Mycoscience 42: 289–294, 2001

New and interesting species of *Eurotium* from Chinese soil

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Received 22 January 2001
Accepted for publication 25 April 2001

***Eurotium taklimakanense*, a new species isolated from desert soil in the Taklimakan desert, Xinjiang Province, China, is described and illustrated. It is characterized by light yellow to reddish yellow colonies on Czapek's agar with 70% (w/v) sucrose, yellow ascomata, broadly lenticular ascospores with conspicuously irregular equatorial crests and tuberculate or verrucose convex surfaces, and an *Aspergillus* anamorph. *Eurotium cristatum* is also described as a new record from China. It is characterized by light yellow colonies on Czapek's agar with 70% sucrose, yellow ascomata, broadly lenticular ascospores with two equatorial crests and echinulate convex surfaces, and small tuberculate conidia.**

Key Words——China; *Eurotium cristatum*; *Eurotium taklimakanense*; soil fungi; systematics.

In a survey of soil-borne hazardous fungi in China begun in 1994, two interesting ascomycetes were isolated from Xinjiang soil by the soil-plate method (Warcup, 1950). The first isolate is characterized by non-ostiolate ascomata surrounded by yellow aerial hyphae, pale yellow to light yellow ascospores with two equatorial crests, and an *Aspergillus* anamorph with uniseriate aspergilla, and by osmophilic growth on Czapek agar with 70% (w/v) sucrose. From these characters, the fungus is assignable to the genus *Eurotium*, Eurotiales (Malloch and Cain, 1972).

The ornamentation profiles of its ascospores, which show incomplete, often petal-shaped equatorial crests and tuberculate or verrucose spore walls, distinguish the isolate from currently recognized species of *Eurotium* (Raper and Fennell, 1965; Blaser, 1976; Kozakiewicz, 1989; Kong and Qi, 1995a, b). Thus, the isolate represents a new species of the genus. The second isolate is identified as *Eurotium cristatum* (Raper & Fennell) Malloch & Cain, a rare fungus known from S. Africa, U. K. (foodstuffs) and U. S. A. (mushroom compost).

Living cultures of these species as well as dried materials are deposited at the Natural History Museum and Institute, Chiba (CBM).

Eurotium taklimakanense Abliz & Y. Horie, sp. nov.
Figs. 1, 3–7

Coloniae in agaro "M40Y" celeriter crescentes, dilute flavae vel rubro-flavae, ascomata abundanter producentia; reversum flavo-aurantiacum vel aurantiacum.

Ascomata superficialia, non ostiolata, globosa vel subglobosa, 70–270 μm diam, cum hyphis flavis laxe intricatis circumdata; peridium brunneo-flavum vel brunneo-aurantiacum, membranaceum, tenue, unistratum, ex "textura angularis" compositum. Asci octospori, globosi vel subglobosi, 12–14 × 10–12.5 μm, evanescentes. Ascosporae flavidae vel laete flavae, late lenticulares, praeter cristam 7–8 × 5–6 μm, duabus cristis aequatorialibus conspicue irregularibus usque 0.5–2 μm latis praeditae, superficie convexa tuberculata vel verrucosa. Status anamorphus: *Aspergillus taklimakanensis*.

Holotypus CBM-FA-876, colonia exsiccata in cultura ex solo, Taklimakan desertum, Taochyon, Xinjiang, in Sina, 2. VIII. 1998, a Y. Horie isolata et ea in collectione fungorum Musei et Instituti Historiae Naturalis Chiba (CBM) conservata.

Etymology: Lat. *taklimakanense*, referring to Taklimakan, the type locality.

Anamorphosis: ***Aspergillus taklimakanensis*** Abliz & Y. Horie, anam. nov.

Coloniae in agaro Czapekii cum 70% saccharo celeriter crescentes, dilute-flavae vel flavae, ascomata abundanter producentia; conidiogenesis abundans; reversum griseo-flavum.

