A review of the doctoral thesis by Radka Hauerová:

Contribution to the taxonomic revision of the order Oscillatoriales

The cyanobacterial taxonomy has been facing a severe transformation within the last 20 years. It is exhibited by a boom of new cyanobacterial genera and many revisions because patterns in phylogeny and morphology do not seem to correspond. I gladly accepted to review this doctoral thesis because I already knew two from three papers included within the thesis. Radka's work made a huge leap towards a better understanding of the diversity and taxonomy of cyanobacteria.

The thesis is composed of three manuscripts. All of them were submitted or already published in high-quality journals. The first paper deals with an epitypification of *Oscillatoria*. Radka made a great job with a connection of the strains in her collection and the type. Although using this approach, it is not absolutely certain that Radka observed the same cyanobacteria as Vaucher and Gomont in the nineteenth century, the epitypication provides a great source of information for the further revisions in *Oscillatoria* and other related genera. Moreover, she did a great job and gathered as much evidence as possible and she included observation of morphology, ultrastructure, and phylogeny of many strains as well as a detailed historical overview of literature on *Oscillatoria*.

The second paper is a careful description of a new genus *Tenebriella* and its two species. Radka used quite an extensive dataset of tens of strains and she applied several molecular markers so that she could investigate intraspecies variability. The case of *Tenebriella* amplifies the importance of deeper sequencing efforts at the species level. Radka mentions in the abstract that the two species of *Tenebriella* can be recognized based on morphology and ecology. However, both species form benthic mats which may later float and their cell with overlaps. Also, there is no statistical test for the width difference. Better wording should be used here. Moreover, *T. amphibia* was found in the soil and stones as well as in fresh water, which suggest much larger ecological niche, and thus, it will be even harder to distinguish from other species.

The third paper is focused on epitypification of *Arthrospira* and the erection of a new genus *Limnospira*. I again appreciate such a large dataset and careful work with literature and performed analyses. "*Spirulina*" is one of the best-known cyanobacteria. *Arthrospira* has not been largely accepted so I hope that *Limnospira* will work out better.

Radka's thesis represents a great deal of a high-quality taxonomic work. I think it can be an inspiration for further careful taxonomic revisions in cyanobacteria. I enjoyed reading the thesis and I gladly recommend it for the defense.

Questions:

- How many species do you expect within *Oscillatoria princeps*? You recognize 12 morphotypes and four clades in the phylogeny.
- Is taxonomy using only genome sequence (SeqCode: https://www.isme-microbes.org/seqcode-initiative) a viable solution?
- *T. amphibia*: "Species forming mats in freshwater habitats that may be later floating detached on the water surface. It has been often found in waters with elevated conductivity and pH, but is also known from greenhouse soils and stones. Is it high tolerance or perhaps intraspecies diversity suggesting ecotypes?
- Which morphological characters have the strongest distinguishing power?
- In last five years, more than a hundred of new genera were proposed. Do you expect that this trend of "splitting" will continue?

In Olomouc 18th June 2021

Petr Dvořák, Ph.D.
Palacký University Olomouc
Faculty of Science
Department of Botany
Šlechtitelů 27
783 71 Olomouc