

New keratinophilic species of *Chrysosporium*

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Received September 9, 1985

SIGLER, L., J. GUARRO, and L. PUNSOLA. 1986. New keratinophilic species of *Chrysosporium*. Can. J. Bot. **64**: 1212–1215.

Two new keratinophilic species, *Chrysosporium europae* and *C. mephiticum*, are described and illustrated. The differences between these and other similar species are discussed.

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Deux nouvelles espèces kératinophiles, *Chrysosporium europae* et *C. mephiticum*, sont décrites et illustrées. Les différences entre ces deux espèces et d'autres espèces similaires sont discutées.

[Traduit par la revue]

Introduction

Two new keratinophilic species of *Chrysosporium* Corda were encountered during surveys for keratinophilic fungi from soil. During an investigation of soil in Catalunya, Spain, a *Chrysosporium* characterized by its slow growth in culture and by development of chains of truncate, intercalary conidia was isolated on three occasions. *Chrysosporium europae* sp. nov. is described from these collections and from an additional collection from bottom sediments of a polluted river in Katowice, Poland. Because of its development of rhexolytically dehiscing lateral conidia and arthroconidia, *C. europae* could be accommodated in either *Chrysosporium* or *Malbranchea*. The reasons for placement of the species in *Chrysosporium* and the differences between *C. europae* and other species of *Chrysosporium* are discussed.

A second species, *C. mephiticum* sp. nov., isolated by Dr. P. C. Jain from soil in India by the keratin bait technique, is distinguished by its pungent odor and by the sessile, subglobose conidia borne in close proximity to one another on orthotropically branched fertile hyphae. Two additional isolates, preserved as *Trichophyton* sp. in the University of Alberta Microfungus Collection and Herbarium (UAMH), came from other keratinous substrates.

Chrysosporium europae Sigler, Guarro & Punsola, sp. nov.

Figs. 1, 3–6

Coloniae in agar phytone extracto levedinis ad 25°C, densae, lente crescunt, vinaceae vel luteae in centrum, cumulae, rugosae, ad marginem lobatae, planae, luteae, granulosae. Ad 37°C incrementum nullum. Hyphae hyalinae deinde flavae, septatae, 2.5–3.5 µm latae. Hyphae fertilia ramosae. Conidia ultima et a latere locata sunt. Conidia lateralia sessilia vel in protrusionibus cylindrica vel cymbiformae; arthroconidia in catenis brevibus vel longis, cylindrica vel doliiformae aut unilateraler inflata. Conidia hyalina vel lutea, levitunicata vel verruculosa, 4.5–8.5 × 2.5–3.5 µm, plerumque 6–8 × 2.5–3 µm, cum cicatrice deorsum 1.5–2 µm. Chlamydosporae et hyphae versus septum inflatae absunt. Teleomorphosis

