

Short Communication

Materials for the fungus flora of Japan (49)*

Shun-ichi Udagawa¹⁾ and Seiichi Ueda²⁾¹⁾ Nodai Research Institute, Tokyo University of Agriculture, 1-1, Sakuragaoka 1-Chome, Setagaya-ku, Tokyo 156, Japan²⁾ Nagasaki Prefectural Institute of Public Health and Environmental Sciences, Nameshi 1-Chome, Nagasaki 852, Japan

Accepted for publication 13 October 1995

Two interesting microfungi are described as new to Japan: *Talaromyces galapagensis* (anam. *Penicillium galapagensis*), isolated from soil in Shizuoka; and *Penicillium megasporum*, isolated from marine sludge in Nagasaki. Some observations are recorded, particularly on ascomatal initials of *T. galapagensis*, which are similar to those described for *Talaromyces flavus*.

Key Words—Japan; marine sludge; *Penicillium galapagensis*; *Penicillium megasporum*; soil fungus; *Talaromyces galapagensis*.

104. *Talaromyces galapagensis* Samson et Mahoney, Trans. Br. Mycol. Soc. **69**: 158. 1977; Pitt, in The genus *Penicillium* and its teleomorphic states *Eu-penicillium* and *Talaromyces*, p. 505. 1979.

Figs. 1, 2

Anam.: *Penicillium galapagensis* Samson et Mahoney, Trans. Br. Mycol. Soc. **69**: 158. 1977.

Colonies on Czapek agar growing very restrictedly, attaining a diameter of 5–7 mm in 14 days at 30°C, floccose, Greyish Orange (M. 5B4, after Kornerup and Wanschler, 1978); ascomata and conidia not produced; reverse and agar Reddish Brown (M. 9E8). Colonies on Czapek-yeast extract agar (CYA) growing rather restrictedly, attaining a diameter of 20–21 mm in 14 days at 30°C, floccose, consisting of a thin basal felt, centrally wrinkled; ascomata scattered on the felt, White to Pale Yellow (M. 4A3); margins somewhat abrupt; exudate clear to pale yellow; conidiogenesis absent; reverse Brownish Red (M. 10D8), with surrounding agar colored in Light Yellow (M. 4A5) or Light Orange (M. 5A5) shades. Colonies on malt extract agar (MEA) growing rather restrictedly, attaining a diameter of 17–20 mm in 14 days at 30°C, plane, consisting of a relatively tough mycelial felt, with surface appearing funiculose, Greyish Yellow (M. 4B5); ascomata scattered on the felt, slowly maturing; conidiogenesis absent; reverse and agar Deep Red to Brownish Red (M. 10C8–10D8). Colonies on oatmeal agar growing more rapidly, attaining a diameter of 20–25 mm in 14 days at 30°C, floccose, consisting of a thin basal felt in which soon develop abundant white ascomata with accompanying aerial hyphae to give the colony a Pale Yellow (M. 4A4) color; margins thin and somewhat submerged; conidiogenesis tardily developing

in submarginal areas, Greenish Grey (M. 25C3); exudate limited, Light Orange (M. 5A4); reverse Brown (M. 6D8–6E8), with surrounding agar lightly colored. Colonies on cornmeal agar growing restrictedly, attaining a diameter of 15–17 mm in 14 days at 30°C, floccose, plane, thin, with vegetative mycelium submerged, producing numerous ascomata in a thin layer, Pale Yellow (M. 4A3).

Ascomata non-ostiolate, often confluent in a dense layer, at first white, becoming pale yellowish brown in age, globose to subglobose, 200–480 µm in diam, maturing within 21 days, soft, loosely covered by pale yellowish brown, encrusted hyphae; ascomatal wall composed of a loose network of branched, septate, roughened, pale yellow, interwoven hyphae measuring 1.5–2.5 µm in diam. Ascomatal initials developing as a large clavate to vermiform branch of hypha, around which a narrow hypha is tightly coiled. Asci in short chains, usually 4–6-spored, globose to subglobose, (16–)18–22 × 16–20 µm, with walls rather persistent, evanescent at maturity. Ascospores hyaline to pale yellow, broadly ellipsoidal, 8–12 × 7–10 µm (excl. ridges), thick-walled, ornamented with irregularly disposed tubercles and ridges.

