

## New and interesting species of *Emericella* from Chinese soil

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Accepted for publication 7 August 1996

***Emericella miyajii*, a new species isolated from Chinese soil, is described and illustrated. It is characterized by pale orange to brownish orange colonies on malt extract agar, subglobose to broadly elliptical ascospores with defective four equatorial crests and smooth convex walls, and with an *Aspergillus* anamorph. *Emericella undulata* is also described as an uncommon species from Chinese soil.**

Key Words—*Aspergillus miyajii*; China; *Emericella miyajii*; *Emericella undulata*; soil fungi.

During the course of a survey of soil-borne mycotoxigenic fungi and pathogenic fungi in China in 1994 and 1995, a new species and an uncommon *Emericella* were isolated from Chinese soil by the soil-plate method (Warcup, 1950). The new species is characterized by subglobose to broadly elliptical ascospores with defective four equatorial crests and smooth convex walls.

The species proved to be sufficiently different from all previously described *Emericella* species (Christensen and Raper, 1978; Christensen and States, 1982; Christensen et al., 1978; Horie, 1978, 1979, 1980; Horie and Udagawa, 1995; Horie et al., 1989, 1990, 1996; Kong and Qi, 1986; Malloch and Cain, 1972; Mehrotra and Prasad, 1969; Raper and Fennell, 1965; Samson and Mouchacca, 1974, 1975; Udagawa and Horie, 1976; Udagawa and Muroi, 1979) to warrant its description as a new taxon. Living cultures of the new species as well as dried materials are deposited at the Natural History Museum and Institute, Chiba (CBM).

***Emericella miyajii* Horie, sp. nov.** Figs. 1, 3–6

Cleistothecia superficialia, dispersa vel aggregata, globosa vel subglobosa, 100–160  $\mu\text{m}$  diam, cum “hülle”-cellulis numerosis, globosis vel subglobosis, crassitunicatis, 14–22  $\mu\text{m}$  diam circumcincta; peridium atrobrunneum vel atrobrunneo-purpureum, tenue, ex “textura intricata” compositum, bi- vel tri-stratum. Asci solemniter 8-sporei, infrequenter 1- vel 7-sporei, globosi vel subglobosi vel ovoidei, 7.5–10  $\times$  7.5–9  $\mu\text{m}$ , evanescentes. Ascosporeae rubro-brunneae vel brunneo-violaceae vel violaceo-brunneae, lenticulares, subglobosae vel late ellipticae, 3.5–6(–10)  $\times$  3.5–5.5(–8)  $\times$  3–3.5  $\mu\text{m}$ , cristis aequatorialibus defectivis quadro plicatis praeditae, partibus convexis levibus ornatae. Status anamorphus: *Aspergillus miyajii*.

Holotypus: CBM-FA-716, colonia exsiccata ex cultura ex solo in Nanjia, Yinchuan, Ningxia, China, 19. VII. 1995, a Y. Horie isolata et ea collectione fungorum Musei et Instituti Historiae Naturalis Chiba (CBM) conservata.

Etymology: named in memory of Professor Makoto Miyaji, Research Center for Pathogenic Fungi and Microbial Toxicoses, Chiba University, Chiba-ken, Japan, eminent medical mycologist.

Anamorphosis: *Aspergillus miyajii* Horie, anam. st. nov.

Capitula conidica griseo-viridia, radiata, 20–50  $\mu\text{m}$  diam. Conidiophora ex hyphis aeriis oriunda; stipites breves, plus minusve sinuosi, 25–130  $\times$  4–7  $\mu\text{m}$ , griseo-flavi vel olivacei; vesiculae subglobosae vel ampulliformes, griseo-flavae vel olivaceae, 7–12(–15)  $\mu\text{m}$  diam, in summa 1/2 parte fertiles. Aspergilla biseriata; metulae 6–7  $\times$  3–5  $\mu\text{m}$ ; phialides 4–6  $\times$  2–3  $\mu\text{m}$ . Conidia globosa vel subglobosa, 3–4  $\mu\text{m}$  diam, levia vel scabra. Status teleomorphus: *Emericella miyajii*.

