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# On some deep-sea Stenheliinae from the Gulf of California and the west coast of the Baja California Peninsula (Mexico): the genus *Delavalia* Brady, 1869 and proposal of *Archaeohuysia* gen. nov. and *Diarthropodella* gen. nov. (Copepoda: Harpacticoida: Miraciidae)

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## Abstract

Several species belonging to the harpacticoid families Ameiridae Boeck, Ancorabolidae Sars, Argestidae Por, and Rhizothrichidae Por have been described so far as an ongoing long-term project on the diversity of deep-sea benthic harpacticoids collected from the Gulf of California and Mexican Pacific. Amongst the several harpacticoid taxa, the subfamily Stenheliinae Brady (Miraciidae Dana) showed to be one of the most important components to overall species richness in deep-sea sediments. Following the rejection of segmentation pattern of the first swimming leg as the only discriminant for subgeneric assignment of stenheliin taxa, four new species of *Delavalia* Brady, 1869 and two new genera, *Archaeohuysia* **gen. nov.** and *Diarthropodella* **gen. nov.** are proposed herein. The new *Delavalia* species belong to the *longicaudata*-group with close relatives in shallow-water habitats. The so far monotypic *Archaeohuysia* **gen. nov.** showed to be unique in the combination of the general structure of the first swimming leg and retention of the primitive complement of four setae on the second endopodal segment of the same leg. *Diarthropodella* **gen. nov.** is the only stenheliin taxon with a two-segmented exopod of the first swimming leg. Some comments are given on probable multiple colonization events of stenheliin taxa.

**Key words:** *Archaeohuysia huysi* **gen. et sp. nov.**, Copepoda, *Delavalia asetosa* **sp. nov.**, *De. californiensis* **sp. nov.**, *De. profunda* **sp. nov.**, *De. reducta* **sp. nov.**, *Diarthropodella prima* **gen. et sp. nov.**, *Di. secunda* **sp. nov.**, Mexico, new species, taxonomy

## Introduction

Preliminary results in unpublished pre- and postgraduate dissertations (Rodríguez-Soberanes 2007; Díaz-Álvarez 2018) revealed a high diversity of deep-sea benthic harpacticoids from the Gulf of California and Mexican Pacific collected during a series of oceanographic cruises on board research vessel "El Puma" of the Universidad Nacional Autónoma de México. Several taxa of harpacticoid copepods reported in the above dissertations have been described since 2002 as part of an ongoing long-term project on the diversity of deep-sea harpacticoids from Mexico (Gómez & Conroy-Dalton 2002; Gómez & Díaz 2017; Gómez 2018a, b, c, d), and the analysis and description of several taxa are still pending and will be the subject of future contributions. The subfamily Stenheliinae Brady (Miraciidae Dana), a primarily shallow marine and brackish taxon, proved to be an important component of the overall diversity of deep-sea benthic harpacticoids in the Gulf of California and Mexican Pacific, and two contributions dedicated to the late Prof. J. B. J. Wells, *viz.* Gómez & Cruz-Barraza (2021) and Gómez (2021), have focused on the description of the so far monotypic genus *Wellstenvalia* Gómez & Cruz-Barraza, 2021 and some new species, *Wellstenhelia euterpoides* Gómez & Cruz-Barraza, 2021, *Pseudostenhelia bathyalis* Gómez, 2021 and *Beatricella calidafornax* Gómez, 2021. Amongst the stenheliin taxa found in deep-sea sediment samples from the Gulf of California and Mexican Pacific, the genus *Delavalia* Brady, 1869 showed to be one of the most species-rich. Most deepwater species of *Delavalia* belong to Willen's (2003) *longicaudata*-group, and only one species, *D. gundulae* Willen,

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2003 belongs to Willen's (2003) *normani*-group. This prompted Willen (2003) to suggest two different colonization events of deep-sea habitats. On the other hand, the rejection of P1 ENP segmentation as the only discriminant for subgeneric assignment of stenheliin taxa by Mu & Huys (2002) was an important step towards redefining the monophyly of the genus *Delavalia*, and inspired other authors (*e.g.* Karanovic & Kim 2014) to start seeking out (syn)apomorphies to define monophyletic stenheliin taxa.

Here I describe four new deep-sea species of *Delavalia* from the Gulf of California and the Mexican Pacific, all of which are assigned to the *longicaudata*-group, and two new genera that could have been placed in *Delavalia* if the segmentation pattern of P1 ENP was the only discriminant for subgeneric assignment of stenheliin taxa. Additionally, some comments are given on probable multiple colonization events of different stenheliin lineages.

This is the ninth contribution on deep-sea harpacticoids and the third of a series of papers on deep-sea stenheliins from the Gulf of California and adjacent waters dedicated to Prof. J. B. J Wells.

## Materials and methods

For a full description of materials and methods see Gómez & Cruz-Barraza (2021).

Abbreviations used in the text: acro, acrothek; ae, aesthetasc; BENP, baseoendopod; ENP, endopod; EXP, exopod; EXP (ENP)1 (2,3), first (second, third) exopodal (endopodal) segment.

Total body length measured in dorsal view.

The type material was deposited in the Copepoda collection of the Instituto de Ciencias del Mar y Limnología, Unidad Académica Mazatlán (ICML-EMUCOP), and microphotographs are available at http://metadata.icmyl.unam.mx.

The map showing the sampling locations (Fig. 1) where the new taxa were found was prepared with SimpleMappr (Shorthouse 2010).

Following Recommendation 25A (ICZN 1999), the generic names *Delavalia* and *Diarthropodella* were abbreviated *De.* and *Di.*, respectively, when used in a binomen.

## Systematics

### Order Harpacticoida Sars, 1903

### Family Miraciidae Dana, 1846

### Subfamily Stenheliinae Brady, 1880

### Genus *Delavalia* Brady, 1869

**Type species.** *Delavalia palustris* Brady, 1869 by original designation.

**Other species.** *Delavalia acutirostris* (Willey, 1935), *De. adriatica* (Marinov & Apostolov, 1981), *De. andamanica* (Rao, 1993), *De. arctica* Scott, 1899, *De. arenicola* (Wilson, 1932), *De. asetosa* **sp. nov.**, *De. bermudensis* (Coull, 1969), *De. bifida* (Coull, 1976), *De. breviseta* (Wells & Rao, 1987), *De. californiensis* **sp. nov.**, *De. clavus* (Wells & Rao, 1987), *De. coineauae* (Soyer, 1971), *De. confluens* (Lang, 1948), *De. cornuta* (Lang, 1936), *De. diegensis* (Thistle & Coull, 1979), *De. elisabethae* (Por, 1960), *De. fustiger* (Wells & Rao, 1987), *De. giesbrechti* Scott & Scott, 1896, *De. gundulae*, *De. hirtipes* (Wells & Rao, 1987), *De. incerta* (Por, 1964), *De. inopinata* Scott, 1902, *De. intermedia* (Marinov & Apostolov, 1981), *De. islandica* (Schriever, 1982), *De. latioperculata* (Itô, 1981), *De. latipes* (Lang, 1965), *De. latisetosa* (Sewell, 1940), *De. lima* (Becker & Schriever, 1979), *De. longicaudata* (Boeck, 1873), *De. longifurca* (Sewell, 1934), *De. longipilosa* (Lang, 1965), *De. madrasensis* (Wells, 1971), *De. magnacaudata* (Monard, 1928), *De. mastigochaeta* (Wells, 1965), *De. minuta* Scott, 1902, *De. mixta* (Wells & Rao, 1987), *De. noodti* (Schriever, 1982), *De. normani* Scott, 1905, *De. nuwukensis* (Wilson, 1965), *De. oblonga* (Lang, 1965), *De. ornamentalia* (Shen & Tai, 1965), *De. paraclavus* (Wells & Rao, 1987), *De. polluta* (Monard, 1928), *De. profunda* **sp. nov.**, *De. reducta* **sp. nov.**, *De. reflexa* (Brady, 1880), *De. saharae* (Marinov & Apostolov, 1985),

*De. schminkei* (Willen, 2002), *De. stephensoni* (Greenwood & Tucker, 1984), *De. tethysensis* (Monard, 1928), *De. truncatipes* (Sewell, 1940), *De. unisetosa* (Wells, 1967), *De. valens* (Wells & Rao, 1987).

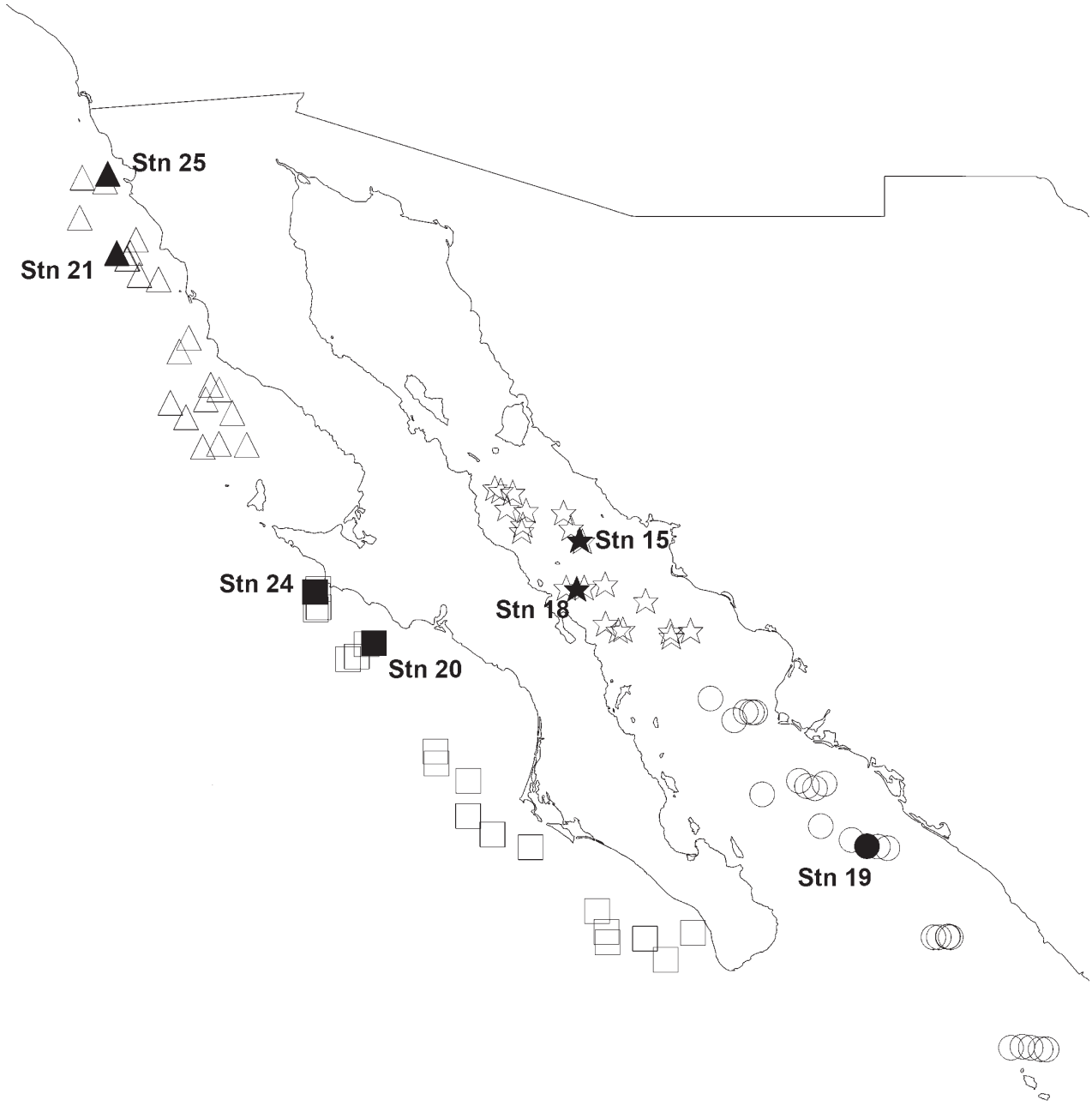


**FIGURE 1.** Sampling locations visited during oceanographic cruises Talud IV (circles), Talud X (stars), Talud XV (squares) and Talud XVIB (triangles). Full figures represent positive collection of *Delavalia profunda* **sp. nov.** (Stn 24 —Talud XV), *Delavalia californiensis* **sp. nov.** (Stn 20 —Talud XV), *Delavalia asetosa* **sp. nov.** (Stn 19 —Talud IV), *Delavalia reducta* **sp. nov.** (Stn 25 —Talud XVIB), *Archaeohuysia huysi* **gen. et sp. nov.** (Stn 21 —Talud XVIB), *Diarthropodella prima* **gen. et sp. nov.** (Stn 15 —Talud X—, and Stn 19 —Talud IV), and *Diarthropodella secunda* **sp. nov.** (Stn 18 —Talud X). Insert shows location of stations 15, 18 and 19 visited during Talud X cruise.

