

# Effects of environmental changes on ecological niches of Iphimediidae amphipods: a stable isotope comparison of West Antarctic Peninsula and East Antarctica

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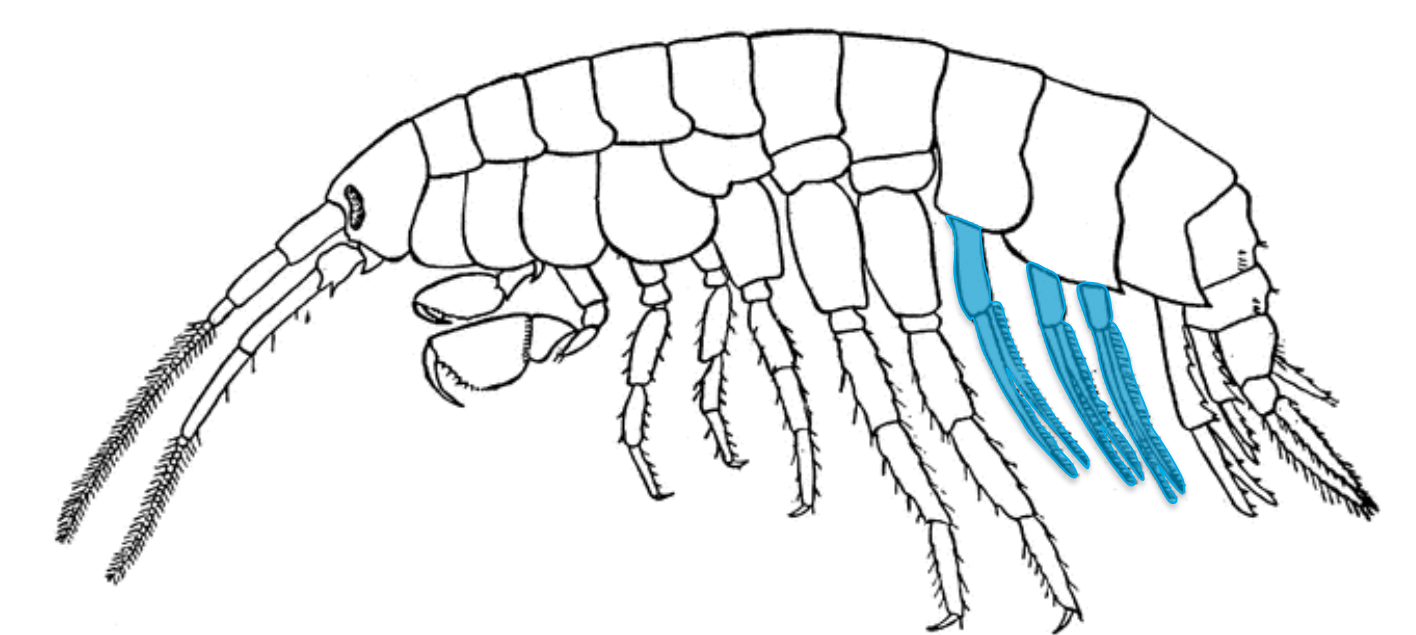
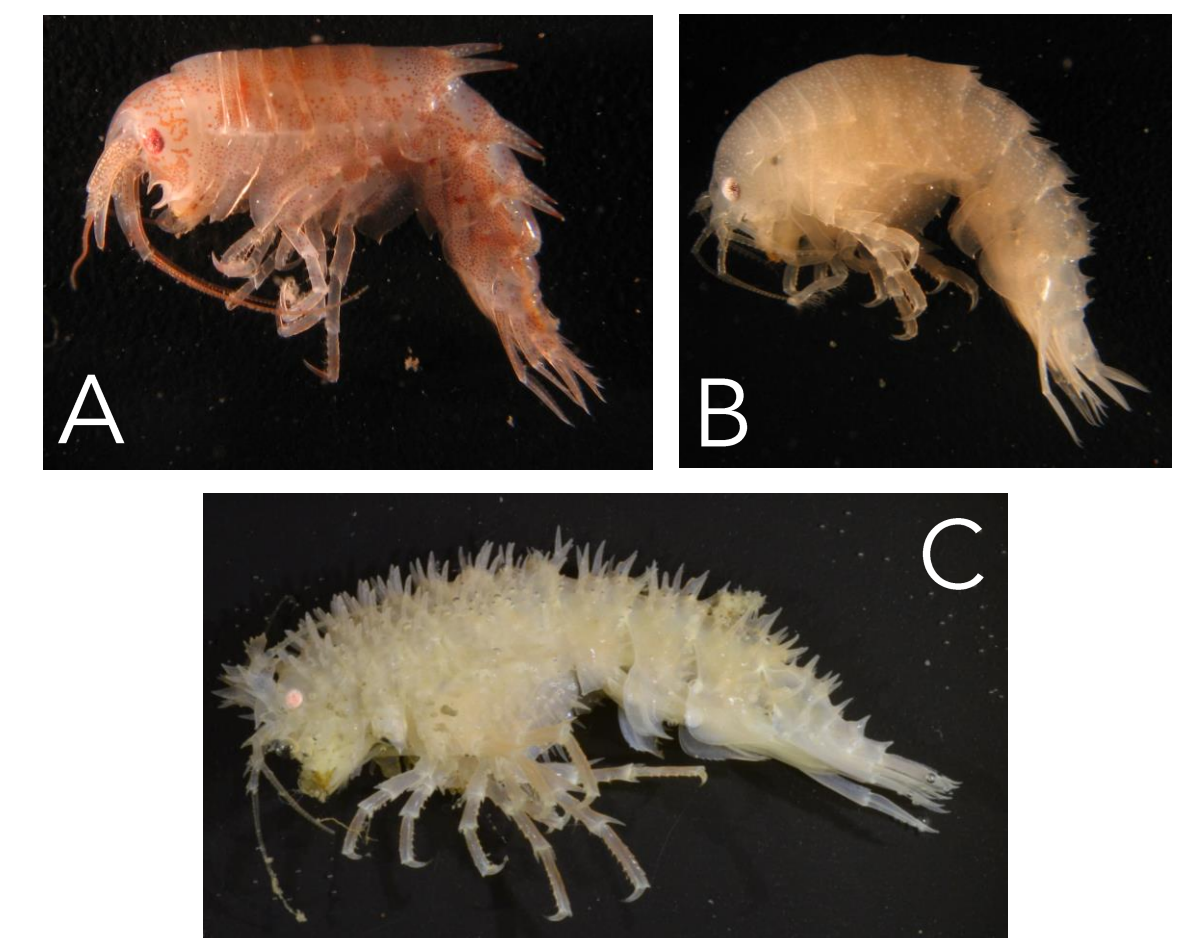
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## Context, objectives & methods

