Diversity of Antarctic microfungi

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INTRODUCTION
The Antarctic mycobiota are diversified depending on differences in local climate and substrate. Most Antarctic microfungi are cosmopolitan, transported to Antarctica by air masses. The others, classified as indigenous, are well adapted to low temperatures, water availability and composition of nutrients in a substrate (Ruisi et al. 2007, Rev Environ Sci Biotechnol 6, 127-141). The purpose of this research is to study the diversity of microscopic fungi from soil crusts of different ecological niches. Soil crusts represent an important component of the area of interest and along with phyto- and zooselaphon in the active layer create a complex mosaic of microhabitats.

MATERIAL AND METHODS
Sampling sites
Investigated area is located at the deglaciated part of the Ulu Peninsula (Fig. 1), close to the Czech Antarctic Station of Johann Gregor Mendel at the James Ross Island (60°48’2.3’S; 57°52’56.7’W). During austral summer, active layer of permafrost is located in the depth of 40-50 cm in majority of deglaciated area of the Ulu Peninsula. The vegetation is represented by cryptogams such as mosses and lichens. They are the main components of communities forming Antarctic vegetation oases. Totally 25 samples of soil crusts and mineral substrates were collected from two different microclimatic niches at the end of February 2007. Eighteen samples were collected from site 1 (Fig. 1) – north-faced sunny slopes of the Berry Hill. Seventeen samples were collected from site 2 (Fig. 3) – shady site near a snowfield located at the southeastern foot of the Berry Hill.

Isolation
Strains were isolated by a direct plating of sample fragments on Petri dishes containing 2% malt extract agar and by using dilution method with cultivation on plate count agar. Plates were incubated at 10°C and 16°C. Occurrence of fungal colonies was observed weekly. Colonies of different morphology of microscopic fungi were picked up and transferred on an appropriate diagnostic medium. The isolates of filamentous fungi were observed under the light microscope using slide cultures mounted in lactophenol. Classification to species or genera level was based upon microscopic and macroscopic morphological characteristics.

RESULTS
Fifty strains of filamentous fungi were isolated from 25 samples. Most of the isolates have represented anamorphic fungi classified into three morphological groups: twenty-four isolates were recognized as Hyphomycetes, nine isolates as Coelomycetes and ten isolates shared inability to express diagnostic characters and were grouped as Agonomycetes. Additional four isolates were fungi of the phylum Zygomycota and remaining two isolates belonged to the phylum Ascomycotia. One strain of the last group was identified as Thelobolus microsporus (Fig. 4). This species is frequently isolated from Antarctica in association with Antarctic birds dung and feathers. It is also reported from cold regions of the Earth (Hoog et al. 2005, Studies in Mycology 51, 33-76). Moreover, we have obtained one isolate of black meristematic fungus - Friedmanniomyces endolithicus (Fig. 4). This is true member of Antarctic cryptoendolithic communities, very well adapted to cope with unfavourable conditions. The species grows typically in microscopic niches under the surface of porous rock (Selbmann et al. 2005, Studies in Mycology 51, 1-32). Classification of all isolates is summarised in Table 1.

CONCLUSION
Hyphomycetes have appeared to be dominant mycobiota both ecological niches of the Ulu Peninsula. 46% of all isolates of Hyphomycetes represented genus Cladosporium. Cladosporium herbarum was the most frequently found species in the niche with cold climate. The other species belonging to the genera Mortierella, Geomyces and Cladosporium were present at both sampling sites. Soil crusts were associated mainly by cosmopolitan species with mesophilic-psychrotolerant behaviour during Antarctic summer. Only two species were typical psychrophilic fungi: F. endolithicus and T. microsporus.

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