Type of Manuscript:
Full Article

e-ISSN: 2595-5527
Doi: 10.32435/envsmoke-2026-0001
Volume 9, 2026
Manuscript ID: es20260001
(01-12)

ENVIRONMENTAL SMOKE

RANGE EXTENSION OF TWO BRACHYURAN CRABS COLLECTED FROM THE AMAZON CONTINENTAL SHELF

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Abstract

The Amazon Continental Shelf (ACS) is composed of numerous benthic habitats, which shelter a high diversity of invertebrates, especially crustaceans. However, due to the complexity of ecosystems, knowledge of crustacean fauna is still incomplete. We herein report the northernmost Brazilian record of two brachyuran crab species, *Teleophrys pococki* Rathbun, 1924 (Mithracidae) and *Euchirograpsus americanus* A. Milne-Edwards, 1880 (Plagusiidae), associated with the Great Amazon Reef System (GARS) (State of Amapá), additionally, providing a description of their first gonopods (G1). Both male specimens *E. americanus* and *T. pococki*, were accidentally collected during commercial fishing operation of the red snapper *Lutjanus purpureus* (Poey, 1866) in the ACS (northern Brazil), at depths up to 70 m, in August 2023 and September 2025. The presence of both species in the GARS increases crustacean biodiversity in this ecosystem and highlights the need for further studies in the region to assess its true diversity and to develop management plans focused on species conservation.

Keywords: Amazon Reefs. Bycatch. State of Amapá. Geographic distribution. New record.

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Submitted on: 17 Nov. 2025
Accepted on: 11 Dec. 2025
Published on: 20 Jan. 2026

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1 Introduction

The Amazon continental shelf (ACS) is classified as a hotspot of diversity, due to the elevated complexity of habitats, the wide range of ecological interactions and adequate environmental conditions for the establishment of species (KLAUTAU et al., 2025); much of this biodiversity is due to the presence of the Amazon River plume, which transports organic matter, establishing a high energy flow in marine food chains (WEBER et al., 2017; DRAKE et al., 2021).

In this area, there is also an ecosystem composed of rhodoliths, and coral beds designated as the Great Amazon Reef System (GARS), which is distributed along mesophotic areas of ACS, ranging from 20 to ~100 m (VALE et al., 2022).

The GARS is the target of several studies, especially on geological mapping, ecological functionality and the diversity associated with this environment (MOURA et al., 2016; VALE et al., 2022).

However, this region has already been affected by human activities, such as fishing, marine litter and the effects of climate change (ALVES-JÚNIOR et al., 2024a), even before the knowledge about the species diversity (including crustaceans, which are usually recorded as part of fishing bycatch) was completely available (MARTINS; ALVES-JÚNIOR, CINTRA, 2025).

The family Mithracidae MacLeay, 1838 corresponds to 15 genera and 68 species, occurring from the coastal zones to the continental shelf break, associated with sand, gravel or coral bottoms (MELO, 1996; WINDSOR; FELDER, 2014; DECANET, 2025a).

Into this family, the genus *Teleophrys* Stimpson, 1860 comprises five recent species: *T. cristulipes* Stimpson, 1860, *T. ornatus* Rathbun, 1901, *T. pococki* Rathbun, 1924, *T. ruber* (Stimpson, 1871), *T. tumidus* (Cano, 1889), besides *T. acornis* Portell & Collins, 2004 as a fossil record (DECANET, 2025a).

From the Brazilian waters, only the species *T. ornatus* and *T. pococki* have been recorded in the northeastern and southeastern regions (MELO, 1996). Despite the occurrence of *T. pococki* in coastal zones of Brazil, this species was reported in a few localities, represented only by occasional records.

Additionally, crabs of the family Plagusiidae Dana, 1851 are found along the coastal zones and continental slope areas (including Oceanic Islands), associated with bottoms of sand, gravel and coral (MELO, 1996; 1998).