Capitula conidica griseo-flava vel cerina, radiata, 65–125 μm diam. Conidiophora ex hyphis aeriis vel mycelio basali orientia; stipites hyalini vel dilute flavo-brunnei, usque 435 μm longi, ad medium 5–7 μm crassi, leves, septati; vesiculae subglobosae vel ampulliformes, 12–

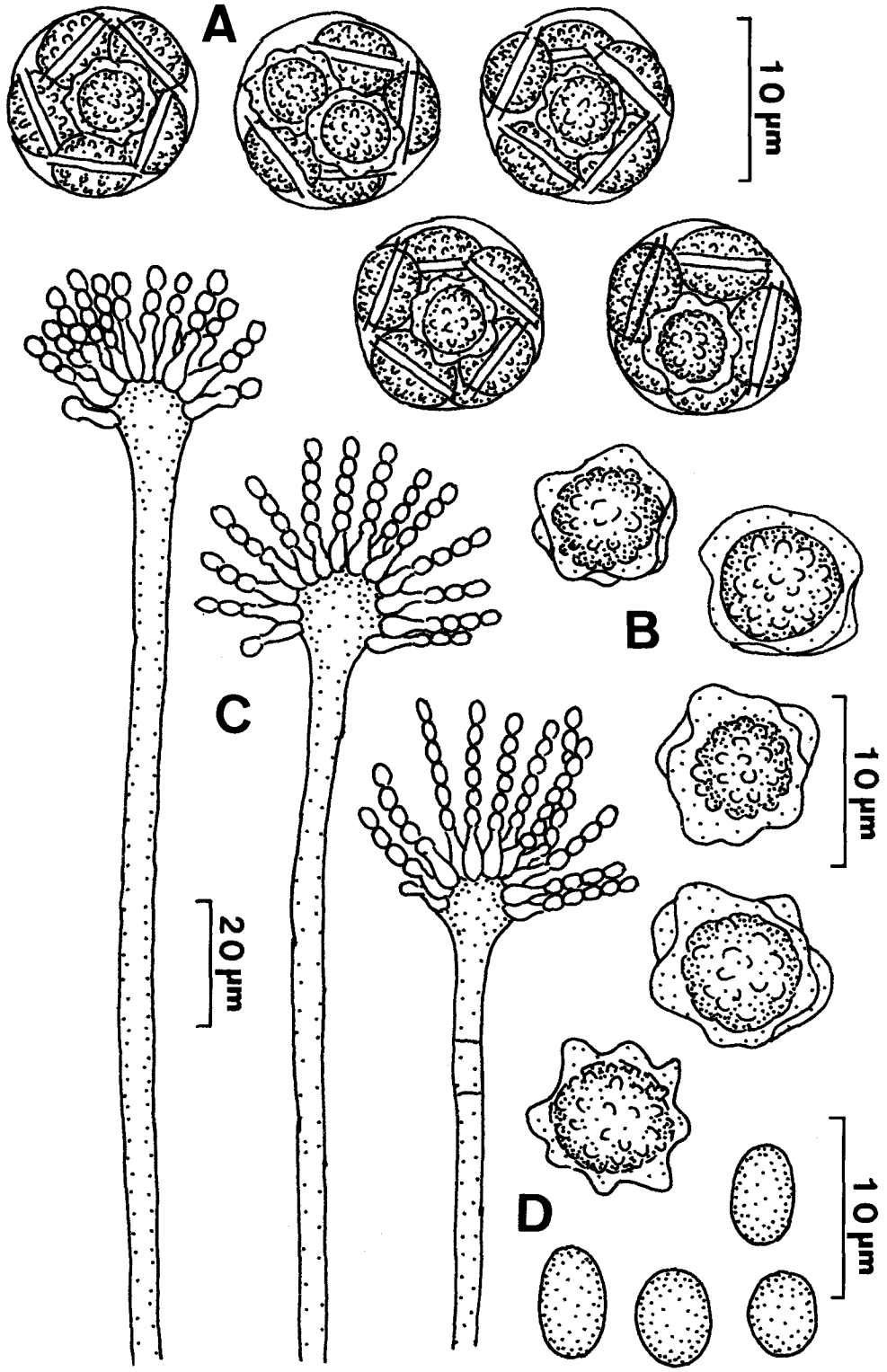


Fig. 1. *Eurotium taklimakanense*. A. Asci. B. Ascospores. C. Aspergilla. D. Conidia.

