

# A new deep-water species of *Epimeria* (Amphipoda: Gammaridea: Epimeriidae) from the continental slope of western Mexico

I. WINFIELD<sup>1</sup>, M. ORTIZ<sup>1</sup> AND M.E. HENDRICKX<sup>2</sup>

<sup>1</sup>Laboratorio de Crustáceos, Facultad de Estudios Superiores Iztacala-Universidad Nacional Autónoma de México, Avenida de los Barrios 1, Los Reyes Iztacala, Tlalnepantla, Estado de México, Mexico, <sup>2</sup>Laboratorio de Invertebrados Bentónicos, Unidad Académica Mazatlán, Instituto de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México, Mexico, PO Box 811, Mazatlán, 82000, Sinaloa, Mexico

*A new species of deep water Epimeria is described based on material collected in 1526–1586 m depth during the TALUD X expedition in the central Gulf of California, Mexico. It is the sixth species of this genus reported for the East Pacific. Epimeria morronei sp. nov. is morphologically similar to E. norfanzi Lörz, 2011 (New Zealand, 1268 m depth) and E. cora J.L. Barnard, 1971 (off Oregon, USA, 2086 m depth). Epimeria morronei sp. nov., however, differs from these two species by a combination of several characters, including: vestigial eyes; multidentate mandibular lacinia mobilis; a distinct setae arrangement in palm and dactylus of gnathopods 1–2; the shape and relative size of coxae 1–5; and the shape of the telson.*

**Keywords:** Amphipoda, Epimeriidae, *Epimeria* new species, continental slope, Gulf of California, taxonomy

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## INTRODUCTION

The family Epimeriidae Boeck, 1871 is distributed worldwide and is particularly well represented in the Antarctic. Species belonging to this family inhabit the continental shelf and slope, in trenches and seamounts, in soft bottoms between 48 m and 3710 m depth (Lörz & Brandt, 2004). Very recently, Lörz (2008, 2009) reported a total of 27 described species in the family Epimeriidae from the Southern Hemisphere. However, since then the number of known species has increased dramatically to a total of 60 marine species in five genera. The most speciose genus, *Epimeria* Costa, 1851, contains 50 species of which about half (25) are from the Antarctic, 11 from the Pacific, 11 from the Atlantic, and one from the Indian Ocean, and another from Australian waters (Coleman & Barnard, 1991; Lörz, 2008, 2011, 2012; Lörz *et al.*, 2009).

Members of the family Epimeriidae are characterized by a laterally-compressed body, a well developed rostrum, long antennae, strong mandibular rakers, and a long mandibular molar process. Many species are blind or feature reduced eyes (Coleman & Barnard, 1991; Lörz & Brandt, 2004).

During exploration expeditions along the western coast of Mexico, several lots of peracarids were obtained from bottom sediment samples or with a benthic sledge. Among this material, a series of 12 amphipods of the family Epimeriidae were recognized and represent an undescribed species in the genus *Epimeria*. This new species is described herein and morphologically compared to other species; very similar species

(*E. norfanzi* Lörz, 2011 and *E. cora* J.L. Barnard, 1971) are presented.

## MATERIALS AND METHODS

The material examined herein was collected during the TALUD X expedition (central Gulf of California; February 2007) aboard the RV 'El Puma' of the Universidad Nacional Autónoma de México (UNAM). Positional coordinates for the sampling stations were plotted using a GPS navigation system. Depth was measured with a digital recorder. Epibenthic water temperature and salinity were measured with a Seabird conductivity–temperature–depth (CTD) probe, and dissolved oxygen content was estimated with the Winkler method and with a probe attached to the CTD. Organic matter content in sediments was estimated by direct oxidation and titulation. During this expedition, samples were obtained from depths of 465 to 1865 m using a benthic sledge (2.5 m width, 0.9 m high) equipped with a modified shrimp net (~5.5 cm stretched mesh size) with ~2.0 cm (3/4") internal lining net. Although smaller than the mesh aperture, amphipods were retained due to the presence of many other organisms that clogged part of the net.