***Delavalia profunda* sp. nov.**
(Figs. 2–6)
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**Type locality.** Off San Pablo Bay, Baja California Sur (Eastern Tropical Pacific), Mexico; Talud XV cruise, sampling station 24 (27.1181°N, 114.6008°W); depth 1,039 m; organic carbon content, 3.26%; organic matter content, 5.60%; sand 35.53%; clay, 7.95%; silt, 56.52%.

**Specimens examined.** Adult female holotype dissected and mounted onto seven slides (EMUCOP-020812-03); August 1, 2012; coll. S. Gómez.

**Etymology.** The specific epithet from the Latin *profunda*, deep, makes reference to the depth at which the species was found. It is in the nominative singular. Gender feminine.

**Description of female.** Total body length measured from tip of rostrum to posterior margin of caudal rami, 462 μm; habitus pyriform, widest at posterior end of cephalothorax, tapering posteriad; cephalothorax/body length ratio, 0.32.

Prosome consisting of cephalothorax with fused first pedigerous somite, and second to fourth free pedigerous somites. Cephalothorax about as long as wide; hyaline fringe broad and smooth. Free pedigerous somites without expansions laterally nor dorsally; without spinular ornamentation; integument smooth, weakly sclerotized; hyaline fringe of second and third pedigerous somites broad and smooth, of fourth pedigerous somite visibly narrower; width of second to fourth pedigerous somites decreasing progressively, with few surface sensilla.

Urosome (Fig. 2A–B) consisting of fifth pedigerous somite (first urosomite), genital double-somite (genital—second urosomite—and third urosomites fused), two free urosomites, and anal somite. Urosomites without expansions laterally nor dorsally; integument weakly sclerotized.

Fifth pedigerous somite (Fig. 2A) visibly narrower than preceding somites; with short dorsolateral spinular row.

Second and third urosomites completely fused dorsally and ventrally forming genital double-somite (Fig. 2B), with dorsolateral trace of division (Fig. 2A); genital double-somite as long as wide, widest part measured in anterior fourth close to P6; proximal half with dorsolateral sensilla and spinular rows close to original posterior margin of genital somite, distal half with fewer dorsolateral sensilla and comparatively longer spinular rows (Fig. 2A); proximal half without surface ornamentation ventrally, distal half with two ventral sensilla close to posterior margin (Fig. 2B); posterior hyaline fringe broad and smooth (Fig. 2A); genital complex hardly distinguishable, copulatory pores not exposed, paired genital apertures located ventrolaterally and covered by P6 (Fig. 2B).

Fourth urosomite (Fig. 2A–B) as distal half of genital double-somite.

Fifth urosomite without sensilla, with few dorsolateral spinules (Fig. 2A); ventrally without spinular ornamentation (Fig. 2B).

Anal somite three times as wide as long (Fig. 2A); with spinules around joint of caudal rami dorsally (Fig. 2A) and ventrally (Fig. 2B); with medial cleft ventrally; anal operculum smooth, semicircular, flanked by one sensillum on each side (Fig. 2A).

Caudal rami elongate, about 5.2 times as long as wide (Fig. 2A–B) and about 3 times as long as anal somite; with outer spinules at base of seta II, and with inner subdistal spinules (Fig. 2A–B), seemingly without pores; with six elements (Fig. 2A–B); seta I absent; seta II subdistal, issuing close to outer distal corner, seta III subdistal, arising ventrally, both setae subequal in length; setae IV and seta V distal; seta VI issuing at inner distal corner; dorsal seta VII triarticulate at base, situated subdistally close to inner margin.

Rostrum (Fig. 3A) trapezoidal, not fused to cephalothorax, reaching distal margin of second antennulary segment, bifid, with two subdistal sensilla, without dorsal pore.

Antennule (Fig. 3A) eight-segmented; all segments smooth, except for proximal spinular row on first segment, the latter without pore. All setae smooth; seemingly without setae with fracture plane; eighth segment with two articulated seta. Armature formula: 1(1); 2(11); 3(7); 4(5 + (1 + ae)), 5(3); 6(4); 7(3); 8(5 + acro). Acrothek consisting of two setae and one minute aesthetasc fused basally.

Antenna (Fig. 3B). Coxa short, with some outer spinules. Allobasis as long as free endopodal segment; with two rows of inner spinules proximally; with one abexopodal seta arising midway inner margin. Free endopodal segment elongate; proximal half with longitudinal row of inner spinules, with subdistal outer strong spinules, with two outer subdistal frills; lateral armature composed of two spines and two setae; distal armature composed of one inner pinnate geniculate apical element, three apical pinnate geniculate setae and one slender element, and one outer distal pinnate geniculate element fused basally to slender seta. Exopod three-segmented; first and third segments longest, with spinules as shown, middle segment short without spinules; first and second segment with one distal seta each, third segment with one proximal and three apical setae, two of which seemingly fused basally.

Mandible (Fig. 4A). Coxa relatively short. Gnathobase wide; ventrodistal corner produced into small sharp semi-hyaline process; with three strong and several smaller teeth, one spine and two setae. Basis elongate, with narrow base; with small spinules proximally, medially and subdistally; with three subdistal outer setae. Exopod arising from short pedestal, one-segmented, elongate, about 3.6 times as long as wide, and 0.3 times as long as basis; with three lateral and three apical setae, none of which fused basally. Endopod recurved, twisted over exopod; with

three lateral setae, and five distal elements (three slender setae, one of which spinulose and one strong element, and longest element fused to endopod basally and with hyaline flange in middle part).

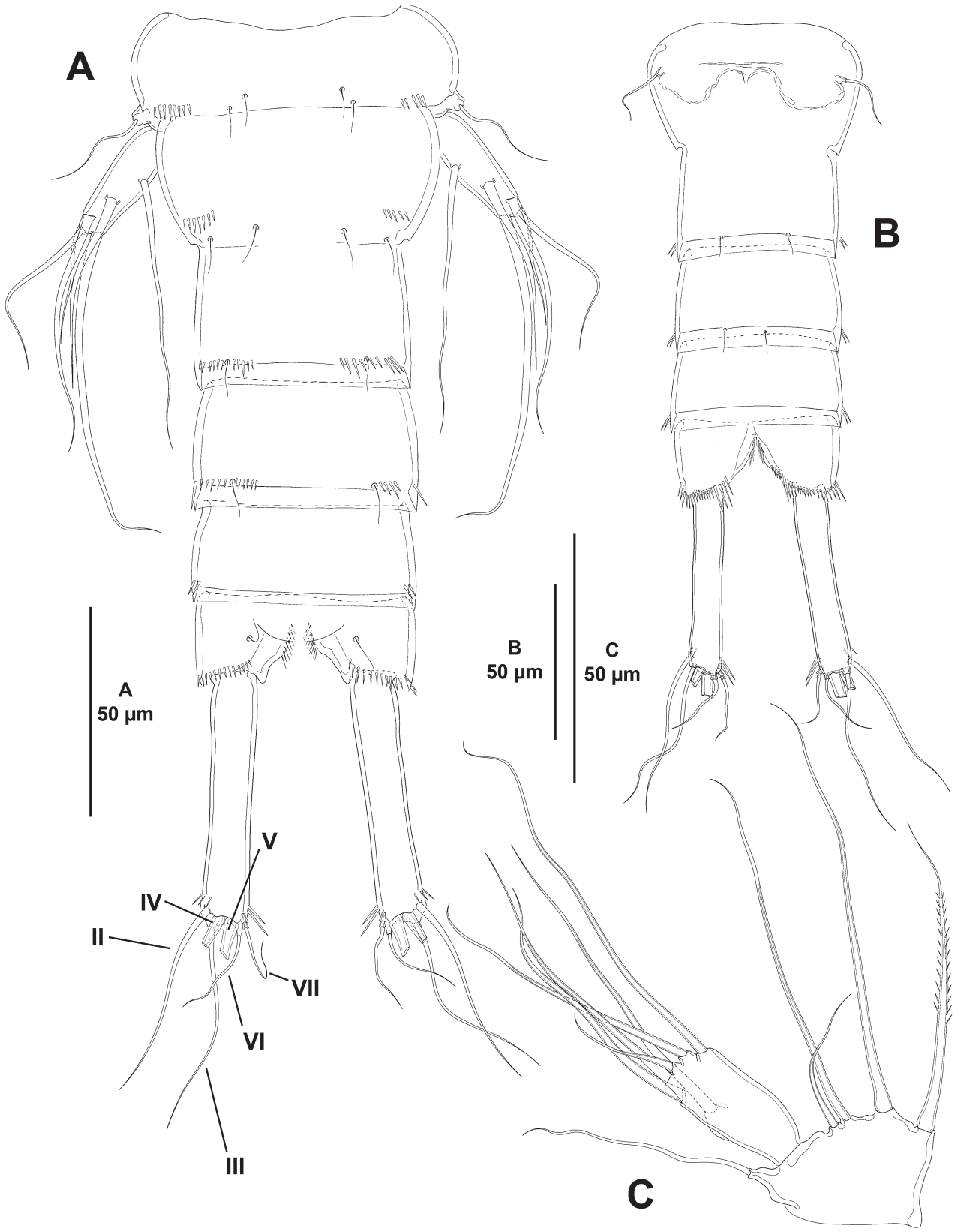


**FIGURE 2.** *Delavalia profunda* **sp. nov.**, female: A, urosome, dorsal; B, urosome, ventral (P5-bearing somite omitted); C, P5, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10597). (Microphotograph of the habitus in dorsal view available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10590).

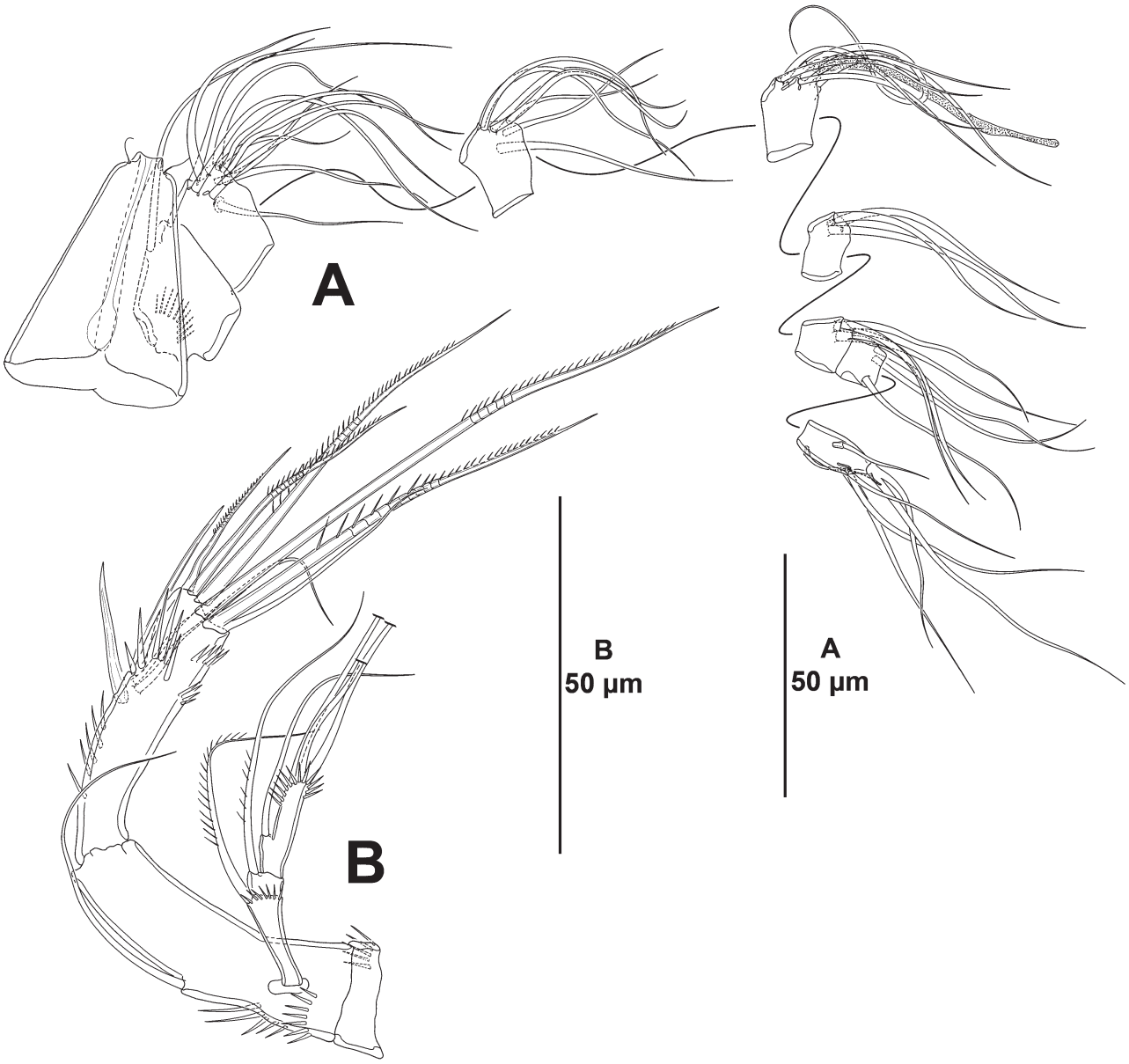


**FIGURE 3.** *Delavalia profunda* **sp. nov.**, female: A, rostrum and antennule (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10598); B, antenna (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10589).