Conidiophores arising from the basal mycelium or aerial hyphae; stipes hyaline, (20–)80–160 × 2–2.5 µm, smooth-walled, septate. Penicillii monoverticillate to biverticillate, often irregularly arranged. Metulae in appressed groups of 2 to 4 measuring 10–12(–15) × 2.5–3 µm. Phialides in verticils of 2–6, acerose, 8–12(–20) × 2–2.5 µm. Conidia hyaline, ellipsoidal to cylindrical, sometimes fusiform, (3–)4–6 × 1.5–2 µm, often pointed at the end, smooth-walled, borne in short disordered chains.

Major ubiquinone: Q-10(H₂).

At 37°C, growth is slightly rapid.

Isolates examined: SUM 3028 and 3040, in culture

* (48): Kaneko, S., Mycoscience 36: 359–360, 1995.

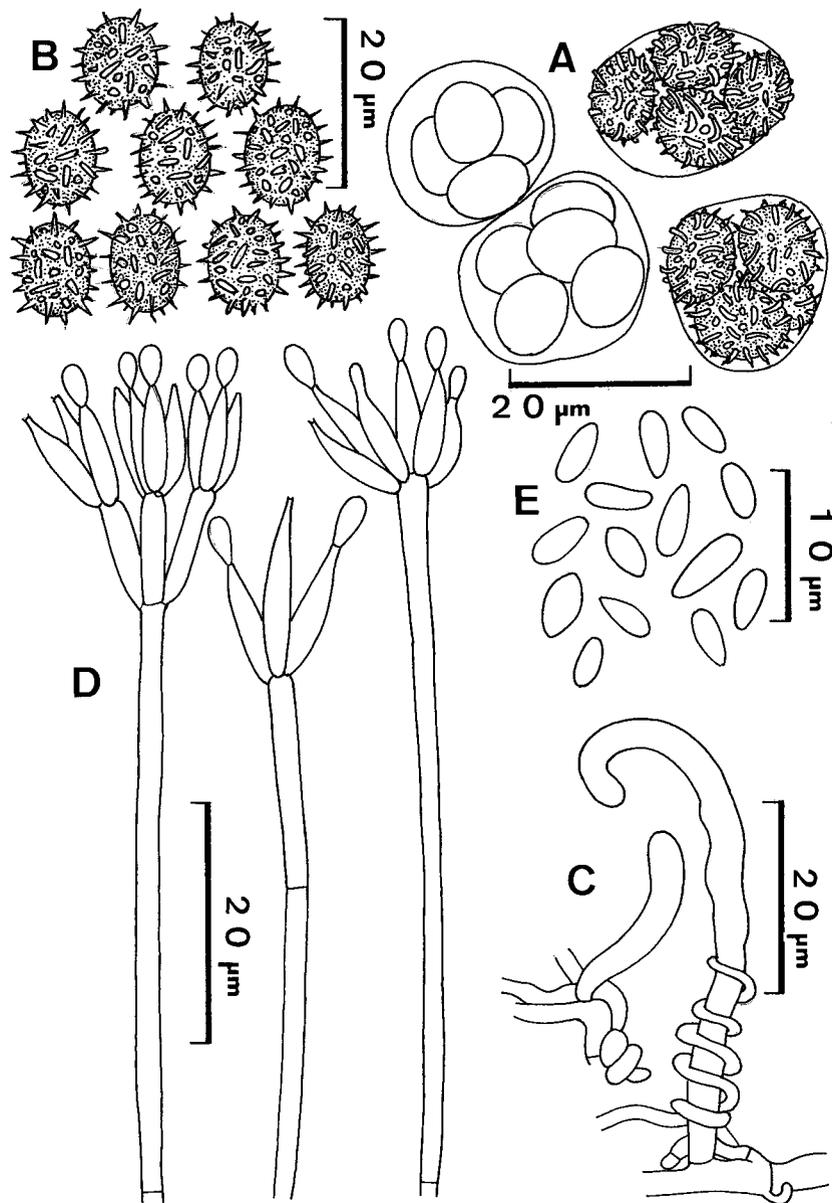


Fig. 1. *Talaromyces galapagensis*, SUM 3028.