Specimens of *Epimeria* were examined, dissected and illustrated using a dissecting microscope MOTIC SMZ-168 equipped with a camera lucida. Bucal parts and small appendages were illustrated using a MOTIC BA-210 compound-microscope also equipped with a camera lucida. Illustrations were completed using the Corel Draw V.12 program. Terminology and taxonomic classification were taken from Coleman & Barnard (1991) and Lörz (2009, 2011). All

**Corresponding author:**  
M.E. Hendrickx  
Email: michel@ola.icmyl.unam.mx

specimens have been deposited in carcinological collections in Mexico: the Regional Marine Invertebrate Collection (EMU), at the Instituto de Ciencias del Mar y Limnología, UNAM, in Mazatlán, and the National Collection of Crustacea (CNCR), at the Instituto de Biología, UNAM, in Mexico DF. Abbreviations: TL, total length; St., sampling station.

## RESULTS

### SYSTEMATICS

Order AMPHIPODA Latreille, 1816  
 Suborder GAMMARIDEA Latreille, 1802  
 Family EPIMERIIDAE Boeck, 1871  
 Genus *Epimeria* Costa, 1851  
*Epimeria morronei* sp. nov.  
 (Figures 1–4)

### TYPE MATERIAL

Holotype: female, 23 mm TL, TALUD X expedition, St. 18, central Gulf of California (coordinates: 27°09'06"N 111°46'54"W), 1526 m depth, benthic sledge, RV 'El Puma' (EMU-9507); coll. M. Hendrickx, 12 February 2007.

Paratypes: TALUD X expedition, St. 22, central Gulf of California (coordinates: 27°02'46"N 111°52'57"W), 1575–1586 m depth, benthic sledge, RV 'El Puma'; coll. M. Hendrickx, 13 February 2007; one female, 16 mm TL (EMU-9508), one female, 19 mm TL (EMU-9509), three females, 19–28 mm TL (EMU-9510), three females, 16–18 mm TL (EMU-9519), one female, 19 mm (CNCR-26576), one female, 21 mm (CNCR-26577), and one female, 17 mm (CNCR-26578).

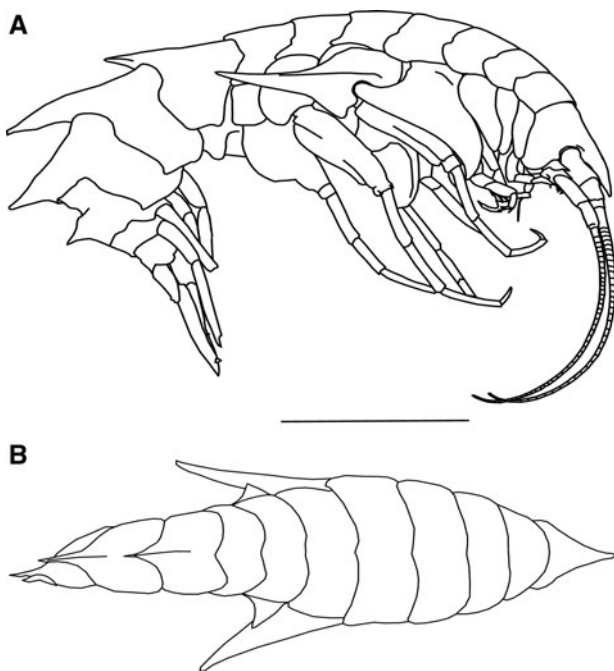


Fig. 1. *Epimeria morronei* sp. nov., holotype: adult female 23 mm, EMU-9507. (A) Lateral view; (B) dorsal view. Scale bar: A, B, 5.0 mm.

### ETYMOLOGY

This new species is named to honour Dr Juan José Morrone Lupi (Facultad de Ciencias, Universidad Nacional Autónoma de México), for his valuable contribution to the study of systematics in Mexico. It is derived from the noun *morrone* in the genitive case.

