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Scientific Note

The octocoral *Carijoa riisei* (Cnidaria, Anthozoa) as a macro-epibiont of the crab *Mycrophrys interruptus* (Crustacea, Brachyura, Majidae) in northeastern Brazil

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Abstract. Due to its tree-like stolonial structure, the octocoral *Carijoa riisei* harbors a rich associated community, but it has never been recorded as an epizoic organism. The present study records for the first time the association between *C. riisei* and the architect crab *Microphrys interruptus*, where *C. riisei* is the epibiont.

Key words: Octocorallia, epibiosis, Decapoda

Resumo. O octocoral *Carijoa riisei* (Cnidaria, Anthozoa) como macroepibionte do caranguejo *Mycrophrys interruptus* (Crustacea, Brachyura, Majidae) no Nordeste do Brasil. O octocoral *Carijoa riisei* pela sua estrutura estolonial arborescente pode abrigar uma extensa comunidade associada, mas nunca tinha sido registrado como organismo epizoico. Este trabalho registra pela primeira vez a associação de *C. riisei* como epibionte do caranguejo arquiteto *Microphrys interruptus*.

Palavras chave: Octocorallia, epibionte, Decapoda

Carijoa riisei (Duchassaing & Michelotti, 1860) (Anthozoa, Clavulariidae) is a colonial octocoral with a tree-like structure, which presents erect, long, and slender primary polyps, which originate from creeping stolons. The budding of the primary polyp can lead to branching up to the sixth degree. This species grows on a broad variety of substrates, being found adhered to the roots of *Rhizophora mangle* in estuarine regions and encrusted on boats; it is found in turbid and turbulent waters and shaded caves (Rees 1972, Sánchez 1994). Colonies of *C. riisei* are host for a number of other organisms (Thomas 1979, Neves *et al.* 2007, Souza *et al.* 2007), as they not only present a tree-like stolonial structure, but also provide an environment favorable to the settlement of epibionts. Bayer (1961) cited the presence of organisms associated with this species, such as algae, protozoans, sponges, other cnidarians, ctenophores, platyhelminthes, brachiopods, echinoderms, annelids, pycnogonids, crustaceans, mollusks, and chordates. These associations are possible due to the tolerance that several cnidarians have to the settlement of organisms on their body, as several organisms are tolerant to the settlement of cnidarians (Fernandez-Leborans 2013).

One example of organisms tolerant to the settlement of cnidarians are crustaceans of the family Majidae (Samouelle, 1819), popularly known as architect or decorator crabs, due to their habit of carrying epibionts (Acuña *et al.* 2003). A particular characteristic of this family is the presence of hookshaped setae on the exoskeleton, which allows sessile organisms and biodetritus to be deliberately fixed (Winter *et al*. 2006). Some Majidae species show a sophisticated adaptation to epizoism. They change the appearance of their carapace to imitate the substrate they inhabit to become less conspicuous to predators (Wicksten 1993, Fernández *et al.* 1998). In addition to camouflage against predators, another behavior that characterizes epizoism is food storage on the exoskeleton (Wicksten, 1993). The architect crab *Microphrys bicornutus* (Latreille, 1825) decorates its carapace with two species of algae, for both camouflage and food storage; the crab's diet varies according to the abundance of algae (Kilar *et al*. 1986). However, little is known about other types of organisms that *M. interruptus* uses to decorate its carapace. *C. riisei* is the only octocoral that takes part in the fouling community, but until now it had never been described as an epizoic organism. Hence, recording this association will contribute to a better understanding of the types of epibionts that this crab can carry and their relationships.

The study site is located in Porto de Galinhas beach, northeastern Brazil (08°30'20"S - 35°00'34"W). The sampling point is known as 'Piscina dos 8' or 'Boca da Barra'. It is a natural pool 8 m deep. The samples were carried out along a wall 6 m deep, where a population of *C. riisei* is established from the surface down to the bottom. A total of 14 octocoral samples were collected using 0.15 x 0.15 m PCV squares and fixed in the field with 4% formalin. We examined the material under a stereoscopic microscope, counted all decapods found, identified them to the finest possible taxonomic level, and measured carapace width (CW) using a caliper (± 0.01 resolution). The specimens were deposited in the anthozoan collection of the Grupo de Pesquisa em Antozoários (GPA) of Universidade Federal de Pernambuco, Brazil.