Maxillule (badly damaged, not shown). Arthrite of praecoxa with two surface setae and some dorsal spinules proximally; distal armature difficult to define, but seemingly with seven distal spines/setae, one spinulose dorsal spine, and one lateral spinulose recurved seta. Coxal endite with three setae; spinular ornamentation difficult to see. Basis with two endites; proximal endite with four, distal endite with three slender setae. Exopod and endopod fused basally, but separated from basis, one-segmented; endopod larger than exopod, with four setae; exopod small, with two setae.

Maxilla (Fig. 4B). Large syncoxa with outer spinules as shown; with three endites; proximal endite bilobed, proximal lobe with one slender element, distal lobe with two spinulose setae; middle and distal endites elongate, the latter slightly longer, with two spinulose and one slender seta each. Basis drawn out into strong claw, additionally with strong spine and two slender setae, one of which arising from elongate setophore. Endopod one-segmented, 1.2 times as long as wide, with six slender setae (one arising basally, two medially, and three apically).

Maxilliped (Fig. 4C) subchelate. Syncoxa rectangular, about 1.5 times as long as wide; with few inner spinules; with one bare and two spinulose strong elements, of which bare seta and one spinulose element at the same level,

the other arising distally from long pedestal. Basis slightly shorter than syncoxa, oval, with some outer spinules, with one anterior and one posterior inner spinular row as depicted, with two slender distal setae subequal in length. Endopod one-segmented, with one claw-like element and one seta.

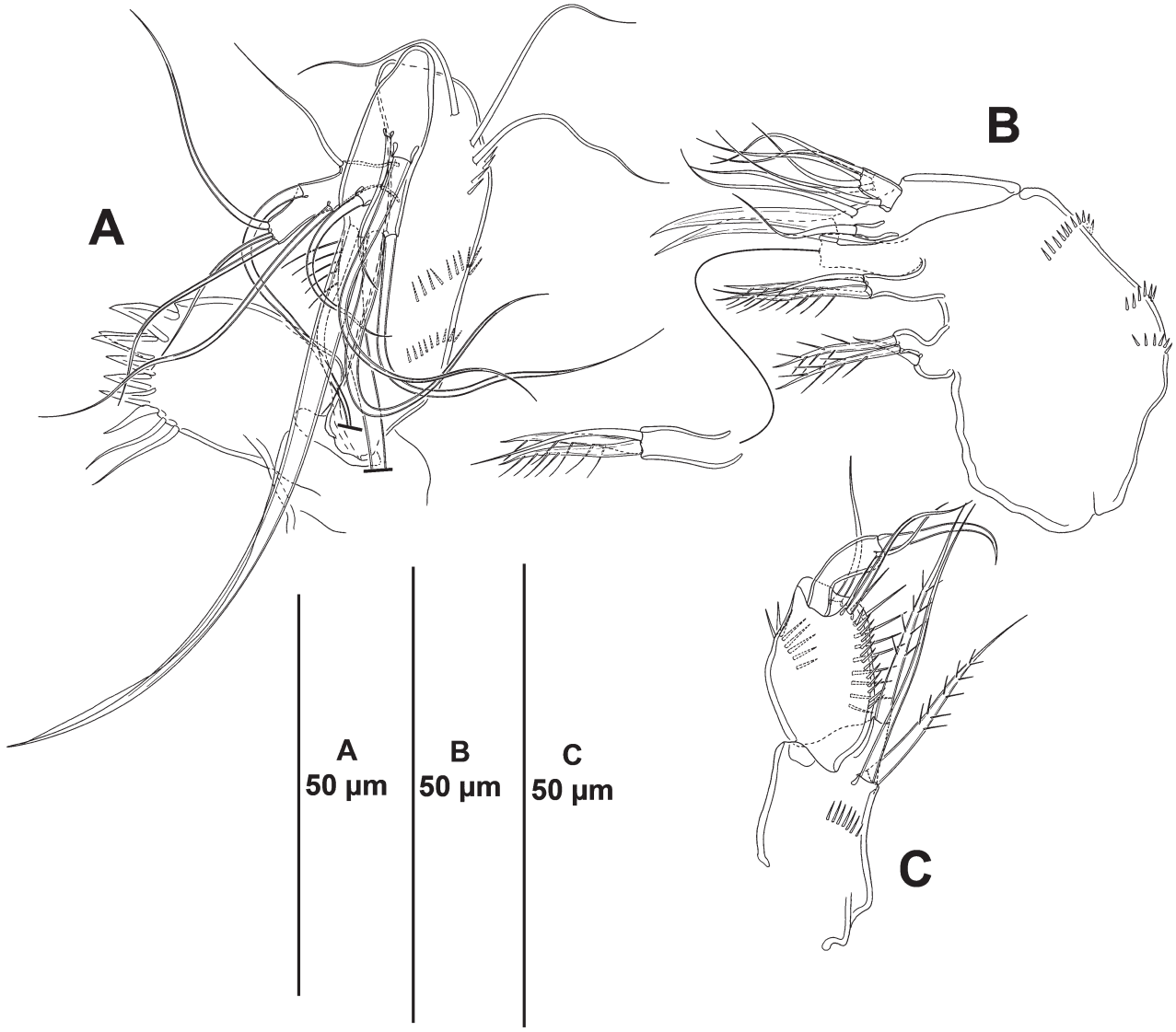


**FIGURE 4.** *Delavalia profunda* **sp. nov.**, female: A, mandible (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10591); B, maxilla, C, maxilliped (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10592).

P1 (Fig. 5A). Intercoxal sclerite (not shown) transversely elongate, nearly straight, without surface ornamentation. Coxa massive, 1.5 times as wide as long; with two anterior and one posterior row of outer spinules, with one medial row of subdistal spinules, and with slender long inner spinules proximally. Basis with slender inner spinules, with stronger and shorter spinules between rami and at base of outer spine; outer and inner spines seemingly bare. Exopod three-segmented, visibly longer than endopod; no pores detected on exopodal segments; EXP1 longest, EXP3 shortest; all segments without outer nor inner acute distal processes; EXP1 and EXP2 with longitudinal row of outer spinules; EXP1 with, EXP2 without inner setules; EXP1 without, EXP2 with inner seta; EXP3 with spinules at base of outer element, with two outer spines and two apical setae. Endopod two-segmented; segments without inner nor outer acute distal processes; no pores detected on endopodal segments; ENP1 reaching tip of EXP1, 1.4 times as long as wide, visibly longer than ENP2, with outer and distal spinules, with one inner seta; ENP2 small, rectangular, about 1.5 times as long as wide, and 0.6 times as long as ENP1, with small outer and distal spinules, with three distal setae, of which innermost slightly displaced inwards and medial seta longest and strongly plumose.

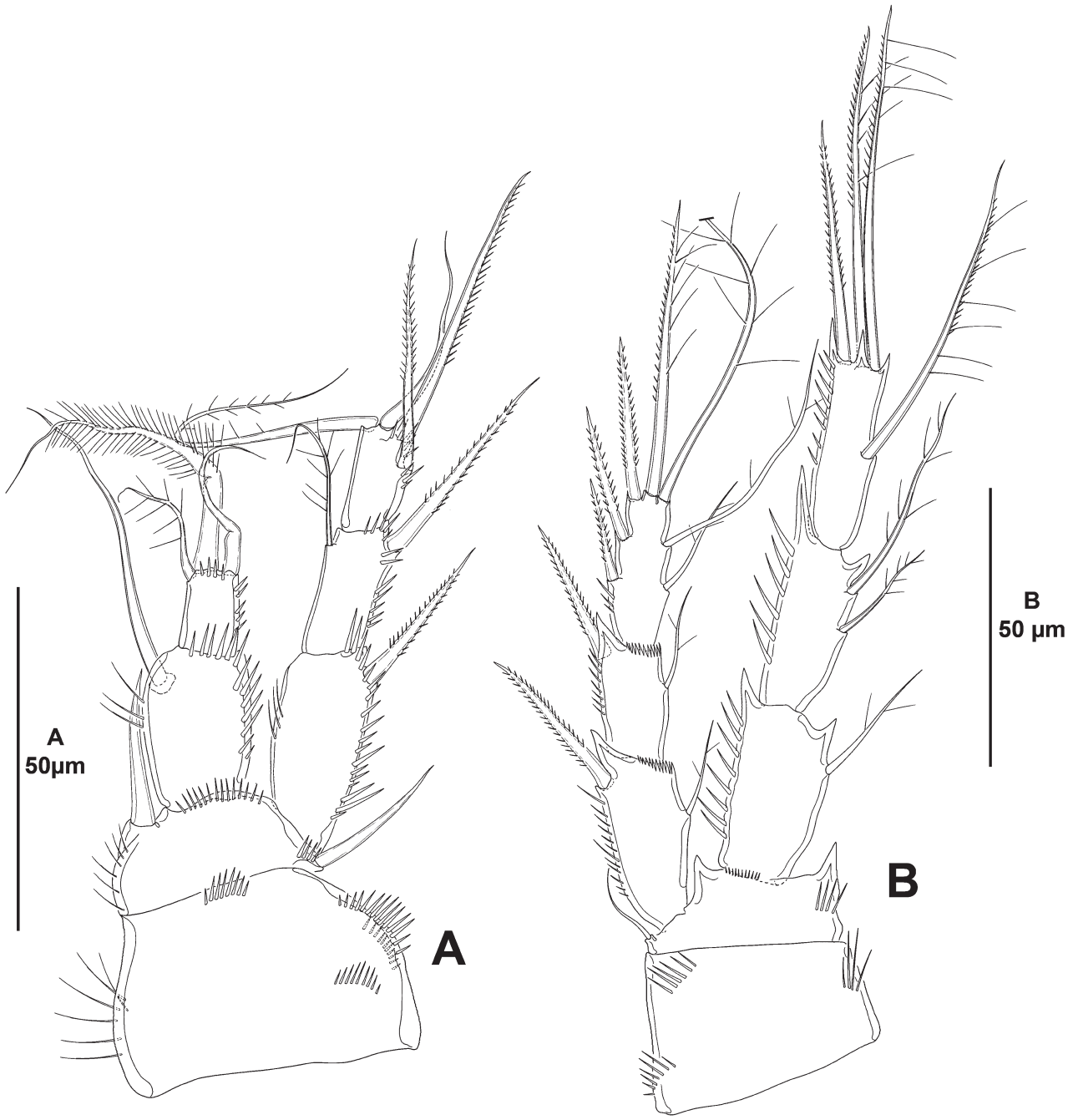


**FIGURE 5.** *Delavalia profunda* **sp. nov.**, female: A, P1, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10593); B, P2, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10594).