23 µm diam. Aspergilla uniserialia; phialides ampulliformes, hyalinae vel dilute flavo-brunneae, 5–7 × 2.5–3 µm. Conidia hyalina, in massa dilute flava vel flava, subglobosa vel ellipsoidea, laevia, 4–6(–7) × 3.5–5 µm. Status teleomorphus: *Eurotium taklimakanense*.

Ascomata superficial, scattered, non-ostiolate, globose to subglobose, 70–270 µm in diam, surrounded by yellowish, loosely entangled hyphae; peridium brownish yellow to brownish orange, membranaceous, thin, one layered, "textura angularis", consisting of angular cells

measuring 5–15 μm in diam. Asci 8-spored, globose to subglobose, 12–14 × 10–12.5 μm, evanescent. Ascospores pale yellow to light yellow, broadly lenticular, spore body 7–8 × 5–6 μm, with two conspicuously irregular equatorial crests, somewhat petal-shaped, measuring 0.5–2 μm wide; convex surfaces tuberculate or verrucose (Fig. 5).

Conidial heads grayish yellow to dull yellow, radiate, 65–125 μm in diam. Conidiophores mostly arising from aerial hyphae or basal mycelium; stipes up to 435 μm long, 5–7 μm in diam at middle, hyaline to pale yellowish brown, smooth, septate; vesicles subglobose to flask-

