



Nota breve | Short note

## Protecting a host species: a case study of *Pontonia pinnophylax* (Decapoda, Palaemonidae) in rough pen shells *Pinna rudis* (Bivalvia: Pinnidae)

Evandro P. Lopes<sup>1,2,3\*</sup>

<sup>1</sup> ISECMAR/UTA, Instituto de Engenharias e Ciências do Mar, Universidade Técnica do Atlântico,  
CP 163, Mindelo, São Vicente, Cabo Verde

<sup>2</sup> CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, InBIO Laboratório Associado,  
Universidade do Porto, Campus Agrário de Vairão, 4485–661 Vairão, Portugal

<sup>3</sup> Faculdade de Ciências da Universidade do Porto, 4169–007 Porto, Portugal

\* Corresponding author e-mail: [elopes@uta.cv](mailto:elopes@uta.cv)

**Keywords:** endosymbiont species, Cabo Verde, North Atlantic Ocean, shrimp – muscle association

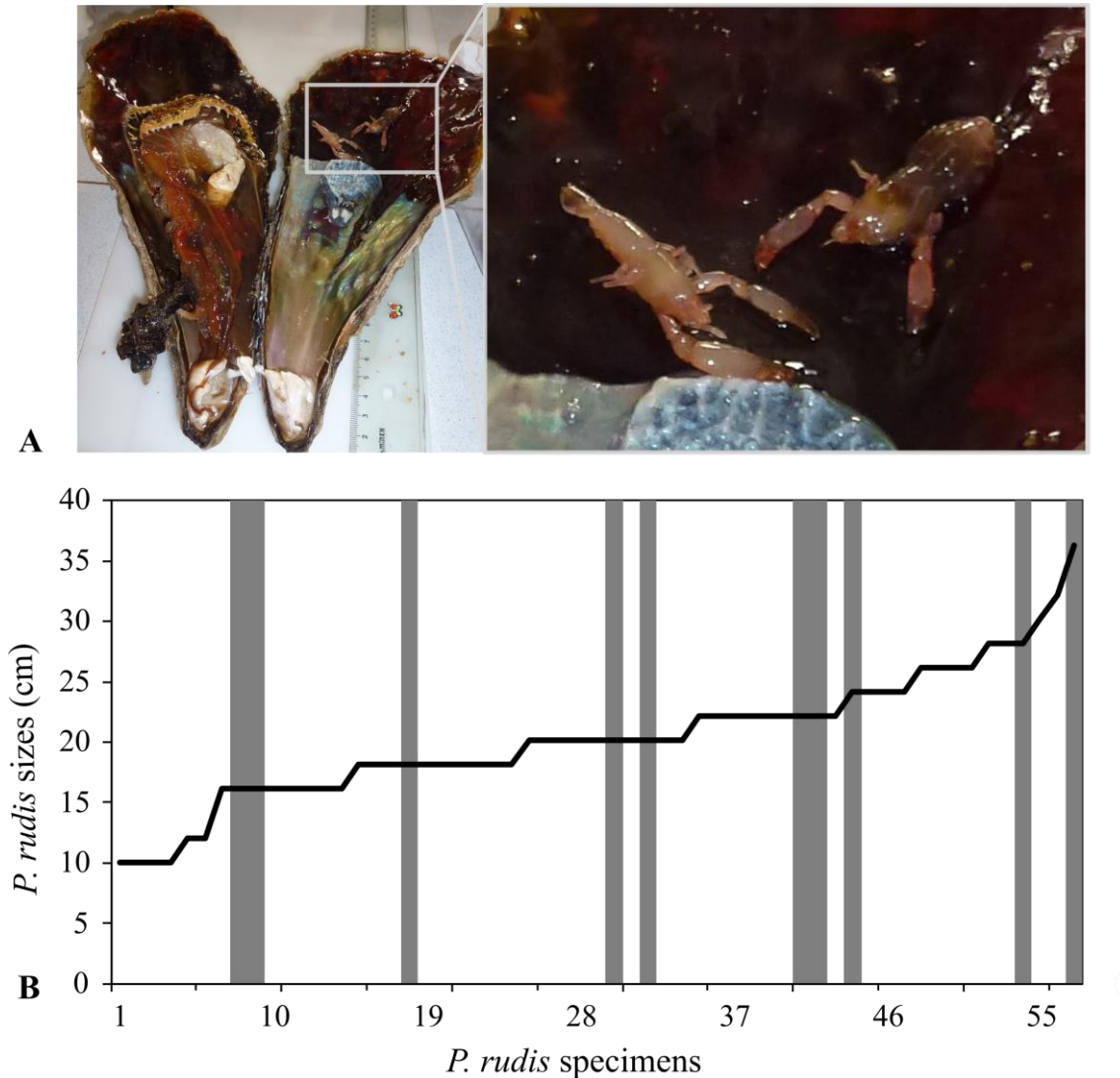
The *Pontonia* shrimp species are well known due to their endosymbiotic association with bivalves and ascidians (Fransen 2002, Marin & Anker 2008). Three species of this genus, *Pontonia pinnophylax* (Otto, 1821), *Pontonia manningi* Fransen, 2000, and *Pontonia pilosa* Fransen, 2002, were recorded from Cabo Verde, within fixed mollusc host species of *Pinna*, *Spondylus* and *Pseudochama* (Fransen 2002, Wirtz & Debelius 2003). *Pontonia pinnophylax* is usually observed in pairs of adults, living in the mantle cavity of live *Pinna* species, feeding on mucus and food particles collected on the surfaces of their gills and epithelium (Kennedy *et al.* 2001). In the North Atlantic, the first ecological study on the symbiotic association between this shrimp