### DIAGNOSIS

Rostrum long; eyes vestigial; accessory flagellum scale-like; mandible with vestigial molar; lower lip without internal lobules; maxilliped palp 4-articulated, outer plate with inner margin finely serrated, 15 submarginal large tooth-like setae; gnathopods 1–2 subequal, chelated; pereonites without lateral process, pleonites each with long dorsal process; coxa 4 well developed, scythe-shaped, anterior margin sinuous, posterior margin expanding in a subtriangular process fitting into coxa 5; coxa 5 posteriorly produced into a spine-like process, tip reaching to first third of epimeral plate 1; posterior margin of telson serrate, with a medial cleft.

### DESCRIPTION

Holotype: adult female 23 mm (EMU-9507). Anterior cephalic region (Figures 1A, B & 2A) sinuous, anterior cephalic lobule developed, rounded, little produced; rostrum as long as head, reaching distal margin of peduncle article 2 of antenna 1; eyes vestigial, contour barely visible, small (less than 1/4 head height), unpigmented and without ommatidies.

Pereonite 1 (Figure 1A, B) slightly shorter than head (measured without rostrum); pereonite 2 subequal to pereonite 1; pereonites 1–6 lacking mid-dorsal or dorsolateral processes; pereonite 6 with 2 midlateral carinae, one on each side; pereonite 7 with a dorsal small tooth on posterior margin.

Pleonites 1–3 (Figure 1A, B) each with acute mid-dorsal tooth slightly curving posteriorly to overhang following somite.

Epimeron 1 (Figures 1A & 2B) anteroventral and posteroventral angles slightly rounded, anteroventral more pronounced; epimera 2 and 3 anteroventral angle rounded, posteroventral produced.

Urosomite 1 (Figure 1A) with mid-dorsal process; urosomites 2–3 without mid-dorsal processes.

Antenna 1 (Figure 2C) article 1 of peduncle with short distal setae, length subequal to articles 2 and 3 combined; accessory flagellum scale-like; primary flagellum with 40 articles.

Antenna 2 (Figure 2C) article 1 with three small distal processes; article 2 with two processes; article 3 the longest, with marginal ventral setae; primary flagellum with 53 articles.

Mandible (Figure 2D, E) with incisor and lacinia mobilis strongly dentate; molar vestigial; left incisor and lacinia mobilis with eight teeth each, right with eight and four teeth respectively, distal margin with 12 rakers; palp 3-articulated; article 2 with seven single setae; article 3 internal margin densely setose, with 32–33 single setae.

Maxilla 1 (Figure 2F) inner plate ovoid, distal margin with three stout plumose setae and eight stout single setae, inner margin with a spine-like basal process; outer plate distal margin with nine bifid, robust setae, 21–22 simple submarginal setae, and seven simple, subdistal setae; palp barely exceeding outer plate, article 1 short, article 2 curved and long, with