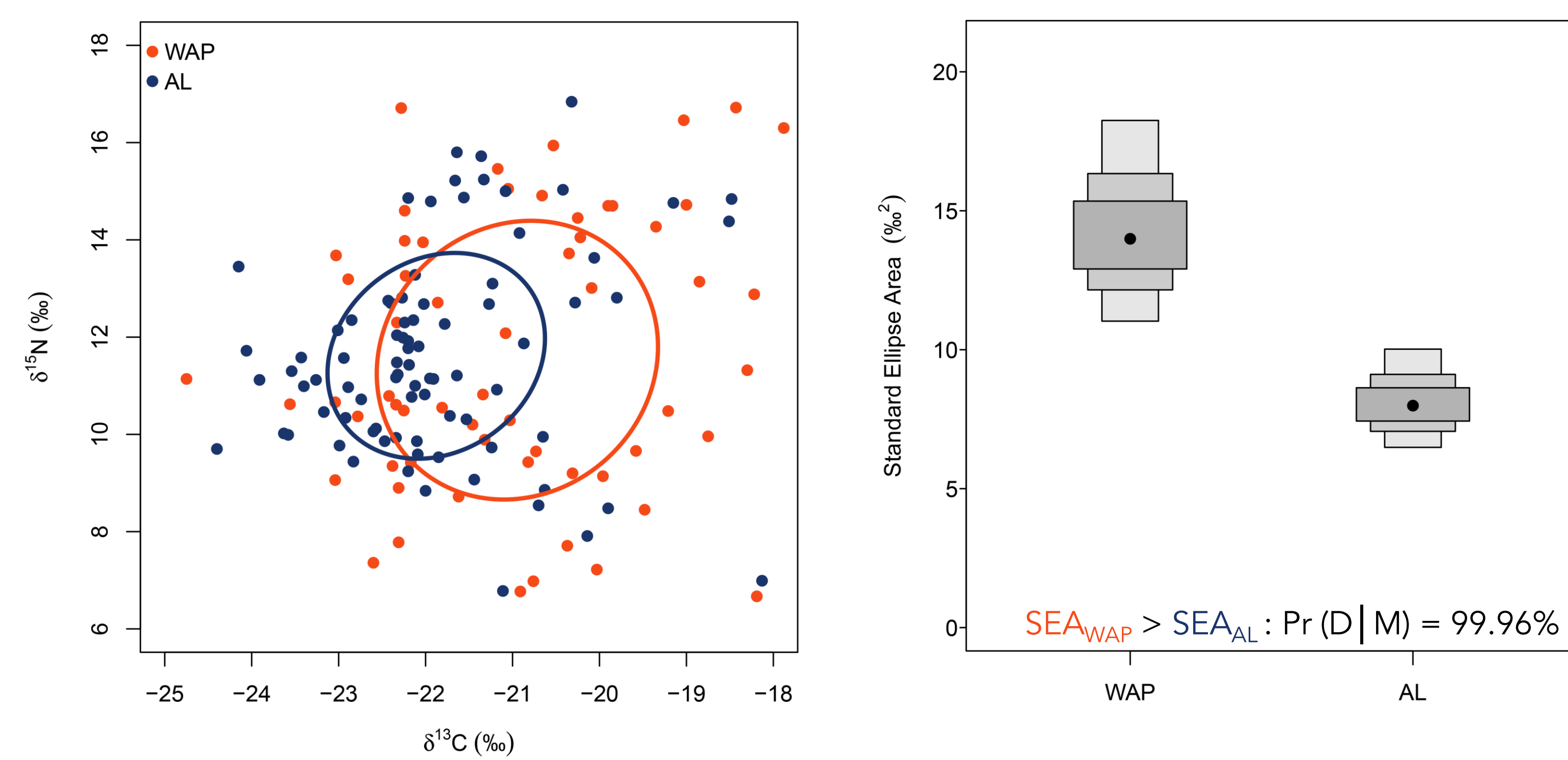
- Climate change has contrasted effects on Antarctica. West Antarctic Peninsula (WAP): T° ↗ and sea ice cover ↘. Adélie Land (AL): T° ↘ and sea ice cover ↗.
- How will benthic invertebrates react to such changes? When faced with environmental changes, organisms are expected to have some intrinsic ability to adapt through ecological plasticity.
- Here: assessment of ecological plasticity of Iphimediidae amphipods (widely distributed family with important ecological diversity) using stable isotopes of carbon and nitrogen.
- Museum specimens (19 species, 248 individuals) sampled in WAP and AL between 2006 and 2013 were dissected to extract pleopods without damaging the rest of the animal. Carbon ( $\delta^{13}\text{C}$ , ‰) and nitrogen ( $\delta^{15}\text{N}$ , ‰) stable isotope ratios in pleopods were measured by CF-EA-IRMS at University of Liège.
- Data were explored through isotopic niche (proxy of realized ecological niche) modelling using SIBER (Stable Isotope Bayesian Ellipses in R; Jackson *et al.* (2011) J. Anim. Ecol. 80: 595-602).

