Trento, September 10th 2021

Committee for the dissertation defences
Study programme Ecology - Faculty of Science
Charles University in Prague

Scientific Secretary
Nataša Tymichová

Concern: **Ph.D. Dissertation**
TITLE: **Freezing tolerance of freshwater diatoms as a key to their success in polar regions**
STUDENT: **Mgr. Eva Hejduková**

Referee's report

The PhD thesis focuses on an interesting topic of fundamental research (freezing tolerance of freshwater diatoms) that could help explaining biogeographical patterns and evolutionary success of a diverse, abundant, and fascinating group of unicellular microalgae (the diatoms).

The topic was tackled both with laboratory experiments, working with isolated strains, and with field work in the High Arctic (Svalbard).

The aspiration to work on freezing tolerance forced the author to carry out in-depth observations on a rarely addressed topic (formation and characteristics of diatom resting stages) that is of pivotal important for the correct interpretation of the biogeography of these organisms.

The thesis is well structured and organized, the information provided is novel. Several of the topics addressed have the potential to improve our understanding of diatom ecology and biology. Out of the thesis achievements, the following were those that mostly caught my attention:

- The scientific work done for the thesis showed that winter survival relies much more than believed on vegetative cells, and it showed that the typical resting stage possesses the apparent morphology of a vegetative cell (which could contribute to understanding why diatom resting stages are so rarely recorded).

- The most typical population cycle seems to be characterized by massive population decline during the winter, and seasonal cycle restarted by surviving vegetative cells and/or resting cells that act as inoculum of the newly developing population. I had this impression while working with mire pools in the Alps which froze completely during the winter, and was glad to see this proven with observations and data.

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- If correctly assessed at the microhabitat level, the freezing conditions aren't as harsh as assumed before, even in the High Arctic.
- The thesis provides, for the first time, a complete and detailed description of the seasonal cycle of diatom assemblages in the High Arctic. Cell viability and functionality was assessed using a multi-parameter fluorescence staining.

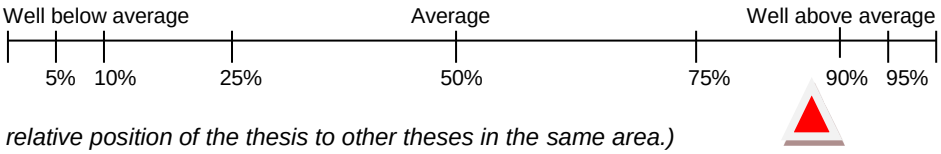
The list of experiences abroad and the co-Authors of the papers included in the dissertation document the important role of international scientific collaboration in the completion of the doctoral studies and research performed for this thesis.

I can't find any major weak point, maybe other than the relatively low practical applicability of the findings of this thesis. However, this is largely compensated by the high usefulness of the findings of this PhD thesis for an improved interpretation and understanding of diatom distributional biogeographical and even ecophysiological patterns.

The results of the doctoral research have been presented at several national and international congresses. The publication strategy of this dissertation has been well conceived and has been successfully carried out. Mgr. Eva Hejduková is first and corresponding Author of all the three papers included in her PhD thesis, which underpins her central role in all the stages of the scientific work performed to produce these publications. Her role is as participant Author only in the book chapter (fourth contribution included in her PhD thesis) which has a broader scope compared to the dissertation and requires experiences collected in a longer scientific career. The papers are all published in renowned journals with medium-high (2.5-3.5) IF and ranked Q1(Q2).

In conclusion, the scientific topics addressed are very interesting and many are novel, and the scientific methods used are exact, and adequate. I therefore don't hesitate to evaluate the PhD work of Mgr. Eva Hejduková (using a general scale) as follows:

Global assessment:



(Indicate the relative position of the thesis to other theses in the same area.)

Dr Marco Cantonati

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