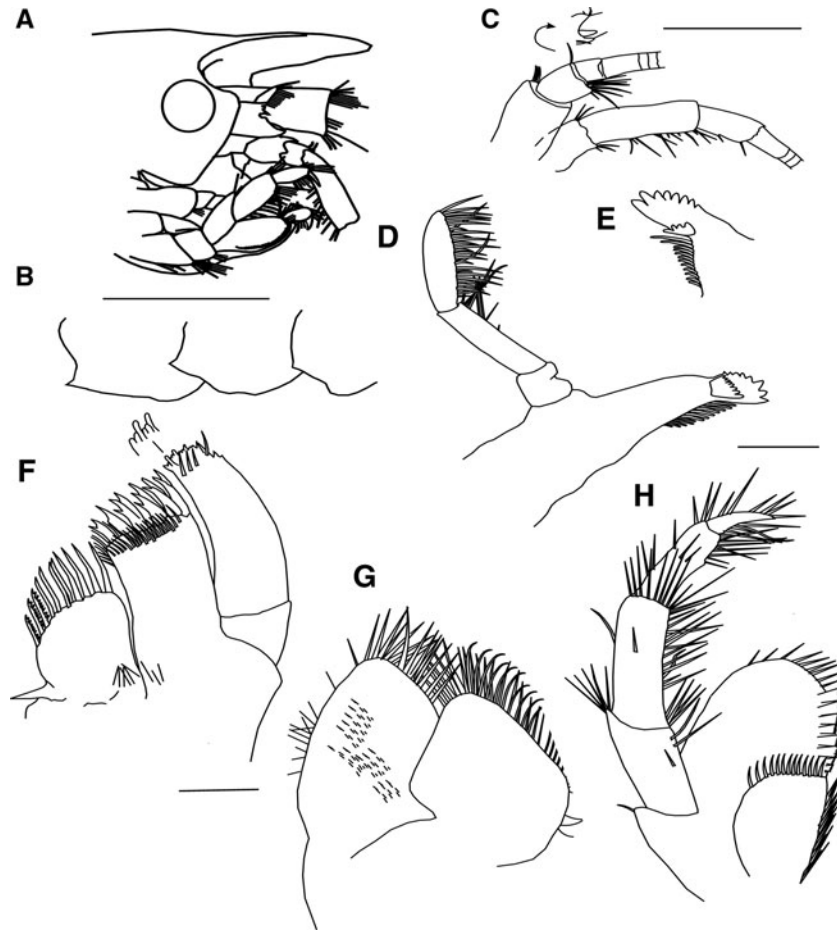


Fig. 2. *Epimeria morronei* sp. nov., holotype: adult female 23 mm, EMU-9507. (A) Head, lateral view; (B) epimera 1–3, lateral view; (C) antenna 1, lateral view; (D) left mandible; (E) right mandible; (F) maxilla 1; (G) maxilla 2; (H) maxilliped. Scale bars: A, B, 2.5 mm; C, 3.0 mm; D, H, 0.6 mm; F, G, 0.4 mm. Arrow indicates the accessory flagellum.

four robust and two smaller submarginal setae, distal margin crenulated.

Maxilla 2 (Figure 2G) plates subtriangular, both with long, plumose, distal setae; inner plate with short, simple marginal setae; outer plate with marginal setae and patches of minute lateral and facial setae.

Maxilliped (Figure 2H) inner plate reaching half length of outer plate, with eight robust and long marginal setae, and 13 robust distal setae; outer plate broadly rounded distally, nine robust distal setae, internal margin finely serrate, 15 tooth-like submarginal setae; palp medial margin strongly setose, tufts of setae on external margin of article 1, on distal margin of article 2, and on article 3.

Epistome wider than high (Figure 3A). Upper lip (Figure 3A) with distal margin slightly bilobulate, with short simple setae. Lower lip (Figure 3B) with fused internal lobes, external lobes subtriangular, mandibular processes subtriangular, margins with short simple setae.

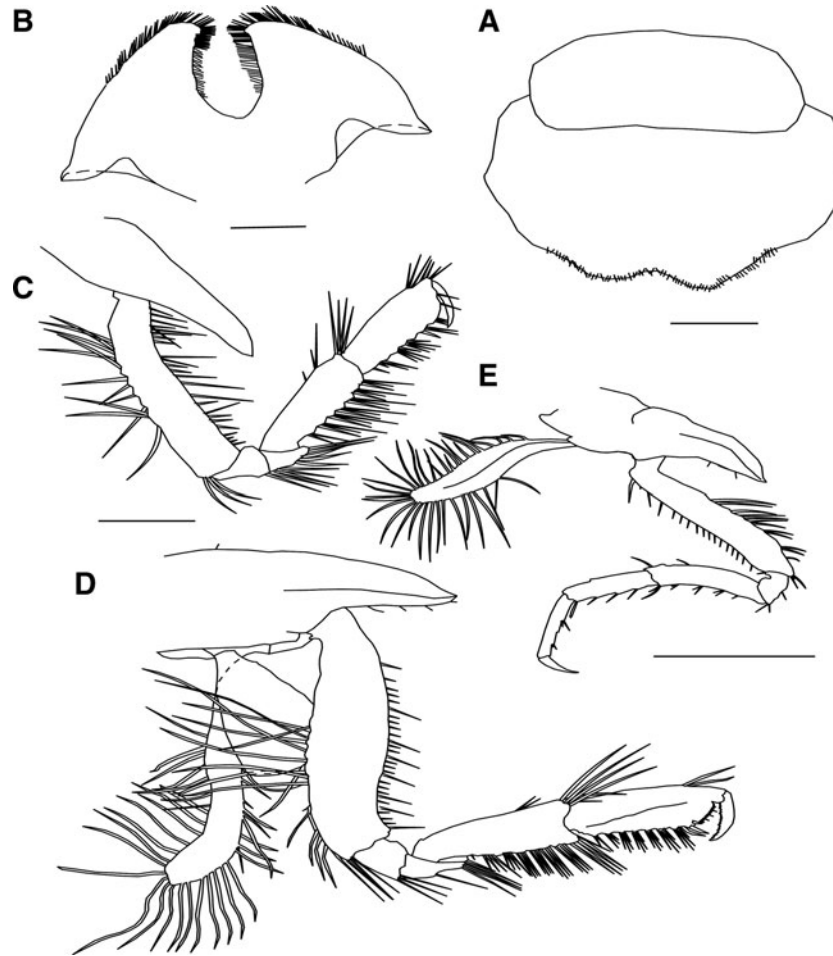
Gnathopod 1 (Figure 3C) coxa long and slender, ventrally subacute; basis linear, slender, ventral margin irregular in middle, margins with numerous long, robust setae; ischium short, subtriangular, two distal setae on posterior margin; merus slightly shorter than ischium, with long, robust setae on posterior margin; carpus as long as propodus, posterior margin irregular, with tufts of setae; propodus slightly expanded distally, posterior margin with tufts of setae,

