

First records of Pseudozeuxidae and Metapseudinae (Metapseudidae) (Crustacea, Tanaidacea) in Southwestern Atlantic, with descriptions of two new species

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Abstract

Based on specimens collected from eulittoral zone in rocky shores of northeast of Rio de Janeiro (Brazil) on 2017, two new tanaidaceans species from two different suborders are described: *Apseudomorpha brasiliensis* **sp. nov.** (Apseudomorpha, Metapseudidae) and *Pseudozeuxo fischeri* **sp. nov.** (Tanaidomorpha, Pseudozeuxidae). Diagnostic characters of *Apseudomorpha brasiliensis* are mandible palp article-2 and article-3 with six and nine finely penicillate setae on inner margin, respectively; pereopod-1 carpus and propodus with two and four ventral spines, respectively; pleonites 2 and 5 with pleura having long distal seta; uropod exopod shorter than endopod articles 1–2 combined, endopod four-articled. *Pseudozeuxo fischeri* is characterized by pereopods 1–3 coxa with long seta about half as long as basis; pereopods 2–3 carpus with ventrodiscal seta; propodus with two ventral setae; pereopods 4–6 propodus with two ventral spines and one seta; uropod endopod two- and exopod one-articled. This is the first record of the family Pseudozeuxidae and the metapseudid subfamily Metapseudinae from the Southwestern Atlantic (Brazil). Remarks on their associations with macroalgae and identification keys to world species of *Apseudomorpha* and *Pseudozeuxo* are provided.

Key Words

Apseudomorpha, Brazil, new record, Rio de Janeiro, rocky shores, Tanaidomorpha

Introduction

Current knowledge about the crustacean order Tanaidacea Dana, 1849 is still significantly underdeveloped, with the number of World species recognized likely to be an order of magnitude too low, with tanaidaceans potentially matching the orders Amphipoda and Isopoda in diversity mainly in environments as deep waters (Błażewicz-Paszkowycz et al. 2012). The Brazilian Tanaidacea fauna is still poorly known, although recent papers have revised upwards the number of recorded species in the past twenty years (Santos and Hansknecht 2007; Larsen et al. 2009; Santos et al. 2012; Araújo-Silva et al. 2013; Segadilha et al. 2018; Segadilha et al. 2019).

Guțu (1998) registered 29 species of the order Tanaidacea from the Brazilian coast, 17 belonging to the suborder Apseudomorpha Sieg, 1980 and 12 to the suborder Tanaidomorpha Sieg, 1980. Larsen et al. (2009) updated Gutu's catalog and listed 41 species in 31 genera and 12 families for the Brazilian area, of which 26 species belong to Apseudomorpha and 15 to Tanaidomorpha. In their latest work, Segadilha et al. (2019) registered a total of 54 species for Brazil. Nevertheless, the Brazilian tanaidacean diversity is yet still relatively under-researched due to few specialists compared with other areas with a wider tradition of study of this group, such as Europe and United States, which makes evident the need for further studies along the Brazilian coast.

Among coastal environments, rocky shores stand out for the high biodiversity of macroalgae, invertebrates, fish and seabirds, in addition to great ecological and economic importance (Messano et al. 2020). Rocky shore environments often cover large areas, although in Brazil they are almost exclusive to the southeast and south regions (Oigman-Pszczol et al. 2004), with the exception of the small rock formation present near the Cabo de Santo Agostinho, Pernambuco (Coutinho and Zalmon 2009). Thereby, the main part of the Brazilian coast where the rocky shores are among the most important ecosystems comprises Cabo Frio (Rio de Janeiro) to Cabo de Santa Marta (São Paulo) (Coutinho and Zalmon 2009). The order Tanaidacea, among other Peracaridans, has great importance associated with secondary biological substrates in rocky shores due to its high density and diversity of species (Edgar and Moore 1986).

The present study is part of the Project Rocky Shores: ecology, impacts, and conservation in the areas of Região dos Lagos and the north Fluminense, which aims to survey biodiversity, study the abundance and structure of invertebrate macrofauna communities and their correlations with environmental parameters in rocky shores of the northern part of Rio de Janeiro (Macaé, Rio das Ostras and Armação dos Búzios).

Material and methods

The Project Rocky Shores: ecology, impacts, and conservation in the areas of Região dos Lagos and the north Fluminense has been executed by the Institute of Biodiversity and Sustainability NUPEM/Universidade Federal do Rio de Janeiro with financial support of the Brazilian Biodiversity Fund (FUNBIO).

Sampling was carried out at four stations: Areias Negras Beach (AN) (22°31'48.98"S, 41°55'30.00"W) at Rio das Ostras; Cavaleiros Beach (CA) (22°24'17.67"S, 41°47'42.53"W) at Macaé; Calhetas Island, Santana Archipelago (AS) (22°23'54.46"S, 41°41'42.22"W), located in front of Macaé; and two points along the Rasa Beach (B1 and B2) (22°44'2.00"S, 41°57'27.36"W) (22°44'0.42"S, 41°57'26.42"W), at Armação dos Búzios.

At each site, collections were made from three zonation strata of the eulittoral zone: upper (A), intermediate (B) and lower (C). The strata were defined according to the dominant group of organisms covering each stratum, being: Upper = green macroalgae (Chlorophyta – *Ulva*, *Enteromorpha*, *Chaetomorpha*), bivalves (*Brachidontes* spp.) and small barnacles (*Chthamalus* spp.); Intermediate = coralline macroalgae (Rhodophyta, e.g., *Coralina*, *Cryptonemia*, *Gelidium*, *Jania*) and large barnacles (*Tetraclita stalactifera*); and Lower = brown macroalgae (Ochrophyta, e.g., *Sargassum*, *Dictyota*).

Five replicates were taken in each stratum, along 30 meters of extension on each shore. Sampling was made during low tides (≤ 0.2 m). The area of each sampled unit was delimited by a *quadrat* of 20x20 cm (0.04 m²) and samples were scraped with spatulas.

Specimens were sorted at the Laboratório Integrado de Biologia de Vertebrados, located in NUPEM/UFRJ. The algae were previously dipped and slightly agitated in buckets with water to remove the largest number of attached organisms, which were passed through a 1 mm mesh sieve. The material retained in the sieve (> 1 mm) was separated, preserved in 70% ethanol and subsequently identified. The washed macroalgae and other larger organisms (e.g., sea urchins, bivalves) were carefully observed in stereomicroscope to search for attached organisms, which were also included and identified.

Drawings were made using a microscope Zeiss with a camera lucida and digitalized with WACOM Tablet using the program Adobe Illustrator CC 2017. The appendages were dissected using chemically sharpened tungsten-wire needles. Body length was measured from the tip of the rostrum to the tip of the pleotelson, and pereonite width at the broadest part. The length/width ratio was calculated from the measurements made in the middle length and width of an article. The measurements of cheliped articles and the morphological terminology follow that used by Błażewicz-Paszkowycz (2007). The articulated protrusions on the distal edge of the maxillipedal endites are called 'gustatory cusps' as proposed by Segadilha et al. (2018) (equivalent to 'cusps' *sensu* Bird and Larsen (2009)). The maps illustrating the distribution of the described species were prepared using Quantum GIS v.2.16.3 Software.

All material cited herein (MNRJ 29854–29871) was stored at Museu Nacional/UFRJ and was saved during the fire in this institution in September 2018, being available for future analysis.

Abbreviations

L:W	as long as wide
MNRJ	Museu Nacional/Universidade Federal do Rio de Janeiro, Brazil
TBL	total body length
Stn	station

Results

Four species of Tanaidacea belonging to four different families were identified in the material collected by the Project Rocky Shores in Rio de Janeiro (Brazil). One species was from the suborder Apseudomorpha (family Metapseudidae: *Apseudomorpha brasiliensis* sp. nov.) and three were from the suborder Tanaidomorpha – two belonging to the superfamily Paratanaoidea (families Leptocheiliidae Lang, 1973: *Chondrochelia dubia* (Krøyer, 1842) and Pseudozeuxidae Sieg, 1982: *Pseudozeuxo fischeri* sp. nov.), and one of the superfamily Tanaidoidea (family Tanaididae Nobili, 1906: *Zeuxo coralensis* Sieg, 1980). Herein we describe the two new species as seen below.

Systematics

Order Tanaidacea Dana, 1849

Suborder Apseudomorpha Sieg, 1980

Superfamily Apseudoidea Leach, 1814

Family Metapseudidae Lang, 1970

Subfamily Metapseudinae Lang, 1970

Genus *Apseudomorpha* Miller, 1940

<http://zoobank.org/E6C1EC34-1A58-4426-B8D5-937138CDE171>

Apseudomorpha Miller, 1940: 315.

Apseudomorpha – Lang 1970: 603. — Guțu 1972: 303. — Guțu, 1981: 96, 103, 106. — Sieg 1986: 32. — Guțu 1987: 35, 38, 40. — Guțu 1991: 355. — Guțu 1996a: 85, 88. — Guțu 1996b: 138, 145. — Heard 2002: 373. — Heard et al. 2004: 55; 59. — Larsen 2005: 34. — Guțu 2006: 6, 16, 23, 26, 29, 36, 39, 41–44, 47–48, 120, 180–182, 190, 204. — Guțu 2007: 65. — Guțu 2009: 101, 103, 109–111, 117. — Heard et al. 2009: 251. — Stępień and Błażewicz-Paszkowycz 2013: 560. — Heard et al. 2018: 302, 308 — Bird 2019: 68, Tab. 10 — Morales-Núñez et al. 2019: 213–214, 227, 229–230, Tab. 2, Fig. 10.

Diagnosis. See Morales-Núñez et al. 2019.

Type species. *Apseudomorpha oahuensis* Miller, 1940.

Species included. *Apseudomorpha albida* (Shiino, 1951); *A. avicularia* (Barnard, 1914); *A. brasiliensis* sp. nov.; *A. drummi* Morales-Núñez, Heard & Bird, 2019; *A. fontainei* Guțu, 1987; *A. glebosa* (Menzies, 1953); *A. hirsuta* (Stebbing, 1910); *A. magdalenensis* (Menzies, 1953); *A. martinicana* Guțu, 2009; *A. negoescuae* Guțu, 2007; *A. oahuensis* Miller, 1940; *A. ortizi* Guțu, 2006; *A. timaruvia* (Chilton, 1882); *A. veleronis* (Menzies, 1953); *A. vestafricana* Guțu, 2006.

Remarks. Family Metapseudidae is divided into four subfamilies: Chondropodinae Guțu, 2008; Metapseudinae; Msangiinae Guțu, 2006 and Synapseudinae Guțu, 1972 (WoRMS 2020a). The genus *Apseudomorpha* is included within the subfamily Metapseudinae and can be distinguished from similar genera *Pseudoapseudomorpha* Guțu, 1991 and *Plectrocopus* Guțu, 2006 mainly by the carapace with an acute and smoother rostrum and the absence of an exopod on the cheliped (Guțu 2006).

Lang (1949) replaced the species *Apseudes timaruvia* Chilton, 1882 into the genus *Apseudomorpha*. According to Guțu (2009), although it resembles the *Apseudomorpha* species by several features, it was wrongly included in this genus, mentioning differences as follows: (1) antennule with inner and outer flagellum with numerous segments (six and 14, respectively); (2) antenna flagellum with eight segments; (3) pereopod-2 propodus with two rows of spines; (4) cheliped propodus configuration; and (5) pleopods setation. Indeed Guțu's conclusion was that *Apseudes timaruvia* belongs to an unknown genus (Guțu 2009). More recently, Graham Bird examined the speci-

mens of *Apseudomorpha timaruvia* and also stated that this species probably belongs in another genus as it differs from the other species of *Apseudomorpha* by (1) only pleonite-3 epimeron with a long apical seta; (2) more numerous antennular articles (six inner, nine outer; not 14 as Guțu indicated); and (3) pereopods 1–3 carpus and propodus with a double row of spines (Morales-Núñez et al. 2019).

The species *Parapseudes hirsutus* Stebbing, 1910 was reclassified by Sieg (1983) in the genus *Apseudomorpha*. However, Guțu (2009) indicated that the characteristics of the pereopods 1–3 (including the large number of the sternal spines on carpus and propodus), the great length of the antennule and the large number of the flagella segments, correspond to the genus *Pseudoapseudomorpha*. Yet, due to the absence of the cheliped description in Stebbing (1910), more specifically if the exopodite is present or not, Guțu (2009) refrained from classification changes. Thus, both species mentioned are still retained in the genus *Apseudomorpha* pending its complete re-description (G. J. Bird in prep.).

The genus *Apseudomorpha* has a worldwide distribution, with 15 species located in tropical and temperate regions of the Pacific, Atlantic and Indian Oceans (Morales-Núñez et al. 2019 and present study).

***Apseudomorpha brasiliensis* sp. nov.**

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Figures 1–7

Material examined. Holotype: Brazil • 1 ♀ ovigerous, TL 2.4 mm (MNRJ 29863), Stn CR.AS. – C4B, 7 Sep. 2017, Santana Archipelago, Macaé, Rio de Janeiro, Brazil.

Allotype: Brazil • 1 ♂, TL 1.8 mm (MNRJ 29864), Stn CR.AS. – C4B, 7 Sep. 2017, Santana Archipelago, Macaé, Rio de Janeiro, Brazil.