Coloniae in agar Czapekii restrictae, planae, ex mycelio coacto tenuiter constantes, aurantiaco-albae vel rubro-albae; cleistothecia exigua; capitula conidica sparsa; reversum brunneo-aurantiacum vel griseo-brunneum.

Coloniae in agaro maltoso (MEA) effusae, planae, ex mycelio coacto tenuiter constantes, granulares; cleistothecia abunde formantia, cum “hülle”-cellulis circumcincta, ex hyphis aeriis et capitulis conidicis laxo oblecta; capitula conidica sparsa, dilute aurantiaca vel brunneo-aurantiaca; reversum brunneo-aurantiacum vel brunneum.

Coloniae in agar “oatmeal” (OA) celeriter crescentes, plus minusve floccosae, planae, ex mycelio coacto tenuiter constantes, granulares; cleistothecia abunde formantia, cum “hülle”-cellulis circumcincta, ex hyphis aeriis et capitulis conidicis laxo oblecta; capitula

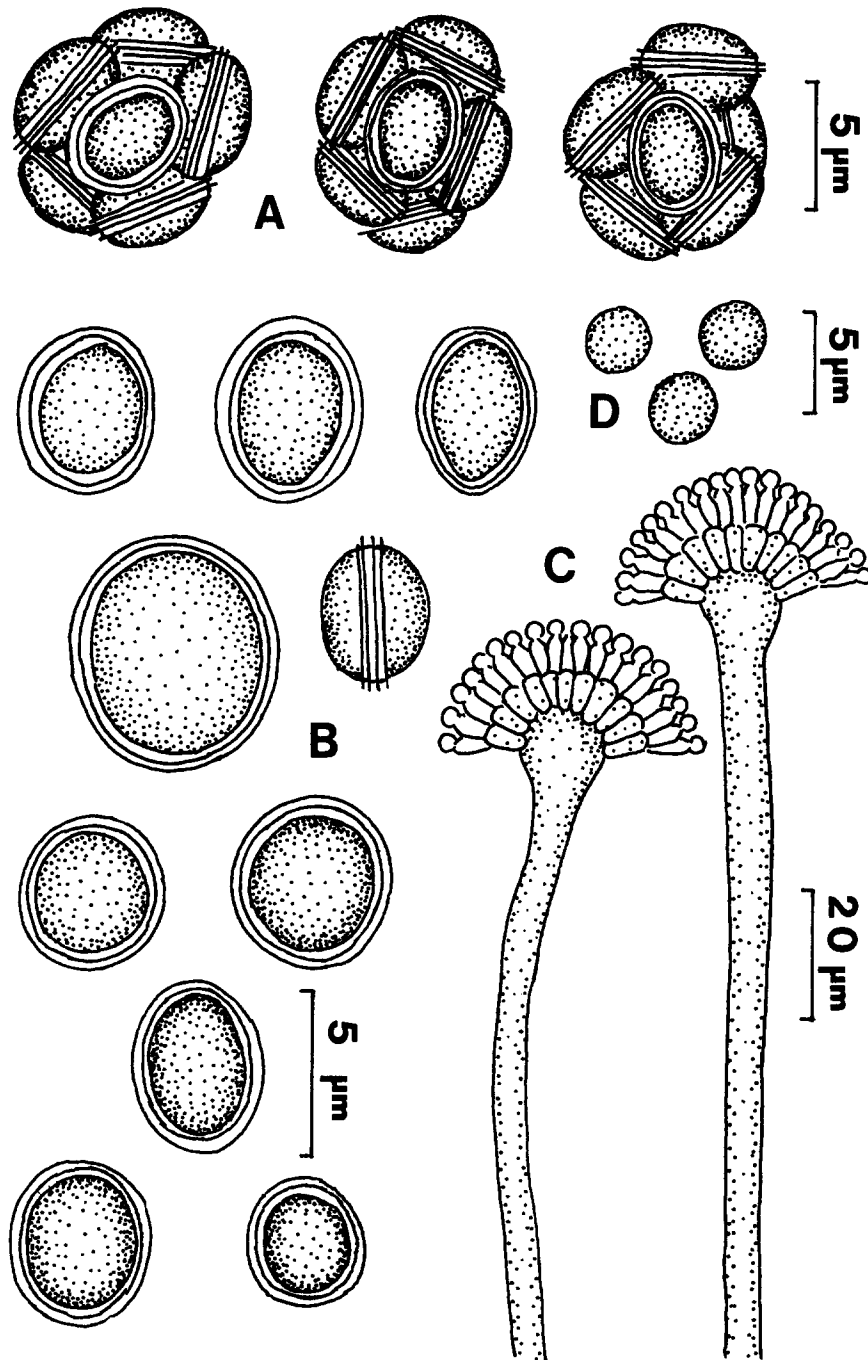


Fig. 1. *Emericella miyajii* Horie, CBM-FA-716.  
A. Asci. B. Ascospores. C. Aspergilla. D. Conidia.

conidica numerosa, griseo-aurantiaca; reversum aurantiaco-album.

Holotypus: CBM-FA-716, loc. cit.

Cleistothecia superficial, scattered or aggregated in a thin layer, globose to subglobose, 100–160  $\mu\text{m}$  in diam, surrounded by a hyaline to pale yellowish brown layer of scattered hyphae bearing numerous globose to subglobose thick-walled hülle cells measuring 14–22  $\mu\text{m}$  in diam; peridium dark brown to dark brownish purple, thin, consisting of irregular cells measuring 3–12  $\mu\text{m}$  in diam.

Asci irregularly disposed, commonly 8-spored, infrequently 1- to 7-spored, globose to subglobose or ovoid, 7.5–10  $\times$  7.5–9  $\mu\text{m}$ , evanescent. Ascospores Reddish Brown (9E7 after Kornerup and Wanscher, 1978) to Brownish Violet (11D7) or Violet Brown (11E7), lenticular, subglobose to broadly elliptical, irregular in size, 3.5–6 (–10)  $\times$  3.5–5.5 (–8)  $\times$  3–3.5  $\mu\text{m}$  including crests, with defective four conspicuously pleated equatorial crests measuring about 1  $\mu\text{m}$  wide, with smooth convex walls.

