

## Review of Doctoral Dissertation

on PhD thesis of Martina Hujslová

### **Diversity and taxonomy of fungi inhabiting extremely acidic and saline soils of natural and anthropogenic origin in the Czech Republic**

The submitted thesis is devoted to diversity of fungi inhabiting extremely acidic or sulphate-rich habitats. The taxonomic part of thesis is focused on phylogenetic placement and formal description of previously undescribed fungal taxa.

The candidate's research resulted in four original papers included in the thesis. The three of them have been already published, one (no. IV in the text) has been submitted to an international scientific journal. The thesis consists of Introduction, four papers including candidate's data, Conclusions, References, and Curriculum Vitae of the candidate.

The Introduction describes the characteristics of extreme environments and role of fungi there. The number of species inhabiting such habitats is remarkable low and they usually have a cosmopolitan distribution. Also potential of these fungi in biotechnology (enzyme production, microbial remediation) is discussed. Nevertheless, the Introduction chapter is rather short and some aspects (e.g. adaptation to extreme environment, evolutionary mechanisms of adaptation leading to speciation) should be discussed in details. The research objectives of the thesis are clearly stated including studies of diversity, taxonomy and ecology of fungi adapted to extreme habitats.

The obtained results included in papers indicate fungal assemblages detected in sulfate-rich soil are considerably different from those typical for saline habitats. The comparison of fungal communities detected from sites with neutral or slightly acidic pH and highly acidic ones yielded considerable differences. The dominant representatives of the community include dematiaceous species of *Teratophariaceae* (Dothideomycetes), several *Penicillium* spp. and some species belonging to Leotiomyces and Sordariomyces. The results revealed numerous undescribed taxa, therefore the diversity of such habitats had been underestimated.

The taxonomic studies led to description of a new genera and species *Acidiella bohémica*,

*Acidothrix acidophila*, *Acidea extrema* and *Soosiella minima* and a new combination *Acidomyces acidotherma*. The results revealed that acidophilic fungi can grow in a broad range of pH and none of studied species had obligately acidophilic nature.

I would like to address the candidate with the following questions and comments:

1. Do you have some information (or idea) about comparison of diversity of both, culturable and non-culturable fungi in saline and acidic soils? Can you estimate a diversity of non-culturable fungi in these habitats?
2. Species of *Acidomyces* spp. have a cosmopolitan distribution. How can you explain dispersal of these species?
3. The analysis of diversity was conducted using Shannon-Weaver index and Bray & Curtis similarity index was used for comparison of communities. Do you know other methods for evaluation of fungal diversity and comparison of communities? Explain why these methods were chosen.
4. How do you define term „hyaline fungi“? The term is used for either, translucent ore colourless structures.

The candidate acquired skills in wide range of methods including microscopic identification of fungi, cultivation techniques, DNA sequence analysis and ecological data processing. I suggest to accept the dissertation and to grant to Martina Hujšlová the scientific degree - “philosophiae doctor” (Ph.D.).

In Brno, 12 August 2015

Michal Tomšovský, Ph.D.