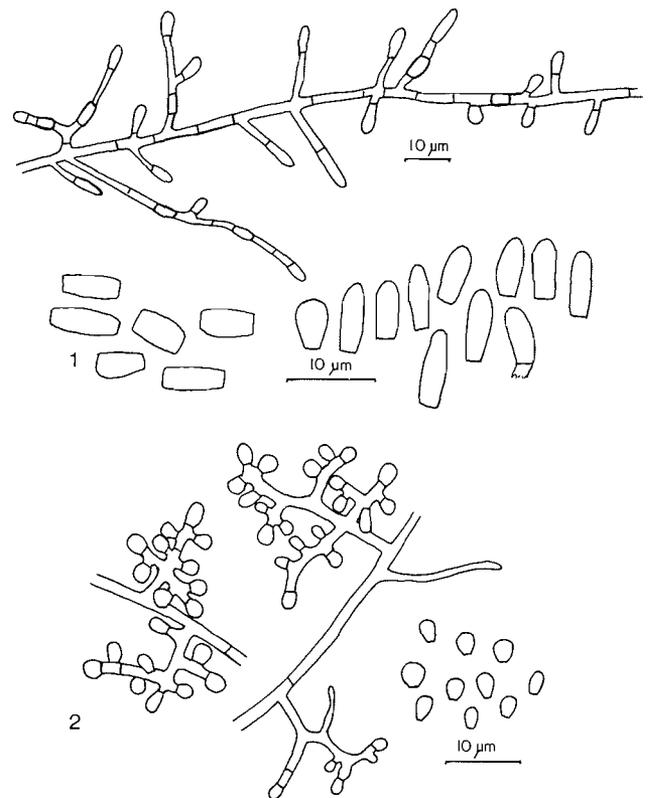


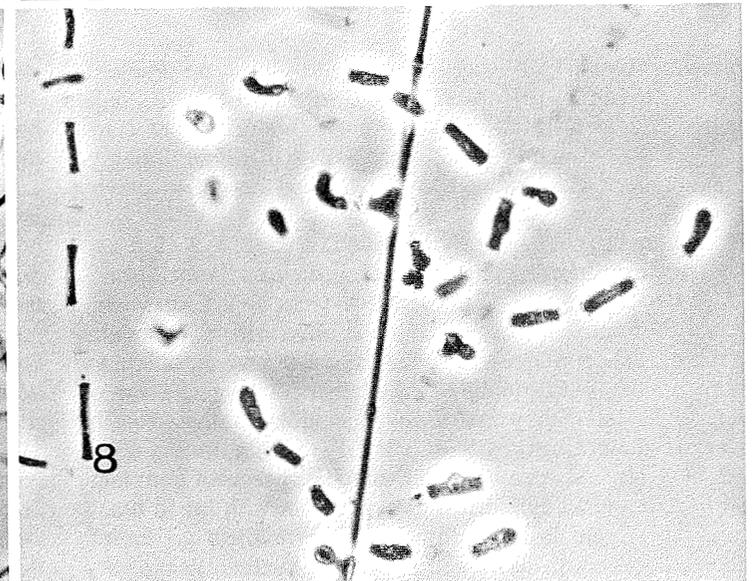
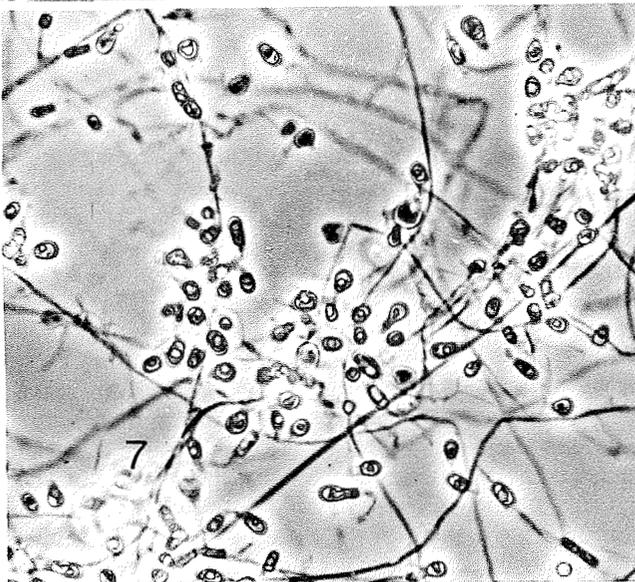
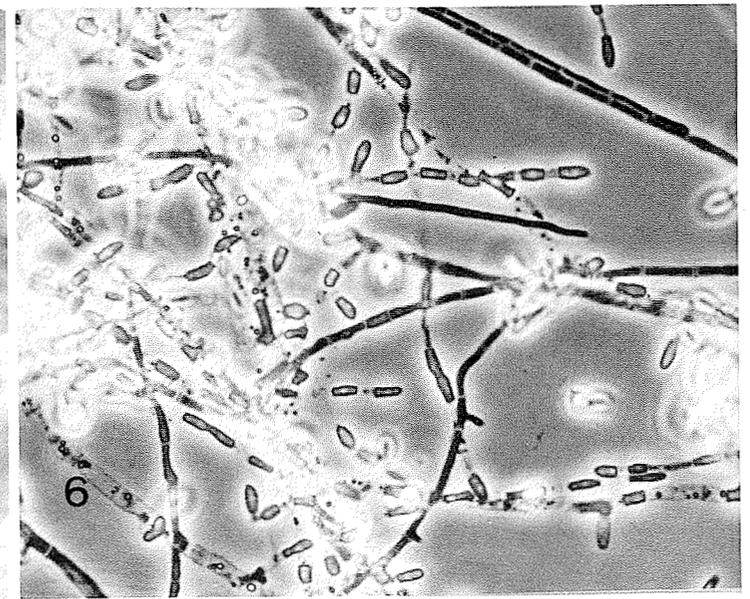