Paratypes: Brazil • 1 ♀ ovigerous and 1 ♂, dissected, TL 2.0 mm (MNRJ 29857) and 1.9 mm (MNRJ 29858) respectively, Stn CR.AS. – C5B, 7 Sep. 2017, Santana Archipelago, Macaé, Rio de Janeiro; Brazil • 5 ♀ non-ovigerous (MNRJ 29859), same station; Brazil • 1 ♀ ovigerous (MNRJ 29860), Stn CR.AS. – C1B, 25 Jun. 2017, Santana Archipelago, Macaé, Rio de Janeiro; Brazil • 1 ♀ non-ovigerous (MNRJ 29856), Stn CR.AS. – C2B, 7 Sep. 2017, Santana Archipelago, Macaé, Rio de Janeiro; Brazil • 3 ♀ ovigerous, 3 ♀ non-ovigerous and 2 ♂ (MNRJ 29865), Stn CR.AS. – C4B, 7 Sep. 2017, Santana Archipelago, Macaé, Rio de Janeiro; Brazil • 3 ♀ ovigerous (MNRJ 29862), Stn CR.AS. – C2C, 7 Sep. 2017, Santana Archipelago, Macaé, Rio de Janeiro; Brazil • 1 ♀ non-ovigerous (MNRJ 29861), Stn CR.AS. – C5C, 7 Sep. 2017, Santana Archipelago, Macaé, Rio de Janeiro; Brazil • 6 ♀ non-ovigerous and 2 ♂ (MNRJ 29854), Stn CR.AS. – F3B, 25 Jun. 2017, Cavaleiros, Macaé, Rio de Janeiro; Brazil • 2 ♀ non-ovigerous (MNRJ 29855), Stn CR.AS. – F3C, 25 Jun. 2017, Santana Archipelago, Macaé, Rio de Janeiro.

Diagnosis. Female. Rostrum with rounded tubercles at base and bifurcate tip. Pleonites 2 and 5 with pleura having long distal seta. Antennule article-1 inner margin with one blunt apophysis, outer flagellum with three segments. Mandible palp article-2 and article-3 with six and nine finely penicillate setae on inner margin respectively. Maxilliped palp article-1 outer margin with seta. Pereopod-1 basis with dorso-proximal margin lacking blunt, spiniform process; carpus and propodus with two and four ventral spines, respectively. Pereopods 1–2 basis with several setae along ventral margin. Pleopods biramous, exopod and endopod each with one long penicillate seta. Uropod exopod shorter than endopod segments 1–2 combined, endopod with four segments.

Male. Cheliped propodus just wider than long, ventral margin with only three simple setae (without proximal apophysis).

Description. Based on ovigerous ♀ holotype (MNRJ 29863) and paratype (MNRJ 29857).

Body (Figs 1A, 2A). Length 2.4 mm, about 4.8 times L:W.

Cephalothorax (Fig. 2A) about 24% of TBL, shorter than pereonites 1–3 lengths combined, about 1.2 times L:W; rostrum convex with broad base, with rounded tubercles at base and median short bifurcate tip (Fig. 2B); eyelobes well defined, visual elements present. Carapace with simple seta near each ocular lobe (Fig. 2B).

Pereon (Fig. 2A) about 60% of TBL, all pereonites wider than long, all with two simple setae on sub-distal dorsal margin and one seta on each anterolateral margins; pereonite-1 wider than others, rectangular with few minute setae on posterolateral margins; pereonites 2–5 longer than pereonite-1; pereonite-6 shortest; pereonites 4–6 with weak anterolateral processes bearing setae.



Figure 1. Digital image of *Apseudomorpha brasiliensis* sp. nov. Paratype female and allotype male (MNRJ 29865 and MNRJ 29864). Female, TL 2.4 mm; Male, TL 1.8 mm. Scale bar: 1.0 mm.

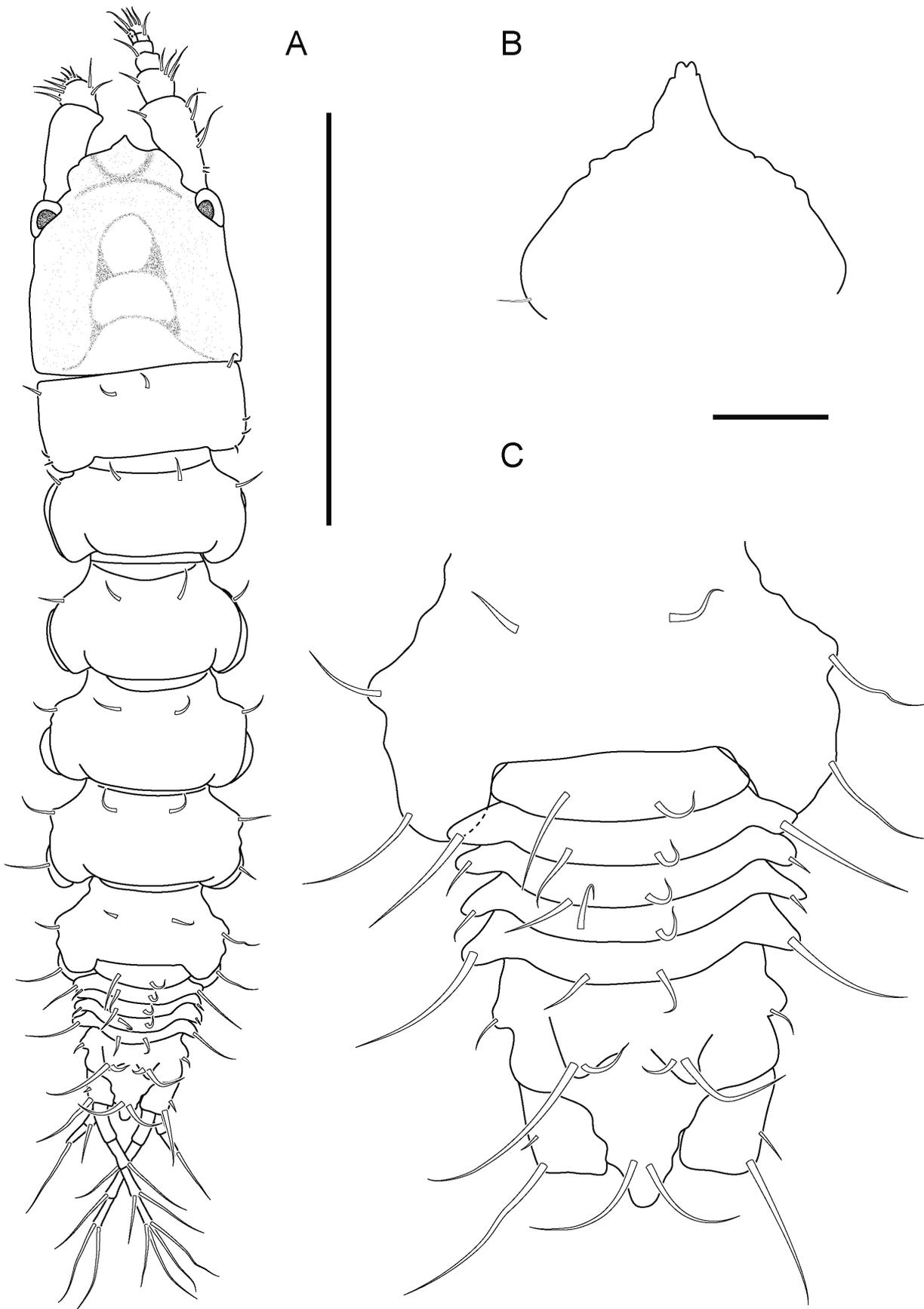


Figure 2. *Apseudomorpha brasiliensis* sp. nov. Holotype, ovigerous female (MNRJ 29863). **A** Dorsal view; **B** enlargement of rostrum; **C** enlargement of pleon and pleotelson. Scale bars: 1.0 mm for **A** and 0.1 mm for **B–C**.

Pleon (Figs 1A, 2A, C) about 16% of TBL, shorter than pereonites 1–2 lengths combined, about 1.2 times L:W; all pleonites sub-equal, wider than long, bearing pleopods; pleonite-1 laterally rounded (Fig. 2C); pleonites 2–5 prominent epimera with round tip (Fig. 2C); pleonites 2 and 5 with long simple seta (Fig. 2C); pleonites 3–4 with small simple seta (Fig. 2C).

Pleotelson (Figs 1A, 2A, C) as long as pereonite-6 (Fig. 2A); dorso-anteriorly with two tubercles, each with two simple setae (Fig. 2A, C); antero-laterally with tubercle with round tip and bearing simple distal seta (Fig. 2C); prominent triangular apex with two sub-distal setae (Fig. 2A, C).

Antennule (Fig. 3A) shorter than cephalothorax. Peduncle with four articles. Article-1 2.2 times L:W; inner margin with two simple sub-distal setae and one blunt apophysis; outer margin with one distal pointed angle, with one simple and three penicillate setae proximally, with one long and one short simple and two penicillate setae medially, and with three simple setae distally. Article-2 as long as wide; with seven simple and one penicillate setae distally. Article-3 just longer than wide; with two simple distal setae. Article-4 as long as wide; with two middle penicillate and one simple and one penicillate distal setae. Outer flagellum with three segments. Segment-1 slightly longer than wide, with middle and two distal simple setae and one aesthetasc. Segment-2 about 1.3 times L:W; distally with three simple setae and one aesthetasc. Segment-3 2.5 times L:W, distally with five simple setae, one penicillate, and one aesthetasc. Inner flagellum with one segment, 2.8 times L:W, distally with three simple and two penicillate setae.

Antenna (Fig. 3B) with eight articles. Article-1 inner margin with rounded distal process. Article-2 inner margin with penicillate seta and distal triangular apophysis; outer margin scaly with two penicillate setae; squama present, longer than article-3, with two distal simple setae. Article-3 wider than long; inner sub-distal margin with simple seta and apophysis. Article-4 inner distal margin with two penicillate setae. Article-5 about 1.3 times L:W, longer than article-4, with two simple and six penicillate setae. Article-6 half-length of article-5, with two simple distal setae. Article-7 longer than article-6, inner distal margin with two simple setae; outer distal margin with simple seta. Article-8 shortest, with three simple and two penicillate distal setae.

Mouthparts: Labrum not recovered. Mandibles (Fig. 3C–D). Right mandible incisor with four denticles (Fig. 3C); *lacinia mobilis* with several denticles on dorsal margin (Fig. 3C). Left mandible incisor with two denticles (Fig. 3D); *lacinia mobilis* broad with three denticles (Fig. 3D); setiferous lobe with four multi-furcate setae (Fig. 3D). Molar process of both mandibles damaged during dissection. Palp (Fig. 3D) article-1 shortest, inner margin with distal simple seta; article-2 longest, 1.8 times L:W, mid-inner margin with six setulate setae; article-3 with nine setulate inner setae.

Maxillule (Fig. 3E). Inner endite not recovered. Outer endite with ten (one setulose) distal and two sub-distal spines, margins finely setose; palp biarticulate with three distal setae.

Maxilla (Fig. 4A). Margins finely setose; outer lobe of moveable endite with six setae; inner lobe of moveable endite with six setae; outer lobe of fixed endite with eleven and three plumose setae (Fig. 4A); inner lobe of fixed endite with eleven setae. Labium and epignath not recovered.

Maxilliped (Fig. 4B–C). Coxa short and wide. Basis finely setose with microtrichia, wider than long, with two denticles on outer distal margin. Palp article-1 shortest, distal inner margin with long (passing article-3) simple seta, and distal outer margin expanded distally with simple seta; article-2 longest, inner margin finely setulose proximally, with 14 simple setae, outer distal margin with strong spine; article-3 inner margin with eight simple setae; article-4 with six simple inner setae and two sub-distal outer setae. Endite (Fig. 4B–C) with inner margin with seven basally-swollen setulate setae, four simple setae and four apically long simple setae; outer margin setulose with small denticles on mid margin.

Cheliped (Fig. 5A). Basis, 1.5 times L:W; ventral margin with distal simple seta. Merus triangular; ventral margin with three simple setae sub-distally. Carpus 2.7 times L:W, just longer than basis, widest distally; ventral margin with one middle and two sub-distal simple setae; dorsal margin with middle and sub-distal simple setae. Propodus 1.9 times L:W; with two simple setae near articulation of dactylus (one long and one small); fixed finger with three ventral simple setae, with five sub-marginal simple setae on outer incisive margin; inner face with sub-distal and mid-ventral simple setae. Dactylus and unguis slightly longer than fixed finger; inner face with simple seta on ventral margin.

Pereopod-1 (Fig. 6A). Coxa with two penicillate and four minute setae. Basis 3.6 times L:W; ventral margin with three penicillate and three simple setae, and one spine, one penicillate and one long seta distally; dorsal margin with seven penicillate setae. Ischium with penicillate and simple ventral seta. Merus 1.7 times L:W, widest distally; ventral margin with two simple setae and one sub-distal serrulate spine; outer margin with two middle setulate setae; distodorsal margin with simple seta and serrulate spine. Carpus as long as wide, widest distally, ventral margin with two simple setae and two serrulate spines; outer margin with middle setulate setae; distodorsal margin with penicillate, two simple setae and serrulate spine. Propodus 2.5 times L:W, ventral margin with four serrulate spines and simple seta; outer margin with middle setulate setae; dorsal margin with two penicillate, simple seta and two (one sub-distal and one distal) serrulate spines, and one sub-distal simple seta; inner face with long penicillate and two pectinate setae distally. Dactylus together with unguis shorter than propodus, dactylus longer than unguis; dactylus with two minute ventral setae and small sub-distal denticle. Unguis curved.

