OC12 - Turbidity mediates the relative importance of herbivory and carnivory in a fairy shrimp

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INTRODUCTION

Large branchiopods, a group including anostracans, are a flagship group of temporary ponds. Anostracans are generally considered to be filter feeders, although there is a rising number of studies providing evidence that individual anostracan species are capable of active predation on adult crustaceans (e.g. Rogers et al., 2006). Temporary waters are usually very shallow habitats, exposed to the mixing effect of wind, which may contribute to high levels of turbidity (Lahr et al., 1999). There are many gaps in our knowledge about temporary ponds, and turbidity due to inorganic particles is largely understudied in particular. Our aim here was to determine whether turbidity affects the feeding process of anostracans and if there is a difference in response between filter and predatory feeding.

METHODS

An anostracan species, *Branchinecta orientalis*, was cultured from sediment collected in Central European soda pans. Short-term feeding experiments were performed with several turbidity levels. For the turbidity treatment, we used sterilised fine sediment from a soda pan. As filter-feeding test, we used two unicellular green algal species: a relatively larger species and a picoplanktonic species, which are dominant members of soda pan phytoplankton throughout the year. In the predatory feeding test, a copepod and a rotifer co-occurring with *B. orientalis* were employed. We used linear models in R to relate feeding efficiency on each food type to different turbidity levels.

RESULTS and DISCUSSION

There was a pronounced decrease in the clearance rates on algae with increasing turbidity (Fig. 1). The effect of turbidity was significant for both algae. Conversely, predation efficiency was not significantly affected by turbidity. Our results therefore imply that the same anostracan species could feed omnivorously in transparent and more predatory in turbid waters, as turbidity only impairs the feeding rates on phytoplankton and not on zooplankton. It confirms our assumption that turbidity directly affects the feeding type of *B. orientalis*. Our study species, *B. orientalis*, exhibits high densities in its natural habitats (Horváth et al., 2013) and therefore might have a strong effect on the co-occurring planktonic species. Our findings therefore suggest that its impact on the food web might be modulated in a crucial way by a single environmental factor, turbidity.

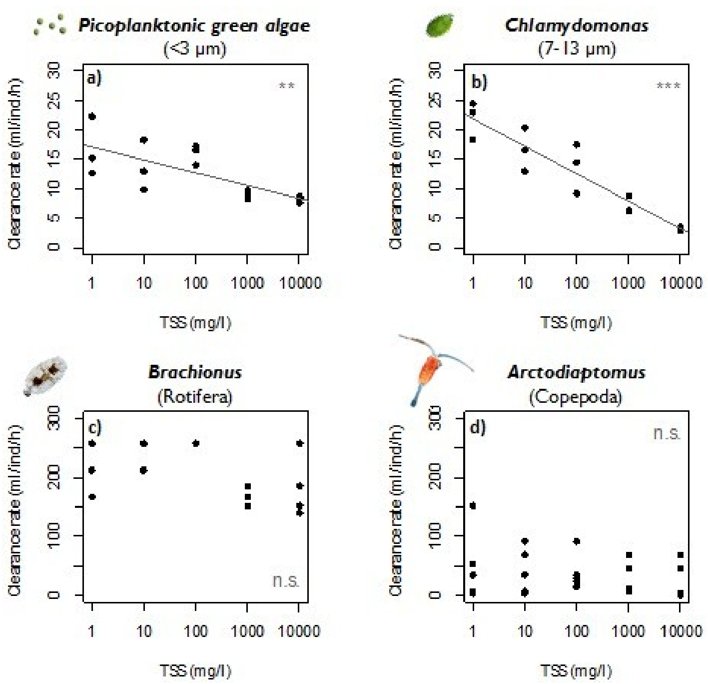

Fig. 1. Clearance rates of *B. orientalis* on different food sources in five turbidity levels covering the entire gradient found in their habitats in spring: a) pico-sized unicellular green algae; b) larger unicellular green algae *Chlamydomonas* sp.; c) rotifer *Brachionus asplanchnoidis*; d) copepod *Arctodiaptomus spinosus*. We calculated clearance rates as other authors and also our observations suggest that anostracans are predatory filter-feeders and not actively foraging predators. Lines represent linear regressions, with significance levels indicated as follows: n.s. – not significant, $p>0.05$; ** – significant, $p<0.01$; *** – significant, $p<0.001$.

CONCLUSIONS

This study provides the first evidence for a direct effect of turbidity on the feeding ecology of fairy shrimps. According to our findings, turbidity may act as a switch on an intra-guild predation relationship, where fairy shrimps feed omnivorously on algae and their grazers at low turbidity, while they feed more exclusively on small zooplankton at high turbidity. A task for the future is to examine food selection of fairy shrimp on mixed diets and how changes in their feeding behaviour induced by turbidity affect community composition in temporary ponds.

ACKNOWLEDGEMENTS

This research was supported by the Interreg V-A Austria-Hungary program of the European Regional Development Fund (“Vogelwarte Madárvárta 2”).

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