Some of the studied species. A: *Gnathiphimedia sexdentata* (total length 20 mm). B: *Echiniphimedia echinata* (TL 35 mm). C: *Echiniphimedia hodgsoni* (TL 35 mm).



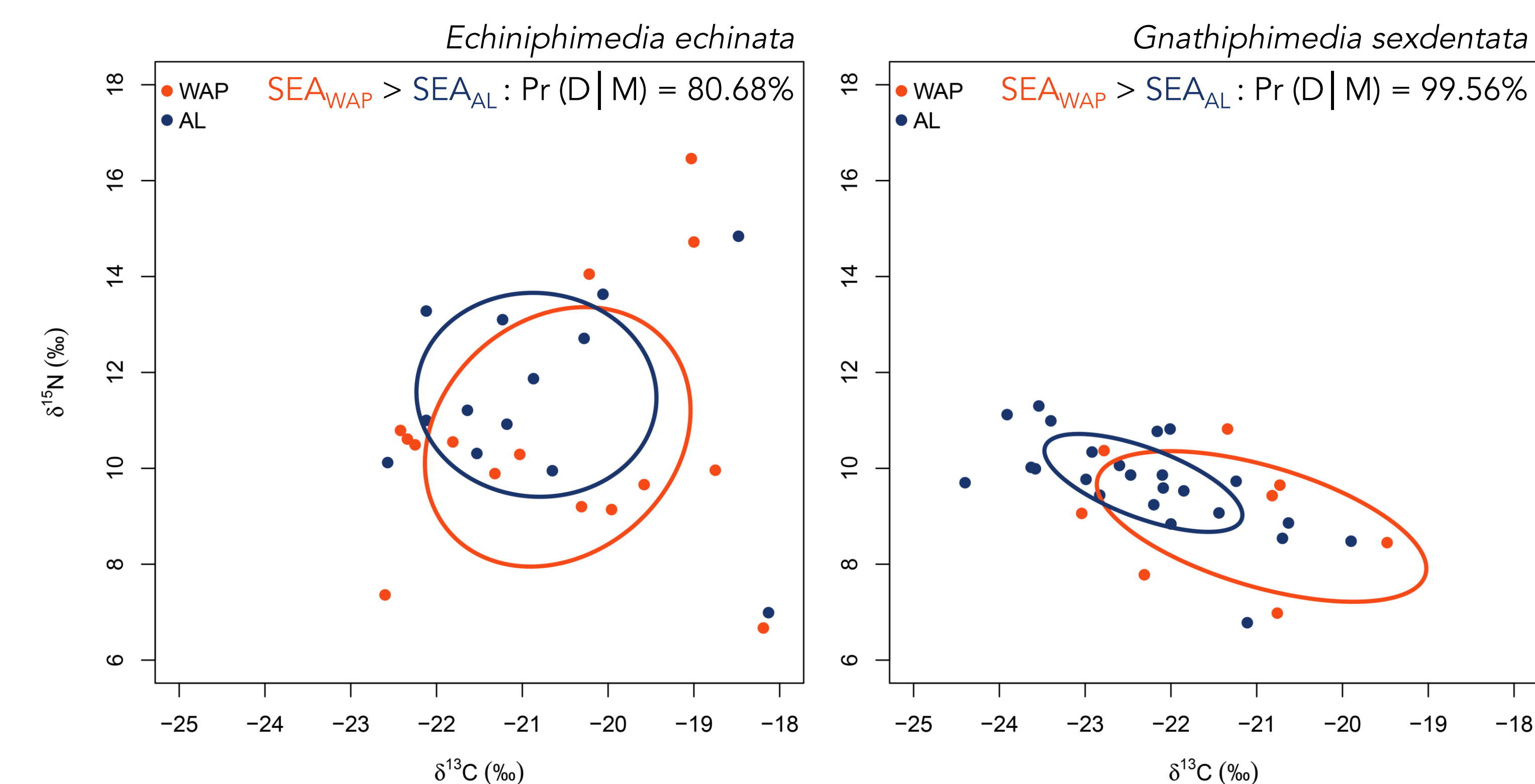
▲ Schematic view of an amphipod showing the sampled body parts (in blue).