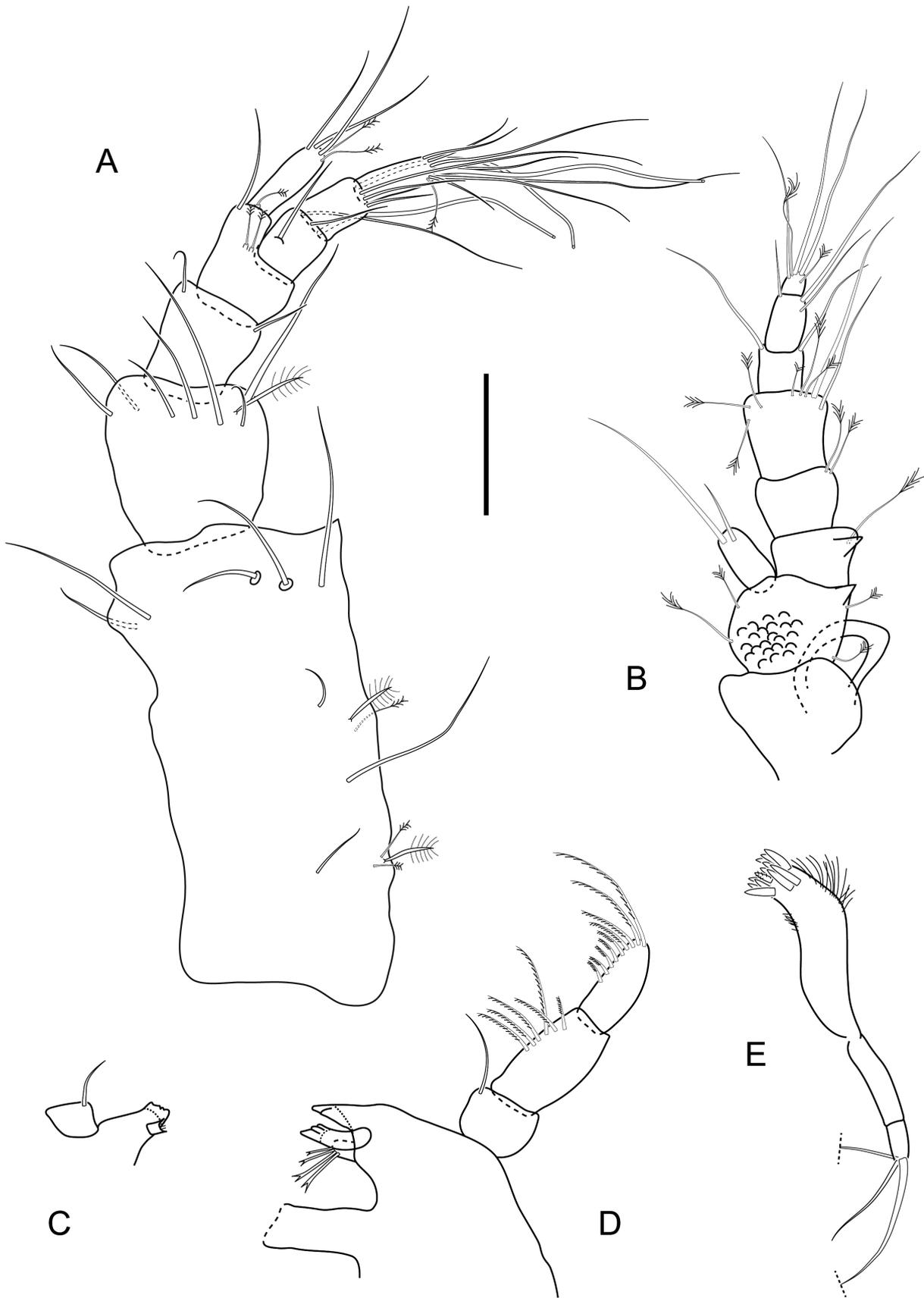


Figure 3. *Apseudomorpha brasiliensis* sp. nov. Paratype, ovigerous female dissected (MNRJ 29857). **A** Antennule; **B** antenna; **C** right mandible; **D** left mandible; **E** maxillule. Scale bars: 0.1 mm.

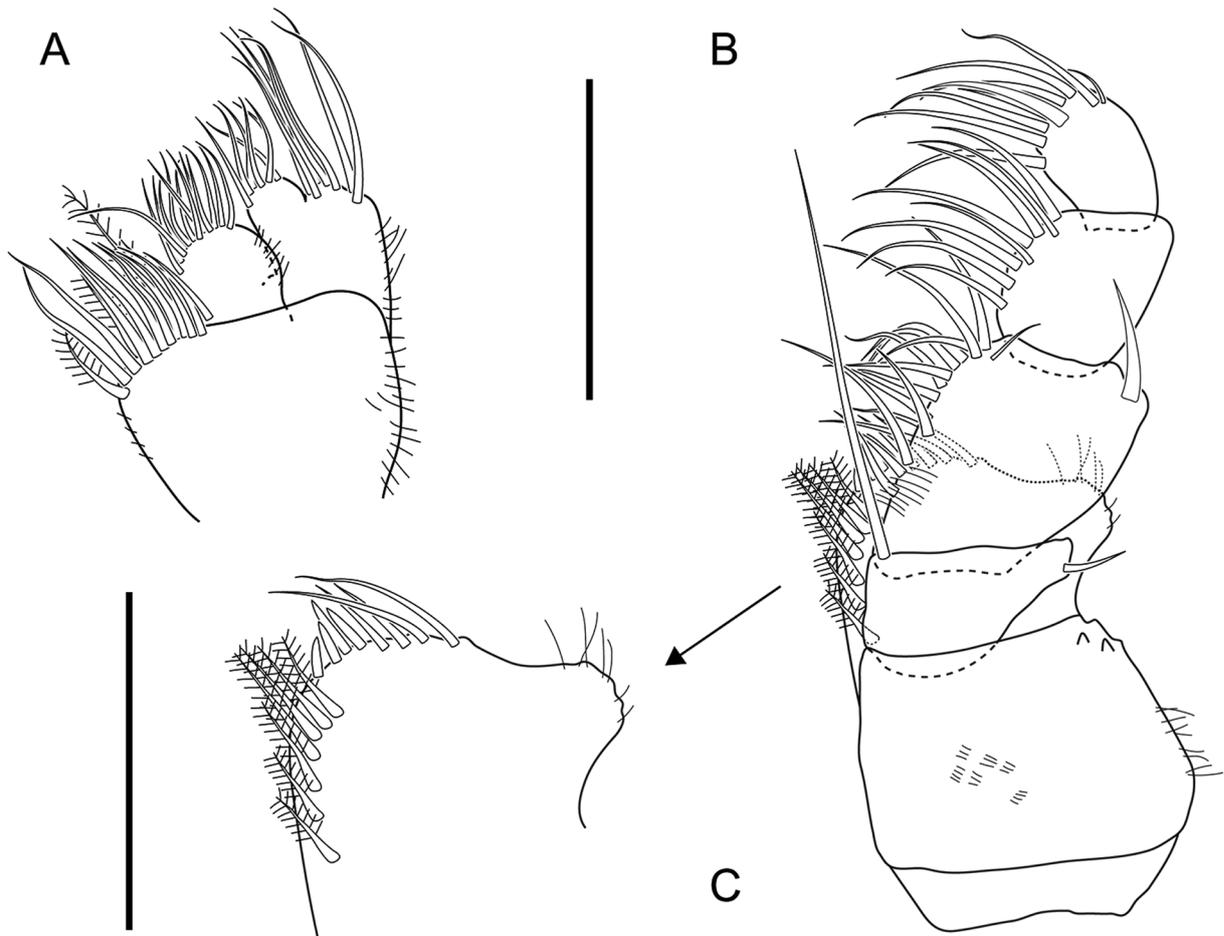


Figure 4. *Apseudomorpha brasiliensis* sp. nov. Paratype, ovigerous female dissected (MNRJ 29857). **A** Maxilla; **B** maxilliped; **C** endite of maxilliped. Scale bar: 0.1 mm.

Pereopod-2 (Fig. 6B) shorter and more gracile than pereopod-1. Coxa with two simple setae. Basis 3.8 times L:W; ventral margin with four simple setae and one long seta distally; dorsal margin with four simple setae. Ischium wider than long, with simple ventral seta. Merus 1.7 times L:W, widest distally; ventral margin with two simple setae and two sub-distal serrulate spines; outer margin with middle simple seta; distodorsal margin with simple seta. Carpus about as long as wide; ventral margin with four serrulate spines; distodorsal margin with four simple setae and two serrulate spines. Propodus 2.6 times L:W; ventral margin with four serrulate spines and two simple setae; dorsal margin with penicillate and two (one sub-distal and one distal) serrulate spines, and one sub-distal simple seta (longer than dactylus); inner face with two pectinate setae distally. Dactylus together with unguis shorter than propodus, dactylus longer than unguis; dactylus with two (one in the middle and one sub-distal) ventral setae and small sub-distal denticle. Unguis curved.

Pereopod-3 (Fig. 6C) similar to pereopod-2 but shorter. Coxa seta broken (as in pereopod-4). Basis ventral margin with two penicillate and one simple setae, and one stout seta distally; dorsal margin with penicillate and

two simple setae. Ischium with two ventral setae. Merus shorter. Carpus with only two distodorsal setae.

Pereopod-4 (Fig. 6D). Coxa with simple seta. Basis three times L:W; ventral margin with two simple and one distal setae; dorsal margin with two penicillate and three simple setae. Ischium wider than long, with two ventral setae. Merus 1.5 times L:W; widest distally; ventral margin with sub-distal simple seta and spine; outer margin with middle setulate seta; distodorsal margin with simple seta. Carpus 1.6 times L:W; ventral margin with two simple setae and four spines; distodorsal margin with five simple setae. Propodus 2.3 times L:W; ventral margin with two spines; outer margin with middle setulate seta; dorsal margin with penicillate seta, and sub-distal spine and simple seta; inner face with row of five sub-distal pectinate plus one long simple setae distally. Dactylus together with unguis shorter than propodus, dactylus longer than unguis; dactylus with two (one in the middle and one sub-distal) ventral setae and small sub-distal denticle. Unguis curved.

Pereopod-5 (Fig. 6E) similar to pereopod-4.

Pereopod-6 (Fig. 6F) similar to pereopod-5 but slightly smaller. Basis dorsal margin with two penicillate and two simple setae. Ischium with ventral setae. Merus

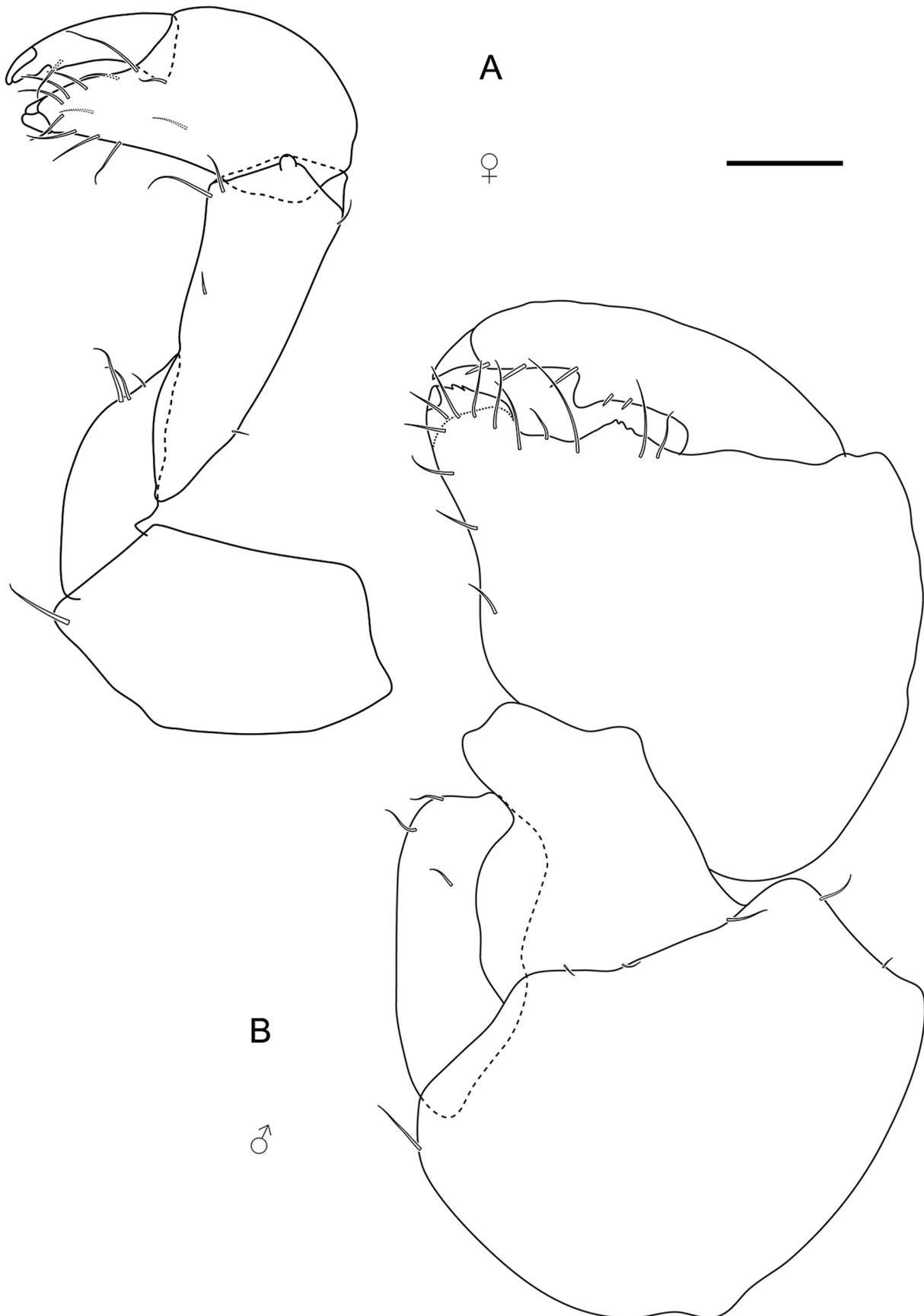


Figure 5. *Apseudomorpha brasiliensis* sp. nov. Paratype, ovigerous female (MNRJ 29857) and male (MNRJ 29858) dissected. **A** Cheliped female; **B** cheliped male. Scale bar: 0.1 mm.

ventral margin with sub-distal simple seta; outer margin with middle setulate seta; distodorsal margin with simple seta. Propodus ventral margin with two spines and simple seta; outer margin with middle setulate seta; dorsal margin with penicillate seta, and sub-distal spine and two simple setae; distally with row of five pectinate and two simple setae.

Pleopods (Fig. 7A). Five similar, biramous pairs. Basal article 5.8 times L:W, 2.4 times longer than both rami, naked. Exopod slightly longer than endopod, both uniaarticulate and with long plumose seta distally.