P2–P4 (Figs. 5B, 6A–B). Intercoxal sclerite (not shown) not transversely elongate, trapezoidal, with strong pointed process on distal outer corners, without surface ornamentation. Coxa with outer spinules proximally and subdistally, of P2 with, of P3 and P4 without inner spinules. Basis with outer seta, with strong acute process between rami and at inner distal corner, the latter larger, of P2 largest, of P4 smallest, with inner spinules medially. Exopod three-segmented, of P2 reaching tip of ENP2, of P3 reaching distal third of ENP3, of P4 slightly longer than ENP; EXP1 and EXP2 with outer acute distal process, with longitudinal row of outer spinules, and with inner distal frill, with inner seta; EXP3 seemingly without conspicuous distal processes, with few outer spinules proximally, with three outer spines and two apical setae, of P2 with two, of P3 and P4 with three inner setae. Endopod three-segmented, of P2 and P3 longer than, of P4 shorter than EXP; no pores detected on endopodal segments; segments of P2 and P3 subequal in length, in P4 ENP3 longest; ENP1 and ENP2 with outer acute and inner small distal

process, outer process of ENP2 visibly longer, ENP3 with distal processes as shown; ENP1 with inner element, of P2 a slender short seta, of P3 and P4 a long stiff element with inner margin pinnate; ENP2 with two (P2) or one inner seta (P3 and P4); ENP3 with one apical outer spine, two apical elements, and one (P2), three (P3) or two (P4) inner setae.

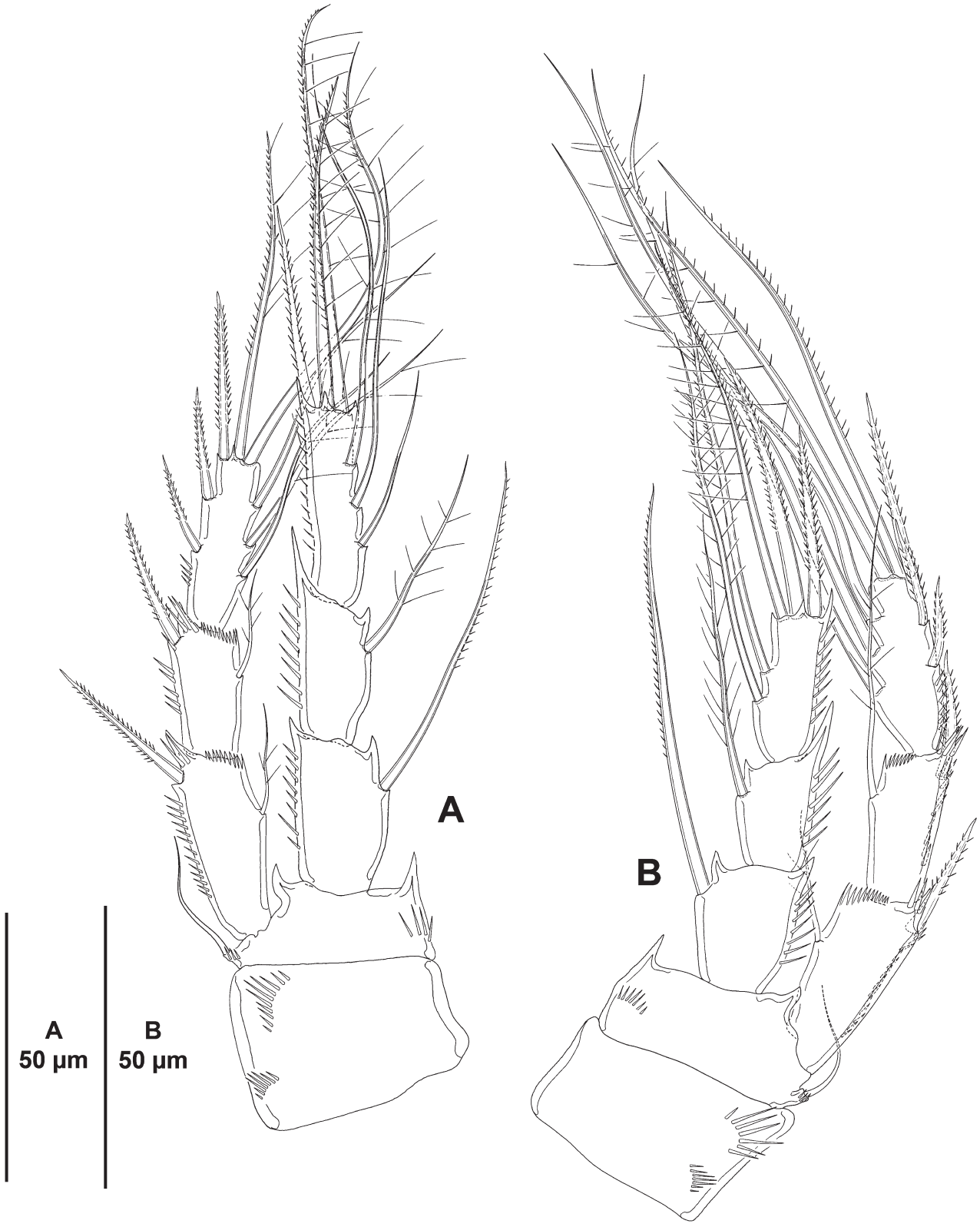


**FIGURE 6.** *Delavalia profunda* **sp. nov.**, female: A, P3, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10595); B, P4, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10596).

Setal formula of swimming legs as follows:

| | P1 | P2 | P3 | P4 |
|---|---|---|---|---|
| EXP | 0,1,022 | 1,1,223 | 1,1,323 | 1,1,323 |
| ENP | 1,111 | 1,2,121 | 1,1,321 | 1,1,221 |

P5 (Fig. 2C). Baseoendopod pentagonal; endopodal lobe poorly-developed, with four setae, of which outermost shortest and set closely to adjacent seta, innermost seta spinulose. Exopod oval, with six setae, of which medial shortest.

P6 (Fig. 2B) represented by a minute flap covering ventrolateral genital aperture, fused to somite, without surface ornamentation, with one slender seta.

**Male.** Unknown.

**Variability.** No variability was detected in the single female found in the sediment samples.

### *Delavalia californiensis* sp. nov.

(Figs. 7–13)

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**Type locality.** Off La Bocana, Baja California Sur (Eastern Tropical Pacific), Mexico; Talud XV cruise, sampling station 20 (26.5428°N, 113.9389°W); depth 479 m; organic carbon content, 3.18%; organic matter content, 5.47%; sand 47.08%; clay, 7.75%; silt, 45.16%.

**Specimens examined.** Adult female holotype dissected (habitus left intact) and mounted onto 15 slides (EMUCOP-020812-04), and adult male allotype dissected partially as follows: antennules, rostrum, and P2–P4 dissected and mounted onto four slides, the rest left intact and preserved in alcohol (EMUCOP-020812-05); August 2, 2012; coll. S. Gómez.

**Etymology.** The specific epithet with the Latin suffix *–ensis*, pertaining to, alludes the region where the species was found. It is in the nominative singular. Gender feminine.

**Description of female.** Total body length measured from tip of rostrum to posterior margin of caudal rami, 650 μm; habitus pyriform, widest at posterior end of cephalothorax, tapering posteriad (Fig. 7A); cephalothorax/body length ratio, 0.35.

Cephalothorax and free pedigerous somites (Fig. 7A) largely as in previous species.

Urosome (Fig. 7A–C) as in previous species.

Fifth pedigerous somite (Fig. 7A–C) narrower than preceding somites; without spinular ornamentation.

Second and third urosomites completely fused dorsally and ventrally forming genital double-somite (Fig. 7C), with dorsolateral trace of division (Fig. 7A–B); genital double-somite as long as wide, widest part measured in anterior fourth close to P6; proximal half of genital double-somite with dorsal (Fig. 7A) and lateral sensilla (Fig. 7B), ventrally without sensilla (Fig. 7C), without spinular ornamentation (Fig. 7A–C); distal half of genital double-somite with dorsal and lateral sensilla and dorsolateral spinular rows (Fig. 7A–B), ventrally with few sensilla and without spinules (Fig. 7C); posterior hyaline fringe broad and smooth; genital complex hardly distinguishable, copulatory pores not exposed, paired genital apertures located ventrolaterally and covered by P6 (Fig. 7C).

Fourth urosomite (Fig. 7A–C) as distal half of genital double-somite, with two ventral pores (Fig. 7C).

Fifth urosomite without sensilla nor spinules (Fig. 7A–C), with two ventral pores.

Anal somite three times as wide as long (Fig. 7A), with spinules around joint of caudal rami laterally (Fig. 7B) and ventrally (Fig. 7C), with spinules along medial cleft ventrally, with one lateral and two ventral pores on each side (Figs. 7A–C); anal operculum without spinular ornamentation, semicircular, flanked by one sensilla on each side (Fig. 7A).

Caudal rami elongate, about 6.5 times as long as wide (Figs. 7A–C) and about 2.8 times as long as anal somite; with outer spinules at base of setae I and II, and with inner subdistal spinules (Fig. 7A–D), with one proximal outer and one subdistal inner pore; with seven elements (Fig. 7D); setae I and II issuing at subdistal outer margin, closely set, the former spine-like and ventral to seta II, the latter lost during dissection; seta III subdistal, arising ventrally (Fig. 7B–D); setae IV and seta V distal, posterior half of the former rat-tail like in distal half, the latter broken off; seta VI small, issuing at inner distal corner; dorsal seta VII triarticulate at base, situated subdistally close to inner margin.

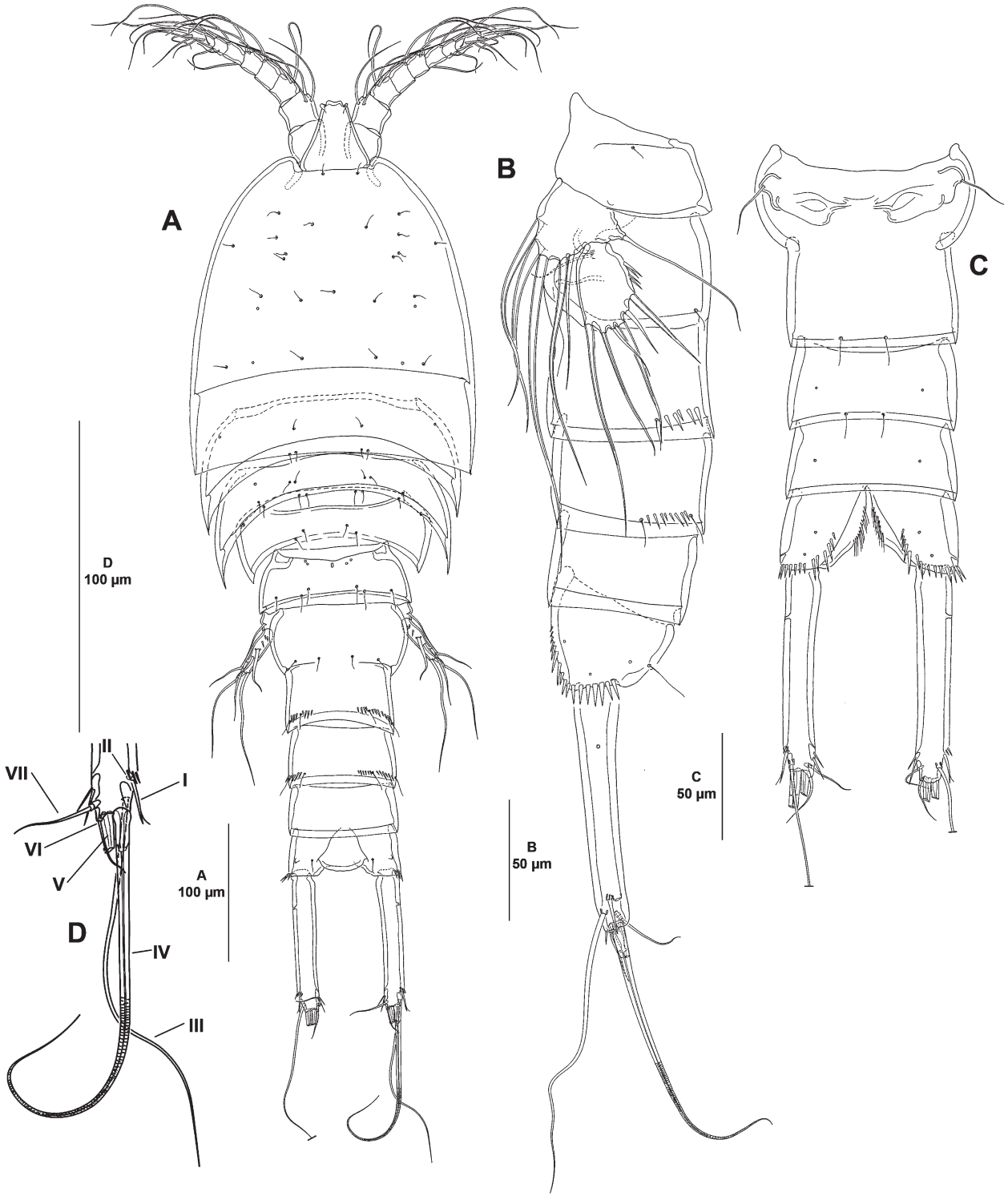


**FIGURE 7.** *Delavalia californiensis* **sp. nov.**, female: A, habitus, dorsal (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10599); B, urosome, lateral; C, urosome, ventral (P5-bearing somite omitted); D, distal part of right caudal ramus, dorsal.