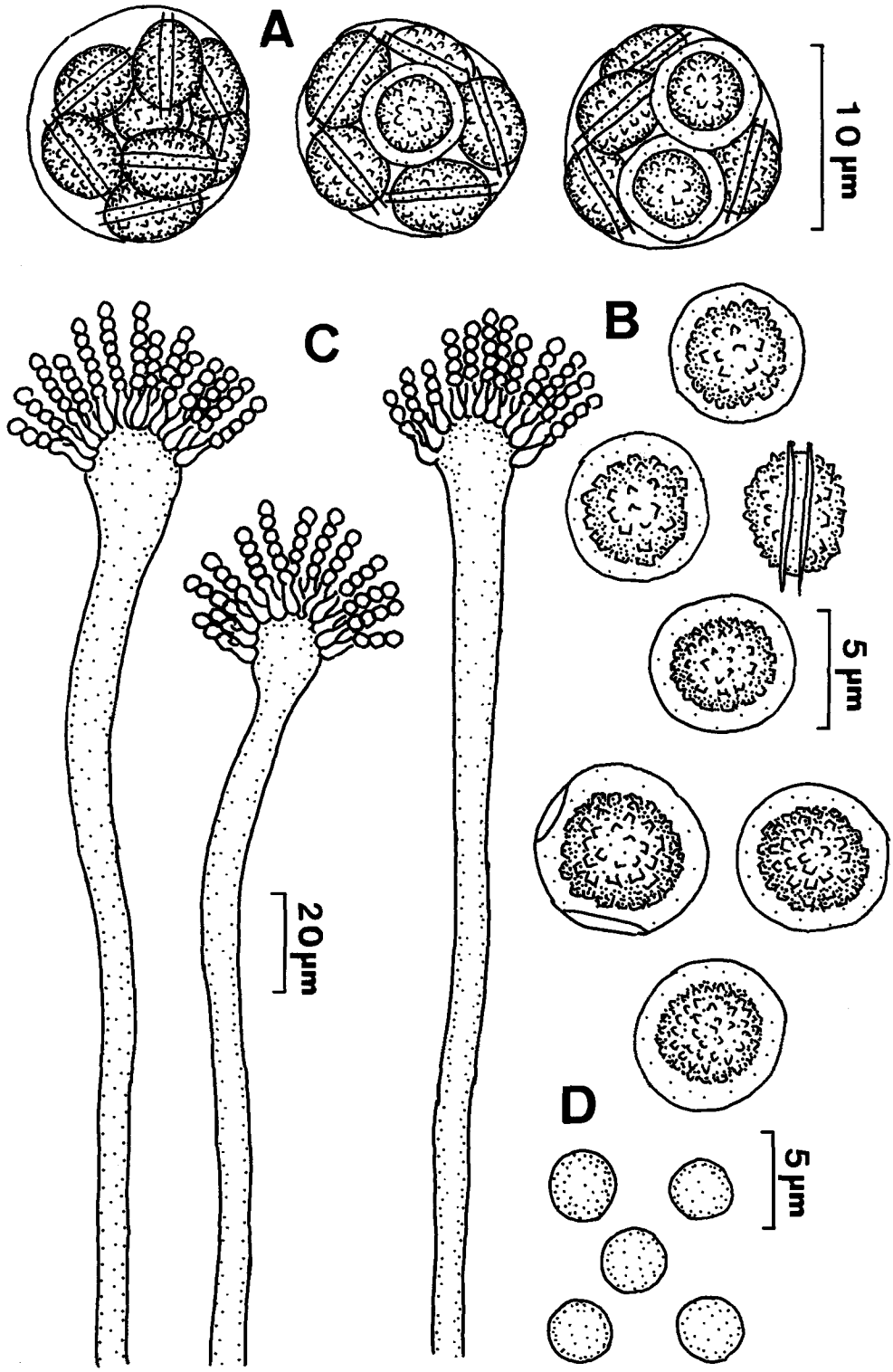
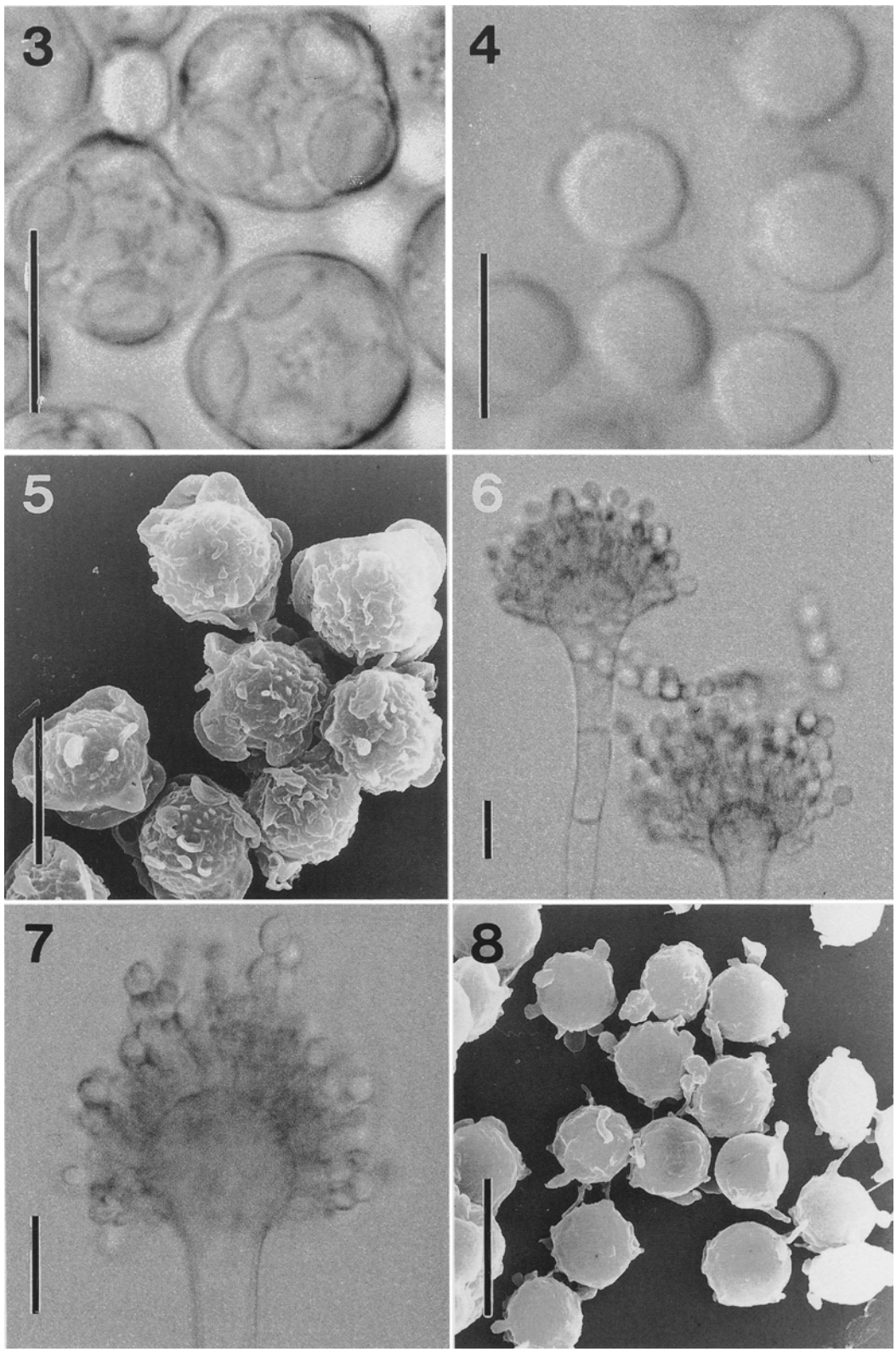


