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Short Communication

Occurrence of *Caligus asperimanus* Pearse, 1951 (Copepoda: Caligidae) parasitic *Lutjanus* spp. (Perciformes: Lutjanidae) in the western South Atlantic

Ocorrência de *Caligus asperimanus* Pearse, 1951 (Copepoda: Caligidae) parasitos de *Lutjanus* spp. (Perciformes: Lutjanidae) no Atlântico Sul ocidental

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Abstract

Sea lice are widespread copepods in marine teleost around the world. In this paper the first record of *Caligus asperimanus* Pearse, 1951 in the Western South Atlantic is documented parasitizing *Lutjanus jocu* and *Lutjanus vivanus* caught from coastal zones of Espírito Santo and Rio de Janeiro State, respectively.

Keywords: *Lutjanus vivanus*, *Lutjanus jocu*, ectoparasites, infestation, South Atlantic.

Resumo

Os piolhos marinhos são copépodes abrangentemente relatados em teleósteos marinhos ao redor do mundo. Neste estudo, é documentado o primeiro registro de *Caligus asperimanus* Pearse, 1951, no Atlântico Sul Ocidental, parasitando *Lutjanus jocu* e *Lutjanus vivanus* capturados nas zonas costeiras do Espírito Santo e Rio de Janeiro, respectivamente.

Palavras-chave: *Lutjanus vivanus*, *Lutjanus jocu*, ectoparasitos, infestação, Atlântico Sul.

Snappers *Lutjanus* species (Lutjanidae) can be found in tropical and subtropical waters of the Atlantic, Indian, and Pacific oceans (Nelson et al., 2016). They are a high commercial demand and possess high added value, in addition to hardiness and adaptability in aquaculture, with some well-known species and others being studied in coastal and oceanic regions (Ibarra-Castro & Duncan, 2007). The dog snapper, *Lutjanus jocu* Bloch & Schneider, 1801, and silk snapper, *Lutjanus vivanus* Cuvier, 1828 are found in continental shelf areas, as well as in clear waters around islands. These species are widely distributed in the Atlantic Ocean from North Carolina (USA) to Southeastern Brazil, feeding day and night on fish, shrimp, crabs, cephalopods, and gastropods (Froese & Pauly, 2019).

According to Luque & Poulin (2007), our knowledge about Latin American fish parasite biodiversity is still quite limited, study effort distribution has been quite heterogeneous, and most known fish species have not been examined for parasites.

Members of the Caligidae family are predominantly external fish parasites, inhabiting the external surface, mouth, gills, and opercular cavity of their hosts and comprise one of the most speciose group within the Copepoda, currently encompassing 450 species distributed in 31 genera (Boxshall & Halsey, 2004; Dojiri & Ho, 2013).

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The genus *Caligus* has the largest number of species in its family, comprising more than 250 species, and is also the most widely represented genus in Brazil, totalling 31 species found in the marine environment (Luque et al., 2013). Although the above caligids species have been found on 55 fish species of the Brazilian coast, but there are no records of Caligidae species parasitizing Lutjanidae fish species in Brazilian coast (Luque & Tavares, 2007; Luque et al., 2013). In the Neotropical Region, Morales-Serna et al. (2016) listed 115 sea lice species found on 217 Neotropical fish species, of which 58 are known *Caligus* species.

In this study, specimens of *Caligus asperimanus* Pearse 1951 were collected from two snapper species in Brazil, specifically *L. jocu* (*n*= 8) caught in the Piraquê-mirim river estuary, Aracruz municipality, Espírito Santo State (19°56'S, 40°10'W), and *L. vivanus* (*n*= 2) caught off the coast of Rio de Janeiro State (22°55'S, 43°12'W). Copepods were removed from the fish surface, fixed in 70% alcohol, and subsequently cleared in a drop of lactophenol before testing with a phase contrast microscope and were examined according to the procedure proposed by Humes & Gooding (1964). Illustrations were made with the aid of an Olympus CX41 microscope (Olympus Corporation, Tokyo, Japan) equipped with a drawing attachment. Measurements based on nine females are given in millimetres, with the range followed by the mean in parentheses. Representative specimens were deposited in in the scientific collection of the Museum of Zoology, University of São Paulo, Brazil. The scientific and common names of the fish used in the present study were according to Froese & Pauly (2019).

Based in the morphology of cephalothorax, genital process, abdomen, small appendages and body proportion, specimens of copepods collected in Brazil (Figure 1) corresponds to the description of *C. asperimanus* given by Pearse (1951) and Cressey (1991). A total of nine *C. asperimanus* female specimens, six on *L. jocu* (MZUSP No 40232 - 2♀) and three on *L. vivanus* (MZUSP No 40231 - 2♀), were collected from the hosts. The female copepods (*n* = 9) had a body length of 3.79-4.32 (4.08) mm (excluding caudal rami setae), and all were attached to the external surface of the fish, close to the operculum. No male individuals were found. Female specimens from Brazil are larger (4.08 mm) than the type specimens collected in Bimini, Bahamas (3.3 mm), and probably with similar size to the specimens collected in Carrie Bow Cay, Belize (4.42 mm) (Pearse, 1951; Cressey, 1991).