subdistal and proximal tufts of setae, two isolated setae on distal margin; dactylus slender, slightly curved, smooth, over-reaching palm angle.

Gnathopod 2 (Figure 3D) coxa much wider than coxa 1, ventrally bluntly triangular; basis, ischium, merus, carpus and propodus similar in shape to gnathopod 1, except for length, number and position of some setae; a pair of subdistal robust setae on posterior margin of propodus, near the tip of dactylus; palm and inner margin of dactylus finely serrate.

Pereopod 3 (Figure 3E) coxa slightly longer than coxa 2; basis linear, slender, proximal 2/3 of anterior margin with long and posterior margin with short, regularly spaced setae; merus slightly longer than carpus, with sparse setae on anterior margin; propodus slightly shorter than carpus, slender, two pairs of short marginal setae; dactylus slender, curved, 1/2 length of propodus.

Pereopod 4 (Figures 1A & 4A) coxa much longer than coxa 3, wider than combined width of coxae 1–3, anterior margin sinuous, ventrally curving backward; posterior margin divided into a deep, proximal, V-shaped indentation, followed by a posteroventral, subacute process inserted into a subcircular opening in anterior margin of coxa 5, and a distal, slightly curving cusp, a ridge parallel to distal portion of posterior margin; basis thick, wider distally; ischium short, naked; merus long and slender, four pairs of short, robust setae on posterior margin and a robust seta on distal margin; carpus



**Fig. 3.** *Epimeria morronei* sp. nov., holotype: adult female 23 mm, EMU-9507. (A) Upper lip; (B) lower lip; (C) gnathopod 1; (D) gnathopod 2; (E) pereopod 3. Scale bars: A, 0.2 mm; B, 0.4 mm; C, D, 1.2 mm; E, 2.5 mm.

shorter than merus, two pairs of short, robust setae on posterior margin and one robust seta, distally; propodus as long as carpus, slightly curved, three pairs of short, robust setae on posterior margin and one distal robust seta; dactylus slender, slightly curved, naked.

Pereopod 5 (Figures 1A & 4B) coxa subtriangular, similar in size to coxa 4, posterodistal angle strongly produced, spine-shaped, tip reaching to first third of epimeral plate 1; basis to dactylus similar to pereopod 4.

Pereopod 6 (Figures 1A & 4C) coxa subquadrate, smaller than coxa 5; basis expanded mid-posteriorly; ischium short, naked; merus and carpus similar in length, each with 3 short, robust setae on anterior margin, merus thicker; carpus with a distal pair of robust setae; propodus slender, 1 1/2 times as long as carpus, a single, short medial seta on posterior margin; dactylus slender, slightly curved.