Uropod (Fig. 7B) biramous. Basal article 1.8 times L:W; inner margin with long distal simple seta; outer margin with one mid and two distal simple setae (one long and one small). Exopod of two segments, shorter than endopod segments 1–2 combined. Segment-1 with two simple distal setae. Segment-2 with two simple distal setae. Endopod shorter than pleon and pleotelson combined, with four segments. Segment-1 with two penicillate and one simple distal setae. Segments 2–4 about same length. Segment-2 with two penicillate and three simple setae on distal margin. Segment-3 with two penicillate and two simple distal setae. Terminal segment with one penicillate and four simple setae distally.

Adult male. Length 1.8 mm. Similar to females except in the size of the chelipeds (allotype and paratype: MNRJ 29864, MNRJ 29858, respectively).

Cheliped (Fig. 5B) robust. Basis longer than wide, with one distoventral and two proximal simple setae. Merus with middle and two distoventral simple setae. Carpus broad and short; distoventral margin with a prolongation and three proximal setae. Propodus just wider than long; ventral margin with three simple setae; fixed finger short, with ten sub-marginal simple setae on outer incisive margin; dorsal margin with two denticles and grasping edge, claw short. Dactylus curved, ventral margin with mid-blunt apophysis and grasping edge with row of five thin spines.

Etymology. The name is dedicated to Brazil, the country where the species were collected.

Type locality. Eulittoral zone of rocky shores at Santana Archipelago, Macaé, Rio de Janeiro, Brazil.

Distribution. This species was found exclusively at eulittoral zone on rocky shores (macroalgae bank) of Santana Archipelago, Macaé, Rio de Janeiro, Brazil, Southwestern Atlantic (Fig. 13).

Ecology. In total, 33 specimens of *Apseudomorpha brasiliensis* sp. nov. were found in eight of 60 quadrats (13.3%) collected at Santana Archipelago. This species was most abundant in the intermediate stratum (82%), however it was also found in the lower stratum (18%), being absent in the upper stratum. The substrate of the quadrats where the species was found was covered predominantly by articulated calcareous algae (Rhodophy-

ta), covering a surface between 50–95% (average of 81% of the area). The intermediate stratum presented mainly Rhodophyta macroalgae, although brown algae Ochrophyta also occurred. The predominant Rhodophyta genera were *Corallina*, *Jania* and *Arthrocardia*, with other taxa such as *Gracilaria*, *Hypnea*, *Pterocladia* and *Plocamium*. The lower stratum showed a greater coverage of brown algae, mainly of the genera *Sargassum*, *Padina* and *Colpomenia*.

Remarks. The new species from Brazil is more similar to those *Apseudomorpha* species characterized by having long setae only on the second and fifth pleonites epimera, namely *A. drummi*, *A. fontainei*, *A. glebosa*, and *A. martinicana* (Morales-Núñez et al. 2019). *Apseudomorpha brasiliensis* sp. nov. differs from *A. fontainei* by having (1) mandibular palp article-1 with one inner simple distal seta (two in *A. fontainei*); (2) pereopods 4–5 carpus distodorsal long seta (longer than half of propodus); (3) biramous pleopods (uniramous in *A. fontainei*); and (4) uropod endopod with four segments (seven in *A. fontainei*).

Apseudomorpha brasiliensis is different from *A. glebosa* by (1) pereopod-1 carpus and propodus ventral margin with two and four spines, respectively (three and five in *A. glebosa*); (2) pereopod-6 with two ventral spines (four in *A. glebosa*); and (3) each pleopod rami with long penicillate seta (only one rami with two setae in *A. glebosa*). The new species is distinguished from *A. martinicana* (1) antennule article-1 inner margin with one blunt apophysis (3–4 apophyses in *A. martinicana*); (2) antennule main flagellum with three segments (four in *A. martinicana*); (3) mandible palp with article-2 with six inner penicillate setae (three in *A. martinicana*); and (4) pereopods 2–3 propodus with four ventral spines (three in *A. martinicana*).

The new species from Brazil closely resembles *A. drummi* by having antennule main flagellum with three segments, pereopod-1 carpus and propodus with two and four ventral spines respectively and pleopods with each rami having one long penicillate seta. The former, however, can be distinguished from *A. drummi* by: (1) antennule article-1 inner margin with one blunt apophysis (three apophyses in *A. drummi*); (2) mandible palp article-2 and article-3 with six and nine finely penicillate setae on inner margin respectively (five and eight in *A. drummi*); (3) pereopods 1–2 basis with several setae along ventral margin, except distally (maximum one in *A. drummi*); (4) uropod exopod shorter than endopod segments 1–2 combined (longer in *A. drummi*); and (5) uropod endopod with four segments (five in *A. drummi*). These comparisons and others are developed in a key to the species of *Apseudomorpha*, shown below.

Apseudomorpha brasiliensis is the first record of the subfamily Metapseudinae from the Southwestern Atlantic. Including the present data, the family Metapseudidae is now represented by four genera in three subfamilies in Brazil: Chondropodinae (*Calozodion* Gardiner, 1973 and *Vestigiramus* Guțu, 2009), Metapseudinae (*Apseudomorpha*) and Synapseudinae (*Synapseudes* Miller, 1940).

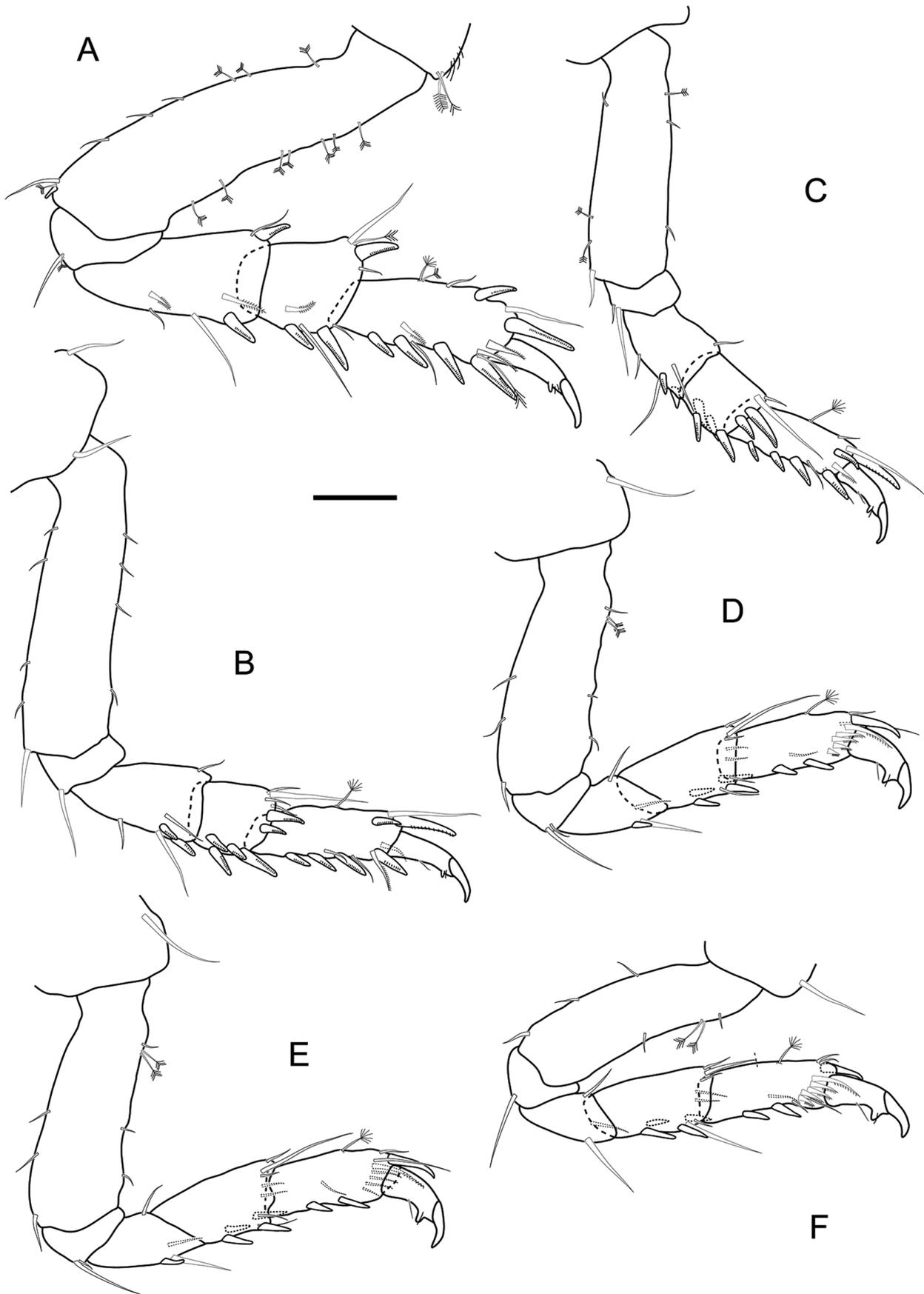


Figure 6. *Apseudomorpha brasiliensis* sp. nov. Paratype, ovigerous female dissected (MNRJ 29857). A–F Pereopods 1–6. Scale bar: 0.1 mm.

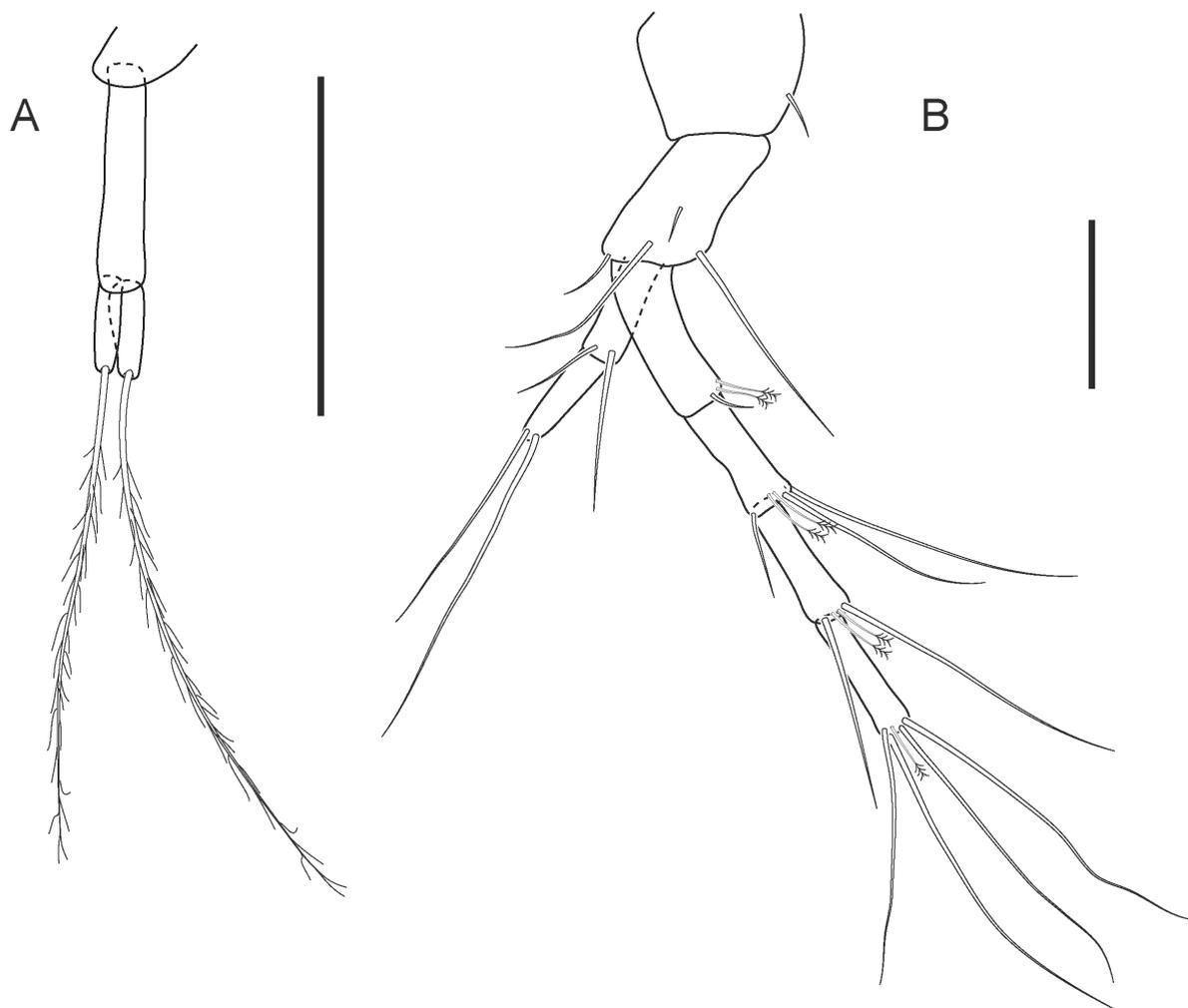


Figure 7. *Apseudomorpha brasiliensis* sp. nov. Paratype, ovigerous female dissected (MNRJ 29857). **A** Pleopod; **B** uropod. Scale bars: 0.1 mm.