and *Pinna rudis* was documented from the Azores (Portugal), with an occupancy rate of around 57% and higher occurrence in larger bivalves (Pacheco *et al.* 2014).

The presence of *P. pinnophylax* in Cabo Verde was first recorded by Türkay (1982) in calcareous algae at Matiota bay, São Vicente. Later, Wirtz & d'Udekem-d'Acoz (2001) found one to two *Pontonia* specimens inside live *P. rudis* specimens from Santiago Island. To evaluate the occupation rate of *P. pinnophylax* inside *P. rudis* specimens, sampling was carried out in Matiota bay (16°53'22"N and 24°59'46"W). A total of 58 *P. rudis* individuals were sampled by SCUBA diving, carefully opened and released *in situ*, and the presence of *Pontonia* was recorded.

Only six *Pinna* specimens were collected for identification of *Pontonia* specimens in the lab. These were identified as *P. pinnophylax* (Fig. 1A). The occupation of *P. rudis* by

shrimps was 20% and occurred only in hosts longer than 15 cm (Fig. 1B). Most shrimps found within the shells were in pairs, and no individual was found among dead *Pinna*.



**Fig. 1.** Association between *Pinna rudis* hosts and *Pontonia pinnophylax* endobionts (photos by E. Lopes). **A)** Two *P. pinnophylax* specimens within a sampled *P. rudis* (more photos available at Morphobank P3976: M740024–M740034). **B)** Shell longitudinal sizes of *P. rudis* in Matiota beach used in the current study. Gray bars represent the *P. rudis* specimens where *P. pinnophylax* were found.

Although recent studies in the Mediterranean have shown that this shrimp is more likely to be found in larger *Pinna nobilis* Linnaeus, 1758 and *P. rudis* (Richardson *et al.* 1997, Rada & Milat 2009), in this study we were able to find it in smaller shells as well. This symbiosis relationship can be extremely important for both species. Shrimps may eat the mollusc pseudofaeces (Yonge, 1953) and

receive sustenance, shelter and assistance in brooding and larval development, while the mollusk may enjoy the protection afforded by cohabitants (Richardson *et al.* 1997, Barreiros *et al.* 2016).

Habitat degradation has been considered the main cause of *P. rudis* population decline, rising its conservation status to the category of vulnerable in some places

(Barea-Azcón *et al.* 2008). In the present study, *P. pinnophylax* was recorded as an endosymbiont of *P. rudis*, confirming its high dependency on rough pen shells for obtaining food and protection (Wirtz & Debelius 2003).