These organisms are widely reported along the Atlantic and Indo-Pacific Oceans, which are classified in 21 species distributed into seven genera: *Caligoplagusia* Fujita & Narusa, 2014, *Davusia* Guinot, 2007, *Euchirograpsus* H. Milne Edwards, 1853, *Guinusia* Schubart & Cuesta, 2010, *Miersiograpsus* Türkay, 1978 and *Plagusia* Latreille, 1804, as well as the extinct species *Petrusia* Beschin, Busulini, Tessier & Zorzin, 2016 (GUINOT, 2007; NG; GUINOT; DAVIE, 2008; DECANET, 2025b).

Currently, the genus *Euchirograpsus* is composed of nine valid species, occurring from 10 to 510 m of depth in the bottoms of sand, mud, rock and corals, associated with gorgonians and sponges (TÜRKAY, 1975; MANNING; HOLTHUIS, 1981, ALVES-JÚNIOR et al., 2016; WILSON; POHLE, 2016). In Brazilian waters, only two species have been recorded: *Euchirograpsus antillensis* Türkay, 1975 and *Euchirograpsus americanus* A. Milne-Edwards, 1880, both occurring along the continental shelf and shelf break of the northeastern and southeastern regions (MELO, 1996; 1998; ALVES-JÚNIOR et al., 2016). Thus, herein we report the Brazilian northernmost records of two brachyuran species: *Teleophrys pococki* and *Euchirograpsus americanu*s from the state of Amapá, associated with the GARS.

2 Material and Methods

The crab species were obtained incidentally attached to an iron cage trap called "manzuá" (mesh size of 5 cm) during commercial fishing operations of the red snapper *Lutjanus purpureus* (Poey, 1866). These fishing activities were performed between the depths of 70 and 100 m, along the continental shelf of the Brazilian state of Amapá (Figure 1) from August 2023 to September 2025, covering areas above the Great Amazon Reef System (GARS).

In the field, the rhodoliths adhered to the external surface of the trap were manually removed, related invertebrate species were fixed in 70% ethanol, and then transported to the *Laboratório de Crustáceos* (LabCrus). All sampling procedures were supervised by the *Centro Nacional de Pesquisa e Conservação da Biodiversidade Marinha do Norte* (CEPNOR) under the SISBIO Number 44915–3.

In the laboratory, both species were identified following Türkay (1975) and Melo (1996), photographed, measured in carapace width (cw.), carapace length (cl.) and wet weight (ww.). After the procedures, the specimens were deposited under voucher number at the *Coleção Carcinológica do Laboratório de Crustáceos (*LabCrus*) / Universidade Federal Rural da Amazônia* (UFRA).

