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NEW OBSERVATION OF ROCINELA SIGNATA SCHIOEDTE & MEINERT, 1879 (ISOPODA: AEGIDAE) AS ECTO- AND GILL PARASITE OF RED SNAPPER FISH LUTJANUS PURPUREUS (POEY, 1866), COLLECTED FROM THE GREAT AMAZON REEF SYSTEM (GARS)

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Abstract

The isopod *Rocinela signata* Schioedte & Meinert, 1879 (Aegidae) is largely recorded in literature as ectoparasites of marine fishes; however, the full list of hosts is still far from complete. We report the occurrence of *R. signata* as ectoparasite from a new host: *Lutjanus purpureus* (Poey, 1866), an important fishery resource in the northern region of Brazil, collected from the Great Amazon Reef System (GARS), Brazil. Four specimens of *R. signata* were observed parasitizing three specimens of *L. purpureus*, collected during the fishery operations, using a manzuá trap along the continental shelf of the Amapá State. The presence of *R. signata* in the GARS expands its geographic distribution (the northernmost Brazilian record), additionally, the occurrence of *R. signata* in deeper waters than previously reported (~90 m), and its new host interaction.

Keywords: Parasitism. Amazon province. Ectoparasite. Crustacean isopod. New host.

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1 Introduction

Parasitic crustaceans are widely observed in aquatic environments, showing a large range of forms, sizes and modified appendices to occur in a wide host range (WILSON, 2008; CARDOSO et al., 2017; ALVES-JÚNIOR et al., 2019). These parasites can be observed adhered on the surface of invertebrates, such as sponges, corals, echinoderms and crustaceans, additionally, in coastal fishes (BUNKLEY-WILLIAMS; WILLIAMS Jr., 1998). These fish-parasitic, especially the isopods, can occur as ecto- and endoparasites, in the oral cavity, gills, body surface and caudal fin, reducing the host's nutritional function and causing damage to tissues, cells and facilitating possible viral and bacterial infections in the host (GARZÓN-FERREIRA, 1990; BUNKLEY-WILLIAMS; WILLIAMS Jr.; BASHIRULLAH, 2006).

Parasitic isopods of the family Aegidae White, 1850 are largely observed as ectoparasites in sponges, other crustaceans and fishes; it contains members with free living habit and obligatory parasites in tropical marine areas, covering shallow to deep regions, following the depth range of the host (MOREIRA, 1977; BRUSCA, 1983; BRUCE, 2009). The genus *Rocinela* Leach, 1818 is composed of 42 valid species, showing a cosmopolitan distribution (BRUCE, 2009; WORMS, 2023).

The species *Rocinela signata* Schioedte & Meinert, 1879 is reported in literature as an ectoparasite of fishes along the estuarine and coastal zones; in Brazil, it is distributed from Pará to Santa Catarina States, in regions of intertidal zones up to 70 m depth (CAVALCANTI et al., 2012). In Brazilian waters, *R. signata* was previously reported as ectoparasite from the family Lutjanidae Gill, 1861 only for the species *Lutjanus analis* (Cuvier, 1828), *L. buccanella* (Cuvier, 1828), L. campechanus (Poey, 1860) and L. *synagris* (Linnaeus, 1758). Herein we increase the occurrence of *R. signata* from the State of Amapá and update the host range from the species *Lutjanus purpureus* (Poey, 1866), both collected in the Amazon Reef System (GARS), Brazil.

2 Material and Methods

The specimens of *R. signata* were collected adhered to the body of the red snapper fish *L. purpureus* during the fishery operation, using a "manzuá" trap along the continental shelf of Amapá State (04°45'29,84"N; 050°39'41,56"W) in October 2022, between the depths of 70 and 100 m (estimated by GPS/Sonar). This fishery covers 52 sampling points along the continental slope which is under the supervision of the Center for Research and Management of Fisheries Resources of the North Coast (CEPNOR) (SISBIO Number: 44915-3) (Fig. 1).

After each point sampled, the fishes collected were sorted out, measured and frozen (refrigerated chambers). The parasitised fishes were photographed in situ, measured (total length: TL), sexed and identified following Marceniuk et al. (2021).