A. Asci. B. Ascospores. C. Ascomatal initials. D. Penicilli. E. Conidia.

isolated from soil, Heta-mura, Tagata-gun, Shizuoka-ken, Japan, 7 June 1981, collected by S. Udagawa. The living cultures are deposited at the Nagasaki Prefectural Institute of Public Health and Environmental Sciences (NEI), Nagasaki, Japan.

Talaromyces galapagensis was originally described by Samson and Mahoney (1977) as forming white to yellow or reddish ascomata, large ascospores ornamented with irregularly disposed warts and ridges, well developed biverticillate penicilli, and short cylindrical conidia. According to the original description, the ascomata develop from small simple initials. The Japanese strains, however, produce large clavate to vermiform ascogonia with slender entwining artherdia which are similar to

those of *T. flavus* (Klöcker) Stolk et Samson (Stolk and Samson, 1972). Apart from this discrepancy, the Japanese strains are identical with the type in almost all morphological aspects. The growth of *T. galapagensis* occurs in the temperature range 9–40°C, with an optimum of 33°C.

Talaromyces galapagensis is probably a rare fungus. The type strain CBS 751.74 was isolated by Mahoney from shaded soil under *Maytenus obovata*, near the Darwin station on Isla Santa Cruz, Galapagos Islands, Ecuador. No record of this species, other than the original description, has been traced.