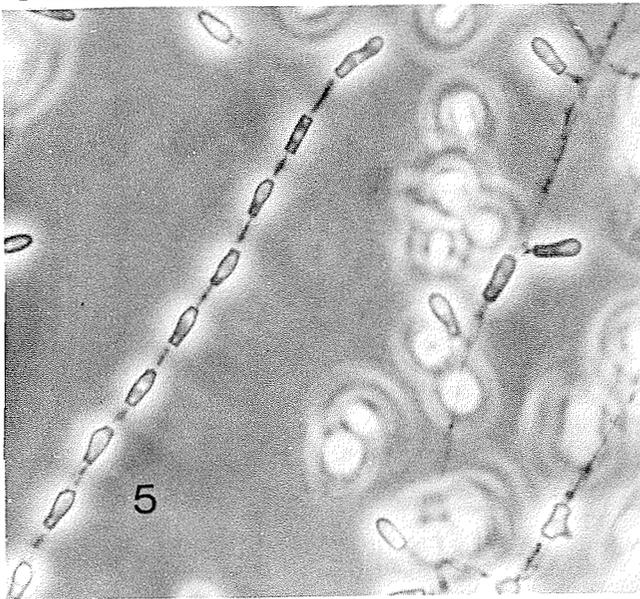
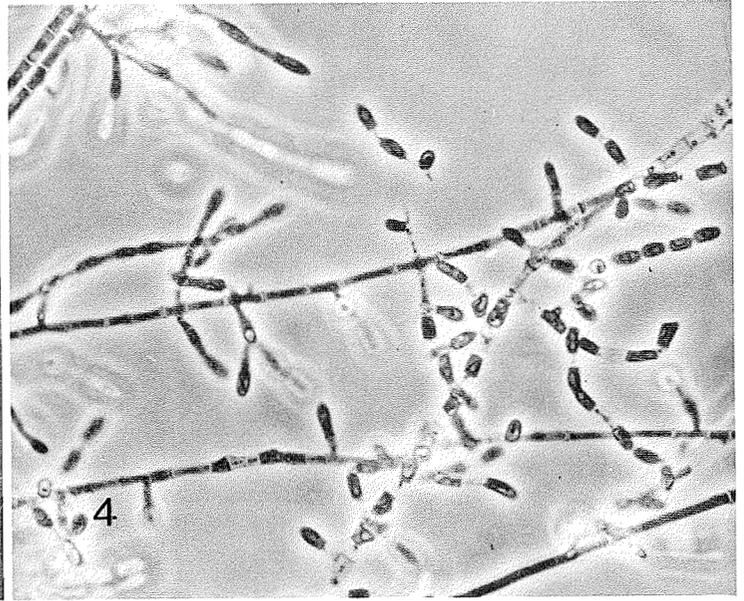
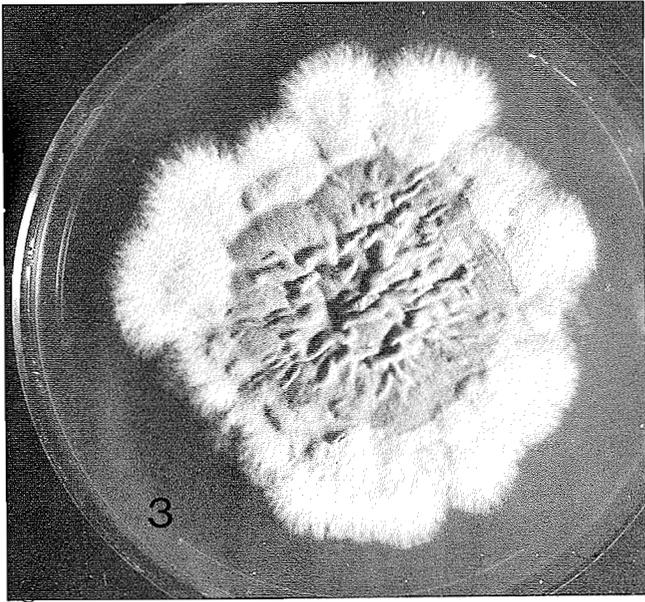
FIG. 1. *Chrysosporium europae*. FIG. 2. *Chrysosporium mephiticum*.

