



Research article

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Six new species of Anthuridae (Peracarida: Isopoda) from the southern Mexican Pacific

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Abstract. Marine isopods, despite being a very diverse group, have been little studied in the Mexican South Pacific. After a revision of 171 specimens collected from Guerrero and Oaxaca, six new species, belonging to five genera, were discovered: *Amakusanthura guerrerensis* sp. nov., *Cortezura caeca* sp. nov., *Mesanthura antenniformis* sp. nov., *M. estacahuitensis* sp. nov., *Skuphonura oaxaquensis* sp. nov., and *Tinggianthura mexicana* sp. nov. In this work, the genera *Amakusanthura* Nunomura, 1977 and *Tinggianthura* Chew, Abdul-Rahim & Haji Ross, 2014, are recorded for the first time in the Tropical Eastern Pacific. Also, the distribution range of the genus *Skuphonura* Barnard, 1925 is increased from the west coast of South America to the southern Mexican Pacific, this being the first record of this genus in the Mexican Pacific. This study doubles the number of species recorded of Anthuridae from the Mexican Pacific, of six to 12 species.

Keywords. *Amakusanthura*, *Cortezura*, *Mesanthura*, *Skuphonura*, *Tinggianthura*.

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Introduction

Marine isopods, despite being a very diverse group, with more than 6250 species described in the World (Poore & Bruce 2012), have been little studied in the Mexican South Pacific. Only 28 species have been recorded in this region, of these only one species of Anthuridae Leach, 1814 has been recorded, *Cortezura penascoensis* Schultz, 1977 (Espinosa-Pérez & Hendrickx 2001; Bastida-Zavala *et al.* 2013).

The Anthuridae is the largest family within the anthuridean isopods (Chew *et al.* 2014). It currently comprises 26 genera and 302 species (Boyko *et al.* 2008 onwards). Approximately 65% of these species are distributed in tropical waters and 30% in warm temperate waters; however, also are frequent in cold and polar regions. Some are found in brackish and freshwater environments but mostly live seashore in sediments of different substrates such as coral reefs, algae, coral rubble, and associated with other invertebrates (Poore 2001; Poore & Bruce 2012).

The most significant characteristics that distinguish Anthuridae from other anthuridean isopods are (1) antenna flagellum with less than 10 articles, shorter than peduncles; (2) mouthparts not produced anteriorly; (3) maxilliped palp twice as long as wide, with 2–4 articles; (4) pereopods 2–6 propodus palm with 1 distal robust seta only, pereopod 7 propodus with three distal robust setae; (5) telson with one pair of statocysts (Poore 2001).

The Anthuridae family have been poorly studied in the Mexican Pacific, and the few studies available are focused on the northern region of the Pacific of Mexico. Among them stand out the descriptions of two species from Gulf of California, *Cortezura penascoensis* and *Mesanthura nubifera* Wägele, 1984. Additionally, in the Western coast of Baja California, Menzies (1962) and Campos & Villarreal (2008) recorded to *Haliophasma geminata* Menzies & Barnard, 1959 and *Mesanthura occidentalis* Menzies & Barnard, 1959; in the Gulf of California, Brusca (1980) only recorded to *Mesanthura* sp. and Espinosa-Pérez & Hendrickx (2001) recorded to *M. occidentalis*, both in the Gulf of California and in the central Pacific of Mexico.

In this study, we describe six new species of Anthuridae from southern Mexican Pacific, belonging to five genera.

Material and methods

The revised specimens are from the Crustacea section of the Scientific Collection (OAX-CC-249-11) of the Laboratorio de Sistemática de Invertebrados Marinos (LABSIM), Universidad del Mar, Puerto Ángel, Oaxaca. The specimens are derived from 13 localities along the coast of Guerrero and Oaxaca (Fig. 1). All material was collected from intertidal and subtidal zone (1–12 m depth) by free diving and scuba on different substrates such as rock, coral, coralline rocks, sand, algae and shells. Collected specimens were fixed 4% formalin and preserved in 70% ethanol.

The specimens were examined with a stereo microscope and separated by morphotypes. The best preserved specimens of each species were measured from the rostrum to the end of telson and the habitus was drawn with a camera lucida. Left appendages were dissected and mounted on glycerol and sealed with Entellan[®] on permanent slides. Drawings of each structure dissected were made using a digital camera and a WACOM brand graphic drawing tablet using Adobe Photoshop CS6 program.

The identification was made using the specialized literature and identification keys of Poore (2001) and Chew *et al.* (2014). Diagnoses and descriptions of the species were standardized and the nomenclature of the structures was based on the terminology of Negoescu (1994) and Garm & Watling (2013). All material examined was labeled, catalogued and deposited in the Crustacea section, Scientific Collection of Laboratorio de Sistemática de Invertebrados Marinos (LABSIM), Universidad del Mar.

Abbreviations

- A1 = Antennule
- A2 = Antenna
- C = Cephalon
- P = Pereopod
- Pl = Pleopod

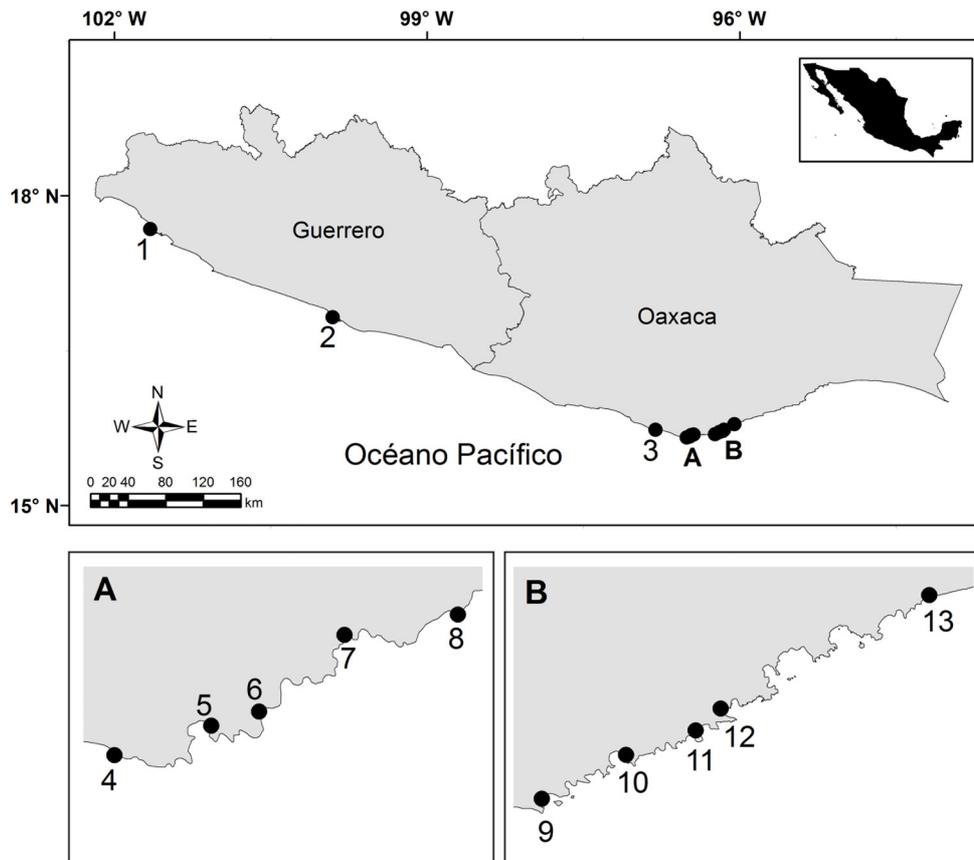


Fig. 1. Study area. Guerrero: 1. Coral Beach. 2. La Roqueta Island. A–B. Oaxaca: 3. Agua Blanca Beach. 4. Zipolite, Playa del Amor. 5. Puerto Ángel Bay. 6. Estacahuite Beach. 7. La Boquilla Beach. 8. La Tijera Beach. 9. San Agustín Bay. 10. Chachacual Bay, Jicaral Beach. 11. Cacaluta Bay. 12. El Maguey Bay. 13. Copalita Beach.

Results

Systematics

Class Malacostraca Latreille, 1802
 Superorder Peracarida Calman, 1904
 Order Isopoda Latreille, 1817
 Suborder Cymothoidea Wägele, 1989
 Superfamily Anthuroidea Leach, 1914
 Family Anthuridae Leach, 1814
 Genus *Amakusanthura* Nunomura, 1977

Amakusanthura guerrerensis sp. nov.

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Figs 2–4, 20A

Etymology

This species is named after Guerrero, the Mexico State where the type material was collected.

Material examined

Holotype

MEXICO • ♀ (body length 5 mm); Guerrero, Ixtapa Island, Coral Beach, E-1A; 17°40'38" N, 101°39'20" W; depth 1.5 m; 19 Sep. 2007; M.S. García-Madrigal *et al.* leg.; coral rock; UMAR-PERA 522.

Paratypes

MEXICO • 2 ♀♀ (ovigerous), 4 ♀♀, 2 mancae; same collection data as for holotype; UMAR-PERA 523.

Additional material

MEXICO – **Guerrero** • 4 ♀♀, 5 mancae; Ixtapa Island, Coral Beach, E-1B; 17°40'38" N, 101°39'20" W; depth intertidal; 19 Sep. 2007; M.S. García-Madrigal *et al.* leg.; algae; UMAR-PERA 524 • 7 ♀♀, 7 mancae; Ixtapa Island, Coral Beach; 17°40'36" N, 101°39'22" W; depth 6 m; 19 Sep. 2007; M.S. García-Madrigal *et al.* leg.; coral; UMAR-PERA 525 • 4 ♀♀, 1 manca; Acapulco, La Roqueta Island; 16°49'26" N, 99°54'29" W; depth 2 m; 21 Sep. 2007; M.S. García-Madrigal *et al.* leg.; tubes of sabellariids; UMAR-PERA 526. – **Oaxaca** • 1 ♀; Cozacoaltepec, Agua Blanca Beach; 15°44'2" N, 96°48'32" W; depth intertidal; 11 Nov. 2007; I. López-Aguilar *et al.* leg.; algae; UMAR-PERA 527 • 3 ♀♀, 1 manca; Puerto Ángel, Estacahuite Beach; 15°40' N, 96°29' W; depth 0.5 m; 3 Jul. 2007; J. Jarquín-González *et al.* leg.; coral; UMAR-PERA 528 • 2 ♀♀ (ovigerous), 6 ♀♀, 1 ♂, 2 mancae; Pochutla, La Tijera Beach; 15°41'33" N, 96°26'33" W; depth 2–4 m; 30 Apr. 2005; J.R. Bastida-Zavala *et al.* leg.; coral rock; UMAR-PERA 529 • 1 ♀, 1 manca; Pochutla, La Tijera Beach; 15°41'33" N, 96°26'33" W; depth 3 m; 7 Apr. 2009; F. Cortés-Carrasco *et al.* leg.; coral rock; UMAR-PERA 530 • 5 ♀♀; Huatulco, San Agustín Bay; 15°41'27" N, 96°14'15" W; depth intertidal; 24 Feb. 2007; M.S. García-Madrigal *et al.* leg.; coral algae; UMAR-PERA 531 • 3 ♀♀; Huatulco, San Agustín Bay; 15°41'22" N, 96°14'14" W; depth intertidal; 24 Oct. 2013; H. Solano-García leg.; coral rock; UMAR-PERA 532 • 1 ♀; Huatulco, Cacaluta Bay; 15°43'21" N, 96°9'48" W; depth shallow water; 27 Oct. 2013; R. Rodríguez leg.; *Spondylus* shells; UMAR-PERA 533.

Description

Holotype (♀, UMAR-PERA 522)

BODY (Figs 2A, 4E, 20A). Length 5 mm, about 10 times as long as wide with a brown pigment band at the posterior margin of the pereonites 3–7 and pleonite 5; moderately setose caudal region; body proportion: C<1=2=3<4>5<6>7. Subcircular cephalon as wide as long; rostral process subequal to the lateral angles. Eyes small, black. Pleonites 1–5 about 1.1 times as long as pereonite 7; pleonites 1–3 with dorsal folds; pleonites 4–5 dorsally fused; pleonite 6 with a median incision at the distal margin. Telson linguiform, medially wider, narrowing distally, rounded apex with numerous marginal setae, proximal region with a pair of statocysts.

ANTENNULE (Fig. 2B). Peduncle with three articles. Articles 1 and 2 with plumose sensory setae; article 2 quadrate, 0.7 times as long as third article, external margin with three long simple setae; flagellum with three articles, subequal to the length of the third peduncular article; tiny distal article with one aesthetasc and a group of simple setae.

ANTENNA (Fig. 2C). Peduncle with five articles. Article 2 rudimentary, subequal in length to articles 2 and 3 together, internal lateral margin with scales; article 4 quadrate, with a group of simple setae at the distal angles; article 5 rectangular, 1.3 times as long as the fourth. Flagellum rudimentary with four articles, 0.6 times as long as last peduncular article.

MAXILLIPED (Fig. 2D). Palp with three articles. Article 1 rectangular with one simple seta; article 2 with one long medial seta and three distal setae, internal margin with setulated scales, bilobed and projected distal angle; article 3 small, oblique with five distal setae. Endite reaching half of the first article of palp.

MAXILLA (Fig. 2E). Straight with seven stout distal teeth.

MANDIBLE (Fig. 2F). Symmetrical; palp with three articles, first article 0.6 times as long as article 2 with a long distal seta; second article 2.5 times as long as article 3 with three distal setae; article 3 with five pectinate setae. Incisor with three teeth; lacinia mobilis with four denticles.

PEREOPOD 1 (Fig. 3A). Subchelate; carpus triangular, apex truncated and crenulated; propodus ovate, 1.8 times as long as wide, palm with middle projection as a step with eight robust short setae; internal distal angle of dactylus projected.

PEREOPODS 2–3 (Fig. 3B–C). Similar in shape and size. Carpus triangular, truncated apically with a small tooth and two long robust setae; propodus elongated oval, 2.1–2.2 times as long as wide, internal margin with a row of simple setae and setulated scales, distoventrally one slightly serrated sensory spine; proximal internal margin of the dactylus with small teeth, distal margin with a robust spine and a group of simple and plumose setae.

PEREOPODS 4–7 (Fig. 3D–G). Very similar in shape and size. Merus with a row of long simple setae and setules on inner margin; carpus subpentagonal, ventrodiscal margin with a sensory spine and simple setae, dorsodiscal margin with a plumose sensory seta; propodus sub-cylindrical, 1.8 times as long as wide in P4–6, and 2.5 times in P7; ventral margin with simple seta and setulated scales, ventrodiscal margin with a denticulate sensory spine. P7 ventrodistally with two pectinate sensory spines; dactylus with setulated scales.

PLEOPOD 1 (Fig. 4A). Protopod with five retinaculae; exopod operculiform, 2.3 times as wide as the endopod, external margin with a medial seta, internal margin with a proximal seta; surrounded laterally and apically by 48 plumose setae; endopod cylindrical, shorter than exopod with six plumose setae on distal margin.

PLEOPOD 2 (Fig. 4B). Oval and elongated, exopod surrounded distally by 14 plumose setae; endopod shorter than exopod, surrounded by eight plumose setae.

UROPODAL PROPOD (Fig. 4C). Rectangular, 1.2 times as long as endopod, inner margin with seven plumose setae, outer margin with a row of plumose setae.

UROPODAL ENDOPOD (Fig. 4C). Apex rounded, 1.7 times as long as wide, distally and laterodistally surrounded by long simple setae.

UROPODAL EXOPOD (Fig. 4D). Oval, distally emarginated, 1.6 times as long as wide, surrounded by 67 setae, 21 smooth and 46 plumose.

Distribution and habitat

From Ixtapa, Guerrero to Huatulco, Oaxaca. In algae, coral, coral rock, tubes of sabellariids and molluscan shells; intertidal to subtidal (6 m).