Key to the known species (females) of *Apseudomorpha* (modified from Guțu 2009 and Morales-Núñez et al. 2019):

- 1 Pereopod-1 basis dorso-proximal margin with blunt, spiniform process.....*A. negoescuae* [Indian Ocean: Réunion Island]
- Pereopod-1 basis dorso-proximal margin lacking blunt, spiniform process 2
- 2 Pleonites 1–5 without a long seta on dorsolateral margins *A. avicularia* [Southeastern Atlantic Ocean: Cape Town]
- At least the last pleonite with a long seta on dorsolateral margins 3
- 3 Pleopods absent *A. vestafricana* [Eastern Atlantic Ocean: Mauritania]
- Pleopods present (uni- or biramous)..... 4
- 4 Only the last pleonite with a long seta on distolateral margins..... 5
- More than the last pleonite with a long seta on distolateral margins 6
- 5 Antennule first peduncular article with some dentiform processes on the proximal half of inner margin.....
- *A. ortizi* [Caribbean Sea: Cuba]
- Antennule first peduncular article without dentiform processes on the proximal half of inner margin *A. albida* [Northwest Pacific Ocean: Japan]
- 6 Last four pleonites with a long seta on distolateral margins..... 7
- At most the last three pleonites with a long seta on distolateral margins 8
- 7 Pleopods biramous, with biarticulate exopodite *A. magdalenensis* [Northwest Atlantic Ocean: Mexico]
- Pleopods biramous, with uniaarticulate exopodite (in male), or uniramous (in female) *A. veleronis* [Southeast Pacific Ocean and Northeast Atlantic Ocean: Ecuador, Colombia, and Panama]

- 8 Last three pleonites with a long seta on lateral margins *A. oahuensis* [Southern North Pacific Ocean: O'ahu Island]
 – Only two pleonites (second and fifth) with a long seta on distolateral margins 9
- 9 Pleopods uniramous *A. fontainei* [Red Sea: Aqaba Gulf]
 – Pleopods biramous 10
- 10 Pereopod-1 carpus and propodus with three and five ventral spines (= spiniform setae), respectively; one rami of pleopods with two long setae *A. glebosa* [Northeast and Southeast Pacific Ocean: Mexico to Ecuador]
 – Pereopod-1 carpus and propodus with two and four ventral spines (= spiniform setae), respectively; each rami of pleopods with one long setae 11
- 11 Antennule main flagellum with four short, thick segments. Mandible palp article-2 with three penicillate (= setulate) setae on inner margin. Maxilliped palp article-1 outer margin with very small seta. Pereopod-2 ventral margin of propodus with three setae *A. martinicana* [Caribbean Sea: Martinique Island]
 – Antennule main flagellum with three segments. Mandible palp article-2 with more than three penicillate (= setulate) setae on inner margin. Maxilliped palp article-1 outer margin with seta. Pereopods 2–3 propodus with four ventral spines (= spiniform setae) 12
- 12 Mandible palp article-2 and article-3 with five and eight finely penicillate (= setulate) setae on inner margin, respectively. Uropod exopod longer than endopod segments 1–2 combined. Uropod endopod with five segments
 *A. drummi* [South Pacific Ocean: Mo'orea Island (French Polynesia)]
 – Mandible palp article-2 and article-3 with six and nine finely penicillate (= setulate) setae on inner margin, respectively. Uropod exopod shorter than endopod segments 1–2 combined. Uropod endopod with four segments
 *A. brasiliensis* sp. nov. [Southwestern Atlantic Ocean: Brazil]

Suborder Tanaidomorpha Sieg, 1980
Superfamily Paratanaoidea Lang, 1949
Family Pseudozeuxidae Sieg, 1982

Genus *Pseudozeuxo* Sieg, 1982

<http://zoobank.org/EF43BDAA-2D59-4DF1-90B3-8974F636EA39>

Pseudozeuxo Sieg, 1982: 66.

Pseudozeuxo — Sieg 1982: 66, 73, 75. — Sieg 1986: 47, 53. — Larsen and Wilson 2002: 207, 213, 218, Tab. 1 — Larsen 2005: 257 — Błażewicz-Paszkowycz 2007: 9 — Bird and Larsen 2009: 142, 154, Tabs. 1-2, Figs. 1-2 — Bird 2012: 10–11, 5L, 5N — Kakui and Fujita 2018: 5, 10.

Diagnosis. Pleon consisting of five pleonites (all reduced) and pleotelson, provided with only one pair of greatly reduced pleopods. Antennule with subterminal aesthetasc. Antenna article-2 with two setae. Maxilliped endites with gustatory cusps on distal margin. Cheliped carpus with three ventral setae. Pereopods 2–3 propodus with two ventral setae. Uropods exopod one or two-articled; endopod two-articled.

Type species. *Pseudozeuxo belizensis* Sieg, 1982.

Species included. *Pseudozeuxo belizensis* Sieg, 1982; *P. fischeri* sp. nov.

Remarks. The family Pseudozeuxidae is characterized by reduced pleon with pleonites narrower than pereonite-6 in dorsal view and pleonites 1–5 combined shorter than pereonite-6 (Sieg 1982; Bamber and Bird 1997; Kakui and Fujita 2018). There are only three monotypic genera in this family: *Charbeitanais* Bamber & Bird, 1997; *Haimormus* Kakui & Fujita, 2018 and *Pseudozeuxo*. Nevertheless, *Haimormus* is easily

distinguished due to the absence of pleopods while *Charbeitanais* and *Pseudozeuxo* present only pleopod-1 (Sieg 1982; Bamber and Bird 1997; Kakui and Fujita 2018).

Pseudozeuxo differs from *Charbeitanais* by (1) antennule with subterminal aesthetasc; (2) antenna article-2 with two setae; (3) maxilliped endites with gustatory cusps only on distal margin; (4) cheliped carpus with three ventral setae; (5) pereopods 2–3 propodus with two ventral setae and (6) uropod endopod two-articled (Sieg 1982; Bamber and Bird 1997).

***Pseudozeuxo fischeri* sp. nov.**

<http://zoobank.org/869C9E34-5C6F-41CE-8110-FB8CCAAB2712>

Figures 8–12

Material examined. Holotype: Brazil • 1 ♀ non-ovigerous, TL 1.3 mm (MNRJ 29867), Stn CR.AN. – C1C, 25 May 2017, Areias Negras, Rio das Ostras, Rio de Janeiro.

Allotype: Brazil • 1 ♂, TL 1.0 mm (MNRJ 29868), Stn CR.AN. – C1C, 25 May 2017, Areias Negras, Rio das Ostras, Rio de Janeiro.

Paratypes: Brazil • 1 ♀ ovigerous (only oostegites remained), dissected TL 1.2 mm (MNRJ 29869), Stn CR.AN. – C1C, 25 May 2017, Areias Negras, Rio das Ostras, Rio de Janeiro; Brazil • 2 ♀ non-ovigerous and 1 ♂ (MNRJ 29870), same station; Brazil • 1 ♀ non-ovigerous (MNRJ 29871), Stn CR.AN. – C1C, 8 Aug. 2017, Areias Negras, Rio das Ostras, Rio de Janeiro.

Diagnosis. Female. Pereopods 1–3 coxa with long seta about half as long as basis. Pereopods 2–3 carpus with one ventrodorsal seta. Pereopods 4–6 propodus with two spines and one seta ventrally. Uropod endopod article-2 0.8 times as long as article-1; exopod one-articled.

Description. Based on non-ovigerous ♀ holotype (MNRJ 29867) and ovigerous (only oostegites remained) paratype (MNRJ 29869).

Body (Figs 8A, 9A). Length 1.2 mm, 6.7 times L:W, not heavily calcified.

Cephalothorax (Figs 8A, 9A) about 0.2 times of TBL, 2.2 times L:W, narrowing distinctly anteriorly, with two pairs of lateral simple setae (one close to eyes); rostrum triangular; eyes present.

Pereonites 1–6 with length ratio of 0.6:0.8:0.9:1.0:1.0:0.6; pereonites 1, 2, 3 and 6 wider than long, pereonites 3–5 as long as wide; all pereonites with pair of long dorsodistal and short lateral simple setae; pereonite-1 with another pair of minute dorsodistal setae and pereonites 4–6 with pair of long mid-lateral setae.

Pleon (Figs 8A, 9A–B) about 0.08 times of TBL. Pleonites narrower than pereonite-6; all wider than long, similar in shape, but the width gradually narrower from

pleonites 1–5; pleonites 1 and 5 with pair of lateral simple setae and pleonite-5 also with two pairs of dorsolateral simple setae.

Pleotelson (Figs 8A, 9A–B) about 0.8 times L:W, pentagonal in dorsal view, with pair of lateral simple setae, pair of subdistal and distal penicillate and simple setae.

Antennule (Figs 9A, 10A) shorter than cephalothorax; three-articled. Article-1 3.3 times L:W, outer margin with middle and distal simple and seven penicillate setae; inner margin with two simple setae. Article-2 0.9 times L:W, with penicillate and two simple distal setae. Article-3 2.1 times L:W, with middle and six distal simple setae and subterminal aesthetasc.

Antenna (Fig. 10B) shorter than antennule; six-articled. Article-1 naked. Article-2 longer than article-3, with two dorsodistal simple setae. Article-3 with dorsodistal simple seta. Article-4 2.4 times L:W, with middle penicillate seta and two penicillate and two simple distal setae.

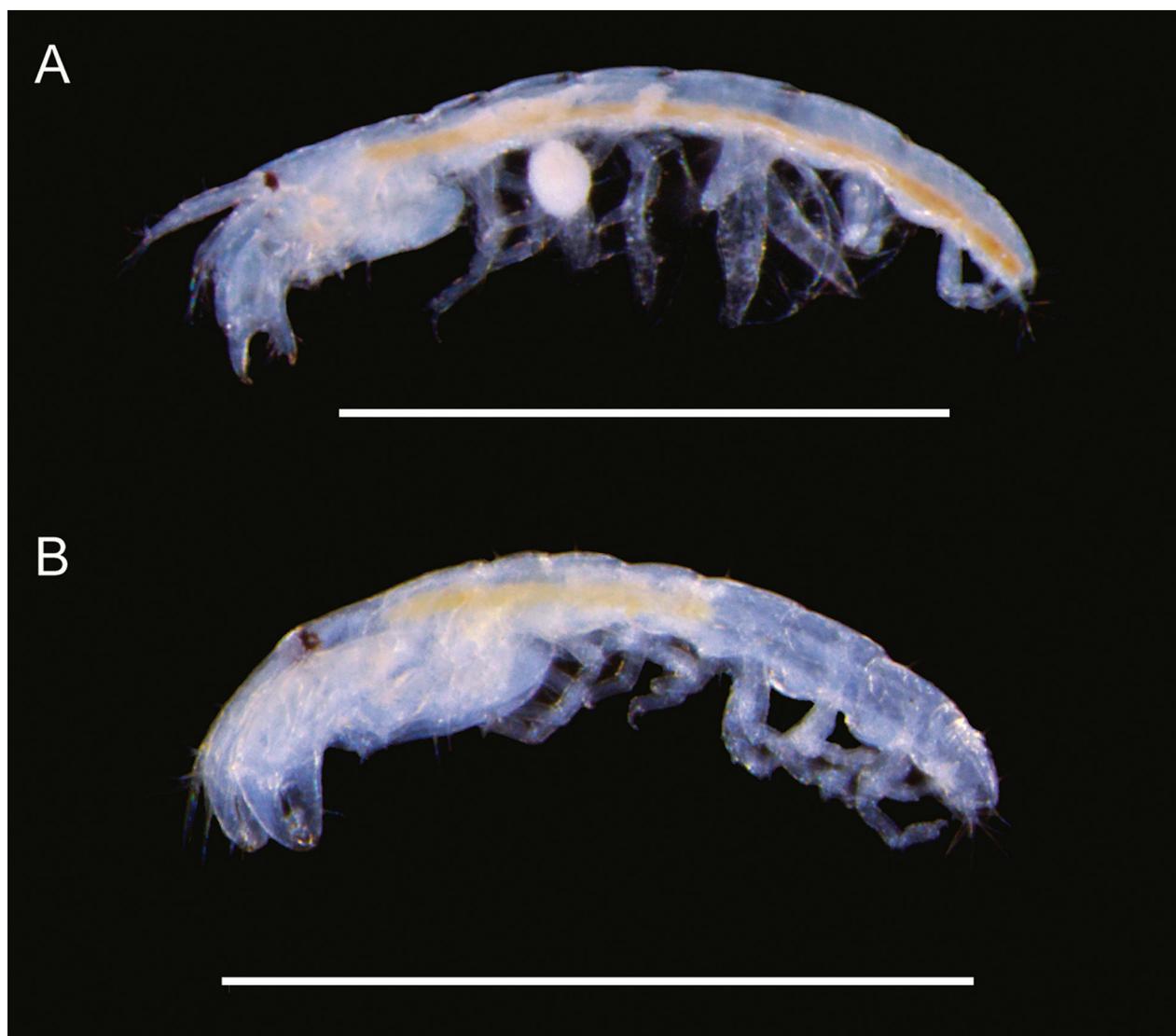


Figure 8. Digital image of *Pseudozeuxo fischeri* sp. nov. paratype female (MNRJ 29869) and allotype male lateral (MNRJ 29868). Female, TL 1.2 mm; Male, TL 1.0 mm. Scale bar: 1.0 mm.