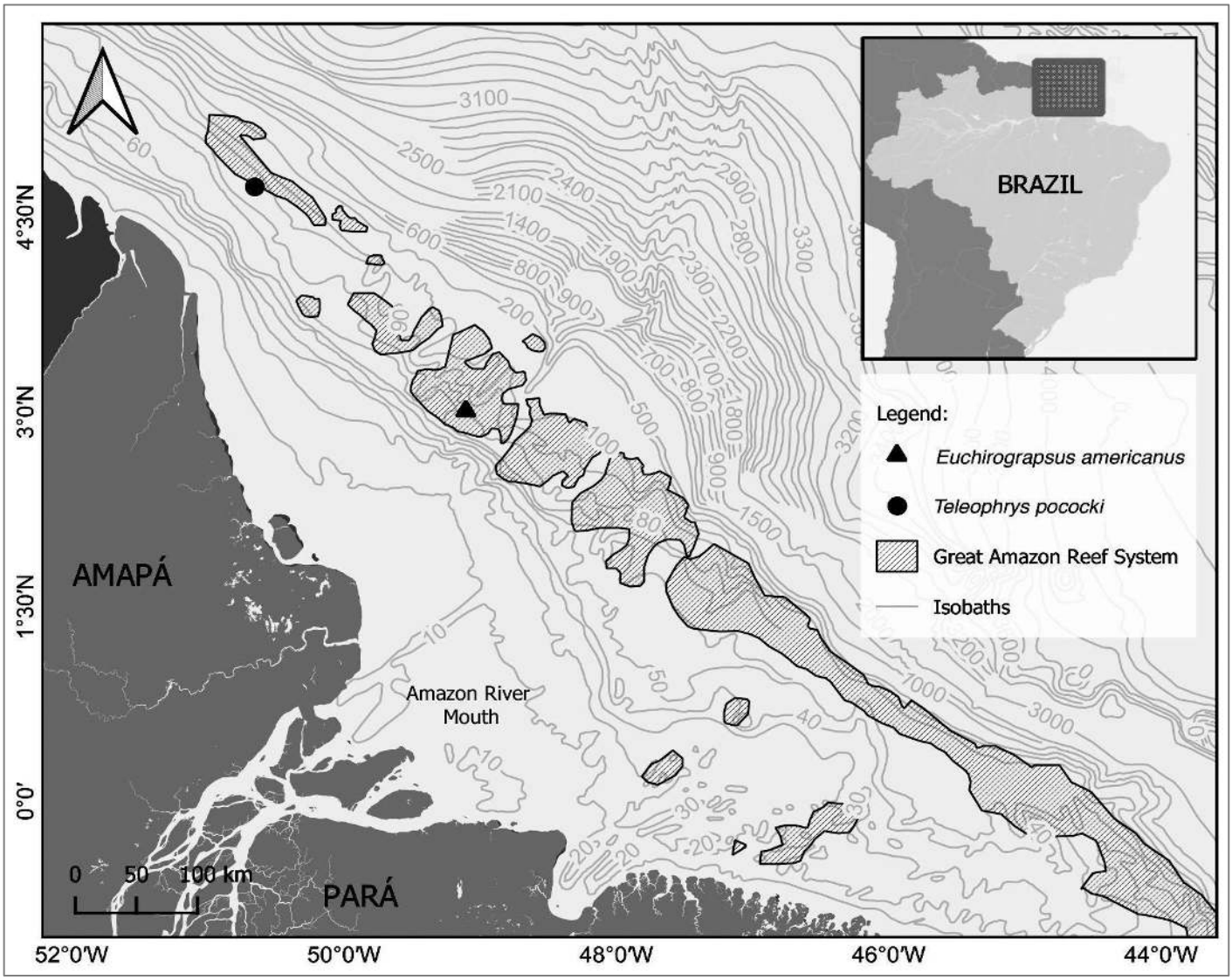


Figure 1. Map of the study area, covering the Amazon continental shelf (ACS), indicating the occurrence sites of *Teleophrys pococki* Rathbun, 1924 and *Euchirograpsus americanus* A. Milne-Edwards, 1880. Shapefile of the GARS from Moura et al. (2016).

3 Results and Discussion

One adult male of *T. pococki* (Figure 2 A-C) (cw. 11.6 mm, cl. 10.3 mm and ww. 0.57 g) (Voucher Number: 2.16.1A) was collected at a depth of 70 m in the GARS area (August 2023), associated with rhodoliths in the gravel bottom, state of Amapá (Brazil) (04°43'59" N; 050°39'18" W). According to Tavares and Mendonça Jr. (2022), the bathymetric distribution of *T. pococki* covers continental shelf areas, from shallow waters to 100 m; however, it is more commonly found up to 25 m of depth (MELO, 1996; CASTAÑO; CAMPOS, 2003; CARMONA-SUÁREZ; POUPIN, 2016).

Our specimen fits well with the original description provided by Rathbun (1924) and additional information provided by Rathbun (1925) and Melo (1996), which include the main characteristics: carapace larger than long, smooth, containing few granules or small tubercles which are more visible in the branchial and cardiac regions; rostrum bifid, also larger than long, with one antero-lateral teeth; carpus of chelipeds with two lobes only in the inner face, chelipeds smooth forming an open angle in the centre, with curved edges. Ambulatory legs with several tubercles forming crests on the upper surface (Figure 2A). Free abdominal somites with a median elevation in somites 3 to 6 (Figure 2 B).