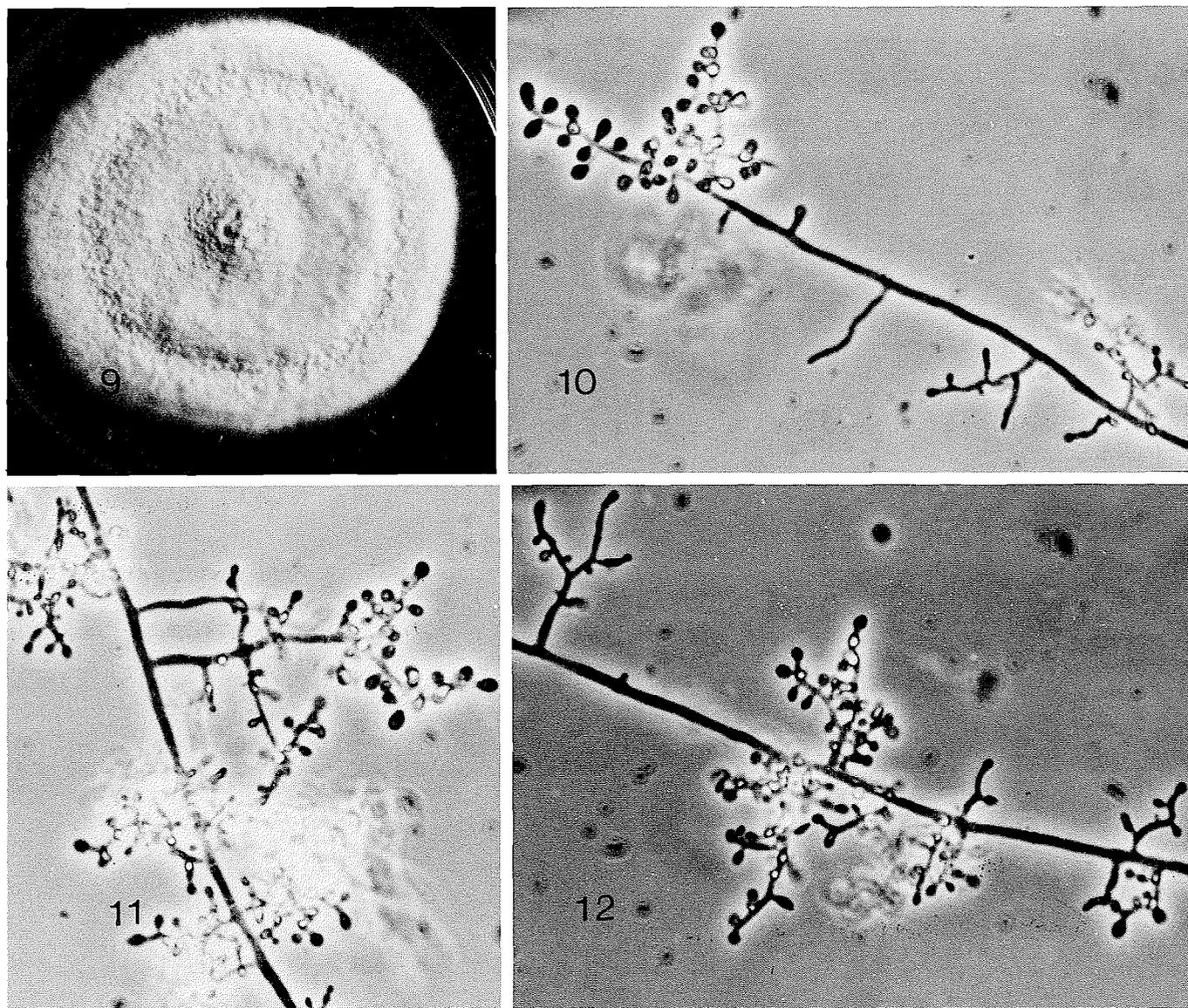
ignota est.