Conidial heads grayish green, radiate, 20–50  $\mu\text{m}$  in

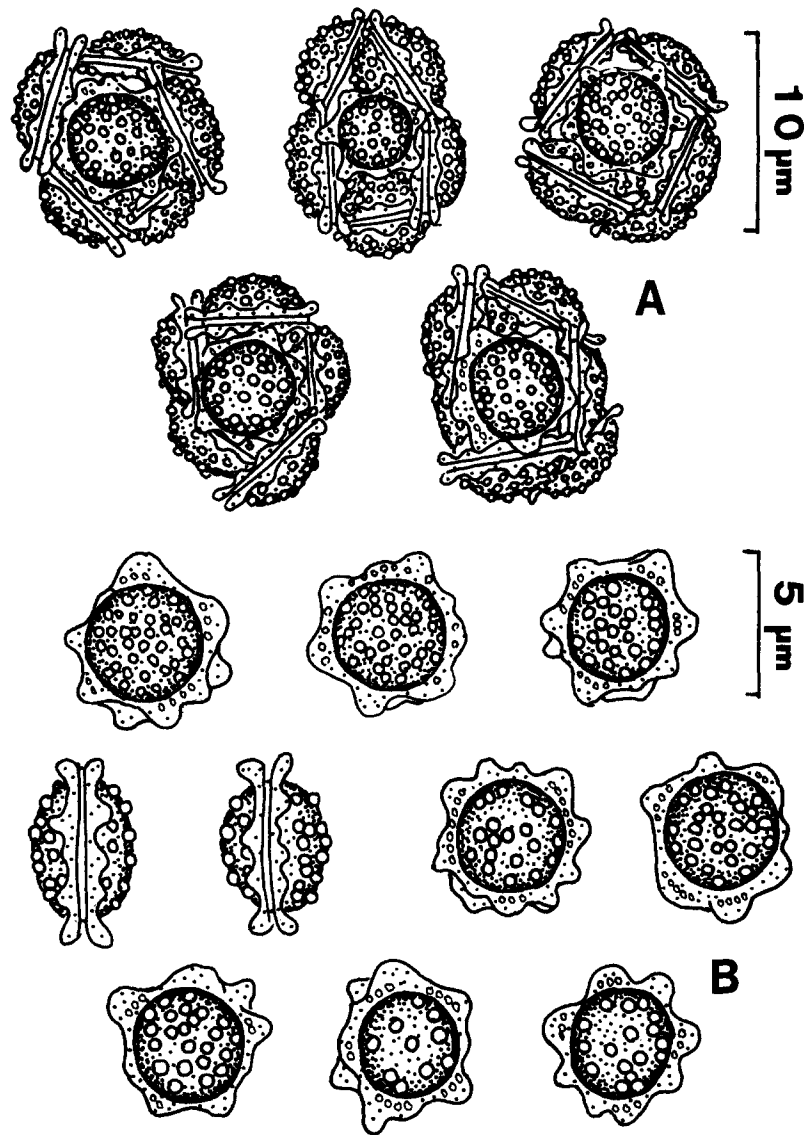


Fig. 2. *Emericella undulata* Kong & Qi, CBM-FA-715.  
A. Asci. B. Ascospores.

diam. Conidiophores arising mostly from aerial hyphae; stipes short, more or less sinuous,  $25-130 \times 4-7 \mu\text{m}$ , grayish yellow to olive; vesicles subglobose to flask-shaped, grayish yellow to olive,  $7-12 (-15) \mu\text{m}$  in diam, fertile over the upper half. Aspergilla biseriate; metulae pale grayish green,  $6-7 \times 3-5 \mu\text{m}$ ; phialides pale grayish green,  $4-6 \times 2-3 \mu\text{m}$ . Conidia globose to subglobose,  $3-4 \mu\text{m}$  in diam, pale yellowish olive, smooth or minutely rough.