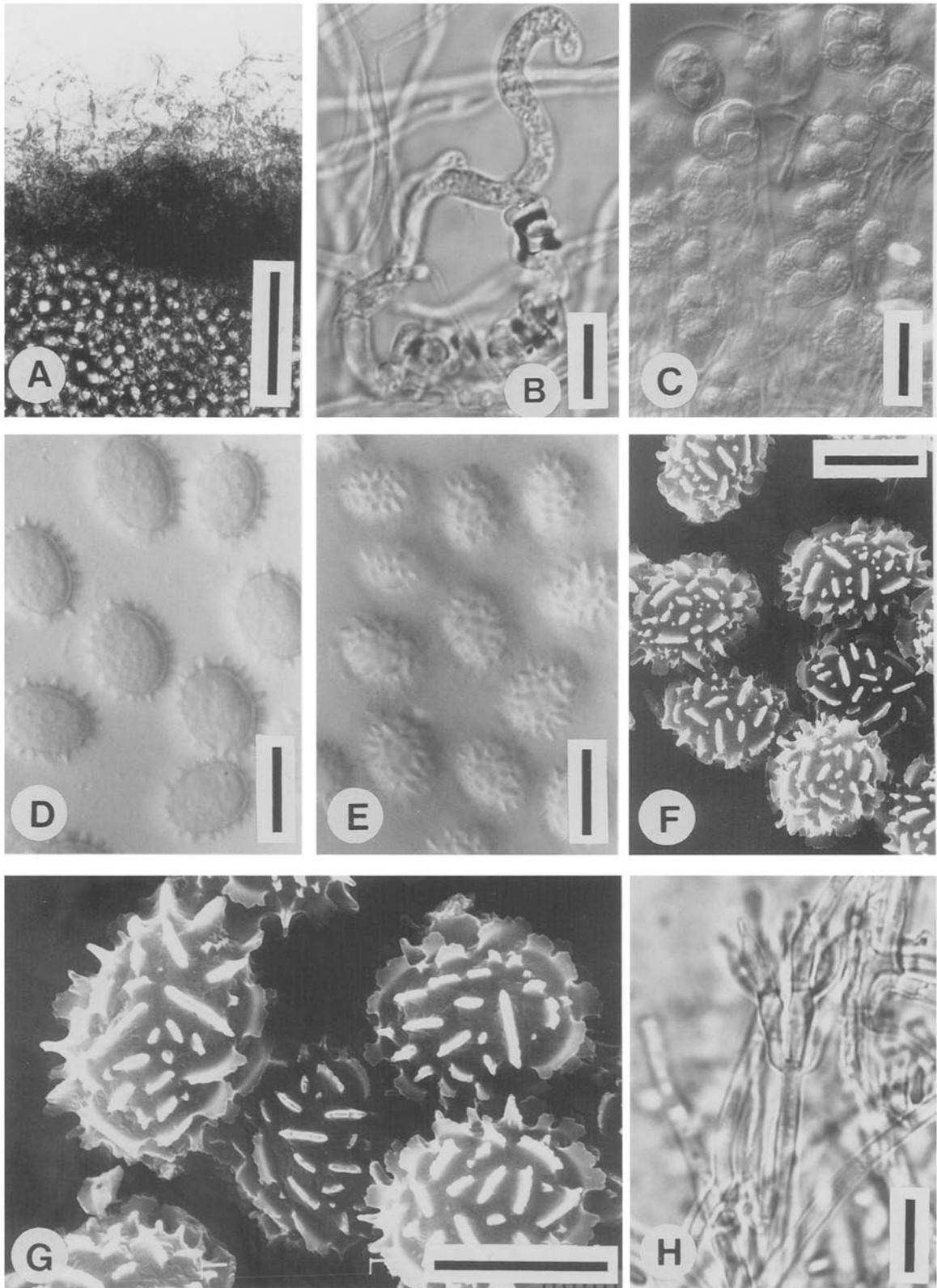


Fig. 2. *Talaromyces galapagensis*, SUM 3028.

A. A part of ascoma. B. Ascomatal initial. C. Asci. D, E. Ascospores (LM). F, G. Ascospores (SEM). H. Penicillus. Scale bars: A=100 μm ; B=10 μm ; C=20 μm ; D-G=10 μm .

