

Introduction

The spiny lobster, *Panulirus argus* (Latreille, 1804) is a species of high commercial importance in the Caribbean region. However, Over-exploitation, habitat destruction and poor fisheries management has caused the decline of this species populations. Additionally, in recent years the presence of *Carcinonemertes conanobrieni* as a predator of lobster eggs has been reported both in Florida-USA (Baeza *et al.*, 2016) and in Magdalena-Colombia (González-Cueto & Quiroga, 2018). This study aimed to better understand the distribution of *C. conanobrieni* in the Caribbean, by determining its presence in *P. argus* eggs from existing populations in the Archipelago of San Andrés, Providencia and Santa Catalina, and to evaluate its impact on embryonic mortality.

Methods

Between September and October of 2019, we collected 25 gravid female lobsters; 16 in Providencia and 9 in Roncador. We separated embryos in Petri dishes with micro-filtered seawater, to determined eggs stage between early or late. The infection status was inspected by the presence of nemerteans in the egg mass in any of their forms: adults actively roaming in the egg mass, ensheathed adults, encysted juveniles, egg cases and larvae. If any of these were found, the lobster was classified as "infected" and, if not, as "not infected".

To determine the intensity of the infection, we counted the active and encapsulated nemerteans. A count equal or over 10 individuals was labelled as "highly infected", whereas a count under 10 individuals was considered as "slightly infected". Finally, we calculated the effect of infection on offspring mortality as a ratio of the number of dead and consumed embryos to live embryos in 500 total embryos counted (Simpson, 2018) (Fig 1).

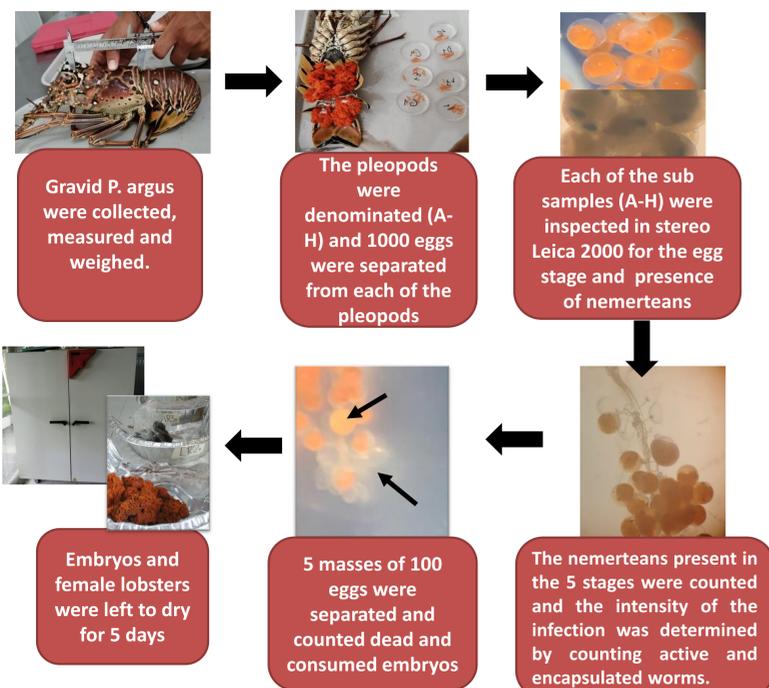


Figure 1. Methodology followed for sample processing based on Simpson, 2018.

Using a Kruskal-Wallis test for non-parametric samples in RStudio Desktop 1.1.463 (R. Studio, 2019) the analysis was made to find differences between the sampling sites, the embryonic stage, the presence of the nemertine and the degree of infection having as a dependent variable the mortality of the embryos.

Results

We reported for the first time, the presence of the nemertean *C. conanobrieni* in the eggs of the Spiny Lobster (*Panulirus argus*) in the Archipelago of San Andres, Providencia and Roncador islands. 88% of the individuals were infected by the nemertean *C. conanobrieni*. We observed four stages of the nemertean in *P. argus* populations (Fig 3). The infection was significantly different between the sites (Fig 4A). Mortality was higher in the late stage (4B) and seems to be related to the intensity of infection by the parasite ($p = 0.77$).

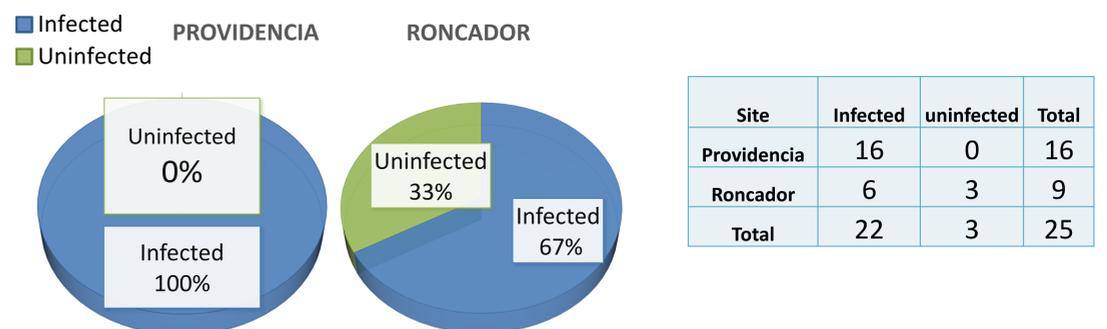


Figure 2. Percentage of Spiny Lobster *P. argus* infected and uninfected by *C. conanobrieni* in the sampling sites.