Pereopod 7 (Figure 1A) coxa similar in size to coxa 6; basis posteriorly expanded; ischium to dactylus similar to pereopod 6.

Uropod 1 (Figure 4D) peduncle shorter than rami, wider distally; inner ramus about 1/5 shorter than outer ramus; rami with very short, robust setae on inner margin.

Uropod 2 (Figure 4E) peduncle slightly longer than rami; inner ramus about 1/5 shorter than outer ramus; rami with very short, robust setae on inner margin.

Uropod 3 (Figure 4F) peduncle short, two simple, short marginal setae, a medial process on distal margin; rami similar in length and thickness, a subdistal robust seta on outer margin.

Telson (Figure 4G) twice as long as wide, distal margin serrate, with median V-shaped cleft.

#### COLOUR

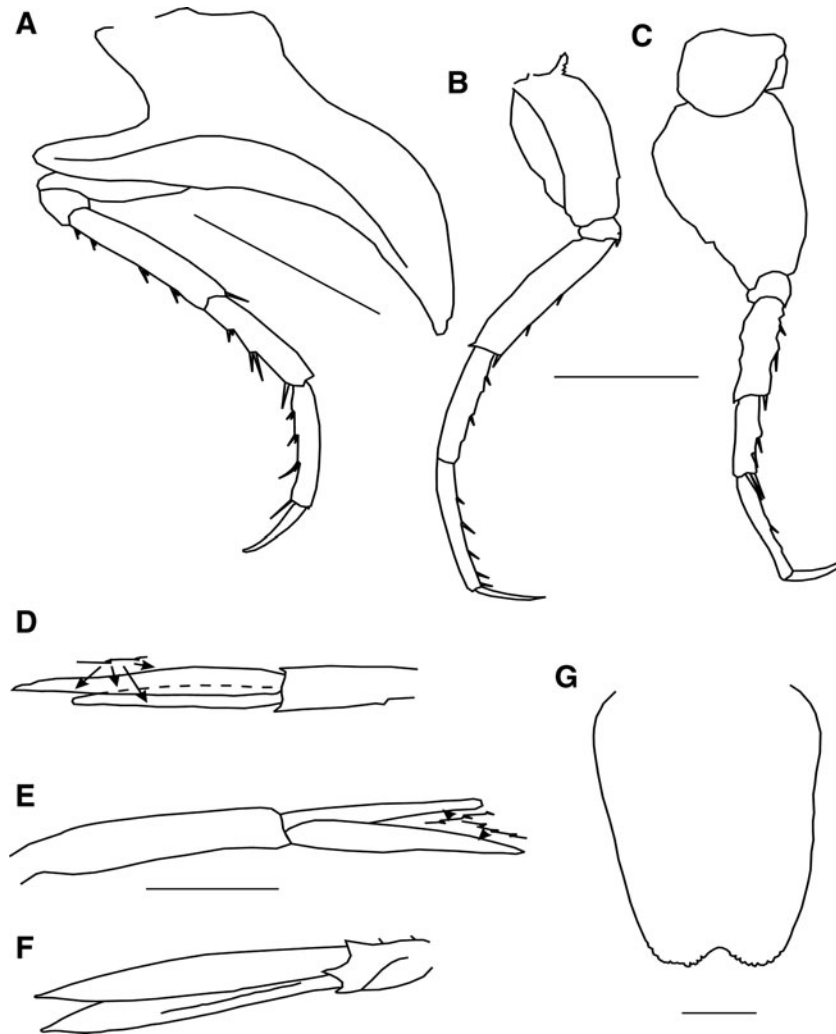
Freshly collected specimens whitish.

#### DISTRIBUTION AND ECOLOGY

Only known from the type locality and a nearby locality (27°09'06"N 111°46'54"W and 27°02'46"N 111°52'57"W), in the central Gulf of California, Mexico. From 1526 to 1586 m depth. Bottom water temperature and dissolved oxygen concentration: 2.7–3.2°C and 0.51–0.88 ml O<sub>2</sub>/l, respectively. Muddy substrate, with 3.04–3.35% of organic matter content.