Colonies on Czapek's solution agar growing restrictively, attaining a diameter of 14-19 mm in 14 d at  $25^\circ\text{C}$ , consisting of a thick mycelial felt, more or less furrowed; cleistothecia few in number; conidial heads limited in number; Orange White (6A2) to Reddish White (7A2); reverse Brownish Orange (7C4) to Greyish Brown (7D3).

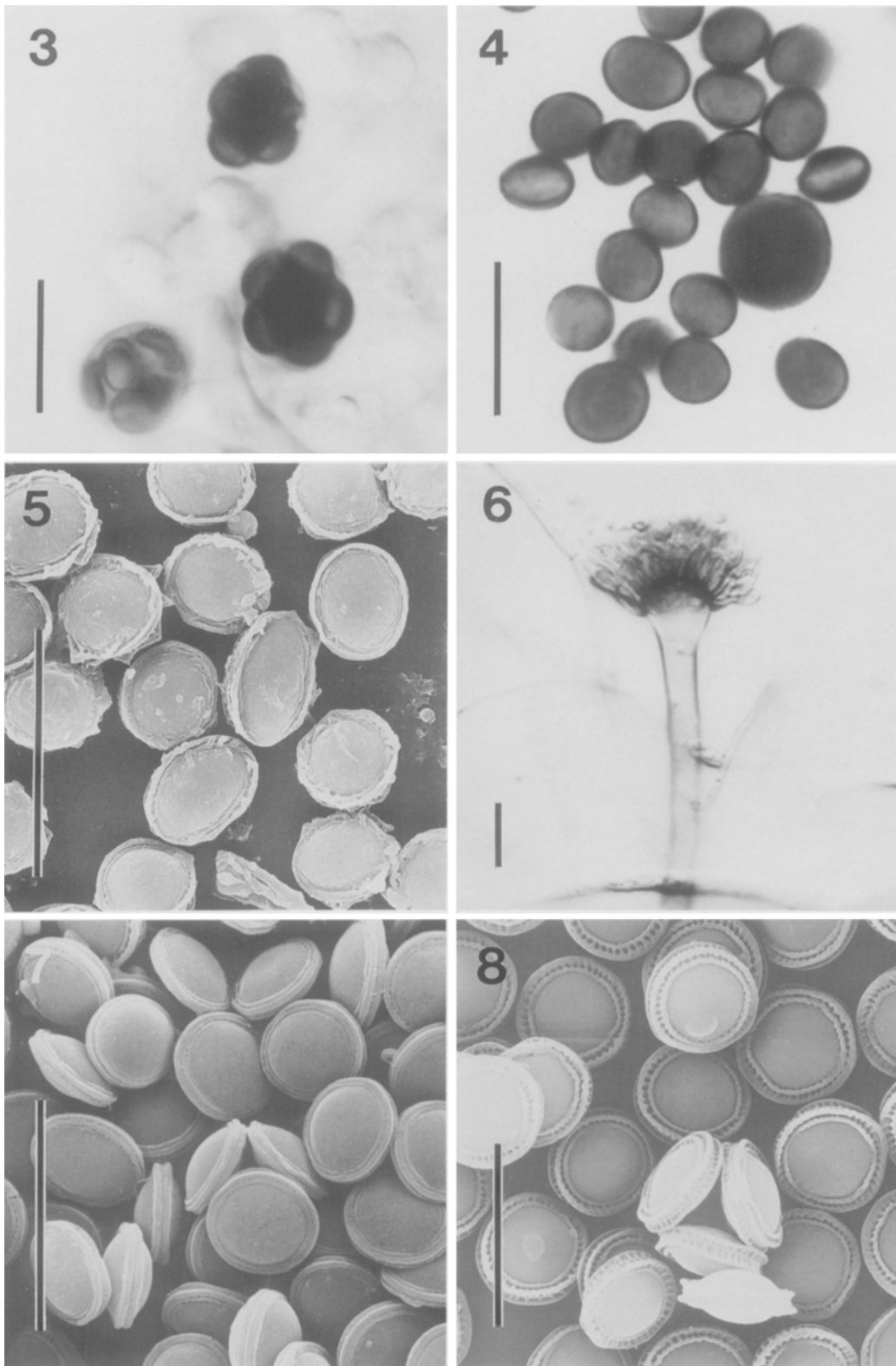
Colonies on MEA spreading broadly, attaining a diameter of 52-72 mm in 14 d at  $25^\circ\text{C}$ , more or less floccose, plane, consisting of a thin mycelial felt, granular in