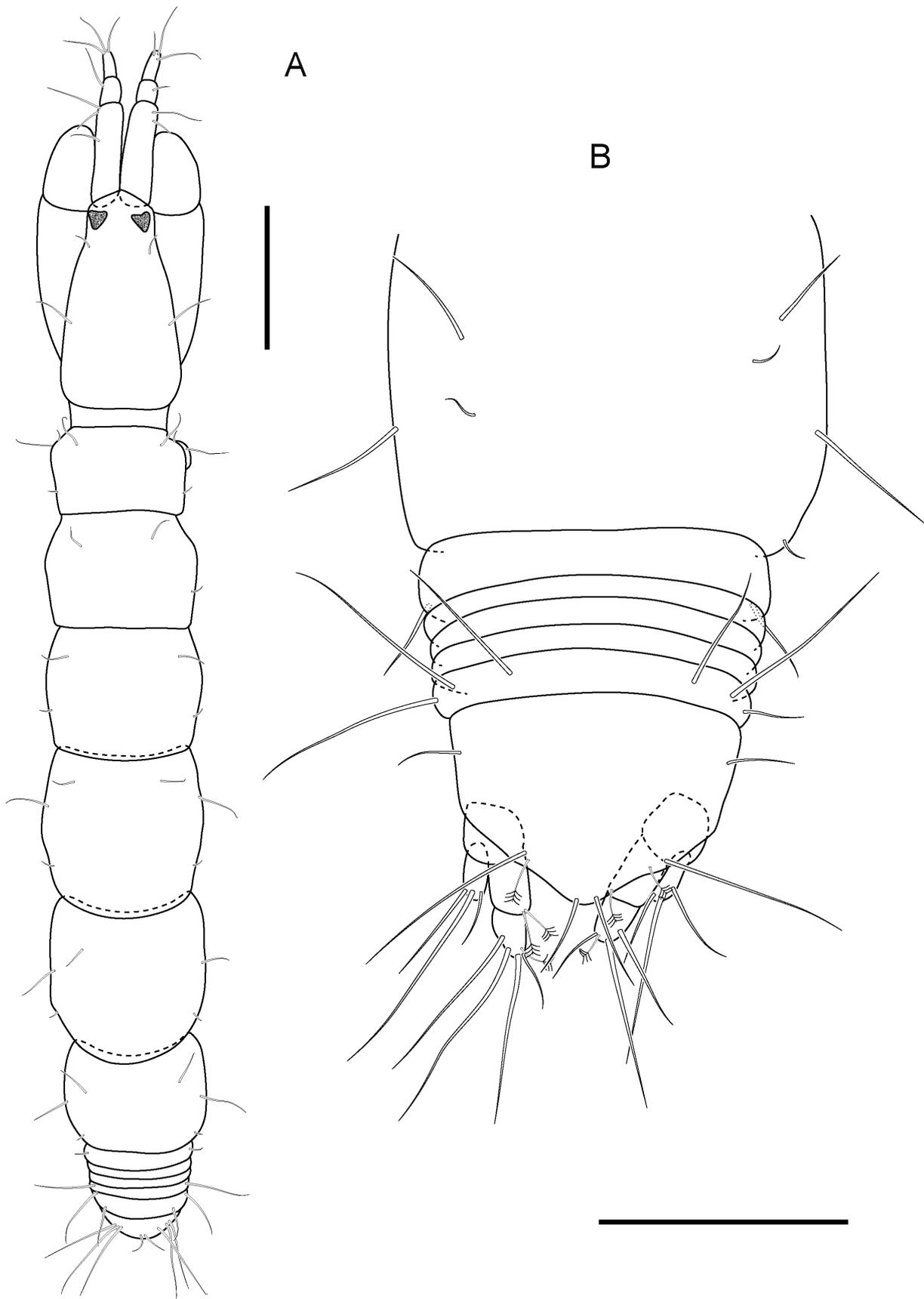


Figure 9. *Pseudozeuxo fischeri* sp. nov. Paratype, female dissected (MNRJ 29869). **A** Dorsal view; **B** enlargement of pleon and pleotelson. Scale bars: 0.1 mm.

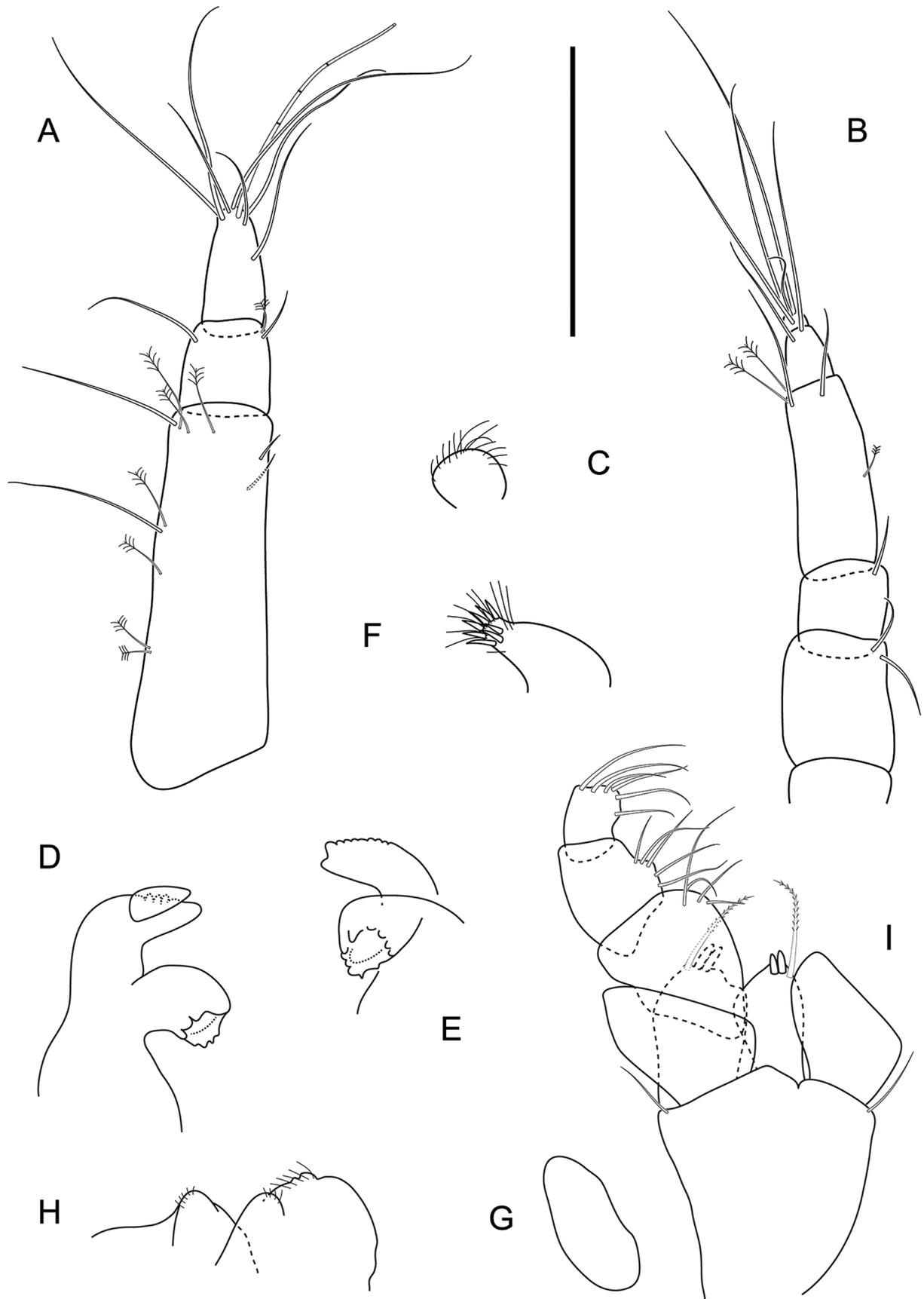


Figure 10. *Pseudozeuxo fischeri* sp. nov. Paratype, female dissected (MNRJ 29869). **A** Antennule; **B** antenna; **C** labrum; **D** left mandible; **E** right mandible; **F** maxillule; **G** maxilla; **H** labium; **I** maxilliped. Scale bar: 0.1 mm.

Article-5 with two distal simple setae. Article-6 with four distal simple setae.

Mouthparts: Labrum (Fig. 10C) rounded, finely setose. Mandibles (Fig. 10D–E) with molar broad, well developed. Incisor of left mandible (Fig. 10D) with several teeth; *lacinia mobilis* smooth. Incisor of right mandible (Fig. 10E) bifurcate distally, with dorsal crenulation. Maxillule (Fig. 10F) with endite bearing eight distal spines and fine long setules; palp broken during dissection. Maxilla (Fig. 10G) oval, naked. Labium (Fig. 10H) bilobed; inner and outer lobes setulate.

Maxilliped (Fig. 10I). Bases fused proximally, each bearing simple seta at insertion of palp. Endites not fused, reaching distal margin of palp article-1, each with long pinnate outer seta and two big gustatory cusps in ventrodiscal region. Palp article-1 naked; article-2 with four simple inner setae; article-3 with five simple inner setae; article-4 with six distal simple setae. Epignath not recovered.

Cheliped (Fig. 11A) attached *via* small sclerite. Basis short, slightly longer than wide. Merus with ventral simple setae. Carpus stout, 1.3 times L:W, with three simple ventral setae and mid-dorsal and dorsodistal simple setae. Propodus about as long as carpus, 1.7 times L:W, with one outer and three inner simple setae near dactylus insertion; fixed finger with two ventral setae, cutting edge with three setae and pointed claw; dactylus with three ventral setae and dorsal seta.

Pereopod-1 (Fig. 11B). Coxa with long seta (shorter than half of basis) and with oostegite. Basis narrow, about 3.9 times L:W, with mid-dorsal simple seta. Ischium with ventral simple seta. Merus with ventrodiscal simple seta. Carpus with ventrodiscal and dorsodistal simple setae. Propodus with one mid-ventral and three dorsodistal simple setae (two reaching dactylus distal margin). Dactylus naked. Unguis about 1.5 times as long as dactylus.

Pereopod-2 (Fig. 11C). Coxa with long seta (longer than half of basis) and with developed oostegite. Basis 2.8 times L:W, with mid-dorsal penicillate seta. Ischium with ventral simple seta. Merus slightly longer than wide, with ventrodiscal simple seta. Carpus slightly longer than wide, with ventrodiscal, distal and dorsodistal simple setae. Propodus with two ventrodiscal and dorsodistal simple setae, and microtrichia. Dactylus naked. Unguis with tip broken.

Pereopod-3 (Fig. 11D) similar to pereopod-2. Merus as long as wide. Carpus 1.2 times L:W, with ventrodiscal and dorsodistal simple setae. Unguis bent by the cover slip.

Pereopod-4 (Fig. 12A). Coxa with developed oostegite. Basis, 2.7 times L:W, naked. Ischium with two ventral simple setae. Merus with two ventrodiscal spines. Carpus with three distal spines and dorsodistal simple seta. Propodus with ventrodiscal spine and simple seta, three dorsodistal strong setae (two broken, one remained), and microtrichia. Dactylus almost completely fused with unguis (claw-like), about twice as long as unguis.

Pereopod-5 (Fig. 12B) similar to pereopod-4, except basis three times L:W, with two mid-dorsal and one mid-ventral penicillate setae. Propodus with two ventrodiscal spines, mid-dorsal penicillate and three dorsodistal strong setae.

Pereopod-6 (Fig. 12C) Ventral view. Basis slender, 3.7 times L:W. Ischium with two ventral simple setae. Merus with two ventrodiscal spines. Carpus with three distal spines and dorsodistal simple seta. Propodus with two mid-ventral spines and ventrodiscal simple seta and three dorsodistal strong setae. Dactylus almost completely fused with unguis (claw-like), about 1.5 times as long as unguis.

Pleopods (Fig. 12D). Only the first pair of pleopods remaining but reduced; coxa naked; basis 1.7 times L:W, with a long inner seta; endopod completely absent; exopod short, with two strong distal setae.

Uropod (Fig. 12E). Basal article naked. Endopod two-articled; article-1 with two penicillate distal setae; article-2 with simple subdistal and three simple and one penicillate setae distally. Exopod one-articled, stout, 1.6 times L:W, 0.4 times as long as endopod, with three terminal simple setae.

Etymology. Named in honor of Dr. Luciano Fischer (NUPEM/UFRJ) for his competent coordination of the Project Rocky Shores, together with his enthusiasm and passion for the marine world.

Type locality. Eulittoral zone of rocky shores at Areias Negras Beach, Rio das Ostras, Rio de Janeiro, Brazil.

Distribution. This species was found within a macroalgae bank of the eulittoral zone of rocky shores at Areias Negras Beach, Rio das Ostras, Rio de Janeiro, Brazil, Southwestern Atlantic (Fig. 13).

Ecology. A total of seven specimens were found in only two of 56 *quadrats* (3.6%) collected at the Areias Negras Beach. The species occurred solely in the lower stratum. In the *quadrats* where the species was found, the substrate was mainly covered by the brown algae *Sargassum* (70% of the surface) and articulated calcareous algae Rhodophyta (20–25% of the surface).

Remarks. The genus *Pseudozeuxo* is currently monotypic and includes *P. belizensis* (WoRMS, 2020b). *Pseudozeuxo fischeri* sp. nov. presents all the diagnostic characters of the genus. It is distinguished from *P. belizensis* by (1) pereopods 1–3 coxa with long seta about as half as long as basis; (2) pereopods 2–3 carpus with only seta ventrodistally (*P. belizensis* has seta and spine); (3) pereopods 4–6 propodus with two spines and one seta ventrally; (4) uropod endopod article-2 0.8 times as long as article-1 (*P. belizensis* with article-2 small, about 0.4 times as long as article-1) and exopod one-articled (*P. belizensis* is two-articled).

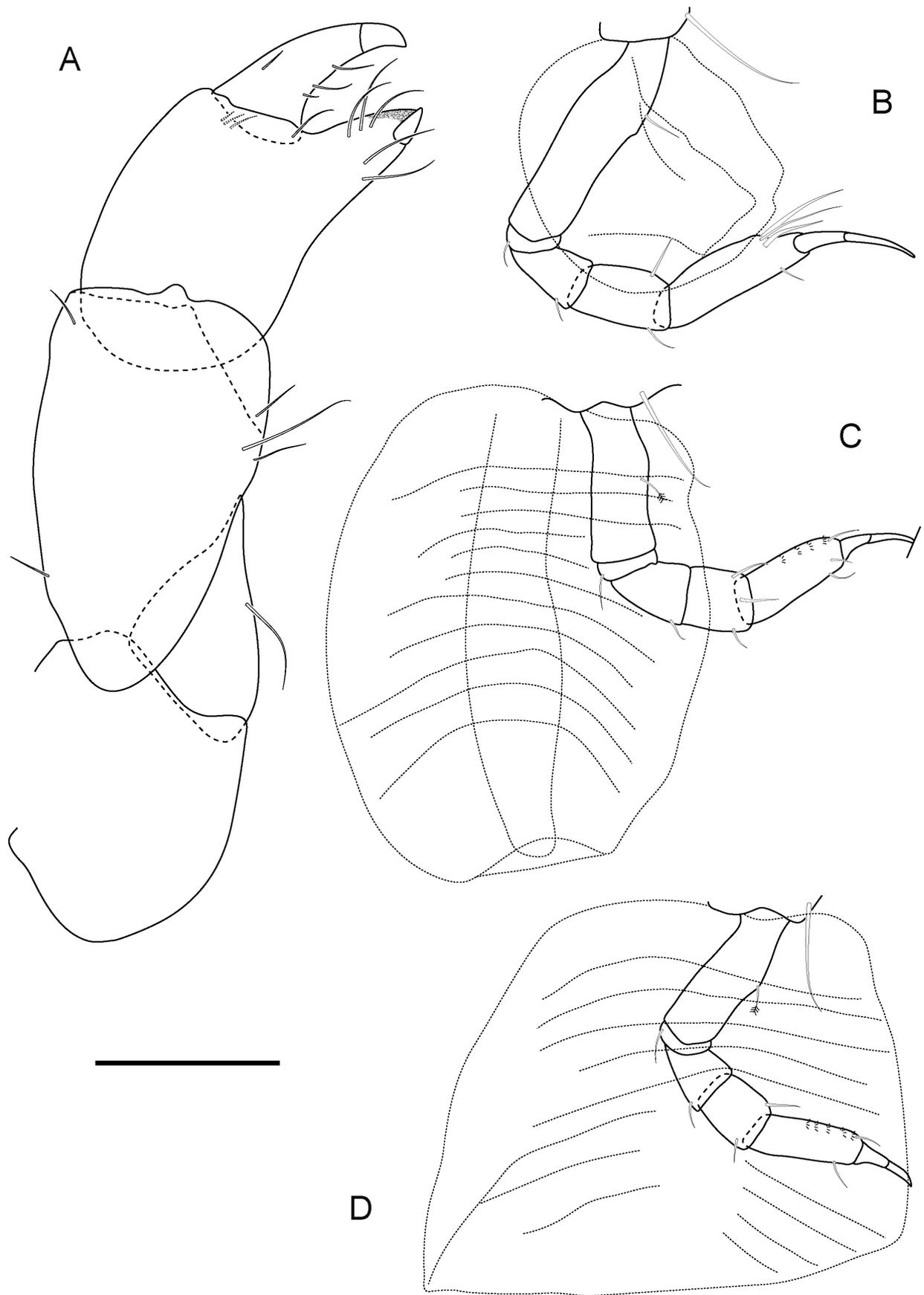


Figure 11. *Pseudozeuxo fischeri* sp. nov. Paratype, female dissected (MNRJ 29869). A Cheliped; B–D pereopods 1–3 with oostegites. Scale bar: 0.1 mm.