Remarks

Amakusanthura guerrerensis sp. nov. shares the following characteristics with 41 previously recorded species of the genus: (1) maxillipedal palp with three free articles, the internal angle of the second article

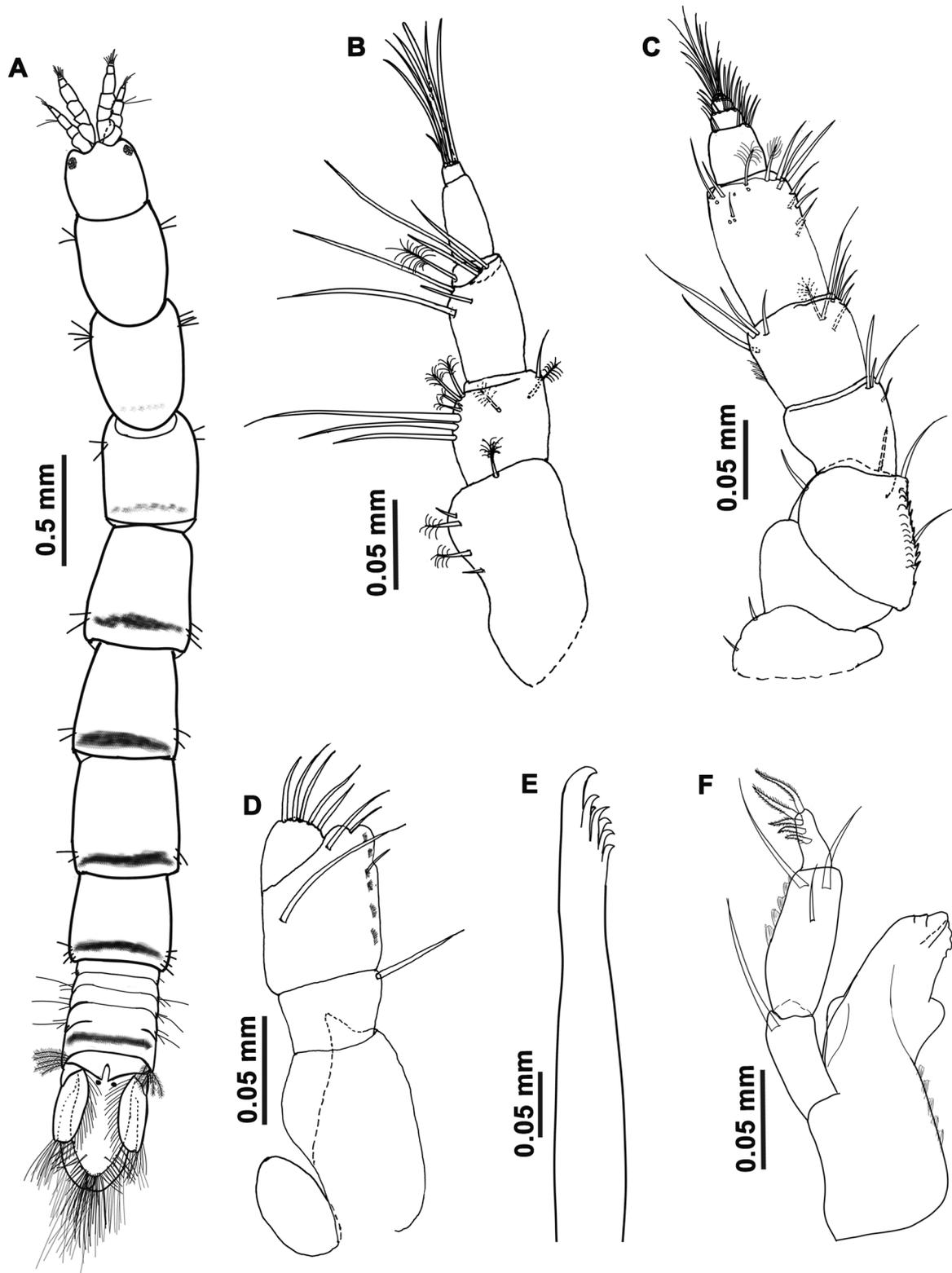


Fig. 2. *Amakusanthura guerrerensis* sp. nov., holotype, ♀, 5 mm, Guerrero, Ixtapa Island, Coral Beach (UMAR-PERA 522). A. Habitus. B. Antennule. C. Antenna. D. Maxilliped. E. Maxilla. F. Mandible (right).

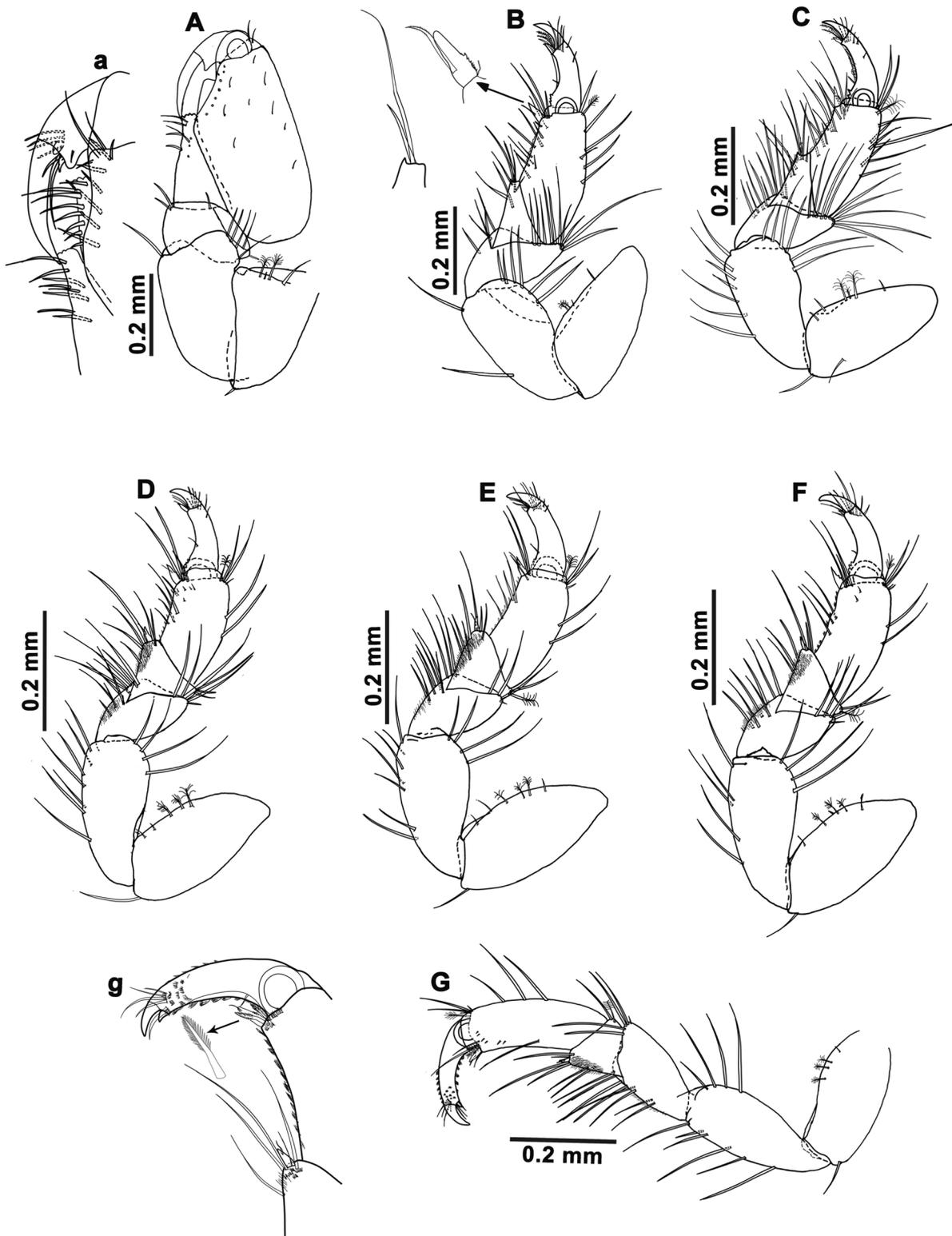


Fig. 3. *Amakusanthura guerrerensis* sp. nov., holotype, ♀, 5 mm, Guerrero, Ixtapa Island, Coral Beach (UMAR-PERA 522). **A.** Pereopod 1 and detail of the palm (a). **B.** Pereopod 2 and detail of the carpus and sensory spine. **C.** Pereopod 3. **D.** Pereopod 4. **E.** Pereopod 5. **F.** Pereopod 6. **G.** Pereopod 7 and detail of the propodus and dactylus (g).

projected; (2) pleon longer than wide; (3) pleonites 1–3 with dorsal suture lines and 4–5 dorsally fused. The new species differs by presenting a unique combination of characteristics: antenna with scales in the internal margin of the second article; palm of the pereopod 1 with a medial projection as a step armed with eight short setae; exopod of pleopod 1 with one proximal and medial simple seta, and 48 distal plumose setae. *Amakusanthura guerrerensis* sp. nov. is similar to *A. californiensis* (Schultz, 1964), the only species recorded in the eastern Pacific, with the following characteristic: (1) more than eight setae in the distolateral part of the telson. The new species, however, differs from *A. californiensis* in the presence of a pigmented line in the pereonites 3–7 and pleonite 5, distal article of the mandibular palp

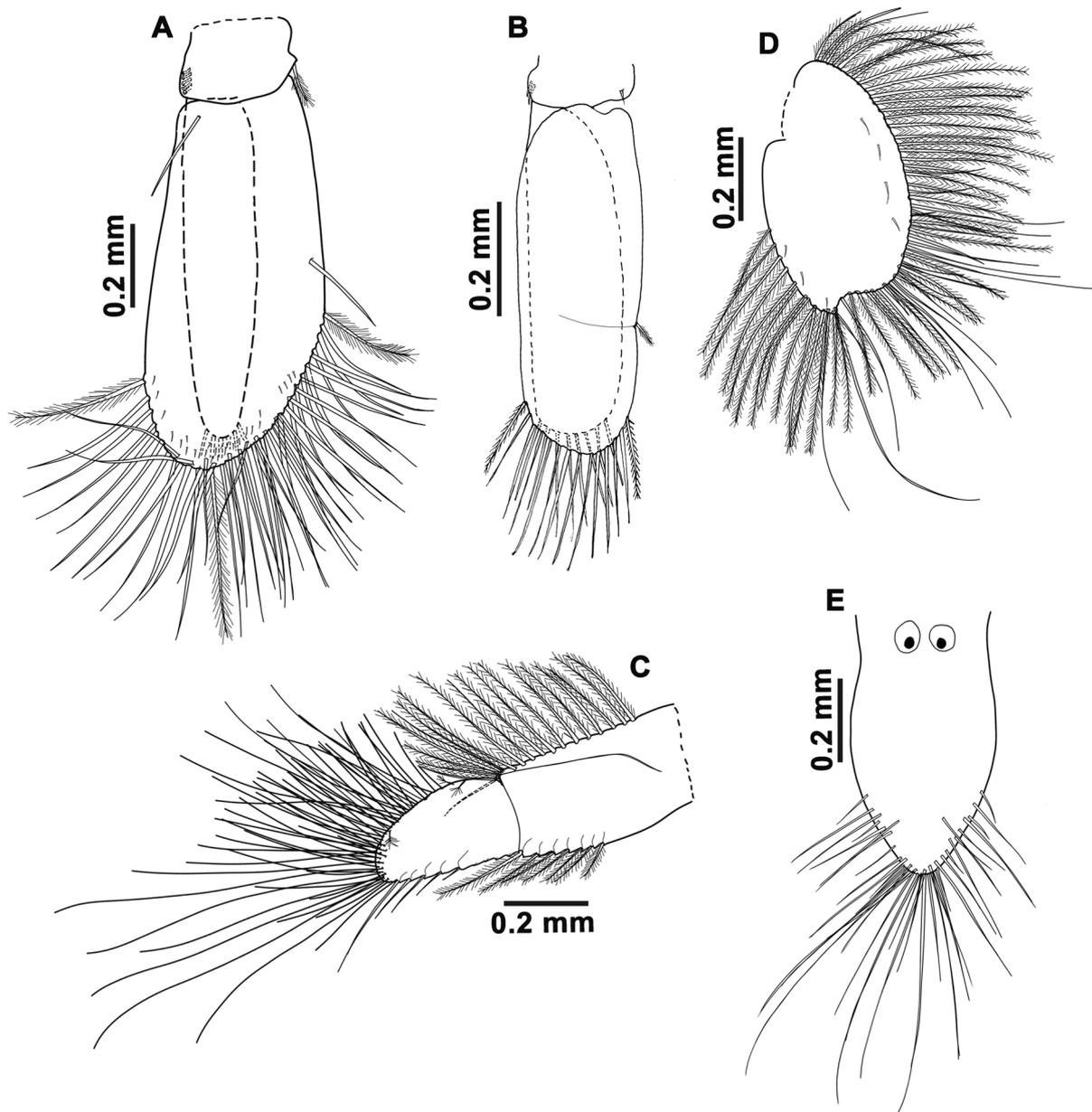


Fig. 4. *Amakusanthura guerrerensis* sp. nov., holotype, ♀, 5 mm, Guerrero, Ixtapa Island, Coral Beach (UMAR-PERA 522). **A.** Pleopod 1. **B.** Pleopod 2. **C.** Uropodal endopod. **D.** Uropodal exopod. **E.** Telson.

with five pectinate setae, palm of the pereopod 1 with a medial projection as a step armed with eight short setae and pleonite 6 is strongly emarginated. In comparison, *A. californiensis* has no pigment, the distal article of the mandibular palp has four setae, palm straight, and the pleonite 6 is slightly emarginated.

Genus *Cortezura* Schultz, 1977

Cortezura caeca sp. nov.

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Figs 5–7, 20B

Etymology

This species is named after ‘*caeca*’ due to the absence of eyes.

Material examined

Holotype

MEXICO • ♀ (body length 7.1 mm); Oaxaca, Huatulco, Jicaral Beach; 15°42'38" N, 96°11'49" W; depth 12 m; 11 Feb. 2007; V. Hernández-Urraca and L. Estrada-Vargas leg.; coral; UMAR-PERA 534.

Paratypes

MEXICO • 1 ♂ (body length 8 mm); same collection data as for holotype; UMAR-PERA 535 • 1 ♀; same collection data as for holotype; UMAR-PERA 536.

Additional material

MEXICO – Oaxaca • 1 ♀; Pochutla, La Tijera Beach; 15°41'13" N, 96°26'36" W; depth 8 m; 24 Apr. 2009; D. Zavala-Casas leg.; sand; UMAR-PERA 537 • 3 ♀♀, 1 ♂; Huatulco, Copalita Beach, in front of the mouth of the Copalita River; 15°47'17" N, 96°3'5" W; depth 10 m; 7 May 2007; E. Morales-Domínguez and C. Hernández-Tlapale leg.; sediment; UMAR-PERA 538.

Description

Holotype (♀, UMAR-PERA 534)

BODY (Figs 5A, 20B). Length 7.1 mm, about 11.8 times as long as wide with a whitish color, without pigment. Body proportion: C<1=2>3<4<5>6>7. Cephalon 1.3 times as long as wide, rostral process equal to lateral lobes, eyes absent; overlapping antennae, forming a flattened surface. Pleon equals to the length of the pereonite 7; pleonites 1–5 fused, pleonite 6 free. Telson 2.6 times as long as wide, tapering distally with two proximal statocysts, mid-distal margin with a group of short setae; apex broadly truncate, slightly sinuous with eight sub-marginal and eight marginal setae.

ANTENNULE (Fig. 5B). Peduncle with three articles. First article 1.2 times as long as second, with four simple setae and plumose sensory setae; article 2 with four long simple setae and scales in ventral margin; article 3 narrow than others with a group of ventrodorsal setae and a long apical seta; flagellum of three articles, distal article with three aesthetascs.

ANTENNA (Fig. 5C). Peduncle with five articles. Article 2 with scales in ventral margin; articles 3 and 4 sub-equal; article 5 subrectangular, 1.2 times as long as article 4; flagellum with three articles, article 1 longer than the others; distal articles with numerous setae.

MAXILLIPED (Fig. 5D). Palp with two articles. Article 1 large, 1.3 times as long as wide, internal margin with four setae, external margin with one seta, distal angle with two setae; distal article oblique with three distal wide setae. Endite present, with fine distal setae.

MAXILLA (Fig. 5E). With seven stout distal teeth.

MANDIBLE (Fig. 5F). Symmetrical; palp with two articles, article 1 with a simple distal seta; distal article 1.8 times as long as article 1, with three mid-distal setae and one long apical. Incisor with three teeth; lacinia mobilis with approximately 13 denticles, sharp molar.

PEREOPOD 1 (Fig. 6A). Subchelate; carpus triangular, apically rounded with a group of distal simple setae; propodus ovate, palm curved, slightly medially convex with a row of 11 short setae; dactylus reaching almost half the palm, internal distal angle with a tooth; unguis slender, reaching the apical margin of the carpus.

PEREOPODS 2–3 (Fig. 6B–C). Similar in shape and size. Ischium, merus and carpus with numerous ventral simple setae; inner margin of merus denticulate; carpus triangular, partially below the propodus with 2 robust setae on the distal margin; propodus cylindrical, 2 times as long as wide, internal margin with setulated scales, distoventrally one serrated sensory spine and a group of simple setae.

PEREOPODS 4–7 (Fig. 6D–G). Similar in shape and size. Inner margin of ischium and merus slightly denticulate and numerous simple setae; carpus pentagonal, ventrodiscal margin with a single sensory spine and a group of long setae; propodus cylindrical, approximately half the width of the carpus, internal margin with a group of simple setae and setulated scales, ventrodiscal margin with a serrate sensory spine and 1–2 pectinate spines; pereopod 7 dactylus with setulated scales on the inner and outer margins. Pereopods 2–7 basis with a long simple seta and plumose sensory setae; merus, carpus and propodus with scales.

PLEOPOD 1 (Fig. 7A). Protopod with three retinaculae; exopod operculiform, 2.4 times as long as wide, surrounded distal and laterally by 28 plumose setae; endopod almost half as wide as exopod with seven plumose setae.

PLEOPOD 2 (Fig. 7B). Exopod surrounded distally by 11 plumose setae; endopod surrounded by eight plumose setae.

UROPODAL PROTOPOD (Fig. 7C). Rectangular, 2 times as long as basal width, outer margin with plumose setae.

UROPODAL ENDOPOD (Fig. 7C). Subtriangular, 1.5 times as long as wide, rounded apex, outer and apical margin with long simple setae and plumose sensory setae.

UROPODAL EXOPOD (Fig. 7D). Auriculiform, dorsal surface with short setae, external margin with 24 simple setae and numerous plumose setae.