appearance due to the production of abundant cleistothecia with hülle cells, overgrown by a loose network of aerial hyphae, Pale Orange (6A3) to Brownish Orange (6C4 to 6C5); conidial heads limited in number; reverse Brownish Orange (6C6) to Brown (6D7).

Colonies on OA spreading broadly, attaining a diameter of 63-65 mm in 14 d at  $25^\circ\text{C}$ , more or less floccose, plane, consisting of a thin mycelial felt, granular in appearance due to the production of abundant cleistothecia with hülle cells, overgrown by loose network of aerial hyphae, Greyish Orange (5B4 to 6B4); reverse Orange White (5A2).

At  $37^\circ\text{C}$ , growth and cleistothecial production are better than at  $25^\circ\text{C}$ .

Specimen examined: CBM-FA-716 (holotype), a dried culture derived from an isolate of Chinese matrimony vine field soil, the Nanjia collective farm, Yinchuan, Ningxia Province, China, collected by Y. Horie.



Figs. 3-6. *Emericella miyajii*, CBM-FA-716. 3. Asci; 4. Ascospores (LM); 5. Ascospores (SEM); 6. Aspergillum  
 Fig. 7. *Emericella acristata*, CBM-FA-068. Ascospores (SEM).  
 Fig. 8. *Emericella quadrilineata*, CBM-FA-096. Ascospores (SEM).  
 All scale bars = 10  $\mu$ m.