#### REMARKS

*Epimeria morronei* sp. nov., is morphologically similar to *E. norfanzi* Lörz, 2011 (New Zealand, 1268 m depth) and *E. cora* J.L. Barnard, 1971 (off Oregon, USA, 2086 m depth). All three species share a well developed rostrum, a reduced accessory flagellum, and they all have processes or carina on



**Fig. 4.** *Epimeria morronei* sp. nov., holotype: adult female 23 mm, EMU-9507. (A) Pereopod 4; (B) pereopod 5, coxa omitted; (C) pereopod 6; (D) uropod 1; (E) uropod 2; (F) uropod 3; (G) telson, dorsal view. Scale bars: A, 3.0 mm; B–F, 2.5 mm; G, 1.6 mm. Arrows indicate the tiny setae on margins.

**Table 1.** The more significant morphological characters used to compare females of *Epimeria morronei* sp. nov., to the two closely related species *E. norfanzi* Lörz, 2011 and *E. cora* J.L. Barnard, 1971.

Character	<i>E. morronei</i> sp. nov.	<i>E. norfanzi</i>	<i>E. cora</i>
Eyes	Vestigial	Present, rounded	Present, oval
Mandible	Molar vestigial; lacinia mobilis multidentate, foliaceous	Molar developed, not triturtative; lacinia mobilis laminar, bifid, dentate	Molar undescribed; lacinia mobilis small, foliaceous, bifid
Lower lip	Inner lobules fused; outer lobules well developed, with setae	Inner lobules much reduced; outer lobules well developed, without setae	Undescribed
Maxilliped	Outer plate inner margin serrated, with long, simple setae; distally concave	Outer plate inner margin not serrated, with short, simple setae; distally subquadrate	Undescribed
Gnathopod 1	Subchelate; palm smooth with 2 long, simple setae; dactylus smooth	Subchelate; palm finely crenulated; dactylus serrate	Subchelate; palm finely crenulated, with 6 submarginal, robust setae; dactylus serrate
Gnathopod 2	Subchelate; palm serrate, with 4 short, simple setae and 3 short, robust, distal setae; inner margin of dactylus serrate	Subchelate, palm finely crenulated with numerous robust setae; dactylus serrate	Subchelate; palm finely crenulated; dactylus finely serrate
Coxae 1–3	Ventrally rounded	Ventrally rounded	Ventrally acute
Coxa 4	Longer and wider than combined coxae 1–3, anterior margin a scythe-like process, posterior margin sinuous	Slightly longer and wider than coxa 3, ventrally produced	Longer and wider than coxa 3, anterior margin scythe-like, posterior lobule long, narrow
Coxa 5	Reaching pleonite 3	Reaching pleonite 3	Reaching half basis of pereopod 7
Telson	Long, subrectangular, posterior margin serrate, with median cleft	Short, subquadrate, without posterior cleft	Short, subrectangular, distally cleft

**Table 2.** Major external morphological differences among species of *Epimeria* known to occur in the Northern Hemisphere.

