

CZECH MYCOLOGY

Publication of the Czech Scientific Society for Mycology

Volume 50

July 1998

Number 4

The occurrence of the rare species *Circinella umbellata* (Mucorales)

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Šimonovičová A. (1998): The occurrence of the rare species *Circinella umbellata* (Mucorales) – Czech Mycol. 50: 245–248

The rare species *Circinella umbellata* Tiegh. et Le Monn. was isolated from Eutric Fluvisol (Je) below an abandoned meadow, Gabčíkovo, Slovakia. In this paper we are giving a description and Scanning Electron Microscope photographs and light microscope photographs.

Key words: microfungi, Zygomycetes, Mucorales, *Circinella umbellata*.

Šimonovičová A. (1998): Výskyt vzácného druhu *Circinella umbellata* (Mucorales) – Czech Mycol. 50: 245–248

Vzácný druh *Circinella umbellata* Tiegh. et Le Monn. bol izolovaný z fluvizeme typickej (Je) pod neobhospodarovaným lúčnym porastom v Gabčíkove. V práci uvádzame popis kultúry a fotodokumentáciu na SEM a vo svetelnom mikroskope.

The genus *Circinella* was erected by Tiegh. et Le Monn. in 1873 (Hesseltine and Fennell 1955). We isolated the species *Circinella umbellata* Tiegh. et Le Monn. from soil samples from the region of Gabčíkovo. The first detailed description of the species *Circinella umbellata* is given by Hesseltine and Fennell (1955). A brief description of the culture without pictures is presented by Milko (1967, 1974). The species is mentioned from soil in Slovakia by Bernát et al. (1984).

MATERIAL AND METHODS

We isolated the species *Circinella umbellata* from Eutric Fluvisol (Je) below an abandoned meadow. The monitoring locality is situated in the region of Bodíky on the right bank of the Danube river system near the water power plant Gabčíkovo. The species *Circinella umbellata* was isolated from a mixed culture on Sabouraud

agar under dilution of 1.10⁻⁵ CFU from 10 g of fine soil. A pure culture was maintained on Sabouraud and Czapek-Dox agars in the dark at room temperature (Milko 1974).

Samples of the culture were observed and photographs (Figs 1-9) were taken on a Scanning Electron Microscope (SEM) model Tesla BS 301 by Mrs. J. Blahutiaková (Institute of Experimental Phytopathology and Entomology, Slovak Academy of Sciences, Ivanka pri Dunaji). Before that, the samples were dried under room temperature and coated with gold. Observations under the light microscope (Figs 10-12) were made too, in a drop of distilled water with Tween 80.

Our strain of *Circinella umbellata* is maintained in the Culture Collection of fungi, Department of Botany, Charles University, Prague (CCF 2971).

Circinella umbellata Tiegh. et Le Monn., 1873

Syn: *Helicostylum moreliae* Berk. et Broome, 1883

Mucor umbellatus (Tiegh. et Le Monn.) J. Schroet., 1886

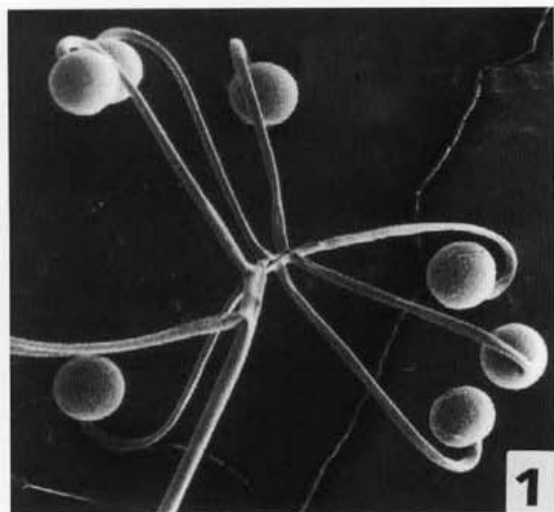
Mucor umbellatus (Tiegh. et Le Monn.) J. Schroet. var. *asperior*
J. Schroet., 1886

