

## **Review of the PhD thesis by Helena Bestova**

This thesis deals with characterizing biodiversity patterns in an important group of benthic protists, desmid algae. There are four chapters in the thesis and at least three papers result from it. Ms. Bestova is the first author on all of them.

This thesis is an impressive body of work that comprehensively covers major ecological processes structuring desmid communities at different scales. The PhD candidate shows deep knowledge of general ecological principles, quantitative approaches and the biology and natural history of desmid algae. The studies included in the thesis are novel, exciting and contribute to our general knowledge of community assembly and patterns in microbes in general and aquatic protists in particular. The PhD candidate applies an impressive variety of quantitative methods highly suitable for analyzing the collected data and draws thoughtful conclusions based on careful analyses.

The thesis is impressive because it addresses important fundamental questions in community ecology and biodiversity science. We still do not know much about the processes and patterns in microbial systems, especially at larger scales. This thesis presents a lot of novel information and thorough analyses that shed light on the nature of community assembly in aquatic protists and microbes in general.

It is particularly exciting that Ms. Bestova employed not only observational but experimental approaches as well. The experiments that she conducted require a lot of effort and yield important information that cannot be obtained from observational studies. Together, these different approaches provide a much more complete picture on the ecology of desmids and other protists.

Many aspects of the thesis are novel and exciting, for example, testing fundamental scaling laws with this group of protists, which has not been done before. The reported patterns are also intriguing, for example a climatic signal in cell size distributions, with larger cells associated with more continental climates, or a change in dominant community assembly processes along environmental gradients, and could stimulate future work by other researchers. It was also impressive to see a novel way to estimate volumes of cells with complex shape working so well for the purpose of the study.

The fundamental conclusion of the thesis that major ecological processes operating in macroorganisms are also at work in microbial systems is an important contribution to the general ecological knowledge and should be of interest to a wide range of community ecologists and biodiversity scientists.

Questions for the PhD candidate (these questions do not necessarily have a “correct” or “incorrect” answers. They are more designed to reveal the general thinking).

1. How important do you think are priority effects in desmid (and other protist) communities and why?
2. Most trait-based analyses of communities use the community weighted means (CWM) of traits. Why do people use this metric and when could the non weighted means be important? What information can we get from looking at the variance in trait distributions? How can competition affect community trait variance?
3. It is interesting that pH was an important predictor of phylogenetic diversity. Why do you think it is? What other environmental factors could be looked at that may be important? Do you think desmids would exhibit niche conservatism in other trait/environmental factor dimensions?
4. Why do you think spatial factors have limited predictive capabilities?
5. How can resource limitation affect scaling relationships? What could happen if you would grow *Micrasterias* under nutrient limitation?

**Overall evaluation:**

This thesis is of excellent quality and highly deserving to be awarded a PhD title.

Sincerely,



Elena Litchman  
MSU Foundation Professor  
Michigan State University, USA