Male (dimorphic characters; based on the paratype ♂, UMAR-PERA 535)

ANTENNULE (Fig. 7E). Peduncle with three articles; article 2 projected internal distal angle; flagellum robust with four articles, article 1 circular; article 2 with numerous aesthetascs; articles 3 and 4 smaller.

MANDIBLE. Mandibular palp with two articles; distal article with seven long setae.

PEREOPOD 1 (Fig. 7F). Subchelate; palm concave with a strong middle tooth and numerous marginal and mesial setae; distoventral angle of dactylus slightly projected.

PLEOPOD 2 (Fig. 7G). Similar to the female; exopod surrounded distally by 10 plumose setae; endopod surrounded by seven plumose setae; male appendix emerging from the middle part of the endopod, slightly longer than ramus, apex rounded and slightly bent towards the inside.

Distribution and habitat

From Puerto Ángel to Huatulco, Oaxaca. In coral, sand and sediment; subtidal (12 m).

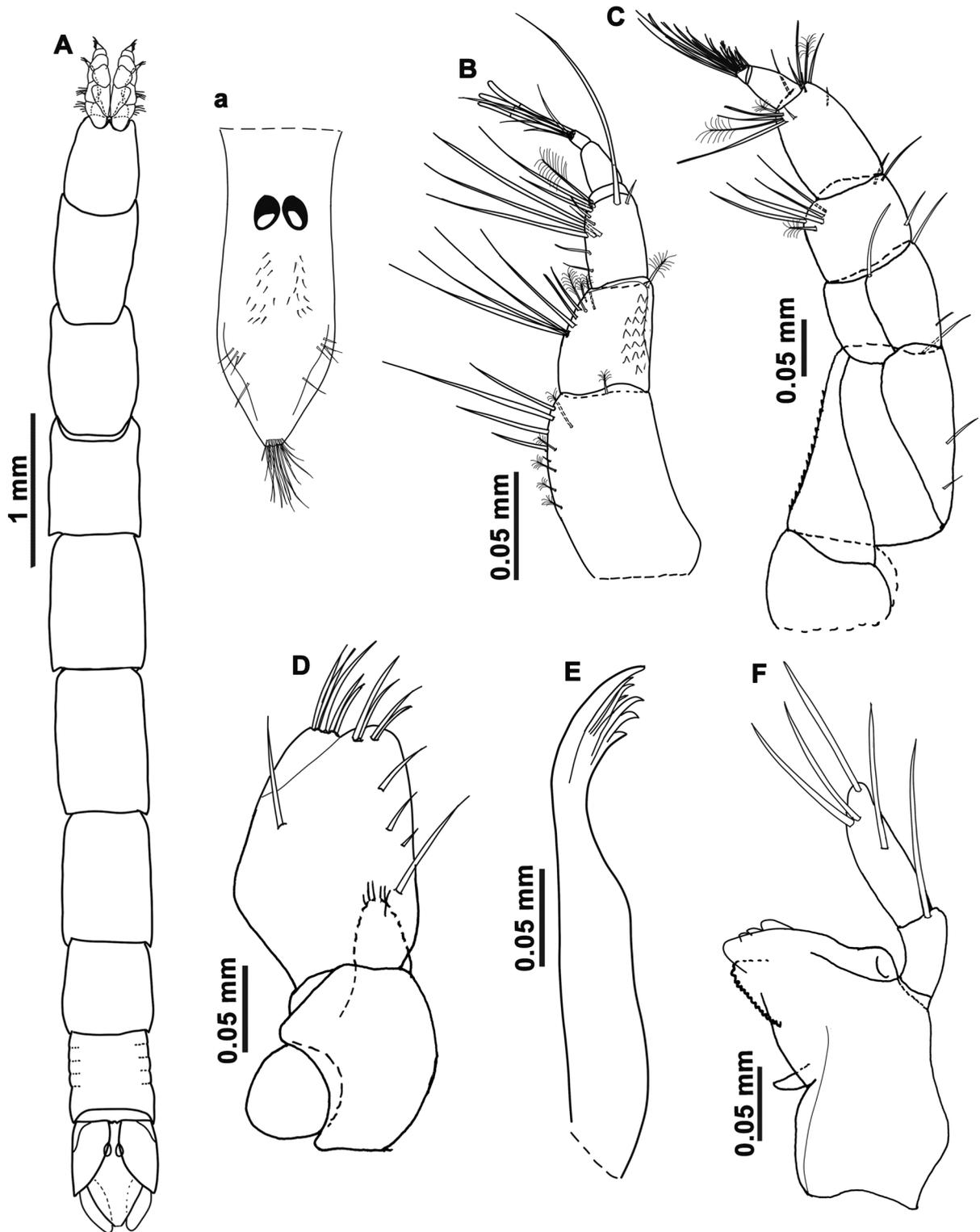


Fig. 5. *Cortezura caeca* sp. nov., holotype, ♀, 7.1 mm, Oaxaca, Huatulco, Jicaral Beach (UMAR-PERA 534). A. Habitus and telson (a). B. Antennule. C. Antenna. D. Maxilliped. E. Maxilla. F. Mandible.

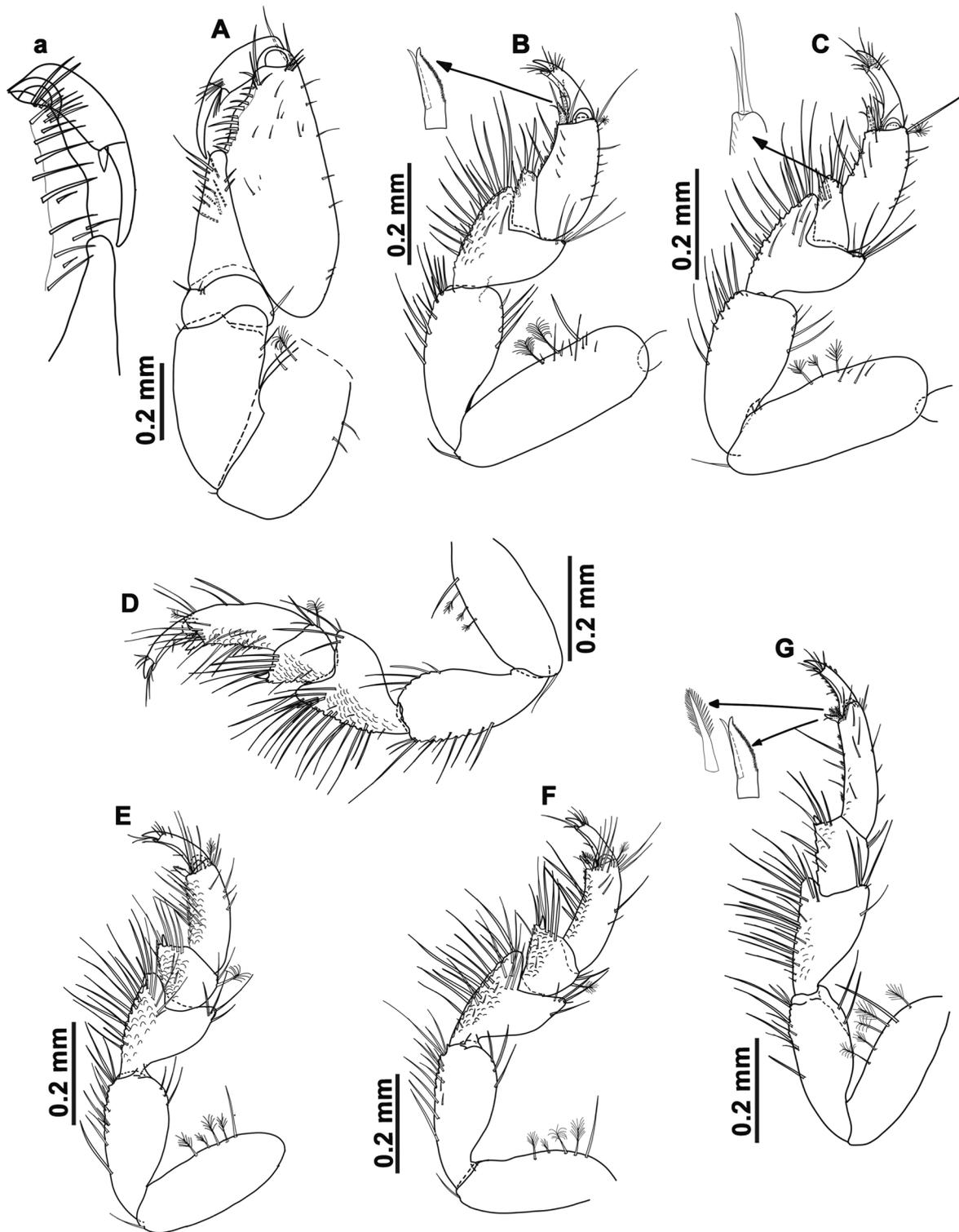


Fig. 6. *Cortezura caeca* sp. nov., holotype, ♀, 7.1 mm, Oaxaca, Huatulco, Jicaral Beach (UMAR-PERA 534). **A.** Pereopod 1 and detail of palm (a). **B.** Pereopod 2 and detail of the sensory spine. **C.** Pereopod 3 and detail of carpus. **D.** Pereopod 4. **E.** Pereopod 5. **F.** Pereopod 6. **G.** Pereopod 7 and detail of the sensory spines.

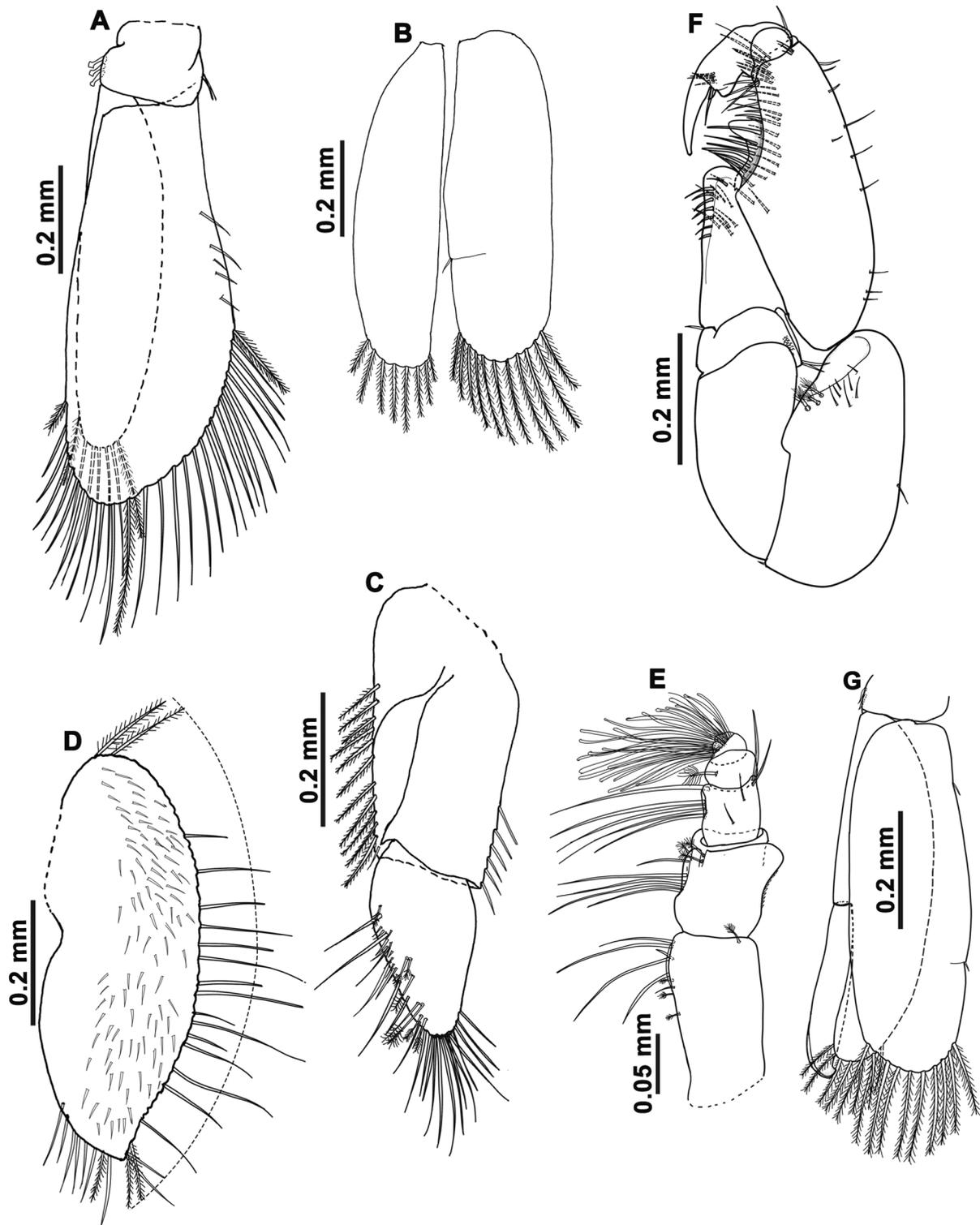


Fig. 7. *Cortezura caeca* sp. nov. **A–D.** Holotype, ♀, 7.1 mm, Oaxaca, Huatulco, Jicaral Beach (UMAR-PERA 534). **A.** Pleopod 1. **B.** Pleopod 2. **C.** Uropodal endopod. **D.** Uropodal exopod. **E–G.** Paratype ♂, 8 mm (UMAR-PERA 535). **E.** Antennule. **F.** Pereopod 1. **G.** Pleopod 2.

Remarks

Cortezura caeca sp. nov. differs from the two previously recorded species of this genus, *C. penascoensis*, described from Puerto Peñasco, Sonora, and *C. confixa* (Kensley, 1978) described from Cubagua Island, Venezuela, by the following unique characteristics: distal article of the mandibular palp with four medial setae and one apical, lacinia mobilis with 13 denticles, telson with distolateral carina, distal region with eight subapical setae and eight apical. *Cortezura caeca* sp. nov. is similar to *C. penascoensis* as follows: (1) form of telson, (2) palm of pereopod 1, and (3) maxilla. However, in *C. caeca* sp. nov. the distal article of the mandibular palp has four medial setae and one apical, lacinia mobilis with 13 denticles, distally tapered telson and the apex is truncated, pereopods 2–7 with scales on the merus, carpus and propodus. And in *C. penascoensis* the distal article of the mandibular palp has six medial setae and one apical, lacinia mobilis presents 8 teeth, pleon with six conspicuous segments. The antennular flagellum of the male of *Cortezura caeca* sp. nov. has four articles and the palm of pereopod 1 has a strong tooth projected transversally, while *C. penascoensis* has one article on the flagellum, palm of pereopod 1 with tooth projected proximally.

Genus *Mesanthura* Barnard, 1914

Mesanthura antenniformis sp. nov.

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Figs 8–10, 20C, Table 1

Etymology

The name ‘*antenniformis*’ refers to the peculiar shape of the second antenna article of this species.

Material examined

Holotype

MEXICO • ♀ (ovigerous, body length 8 mm); Oaxaca, Puerto Ángel, Estacahuite Beach; 15°40′ N, 96°29′ W; depth 7 m; 17 Apr. 2008; S. Salazar-Vallejo *et al.* leg.; dead coral; UMAR-PERA 542.

Paratypes

MEXICO • 1 ♂ (body length 4.1 mm); same collection data as for holotype; UMAR-PERA 543 • 6 ♀♀ (ovigerous), 1 ♀, 1 ♂; same collection data as for holotype; UMAR-PERA 544.

Additional material

MEXICO – Oaxaca • 1 ♀ (ovigerous); Cozacoatlán, Agua Blanca Beach; 15°44′2″ N, 96°48′32″ W; depth shallow water; 2 Apr. 2009; J. León-Robles leg.; fouling algae; UMAR-PERA 539 • 1 ♀ (ovigerous), 1 ♀; Puerto Ángel Dock; 15°39′56″ N, 96°29′27″ W; depth 3 m; 12 Jul. 2019; Y. Chávez-López and A. Pérez-Chávez leg.; tubes of sabellariids; UMAR-PERA 540 • 1 ♀ (ovigerous); Puerto Ángel, Estacahuite Beach; 15°40′ N, 96°29′ W; depth 2–4 m; 10 Sep. 2005; J.R. Bastida-Zavala *et al.* leg.; tubes of sabellariids; UMAR-PERA 541 • 1 ♀, 2 ♂♂, 5 mancae; Puerto Ángel, Estacahuite Beach; 15°40′ N, 96°29′ W; depth 7 m; 17 Apr. 2008; S. Salazar-Vallejo *et al.* leg.; rock; UMAR-PERA 545 • 3 ♀♀, 3 ♂♂, 5 mancae; Puerto Ángel, Estacahuite Beach; 15°40′ N, 96°29′ W; depth 2–4 m; 10 Sep. 2005; J.R. Bastida-Zavala *et al.* leg.; coral rock; UMAR-PERA 546.

Description

Holotype (♀ (ovigerous), UMAR-PERA 542)

BODY (Figs 8A, 20C). Length 8 mm, 7.7 times as long as wide, pigmented; cephalon almost half the length of the first pereonite; rostrum prominent and acute, sub-equal to the distal angles of the cephalon; small eyes located on the anterolateral edges of the head, not distinguishable ommatidia; body

proportion: C<1>2<3<4=5>6>7. Pereonite 7 slightly wider than length; pleonites 1–5 fused, sub-equal to pereonite 7; telson linguiform, slightly shorter than uropodal endopod, rounded distal region, apex slightly emarginated with six pairs of setae; proximal part with one pair of statocysts.