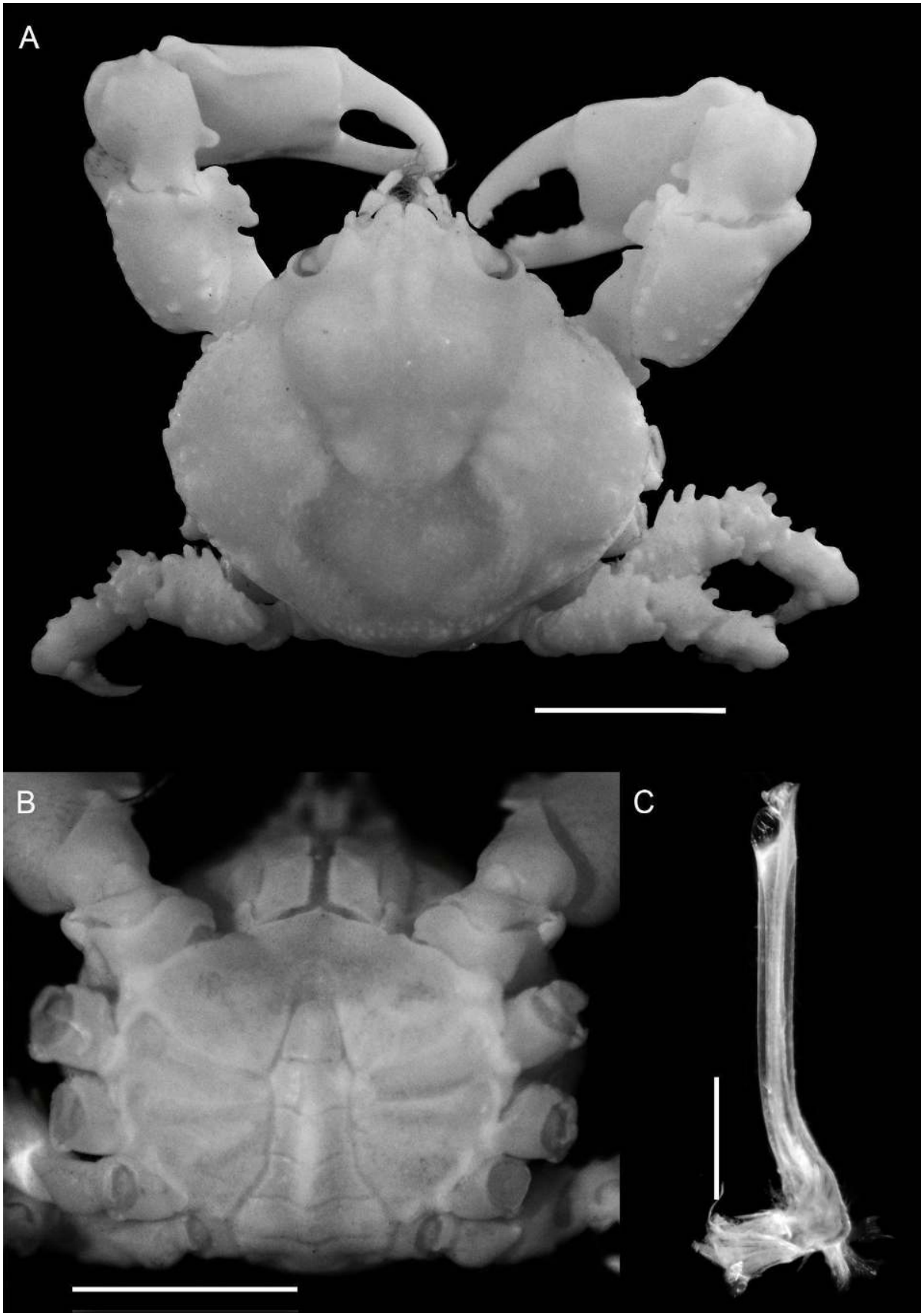


Figure 2. *Teleophrys pococki* Rathbun, 1924. (A) Male in dorsal view; (B) ventral view; (C) right first gonopod in pleonal view, in stereomicroscopy (Scale bars = 5mm (A,B), 1mm (C).