Fig. 2. *Eurotium cristatum*. A. Asci. B. Ascospores. C. Aspergilla. D. Conidia.



Figs. 3–7. *Eurotium taklimakanense*. 3. Asci. 4. Ascospores. 5. Scanning electron microscope (SEM) micrograph of ascospores. 6, 7. Aspergilla. Fig. 8. SEM micrograph of ascospores of *Eurotium appendiculatum*. All scales: 10 μm.

shaped, hyaline to pale yellowish brown, 12–23 μm in diam, fertile over the upper half. Aspergilla uniseriate; phialides hyaline to pale yellowish brown, 5–7 × 2.5–3 μm. Conidia hyaline, pale yellow to pastel yellow in mass, subglobose to ellipsoidal, smooth, 4–6(–7) × 3.5–5 μm.

Colonies on M40Y spreading broadly, attaining a diam 80–85 mm in 14 d at 25°C, light yellow (4A5, after Kornerup and Wanscher, 1978) to reddish yellow (4A6), floccose, consisting of a thin mycelial felt, characterized by very abundant ascomata in a granular appearance, loosely overgrown by yellow to yellowish orange hyphae; conidial heads limited; reverse yellowish orange to orange-yellow.

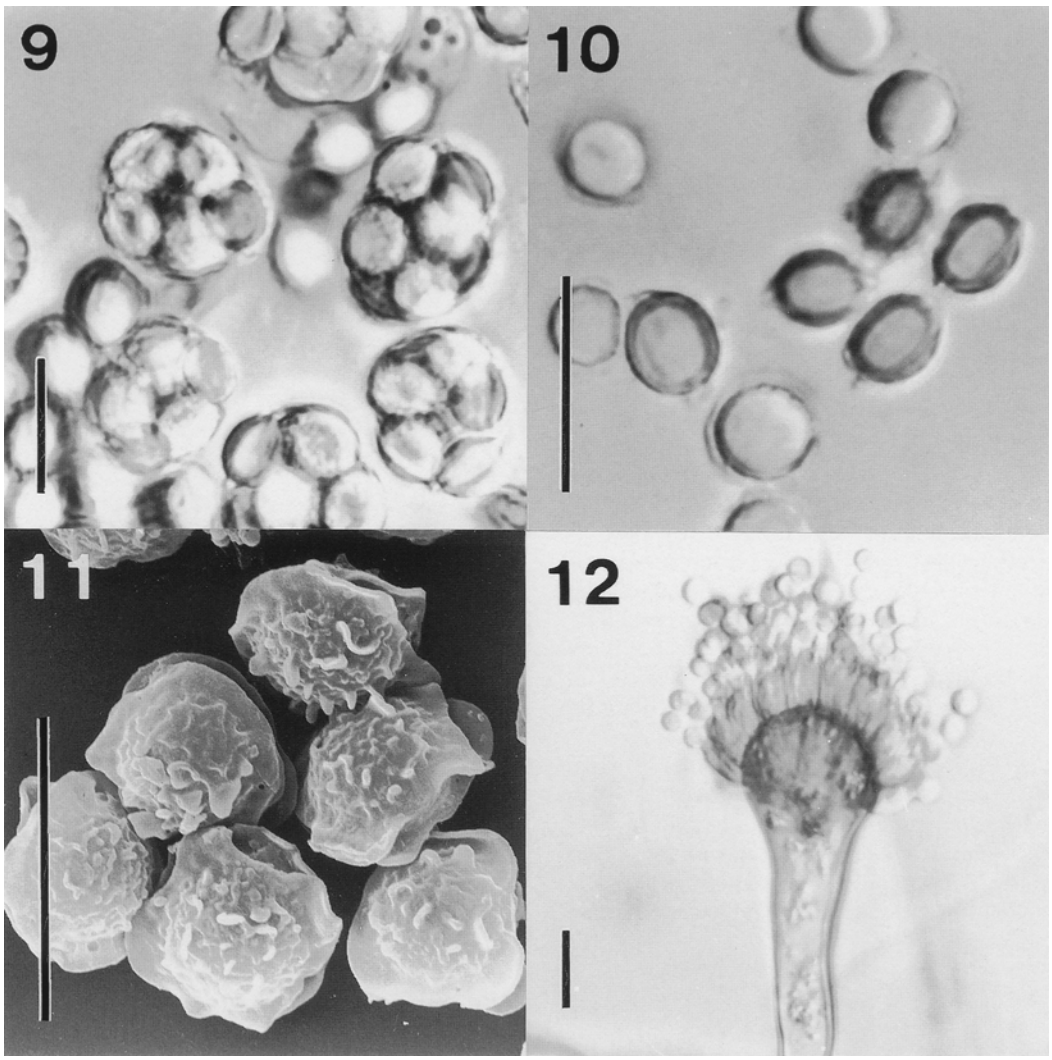
Colonies on Czapek's agar with 70% (w/v) sucrose spreading broadly, attaining a diam of 60–70 mm in 14 d at 25°C, light yellow (2A5) to yellow (3A6), floccose, consisting of a thin mycelial felt, characterized by very abundant ascomata in a granular appearance or in small clusters, loosely overgrown by yellow hyphae; conidial heads abundant; reverse greyish yellow.