ANTENNULE (Fig. 8B). Peduncle with three articles. Article 1 rectangular, 1.3 times as long as the second and third together with plumose sensory setae; article 2 half of the 3; flagellum with three articles, sub-equal to the last peduncular article, distal article with 5–6 aesthetascs and simple setae.

ANTENNA (Fig. 8C). Peduncle with five articles. Second article 1.4 times as long as the subsequent peduncular articles; internal angle projected with two simple setae, distal margin with small sinuosities; article 3 partially covered by second article; last article 1.1 times as long as article 4 with simple and sensory plumose setae in the distal region; flagellum with five articles, sub-equal to the length of the last peduncle article, square article with numerous thin setae.

MAXILLIPED (Fig. 8D). Palp with three articles. Article 1 rectangular, half the length of the second with a single ventrodiscal seta; distal article small, oblique with six setae, proximal and distal plumose setae, a medial pectinate seta and a simple one.

MAXILLA (Fig. 8F). Slender, bent apically with seven teeth.

MANDIBLE (Fig. 8E). Symmetrical; palp with three articles, article 2 cylindrical, 2.2 times as long as the first with a subdistal seta; distal article with 5–6 robust marginal setae; incisor with three teeth; lacinia mobilis with five denticles and small molars.

PEREOPOD 1 (Fig. 8G). Subchelate; carpus triangular, apical margin rounded with four simple setae; palm slightly convex with four marginal setae, distal margin crenulated; dactylus with a spine in the distoventral angle and a group of setae.

PEREOPODS 2–3 (Fig. 9A–B). Similar in shape and size. Carpus triangular with three apical setae; propodus elongated, cylindrical, 2.1–2.2 times longer than wide, ventral margin slightly curved with two long setae, distoventral angle with a denticulate sensory spine; dactylus curved with one spine and a group of distal setae.

PEREOPODS 4–7 (Fig. 9C–F). Similar in shape and size. Carpus trapezoidal with a sensory spine at the ventrodiscal margin and three simple setae, external margin with a plumose sensory seta; propodus cylindrical with a denticulate sensory spine at the distal inner angle; dactylus curved. Pereopod 7 propodus with setulated scales and two robust pectinate spines on internal angle. Propodus of all pereopods with plumose sensory setae.

PLEOPOD 1 (Fig. 10A). Protopod with five retinaculae; exopod operculiform, almost two times as long as wide, sinuous distal margin, surrounded by 31 plumose setae; endopod sub-equal to the length of the exopod and 0.3 times its width, surrounded apically by 10 plumose setae.

PLEOPOD 2 (Fig. 10B). Oval and elongated; exopod shorter than endopod, surrounded apically by 10 plumose setae; endopod with seven plumose setae.

UROPODAL PROPOD (Fig. 10C). Uropodal protopod 2.3 times as long as endopod with plumose setae on the external margin.

UROPODAL ENDOPOD (Fig. 10C). Oval, distally narrower, 1.6 times as long as wide, margin with simple and plumose setae.

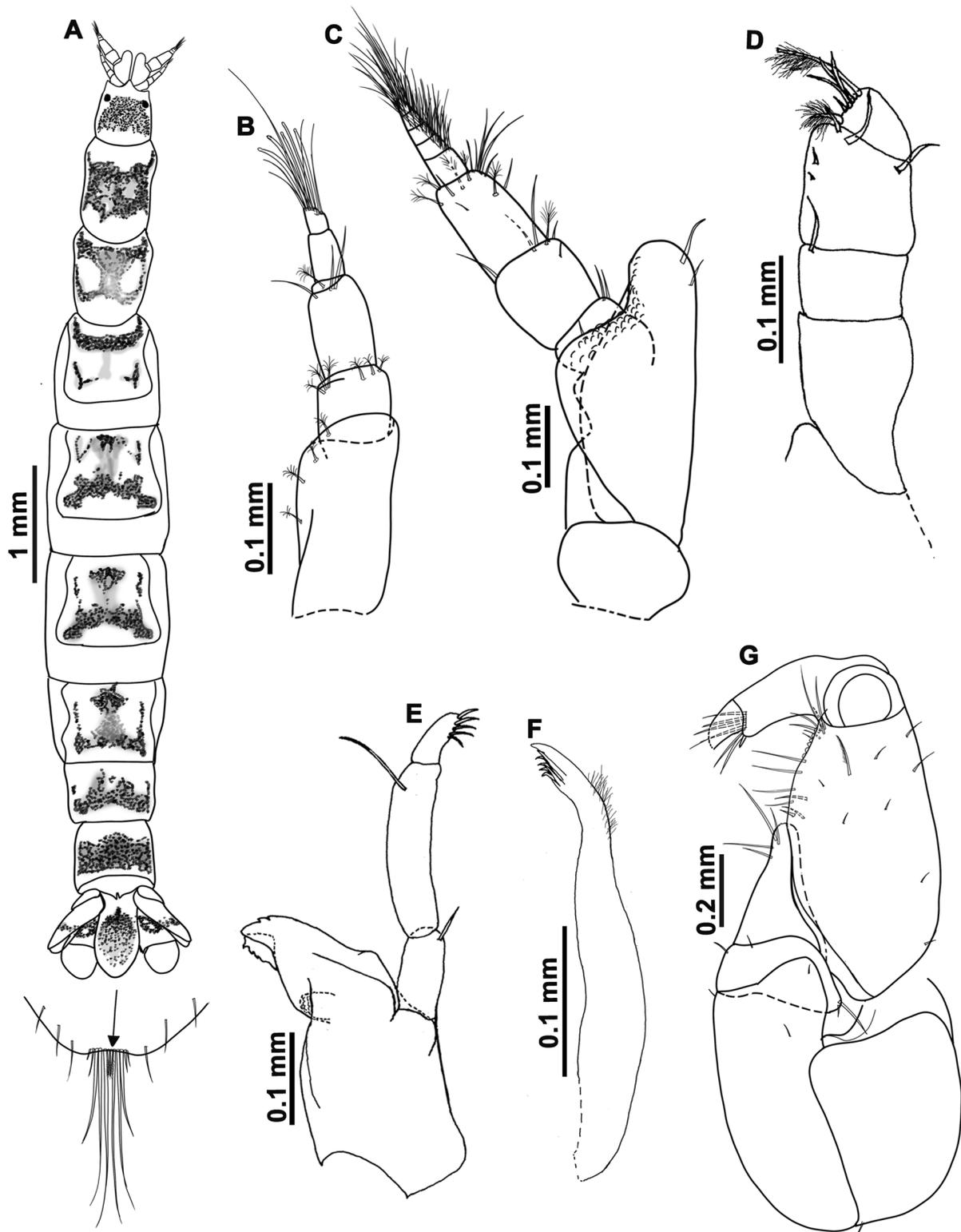


Fig. 8. *Mesanthura antenniformis* sp. nov., holotype, ♀ (ovigerous), 8 mm, Oaxaca, Puerto Ángel, Estacahuite Beach (UMAR-PERA 542). **A.** Habitus and detail of the telson. **B.** Antennule. **C.** Antenna (right). **D.** Maxilliped. **E.** Mandible. **F.** Maxilla. **G.** Pereopod 1.

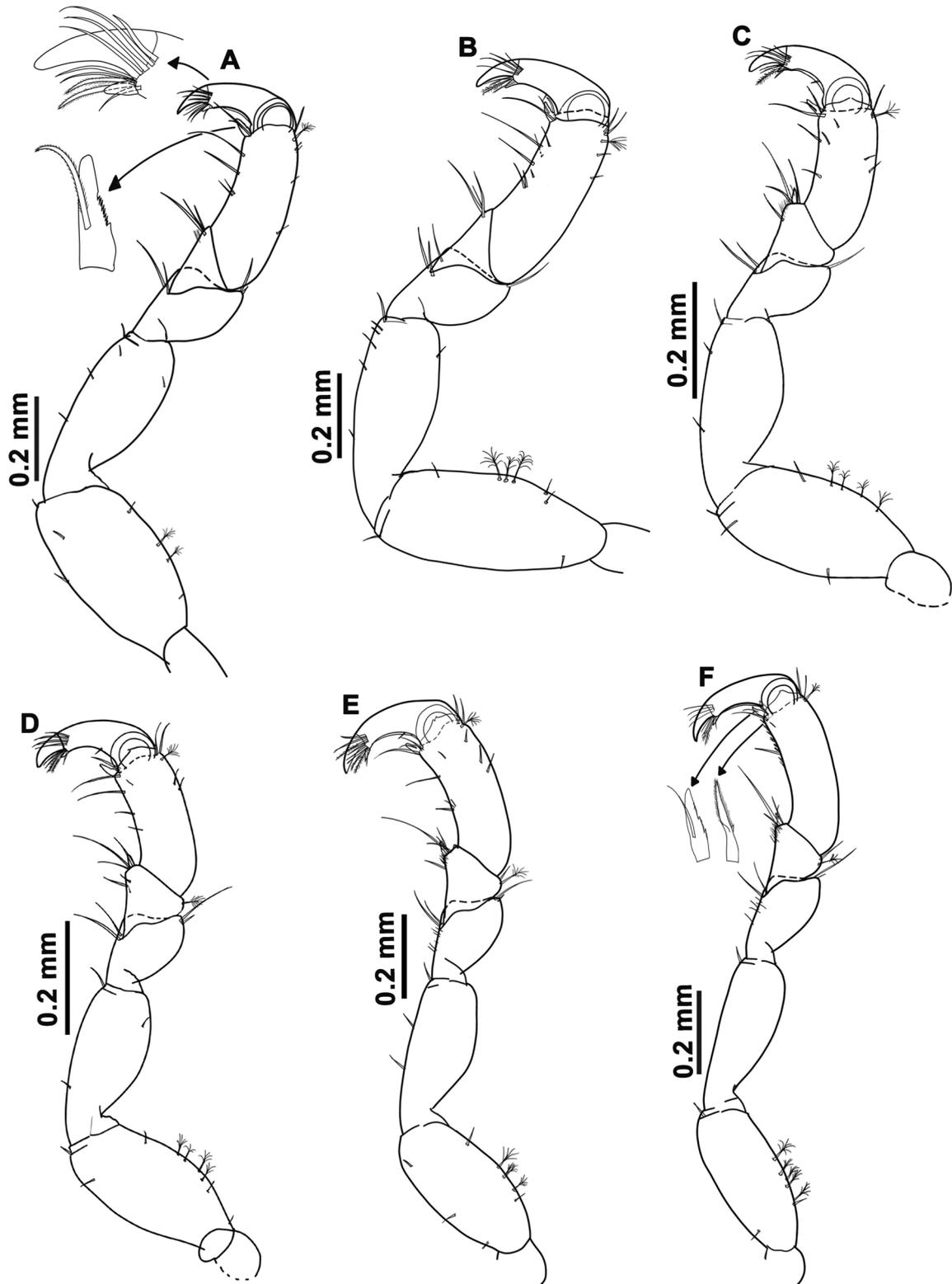


Fig. 9. *Mesanthura antenniformis* sp. nov., holotype, ♀ (ovigerous), 8 mm, Oaxaca, Puerto Ángel, Estacahuite Beach (UMAR-PERA 542). **A.** Pereopod 2 and detail of dactylus. **B.** Pereopod 3. **C.** Pereopod 4. **D.** Pereopod 5. **E.** Pereopod 6. **F.** Pereopod 7 and detail of the sensory spines.

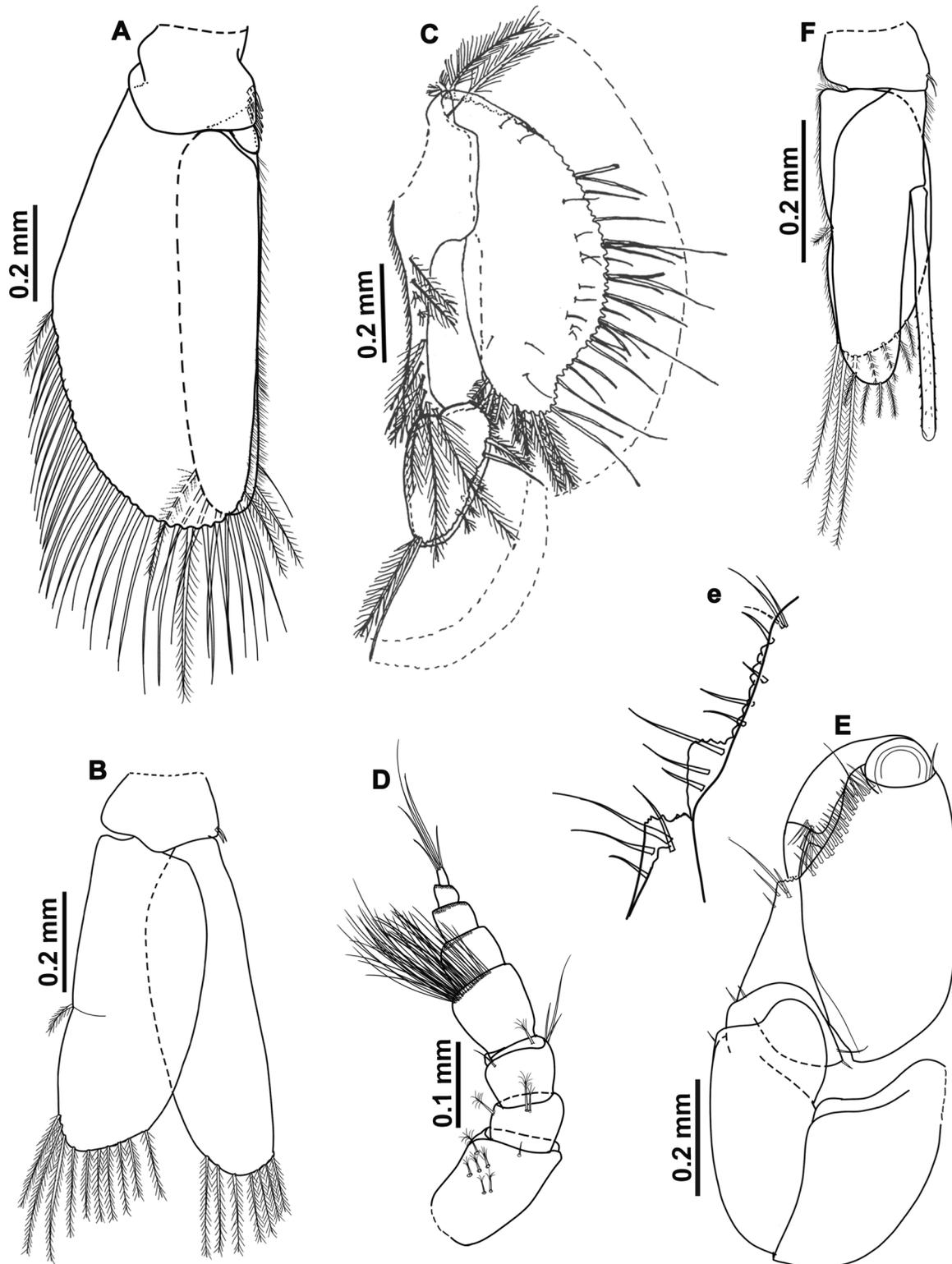


Fig. 10. *Mesanthura antenniformis* sp. nov. **A–C.** Holotype, ♀ (ovigerous), 8 mm, Oaxaca, Puerto Ángel, Estacahuite Beach (UMAR-PERA 542). **A.** Pleopod 1. **B.** Pleopod 2. **C.** Uropod. **D–F.** Paratype, ♂, 4.1 mm (UMAR-PERA 543). **D.** Antennule. **E.** Pereopod 1 and detail of the palm (e). **F.** Pleopod 2.

UROPODAL EXOPOD (Fig. 10C). Sub-equal in length to the protopod, oval, distally emarginated, external margin strongly crenulated with plumose and simple setae.

Male (dimorphic characters; based on the paratype ♂, UMAR-PERA 543)

ANTENNULE (Fig. 10D). Robust; articles 1 and 2 with plumose sensory setae, article 1 rectangular, 2.4 times as long as second; article 2 and 3 sub-equal in length; flagellum with six articles, articles 2–5 with numerous aesthetascs; distal article with a group of long setae.

PEREOPOD 1 (Fig. 10E). Subchelate; carpus distal part truncated with crenulated margin; palm with a step-like proximal process with robust setae, distal margin crenulated, mesial region with numerous setae.

PLEOPOD 2 (Fig. 10F). Exopod shorter than endopod, surrounded apically by seven plumose setae; endopod surrounded apically by four plumose setae; male appendix cylindrical with scales in distal region.

Distribution and habitat

Central coast of Oaxaca, from Agua Blanca to Estacahuite Beach. In coral, tubes of sabellariids, rocks and algae; intertidal to subtidal (7 m).