TYPUS: UAMH 4587, colonia exsiccata ex solo, Hispania, a J. Guarro (FFBA 298) isolata est.

Colonies on cellophane on phytone yeast extract agar (PYE, BBL) (1) at 25°C slow growing (55–65 mm diam after 5 weeks); in the centre, raised, wrinkled, granular and vinaceous buff; at the margin, flat, lobate, powdery, buff or pinkish buff;

FIGS. 3–6. *C. europae*. Fig. 3. Colony on PYE at 5 weeks, UAMH 4599. ×1. Figs. 4–6. Branched fertile hyphae bearing terminal and lateral conidia and chains of alternate arthroconidia. Figs. 4 and 6. UAMH 4735. ×610. Fig. 5. UAMH 4587. ×770. FIG. 7. *C. queenslandicum*, from type (UAMH 4319), showing terminal and lateral conidia and rare intercalary conidia. ×610. FIG. 8. *C. articulatum*, from type (UAMH 4320), showing chains of alternate arthroconidia. ×610.





FIGS. 9–12. *C. mephiticum*, from type (UAMH 4447). Fig. 9. Colony on PYE at 3 weeks. $\times 1$. Figs. 10–12. Pyriform to subglobose sessile conidia borne on orthotropically branched fertile hyphae. $\times 830$.

vinaceous brown diffusing pigment. Colonies on Pabulum cereal agar (CER) (3) on cellophane restricted (17–21 mm diam after 5 weeks), flat, zonate, granular with fimbriate margin, buff. No growth at 37°C; scant growth at 18°C. Strongly keratinolytic, as determined by the method described previously (1, 4).

Vegetative hyphae sparsely branched, septate, 2.5–3.5 μm wide, occasionally forming alternate arthroconidia measuring 4.5–13 \times 2.5–3 μm . Aerial fertile hyphae 2–2.5 μm wide, repeatedly branched, bearing lateral conidia which are sessile or borne on short pedicels, and chains of 2 to several, alternate arthroconidia; arthroconidia occasionally occurring adjacent to each other. Intercalary and terminal conidia similar to each other in size, measuring 4.5–8.5 \times 2.5–3.5 μm , mostly 6–8 \times 2.5–3 μm , and released by rhexolytic dehiscence. Terminal and lateral conidia cylindrical to cymbiform with broad basal scar, 1.5–2 μm wide; arthroconidia cylindrical to barrel shaped, occasionally asymmetric; initially hyaline, in age yellow, smooth to minutely warty. Racquet hyphae and chlamy-

dospores not observed. Teleomorph unknown.

Chrysosporium europae, which produces rhexolytically dehiscing alternate arthroconidia and lateral conidia, is intermediate between *Malbranchea*, characterized by narrow (1.5–4 μm), alternate arthroconidia, and *Chrysosporium*, characterized by sessile conidia, or conidia borne terminally, at the ends of short or long lateral branches. These conidia may intergrade with alternate arthroconidia. Where intergrades occur between the blastic development of conidia and the fragmentation of fertile hyphae, the distinctions between the form-genera *Chrysosporium* and *Malbranchea* are not clear cut. Intergrades also occur between *Chrysosporium* and other similar form-genera such as *Trichophyton*, *Emmonsia*, and *Myceliophthora*.

Sigler and Carmichael (4) used the width of the conidium compared with the diameter of the fertile hypha to distinguish *Malbranchea* from *Chrysosporium*. In *Malbranchea*, the arthroconidia are cylindrical and there is little enlargement of the arthroconidia before disarticulation. They (4) used this criterion to include in the genus, *Malbranchea chrysosporioidea*

Sigler & Carmichael, in which the lateral conidia are the same width as the supporting hypha.

In *Chrysosporium*, the terminal and lateral conidia are usually subglobose, pyriform or clavate, and broader than the diameter of the fertile hyphae. The conidia of *C. europae* are only slightly broader than the width of the fertile hyphae. Therefore the decision to include the species in *Chrysosporium* is somewhat arbitrary and is based on the similarity between conidium development in this species and in *C. articulatum* Scharapov, which also produces chains of alternate arthroconidia. *Chrysosporium europae* differs from *C. articulatum* by its slow-growing vinaceous buff pigmented colonies on PYE, and by the size and shape of the conidia. Van Oorschot (2) placed *C. articulatum* into synonymy with *C. queenslandicum* Apinis & Rees, but these two species are clearly different. In *C. queenslandicum*, arthroconidia occur sporadically rather than in regular chains, and the terminal and lateral conidia measure $4-6(8) \times 2.5-4.5 \mu\text{m}$, with a broad basal scar, $2.5-3.5 \mu\text{m}$ wide (Fig. 7). *Chrysosporium articulatum* is differentiated from both *C. queenslandicum* and *C. tropicum* Carmichael, another similar species (1), by its regular chains of arthroconidia measuring $7-15 \times 2.5-4(5) \mu\text{m}$ and by the large, occasionally 1-septate, lateral and terminal conidia measuring $(4.5)6-12(14) \times (2.5)3-5.5(6.5) \mu\text{m}$, with basal scars measuring $1.5-2.5 \mu\text{m}$ (Fig. 8).

