Stable isotope ratios reveal trophic niche partitioning among hermit crabs from tropical polyspecific seagrass meadows

Loïc N. MICHEL[1,*], Bruno FRÉDÉRICH[2], Thierry LAVITRA[3] & Gilles LEPOINT[1]

[1]Laboratory of Oceanology, MARE Centre, University of Liege, Belgium. [2]Functional and Evolutionary Morphology Laboratory, University of Liege, Belgium. [3]Institute of Fishery and Marine Sciences (IHSM), University of Toliara, Madagascar.

*E-mail: loicnmichel@gmail.com, publications available at http://goo.gl/xdxaHM

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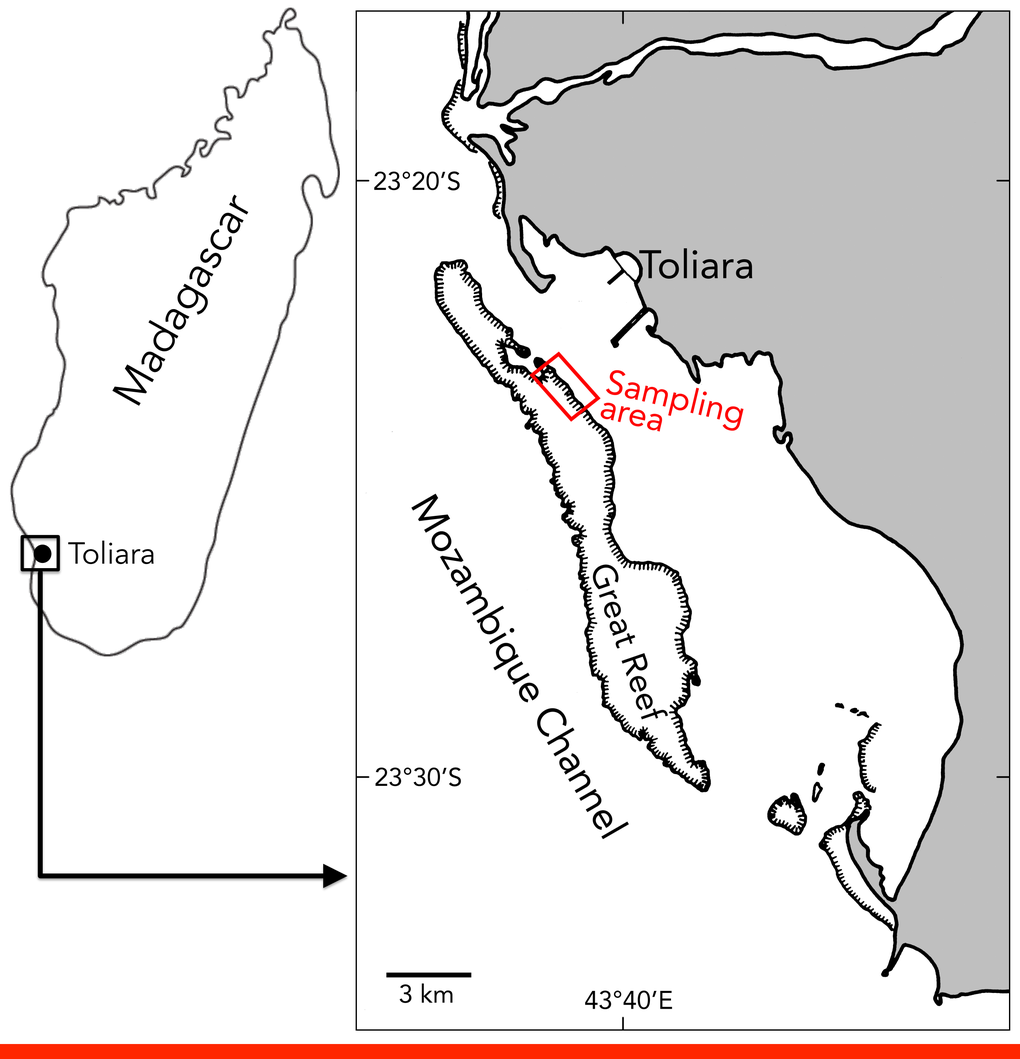
Context, objectives & methods



- Tropical polyspecific **seagrass meadows** provide many ecological and socio-economical **services**
- These ecosystems undergo multiple **anthropogenic threats** (eutrophication, overfishing, invertebrate overharvesting)
- Data about **functional ecology** of meadows and **structure** of the associated **food webs** are needed to understand how they could react to human impacts
- As part of a larger study: examination of **resource segregation** between two common, co-occurring, supposedly omnivore Diogenidae **hermit crabs**