Remarks

Mesanthura antenniformis sp. nov. differs from previously recorded species of *Mesanthura* in the following unique characteristics: second article of antenna strongly projected and winding on the distal margin; palm of pereopod 1 straight. Between the three eastern Pacific species (Table 1), *M. antenniformis* sp. nov. is more similar to *M. occidentalis*, described from Point Conception, California, by the following characteristics: (1) last article of mandibular palp with five setae, (2) dorsal surface of the telson with some setae; however, differs because in that *M. antenniformis* sp. nov. has a dense pigmentation pattern, the palm of pereopod 1 is straight with the distal margin crenulate, propodus of pereopod 2 with setulated scales, apical part of the telson slightly emarginated and with six pair of setae, while, *M. occidentalis* has a slightly pigmented body in a circular pattern, palm of pereopod 1 medially projected, propodus of pereopod 2 with cuticular scales and the telson has eight pairs of setae.

Mesanthura estacahuitensis sp. nov.

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Figs 11–13, 20D, Table 1

Etymology

This species is named after its type locality, Estacahuite Beach, Oaxaca.

Material examined

Holotype

MEXICO • ♀ (body length 6.8 mm); Oaxaca, Puerto Ángel, Estacahuite Beach; 15°40' N, 96°29' W; depth 2–4 m; 10 Sep. 2005; J.R. Bastida-Zavala *et al.* leg.; coral rock; UMAR-PERA 547.

Description

Holotype (♀, UMAR-PERA 547)

BODY (Figs 11A, 20D). Length 6.8 mm, 11.1 times as long as wide, strongly pigmented; cephalon almost as wide as long, circular eyes, in lateral position, rostrum slightly shorter than lateral angles; body proportion: C<1=2>3<4=5>6>7. Pereonites 2–3 cylindrical, 4–6 rectangular, pereonite 7 square;

Table 1. Comparison between the species of *Mesanthura* Barnard, 1914 recorded in the Mexican Pacific and *Mesanthura antenniformis* sp. nov., *Mesanthura estacahuitensis* sp. nov. from Oaxaca.

Character / species	<i>M. occidentalis</i> Menzies & Barnard, 1959	<i>M. nubifera</i> Wägele, 1984	<i>M. antenniformis</i> sp. nov.	<i>M. estacahuitensis</i> sp. nov.
Locality	Point Conception, California	Turner Island, Sonora	Estacahuite Beach, Oaxaca	Estacahuite Beach, Oaxaca
Body length	7.5 mm	14 mm	8 mm	6.8 mm
Last flagellar article of A1	3 aesthetascs 7 setae	5 aesthetascs 4 setae	5–6 aesthetascs 5 setae	4 aesthetascs 3 setae
Distal margin of second article of A2 peduncle	Straight	Straight	Internal angle projected	Straight
Last article of the mandibular palp	5 setae	10 setae	5–6 setae	8 setae
Palm of P1	Medially projected	Medially projected	Straight	Medially projected
Propodus of P2	Cuticular and setulated scales	Cuticular scales	Setulated scales	Setulated scales
Apex of telson	Rounded with 8 pairs of setae	Slightly rounded with 9 pairs of setae	Depressed with 6 pairs of setae	Rounded with 5 pairs of setae
Setae on telson surface	Some shorts	None	Some shorts	None

pleonites 1–5 fused, slightly wider than long, 0.9 times as long as pereonite 7, pleonite 6 free with a medial incision on the distal margin; telson linguiform, medially wider, 1.8 times as long as wide, apex broadly rounded with three pairs of long smooth setae and one pair of short plumose setae; one pair of proximal statocysts.

ANTENNULE (Fig. 11B). Peduncle with three articles; article 1 sub-equal in length to articles 2 and 3 together with plumose sensory setae; article 2 sub-square with distal plumose sensory setae; article 3 rectangular, 2.1 times as long as wide; flagellum with three articles, article 1 tiny with one plumose sensory seta; article 2 longest, 0.6 times as long as last peduncle article; article 3 with four aesthetascs and three long simple setae.

ANTENNA (Fig. 11C). Peduncle with five articles; articles 2–5 with grooved external margin, article 2 sub-square; article 3 shorter than the others; article 4 square; last article 1.3 times as long as article 4 with a group of apical setae; flagellum 0.6 times as long as last peduncle article with four articles decreasing distally and with numerous fine setae.

MAXILLIPED (Fig. 11D). Palp with three articles. Article 1 rectangular, 1.3 times as wide as long with a long seta in the internal distal angle; article 2 with two setae in the inner angle; article 3 oblique, with five setae, one proximal and two distal plumose.

MAXILLA (Fig. 11E). Slender, bent distally with five teeth.

MANDIBLE (Fig. 11F). Symmetrical; palp with three articles, article 1 rectangular, almost half the length of second; article 2 with an apical seta; article 3 with eight serrated robust setae. Incisor with three teeth; lacinia mobilis with four denticles and molars rounded.

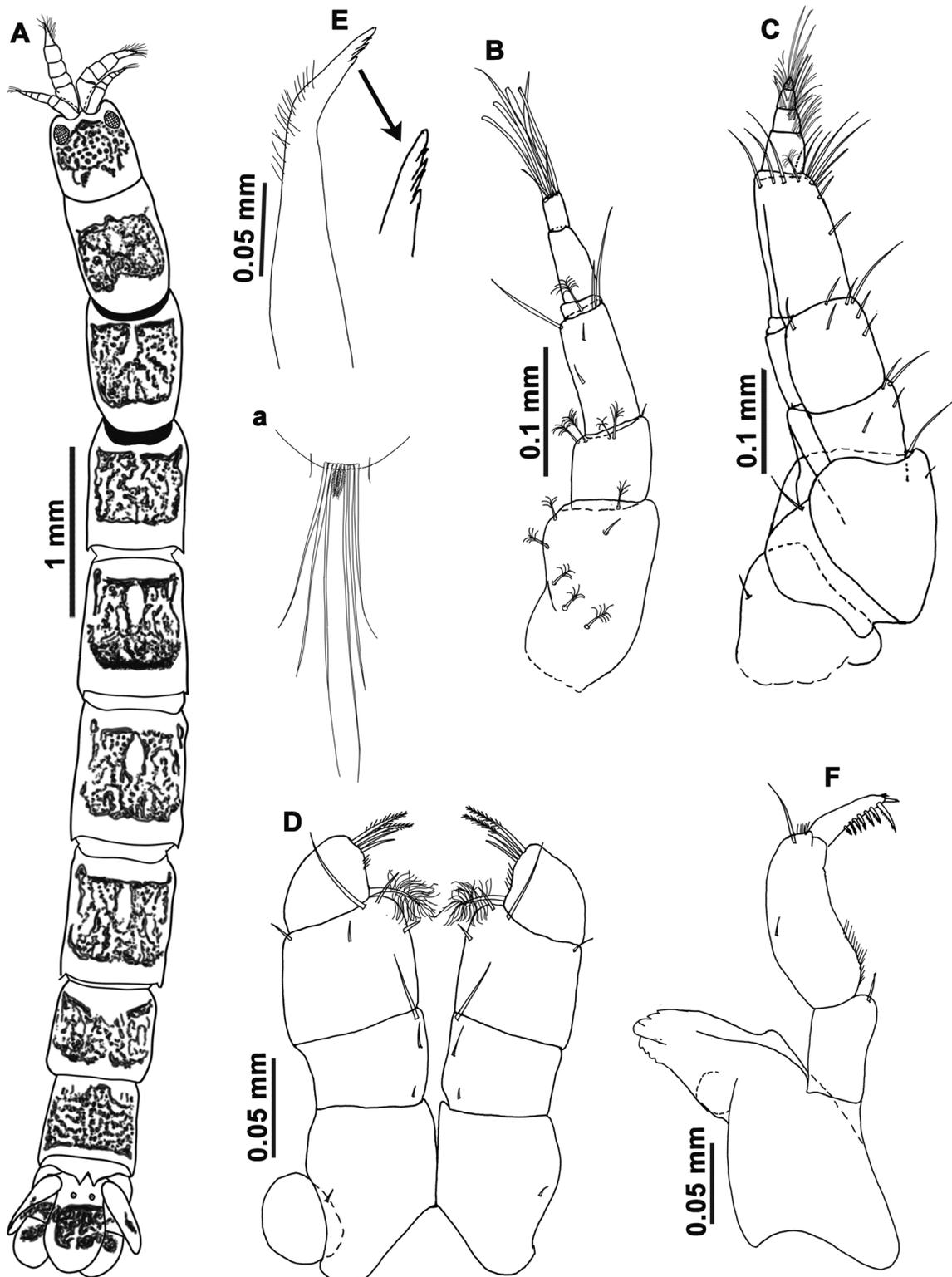


Fig. 11. *Mesanthura estacahuitensis* sp. nov., holotype, ♀, 6.8 mm, Oaxaca, Puerto Ángel, Estacahuite Beach (UMAR-PERA 547). **A.** Habitus and detail of the telson (a). **B.** Antennule. **C.** Antenna. **D.** Maxilliped. **E.** Maxilla and detail of the distal teeth. **F.** Mandible.

PEREOPOD 1 (Fig. 12A). Subchelate; carpus triangular, rounded distally, with three long setae; propodus oval, 2 times as long as wide, palm projected medially with crenulated margin, proximal region with a row of four setae, distal region with a group of smooth setae; dactylus reaching the projection of the palm with two long setae in internal distal angle.

PEREOPODS 2–3 (Fig. 12B–C). Similar in shape and size. Carpus triangular, with three apical setae; propodus sub-cylindrical, 2.2 times as long as wide in P2 and 2.7 times as long as wide in P3, internal margin with scales, ventrodistal angle with a denticulate sensory spine; distal margin of dactylus with a spine and a group of smooth and plumose setae.

PEREOPODS 4–7 (Fig. 12D–G). Similar in shape and size. Carpus sub-pentagonal with a sensory spine on the ventrodistal margin, external margin with a plumose sensory seta; propodus cylindrical, slightly curved, internal margin with setulated scales; ventrodistal angle with a denticulate sensory spine and two pectinate spines in P7; dactylus with a denticle in the internal proximal margin.

PLEOPOD 1 (Fig. 13A). Protopod with five retinaculæ; exopod operculiform, 3.3 times as wide as the endopod, surrounded distally by 26 plumose setae; endopod slightly shorter than exopod, apically rounded with seven plumose setae.

PLEOPOD 2 (Fig. 13B). Exopod cylindrical, longer than endopod, surrounded distally by eight plumose setae; endopod with five plumose setae.

UROPODAL PROPOD (Fig. 13F). Rectangular, 1.6 times as long as wide with a row of plumose setae on the inner margin.

UROPODAL ENDOPOD (Fig. 13F). Oval, 1.3 times as long as wide, distal region with smooth and plumose sensory setae.

UROPODAL EXOPOD (Fig. 13G). Oval with a strong emargination on the distal region; margin with approximately 20 smooth setae and 30 plumose setae.

Distribution and habitat

Known only in the type locality, Estacahuite Beach, Oaxaca. In coral rock; subtidal (4 m).

Remarks

Mesanthura estacahuitensis sp. nov. differs from previously recorded species of *Mesanthura* by the following unique characteristics: pigmentation pattern, last article of mandibular palp with eight setae, palm of pereopod 1 crenulated and projected medially. *Mesanthura estacahuitensis* sp. nov. is more similar to *M. nubifera*, described from Turner Island, Sonora than to the other species (Table 1) as follows: (1) projection to palm of pereopod 1, (2) mandible, (3) shape and dorsal ornamentation of the telson. However, in *M. estacahuitensis* sp. nov. the distal article of the antennular flagellum has four aesthetascs, flagellum of antenna with four articles, last article of maxillipedal palp with three plumose setae, internal margin of the carpus and propodus of the pereopods 2–7 with setulated scales and 1–2 simple setae, apical region of the telson with three pairs of simple setae and one pair of plumose setae, while *M. nubifera* has antennule with five aesthetascs, antennal flagellum with one article, last article of maxillipedal palp with one plumose seta and two pectinate setae, carpus and propodus of the pereopods 2–7 with cuticular scales and up to seven simple setae, and telson with nine pairs of apical setae.

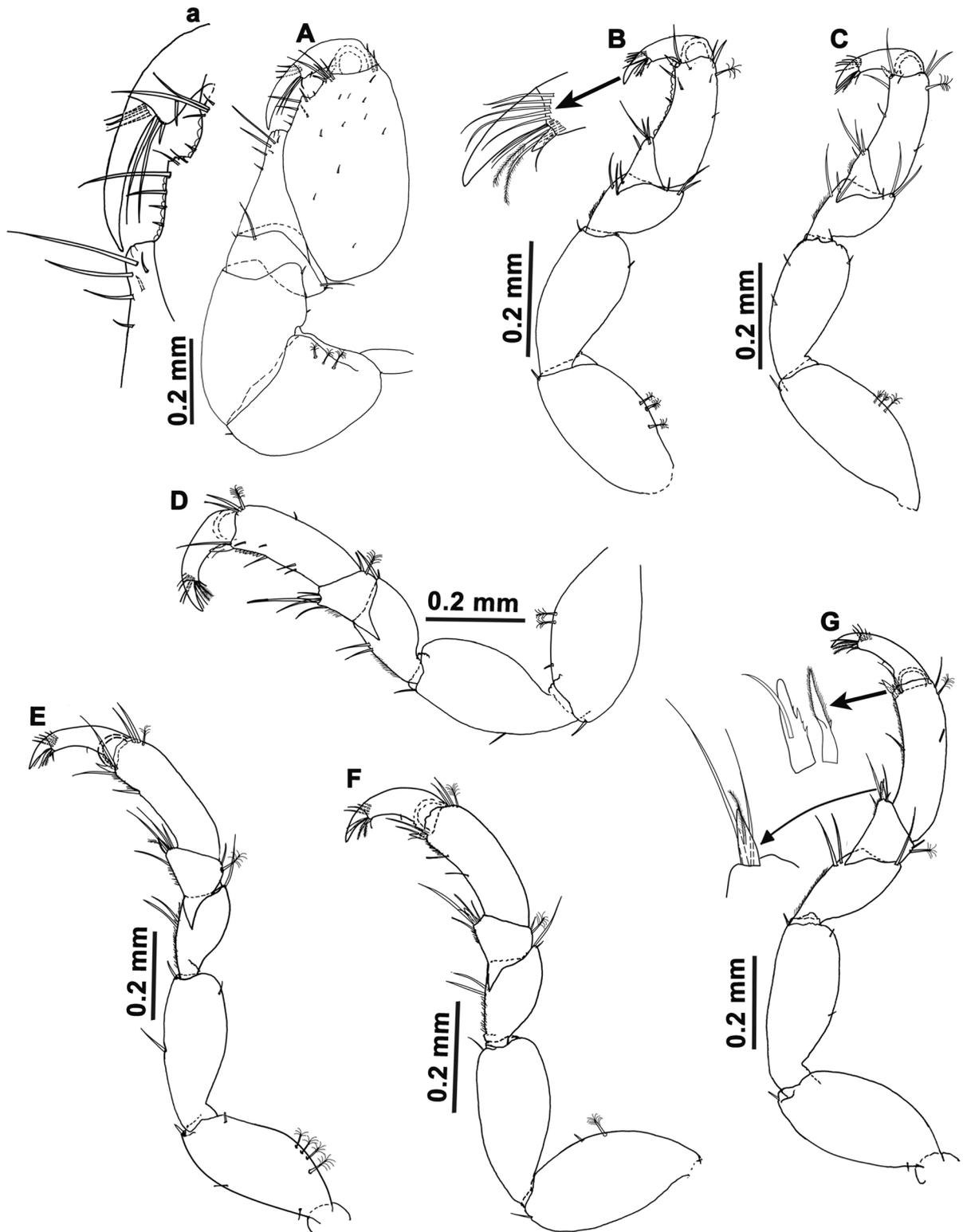


Fig. 12. *Mesanthura estacahuitensis* sp. nov., holotype, ♀, 6.8 mm, Oaxaca, Puerto Ángel, Estacahuite Beach (UMAR-PERA 547). **A.** Pereopod 1 and detail of the palm (a). **B.** Pereopod 2 and detail of the dactylus. **C.** Pereopod 3. **D.** Pereopod 4. **E.** Pereopod 5. **F.** Pereopod 6. **G.** Pereopod 7 and detail of carpus and sensory spines.

