

**Zooplankton diet preferences across species, life stages and seasons using DNA barcoding**

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Identifying feeding links is critical for quantifying the sources and fluxes of energy across trophic levels. An important part of this process is the analysis of what has been eaten in the field, information we can now obtain using advances in molecular tools that enable characterization of feeding links for generalist herbivores and predators, such as marine zooplankton species. Zooplankton are a key linkage for carbon and nutritional fluxes from primary producers to fish that utilizes various dietary resources, however little is known about their diet sources in the natural environment and factors influencing zooplankton feeding strategies. Here we use complimentary DNA barcoding techniques to detect zooplankton dietary patterns of common Baltic Sea copepod and cladoceran species and their life stages across two seasons. The combined analysis of 16S and 18S rDNA identified a broad range of major phyto- and microzooplankton prey taxa, revealing that all species and life stages feed omnivorously on a broad range of taxa. Zooplankton showed specific diet preferences for diverse algal and ciliate species, suggesting selective feeding. We find a high diet overlap among copepods and cladoceran species, and life stages but a low diet overlap between seasons. The different feeding strategies between seasons are related to changes in available prey diversity and abundance, and grazing pressure. These results reveal new detailed insights into plankton feeding linkages in nature and show that DNA barcoding is a promising tool to detect trophic food web interactions in plankton communities.

Keywords: food webs, copepods, marine cladoerans, nauplii, feeding links, 16S rDNA, 18S rDNA

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