- Sampling of ***Dardanus scutellatus*** (n=28) and ***Ciliopagurus tricolor*** (n=17) on the **Toliara Great Reef** (SW Madagascar, see map on left) in July 2014
- Analysis of **stable isotope ratios of C, N and S** of their abdominal muscle using CF-EA-IRMS
- Exploration of **data** using statistical **hypothesis testing** and isotopic **niche modeling** (SIBER: Stable Isotope Bayesian Ellipses in R) [Jackson *et al.* 2011, J Anim Ecol 80: 595-602]

Results & discussion

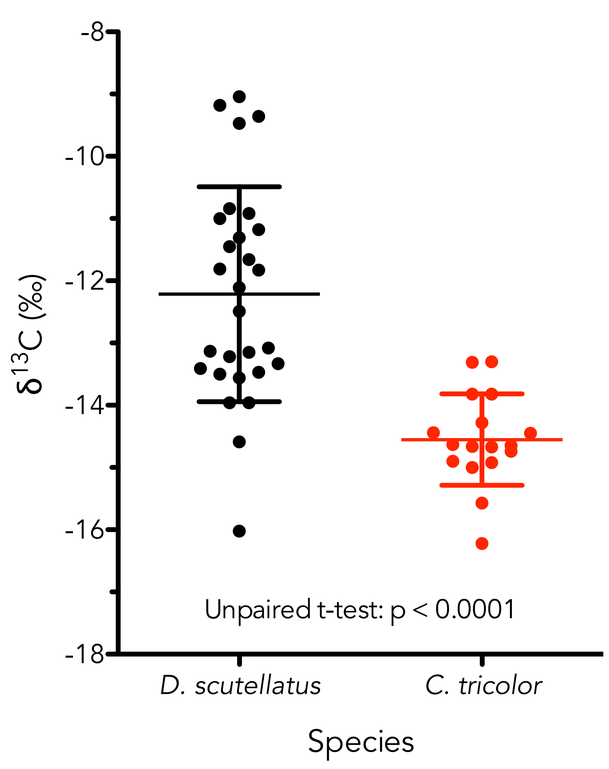
Isotopic ratios of consumers

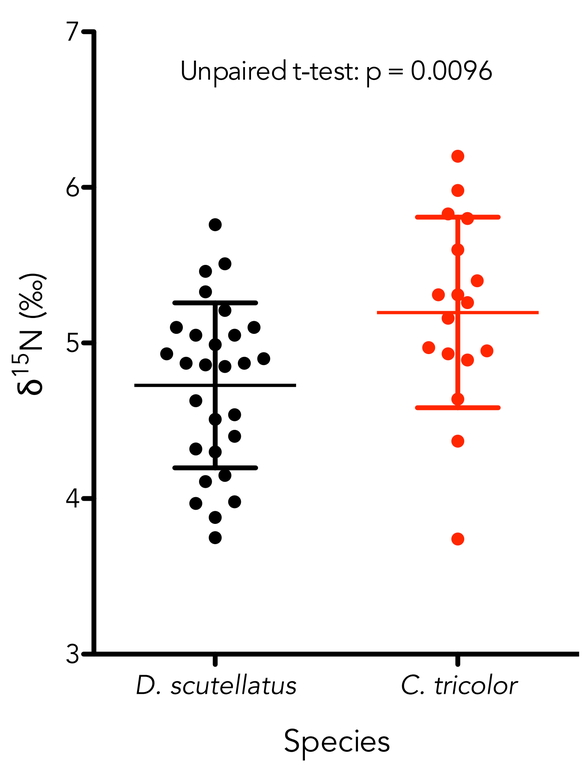
Significant differences in the isotopic composition of all **3 elements** ➔
The two species do not feed on the same items

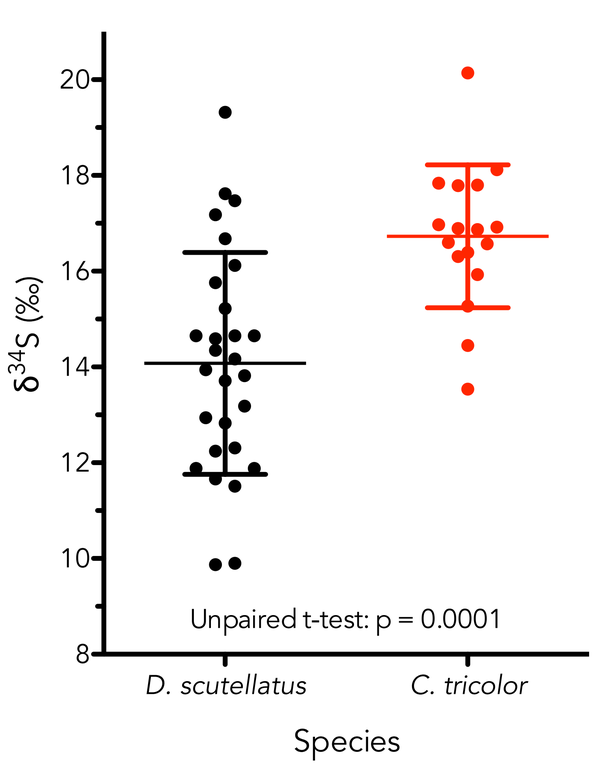
According to literature from the area: [Lepoint *et al.* 2008, Sci Mar 72: 109-117; Frédérich *et al.* 2009, Ichtyol Res 56: 10-17]