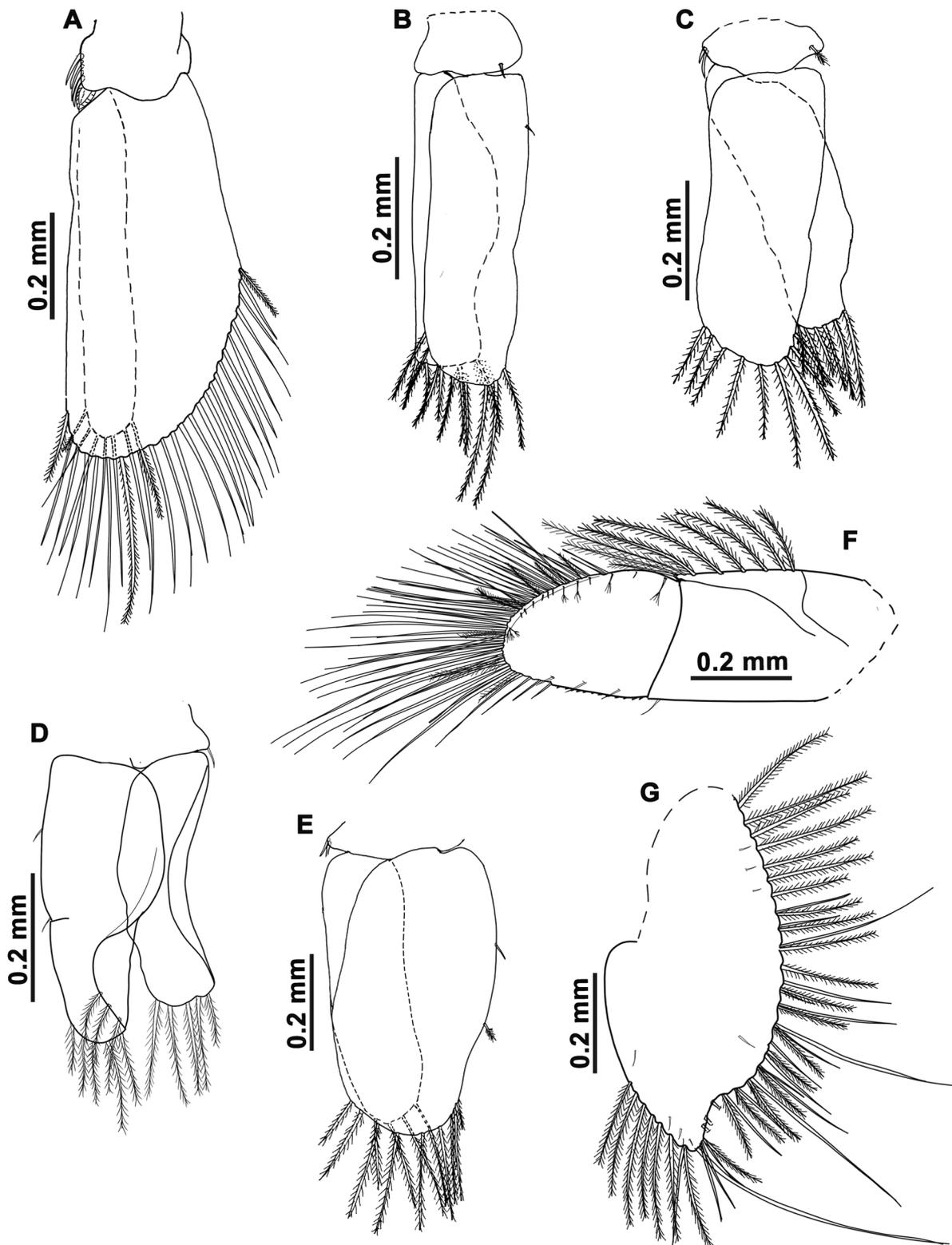


Fig. 13. *Mesanthura estacahuitensis* sp. nov., holotype, ♀, 6.8 mm, Oaxaca, Puerto Ángel, Estacahuite Beach (UMAR-PERA 547). **A.** Pleopod 1. **B.** Pleopod 2. **C.** Pleopod 3. **D.** Pleopod 4. **E.** Pleopod 5. **F.** Uropodal endopod. **G.** Uropodal exopod.

Genus *Skuphonura* Barnard, 1925

Skuphonura oaxaquensis sp. nov.

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Figs 14–16, 20E, Table 2

Etymology

This species is named after Oaxaca, the Mexican State where the specimens were collected.

Material examined

Holotype

MEXICO • ♀ (body length 7.9 mm); Oaxaca, Puerto Ángel, Estacahuite Beach; 15°40' N, 96°29' W; depth 2–4 m; 10 Sep. 2005; J.R. Bastida-Zavala *et al.* leg.; coral rock; UMAR-PERA 548.

Paratypes

MEXICO • 1 ♂ (body length 7.3 mm); same collection data as for holotype; UMAR-PERA 549 • 12 ♀♀, 1 ♂; same collection data as for holotype; UMAR-PERA 550.

Description

Holotype (♀, UMAR-PERA 548)

BODY (Figs 14A–B, 20E). Length 7.9 mm, 8.4 times as long as wide with pigment in the cephalon and margins of each somite; body proportion: $C < 1 > 2 \geq 3 < 4 > 5 > 6 > 7$. Cephalon 1.2 times as long as wide, rostrum as long as the lateral angles of cephalon, base of the mouthparts with two sharp spines. Pereonite 7 rectangular, 1.3 times as wide as long; pleonites 1–5 fused, broadened distally, slightly longer than pereonite 7; telson linguiform, narrow distal region, mid-distal region with a group of seven setae, apex slightly excavated with three pairs of setae; a pair of the statocysts.

ANTENNULE (Fig. 14D). Peduncle with three articles. Articles 1 and 2 with plumose sensory setae; article 2 rectangular, slightly more than half the length of the first with six long distolateral setae; article 3 sub-equal in length to second with one long seta in the external distal angle and two in the internal one; flagellum with three articles, last tiny article with three aesthetascs and two smooth setae.

ANTENNA (Fig. 14E). Peduncle with five articles. Article 2 with ventrodistal angle projected to article 3; flagellum with four articles with numerous thin setae.

MAXILLIPED (Fig. 14F). Palp with three articles; article 1 with concave external margin; article 2 larger to the others with sinuous internal margin; distal article subcircular with a row of distal setae.

MAXILLA (Fig. 14G). With eight distal teeth.

MANDIBLE (Fig. 14H). Symmetrical; palp with three articles, article 1 sub-equal in length to the second with a long pectinate seta; article 2 with three pectinate setae and setulated scales in dorsal margin; article 3 small, 0.4 times as long as second, with four distal setae; incisor with four teeth; lacinia mobilis with 11 denticles and molars with two rounded tubercles.

PEREPOD 1 (Fig. 15A). Subchelate; basis with dorsodistal angle lobate; carpus subtriangular, distal angle projected transversally; palm concave with a strong proximal tooth; proximal margin with six setae, distal margin with eight setae; internal margin of dactylus slightly concave with a cuticular ridge; unguis slightly more than half the length of dactylus with a slight curvature distally.

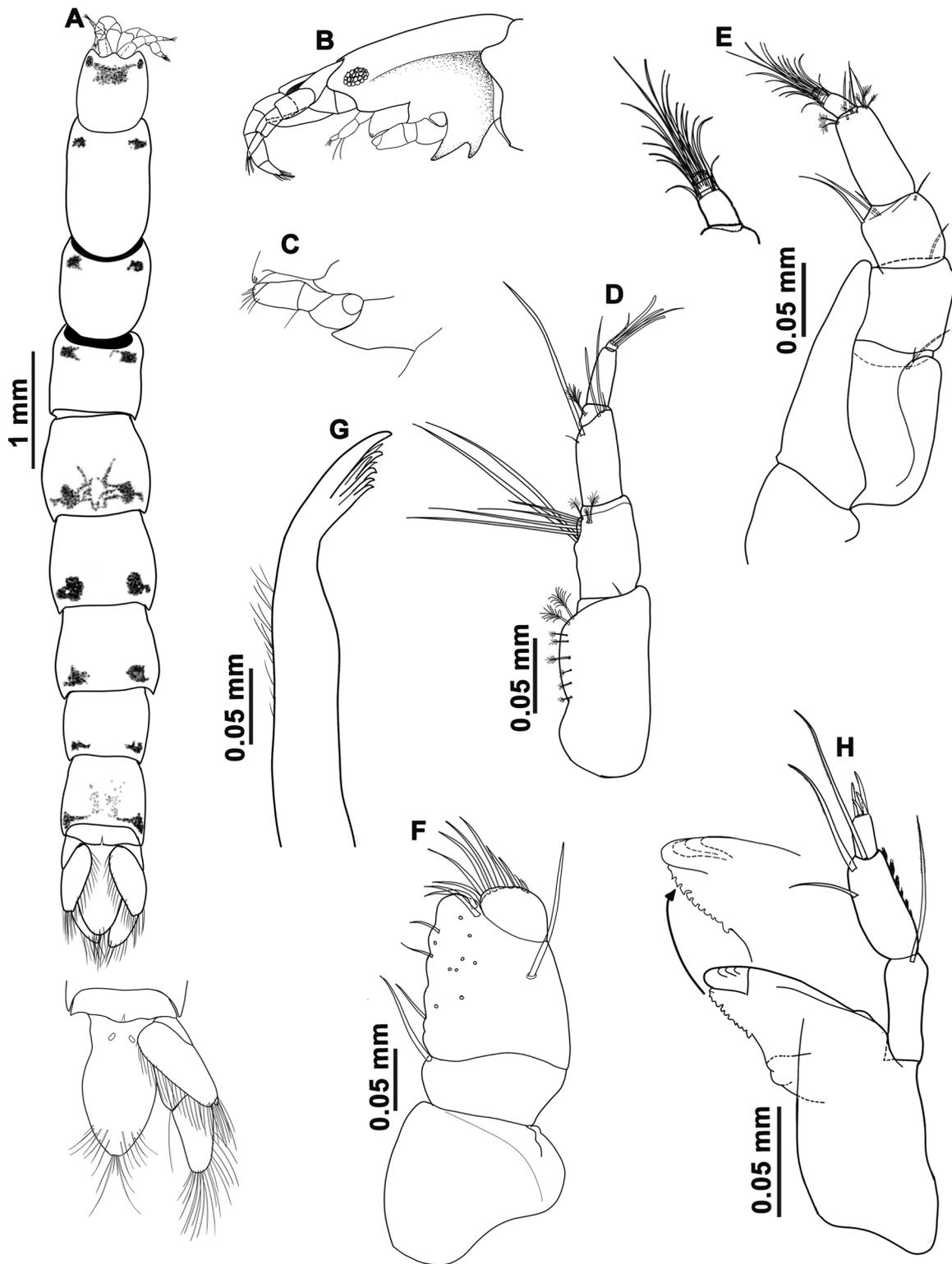


Fig. 14. *Skuphonura oaxaquensis* sp. nov. **A–B, D–H.** Holotype, ♀, 7.9 mm, Oaxaca, Puerto Ángel, Estacahuite Beach (UMAR-PERA 548). **A.** Habitus and detail of the pleotelson. **B.** Cephalon. **C.** Paratype, ♂, 7.3 mm (UMAR-PERA 549). Base of mouthparts. **D.** Antennule. **E.** Antenna and detail of flagellum. **F.** Maxilliped. **G.** Maxilla. **H.** Mandible and detail of the lacinia.

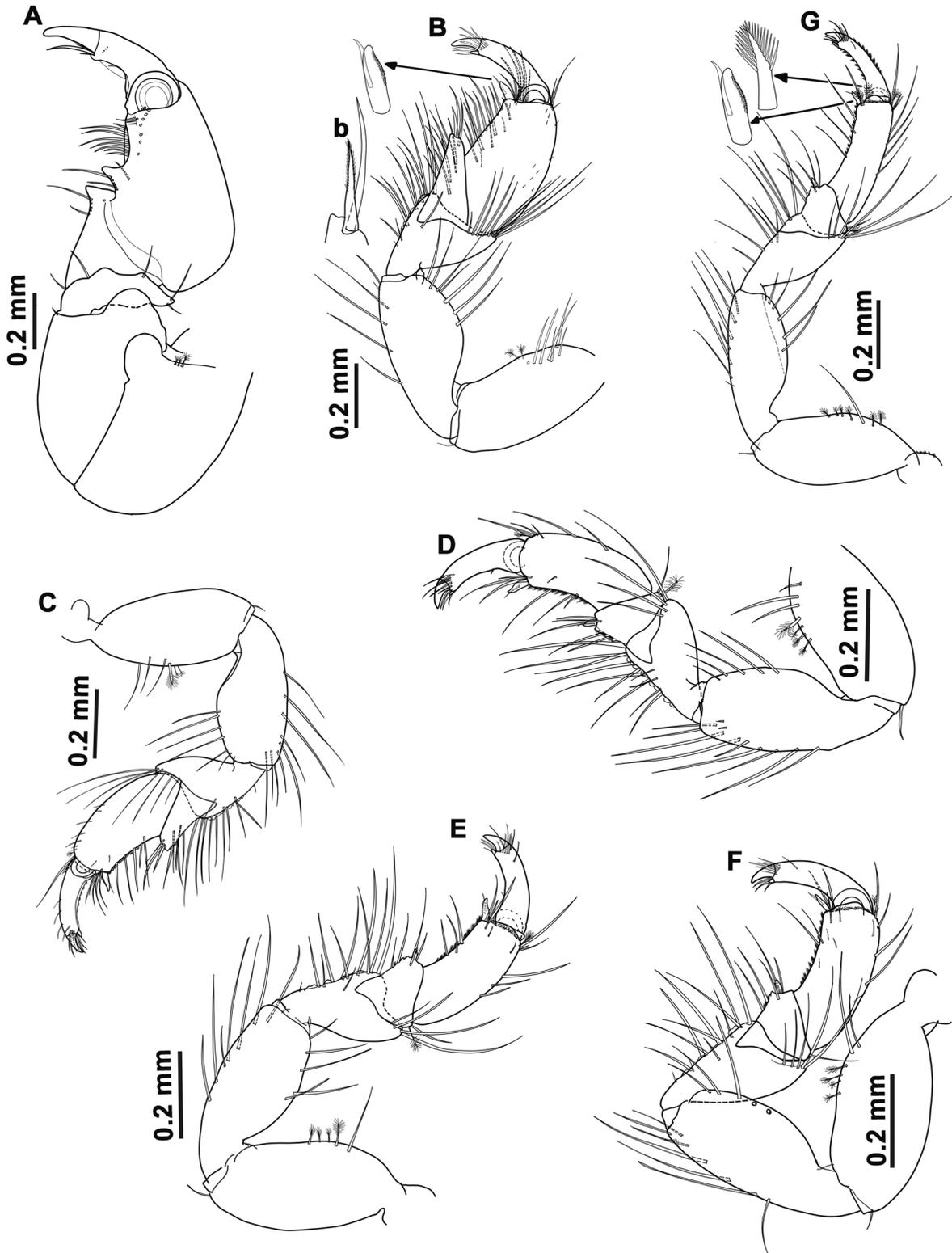


Fig. 15. *Skuphonura oaxaquensis* sp. nov., holotype, ♀, 7.9 mm, Oaxaca, Puerto Ángel, Estacahuite Beach (UMAR-PERA 548). **A.** Pereopod 1. **B.** Pereopod 2 and detail of the carpus (b) and sensory spine. **C.** Pereopod 3. **D.** Pereopod 4. **E.** Pereopod 5. **F.** Pereopod 6. **G.** Pereopod 7 and detail of the sensory spines..

PEREPODS 2–3 (Fig. 15B–C). Similar in shape and size. Merus internal margin with cuticular ridges and numerous setae; carpus triangular, distal margin with a denticulate seta; palm with numerous setae and setulated scales, ventral angle with a denticulate sensory spine and a group of smooth setae.

PEREPODS 4–6 (Fig. 15D–F). Similar in shape and size. Merus margin with cuticular ridges; carpus subtriangular, truncated distally with a simple sensory spine and simple setae; propodus cylindrical, 2–2.1 times as long as wide in P4 and P5, 2.3 in P6, internal margin with setulated scales and simple setae, ventrodiscal angle with a denticulate sensory spine and simple setae.

PEREPOD 7 (Fig. 15G). Slenderer than the preceding ones, propodus 3.3 times as long as wide, ventrodiscal margin with setulated scales and one denticulate sensory spine and two pectinate spines; lateral margins of dactylus with setulated scales.

PEREPODS 2–7. With smooth and plumose sensory setae at the basis.

PLEOPOD 1 (Fig. 16A). Protopod with three retinaculae; exopod operculiform, 2.2 times as long as wide, surrounded distally by 40 plumose setae; endopod 0.7 times the length of exopod, surrounded distally by five plumose setae.

PLEOPOD 2 (Fig. 16B). Oval and elongated; exopod 2.8 times as long as wide, surrounded distally by 12 plumose setae; endopod slightly shorter than exopod, surrounded distally by eight plumose setae.

UROPODAL PROPOD (Fig. 16C). Rectangular, 1.7 times as long as wide, 1.2 times as long as endopod, external margin with plumose setae, ventrodiscal angle with a long seta.

UROPODAL ENDOPOD (Fig. 15C). Conical, 1.9 times as long as basal width, apically rounded, external margin with numerous long setae.

UROPODAL EXOPOD (Fig. 16D). Suboval with a distal notch, margin with 17 long smooth setae and approximately 55 plumose setae.

Male (dimorphic characters; based on the paratype ♂, UMAR-PERA 549)

BODY. Mid-region of the cephalon (Fig. 14C) with a poorly developed spine.

ANTENNULE (Fig. 16E). Peduncle with three articles; article 1 and 2 with plumose sensory setae; article 2 with six long setae in the external distal angle; flagellum with nine articles, distal article with three aesthetascs.

PEREPOD 1 (Fig. 16F). Subchelate; carpus triangular, distally produced in a narrow triangular process; propodus oval, palm straight with a triangular proximal process, accompanied by eight setae; dactylus 1.4 times as long as unguis, distoventral angle with a small spine.

PLEOPOD 2 (Fig. 16G). Endopod and exopod sub-equal in length; exopod surrounded distally by 11 plumose setae; endopod surrounded distally by seven plumose setae; male appendix thin, longer than the branches, emerging from the middle proximal part of the endopod, ending in a pointed apex.

Distribution and habitat

Known only from the type locality, Estacahuite Beach, Oaxaca. In coral rock; subtidal (4 m).