Rostrum (Fig. 8A) trapezoidal, not fused to cephalothorax, bifid, with two subdistal sensilla, without dorsal pore.

Antennule (Fig. 8A) eight-segmented; all segments smooth, except for first segment with proximal spinular row; first segment without pore. All setae smooth, except for one pinnate seta on first and second segments; second segment with one, third segment with one (or two?) setae with fracture plane; seventh segment with one, eighth segment with two articulated setae. Armature formula: 1(1); 2(11); 3(8); 4(4 + (1 + ae)), 5(3); 6(4); 7(4); 8(5 + acro). Acrothek consisting of two setae and one minute aesthetasc fused basally.

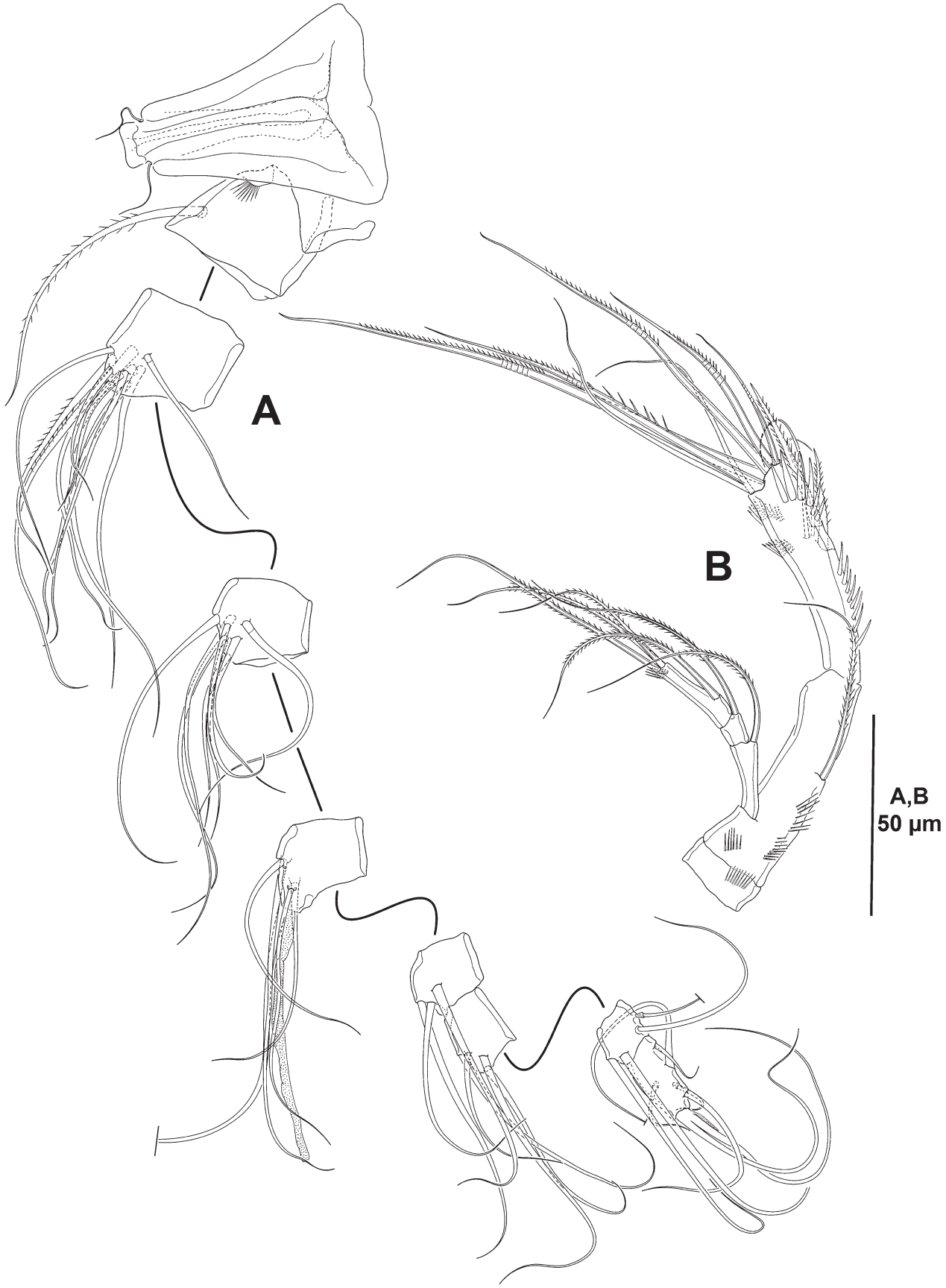


**FIGURE 8.** *Delavalia californiensis* **sp. nov.**, female: A, rostrum and antennule (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10605); B, antenna.

Antenna (Fig. 8B). Coxa short, with some outer spinules. Allobasis as long as free endopodal segment; with two inner spinular rows below the insertion site of abexopodal seta, and one outer spinular row proximally; with one abexopodal seta arising midway inner margin. Free endopodal segment elongate; proximal half with longitudinal row of inner spinules, with subdistal outer strong spinules, with two outer subdistal frills; lateral armature composed of two spines and two setae, distal armature composed of one inner geniculate apical element, three apical pinnate geniculate setae and one slender element, and one outer distal pinnate geniculate element fused basally to slender seta. Exopod three-segmented; first and third segments longest; first and middle segments without, third segment with subdistal spinules; first and second segments with one distal seta each, third segment with one proximal and three apical setae, two of which seemingly fused basally.

Mandible (Fig. 9A). Coxa relatively short. Gnathobase wide; ventral distal corner produced into small sharp semi-hyaline process; with two strong and several smaller teeth, two spines and two setae, one of which pinnate. Basis elongate, with small spinules proximally, medially and subdistally as shown, with three subdistal outer setae. Exopod arising from short pedestal, one-segmented, elongate, about 3.5 times as long as wide, and 0.4 times as long as basis; with three lateral and three apical setae, none of which fused basally. Endopod recurved, twisted over exopod; with three lateral setae, and five distal elements (three slender setae, one of which spinulose and one strong element, and longest element fused to endopod basally and with hyaline flange in middle part).

Maxillule (Fig. 9B). Arthrite of praecoxa with two surface setae and some dorsal spinules proximally; distal armature composed of nine elements, of which two setiform and one spinulose element, two spiniform with a long spinule, and one lateral spinulose recurved seta. Coxal endite with three setae; with subdistal spinules. Basis with two endites; proximal endite with four, distal endite with three slender setae. Exopod and endopod fused basally, separated from basis, one-segmented; endopod larger than exopod, with four setae; exopod small, with two setae.

Maxilla (Fig. 9C). Large syncoxa with some outer spinules as shown; with three endites; proximal endite bilobed, each lobe with two setae; middle and distal endites elongate, the latter slightly longer, with three spinulose setae each. Basis drawn out into strong claw, with strong spinulose spine and two slender setae, one of which arising from elongate setophore. Endopod one-segmented, with six slender setae (one arising basally, two medially, and three apically).

Maxilliped (Fig. 9D) subchelate. Syncoxa rectangular, about two times as long as wide; with medial and inner spinules as shown; with one bare and two spinulose strong elements, of which bare seta and one spinulose element at the same level, the other arising distally from long pedestal. Basis slightly shorter than syncoxa, oval, with some outer spinules, with one anterior and one posterior inner spinular row as depicted, with two slender distal setae subequal in length. Endopod one-segmented, with one claw-like element and one seta.

P1 (Fig. 10A). Intercoxal sclerite (not shown) transversely elongate, nearly straight, without surface ornamentation. Coxa massive, 1.3 times as wide as long, with one outer proximal, one outer subdistal, and one medial subdistal row of spinules. Basis with outer and inner spinulose spines, with spinules at base of endopod and at base of inner spine. Exopod three-segmented, longer than endopod; no pores detected on exopodal segments; EXP1 longest, EXP3 shortest; all segments without outer nor inner acute distal processes; EXP1 and EXP2 with longitudinal row of outer spinules; EXP1 without, EXP2 with inner seta; EXP3 with longitudinal row of outer spinules, with two outer spines and two apical setae, the latter rat-tail like in distal half. Endopod two-segmented, reaching distal third of EXP2, segments without inner nor outer acute distal processes; no pores detected on endopodal segments; ENP1 reaching slightly beyond tip of EXP1, 1.7 times as long as wide, visibly longer than ENP2, with outer and distal spinules, and slender medial inner spinules as shown, with one inner long seta; ENP2 small, rectangular, about 1.7 times as long as wide, and 0.5 times as long as ENP1, with small spinules at base of outer element, with three distal elements, of which outermost a spine, medial a long rat-tail like strongly plumose seta, innermost a slender seta.

P2–P4 (Figs. 10B, 11A–B). Intercoxal sclerite (not shown) not transversely elongate, trapezoidal, with strong pointed process on distal outer corners, without surface ornamentation. Praecoxa small, without spinular ornamentation. Coxa with outer spinules proximally and subdistally. Basis with (P2) or without spinules (P3 and P4) at base of outer seta, with strong acute process between rami and at inner distal corner, the latter larger, of P2 largest, of P4 smallest. Exopod three-segmented, of P2 reaching middle of ENP3, of P3 slightly shorter than ENP, of P4 visibly longer than ENP; no pores detected on exopodal segments; EXP1 and EXP2 with outer acute distal process (of P4 less developed), with longitudinal row of outer spinules and with inner distal frill, with inner seta; EXP3 with distal processes as shown, with few outer spinules proximally, with three outer spines and two apical setae, of P2 with two, of P3 and P4 with three inner setae. Endopod three-segmented, of P2 visibly longer than, of P3

slightly longer than EXP, of P4 reaching proximal third of EXP3; pores present on P2 ENP2 and P3 ENP3; P2–P4 ENP1–3 with longitudinal row of outer spinules; P2 and P3 ENP1 and ENP2 with inner distal spinules, P4 ENP1 without, ENP2 with inner distal spinules; P2–P4 ENP1 shortest, ENP3 longest; ENP1 and ENP2 with outer acute and inner small distal process, outer process of ENP2 visibly longer, distal processes of ENP3 as shown; ENP1 with inner element, of P2 and P3 a slender short seta, of P4 a long stiff element with inner margin pinnate; ENP2 with two (P2) or one inner seta (P3 and P4); ENP3 with one apical outer spine, two apical elements, and one (P2), three (P3) or two (P4) inner setae.