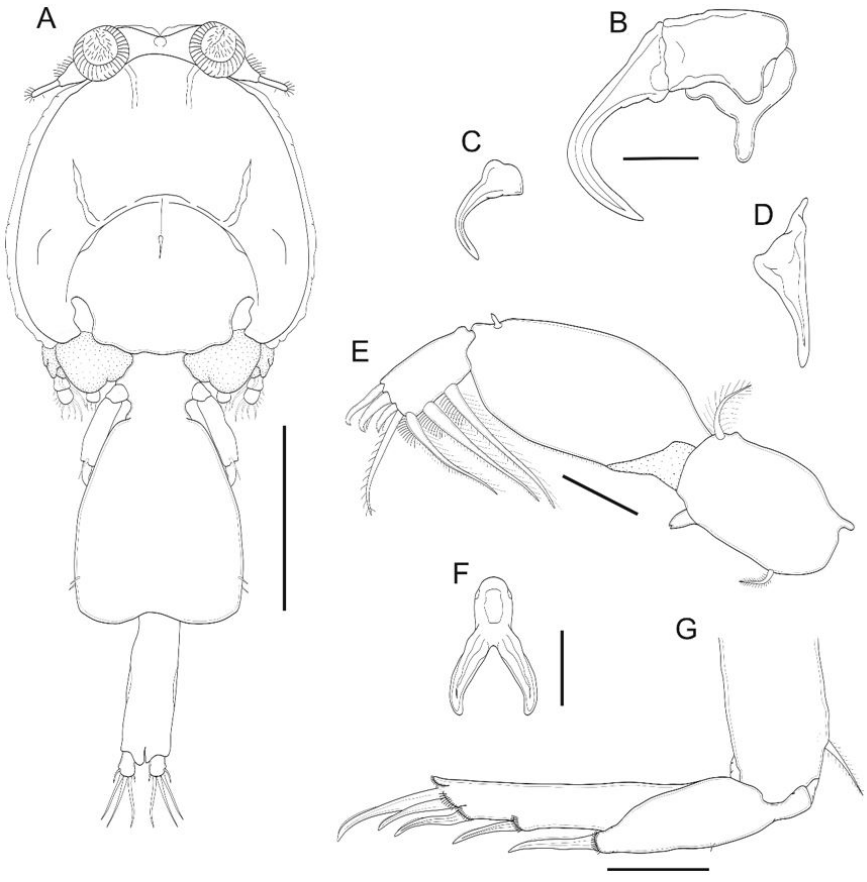

Figure 1. *Caligus asperimanus* from Brazil. Adult Female. (A) Habitus, dorsal view; (B) Antenna; (C) Postantennal process; (D) Maxillule; (E) Leg 1; (F) Sternal furca; (G) Leg 4. Scale bars: A = 1 mm; B-C and F = 80 µm; E and G = 100 µm.

Caligus asperimanus was originally described by Pearse (1951) from the mutton snapper *Lutjanus analis* Cuvier, 1828 (Perciformes, Lutjanidae), collected in the Bimini Sea, Bahamas. This species of ectoparasite was subsequently recorded by Cressey (1991) on schoolmaster snapper *Lutjanus apodus* Walbaum, 1792, *L. jocu*, and lane snapper, *Lutjanus synagris* Linnaeus, 1758, in the Carrie Bow Cay sea, Belize. Years later, Pilla et al. (2012) recorded this species of ectoparasite in John's snapper *Lutjanus johnii* Bloch, 1792 in the Pacific Ocean for the first time, more specifically from the Indian coast. Although this species of ectoparasite has a high prevalence in snapper fish, recently Morales-Serna et al. (2016), in their study on copepod parasites of economically important Ecuadorian fish, recorded this species for the first time in non-lutjanid fish, i.e., the Chere-chere grunt *Haemulon steindachneri* Jordan & Gilbert, 1882 (Haemulidae) and the pacific porgy *Calamus brachysomus* Lockington, 1880, in addition to the yellow snapper *Lutjanus argentiventris* Peters, 1869, all from the coastal waters of Jaramijó, Manabí province, Ecuador.

The discovery of *C. asperimanus* in Brazilian waters represents the 32nd *Caligus* species recorded in the country and the first record of this species of copepod in the western South Atlantic, considerably expanding its geographical distribution. As mentioned in the previous paragraph, this parasitic copepod species has a high incidence in lutjanid fish; however, in this study, *C. asperimanus* has been recorded for the first time in *L. vivanus*, being also the first caligid copepod found in snappers in Brazil.

Snapper commercial farming is growing considerably in the Neotropics (Central America and the Caribbean), and several research initiatives are underway in South America and the United States, showing their importance and potential for aquaculture (Castillo-Vargasmachuca et al., 2018). In Brazil, studies with snappers have been developed focused on laboratory reproduction (Fernandes et al., 2012; Sanches et al., 2015), transport (Oliveira et al., 2018) and diets (Sanches, 2011). Appears to be the most suitable for farming in floating cages because it accepts artificial food (pellet), it is easy to manipulate, it tolerates captivity and its growth from hatchery to market size is completed within 8 months (Hernández et al., 2015).

Caligid copepods are a serious problem in European and Asian aquiculture (Boxshall & Defaye, 1993). According to Johnson et al. (2004), the estimated that in marine and brackish water fish cultures, 61% of copepod infestations are caused by members of the family Caligidae of which 47% are caused by species of *Caligus*, and 14% by species of *Lepeophtheirus*. The best-studied examples of this epidemiological interaction are the ectoparasites *Caligus elongatus* Nordmann, 1832, *Caligus rogercresseyi* Boxhall & Bravo, 2000 and *Lepeophtheirus salmonis* Krøyer, 1837, which can cost the salmon industry, for example, € 300 million (US $ 480 million) per year and 6% of the product value (Costello, 2009; Dojiri & Ho, 2013). The rapid identification and prophylactic actions to eliminate parasitic fauna in fish collected from a natural environment and transported to farming sites (often under high density) are essential for the sanitary control of farmed fish. The threat of sea lice to marine-fish farming should always be considered. Thus, prior knowledge of the parasitic fauna of a possible aquaculture fish is essential, especially in relation to the diagnosis, control, and management of possible parasitic diseases.

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