A total of 51 decapods were found: *Clibanarius sp* (2 specimens), *Hippolyte sp* (2), *Leander* sp (3), *Mithraculus forceps* (8), *Mycrophrys bicornutus* (1), *Mycrophrys interruptus* (3), *Palaemonetes* sp (17), *Periclimenacus* sp (3), *Periclimenes* sp (5), *Processa* sp (1), *Synalpheus* sp (3), and *Thor* sp (3). Of all decapods found, only *M. interruptus* had the octocoral *C. riisei* as an epibiont. All *M. interruptus* specimens were females (3), including two ovigerous; they were found at the base of the octocoral colonies, among stolons and primary polyps. Several polyps of *C. riisei*, at different sizes were found on the dorsal region of *M. interruptus's* carapace. The first *M. interruptus* specimen (GPA 253) was an ovigerous female with a 6 mm CW. This female carried six polyps of *C. riisei*: four on the left side, one in the middle, and one on the right side of the carapace; five of these polyps measured 2 mm and the one on the right side of the carapace was the largest, measuring 10 mm and presenting three secondary polyps (Figure 1a). The second specimen (GPA 254) was also an ovigerous female with a 6 mm CW, which carried eight polyps measuring from 1 mm to 6 mm, randomly distributed throughout the carapace, but the largest three polyps were located at the frontal part (Figure 1b and c). The third specimen (GPA 255) was a female with a 5 mm CW, which carried two polyps, both measuring 0.2 mm, and located on the left side of the carapace.

Several organisms are known to prey on the Majidae, including seagulls, octopuses, lobsters, turtles, otters, fish, and even other crabs. In this family, the main defense against predation is camouflage. According to Wicksten (1980), Ascidia, Porifera, Hydrozoa and Actiniaria can be used as defenses by the crab, as they produce toxic substances to crab predators, which could also be the case of *C. riisei*. Despite the limited number of crabs analyzed in our study, our data seems to corroborate the study by Jeffries *et al*. (1992), who stated that ovigerous females have an epizoic density higher than non-ovigerous females. Ovigerous females have less mobility during egg incubation, which would create more suitable conditions for the settlement of epibionts. Also, it is likely that the presence of macro-epizoics brings advantages to these females, such as protection for their eggs. Another hypothesis that should be considered is the end of the molting process in ovigerous females; an older carapace than in previous stages would facilitate the development of epizoics (Winter *et al*. 2006). In this study, *C. riisei* was only found on the dorsal surface of the crab's carapace, not being observed on other regions of the crab body

The distribution of epizoic organisms on the crab's body surface seems to be directly related to its morphology. For Fernandez *et al.* (1998), the carapace is a relatively large and very exposed area, which can be easily colonized by organisms of different shapes and forms. Conversely, the ventral part of the cephalothorax is less accessible and does not need camouflage. The pereiopod is the least favorable area for colonization due to its mobility, shape, and reduced body surface (Winter *et al*. 2006). All crabs analyzed were located among the base of primary polyps in the colonies of the octocoral studied. This suggests that the epibiosis occurred through vegetative growth instead of larval settlement, as the octocoral *C. riisei* has a fast stolonial growth (Kahng & Grigg 2005). The stolonial growth is triggered by a contact of the stolon with any hard surface (Carlos D. Pérez, personal observation).

Hence, the ecological relationship between *Microphrys interruptus* and *Carijoa riisei* may be seen as a commensalism, in which *M. interruptus* benefits from the protection and camouflage provided by the octocoral, but apparently with no benefits for the octocoral. Further studies are necessary to confirm the nature of the relationship between these two species.