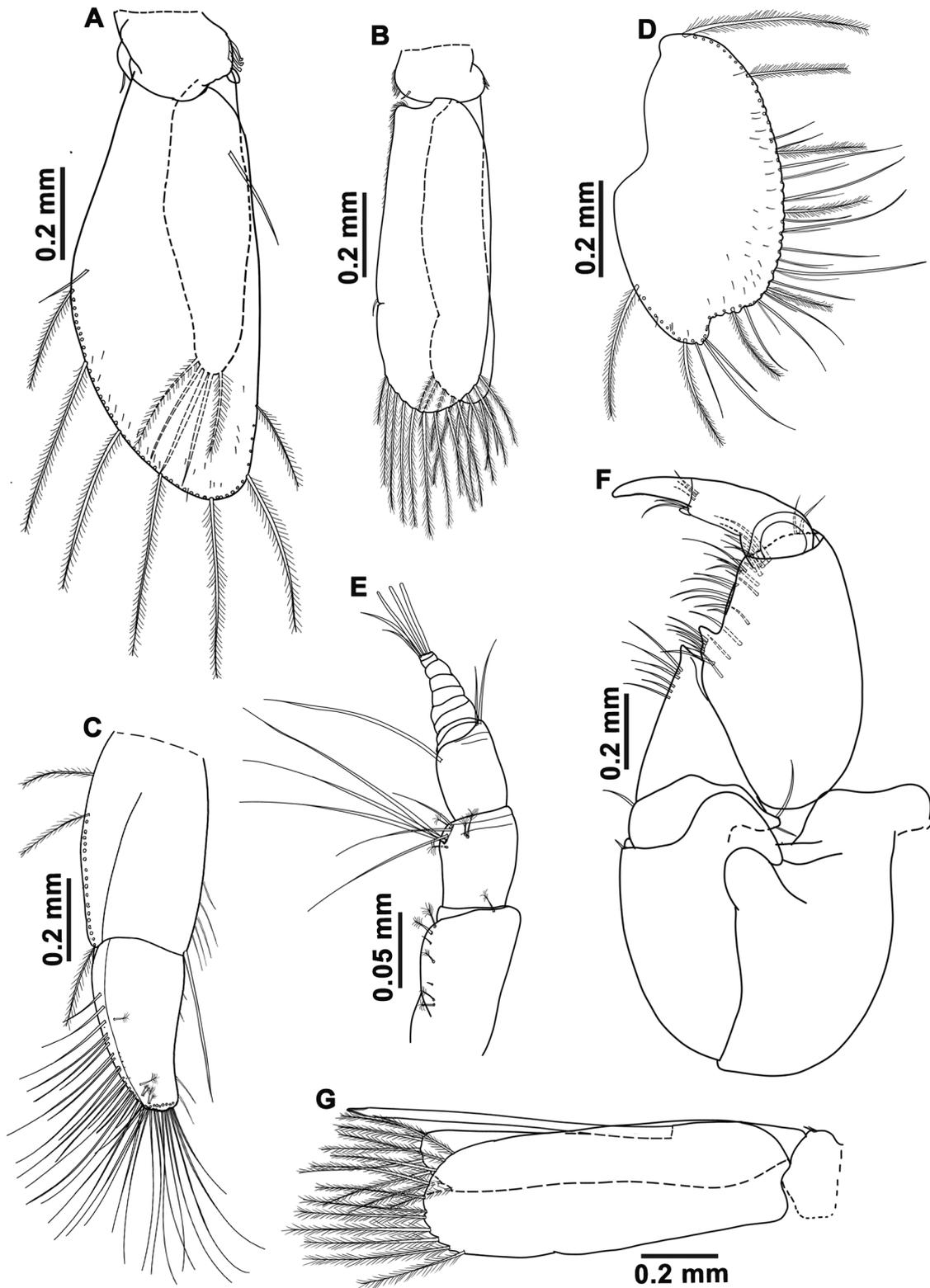


Fig. 16. *Skuphonura oaxaquensis* sp. nov. **A–D.** Holotype, ♀, 7.9 mm, Oaxaca, Puerto Ángel, Estacahuite Beach (UMAR-PERA 548). **A.** Pleopod 1. **B.** Pleopod 2. **C.** Uropodal endopod. **D.** Uropodal exopod. **E–G.** Paratype, ♂, 7.3 mm (UMAR-PERA 549). **E.** Antennule. **F.** Pereopod 1. **G.** Pleopod 2.

Table 2. Comparison between *Skuphonura oaxaquensis* sp. nov. and the closest species of genera.

Character / species	<i>S. ecuadorensis</i> Kensley, 1980	<i>S. itapuca</i> Kensley, 1980	<i>S. kensleyi</i> Brusca & Müller, 1991	<i>Skuphonura</i> <i>oaxaquensis</i> sp. nov.
Locality	La Libertad, Ecuador	Nichteroy, Rio de Janeiro, Brazil	Santa Marta, Punta de Betin, Colombia	Estacahuite Beach, Oaxaca
Body length	7.2 mm	9.3 mm	5.7 mm	7.9 mm
Body	Not pigmented	Not pigmented	Reticulated pigment	Partially pigmented
Anterior length of cephalon	Wider than the posterior	Subequal as the posterior	As wide as the posterior	As wide as the posterior
Medioventral processes of cephalon	1 conical spine, 1 blunt tubercle	2 conical spine	–	2 conical spine
Articles of flagellum A1	1	1	3	3
Aesthetascs	2	2	1	3
Article of flagellum A2	1	1	1	4
<i>Lacinia mobilis</i> denticles	11	9	6	10
Setae of the last article of mandibular palp	3	3	3	4
Setae of the 2 article of mandibular palp	4	3	2	3
Carpus of P1	Well produced	Slightly produced	Well produced	Well produced
Palm spines of P1	2 distal	1 large proximal and 1 small distal	1 small medial	1 large proximal

Remarks

Skuphonura oaxaquensis sp. nov., and three other species of genus: *S. kensleyi* Brusca & Müller, 1991, *S. itapuca* Kensley, 1980 and *S. lindae* Menzies & Kruczynski, 1983 (Table 2), share the following two characters: anterior margin of the cephalon as wide as the posterior margin and the anterolateral lobes are sub-equal to the rostral process, while in *S. ecuadorensis* Kensley, 1980 and *S. laticeps* Barnard, 1925, the anterior margin of the cephalon is wider than the posterior and the lobes are longer than the rostral process.

Skuphonura itapuca, described from Nichteroy, Rio de Janeiro, Brazil, is the closest species to *S. oaxaquensis* sp. nov. by the following characteristics: (1) absence of a mid-ventral spine in the pereonite 1, (2) mid-ventral region of cephalon with two processes, (3) second article of mandibular palp with three long setae. However, in *S. oaxaquensis* sp. nov. the body is partially pigmented, cephalon slightly wider medially, flagellum of antennule with three articles, distal article with three aesthetascs, flagellum of antenna with four articles, and carpus of pereopod 1 is externally projected and palm with one proximal tooth; while, *S. itapuca* lacks pigment, anterior margin of the cephalon is slightly wider than the posterior, flagellum of antennule with two article and two distal aesthetascs, flagellum of antenna with one article, carpus of pereopod 1 projected apically and palm with one proximal and one distal spine.

Skuphonura oaxaquensis sp. nov. and *S. kensleyi*, described from Santa Marta, Punta de Betín, Colombian Caribbean, are similar by the following characteristics: (1) pigmentation pattern, (2) cephalon slightly wider medially, (3) antennular flagellum, (4) carpus of pereopod 1. However, in *S. kensleyi* the pereonites and pleon have reticulated pigmentation, antennular flagellum with one aesthetasc, antennal flagellum with one article, the second article of the mandibular palp with two distal setae and three proximal setae, lacinia mobilis with six denticles, and palm of the pereopod 1 has a medial tooth; while, in *S. oaxaquensis* sp. nov. the reticulated pigmentation is partial in pereonite 4 and pleon.

Skuphonura oaxaquensis sp. nov. differs from the preceding species by the following unique characteristics: (1) body pigmentation, (2) last article of mandibular palp with four setae, (3) lacinia mobilis with 11 denticles, (4) inner margin of the second article of maxillipedal palp sinus, and (5) palm of pereopod 1 with a proximal tooth.

Genus *Tinggianthura* Chew, Abdul-Rahim & Haji Ross, 2014

***Tinggianthura mexicana* sp. nov.**

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Figs 17–19, 20F, Table 3

Etymology

This species is named after Mexico, the country where the second species of the genus is described.

Material examined

Holotype

MEXICO • ♀ (body length 3.7 mm); Oaxaca, Huatulco, El Maguey Bay; 15°43'59.6172" N, 96°9'5.5116" W; depth 1 m; 4 Jul. 2007; B. Martínez-Guerrero *et al.* leg.; algae and sediment; UMAR-PERA 561.

Paratypes

MEXICO • 1 ♂ (body length 3.9 mm); same collection data as for holotype; UMAR-PERA 562 • 3 ♀♀, 2 ♂♂; same collection data as for holotype; UMAR-PERA 563.

Additional material

MEXICO – **Guerrero** • 1 ♀; Ixtapa Island, Coral Beach, E-1A; 17°40'38" N, 101°39'20" W; depth 1.5 m; 19 Sep. 2007; M.S. García-Madrigal *et al.* leg.; coral rock; UMAR-PERA 551 • 1 ♂; same locality data as for preceding; depth 6 m; 19 Sep. 2007; M.S. García-Madrigal *et al.* leg.; algae; UMAR-PERA 552 • 1 ♂; Acapulco, La Roqueta Island; 16°49'26" N, 99°54'29" W; depth 2 m; 21 Sep. 2007; M.S. García-Madrigal *et al.* leg.; tubes of sabellariids; UMAR-PERA 553. – **Oaxaca** • 1 ♀, 1 ♂; Zipolite, Playa del Amor; 15°39'35" N, 96°30'33" W; 3 Jul. 2007; S. Rodríguez-Hernández *et al.* leg.; algae in tidal pool; UMAR-PERA 554 • 3 ♀♀, 1 ♂; Puerto Ángel, Estacahuite Beach; 15°40' N, 96°29' W; depth 2–4 m; 18 May. 2005; J.R. Bastida-Zavala *et al.* leg.; coral rock; UMAR-PERA 555 • 1 ♀, 2 ♂♂; same locality data as for preceding; 10 Sep. 2005; J.R. Bastida-Zavala *et al.* leg.; UMAR-PERA 556 • 3 ♀♀, 2 ♂♂; Puerto Ángel, Estacahuite Beach; 15°40'6" N, 96°28'54" W; depth 4 m; 25 Aug. 2006; J.R. Bastida-Zavala *et al.* leg.; coral rock; UMAR-PERA 557 • 3 ♀♀; Puerto Ángel, La Boquilla Bay; 15°40'59" N, 96°27'54" W; 3 Nov. 2007; J. Medina-Elizalde and E. Serrano-Figueroa leg.; shallow water sand; UMAR-PERA 558 • 11 ♀♀; Pochutla, La Tijera Beach; 15°41'33" N, 96°26'33" W; depth 2–4 m; 30 Apr. 2005; J.R. Bastida-Zavala *et al.* leg.; coral rock; UMAR-PERA 559 • 1 ♂; same locality data as for preceding; 17 Sep. 2006; J.R. Bastida-Zavala *et al.* leg.; UMAR-PERA 583 • 1 ♀; Huatulco, San Agustín Bay; 15°41'27" N, 96°14'15" W; 24 Feb. 2007; M.S. García-Madrigal *et al.* leg.; shallow water coral algae; UMAR-PERA 560.

Description

Holotype (♀, UMAR-PERA 561)

BODY (Figs 17A, 20F). Length 3.7 mm, 9.9 times as long as wide with a pigment line on the cephalon and pereonites 2–6; body proportion: $C < 1 > 2 < 3 < 4 = 5 > 6 > 7$. Cephalon as long as wide, 0.4 times as long as pereonite 1, rostrum as long as lateral angles; eyes small, rounded. Pereonite 1 long compared to the others, pereonite 7 the shortest. Pleon sub-square, 1.4 times as long as pereonite 7; pleonites 1–5 fused with ventrolateral suture lines, distal margin of pleonite 6 emarginated. Telson linguiform, 2.3 times as long as wide with a pair of proximal statocysts; dorsal surface squamous with a row of distal and medial setae, apex with a small excavation with three pairs of setae, two short and one long.

ANTENNULE (Fig. 17B). Peduncle with three articles. Article 1 and 2 with plumose sensory setae; article 2 with four long setae; article 3 with four long setae on the external margin and one on the internal distal angle; flagellum with three articles, second article 3.6 times as long as third, article 3 with three aesthetascs.

ANTENNA (Fig. 17C). Peduncle with five articles. Article 2 larger compared to the others, 1.2 times as long as wide and 2.2 times as long as the third one, article 3 sub-equal to article 4, article 4 square with simple and sensory setae in the internal distal angle, last article 1.3 times as long as article 4, distal margin with a group of smooth and sensory plumose setae; flagellum with three articles, article 1 visible, distal articles smaller, difficult to distinguish with numerous setae.

MAXILLIPED (Fig. 17D). Palp with two articles, first article with one proximal seta, one medial and two distal; article 2 oblique with five setae. Endite absent.

MAXILLA (Fig. 17E). With six distal teeth.

MANDIBLE (Fig. 17F). Symmetrical; palp with three articles, article 1 with one seta; article 2 with four long setae; article 3 reduced, 0.25 times the length of the article 1 with a robust denticulate seta; incisor with three teeth; lacinia mobilis with four denticles and molar blunt.

PEREOPOD 1 (Fig. 18A). Subchelate; carpus triangular, apically rounded with a cuticular ridge and seven simple setae; propodus oval, 2 times as long as wide, palm convex with a cuticular ridge and a row of eight setae; dactylus with a long seta in the ventrodistal angle; unguis longer than dactylus.

PEREOPODS 2–3 (Fig. 18B–C). Similar in shape and size. Carpus triangular with an apical denticle and two robust setae; propodus 1.9 times as long as wide, internal margin with 4–5 simple setae and one ventrodistally denticulate sensory spine, dorsal margin with a simple seta.

PEREOPODS 4–6 (Fig. 18D–F). Similar in shape and size. Merus inner margin denticulate; carpus trapezoid, ventrodistal margin with a simple sensory spine and a plumose sensory seta in the dorsal margin; propodus cylindrical, internal margin with setulated scales and two simple setae, ventrodistal angle with one denticulate sensory spine.

PEREOPOD 7 (Fig. 18G). Similar to pereopods 4–6, slender. Propodus 2.6 times as long as wide, ventral margin with one simple seta and setulated scales, ventrodistal angle with one denticulate sensory spine and two pectinate spines; dactylus with setulated scales on ventral and dorsal margins. Basis of all pereopods with simple and plumose sensory setae.

PLEOPOD 1 (Fig. 19A). Protopod with three retinaculæ and two setae on the inner margin; exopod operculiform, 2.1 times as long as wide and 2.6 times as wide as endopod, internal proximal margin

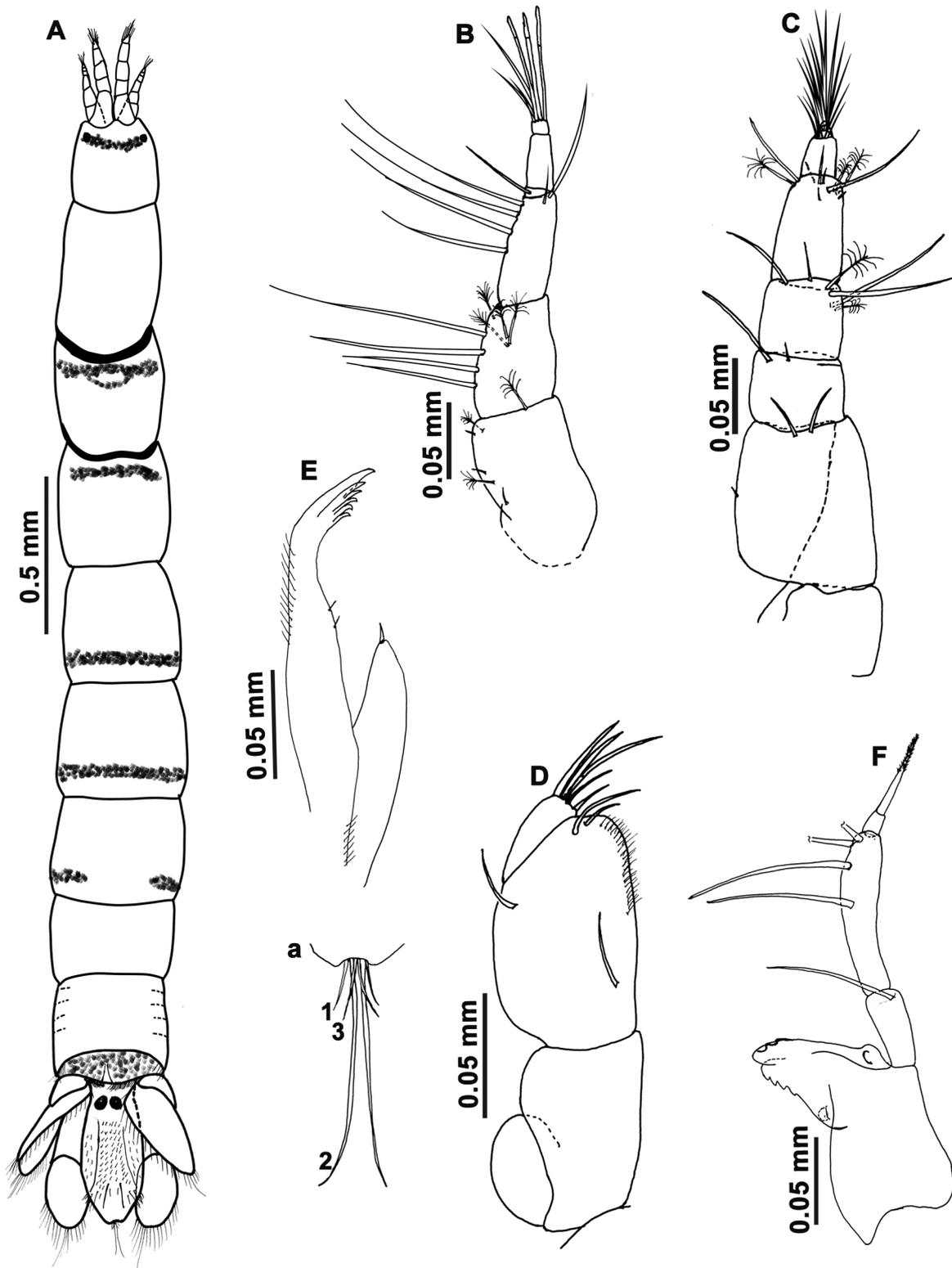


Fig. 17. *Tinggianthura mexicana* sp. nov., holotype, ♀, 3.7 mm, Oaxaca, Huatulco, El Maguey Bay (UMAR-PERA 561). A. Habitus and detail of the telson (a) (the numbers indicate the pairs of setae). B. Antennule. C. Antenna. D. Maxilliped. E. Maxilla. F. Mandible.

