Report on Mgr. Anna Tichá dissertation. Charles University, Faculty of Science, PhD study programme: Botany.
Changes in nutrient availability imprinted in long-term diatom succession in lakes

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General statement:
Sediment lakes are an exceptional record for studying long-term ecological dynamics from decades to millennia. Sediments provide information about the lake ecosystem and, as relevantly, the processes occurring in the catchment and the atmospheric influence, the so-called airshed. Therefore, providing a comprehensive view of the hierarchical chain connecting ecosystems of different spatial characteristic scales. Not only is the length of the record relevant, but the multivariate nature of the register allows reading the same history in "many different languages," namely the physical, chemical, and biological proxies. The thesis is based on one of these languages, diatoms, and their indicative value as indicators of lake trophic conditions that the candidate combines with other proxies analyzed by collaborators to address different aspects of lake ontogeny during the Holocene in some Bohemian lakes.
The title does not pay enough credit to the actual content because it focuses on nutrient availability, but, indeed, diatoms are used in the chapters in a broader sense as indicators of lake functional conditions. The chapters' contents indicate an excellent expert knowledge of diatoms and the interpretation of several other proxies (chironomids, cladocerans, elemental chemical composition, etc.) in a broad context of climate, landscape, and lake dynamics. Mastering the paleolimnological tools and conceptual context is also evidenced across the thesis. The requirements for a doctoral degree are more than fulfilled

Questions:
1) Paleolimnological measurements and diatoms, in particular, offer alternative interpretations. Diatoms provide rich community records, including many species, which can be identified with the same accuracy as living specimens. The paleolimnological community has made a considerable effort to provide tools for the environmental interpretations of the diatom record. However, it is still far from being completely satisfactory. Based on your thesis experience, I would like to ask about the strengths and weaknesses you identify for relating diatom remains to environmental reconstructions?

2) Some interpretations in the Lake Komořany study (Chapter 2) led to apparent contradictions. Diatoms are unicellular eukaryotes that respond quickly to the immediate (proximal) environment. Therefore, it is difficult to accept that nutrient-demanding taxa appear in lower primary productivity conditions. I think we should look for alternative explanations. For instance, this is a large shallow lake, and you have considered changes in depth; I wonder if it has been considered that the lake could shift between a unique lake and several smaller lakes, driven by those depth fluctuations, and how that will influence the diatom communities?

3) The ratio between chrysophyte cysts and diatom valves (CD) can be interpreted in different ways. In the thesis, changes in depth have been favored as interpretation;

however, in some cases, it seems also appropriate to consider it as a trophic state indicator. Do you see any case in your records that can be preferentially considered in that way?

4) Generally, the main interpretations based on the paleolimnological evidence are correct across the thesis chapters. However, sometimes the narrative is too long, in my opinion, tending to some overinterpretation of too many details. The last chapter about brownification is very interesting, and the overall result is clear. Have you considered, for instance, using tables to summarize details if needed and concentrating on the central issues in the text?

5) Zonation is a traditional practice for interpreting paleolimnological records, likely influenced by the "facies concept" in sedimentology. CONISS has become the standard method, probably because it was readily available in programs such as Tylia; however, other methods exist, and some of them could be better depending on the nature of the samples. Have you considered this possibility?

6) Is there room for chance in ecosystem dynamics? For instance, would the environmental interpretation be the same without the irruption of Asterionella ralfssi in Prášilské Lake?

Jordi Catalan, Bellatera, 17th June 2022