The first gonopod (G1) is long and robust, base with plumose setae, lateral margin with simple setae sparsely distributed, a suture present from the base to the distal margin of the apical plate, rounded protuberance on the lateral margin; apical plate with two lobes covered with several acute spines (Figure 2C).

Originally, the species *T. pococki* was designated as a new species in a revision of the type material of *T. cristulipes* provided by Rathbun (1924), being these both closely related species, which can be easily separated by main characters: rostrum short and large, slightly bifid and not reaching the first antennal peduncle in *T. pococki vs.* rostrum with frontal margin large, bifid and overcoming the first antennal peduncle in *T. cristulipes*; carapace with only one antero-lateral tooth in *T. pococki vs.* carapace with 3-4 antero-lateral teeth in *T. cristulipes*; carapace smooth, with small granules and tubercles only in the branchial and cardiac regions in *T. pococki vs.* all carapace regions covered with small granules and tubercles in *T. cristulipes*. Ambulatory legs are slender, with tubercles forming a crest in the superior margin in *T. pococki vs.* ambulatory legs robust with a visible lobe at propodus in *T. cristulipes* (see more details in RATHBUN, 1925). Rathbun (1900), analyzing samples from Brazil, indicated *T. cristulipes* as occurring in the region; however, the same author posteriorly described the Brazilian species as *T. pococki*, indicating *T. cristulipes* as native from the Pacific Ocean. In addition, the distribution of *T. cristulipes* covers the Pacific Ocean, Mexico (Baja California), Costa Rica (Golfo Dulce), Panama, Colombia, Ecuador (Galapagos) (HOLTHUIS, 1979; HENDRICKX, 2010).

The species *T. pococki* is restricted to Western Atlantic, occurring in the United States (Louisiana), Bonaire, Curaçao, Honduras, Bahamas, Lesser Antilles, Colombia (Santa Marta), Venezuela and Brazil: (Amapá [this study], Rocas Atoll, Fernando de Noronha Archipelago, Pernambuco, Alagoas, Bahia and São Paulo, Trindade and Martin Vaz Archipelago) (GARTH, 1978; GOUVÊA, 1986; COELHO; ALMEIDA; BEZERRA, 2008; MELO, 1996; 1998; ALVES et al., 2012; FLEEGER; COWAN-JR.; PASCAL, 2013; CARMONA-SUÁREZ; POUPIN, 2016). In Brazilian waters, only two *Teleophrys* species (*T. pococki* and *T. ornatus*) have been reported; however, *T. ornatu*s is recorded only in Fernando de Noronha Archipelago, Bahia and São Paulo (MELO, 1996; ALVES et al., 2012). The main differences between these two species are: *T. pococki* has the carapace unarmed, covered with granules and wider than long, and the ambulatory legs with a crest only on the upper surface; while *T. ornatus* has the carapace armed with tubercles and small spines and longer than wide, and the ambulatory legs showing a crest on both sides (superior and inferior margins) (see MELO, 1996, pags. 248, 249).

The mithracid species *T. pococki* is considered an ecosystem engineer, especially living in association with coral reefs (e.g. *Mussismilia hispida* (Verrill, 1901) in shallow habitats), or living in burrows in dead coral or artificial substrates such as artificial reefs, oil platforms and ship hulls (NOGUEIRA; NEVES; JOHNSON, 2015).