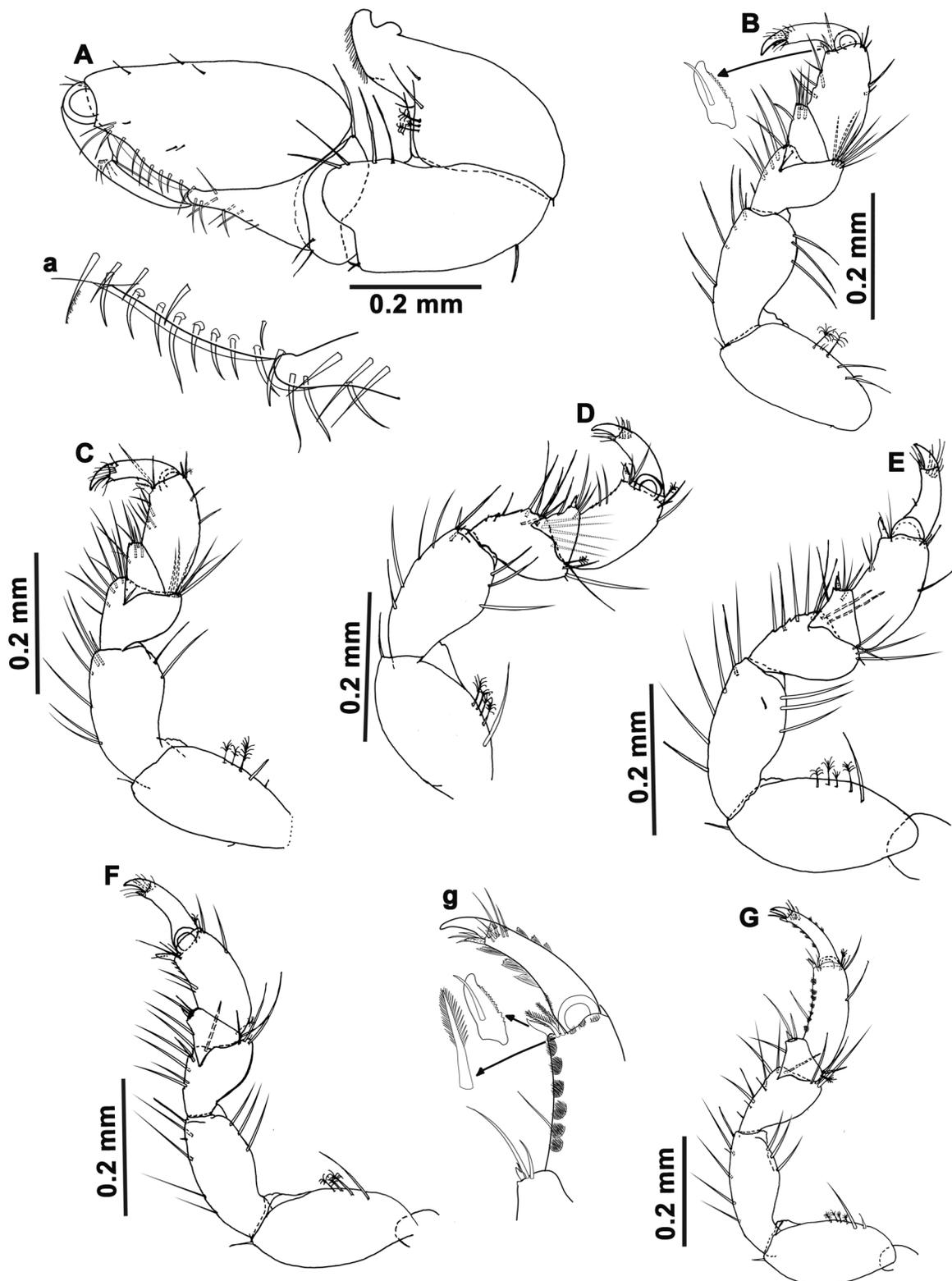


Fig. 18. *Tinggianthura mexicana* sp. nov., holotype, ♀, 3.7 mm, Oaxaca, Huatulco, El Maguey Bay (UMAR-PERA 561). **A.** Pereopod 1 and detail of the palm (a). **B.** Pereopod 2 and detail of the sensory spine. **C.** Pereopod 3. **D.** Pereopod 4. **E.** Pereopod 5. **F.** Pereopod 6. **G.** Pereopod 7 and detail of propodus and dactylus (g).

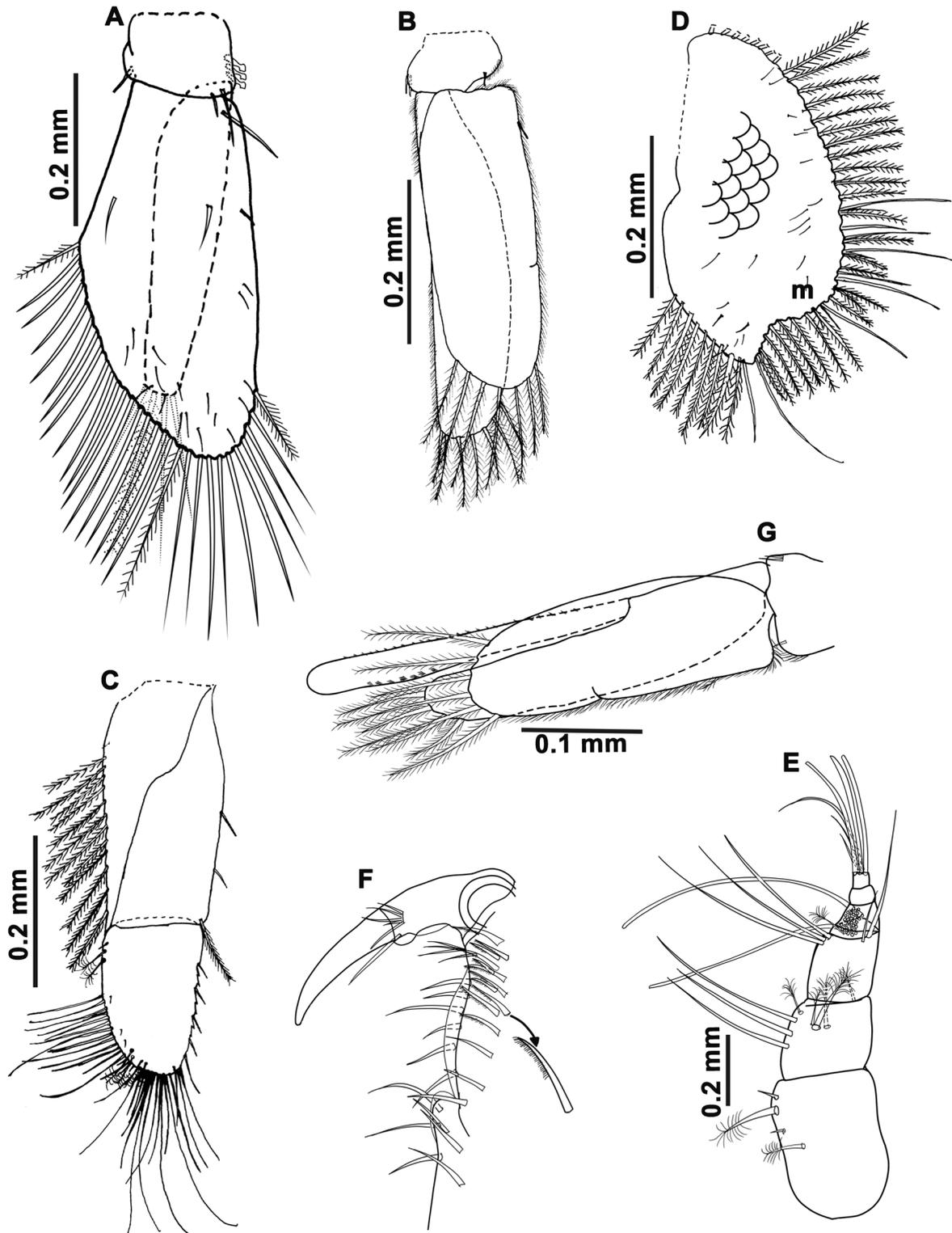


Fig. 19. *Tinggianthura mexicana* sp. nov. **A–D.** Holotype, ♀, 3.7 mm, Oaxaca, Huatulco, El Maguey Bay (UMAR-PERA 561). **A.** Pleopod 1. **B.** Pleopod 2. **C.** Uropodal endopod. **D.** Uropodal exopod. **E–G.** Paratype, ♂, 3.9 mm (UMAR-PERA 562). **E.** Antennule. **F.** Pereopod 1. **G.** Pleopod 2.

with a simple seta, distal margin surrounded by 29 plumose setae; endopod surrounded distally by four plumose setae.

PLEOPOD 2 (Fig. 19B). Exopod elongated oval, 0.8 times the length of endopod; endopod and exopod surrounded distally by seven plumose setae.

UROPODAL PROPOD (Fig. 19C). Rectangular, 1.6 times as long as endopod, external margin with a row of plumose setae, distoventral angle with a plumose seta.

UROPODAL ENDOPOD (Fig. 19C). Oval, distally rounded, 1.5 times as long as wide, slightly longer than pleotelson; distal margin surrounded by simple and plumose sensory setae.

UROPODAL EXOPOD (Fig. 19D). Oval, distally excavated, 1.8 times as long as wide, margin surrounded by 52 long setae, eight simple and 44 plumose setae; dorsal surface covered by scales and some small setae.

Male (dimorphic characters; based on the paratype ♂, UMAR-PERA 562)

ANTENNULE (Fig. 19E). Peduncle with three articles; article 1 almost twice as long as second, outer margin with plumose sensory setae; article 2 sub-square, outer margin with three long setae and sensory setae in distal margin; article 3 with three long setae in the dorsodistal angle and two on the ventral one; flagellum with four article, article 1 tiny; article 2 with a group of long aesthetascs; distal article with three aesthetascs and simple setae.

PEREOPOD 1 (Fig. 19F). Similar to the female; carpus triangular, rounded distally with a cuticular ridge and simple setae; palm slightly convex with a cuticular ridge and seven short marginal setae, mesial region with a row of smooth and pectinate setae.

PLEOPOD 2 (Fig. 19G). Exopod elongated oval, distal margin surrounded by six plumose setae; endopod longer than exopod, 0.6 times its width, distal margin with four plumose setae; male appendix cylindrical, rounded apex, distolateral margins with setulated scales.

Distribution and habitat

From Ixtapa, Guerrero to Huatulco, Oaxaca. In coral, coral rock, algae, tubes of sabellariids and sand; intertidal to subtidal (6 m).

Remarks

Tinggianthura alba Chew, Abdul-Rahim & Haji Ross, 2014, described from Pulau Tinggi, Johor, Malaysia, is the only other species of this genus and differs from *T. mexicana* sp. nov. by having the following unique characteristics: body slightly pigmented; article three of mandibular palp with one pectinate seta; pleopod 1 with inner margin of protopod with two distal setae and exopod with inner proximal seta; and telson and uropodal exopod with scales on dorsal surface. *Tinggianthura mexicana* sp. nov. is similar to *T. alba* by the following characteristics: (1) the article 3 of the mandibular palp is almost a third of 1, (2) maxillipedal palp with two free segments, (3) palm of the pereopod 1 without a marginal projection, and (4) pleon as long as wide. The new species differs from *T. alba* by (1) distal setae of telson, (2) antennal flagellum, (3) lacinia mobilis, (4) molar process, and (5) palm of pereopod 1. While in *T. alba* the telson has three setae on the lateral margins and eight on the dorsal surface, the antennal flagellum has two articles, lacinia mobilis with five denticles, molar process is strongly projected, and the palm of pereopod 1 has many setae. In comparison, in the new species the telson has five lateral and 10 dorsal setae, antennal flagellum with three articles, lacinia mobilis with four teeth, molar process is truncated, and palm of the pereopod 1 with eight robust setae (Table 3).



Fig. 20. A. *Amakusanthura guerrerensis* sp. nov., holotype, ♀ (UMAR-PERA 522). B. *Cortezura caeca* sp. nov., holotype, ♀ (UMAR-PERA 534). C. *Mesanthura antenniformis* sp. nov., paratype, ♀ (ovigerous) (UMAR-PERA 540). D. *M. estacahuitensis* sp. nov., holotype, ♀ (UMAR-PERA 547). E. *Skuphonura oaxaquensis* sp. nov., holotype, ♀ (UMAR-PERA 548). F. *Tinggianthura mexicana* sp. nov., holotype, ♀ (UMAR-PERA 561). Scale bars = 1 mm.

Table 3. Comparison between *Tinggianthura alba* Chew, Abdul-Rahim & Haji Ross, 2014 of Malaysia and *Tinggianthura mexicana* sp. nov. from Oaxaca, Mexico.

Character / species	<i>T. alba</i> Chew, Abdul-Rahim & Haji Ross, 2014	<i>Tinggianthura mexicana</i> sp. nov.
Locality	Pulau Tinggi, Johor, Malaysia	El Maguey Bay, Huatulco, Oaxaca
Body length	3.9 mm	3.7 mm
Body	Non pigmented	Slightly pigmented
A1 flagellum	3 articles	3 articles
A2 flagellum	2 articles	3 articles
Article 3 of the mandibular palp	2 smooth setae	1 setulated seta
<i>Lacinia mobilis</i>	6 teeth	4 teeth
Maxillipedal palp	2 articles	2 articles
Palm of P1	Slightly convex	Convex
Setae of protopod of P11	None	2 internal setae
Setae of exopod of P11	29 distal	1 long proximal and 29 distal
Distal setae of endopod of P11	5	4
Scales on uropodal exopod	None	Present
Scales on telson surface	None	Present
Setae on subdistal region of telson	3 marginal and 8 dorsal	5 marginal and 10 dorsal setae
Apical region of telson	Slightly concave, 3 pairs of setae	Slightly concave, 3 pairs of setae

Discussion

Although the Anthuridae are the largest and most widespread anthuridean family (Poore 2001), the taxonomic knowledge of the group is very limited in some regions of the world (e.g., eastern Pacific). Also, many genera are very widespread, and probably old, such as *Cortezura*, *Skuphonura* and *Tinggianthura*, which are represented by few species having been recorded only once and with restricted distribution, so it could be thought that these species probably present a high endemism as mentioned Kensley & Schotte (2000).

Among the 26 genera of Anthuridae known in the world, five have been recorded in the tropical eastern Pacific, *Cortezura*, *Cyathura* Norman & Stebbing, 1886, *Haliophasma* Haswell, 1881, *Mesanthura* and *Skuphonura* (Espinosa-Pérez & Hendrickx 2001). With the present study, the number of genera increases to seven, recording for the first time *Amakusanthura* and *Tinggianthura* and the number of species increases from nine to 15. Also, *Tinggianthura mexicana* sp. nov. is the second species described in the genus. Likewise, *Skuphonura oaxaquensis* sp. nov. is the second species of the genus described from the tropical eastern Pacific, extending the distribution range of the genus from the coast of Ecuador to Oaxaca, Mexico.

This study is the first work about anthurideans in the north eastern Pacific of Mexico, the discovery of these six new species is indicative of the marine biodiversity that still needs to be discovered from this region and, in general, from the Mexican Pacific (García-Madrigal *et al.* 2012; Bastida-Zavala *et al.* 2013; Jarquín-Gonzalez & García-Madrigal 2013). Therefore, an exhaustive sampling at other localities, other habitats, or even sampling in deeper waters from the Mexican Pacific would reveal more undescribed species of these anthuridean isopods.

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