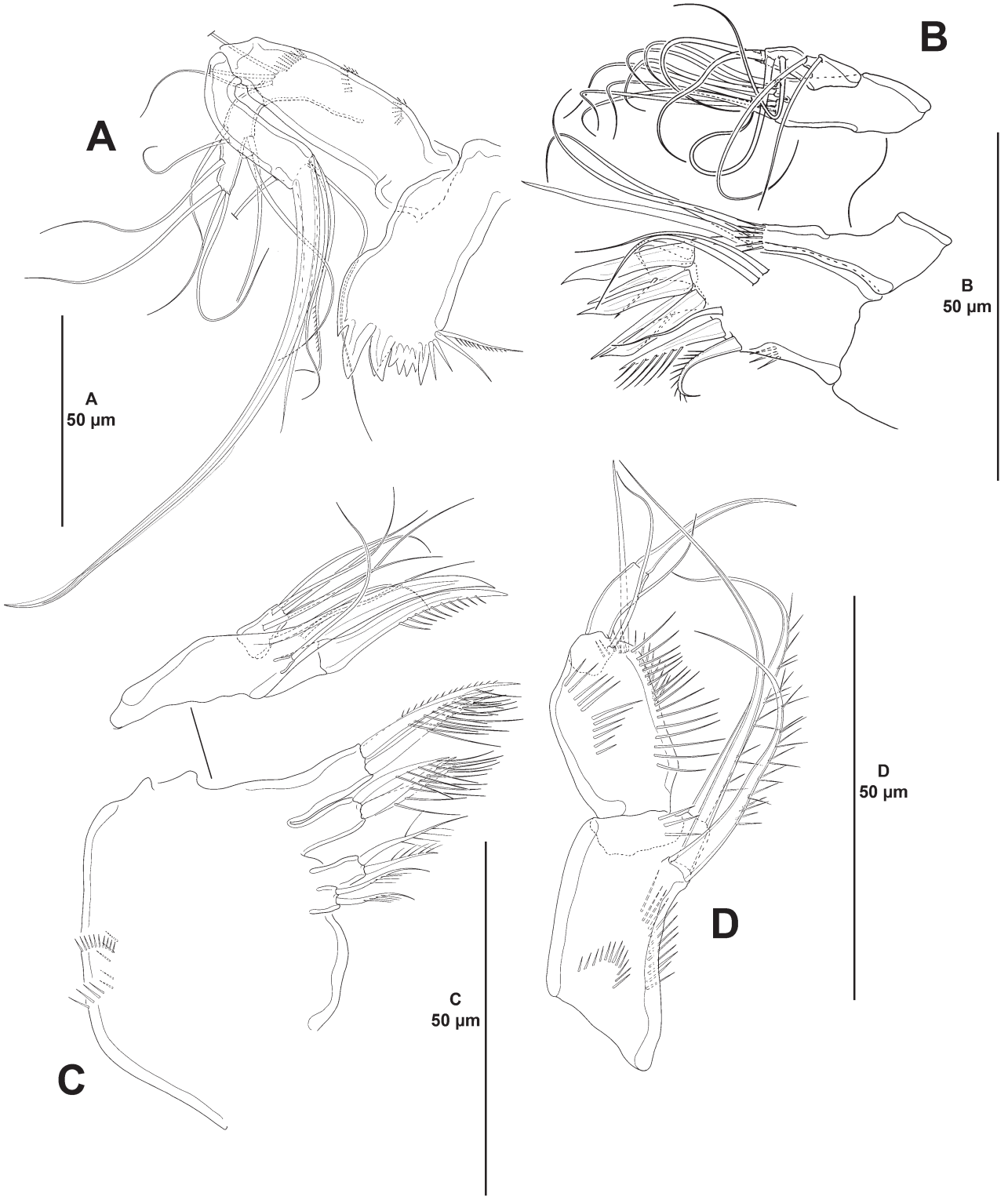


**FIGURE 9.** *Delavalia californiensis* **sp. nov.**, female: A, mandible (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10600); B, maxillule; C, maxilla; D, maxilliped.

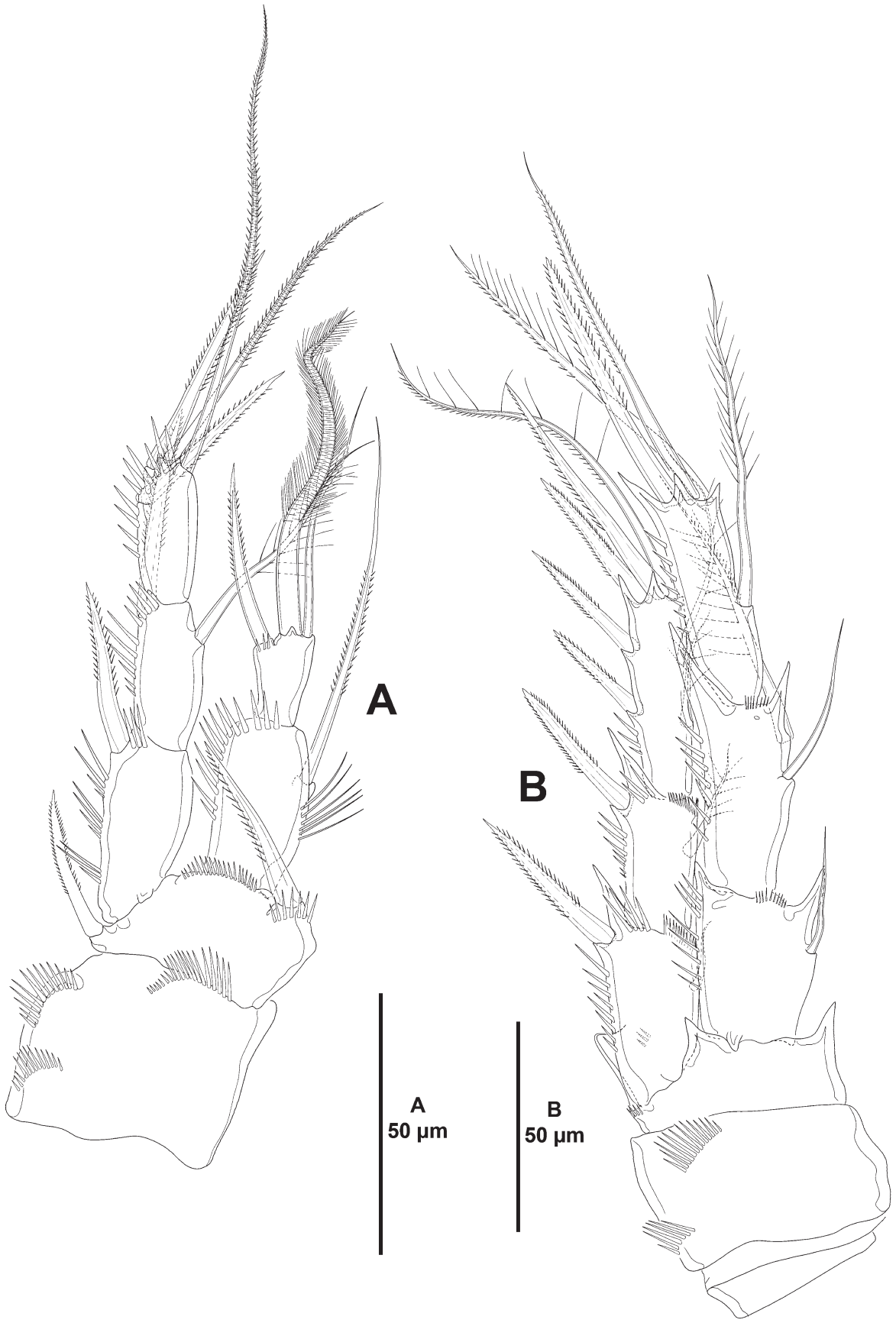


**FIGURE 10.** *Delavalia californiensis* **sp. nov.**, female: A, P1, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10601); B, P2, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10602).

Setal formula of swimming legs as follows:

| | P1 | P2 | P3 | P4 |
|---|---|---|---|---|
| EXP | 0,1,022 | 1,1,223 | 1,1,323 | 1,1,323 |
| ENP | 1,111 | 1,2,121 | 1,1,321 | 1,1,221 |

P5 (Fig. 11C). Baseoendopod pentagonal; endopodal lobe poorly-developed, with five setae, of which outermost shortest and set closely to adjacent seta, all setae pinnate. Exopod oval, with six setae and few outer spinules as shown.

P6 (Fig. 7C) represented by a minute flap covering ventrolateral genital aperture; fused to somite, without surface ornamentation, with one slender seta.

**Description of male.** Total body length measured from tip of rostrum to posterior margin of caudal rami, 700 μm; general shape of habitus (Fig. 12A) as in female.

Sexual dimorphism expressed in the antennule, genital somite and third urosomite not fused, P2 ENP, P5 and P6.

Pedigerous somites largely as in female.

Genital somite and third urosomite not fused (Fig. 12A–B), each with dorsolateral spinules and with posterior sensilla dorsally (Fig. 12A); ventral surface of genital somite without spinular ornamentation, of third urosomite with continuous transverse row of spinules and some sensilla (Fig. 12B).

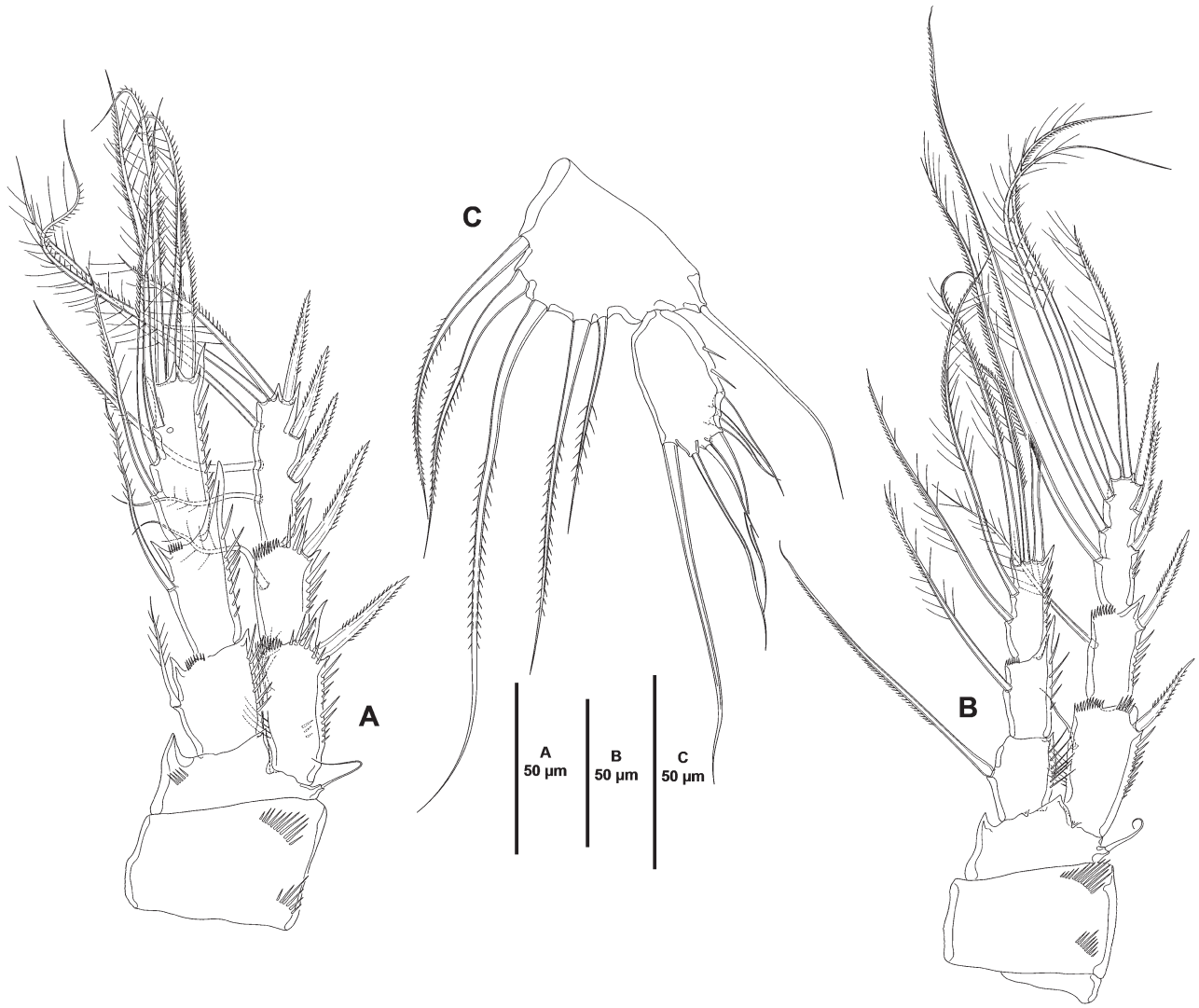


**FIGURE 11.** *Delavalia californiensis* **sp. nov.**, female: A, P3, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10603); B, P4, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10604); C, P5, anterior.