Furthermore, this species may be found in calcareous algae beds; nonetheless, it is commonly found using seaweed of the genera *Centroceras* Kützing, 1841, *Ceramium* Roth, 1797 and *Chaetomorpha* Kützing, 1845 as ornamentation on areas of the carapace and walking legs (GOUVÊA, 1986; LÓPEZ; SOLANO, 2005; TAVARES; MENDONÇA JR., 2022). Studies performed by Vera-Caripe et al. (2017) indicated the commensal association of *T. pococki* with the sea urchin *Tripneustes ventricosus* (Lamarck, 1816), being the echinoderm a protection against predators.

Into our grapsid specimen, we collected one male of *E. americanu*s (Figure 3 A-D) (cw. 7.10 mm, cl. 7.50 mm and ww. 0.24 g) (Voucher Number: 22.2.1 A), at 85 m of depth, in areas of the GARS (September 2025), state of Amapá (Brazil) (03°00’27” N; 049°06’20” W), associated with rhodoliths in the gravel bottom. Our specimen agrees with the original description provided by A. Milne-Edwards (1880) and additional posterior descriptions of A. Milne-Edwards and Bouvier (1894), Rathbun (1918), Türkay (1975) and Melo (1996).

The main characteristics for the identification of this species are: carapace subquadrate, flattened posteriorly, with the surface covered with small granules and clumps of stout setae spread non-uniformly, including numerous short setae covering the carapace. The bilobed front reaches the middle of the first antennular article (Figure 3A). Three antero-lateral acute spines (excluding the orbital), being the second more pronounced/acute than the others (Figure 3A-C).

Chelipeds thin, covered by stout setae and small granules, slightly curved downward. Merus of the chelipeds contain five acute spines on the ventral-distal angle. Ambulatory legs covered with stout setae and small granules; merus of pereopods 2 to 5 (P2-P5) ending in a sharp distal tooth, merus of the second ambulatory leg (P2) containing three to four subdistal teeth (a higher and sharper) (Figure 3B). Dactyl of P2-P5 with five to six robust spines, being the tip trifurcated (similar to a hook). Abdominal somites one and two are reduced, and somites 4-6 are slightly fused. First gonopod (G1) robust, slightly curved towards the mesial line, with sparse setae in its mid-distal portion and dense pubescence at the tip (see Figure 3D) (modified from TÜRKAY, 1975; MELO, 1996).

