. Ascospores (SEM). 12. Ascomatal initial. 13, 14. Conidiogenous cells and conidia. Scale bars: 8, 9, 12–14 = 20 μm ; 10 = 10 μm ; 11 = 5 μm .

posed of textura angularis, 6–20 \times 3–14 μm cells. Asci 8-spored, globose to subglobose or pyriform, 8–12 \times 6.5–9.5 μm , evanescent. Ascospores oblate, 3–4.5 \times 2–3.5 μm , yellow, finely reticulate.

Anamorph: *Malbranchea* sp. Arthroconidia usually alternate, cylindrical, 5–24(–36) \times 2.5–4 μm , truncate at both ends, hyaline, smooth-walled, sometimes swollen into more or less globose or triangular cells measuring 6.5–13 \times 4–8 μm . Terminal aleurioconidia ovoid to pyriform, 6.5–11 \times 3–6.5 μm , rounded above, truncate at the base, hyaline, smooth-walled.

Keratinolytic.

At 37°C, growth is very restricted.

Distribution: Canada, Spain, Russia.

Specimen examined: SUM 3073, a dried culture isolated from forest soil, Kabany-Ammonity, Primorsk Kray region, Sikhote Alin reserve, Russian Federation, 12 July 1994, isol. S. Uchiyama.

Note: *Aphanoascus canadensis* is apparently reported for the first time in the Far East. It is characterized by dark brown, cleistothecial ascomata, yellow, oblate, finely reticulate ascospores and a *Malbranchea* anamorph.

Aphanoascus canadensis resembles *A. mephitalis* (Malloch et Cain) Cano et Guarro on basis of the similarity of the ascospore size and shape (Malloch and Cain, 1971; Cano and Guarro, 1990). It differs, however, from the latter species by solitary ascomata (never clustered nor covered by a tomentum) and the reticulate ornamentation of ascospores.

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