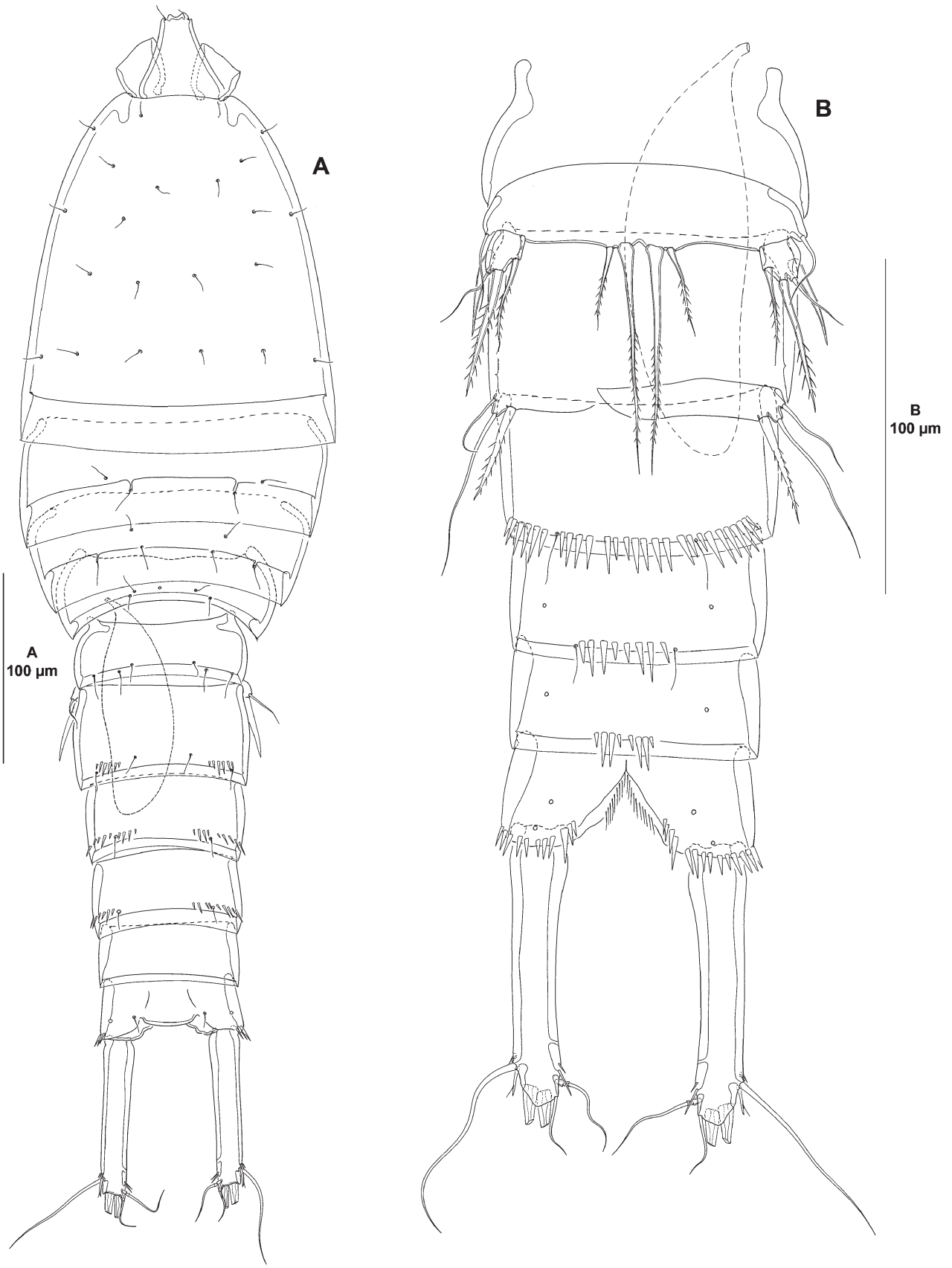


**FIGURE 12.** *Delavalia californiensis* **sp. nov.**, male: A, habitus, dorsal (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10606); B, urosome, ventral.

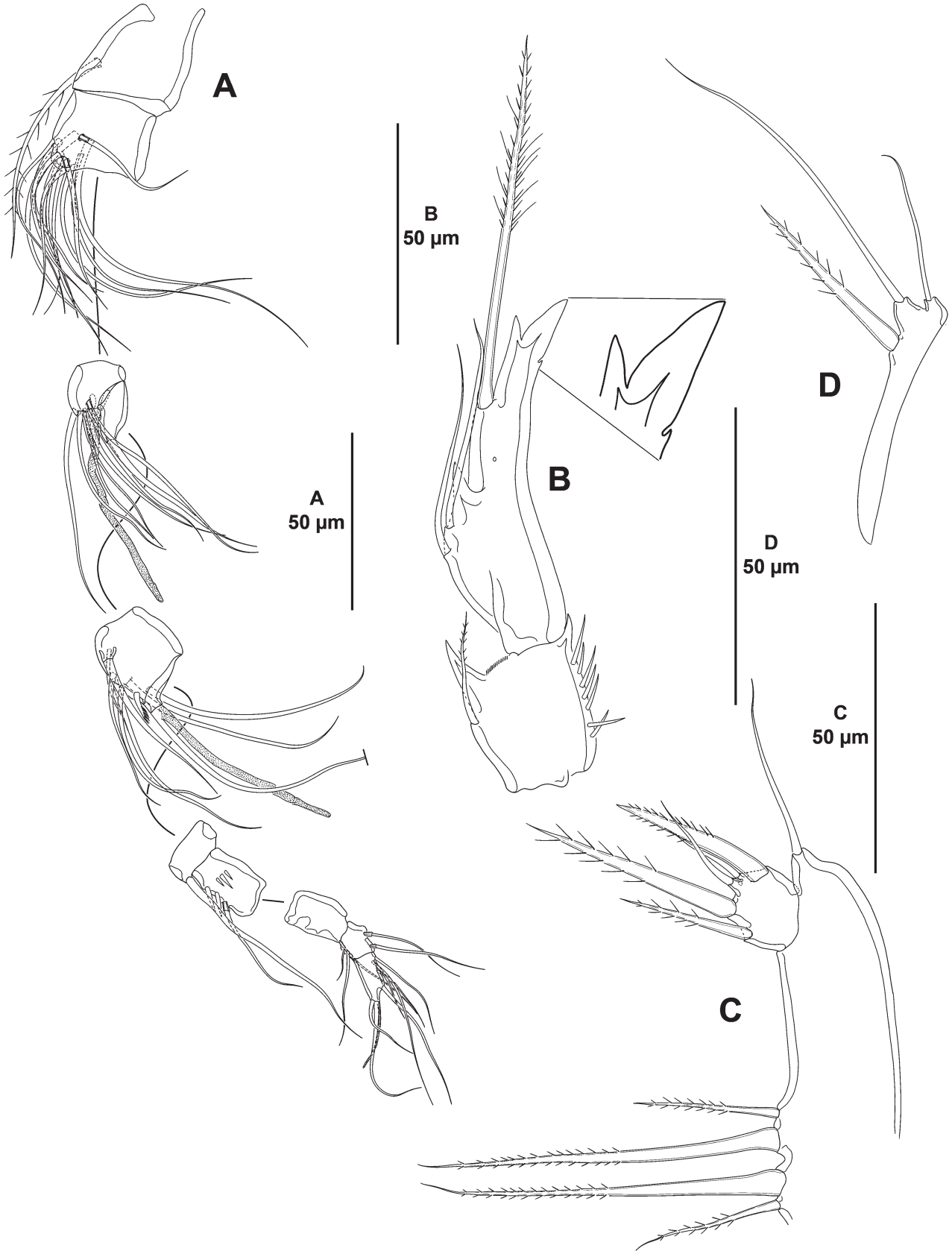


**FIGURE 13.** *Delavalia californiensis* **sp. nov.**, male: A, antennule; B, endopod of P2; C, P5, anterior; D, P6.

Fourth urosomite with dorsolateral spinules and sensilla as shown (Fig. 12A), ventrally with medial transverse spinular row and few sensilla, with two pores (Fig. 12B).

Fifth urosomite as preceding somite but without lateral and dorsal spinular ornamentation (Fig. 12A), and ventral spinular row shorter (Fig. 12B).

Anal somite and caudal rami (Fig. 12A–B), and rostrum (not shown) as in female.

Antennule (Fig. 13A) ten-segmented; haplocer; with geniculation between fourth and fifth, and seventh and eighth segments; first segment without pore. All segments smooth except for seventh segment with some spinules —no spinular ornamentation detected on first segment. All setae smooth except for pinnate long seta on first segment and short element on fifth segment. Second and third segments with one seta with fracture plane each; seventh segment with one, ninth and tenth segments with two articulated setae. Aesthetasc present on third, fifth, and last segments. Armature formula: 1(1); 2(13); 3(7 + ae); 4(1); 5(8 + (1 + ae)), 6(1); 7(1); 8(1); 9(4); 10(5 + acro). Acrothek consisting of two setae fused basally to aesthetasc.

Antenna, mandible, maxillule, maxilla and maxilliped, P1, P3, and P4 (not shown) as in female.

P2 EXP (not shown) as in female; P2 ENP (Fig. 13B) sexually dimorphic, two-segmented; first segment small, with inner and outer process, with longitudinal row of outer spinules and inner distal row of minute spinules, with one inner seta; second segment elongate, with one medial pore, with three inner setae as shown, distal part bifurcate with outer small notch (see insert of Fig. 13B).

P5 (Figs. 12B, 13C). Both legs fused medially forming a continuous plate; endopodal lobe poorly-developed, with two pinnate setae, of which outermost smaller; EXP small, oval, with five elements (one outer spine like element, two apical outer slender setae, one apical inner pinnate strong and long element, and one inner visibly shorter pinnate seta).

P6 (Figs. 12B, 13D) asymmetrical, one leg functional, the other fused to somite; each leg with outer basal seta and two elements, of which innermost a spine, outermost a slender long seta.

**Variability.** No variability was detected in the single female and male found in the sediment samples.

### *Delavalia asetosa* sp. nov.

(Figs. 14–18)

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**Type locality.** Off central Sinaloa State, east of Pescadero Trough, southern Gulf of California, Mexico; Talud IV cruise, sampling station 19 (24.26667°N, 108.4019°W); depth 1,240 m; depth, 1240 m; organic carbon content, 3.96%; sand, 1.77%; clay, 49.12%; silt, 49.12%.

**Specimens examined.** Adult female holotype dissected and mounted onto seven slides (EMUCOP-250800-01); August 25, 2000; coll. S. Gómez.

**Etymology.** The specific epithet from the ancient Greek *ἀ-*, a-, without, and the Latin *seta,* hair, makes reference to the lack of inner armature on P3–P4 EXP1. It is in the nominative singular. Gender feminine.

**Description of female.** Total body length measured from tip of rostrum to posterior margin of caudal rami, 592 µm; habitus (not shown) pyriform, widest at posterior end of cephalothorax, tapering posteriad; cephalothorax/body length ratio, 0.34.

Prosome and pedigerous somites largely as in previous species.

Urosome (Figs. 14A, B) consisting of fifth pedigerous somite (first urosomite), genital double-somite (genital—second urosomite—and third urosomites fused), two free urosomites, and anal somite. Urosomites without expansions laterally nor dorsally; integument weakly sclerotized.

Fifth pedigerous somite (not shown) narrower than preceding somites; without spinular ornamentation.

Second and third urosomites completely fused dorsally and ventrally forming genital double-somite (Fig. 14B), with dorsolateral trace of division (Fig. 14A); genital double-somite as long as wide, widest part measured in proximal fourth close to P6; proximal half of genital double-somite with sensilla and few spinules dorsally (Fig. 14A), ventrally without spinular ornamentation (Fig. 14B); distal half of genital double-somite with posterior sensilla and dorsolateral spinular rows (Fig. 14A), ventrally (Fig. 14B) with few sensilla and without spinules; posterior hyaline fringe broad and smooth; genital complex hardly distinguishable, copulatory pores not exposed, paired genital apertures located ventrolaterally and covered by P6 (Fig. 14B).

Fourth urosomite (Fig. 14A) as distal half of genital double-somite, but with fewer spinules, with two ventral pores (Fig. 14B).