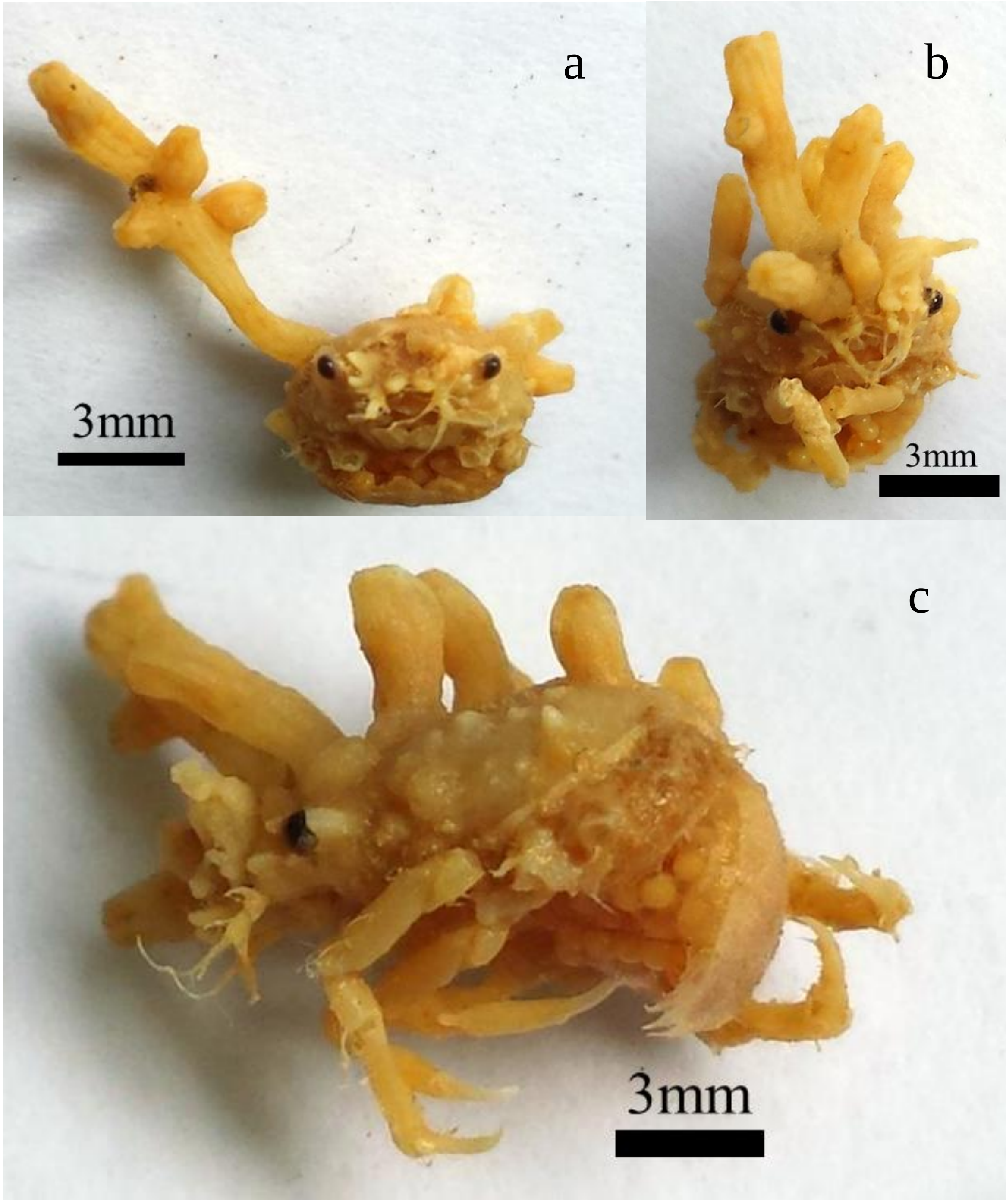

Figure 1. The octocoral *Carijoa riisei* as an epibiont on the carapace of an ovigerous female of the crab *Microphrys interruptus.* **A**, GPA 253, front view and a 10 mm polyp; **B**, GPA 254, front view; **C**, GPA 254, side view.

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