Colonies on Czapek's agar growing rather rapidly, attaining a diam of 30–40 mm in 14 d at 25°C, greyish yellow (4B4-5), floccose, consisting of a thin mycelial felt; ascomata abundantly produced; conidial heads limited; reverse greyish yellow to dark yellow.

At 37°C, spreading broadly, ascomata more abundant than 25°C; conidial heads limited.

Specimen examined: CBM-FA-876 (holotype), a dried culture derived from an isolate of desert soil in the central part of the Taklimakan desert, Taochyon, 350 km inland from Minfeng (Niya), Xinjiang Province, China, collected by Y. Horie, as strain No. 98-TA-571-C, 2 August 1998. The fungus was isolated by Y. Horie in the laboratory of the Research Center of Medical Mycology, Beijing Medical University, Beijing. The holotype is deposited in the Natural History Museum and Institute, Chiba (CBM).

Other specimen examined for comparison: *Eurotium appendiculatum* Blaser CBM 374, 75.



Figs. 9–12. *Eurotium cristatum*. 9. Asci. 10. Ascospores. 11. SEM micrograph of ascospores. 12. Aspergillum. All scales: 10 μm.

Eurotium taklimakanense resembles *E. appendiculatum* in producing ascospores with incomplete equatorial crests, but it clearly differs in several features. The latter has smaller ascomata (up to 150 μm in diam), smaller ascospores (5.5–6.9 × 4.3–5.3 μm), which are characterized by two equatorial crests with more or less filamentous appendages and almost smooth convex surfaces (Fig. 8 in this paper and Fig. 30 (B, C) in Kozakiewicz's photographs (Kozakiewicz, 1989)), olivaceous and wider conidial heads (120–180 μm wide), conidiophores with hyaline and longer stipes (up to 1,400 μm long), larger phialides (7.5–9 × 4.5–6 μm, and echinulate conidia (Blaser, 1976).

Eurotium cristatum (Raper & Fennell) Malloch & Cain, Can. J. Bot. **50**: 64. 1972.

≡*Aspergillus cristatus* Raper & Fennell, The genus *Aspergillus*, p. 169. 1965.

St. Anam. *Aspergillus cristatellus* Kozak., Mycol. pap., **161**: 81. 1989. Figs. 2, 9–12

Colonies on Czapek's agar with 70% sucrose spreading broadly, attaining a diam of 40–50 mm in 14 d at 25°C, consisting of a thin mycelial felt, granular due to the very abundant production of ascomata, light yellow (3A3 to 3A5); conidial heads abundantly produced; reverse dull yellow (3B4 to 3B5).