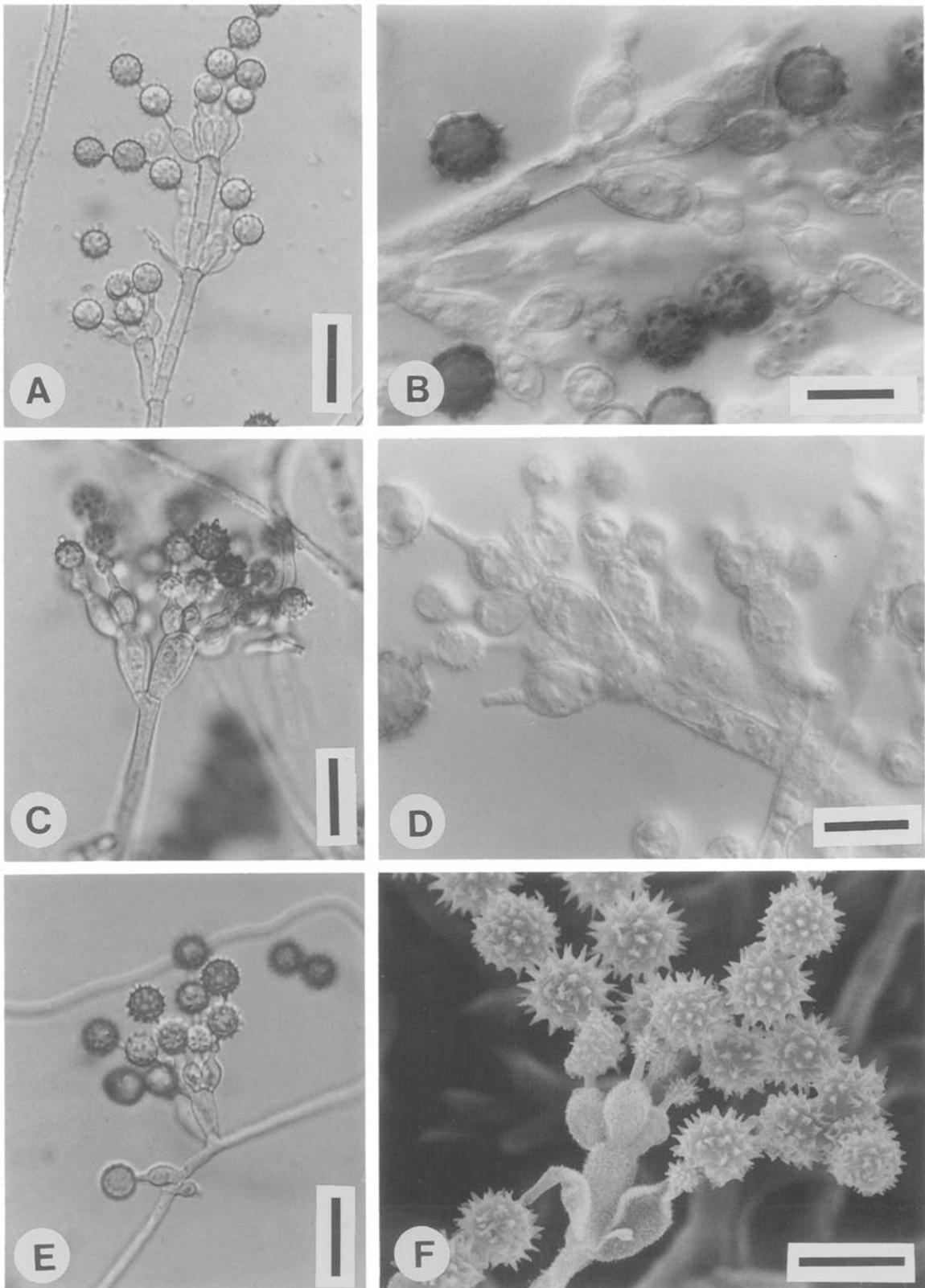


Fig. 3. *Penicillium megasporum*, NHL 2977.
 A-E. Penicilli and conidia (LM). F. Penicillus and conidia (SEM).
 Scale bars: A = 20 μm ; B = 10 μm ; C = 20 μm ; D = 10 μm ; E = 20 μm ;
 F = 10 μm .

105. *Penicillium megasporum* Orpurt et Fennell, *Mycologia* **47**: 233. 1955; Pitt, in *The genus Penicillium and its teleomorphic states Eupenicillium and Talaromyces*, p. 312. 1979; Ramirez, in *Manual and atlas of the Penicillia*, p. 315. 1982. Fig. 3
Syn.: *Penicillium giganteum* Roy et Singh, *Trans. Br. Mycol. Soc.* **51**: 805. 1968; Ramirez, in *Manual and atlas of the Penicillia*, p. 433. 1982.

Colonies on Czapek agar growing restrictedly, attaining a diameter of 10–11 mm in 7 days at 23°C, velvety, centrally raised up to 2 mm high, consisting of a thin basal felt with delicate aerial hyphae; margins narrow; conidiogenesis moderate, Dark Green (M. 26F4); exudate absent; reverse Citrine Green to Greenish Glauous (Rayner, 1970). Colonies on CYA growing rather restrictedly, attaining a diameter of 13–15 mm in 7 days at 23°C, in texture as on Czapek; conidiogenesis heavy, Dull Green (M. 25E4-3) or Dark Bluish Green (R); reverse Greenish Yellow (M. 3C4) or Amber (R). Colonies on MEA growing rather restrictedly, attaining a diameter of 14–15 mm in 7 days at 23°C, plane, consisting of a thin basal felt with surface appearing more or less floccose; margins broad and thin; conidiogenesis heavy, Dark Green (M. 26F7) or Olivaceous Black (R); exudate absent; odor moldy; reverse Greyish Yellow (M. 3B5) or Amber (R).