After the field procedures, the parasitic isopods were removed from the fish with the help of tweezers and frozen in isolated eppendorfs. At the Carcinology Laboratory of CEPNOR/IBAMA, the specimens of R. singnata were identified following Moreira (1977), Brusca; France (1992), measured using digital caliper (0.01 mm) in total length (TL), sexed, preserved in 70% ethyl alcohol, and stored in the carcinological collection (under voucher number- CL 1002) at Universidade Federal Rural da Amazônia, UFRA.

3 Results and Discussion

We collected three specimens of *L. purpureus* (Fig. 2 A) (TL: 29-38 cm) during industrial fishing operations in the region of the GARS, in which four specimens of *R. signata* (Fig. 2 B) (TL: 1.2 - 1.6 cm) were observed as ectoparasites in the operculum and gills region (Fig. 2 C-D).

The occurrence of *R. signata* in branchial chambers of fishes are widely reported in the literature, based on the fact that this isopod parasite feeds on the blood of estuarine and marine fishes from the tropical and subtropical areas, as observed in *Haemulon aurolineatum* Cuvier, 1830, *Orthopristis ruber* (Cuvier, 1830), *Epinephelus itajara* (Lichtenstein, 1822) and *Lutjanus buccanella* (Cuvier, 1828) (see complete list in CARDOSO et al., 2017).

Due to the relative mobility of the parasite on the host body, the species can be observed in regions near the mouth, gills, dorsal, pectoral and caudal fins (BRUSCA, 1983; BUNKLEY-WILLIAMS; WILLIAMS Jr.; BASHIRULLAH, 2006; HERMIDA et al., 2014).

According to Cardoso et al. (2017), the isopod *R. signata* can be found associated with gravel, sand and coral bottom, looking for new hosts to parasite, especially fish that live associated with the seabed, on coral banks or coastal reefs as the case of *Mullus argentinae* Hubbs & Marini, 1933; *Pseudupeneus maculatus* (Bloch, 1793) and *Sparisoma frondosum* (Agassiz, 1831) (LUQUE, PORROZZI; ALVES, 2002; CAVALCANTI et al., 2012; CARDOSO et al., 2017).