1. Both species are **primary consumers.**

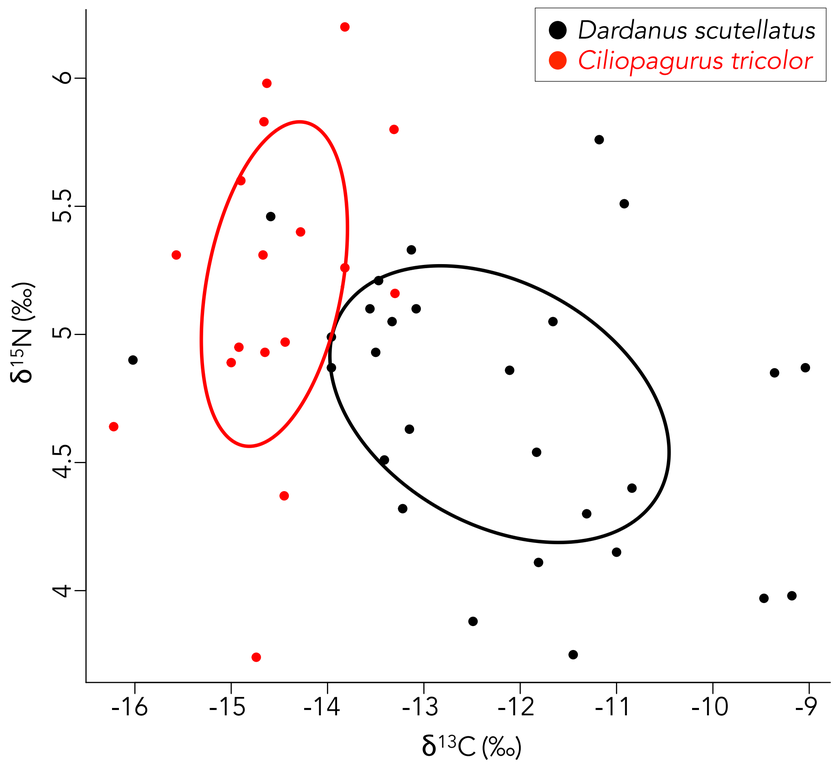
2. ***C. tricolor*** mostly relies on **algal production**, while some ***D. scutellatus*** could assimilate **seagrass**-derived matter. Pelagic inputs to hermit crab diet are likely weak.





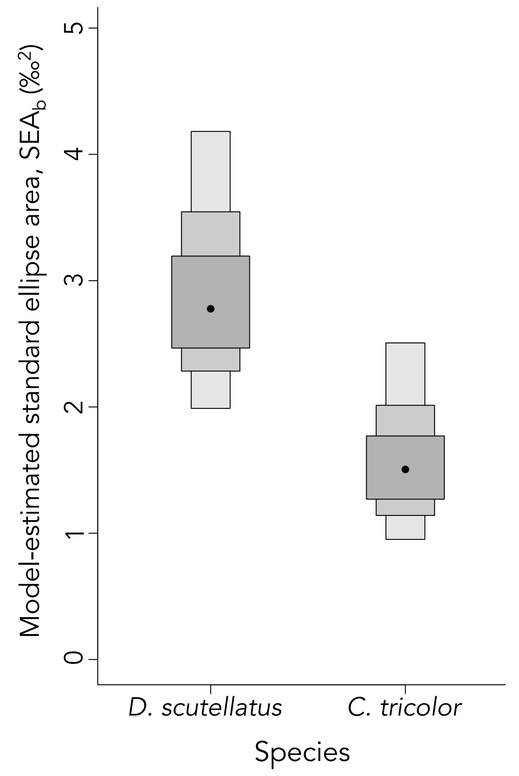


Isotopic niche modeling



◀ **No overlap** of **standard ellipses** (solid lines on the figure on the left) of the two species ➔ they are supported by **different core resources**

The **area** of the **standard ellipse** of *D. scutellatus* is larger than the one of *C. tricolor* in 97.46% of 10^5 model estimates ➔ ***D. scutellatus*** exploits **more food items** than *C. tricolor.* ▶



Conclusions & perspectives

- **Differences** in **foraging ecology** of these two hermit crabs ➔ could **limit** interspecific **competition** and **facilitate coexistence** of *D. scutellatus* and *C. tricolor* in Malagasy seagrass beds
- Analysis of **food items** sampled at the same time and location will enable use of a **mixing model** and ultimately reveal which producers actually support hermit crabs populations

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