MATERIAL EXAMINED: *C. europae*: UAMH 4587, TYPE, soil, Spain, Guarro FFBA 298; UAMH 4599, soil, Spain, Guarro FFBA 300; UAMH 4735, soil, Spain, Guarro FFBA 368; UAMH 4767, bottom sediment polluted river, Poland, K. Ulfig 2; *C. articulatum*: UAMH 1733, soil, river, Tonasi, Panama by Orr O-2548; UAMH 3859, human skin lesion, by Halde, from Orr O-1208; UAMH 4320, TYPE ex fur *Sicista betulina* Pallaf, Novosibirsk, USSR by Scharapov (CBS 662.78); UAMH 4724, scrapings, circular lesion on horse by Carmichael 1982; *C. queenslandicum*: UAMH 4319, TYPE ex feathers domestic fowl, Cunnunuala, Australia by Apinis & Rees, 1965 (CBS 280.77).

Chrysosporium mephiticum Sigler, sp. nov.

Figs. 2, 9-12

Coloniae in agar phytono extracto levedinis ad 25°C , moderate crescent, 50-62 mm in diametro attingunt, granulosa, cremeae. Ad 37°C incrementum nullum. Odor foetidus. Hyphae hyalinae, septatae, interdum moniliformes. Hyphae versus septum inflatae adsunt. Hyphae fertilia ramosae. Conidia ultima et a latere simul locata sunt. Conidia lateralia sessilia vel in protrusionibus brevibus inflatibus, apressasunt, hyalina, leviatunicata, subglobosa, $2.5-3.5 \times 2.5-3 \mu\text{m}$, cum cicatrice deorsum $1.5-2 \mu\text{m}$. Conidia intercalaria et chlamydosporae absunt. Teleomorphosis ignota est.

TYPUS: UAMH 4447 colonia exsiccata ex solo, India a P. C. Jain (CP-31) isolata est.

Colonies on PYE and CER with cellophane attaining 50-62 mm diam in 21 days at 25°C , growth slightly slower on CER; flat, powdery, creamy white; reverse cream to pale orange. No growth at 37°C . Strong pungent odor similar to *Nepeta cataria*

L. (catnip). Strongly keratinolytic.

Vegetative hyphae straight or with chains of swollen cells, occurring singly or in fascicles; rarely fragmenting to form arthroconidia measuring $5-11 \times 3-4(5) \mu\text{m}$. Racquet hyphae present. Aerial fertile hyphae arising as lateral branches, initially curved or geniculate, becoming profusely branched; branches orthotropic, $1.5-2 \mu\text{m}$ wide. Conidia borne terminally or laterally, sessile or rarely on short swollen pedicels; occurring more or less synchronously and in close proximity with one another; released by rhexolytic dehiscence; hyaline, smooth, pyriform to subglobose with broad basal scar ($1-1.5 \mu\text{m}$), $2.5-3.5 \times 2.5-3 \mu\text{m}$. Intercalary conidia and chlamydosporae not observed. Teleomorph unknown.

MATERIAL EXAMINED: UAMH 791, feather on ground, Tupman, Calif., G. F. Orr (O-564); UAMH 2559, whistling eagle *Haliastur sphenurus* (Vieillot), Mitchell River, Queensland, Australia, R. G. Rees (H429), 1965; UAMH 4447, TYPE, soil survey for keratinophilic fungi, India, Jain CP-31.

With its clusters of subglobose conidia on orthotropically branched fertile hyphae, *C. mephiticum* resembles *C. lobatum* Scharapov (2) and *Trichophyton mentagrophytes* (Robin) Blanchard (microconidial anamorph). In *C. lobatum*, the conidia are sometimes sessile but more often occur on short narrow projections which give the fertile hyphae a striking appearance. *Chrysosporium lobatum* is further distinguished by its greenish to vinaceous colonies and its conidia which are echinulate and reddish brown when mature.

In granular forms of *T. mentagrophytes*, microconidia are more frequently borne from swollen pedicels and the fertile hyphae are rather thick, $2.5-4 \mu\text{m}$ wide. The presence of macroconidia and spiral hyphae, and good growth at 37°C , further distinguish this species from *C. mephiticum*.

Acknowledgements

We thank Drs. C. Ramirez and R. Currah for checking the Latin diagnoses, and J. W. Carmichael for reading the manuscript. The senior author also thanks Dr. K. Ulfig, Environmental Pollution Abatement Centre, Katowice, Poland, for allowing the inclusion of his isolate of *C. europae* in this study, and Dr. P. C. Jain, Department of Botany, University of Sauger, Sagar, India, for sending his interesting fungus to UAMH for examination.

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