

Observations of *Carapus bermudensis* (Carapidae) in *Isostichopus badionotus* (Stichopodidae) from Taganga Bay, Colombia

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Introduction

This paper reports on the pearlfish, *Carapus bermudensis*, which inhabits the body cavity of the sea cucumber *Isostichopus badionotus* in Taganga Bay in Colombia (Colombian Caribbean Sea). The host *I. badionotus* is distributed in the western Atlantic Ocean and occurs in shallow waters of the northern coast of Colombia (Caycedo 1978). It is part of a group of sea cucumbers listed as commercially important in Latin America and the Caribbean (Toral-Granda 2008). The pearlfish, *Carapus bermudensis*, is an eel-like fish that spends its life within the body cavity of sea cucumbers using their hosts as shelter (Olney 2006; Parmentier and Vandewalle 2005; Parmentier et al. 2003; Smith et al. 1981).

Adult *Isostichopus badionotus* (222.29 g ± 81.02 SE, wet weight) were collected by snorkeling between depths of 2 feet and 5 feet in the beach town of Santa Marta (11°12'53,47"N to 11°12'32,01"N and 74°14'10,59"W to 74°14'23,02"W). Sea cucumbers were transferred to the Aquaculture Laboratory at Magdalena University in Colombia (20 min. drive), and randomly stocked in 500-L plastic tanks filled with seawater, which were aerated using airstones. During the next few days, we noted that some cucumbers had eviscerated, and the presence of two fish in the tanks was observed. Morphological characterization and taxonomic keys were used to identify the host species.

Observations

In assessing sea cucumber behavior, we observed an unusual movement in the tanks. Near the anus of a cucumber, a small fish (*Carapus bermudensis*) poked its head out (Fig. 1). We found one fish per sea cucumber for the 12 observations we made of *C. bermudensis* swimming in the rearing tanks. Most of the time, the fish swam around the sea cucumbers in the culture tanks. Carapid fish can be found in the sea cucumber body cavity, but are mainly found in the respiratory trees (Gustato 1976; Parmentier and Das 2004; Trott 1970; Van Meter and Ache 1974). Our findings show the presence of *Carapus bermudensis* inside the digestive tract of *I. badionotus*, which reaffirms statements made by native artisanal fishermen

in the study area (Taganga Bay) and by other authors (Arnold 1956; Shen and Yeh 1987).

The *Carapus bermudensis* in this study (mean prevalence = 4%), had an average total length of 73 mm (± 2.55 SE), indicating that they were juveniles. Individuals were long and narrow, laterally compressed, and had soft fin rays. They were hyaline or slightly pigmented, with the exception of the visceral cavity due to food content. Blood flow was observed in their gills. The fishes' heads were greater in height than the rest of the body. They had no pelvic fins, 20 pectoral rays, 23 precaudal vertebrae, and did not have scales (Fig. 1).

Once the sea cucumbers evacuated their guts, the pearlfish made efforts to re-enter the visceral cavity of the sea cucumber, and we observed knocking and pecking motions at the cloacal opening. Pearlfish re-entry was done rapidly by bringing its tail towards the sea cucumber's cloacal opening. Finally, the fish gained entry into the host, despite the fact that the sea cucumber host did not contain viscera.²

The *Carapus bermudensis* recorded in this study appear to have a commensal relationship with *Isostichopus badionotus* because the hosts appeared to be in good health and their internal organs did not show any damage. However, further observations should be done in the wild and under controlled conditions.

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² See video at: <https://youtu.be/JTRicFdIqQU>

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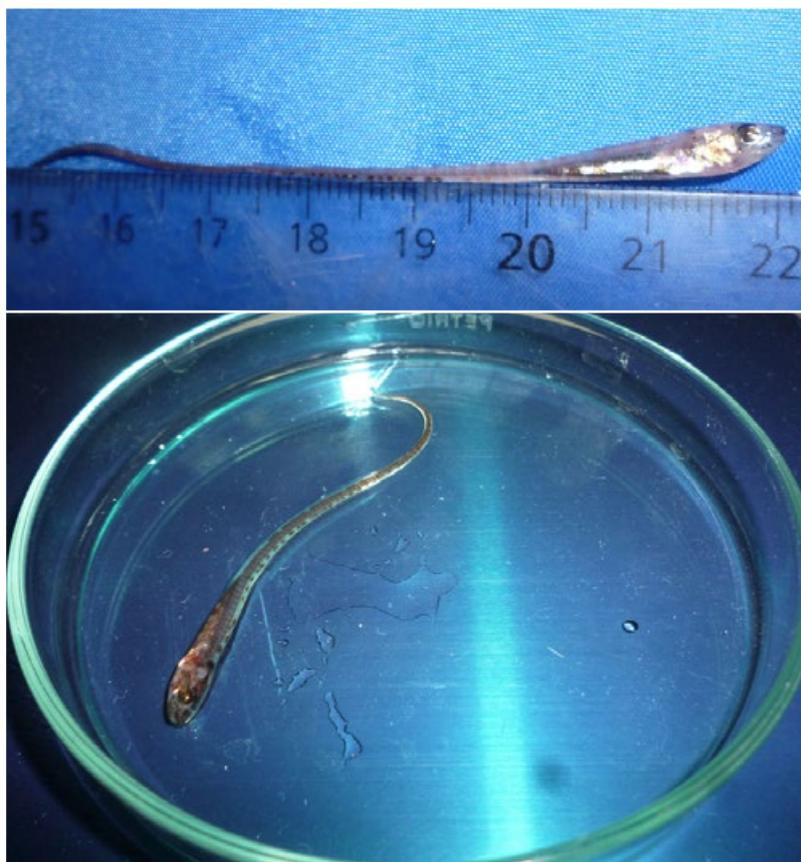


Figure 1. *Carapus bermudensis* expelled from *Isostichopus badionotus* from Taganga Bay in Colombia.

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