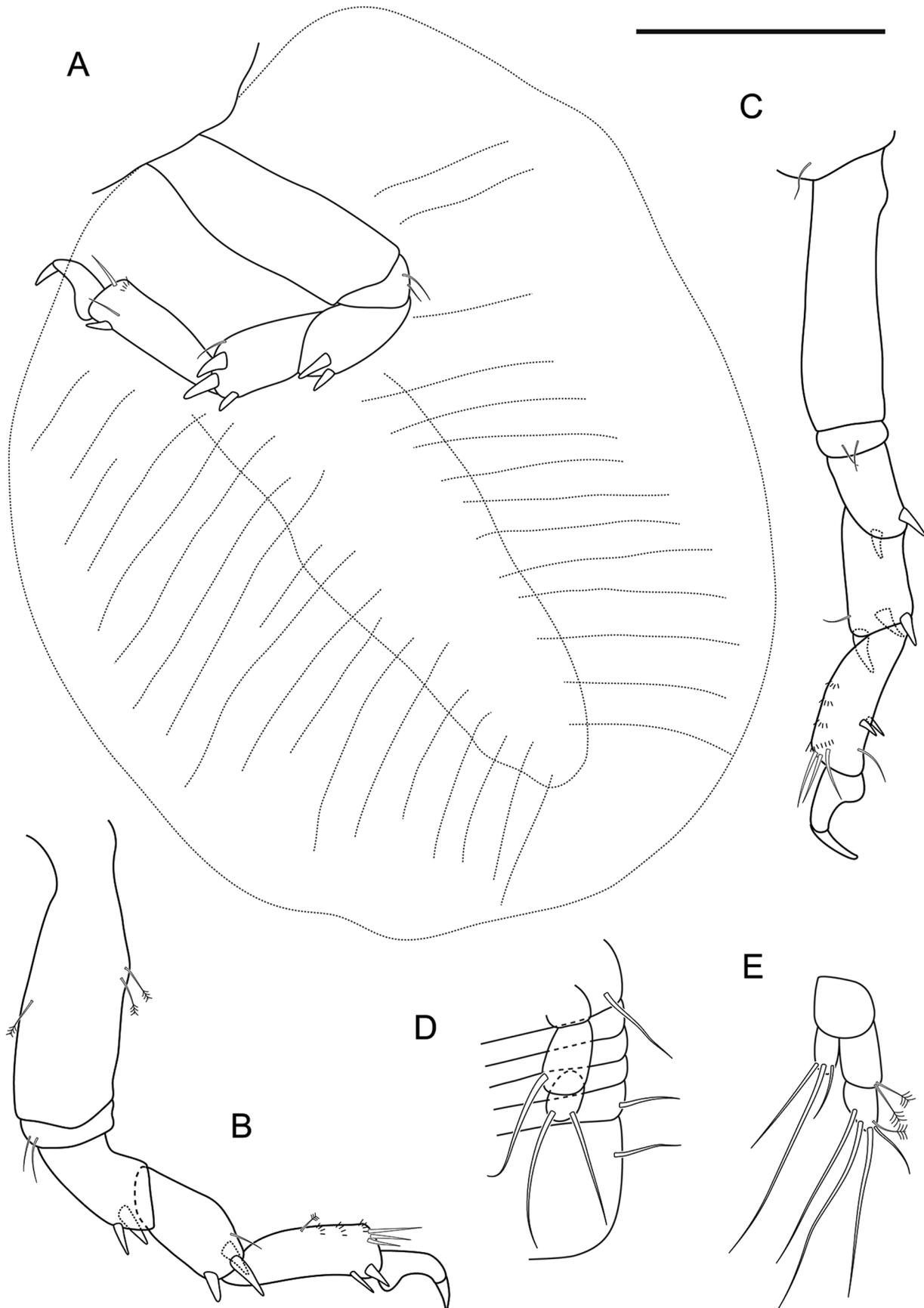


Figure 12. *Pseudozeuxo fischeri* sp. nov. Paratype, female dissected (MNRJ 29869). **A** Pereopod-4 with oostegite; **B–C** pereopods 5–6; **D** pleopod; **E** uropod. Scale bar: 0.1 mm.

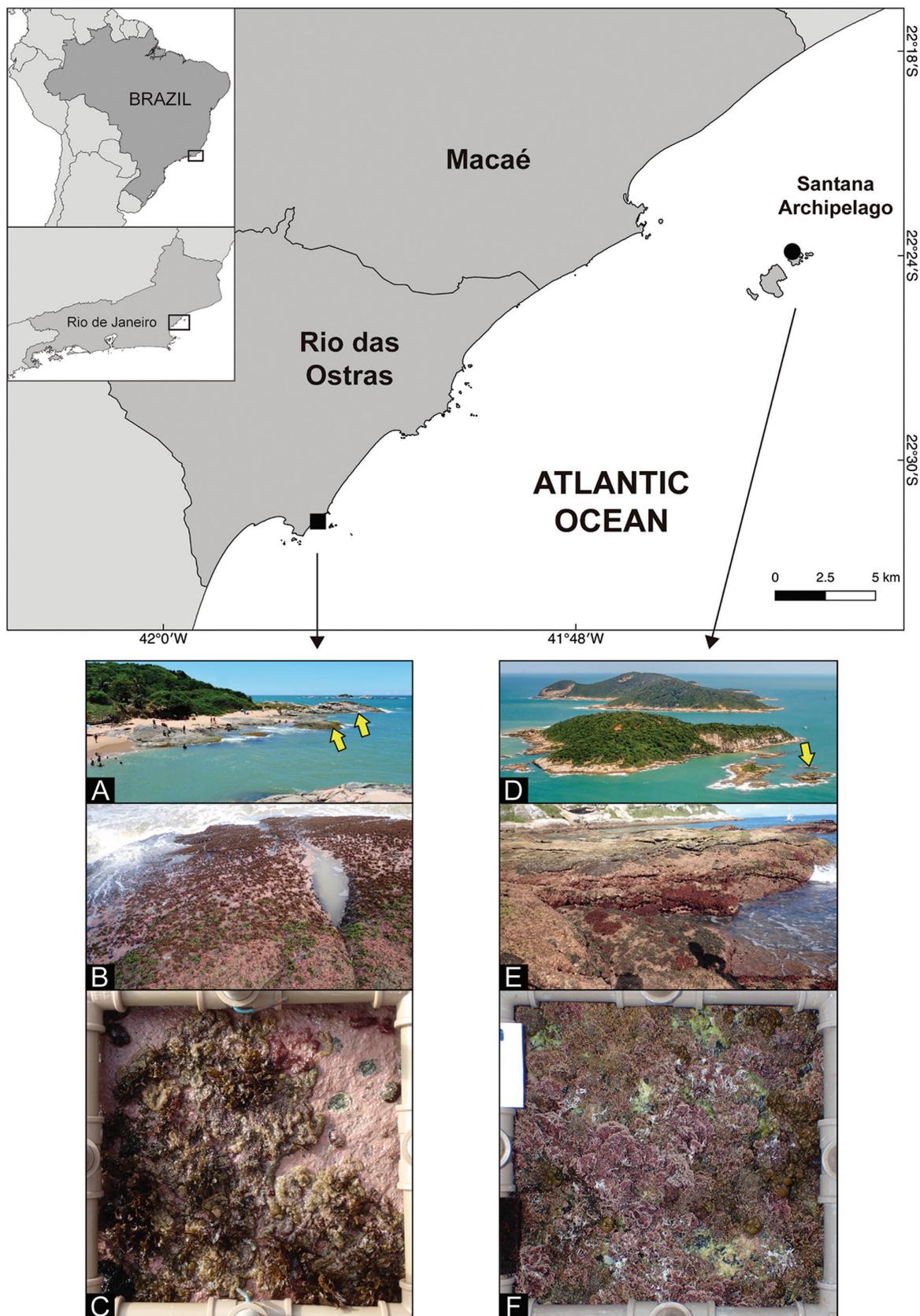


Figure 13. Geographic distribution of *Apseudomorpha brasiliensis* sp. nov. (circle) and *Pseudozeuxo fischeri* sp. nov. (square) on the study area. **A–C** Areias Negras Beach, Rio das Ostras. **A** General view of Areias Negras Beach; **B** view of the rocky shore eulittoral site; **C** view of the *quadrat* sample and seaweed cover; **D–F** Santana Archipelago, Macaé; **D** General view of Santana Archipelago; **E** view of the rocky shore eulittoral site; **F** view of the *quadrat* sample and seaweed cover. Program: QGIS 2.16.3 SRC: EPS4326 WGS84.

Charbeitanais and *Haimormus* are recorded from the Pacific Ocean (Hong Kong and Japan, respectively; Bamber and Bird 1997; Kakui and Fujita 2018) and *Pseudozeuxo* is restricted to the Atlantic Ocean, being now recorded from the Southwestern Atlantic, besides the Caribbean

Sea (Belize; Sieg 1982). *Pseudozeuxo belizensis* is a shallow water species (0.5–3 m depth) occurring at upper stratum of middle intertidal zone on coral reef (Sieg 1982), a generally similar habitat to that of *Pseudozeuxo fischeri*.

Key to species (females) of *Pseudozeuxo*:

- 1 Pereopods 1–3 coxa with short seta (less than half of basis). Pereopods 2–3 carpus with seta and spine ventrodorsally. Pereopods 4–6 propodus with two setae ventrally. Uropod endopod article-2 small, about 0.4 times as long as article-1, and exopod two-articled *P. belizensis* [Caribbean Sea: Belize]
- Pereopods 1–3 coxa with long seta (about half as long as basis). Pereopods 2–3 carpus with only seta ventrodorsally. Pereopods 4–6 propodus with two spines and seta ventrally. Uropod endopod article-2 0.8 times as long as article-1 and exopod one-articled *P. fischeri* sp. nov. [Southwestern Atlantic Ocean: Brazil]

Discussion

The apseudomorphs are predominantly a shallow-water group and the family Metapseudidae occurs mainly in the continental shelf <200 m (Błażewicz-Paszkowycz et al. 2012). Species of Pseudozeuxidae are typical from coastal water (to 18 m) (Sieg 1982; Bamber and Bird 1997; Kakui and Fujita 2018).

Currently, there are regions whose shallow-water tanaidacean faunas are still under-researched. A study of the Tanaidacea from Australia, predominantly in shallow waters, has discovered an extremely high diversity, increasing the number of described species in 14 years from 16 in 1996 to 117 by 2010 (Błażewicz-Paszkowycz et al. 2012). In addition, despite rocky shores being well-known in comparison to the deep sea, there are few specific tanaidacean works from this environment (e.g. Greve 1968; Pires 1980; Masunari 1983; Bamber and Bird 1997; Riggio 2008; Bamber 2012; Esquete et al. 2012). Of these authors, only Pires (1980) studied the Brazilian Peracarida fauna from the intertidal zone, at Ubatuba, São Paulo, which recorded three tanaidacean species: *Chondrochelia savignyi* (Krøyer, 1842), *Teleotainais* sp. and *Zeuxo coralensis*.

Apart from that, six from the 54 species registered in Brazilian coast were recorded in sediments with algae (*Apseudes aisoë* Araújo-Silva, Coelho and Larsen, 2013, *A. noronhensis* Araújo-Silva, Coelho and Larsen, 2013, *Chondrochelia dubia*, *Intermedichelia jesseri* Araújo-Silva & Larsen, 2012, *Makraleptochelia potiguara* Araújo-Silva & Larsen, 2012, *Zeuxo coralensis*), representing three families: Apseudidae Leach, 1814, Leptocheliidae and Tanaididae (Brum 1973; Guçu 1998; Araújo-Silva and Larsen 2012; Araújo-Silva et al. 2013). Nevertheless, as these papers were taxonomic studies, no more information about the algae identification was given making it impossible to compare with the results herein found to the families Metapseudidae and Pseudozeuxidae.