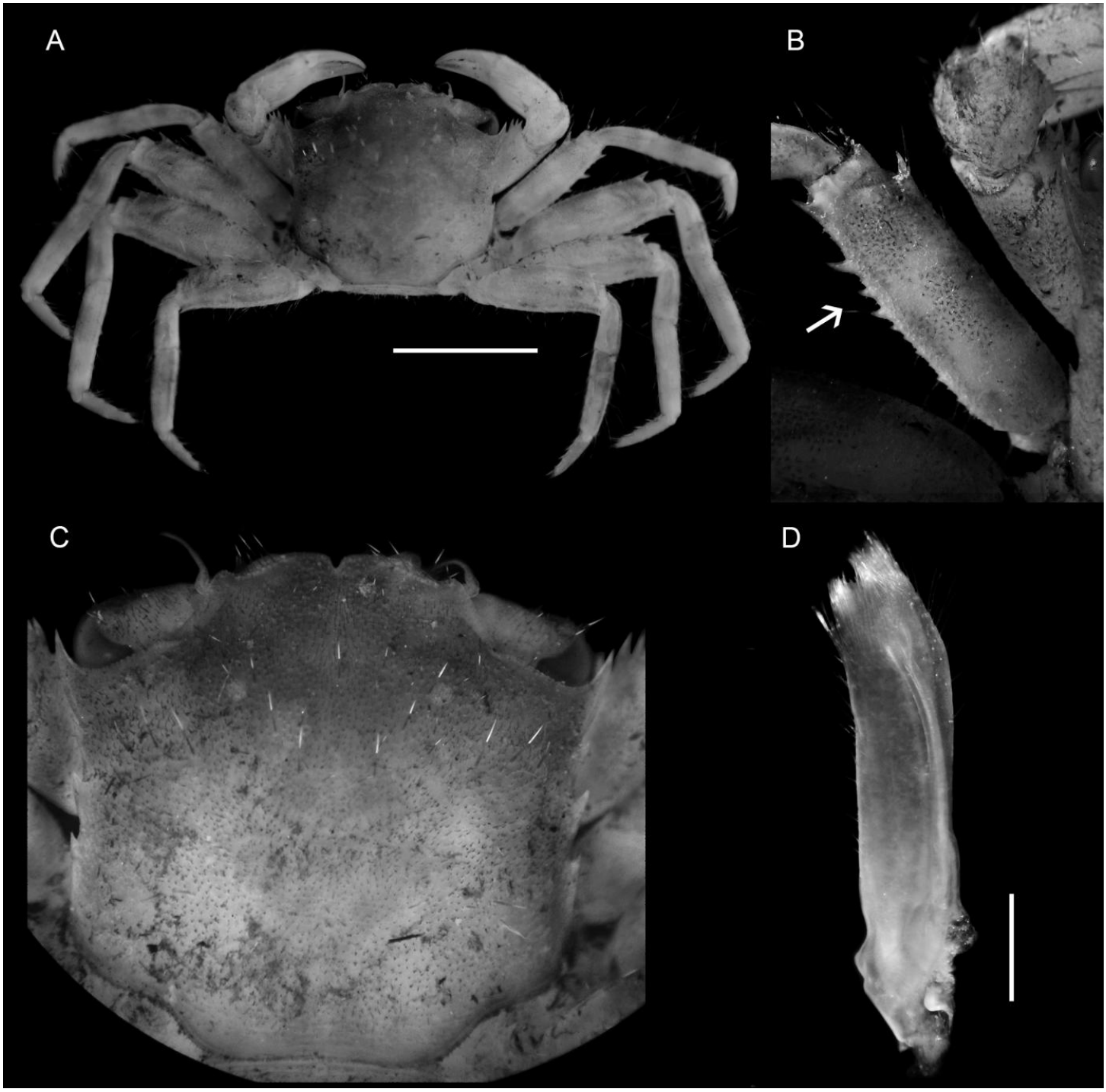


Figure 3. *Euchirograpsus americanus* A. Milne-Edwards, 1880. (A) Male in dorsal view; (B) inferior margin of the merus of the second pair of ambulatory legs (P2); (C) Carapace; (D) right first gonopod in pleonal view, in stereomicroscopy (Scale bars = 5mm (A), 1mm (D).

In the Western Atlantic, the species most closely related to *E. americanus* is *E. antillensis*. Both species occur in the same habitats (sympatric species), however they are morphologically distinguished according to Türkay (1975, pag. 113, Fig. 16) and Alves-Júnior et al. (2016, pag. 3, Fig. 1) following the characters: the individuals of *E. americanus* have three to four subdistal teeth on the inferior margin of the merus of the second pair of ambulatory legs (P2), being the first or second (sometimes the last) larger and higher pitched than the others; while in *E. antillensis* all subdistal teeth on the inferior margin of the merus of P2 are of the same size. Additionally, Türkay (1975) indicated that the anterolateral teeth of *E. americanus* are less developed than in *E. antillensis*. Studies developed by Poupin (1994; 2018) indicated this character as valid for male and female specimens identification.

