PRONOUNCED GEOGRAPHIC STRUCTURING AND ENDEMISM IN FRESHWATER DIATOMS OF THE ANTARCTIC REALM

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Microorganisms are crucial players in all global biogeochemical cycles and ecosystem functioning in terrestrial and aquatic habitats. Despite this, information on their large-scale biogeographic structuring is largely lacking, mainly due to a lack of taxonomic resolution and consistency in the available datasets. Despite a growing number of morphology- and DNA-based studies on microbial biodiversity, our understanding of large-scale microbial biogeographical patterns remains a contentious issue, mainly because of the lack of taxonomic resolution and consistency in the available datasets.

In this lecture, an analysis will be presented of biogeographic patterns in freshwater diatoms based on a high-resolution and internally fully consistent species-level taxonomic data set from > 400 lakes covering the entire Antarctic Realm. A strong biogeographic structuring at multiple spatial scales was observed with distinct, differently sized diatom floras characterizing Continental Antarctica, Maritime Antarctica and the Sub-Antarctic islands. Additional biogeographic provincialism emerged in all three regions. These patterns were underlain by species turnover rather than nestedness; explained predominantly by historical and spatial factors, such as distance between regions and differences in the deglaciation history. A total of 59% of the recorded species are currently only known from the Antarctic Realm. The proportion of regionally restricted species was particularly high in predominantly terrestrial genera and, in contrast to local and regional richness, significantly increased with increasing latitude. This strong biogeographical structuring suggests that effective dispersal between the biogeographical regions has been limited, fostering the evolution of highly endemic diatom floras, making a compelling case for the important role of historical events in the evolution of lacustrine diatoms, which is similar to macroscopic organisms from the Antarctic Realm based on morphological and genetic data.