Conidiophores arising from the basal mycelium or aerial hyphae; stipes hyaline to pale brown, variable in length from 15–65 μm as branches from aerial hyphae, up to 240–320(–400) \times 2–4(–5) μm , with walls roughened throughout or sometimes smooth in lower part, septate. Penicilli monoverticillate to biverticillate, sometimes irregularly arranged as divergent unequal branches. Metulae often irregularly arranged and apically inflated, (2–)4–6 in the verticil, 8–15(–18) \times (4–)5–7 μm , with walls smooth or roughened. Phialides ampulliform, usually 2–4 in the verticil, 8–13 \times 4–5 μm , often with conidium-bearing tubes definitely constricted and long, 2–5 \times 1–1.5 μm , smooth to minutely roughened. Conidia at first hyaline, becoming dark brown when mature, olivaceous black in mass, globose to subglobose, 7–12(–13) μm in diam (incl. spines), prominently spinose, borne in short disordered chains.

At 37°C, growth is more rapid.

Isolate examined: NHL 2977 (=ATCC 64165), in culture isolated from marine sludge, Omura Bay, Omura-shi, Nagasaki-ken, Japan, 20 April 1981, collected by S. Ueda. The living cultures are deposited at ATCC and NEI.

Specimens examined: ATCC 12322, from soil,

Suffolk, England, J. H. Warcup; ATCC 48997, from beach sand, Lebanon, J. Nicot; ATCC 48996 (=IMI 132774), from soil, botanic garden, Banaras Hindu University, Varanas, India, G. H. Singh, as *Penicillium giganteum*.

Penicillium megasporum is distinguished by dark green, restricted colonies, divaricate penicilli and particularly by very large, coarsely spinose, globose conidia (Pitt, 1979). With *P. asperosporum* G. Smith, which also produces large spinose conidia, *P. megasporum* is placed in series *Megaspora*, but the two species show little affinity with most other *Penicillium* species. Ubiquinone profiles of these two species are also specific: Q-10 for *P. megasporum* and Q-10(H₂) for *P. asperosporum*, instead of Q-9 for most other species belonging to the subgenus *Furcatum* (Kuraishi et al., 1991). Thus the placement of *P. megasporum* within the subgenus *Furcatum* remains in doubt.

Penicillium megasporum was originally isolated from grasslands characterized ecologically as a normal component of the mycoflora in mesic or high prairies, southern Wisconsin, USA (Orpurt and Fennell, 1955). It is one of the rarer *Penicillium* species but nevertheless has a worldwide distribution, being known from Canada, China, India, Japan, Lebanon, Russia, UK and USA.

Literature cited

- Kornerup, A. and Wanscher, J. H. 1978. "Methuen handbook of colour, 3rd ed.," Eyre Methuen, London. 252 p.
- Kuraishi, H., Aoki, M., Itoh, M., Katayama, Y., Sugiyama, J. and Pitt, J. I. 1991. Distribution of ubiquinones in *Penicillium* and related genera. *Mycol. Res.* **95**: 705–711.
- Orpurt, P. A. and Fennell, D. I. 1955. A new species of *Penicillium* from soil. *Mycologia* **47**: 233–237.
- Pitt, J. I. 1979. "The genus *Penicillium* and its teleomorphic states *Eupenicillium* and *Talaromyces*," Academic Press, London. 634 p.
- Ramirez, C. 1982. "Manual and atlas of the Penicillia," Elsevier Biomedical Press, Amsterdam. 874 p.
- Rayner, R. W. 1970. "A mycological colour chart," Commonwealth Mycological Institute, Kew and British Mycological Society.
- Roy, R. Y. and Singh, G. N. 1968. *Penicillium giganteum* sp. nov. from soil. *Trans. Br. Mycol. Soc.* **51**: 805–806.
- Samson, R. A. and Mahoney II, D. P. 1977. *Talaromyces galapagensis* sp. nov. *Trans. Br. Mycol. Soc.* **69**: 158–161.
- Stolk, A. C. and Samson, R. A. 1972. "The genus *Talaromyces* Studies on *Talaromyces* and related genera II," *Studies in Mycology*, No. 2. Centraalbureau voor Schimmelcultures, Baarn. 67 p.