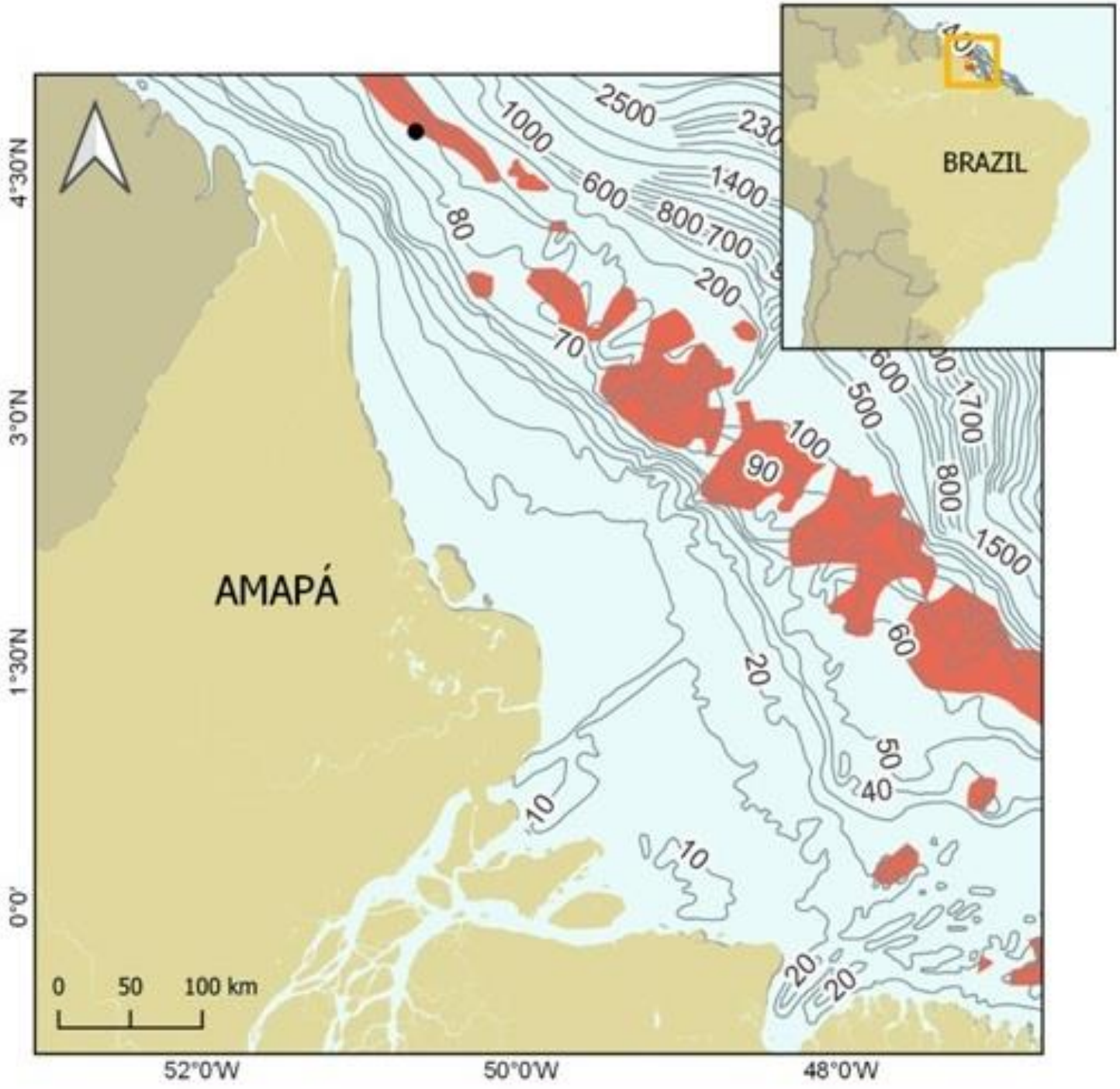

Figure 1. Map showing the sample site (black circle) in Great Amazon Reef System (GARS) (in red), where were collected the parasite isopod *Rocinela signata* Schioedte & Meinert, 1879 as ectoparasite in red snapper fish *Lutjanus purpureus* (Poey, 1866).

