

Mucoraceae sp. in Uppsala soil

Sofia Henriksson, Uppsala University 2022

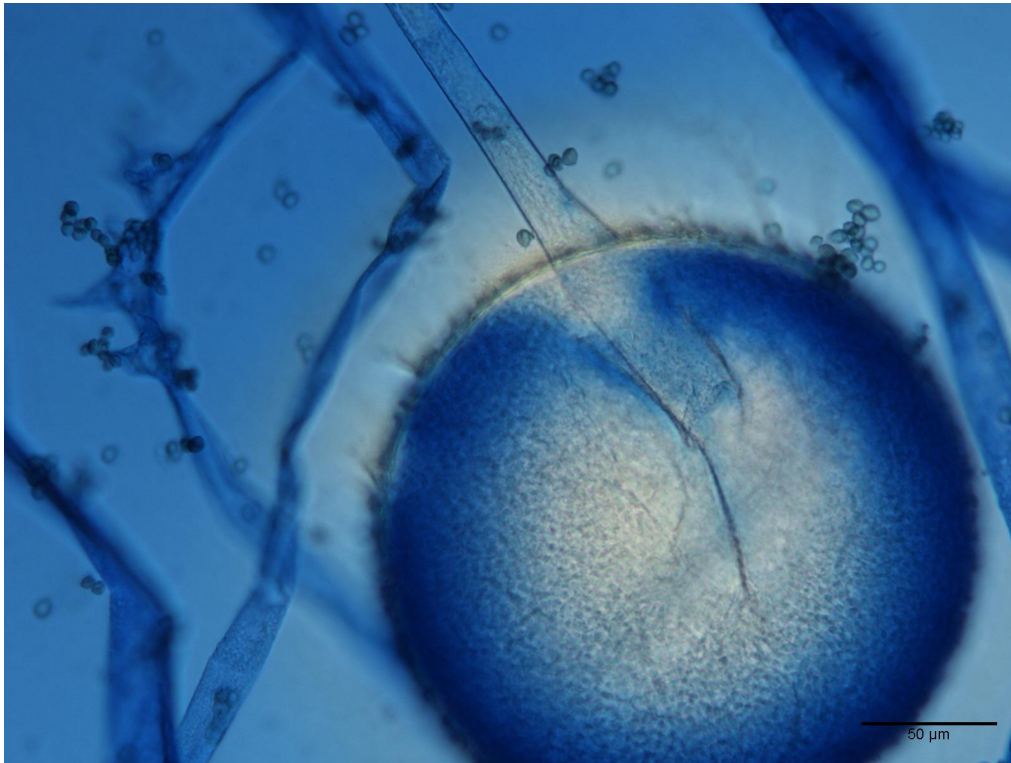


Fig. 1: Sporangium, hyphae, and spores of the isolate. Stained with cotton blue, image at 20x magnification.

As part of a course in “Diversity and Evolution of Microbial Eukaryotes”, a fungal species was isolated from a soil sample taken in central Uppsala. Identification of the species via sequencing was attempted, but failed. However, morphological observation would suggest that it might be a member of the *Mucoraceae* family, possibly in the *Rhizopus* genus.

Sampling

The sample was collected in a small urban green area in central Uppsala, the 11 of November 2022. At the location, a tree had recently been felled and mulched. As such, the sample contained decomposing wood and the surrounding soil.



Fig. 2: Sample location in central Uppsala. The sample consisted of soil and mulch from a recently felled tree.

After sampling, the soil was spread on an agar plate containing potato dextrose agar (PDA) and chloramphenicol, which was then incubated for 4 days at 30 °C. A sterile wire loop was used to isolate spores from a single species onto a new plate. After 2 days, the new plate was examined, and appeared to contain two species, and so it was re-streaked again onto a third PDA plate. To identify the species, DNA was extracted from spores of the pure isolate, and amplified using PCR with the primers ITS-1 and ITS-4. However, the sequence obtained from the PCR was of poor quality, and proved unusable.

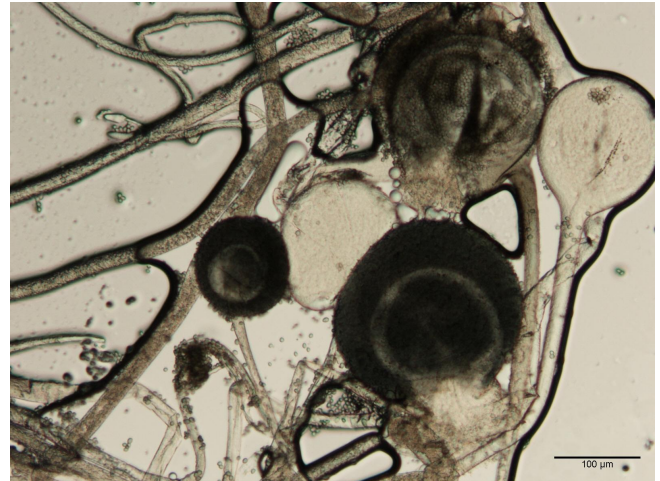


Fig 3: Immature sporangia (colorless) are shown next to mature sporangia (black), as well as hyphae and spores. Sample in colorless glycerol, at 10x magnification.

Morphology and genus

The fungus had long white stalks, growing into the lid of the petri dish, and large black sporangia at the top, easily visible to the naked eye. The sporangia had a diameter of around 220 µm, while the egg-shaped spores seemed to have a maximum diameter of about 8 µm.

While unable to identify the family or order of the fungus using the sequencing data, morphological observation would suggest it to be of the *Mucoraceae* family, possibly of the *Rhizopus* genus. Fig. 4 shows a *Rhizopus stolonifer*, with very similar morphological features.

Rhizopus are saprophytes, but some species can also be pathogenic to plants and animals. In humans they can be opportunistic pathogens, mainly in immunocompromised people, causing a serious infection known as Mucormycosis. Commonly affecting the sinuses, eyes, and brain, it has a rapid onset and is often fatal. While *Rhizopus* are very common fungi globally, mucormycosis is a rare disease^{1,2}.



Fig. 4: Image of *Rhizopus stolonifer*. 2012, Wikimedia Commons³

1. Reid G, Lynch J III, Fishbein M, Clark N. 2020. Mucormycosis. *Seminars in Respiratory and Critical Care Medicine* 41: 099-114. DOI: 10.1055/s-0039-3401992
2. Center for Disease Control and Prevention. About Mucormycosis. WWW document 8 August 2021. <https://www.cdc.gov/fungal/diseases/mucormycosis/definition.html>. Accessed 22 December 2022.
3. Wikipedia Commons image, user WDKeeper. 2012. Licensed under Creative Commons Attribution-Share Alike 4.0 International license: <https://creativecommons.org/licenses/by-sa/4.0/deed.en>. No changes made.