The diversity of the tanaidaceans in certain ocean regions remains to be discovered, especially in Brazil where this group is still understudied (in rocky intertidal sites,

shallow water sediment or deep sea environments). Both new species represent also new records to Southwestern Atlantic for the family Pseudozeuxidae (*Pseudozeuxo fischeri* sp. nov.) and for the subfamily Metapseudidae (*Apseudomorpha brasiliensis* sp. nov.). Thus, it is likely that further studies on the Brazilian coast would lead to the discovery of new species besides other new records.

Great advances have been made in the past twenty years to understand the Brazilian Tanaidacean fauna; however progress will continue to be restricted by the lack of tanaidacean taxonomists and researchers, but mainly by the lack of funding for this enterprise. Nevertheless, it is evident from our current knowledge that the Tanaidacea form a very diverse order of the Peracarida and are of considerable ecological significance in certain regions and habitats (Błażewicz-Paszkowycz et al. 2012), and future investments in this field should be considered.

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References

- Araújo-Silva CL, Coelho PA, Larsen K (2013) Tanaidacea (Peracarida) from Brazil. V. Two new species of Apseudes Leach, 1814 from the northeastern coast of Brazil. *Crustaceana* 86: 221–245. <https://doi.org/10.1163/15685403-00003155>
- Bamber RN (2012) Littoral Tanaidacea (Crustacea: Peracarida) from Macaronesia: Allopatry and provenance in recent habitats. *Journal of the Marine Biological Association of the United Kingdom* 92: 1095–1116. <https://doi.org/10.1017/S0025315412000252>
- Bamber RN, Bird GJ (1997) Peracarid crustaceans from Cape d'Aguilar and Hong Kong, III. Tanaidacea: Tanaidomorpha. In: Morton B (Ed.) *The Marine Flora and Fauna of Hong Kong and Southern China IV*. Hong Kong University Press, Hong Kong, 2–20.
- Bird GJ (2012) A new leptocheiloid family, Heterotanoididae (Crustacea: Peracarida: Tanaidacea), and a new species of Heterotanoides from New Zealand. *Zootaxa* 26: 1–26. <https://doi.org/10.11646/zootaxa.3481.1.1>
- Bird GJ (2019) Tanaidacea (Crustacea: Peracarida) from the Southern French Polynesia Expedition, 2014. I. Tanaidomorpha. *Zootaxa* 4548: 1–75. <https://doi.org/https://doi.org/10.11646/zootaxa.4548.1.1>
- Bird GJ, Larsen K (2009) Tanaidacean Phylogeny – the Second Step: the Basal Paratanaoidean Families (Crustacea: Malacostraca). *Arthropod Systematics & Phylogeny* 67: 137–158.
- Błażewicz-Paszkowycz M (2007) A revision of the family Typhlotanoidae Sieg 1984 (Crustacea: Tanaidacea) with the remarks on the Nototanoidae Sieg, 1976. *Zootaxa* 1598: 1–141. <https://doi.org/10.11646/zootaxa.1598.1.1>
- Błażewicz-Paszkowycz M, Bamber RN, Anderson G (2012) Diversity of Tanaidacea (Crustacea: Peracarida) in the world's oceans – How far have we come? *PLoS ONE* 7: e33068. <https://doi.org/10.1371/journal.pone.0033068>
- Coutinho R, Zalmon IR (2009) O bentos de costões rochosos. In: Pereira RC, Soares-Gomes A (Eds) *Biologia Marinha*. Interciência, Rio de Janeiro, 281–297.
- Edgar GJ, Moore PG (1986) Macro-algae as habitats for motile macrofauna. *Monografias biológicas* 4: 255–277.
- Esquete P, Bamber RN, Aldea C (2012) On some shallow-water Tanaidomorpha (Crustacea: Peracarida: Tanaidacea) of Chilean fjords, with description of a new species of Zeuxoides Sieg, 1980. *Zootaxa* 3257: 38–55. <https://doi.org/10.11646/zootaxa.3257.1.3>
- Greve L (1968) Tanaidacea from Hardangerfjorden, Western Norway. *Sarsia* 36: 77–84. <https://doi.org/10.1080/00364827.1968.10408851>
- Guțu M (1972) Phylogenetic and systematic considerations upon the Monokonophora (Crustacea-Tanaidacea) with the suggestion of a new family and several new subfamilies. *Revue Roumaine de Biologie. Série de Zoologie* 17: 297–305.
- Guțu M (1981) A new contribution to the systematics and phylogeny of the suborder Monokonophora (Crustacea, Tanaidacea). *Travaux du Muséum National d'Histoire Naturelle <Grigore Antipa>* 23: 81–108.
- Guțu M (1987) *Apsedomorpha fontainei* new species of Tanaidacea (Crustacea from the Red Sea). *Travaux du Muséum National d'Histoire Naturelle <Grigore Antipa>* 29: 35–41.
- Guțu M (1991) The description of a new genus and of two new species of Tanaidacea (Crustacea) from Western Indian Ocean. *Travaux du Muséum National d'Histoire Naturelle <Grigore Antipa>* 31: 355–364.
- Guțu M (1996a) Tanaidaceans (Crustacea, Peracarida) from Brazil, with description of new taxa and systematical remarks on some families. *Travaux du Muséum National d'Histoire Naturelle <Grigore Antipa>* 36: 23–13.
- Guțu M (1996b) The synoptic table and key to superspecific taxa of recent *Apsedomorpha* (Crustacea, Tanaidacea). *Travaux du Muséum National d'Histoire Naturelle <Grigore Antipa>* 36: 135–146.
- Guțu M (1998) Malacostraca—Peracarida. Tanaidacea. In: Young PS (Ed.) *Catalogue of Crustacea of Brazil*. Museu Nacional, Rio de Janeiro, 549–557.
- Guțu M (2006) New *Apsedomorph* taxa (Crustacea, Tanaidacea) of the World Ocean. *Curtea Vec, Bucharest*, 318 pp.
- Guțu M (2007) Contribution to the knowledge of the Indo-West-Pacific *Apsedomorpha* (Crustacea: Tanaidacea). *Travaux du Muséum National d'Histoire Naturelle <Grigore Antipa>* 50: 47–86.
- Guțu M (2009) A contribution to the knowledge of Metapseudids. Description of a new genus and three new species from the Caribbean Sea and the Indian Ocean (Crustacea: Tanaidacea: *Apsedomorpha*). *Travaux du Muséum National d'Histoire Naturelle <Grigore Antipa>* 52: 101–125.
- Heard RW (2002) I Contributions to the Study of East Pacific Crustaceans Annotated checklist and bibliography for the order Tanaidacea (Crustacea: Malacostraca: Peracarida) reported from the Pacific coasts of the Americas (Alaska to Chile) and associated off shore island, 369–383.
- Heard RW, Breedy O, Vargas R (2009) Tanaidaceans. In: Wehrmann JC (Ed.) *Marine Biodiversity of Costa Rica, Central America*. 245–256. https://doi.org/10.1007/978-1-4020-8278-8_22
- Heard RW, Hansknecht T, Larsen K (2004) An illustrated identification guide to Florida Tanaidacea (Crustacea: Peracarida) occurring in depths of less than 200 m. State of Florida, Department of Environmental Protection, Tallahassee, 92 pp.
- Heard RW, Stepień A, Drumm DT, Błażewicz M, Anderson G (2018) Systematic and taxonomic observations on the subfamily Synapseudinae Guțu, 1972 and related metapseudid taxa (Crustacea: Tanaidacea: *Apsedomorpha*), with the erection of a new genus and descriptions of three new species. *Zootaxa* 4370: 301–344. <https://doi.org/10.11646/zootaxa.4370.4.1>
- Kakui K, Fujita Y (2018) *Haimormus shimojiensis*, a new genus and species of Pseudozeuxidae (Crustacea: Tanaidacea) from a submarine limestone cave in Northwestern Pacific. *PeerJ* 6:e4720: 1–15. <https://doi.org/10.7717/peerj.4720>
- Lang K (1949) Contribution to the systematics and synonymics of the Tanaidacea. *Arkiv för Zoologie, Series 1* 42: 1–14.
- Lang K (1970) Taxonomische und phylogenetische Untersuchungen über die Tanaidaceen. 5. Die Gattung *Typhlotanais* G.O. Sars, 1882, nebst Beschreibung einer neuen Art dieser Gattung. Dazu eine Berichtigung der Dornenzahl des Enditen der Maxillulae bei *Typhlotanais peculiaris* Lang, 1968. *Arkiv för Zoologie* 2: 267–291.
- Larsen K (2005) Deep-Sea Tanaidacea (Peracarida) from the Gulf of Mexico. Brill, Leiden, Boston, 381 pp.
- Larsen K, Araújo-Silva CL, Coelho PA (2009) Tanaidacea from Brazil. I. The family Tanaellidae Larsen & Wilson, 2002. *Zootaxa* 2141: 1–19. <https://doi.org/10.11646/zootaxa.2141.1.1>
- Larsen K, Wilson GDF (2002) Tanaidacean phylogeny, the first step: The superfamily Paratanaoidea. *Journal of Zoological Systematics and Evolutionary Research* 40: 205–222. <https://doi.org/10.1046/j.1439-0469.2002.00193.x>

- Masanari S (1983) Postmarsupial development and population dynamics of *Leptocheilia savignyi* (Krøyer, 1842) (Tanaidacea). *Crustaceana* 44: 151–162. <https://doi.org/10.1163/156854083X00776>
- Messano LVR de, Gonçalves JEA, Ferreira CEL, Coutinho R (2020) Caracterização ecológica dos ambientes de substrato consolidado. In: Baptista D, Granthom-Costa LV, Coutinho R (Eds) Biodiversidade Marinha dos costões rochosos de Arraial do Cabo: Histórico, Ecologia e Conservação. IEAPM, Rio de Janeiro: 48–75.
- Miller MA (1940) The Isopod Crustacea of the Hawaiian Islands (Cheilifera and Valvifera). Bernice Pauahi Bishop Museum Occasional Papers 15: 295–319.
- Morales-Núñez AG, Heard RW, Bird GJ (2019) Two new apseudomorphan species (Crustacea: Tanaidacea: Metapseudidae) from Mo‘orea Island (Society Islands, French Polynesia) with taxonomic keys. *Zootaxa* 4564: 1–213. <https://doi.org/10.11646/zootaxa.4564.1.8>
- Oigman-Pszczol SS, Figueiredo MA de O, Creed JC (2004) Distribution of Benthic Communities on the Tropical Rocky Subtidal of Armação dos Búzios, Southeastern Brazil. *Marine Ecology* 25: 173–190. <https://doi.org/10.1111/j.1439-0485.2004.00018.x>
- Pires AMS (1980) Ecological Studies on Intertidal and Infralittoral Brazilian Tanaidacea (Crustacea, Peracarida). *Studies on Neotropical Fauna and Environment* 15: 141–153. <https://doi.org/10.1080/01650528009360571>
- Riggio S (2008) *Synapseudes shiinoi* Riggio, 1973, a species of Tanaidacea found in the Mediterranean. *Crustaceana* 33: 153–162. <https://doi.org/10.1163/156854077x00052>
- Santos KC dos, Hansknecht T (2007) *Taraxapseudes* n. gen., *Taraxapseudes diversus* (Lang, 1968) n. comb. and two new species of *Atlantapseudes* Băcescu, 1978 (Tanaidacea: Apseudidae) from Brazil and Madagascar, with a key for the genus. *Zootaxa* 1639: 23–39. <https://doi.org/10.11646/zootaxa.1639.1.2>
- Santos KC dos, Santana W, Pires-Vanin AMS (2012) *Postispinatus youngi* n. gen., n. sp. (Apseudomorpha; Tanaidacea; Crustacea): Phylogenetic analysis and taxonomic remarks about kalliapseudids. *Zootaxa* 3192: 24–38. <https://doi.org/10.11646/zootaxa.3192.1.2>
- Segadilha JL, Gellert M, Błażewicz M (2018) A new genus of Tanaidacea (Peracarida, Typhlotanidae) from the Atlantic slope. *Marine Biodiversity* 48: 915–925. <https://doi.org/10.1007/s12526-018-0856-y>
- Segadilha JL, Serejo CS, Błażewicz M (2019) New species of Typhlotanidae (Crustacea, Tanaidacea) from the Brazilian coast: genera *Hamatipeda*, *Meromonakantha* and *Paratyphlotanais*, with description of *Targaryenella* gen. nov. *Zootaxa* 4661: 309–342. <https://doi.org/10.11646/zootaxa.4661.2.4>
- Sieg J (1982) Über Ein “Connecting Link” in Der Phylogenie Der Tanaidomorpha (Tanaidacea). *Crustaceana* 43: 65–77. <https://doi.org/10.1163/156854082X00092>
- Sieg J (1983) Tanaidacea. In: Gruner H-E, Holthuis LB (Eds) *Crustaceorum Catalogus*. The Hague, 552 pp.
- Sieg J (1986) Crustacea Tanaidacea of the Antarctic and the Subantarctic – 1. On material collected at Tierra del Fuego, Isla de los Estados, and the west coast of the Antarctic Peninsula. In: Kornicker LS (Ed.) *Biology of the Antarctic Seas* 18 (Vol. 45). Washington, 180 pp. <https://doi.org/10.1029/AR045>
- Stebbing TRR (1910) No. VI.- Isopoda from the Indian Ocean and British East Africa. The Percy Sladen Trust Expedition to the Indian Ocean in 1905 (Vol. III). The Transactions of the Linnean Society of London, Series 2, Zoology 14: 83–122. <https://doi.org/10.1111/j.1096-3642.1910.tb00525.x>
- Stępień A, Błażewicz M (2013) Four new species and two new genera of Metapseudidae (Crustacea: Tanaidacea: Apseudomorpha) from Australian coral reefs. *Zootaxa* 3717: 559–592. <https://doi.org/10.11646/zootaxa.3717.4.7>
- WoRMS (2020a) Metapseudidae Lang, 1970. <http://www.marinespecies.org/aphia.php?p=taxdetails&id=136155> [Accessed 12 August 2020]
- WoRMS (2020b) *Pseudozeuxo* Sieg, 1982. <http://www.marinespecies.org/aphia.php?p=taxdetails&id=247008> [Accessed 12 August 2020]