

Stable isotopes reveal effects of *environmental* changes on ecological niches of Iphimediidae amphipods

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When faced with environmental changes, organisms are expected to have some intrinsic ability to adapt through ecological plasticity. However, this process is still poorly understood in many Antarctic invertebrates. Here, we focused on Iphimediidae amphipods, as this widely distributed family shows important ecological diversity. In total, 248 amphipods (19 species) from two widely different zones (the West Antarctic Peninsula, or WAP, and Adélie Land, AL) were studied to elucidate how environment can influence ecological niche parameters. Ecological niches were explored using stable isotope ratios of carbon and nitrogen and the SIBER approach (Jackson et al., 2011).

The isotopic niche of the whole amphipod assemblage was wider in WAP than in AL. This was true for both total (proxy of the whole range of resources exploited by animals) and the core (proxy of the most commonly used resources) isotopic niches. The ratio between total and core isotopic niches was smaller in WAP than in AL (4.13 vs. 5.74), suggesting that in WAP, animals commonly use a greater relative percentage of the resources to which they have access.

Niche modelling at the specific level revealed that this trend was not found in all taxa. For example, niches of *Gnathiphimedia sexdentata* and *Iphimediella microdentata* were bigger in WAP than in AL, following the general pattern. On the other hand, niches of *Echiniphimedia echinata* and *E. hodgsoni* had the same width in both areas. Moreover, relative niche overlap between these two species was much higher in WAP (42%) than in AL (20%).

Our results indicate that the widely different environmental conditions encountered by the animals in these two zones clearly influence their ecology. Overall, Iphimediidae amphipods tend to exploit more resources in WAP, i.e. in the zone where impacts of global change (temperature increase, sea ice cover decrease) are the strongest. Niche overlap between some closely related (i.e. congeneric) species was also more important in WAP. Ultimately, environmental changes in this region might reinforce these trends, which might lead to competition and perturb amphipod community structure.

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References

- Jackson A.L., Inger R., Parnell A.C. & Bearhop S. 2011. Comparing isotopic niche widths among and within communities: SIBER - Stable Isotope Bayesian Ellipses in R. *Journal of Animal Ecology* 80:595-602.