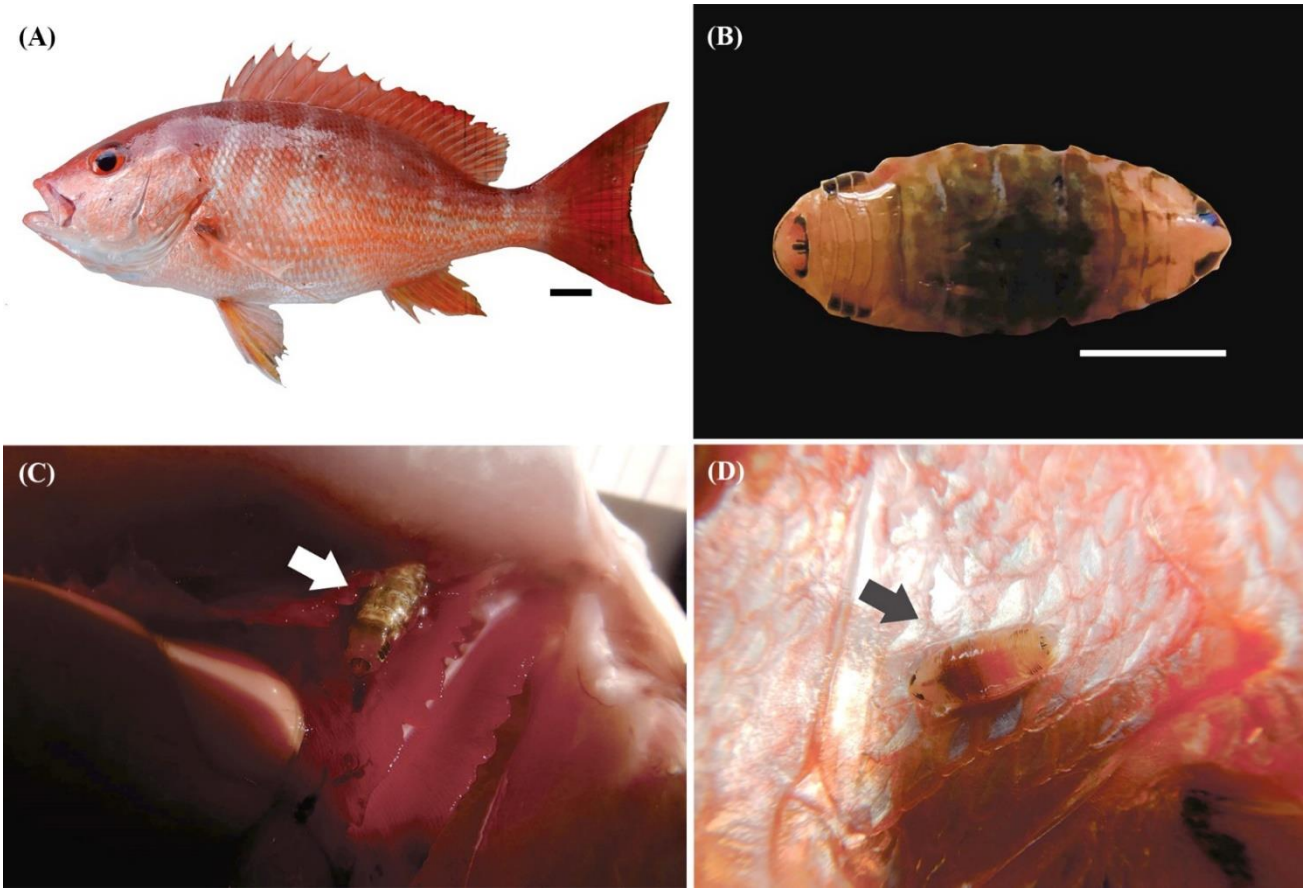

Figure 2. A) Red snapper fish *Lutjanus purpureus* (POEY, 1866); B) *Rocinela signata* Schioedte & Meinert, 1879; C) *R. signata* feeding on blood in gills of *L. purpureus*; D) *R. signata* adhered in operculum of *L. purpureus*. Scale bar of Figure A = 1 cm; Figure B = 0.5 cm.

The prevalence of parasites in fish was low compared to other studies provided by Lima; Chellappa; Thatcher (2005), Lima et al. (2011) and Cavalcanti et al. (2012), both studies carried out in the State of Rio Grande do Norte; these studies observed high levels (between 18 and 40%) of parasitism in the samples.

The species *R. signata* is widely reported from Brazilian waters, occuring in Amapá (presente record), Pará, Maranhão, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Bahia, Espírito Santo, Rio de Janeiro, São Paulo, Paraná, and Santa Catarina (COELHO; KOENING, 1972; MOREIRA, 1977). The vertical distribution of this species covers the shallow waters up to 70 m of depth, and it is associated with the vertical migration of the host, since migratory fish species can transport the isopod species between regions, as well as along different depths through the continental shelf to oceanic islands.

All samples analyzed in the present study were collected at a depth of ~90 m, indicating a range extension of the parasite species to deeper waters.

The presence of *R. signata* as ectoparasite may present problems for the fish's health, since the parasite in gills chambers may decrease blood flow and oxygen absorption, causing respiratory problems, as well as favoring infections by external bacteria (WILLIAMS Jr., 1998; BUNKLEY-WILLIAMS; WILLIAMS Jr.; BASHIRULLAH, 2006; HERMIDA et al., 2014; CARDOSO et al., 2017). *Rocinela signata* is a temporary or facultative parasite with low host specificity, and it is possible to observe this species in branchial and body regions of several commercial fish such as *Caranx crysos* (Mitchill, 1815), *Cynoscion leiarchus* (Cuvier, 1830) and *L. analis* (CARVALHO-SOUZA et al., 2009; LIMA et al., 2011; HERMIDA et al., 2014; CARDOSO et al., 2017).

The occurrence of *R. signata* as ectoparasite along the fish body may cause damage to the skin and is a gateway for harmful bacteria to enter the host, thus decreasing the health of the fish, decreasing life expectancy, and favoring predation on the individual (BUNKLEY-WILLIAMS; WILLIAMS Jr.; BASHIRULLAH, 2006; CARDOSO et al., 2017).

4 Conclusions

In conclusion, the presence of *R. signata* in GARS expands its geographic distribution, being the Amapá State the northernmost record of this species in Brazilian waters, beyond its observation in deeper waters than previously reported. Additionally, herein we expand the new host occurrence of isopod species for the red snapper *L. Purpureus*, an important fishery resource in the northern region of Brazil.

CREDIT AUTHORSHIP CONTRIBUTION STATEMENT

FAAJ, DEGM conceived the research ideas and designed the study and writing of the manuscript; RJCP performed the species identification, AGCMK and IAHC performed the first draft of this manuscript and revisions along the main text.

DECLARATION OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence this study.

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