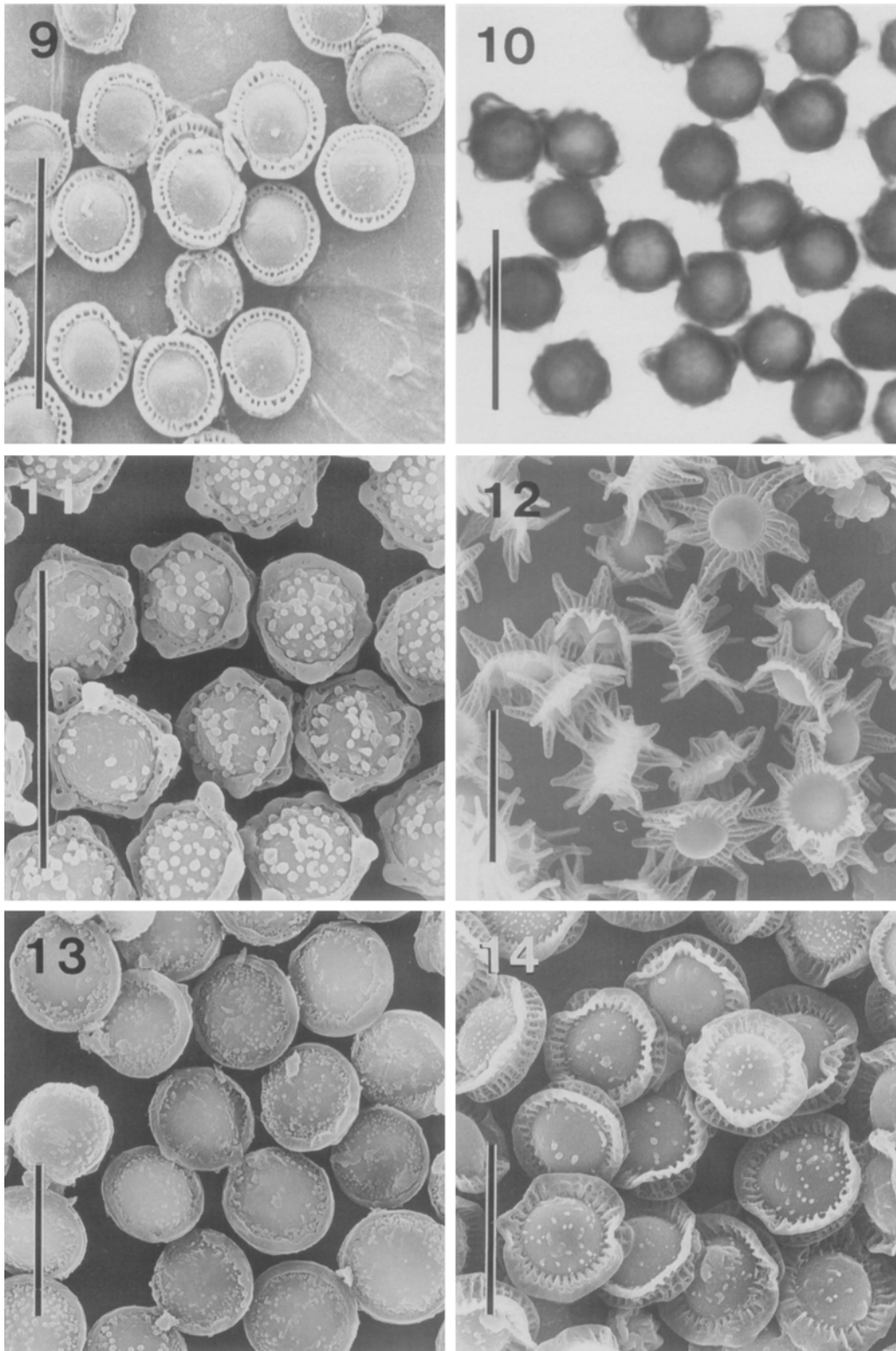


Fig. 9. *Emericella parvathecia*, CBM-FA-763. Ascospores (SEM).  
 Figs. 10, 11. *Emericella undulata*, CBM-FA-715. 10. Ascospores (LM); 11. Ascospores (SEM).  
 Fig. 12. *Emericella varicolor*, CBM-FA-110. Ascospores (SEM).  
 Fig. 13. *Emericella desertorum*, CBM-FA-080. Ascospores (SEM).  
 Fig. 14. *Emericella omanensis*, CBM-FA-700. Ascospores (SEM).  
 All scale bars = 10  $\mu$ m.

Isolated and developed by Y. Horie in the laboratory of the Research Center of Medical Mycology, Beijing Medical University, Beijing, as strain No. 95-NC-33, 19 July 1995, and deposited in the Natural History Museum and Institute, Chiba (CBM).

This species is characterized by having (1-)8-spored asci and subglobose to broadly elliptical ascospores with defective four equatorial crests.

In the surface ornamentation observed by scanning electron microscopy (SEM), ascospores of the new species are somewhat similar to those of *Emericella acristata* (Fennell & Raper) Horie, *E. parvathecica* (Raper & Fennell) Malloch & Cain and *E. quadrilineata* (Thom & Raper) C. R. Benj. (Horie, 1980). However, *E. acristata*, *E. parvathecica* and *E. quadrilineata* differ from the new species in their ascospore shape (Figs. 7-9).

