



29 November 2017

Prof. Karol Marhold
Chairman of the Board of Examiners
Charles University, Faculty of Science

Dear Prof Marhold

EXTERNAL EXAMINER REPORT: PhD Thesis of Mr Vít Hubka

In the aftermath of the adoption of the one fungus one name principles in 2011, fungal taxonomists were faced with the challenge of reconsidering more than a century of extremely confusing nomenclatural practices. This was the result of a new understanding of evolutionary relationships among fungi that was revealed by the analyses of DNA sequence data. The amended Melbourne Code of Nomenclature required that a single name be chosen for each fungal species, and that the oldest genus name would have priority. The risk was there that if the rules were applied strictly, the names of many well-known genera and species could change, leading to even more confusion. This meant that many people were against the suggestion.

But the proponents of these changes to the Code also suggested that the mycological community should proceed with caution, and that working groups should be formed for different groups of fungi, where the group would then come up with a workable solution to apply the one fungus one name rule in the most responsible way. The International Commission of *Penicillium* and *Aspergillus* was tasked to guide the community with regards to naming species linked to these two genera. It was more or less at this time that Mr Hubka started with his PhD. He thus entered the field of fungal taxonomy working in one of the most important and controversial fungal groups, at a time where the nomenclature, but also species and genus concepts of fungi in general, were in the process of being redefined. Taxonomists were still trying to make sense of how to reconcile traditional phenotypic based criteria with DNA sequence data.

From the impressive body of work presented in this PhD, it is clear that Mr Hubka has progressed much further than the average student during the course of a PhD. He has not only mastered the state-of-the-art technologies and analytical methods, and gained a good understanding of his field of study, but has produced a body of work in five years that some mycologists will only achieve in a lifetime. He published 23 papers in the highest rated peer-reviewed mycological journals, and was first author of 11 of these. The authorlines of his publications further show that he has collaborated with the world leaders in this field of study. Some of the publications from this thesis were prescribed reading during the past months for the Nomenclature Committee for Fungi (NCF) when they had to vote on a proposal regarding *Aspergillus*. This confirms that Mr Hubka has, within five years, established himself not only as a collaborator of, but as one of the leaders in this field of study.

The Introduction to the thesis summarizes the contents and all the major issues dealt with in the thesis beautifully. These include the current controversy about the genus concept, but also current



“Future Forests and Food”

FABI (Forestry and Agricultural Biotechnology Institute)

concepts of the subgenera and sections, species delineation, new analytical approaches, paralogous beta-tubulin genes, hybridization, and the clinical relevance of the work globally and for the Czech Republic. The topics addressed are the current issues that all fungal taxonomists deal with, and as such it becomes a universal story of the revolution that took place in fungal taxonomy and nomenclature during the last 25 years, and how the changes are being dealt with in a responsible way. In fact, with some modification I suggest the introduction can be published as a review paper with a title like "An introduction to *Aspergillus* for non-aspergillogists" or "The taxonomy of *Aspergillus*: generic, subgeneric, section and species concepts" or something similar. He might just add a section on fungal genomes and the road ahead.

Apart from a few minor grammar corrections that I suggest in the attached pdf to the introductory part of the thesis, there is really not much to say about the contents of this thesis, apart from congratulating him and his supervisor on a job exceptionally well done!

I recommend without any reservation that Mr Hubka is awarded his Ph.D. degree.



Prof ZW de Beer

QUESTION 1

As scientists we often hear these days that we should improve our science communication to the general public. Can you explain in two minutes to the non-biologists in the audience what your research for your PhD was about, and why it was important?

QUESTION 2

In your thesis you applied a wide generic concept, supported by phylogenetic analyses. In a recent study, Divakar et al. (2017) followed a temporal approach that uses time-calibrated chronograms to identify temporal bands to assist in defining genera and families. Do you think such an approach can work for the Aspergillaceae? Motivate your answer.

QUESTION 3

In my experience, taxonomy based on robust phylogenetic data often changes the way we view the fungal groups we worked with, especially with regards to the characters that are really taxonomically informative, but also in terms of their evolution. If you look back now, did the improved phylogenies that resulted from your studies, change the way you view this group of fungi? Were there any outcomes that surprised you and that were different from what you expected?

QUESTION 4

In terms of *Aspergillus* taxonomy and diagnostics, what remains to be done? And what do you predict will the impact of whole genome sequencing be on this field of study?

REFERENCE

Divakar, PK, Crespo, A, Kraichak, E, et al. (2017). Using a temporal phylogenetic method to harmonize family- and genus-level classification in the largest clade of lichen-forming fungi. *Fungal Diversity* 84: 101-117.