Ascomata superficial, globose to subglobose, 120–180 μm in diam, surrounded by a thin layer of hyphae, pale yellow to dull yellow; peridium yellow, membranaceous, thin, "textura angularis", consisting of angular cells measuring 5–22.5 μm in diam. Asci 8-spored, globose to subglobose, 12–14 × 10–12 μm, evanescent. Ascospores hyaline to pale yellowish brown, broadly lenticular, spore body 4–6 × 3.5–4 μm, with two well-separated, thin, flexuous equatorial crests measuring 0.5–1 μm wide; convex surfaces roughened into rather distinct echines (Fig. 11).

Conidial heads grayish green, radiate, 65–90 μm in diam. Conidiophores mostly arising from aerial hyphae; stipes more or less sinuous, up to 1200 μm long, 7–11 μm in diam, hyaline to pale yellow, smooth; vesicles hemispherical, pastel yellow to grayish green, 16–25 μm in diam, fertile on the upper half. Aspergilla uniseriate; phialides hyaline to pale grayish green, 6–8 × 2–2.5 μm. Conidia hyaline to pale yellowish green, globose to subglobose, 3–3.5 μm, minutely roughened, tuberculate under SEM.

Colonies on M40Y agar spreading broadly, attaining a diam of 80–85 mm in 14 d at 25°C, consisting of a thin mycelial felt; ascomata abundantly produced, granular in appearance; conidial heads limited, greyish yellow (3B5 to 3B6); reverse greyish yellow (4B5 and 4B6).

Colonies on Czapek's agar spreading broadly, attaining a diam of 80–85 mm in 14 d at 25°C, consisting of a thin mycelial felt; ascomata abundantly produced; conidial heads abundant; reverse uncolored to yellowish white (2A2).

At 37°C, spreading broadly, ascomata abundant; conidial heads limited.

Specimen examined: CBM-FA-877, an isolate from damp grassland soil at Kara Kuri lake, near Mt. Kungur, Pamire plateau, Xinjiang Province, China, collected by Y. Horie, isolated by Y. Horie in the laboratory of the Research Center of Medical Mycology, Beijing Medical University, Beijing, as strain No. 97-XY-708-B, 4 August 1997.

This species is characterized by the production of yellow, mature ascomata on Czapek's and malt extract agar, lenticular ascospores with two well-separated, flexuous equatorial crests and verruculose to ridged convex surfaces, and small, tuberculate conidia. The ascospores are somewhat similar to those of *E. intermedium* Blaser (Blaser, 1976), but conidia of the two species are completely different as shown by Kozakiewicz (1989).

Acknowledgements——The authors thank Dr. Shun-ichi Udagawa, Department of Applied Biology and Chemistry, Tokyo University of Agriculture, for reading the manuscript and making helpful suggestions and Prof. Duan Li Wang, Research Center for Medical Mycology, Beijing Medical University, for making helpful suggestions on the research in China. This work was supported by Goho Life Sciences International Fund and the International Scientific Research Program of Ministry of Education, Culture, Sports, Science and Technology in Japan by a grant-in-aid for Scientific Research.

Literature cited

Blaser, P. 1976. Taxonomische und physiologische untersuchungen uber die Gattung *Eurotium* Link ex Fries. Sydowia **28**: 1–49.

Kong, H. and Qi, Z. 1995a. Two new species of *Eurotium* Link. Acta Mycol. Sinica **14**: 10–16 (In Chinese.)

Kong, H. and Qi. Z. 1995b. Two new species of *Eurotium* isolated from Xizang (Tibet), China. Acta Mycol. Sinica **14**: 86–91.

Kornerup, A. and Wanscher, J. H. 1978. Methuen handbook of colour, 3rd ed. Eyre Methuen, London.

Kozakiewicz, Z. 1989. *Aspergillus* species on stored products. CMI Mycol. Pap. **161**: 1–188.

Malloch, D. and Cain, R. F. 1972. The Trichocomataceae: Ascomycetes with *Aspergillus, Paecilomyces*, and *Penicillium* imperfect states. Can. J. Bot. **50**: 2613–2628.

Raper, K. B. and Fennell, D. I. 1965. "The genus *Aspergillus*." Williams and Wilkins, Baltimore.

Warcup, J. H. 1950. The soil plate method for isolation of fungi from soil. Nature **166**: 117–118.