***Emericella undulata*** Kong & Qi, Acta Mycol. Sinica 5: 211-213. 1986. Figs. 2, 10, 11

Colonies on Czapek's solution agar growing restrictively, attaining a diameter of 22-23 mm in 14 d at 25°C, plane, consisting of a thin mycelial felt; cleistothecia few in number, Yellowish Grey (3C2 to 4B2); conidial heads not produced; reverse Greyish Brown (7E3).

Colonies on MEA spreading broadly, attaining a diameter of 48-51 mm in 14 d at 25°C, plane, consisting of a thin mycelial felt, granular in appearance due to the production of abundant cleistothecia with hülle cells, Brownish Grey (8E1 to 9E2); conidial heads not produced; reverse Greyish Brown (8F3) to Brownish Grey (10F2).

Colonies on OA spreading broadly, attaining a diameter of 40-45 mm in 14 d at 25°C, plane, consisting of a thin mycelial felt, granular in appearance due to the production of abundant cleistothecia, Brownish Grey (8E2) to Greyish Brown (9E3); conidial heads not produced; reverse Dark Brown (9F4) to Violet Brown (10F5).

Cleistothecia superficial, scattered or aggregated in a thin layer, globose to subglobose, 200-300 µm in diam, surrounded by a hyaline to pale yellowish brown layer of scattered hyphae bearing numerous globose to ovoid, thick-walled hülle cells measuring 12-26 µm in diam. Peridium brown to dark brown, thin, of textura intricata, 2-3-layered; outermost layer consisting of hyphal cells measuring 2.5-12.5 µm in diam. Asci irregularly disposed, 8-spored, globose to subglobose or ovoid, 10-12 × 8.5-10.5 µm, evanescent. Ascospores at first hyaline to pale reddish brown, becoming Violet Brown (11F7) to Dark Ruby (12F7) or Dark Magenta (13F7), broadly lenticular, spore body 3.5-4.5 × 3.0-4.0 µm, with two conspicuously pleated and stellate equatorial crests measuring 1-2 µm wide, with capitate convex walls, ornamented with spherical swellings measuring up to 0.5 µm in diam (Figs. 10, 11).

Anamorph not produced.

At 37°C, growth and cleistothecial production are more limited than at 25°C.

Specimen examined: CBM-FA-715, in culture from the desert soil near the Great Wall of the Ming period in

Yinchuan, Ningxia Province, China, isolated and developed by Y. Horie in the laboratory of the Research Center of Medical Mycology, Beijing Medical University, Beijing, as a strain No. 95-NC-369-1, 21 July 1995, and deposited in the Natural History Museum and Institute, Chiba (CBM).

This species, first isolated from soil at Shennongjia, Hubei Province (Kong and Qi, 1986), is characterized by pale orange to brownish orange colonies, ascospores with stellate equatorial crests and capitate convex walls, and an anamorph of *Aspergillus* section *Nidulantes*. Despite its failure to develop an anamorph upon any substratum tested, our strain (CBM-FA-715) shows the general characters of *E. undulata* sufficiently to be identified satisfactorily.

In the surface ornamentation observed by SEM, ascospores of *E. undulata* are somewhat similar to those of *E. varicolor* Berk. & Br. (Raper and Fennell, 1965). However, *E. varicolor* differs from *E. undulata* in its smooth convex walls of ascospores (Fig. 12). The ascospores of *E. undulata* are also somewhat similar to those of *E. desertorum* Samson & Mouchacca and *E. omanensis* Horie & Udagawa (Samson and Mouchacca, 1974; Horie and Udagawa, 1995). However, these two species differ from *E. undulata* in their ascospore ornamentation as shown by Figs. 13 and 14.

Acknowledgements—The authors thank Dr. Shun-ichi Udagawa, Nodai Research Institute, Tokyo University of Agriculture, for reading the manuscript and making helpful suggestions. This work was supported as International Scientific Research Program of The Ministry of Education, Science, Sport and Culture by a grant-in-aid for Scientific Research (Field Research).

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