*In situ* conservation actions of *P. rudis* may thus play an important role in the conservation of *P. pinnophylax* in habitats where refuges are scarce.

#### ACKNOWLEDGEMENTS

This study is included in BIODIV PhD programme, supported by COIA and ICETA 2016-31 research grant. I thank my supervisor

A. M Santos and R. Freitas for the review and biology students (ISECMAR/ UTA) for data collection.

#### REFERENCES

- Barea-Azcón, J.M., Ballesteros-Duperón, E. & Moreno, D. (2008) *Libro Rojo de los Invertebrados de Andalucía. 4 Tomos*. Consejería de Medio Ambiente, Junta de Andalucía, Sevilla, Spain, 1430 pp.
- Barreiros, J.P., Pacheco R.J.S. & Gonçalves, S.C. (2016) A New Insight on the Symbiotic Association between the Fan Mussel *Pinna rudis* and the Shrimp *Pontonia pinnophylax* in the Azores (NE Atlantic). *Global Journal of Zoology*, 1, 1–2.
- Fransen, C.H.J.M. (2002) Taxonomy, phylogeny, historical biogeography, and historical ecology of the genus *Pontonia* Latreille (Crustacea: Decapoda: Caridea: Palaemonidae). *Zoologische Verhandlungen*, 336, 1–433.
- Kennedy, H., Richardson, C.A., Duarte, C.M. & Kennedy, D.P. (2001) Diet and association of *Pontonia pinnophylax* occurring in *Pinna nobilis*: insights from stable isotope analysis. *Journal of the Marine Biological Association*, 81, 177–178.
- Marin, I. & Anker, A. (2008) A new species of *Pontonia* Latreille, 1829 (Crustacea, Decapoda, Palaemonidae) associated with seasquirts (Tunicata, Ascidiacea) from the Pacific coast of Panama. *Zoosystema*, 30, 501–515.
- Pacheco, R.J., Barreiros, J.P. & Gonçalves, S.C. (2014) The fan mussel *Pinna rudis* – occurrence and association with *Pontonia pinnophylax* in Terceira Island. (Azores, NE Atlantic). *Frontiers in Marine Science Conference Abstract: IMMR-International Meeting on Marine Research*, Peniche, Portugal. Available from: [https://www.frontiersin.org/10.3389/conf.FMARS.2014.02.00098/event\\_abstract](https://www.frontiersin.org/10.3389/conf.FMARS.2014.02.00098/event_abstract)
- Rada, B. & Milat, T. (2009) The First Record of the Decapod, *Pontonia pinnophylax*, in *Pinna nobilis* from the Southern Adriatic (Croatia) (Decapoda, Natantia). *Crustaceana*, 1383–1392.
- Richardson, C.A., Kennedy, H., Duarte, C.M. & Proud S.V. (1997) The occurrence of *Pontonia pinnophylax* (Decapoda: Natantia: Pontoninae) in *Pinna nobilis* (Mollusca: Bivalvia: Pinnidae) from the Mediterranean. *Journal of the Marine Biological Association of the United Kingdom*, 77, 1227–1230.
- Türkay, M. (1982) Marine Crustacea Decapoda vonden Kapverdischen Inseln mit Bemerkungen zur Zoogeographie des Gebietes. *Courier Forschungsinstitut Senckenberg*, 52, 91–129.
- Wirtz, P. & d’Udekem-d’Acoz, C. (2001) Decapoda from Antipatharia, Gorgonaria and Bivalvia at the Cape Verde Islands. *Helgolander Marine Research*, 55, 112–115.
- Wirtz, P. & Debelius, H. (2003) *Mediterranean and Atlantic invertebrate guide*. Conch Books, Hackenheim, Germany, 305 pp.
- Yonge, C.M. (1953) Form and habit in *Pinna carnea* Gmelin. *Philosophical Transactions of the Royal Society*, 237, 335–374.

Received 22 April 2021

Accepted 30 May 2021