Circinella aspera Lendn., 1908

Circinella conica Moreau, 1913

Systematic position: Zygomycota, Zygomycetes, Mucorales

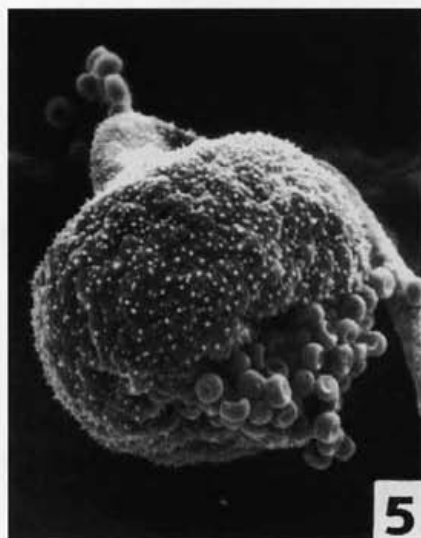
Circinella umbellata forms fast growing colonies with rich air mycelium. At the beginning they are pubescent or slightly pubescent, light brown or ochre coloured, later their height is 1.5 to 2.0 cm and the colonies are grey-brown or ochre-brown coloured. Sporangiohores grow from the mycelium to 2.0 cm high, and can be simple and straight with one globose circinate sporangium (Fig. 3), then the sporangiophore continues and is terminated by a curved sterile spine, or the sporangiophores are borne terminally on circinate branches. They are joined into umbels, 3 to 7 per umbel (Fig. 1), sometimes 9 or, 2 to 12 per umbel (Fig. 2), or up to 15. Beneath the umbel of sporangiophores a club-shaped sterile spine is formed (Fig. 2 on the right side). The stalks and side branches in young cultures are bound together, however later they are fan-shaped and are then opened. The circinate globose sporangium is located at the stalk terminals. The surface of the sporangium is rugged and wartlike and even the surface of the side branches is slightly rugged, evident below the basis of the sporangium (Figs 3-5). In young cultures the sporangium is light brown. During senescence of culture the sporangium ripens and becomes dark brown, its wall is fissured. The ripe sporangium cracks and opens by a fissure (Figs 4 and 5), which is prolonged and extended along the sporangium periphery to the basis of



Figs 1-2. *Circinella umbellata* Tiegh. et Le Monn.

1. Sporangiophore with seven branches. Beneath the branching in the left part there is sterile spine. 150 \times .

2. Branched sporangiophore with twelve side stalks that carry ripened and cracked sporangia. At the right side of the picture the sporangiophore has only three side branches, below them is a club-shaped sterile fibre. 150 \times [SEM photomicrographs].



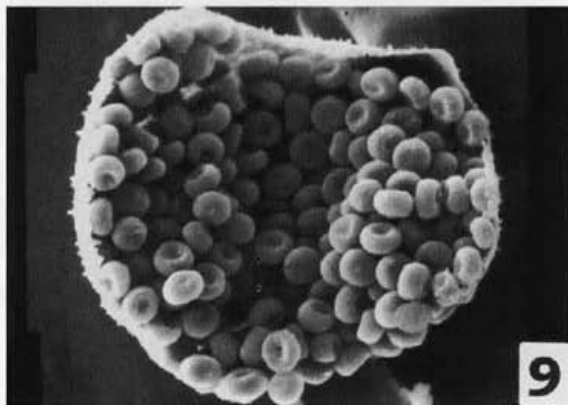
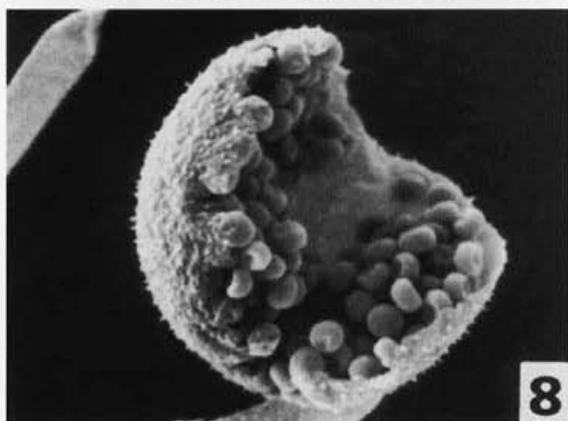
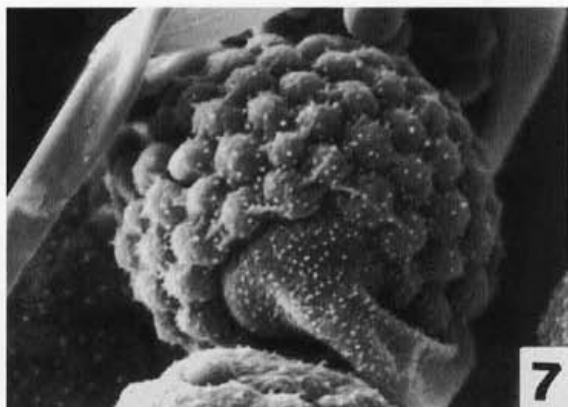
Figs 3–6. *Circinella umbellata* Tiegh. et Le Monn.

3. Sporangiophore with one globose circinate sporangium with a rugged and wartlike surface. 750 \times .

4. Ripened sporangium forming a fissure. 800 \times .

5. Sporangiospores are released from the ripe sporangium through the fissure. 750 \times .

6. The surface membrane of the ripe sporangium at the fissure is getting thinner and this thinning leads to the basis of the columella. 850 \times [SEM photomicrographs].

