

Supplementary Material

The environmental set of conditions, and the fact that sandhoppers populations are established since generations on the beaches selected for this study supplied a natural experimental framework, and may represent a background for the study of adaptation of resident fauna to changing environments (Peterson *et al.* 2006). The effects of physical environmental constraints on the supralittoral fauna were confirmed to be acting on population characteristics, including behaviour (Fanini *et al.* 2009). Consequently, changes in the physical environment are expected to shape different behavioural adaptations. Our experiments also confirmed that behavioural plasticity may be considered as a key adaptation to salinity changes in the environment. Namely, we found different behavioural responses among Mediterranean and Baltic populations to different salinity rates. Behaviours were affected differently by changes in salinity, consistent with their functional meaning. The functionality of behaviour fitted to the habitat (Koehl 2010) as highlighted by this study.

Fanini, L., Defeo, O., Do Santos, C., and Scapini, F. (2009). Testing the Habitat Safety Hypothesis with behavioural field experiments: amphipod orientation on sandy beaches with contrasting morphodynamics. *Marine Ecology Progress Series* **392**, 133-141.

Koehl, M. A. R. (2010). How does morphology affect performance in variable environments? In *'In Search of the Causes of Evolution: From Field Observations to Mechanisms.'* (Eds P. R. Grant and B. R. Grant), pp. 177-191. (Princeton University Press: Princeton.)

Peterson, C. H., Bishop, M., Johnson, G. A., D'Anna, L. M., and Manning, L. M. (2006). Exploiting beach filling as an unaffordable experiment: benthic intertidal impacts propagating upwards to shorebirds. *Journal of Experimental Marine Biology and Ecology* **338**, 205-221.