	Rostrum	Eyes	Dorsal carinae	Coxa 4	Coxa 5	Telson
<i>E. bruuni</i>	Long, subequal to article 1 of antenna 1	Large	On pereonite 7 and pleonites 1–3	Long, posteriorly curved	Short and subquadrate	Short, posterior cleft 1/4 total length
<i>E. cora</i>	Long, longer than article 1 of antenna 1	Medium-sized	Little developed	Very long, ventral margin concave, scythe-shaped	Subquadrate, postero-ventral margin acute	Short, posterior cleft 1/6 total length
<i>E. cornigera</i>	Short, less than length of article 1 of antenna 1	Large	Regularly developed	Very long, ventral margin concave, scythe-shaped	Subquadrate, postero-ventral margin acute	No data
<i>E. longispinosa</i>	Long, over-reaching article 2 of antenna 1	Medium-sized	Well developed on pereonites 1–3	Very long, ventral margin concave, scythe-shaped	Very long, posteriorly acute	Short, posterior cleft 1/7 total length
<i>E. loricata</i>	Very long, subequal to article 3 of antenna 1	Medium-sized	On the entire dorsum	Very long, ventral margin concave, scythe-shaped	Subquadrate, posterior margin bifid	Short, posterior cleft 1/5 total length
<i>E. morronei</i> n. sp.	Long, subequal to article 2 of antenna 1	Vestigial	On pleonites 1–3	Well developed, scythe-shaped	Long, posteriorly acute	Short, posterior cleft 1/20 total length
<i>E. obtusa</i>	Long, subequal to article 2 of antenna 1	Small	Absent	Medium-sized, longer than wide	Short, subquadrate	Short, posterior cleft 1/4 total length
<i>E. pacifica</i>	Very long, over-reaching article 3 of antenna 1	Large	On pereonites 2–3	Longer than wide, scythe-shaped	Long, posteriorly acute	Short, posterior cleft 1/11 total length
<i>E. parasitica</i>	Long, longer than article 1 of antenna 1	Very large	Little developed	Well developed, scythe-shaped	Subquadrate, postero-ventrally acute	No data
<i>E. pelagica</i>	Short, not reaching 1/2 length of article 1 of antenna 1	Large	Absent	Short, sharp	Small, subquadrate	Short, posterior cleft 1/3 total length
<i>E. subcarinata</i>	Short, less than length of article 1 of antenna 1	Absent	Little developed on pleonites 1–2; well developed on pleonite 3	Well developed, scythe-shaped	Subquadrate, postero-ventrally acute	Small, posterior cleft 1/13 total length
<i>E. tuberculata</i>	Long, subequal to article 1 of antenna 1	Medium-sized	Little developed	Well developed, scythe-shaped	Subquadrate	No data
<i>E. yaquinae</i>	Absent	Absent	Little developed	Very long, distally digitated	Short, ovoid	Short, posterior cleft 1/4 total length

pereonites 1–7 and processes on pleonites 1–3. *Epimeria morronei* sp. nov., however, differs from these two species by a combination of several of the following characters: the size and structure of the eyes (vestigial in the former); the shape of the mandibular molar and lacinia mobilis, of the lower lip and of the external plate of the maxilliped; the setae arrangement in palm and dactylus of gnathopods 1–2; the shape and relative size of coxae 1–5; and the shape of the telson. Major differences are summarized in Table 1.

## DISCUSSION

Including the new species described herein, there are 61 species belonging to the Epimeriidae: *Epimeria* (50 species), *Paramphithoe* (8), *Actinacanthus*, *Metepimeria* and *Uschakoviella* (one species each). About half *Epimeria* species are restricted to the Antarctic, while the rest occur in the Atlantic, Pacific or Indian Oceans (Lörz *et al.*, 2009; Lowry *et al.*, 2010; Lörz, 2011, 2012). Of the 60 previously described species, only three (less than 10%) are known to the East Pacific of a total of 10 species reported for the entire Pacific Ocean, between 970 and 3710 m depth. These 10 species are (last two restricted to the East Pacific): *Epimeria horsti* Lörz, 2008; *E. norfanzi* Lörz, 2011; *E. pacifica* Gurjanova, 1955; *E. pelagica* Birstein & Vinogradov, 1958; *E. subcarinata* Nagata, 1963; *E. victoria* (Hurley, 1957); *E. bruuni*

Barnard, 1961; *E. glaucosa* Barnard, 1961; *E. cora* J.L. Barnard, 1971; and *E. yaquinae* McCain, 1971 (Lörz, 2011). The discovery of a third species, *E. morronei* sp. nov., in the East Pacific is therefore considered significant. With the addition of *E. morronei* sp. nov. a total of 13 species of *Epimeria* are known to occur in the Northern Hemisphere, 12 benthic and one pelagic. These species can be separated using the characters provided in Table 2.

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**Correspondence should be addressed to:**

M.E. Hendrickx  
Laboratorio de Invertebrados Bentónicos  
Unidad Académica Mazatlán  
Instituto de Ciencias del Mar y Limnología  
Universidad Nacional Autónoma de México  
Mexico, PO Box 811, Mazatlan, 82000, Sinaloa, Mexico  
email: michel@ola.icmyl.unam.mx