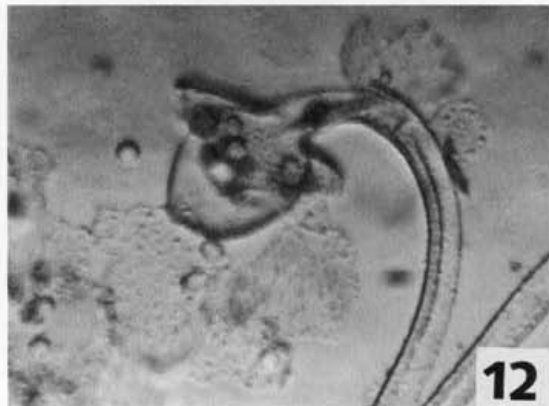
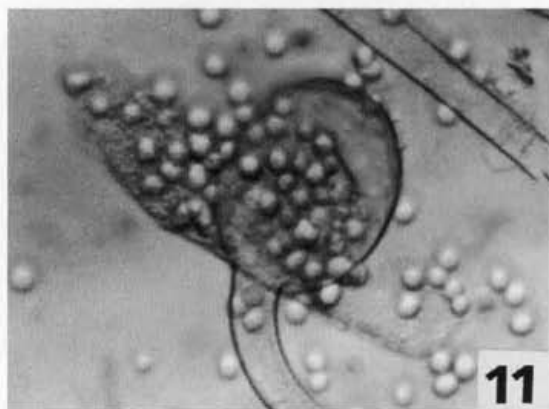
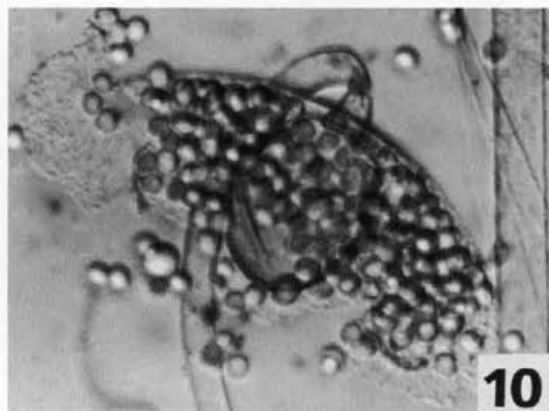


Figs 7-9. *Circinella umbellata* Tiegh. et Le Monn.

7. Basal part of the columella of a ripe sporangium. 1300 X.

8. Halved sporangium with remarkable remain of columella. 1300 X.

9. Halved sporangium with sporangiospores that are globose. Slightly flattened sporangiospores with depression on the side are caused by rehydration (artifact on SEM). 1300 X [SEM photomicrographs].



Figs 10–12. *Circinella umbellata* Tiegh. et Le Monn.

10. The membrane of a ripped sporangium cracks and remains as a collar on the basis of columella. 150 \times .

11. Columella of globose shape with remains of the membrane of the ripe sporangium. 150 \times .

12. Conical columella slightly flattened in its apical part. The remains of the membrane from the ripe sporangium are minimal. 150 \times [on a light microscope].

the columella. In the other case the surface membrane at the fissure is gradually getting thinner (Fig. 6) and its thinning also leads to the basis of columella (Fig. 7). The sporangiospores of *Circinella umbellata* are light green and globose. In Fig. 8 and 9 the sporangiospores are half-globose and slightly flattened with the whole depression on the side. This alternation (modification, artefact) is caused by scanning of dry (rehydrated) sporangiospores. The columella has a globose or half-globose, conical or cylindrical form, and is sometimes slightly flattened. On its basis part of the surface membrane of the ripped and cracked sporangium remains as a collar of various size (Figs 10–12). Zygospores were not observed. It is a heterothallic species.

Milko (1974) presented 11 species of the genus *Circinella*, which are characterized as physiologically non-specific saprophytes living on animal excrements, on decayed plant remains and even in soil. Milko (1974) made descriptions of the species *Circinella umbellata* based on his own isolate from excrements of a forest mouse.

In Slovakia the species was isolated from agricultural soils for the first time by Bernát et al. (1984). It was found in Haplic Phaeozem (Hh) with a frequency of occurrence of 0.01 and from (Vermi) Haplic Chernozem (Ch) with a frequency of occurrence of 0.05. Both soil types occur in the Danubian lowland (Žitný ostrov) or on alluvial soils along the river Váh. They are found in the warmest and the driest regions of Slovakia. We isolated the species *Circinella umbellata* from Eutric Fluvisol (Je). All soil types where *Circinella umbellata* has been found so far i. e. Haplic Phaeozem, (Vermi) Haplic Chernozem and Eutric Fluvisol, are soils with high contents of high quality humus and with a naturally high fertility (Sotáková 1982).

For Mucorales it is typical that they are found on substrates where a sufficient amount of easily attainable substances. Although the soil types mentioned above are sufficiently rich in organic substances, we consider the occurrence of the species *Circinella umbellata* in them as very seldom. Our identification of this species in Eutric Fluvisol will be a valuable contribution to its ecology and morphology, too.

ACKNOWLEDGEMENT

This work was supported by Grant Agency, VEGA, Grant 5048/98.

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