ABSTRACT

In Antarctica, diatoms inhabit multiple limno-terrestrial habitat types, which may each individually offer unique ecological information for use in biomonitoring, paleoecology, and biogeography. However, we are still at the initial exploration stage of documenting the diversity among habitat types from different Antarctic regions, which is necessary to serve as baseline data for the aforementioned scientific disciplines, and ultimately inform conservation decisions.

To gain insight into the spatial and habitat controls on Antarctic diatom communities, the importance of habitat type and island aspect was investigated by studying diatoms living in ponds, mosses, streams, and seepage areas on two opposite sides Vega Island, Antarctic Peninsula. A diverse flora of 136 taxa belonging to 31 genera was revealed, which was dominated by the genus *Nitzschia*, and suggests that the flora of Vega Island is biogeographically influenced by both continental and Maritime Antarctic bioregions. Habitat type was found to be a crucial factor for diatom community composition, and was stronger than the influence of island aspect. In ordination analyses, moss samples were separated primarily by their abundances of the diatom *Chamaepinnularia krookiformis*, while pond samples were separated by *Nitzschia paleacea* and stream habitats by *Fistulifera pelliculosa*.

These 'recent' communities were then compared with paleo-assemblages characterized from sediment cores extracted from prominent lakes from both sides of the island. In both cores, diatom assemblages were relatively uniform throughout, suggesting stable lake communities and/or allochthonous inputs over time. However, sediment cores differed substantially from each other in their species richness and diversity, and reflected patterns described for modern communities between the two sides of the island, suggesting that the drivers of these differences in modern communities are probably operating over long timescales.

This thesis expands ongoing research of diatom diversity and distributions on Maritime Antarctic islands, and reveals that both habitat and spatial controls are prominent in structuring communities. Furthermore, this research provides a fresh, holistic approach to interpreting diatoms in sediment cores to reconstructing past ecological conditions. Lastly, as the human presence in Antarctica continues to increase, this knowledge can help to develop specially managed and protected areas throughout the region by helping to understand factors that promote high and endemic diversity.

Keywords: James Ross Archipelago; Vega Island; Bacillariophyta; Ecology; Paleolimnology; Taxonomy