Until now, several specimens were erroneously assigned as *E. americanus*, especially in Indo-Pacific regions; however, after the revision provided by Türkay (1975) and additional observations of Manning and Holthuis (1981); these authors indicated that only two *Euchirograpsus* species (*E. americanus* and *E. antillensis*) are restricted to the Western Atlantic. The distribution of *E. americanus* covers: Canada (Bay of Fundy), USA (towards the Carolina's in Toms/ Meys Canyon and Baltimore Canyon, Massachusetts in Canyon at the edge of Georges Bank, Delaware, New Jersey, Louisiana, Florida), Gulf of Mexico, Dry Tortugas, Cuba, Lesser Antilles, West Indies, Guadalupe, Barbados, Colombia, Venezuela, French Guiana and Brazil (Amapá [this study], Maranhão, Rio Grande do Norte and Rio Grande do Sul states) (ZARIQUIEY ALVAREZ, 1968; TÜRKAY, 1975; MELO, 1996; 1998; CORBARI et al. 2015; ALVES-JÚNIOR et al., 2016; WILSON; POHLE, 2016; POUPIN, 2024). According to Wilson and Pohle (2016), this species is normally found in tropical areas; however, possibly due to climate change events, *E. americanus* has expanded into subtropical areas, as observed in cold waters (~8.3 °C) of Canada (Bay of Fundy).

The presence of these species in the State of Amapá may be associated with the GARS, once this region encompasses a wide range of micro- and macro habitats beneath the Amazon River plume, characterized by high energy flow and acting as connection between South America and the Caribbean Sea (MOURA et al., 2016; VALE et al., 2022; ALVES-JÚNIOR; MARTINS; CINTRA, 2024b). Along the GARS, the migration/distribution of invertebrate and vertebrate species may occur in a stepping-stones process, especially in areas below 70 m (ALVES-JÚNIOR; MARTINS; CINTRA, 2024b; MARTINS; ALVES-JÚNIOR; CINTRA, 2025). This explains the widespread occurrence of *T. pococki* and *E. americanus* throughout the Western Atlantic.

Two other additional hypotheses that may explain the presence of both species in northern Brazil are: 1) their transport (larvae and adults) is associated with ships on route between Brazil and the Caribbean Sea; 2) these species were probably already distributed throughout the Amazon continental shelf region, but the lack of researchers and specialized sampling efforts along the GARS have hindered knowledge of the distribution of *T. pococki* and *E. americanus*.

4 Conclusions

Despite the high biological diversity found in the ACS, the region is suffering severe anthropogenic impacts, especially associated with fishing activities, climate change, marine debris and ghost fishing. As a result, several species of marine invertebrates and vertebrates are included in threatened species lists, even before they have been catalogued or their biological characteristics fully understood. The presence of only a single specimen of *T. pococki* and *E. americanus* in the northern region limits our understanding of their biology and conservation status. In conclusion, we herein update the geographic distribution of two brachyuran crab species from the Amazon continental shelf; however, further studies in the Amazon reef region are needed to improve the knowledge of crustacean diversity in northern Brazil.

CREDIT AUTHORSHIP CONTRIBUTION STATEMENT

Conceptualization: D.E.G.M., I.H.A.C., F.A.A.J. and B.B. Funding: I.H.A.C., F.A.A.J. and B.B. Data curation, Methodology: D.E.G.M., I.H.A.C. and F.A.A.J. Investigation: D.E.G.M. and F.A.A.J. Visualization: D.E.G.M. Writing – original draft: D.E.G.M., I.H.A.C. and F.A.A.J. Writing – Review & Editing: D.E.G.M. and B.B.

DECLARATION OF INTEREST

The authors disclose that they have no known competing financial interests or personal relationships that could have appeared to influence the study reported in this manuscript.

FUNDING SOURCE

This research was financed by the *Conselho Nacional de Desenvolvimento Científico e Tecnológico* – CNPq (Brazil), through the productivity grant award, reference numbers: 304401/2025-0 (author Israel Cintra) and 302175/2025-3 (Bianca Bentes).

ETHICAL PROCEDURES

No live animal treatments were carried out in this study. All specimens were retrieved from regulated commercial fishing operations and were dead upon examination.

ACKNOWLEDGEMENTS

The authors would like to thank the *Centro Nacional de Pesquisa e Conservação da Biodiversidade Marinha do Norte* (CEPNOR, Brazil) for the sampling of the examined material and the support in the laboratory. Additionally, we would like to thank the anonymous reviewers for their valuable comments throughout the manuscript.

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