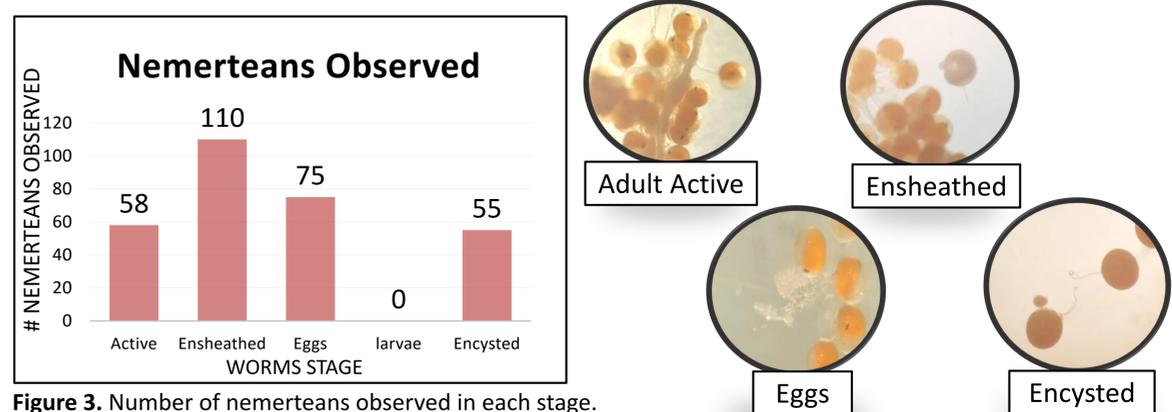


Figure 3. Number of nemerteans observed in each stage.

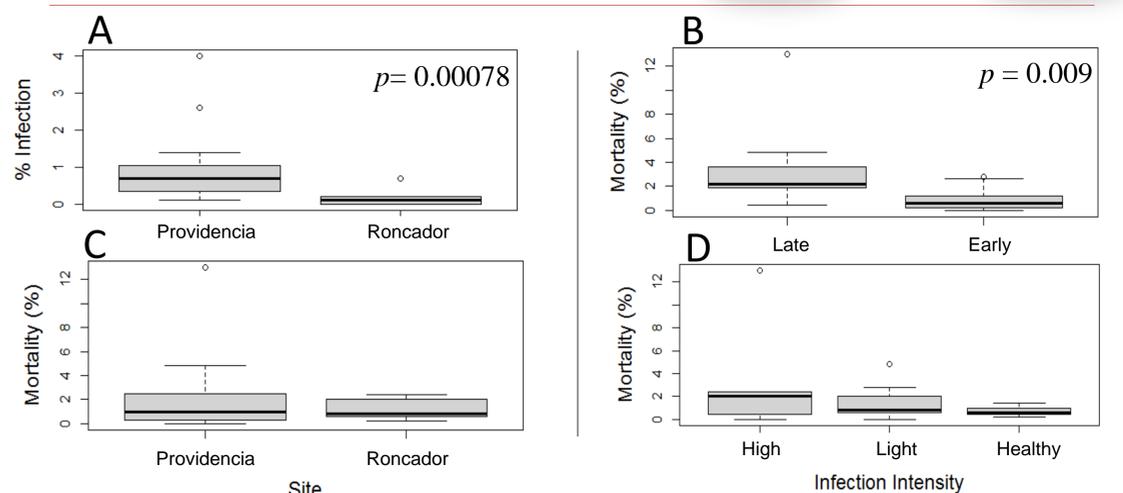


Figure 4. A. Infection between Providence and Roncador . B-D. Mortality according to sampling sites, embryo stage and infection intensity of nemertean.

Discussion and Conclusion

- We added a new record to the previous observations made by Baeza *et al.* (2016) and Gonzales & Quiroga (2018), suggesting that this nemertean might be present in the entire range of distribution of the host species *P. argus*.
- The presence of this parasite was significantly higher in the Providencia lobsters. Furthermore, infection status on brood mortality demonstrated that a high infection status play a role in brood loss.
- 68% of lobsters report low infection or "slightly" that may be from active parental care, off-peak sampling of lobsters, or the recent arrival of the parasite; it has been observed that fisheries are not affected when infection is low (Shields, 2012). However, factors such as overfishing, environmental variations or environmental changes can cause outbreaks where the high infection increases the eggs mortality (Shields & Kuris, 1988).

References

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