## Results & discussion



### 2) Species-specific trends

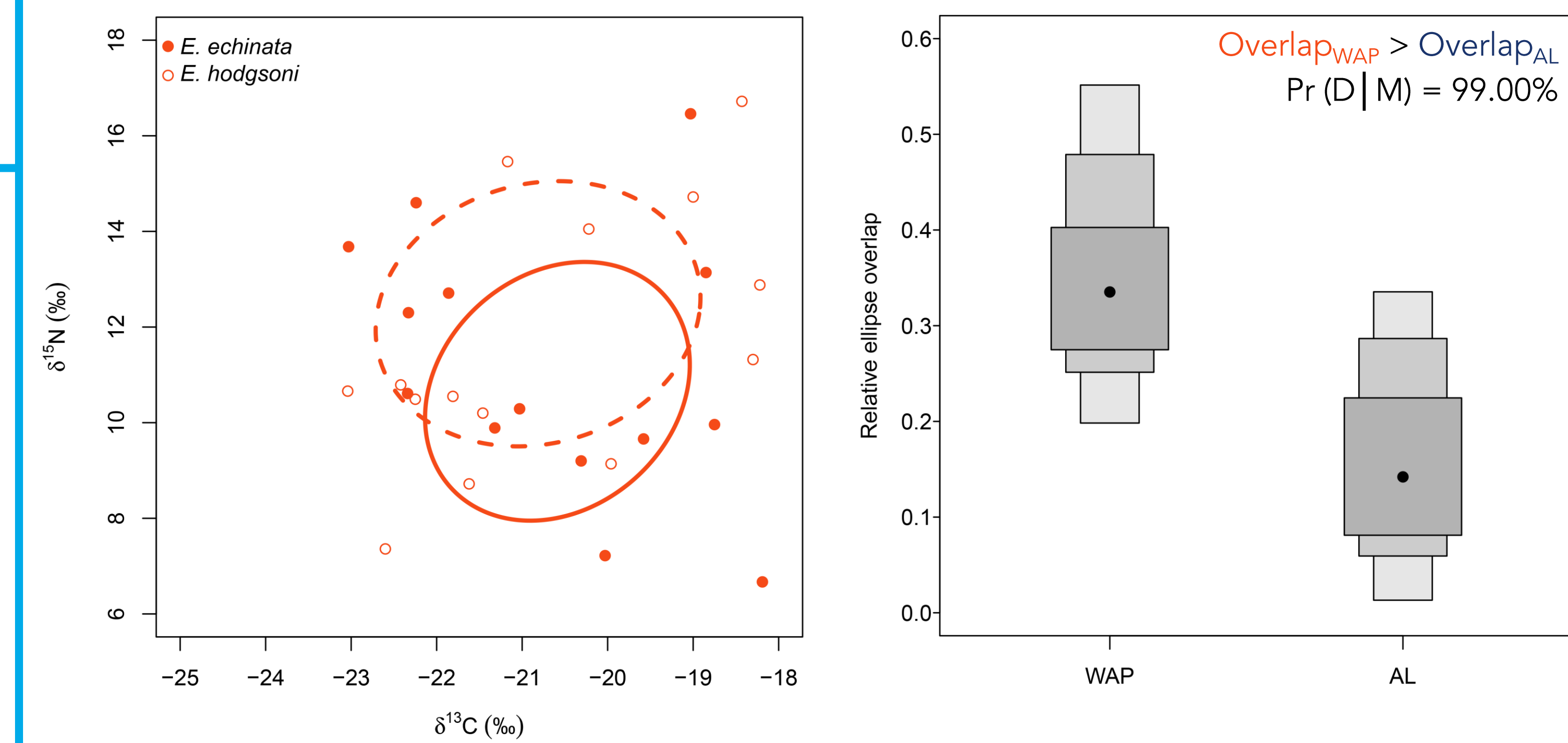
- Species-level niches are also larger in WAP for some taxa (e.g. *G. sexdentata*, right), but others have similar width in both areas (e.g. *E. echinata*, left) → Different Iphimediidae species show different degrees of ecological plasticity.
- Differences in ellipse shape are also clear → Drivers of ecological plasticity are likely to differ among species



### 1) Global assemblage niche size

- Comparison of isotopic niches built using all individuals belonging to species found in both areas ( $N_{\text{species}} = 11$ ,  $N_{\text{individuals}} = 62$  for WAP and 83 for AL)
- Isotopic niche is wider in WAP than in AL → Iphimediidae assemblage exploit more food and/or habitat resources in the WAP area

### 3) Niche overlap between congeneric species



Niche overlap between morphologically similar and closely related (congeneric) species is higher in the WAP area



Risks of competition for resources could be higher in WAP than in AL

## Conclusions & perspectives

- The widely different environmental conditions encountered by animals in the studied areas clearly influence their ecology.
- Niche width and overlap tend to be higher in WAP. Strong environmental changes in these region might reinforce those trends, which might lead to competition and perturb amphipod assemblage structure
- Future questions: Relative importance of habitat vs. food as drivers of ecological plasticity? Influence of cryptic speciation on niche parameters?

## Acknowledgements

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