Fifth urosomite without sensilla, with few lateral spinules (Fig. 14A); ventrally with two medial sets of spinules as shown, with two ventral pores (Fig. 14B).

Anal somite 2.5 times as wide as long (Fig. 14A); with few spinules dorsally, laterally and ventrally with spinules around joint of caudal rami (Figs. 14A, B), with spinules along medial cleft ventrally (Fig. 14B); with one ventral pore on each side (Fig. 14B); anal operculum without spinular ornamentation, semicircular, flanked by one sensilla on each side (Fig. 14A).

Caudal rami elongate, about 6.2 times as long as wide (Figs. 14A, B) and as long as three last urosomites combined; with small outer spinules at base of setae I and II, III, V and VII (Figs. 14A–C); no pores detected; with seven setae (Figs. 14A–C); setae I and II lateral, issuing at distal fifth, the former very small and ventral to seta II; seta III subdistal, issuing ventrally; setae IV and V distal, rat-tail like in distal half, with fracture plane; seta VI small, issuing at inner distal corner; dorsal seta VII triarticulate at base, plumose, situated subdistally close to inner margin.

Rostrum (Fig. 15A) trapezoidal, not fused to cephalothorax, bifid, with two subdistal sensilla, without dorsal pore.

Antennule (Fig. 15B) eight-segmented; all segments smooth, except for first segment with proximal spinular row; first segment without pore. All setae smooth, except for two and one slightly plumose seta on seventh and last segment, respectively; no setae with fracture plane detected; seventh segment with two, eighth segment with three articulated setae. Armature formula: 1(1); 2(11); 3(9); 4(5+(1+ae)), 5(3); 6(4); 7(4); 8(4+acro). Acrothek consisting of two setae and one minute aesthetasc fused basally.

Antenna (Fig. 15B). Coxa short, with some outer spinules. Allobasis as long as free endopodal segment; with spinules as shown; with one abexopodal seta arising slightly above middle of inner margin. Free endopodal segment elongate; proximal half with longitudinal row of inner spinules, with subdistal outer strong spinules, with two outer subdistal frills; armature composed of two lateral spines and two setae, distally with one inner apical element, three apical geniculate setae and one slender element, and one outer distal pinnate element fused basally to slender seta. Exopod three-segmented; first and third segments longest; first and third segments with, second segment without subdistal spinules; first and second segments with one distal seta each, third segment with one proximal and three apical setae two of which seemingly fused basally.

Mandible (Fig. 16A). Coxa relatively short, with one medial and one proximal spinular row. Gnathobase wide; ventral distal corner produced into small sharp semi-hyaline process; with two strong and several smaller teeth, two spines and two setae one of which pinnate. Basis elongate, with small spinules proximally, medially and subdistally, with three subdistal outer setae. Exopod arising from short pedestal, one-segmented, elongate, about 3.5 times as long as wide, and 0.4 times as long as basis, with three lateral and three apical setae, none of which fused basally. Endopod recurved, twisted over exopod, with three lateral setae, and five distal elements (three slender setae, one of which spinulose and one strong element, and longest element fused to endopod basally and with hyaline flange in middle part).

Maxillule (Fig. 16B). Arthrite of praecoxa with two surface setae and some dorsal spinules proximally; distal armature composed of nine elements, of which one setiform and one strongly spinulose element, and one lateral spinulose recurved seta. Coxal endite with three setae; no spinules detected. Basis with two endites; proximal endite with four, distal endite with three slender setae. Exopod and endopod fused basally, separated from basis, one-segmented; endopod larger than exopod, with four setae; exopod small, with two setae.

Maxilla (Fig. 16C). Large syncoxa with outer spinules as shown; with three endites; proximal endite bilobed, each lobe with two spinulose setae; middle and distal endites elongate, the latter slightly longer, with three spinulose setae each. Basis drawn out into strong claw, with strong spinulose spine and two slender setae, one of which arising from elongate setophore. Endopod one-segmented, with six slender setae (one arising basally, two medially, and three apically).

Maxilliped (Fig. 16D) subchelate. Syncoxa rectangular, about two times as long as wide, with spinules as shown, with one bare and two spinulose strong elements, of which bare seta and one spinulose element set close to each other, the other spinulose seta arising distally from pedestal. Basis visibly shorter than syncoxa, oval, with outer spinules as shown, with one anterior and one posterior inner spinular row as depicted, with two slender distal setae. Endopod one-segmented, with one claw-like element and one seta.

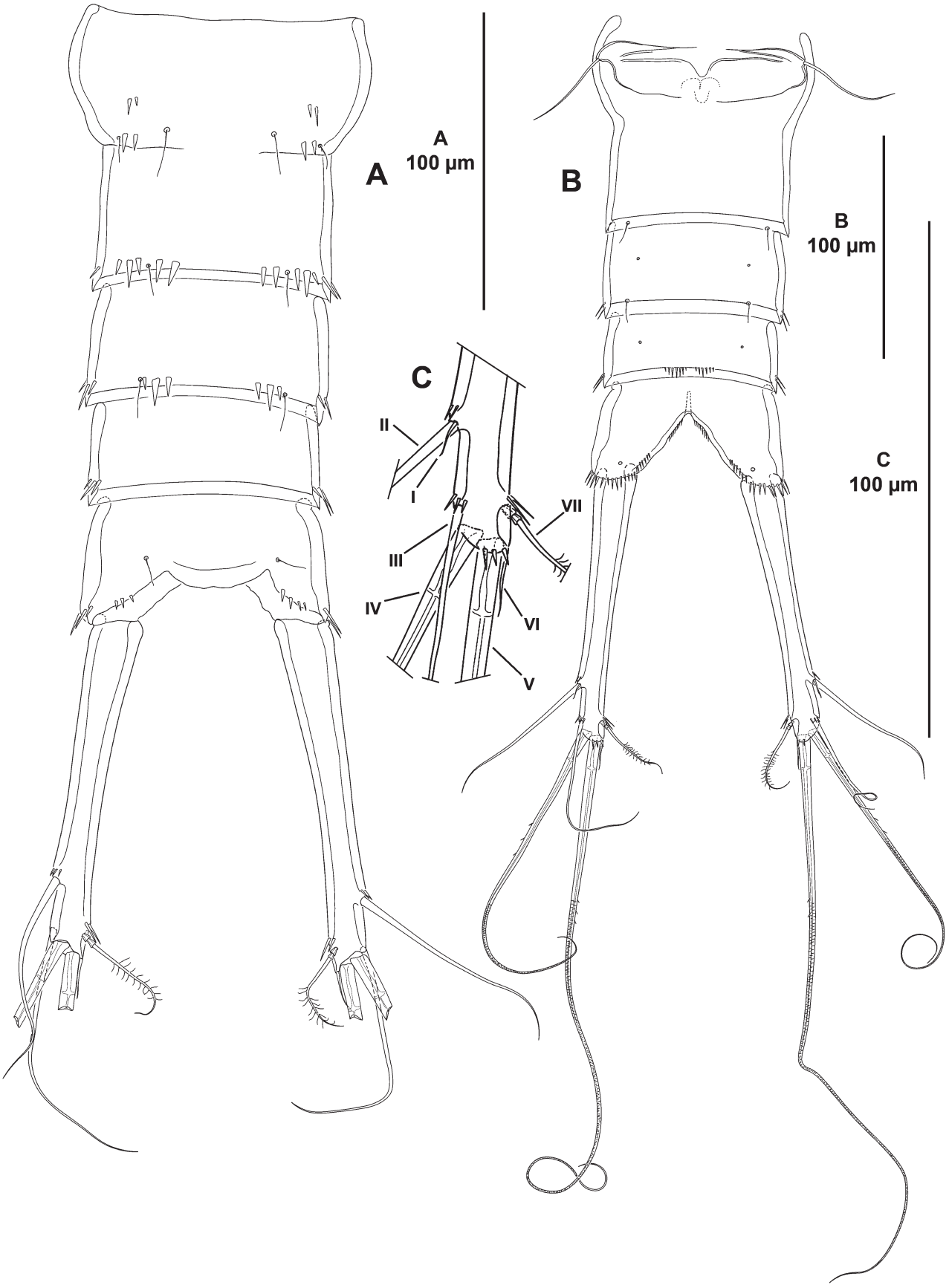


**FIGURE 14.** *Delavalia asetosa* **sp. nov.**, female: A, urosome, dorsal (P5-bearing somite omitted); B, urosome, ventral (P5-bearing somite omitted) (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10653); C, right caudal ramus, ventral.

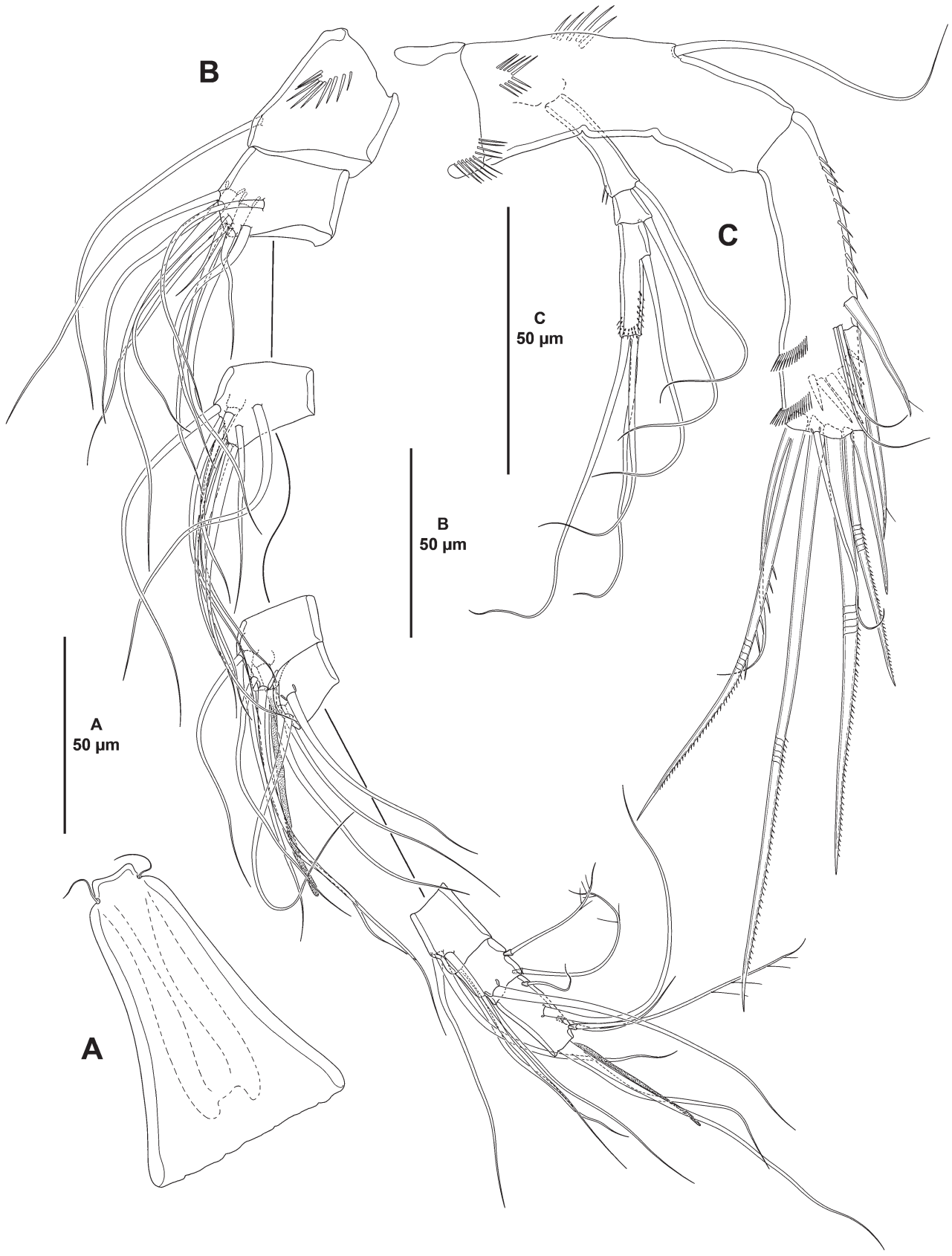


**FIGURE 15.** *Delavalia asetosa* **sp. nov.**, female: A, rostrum; B, antennule (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10644); C, antenna (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10643).

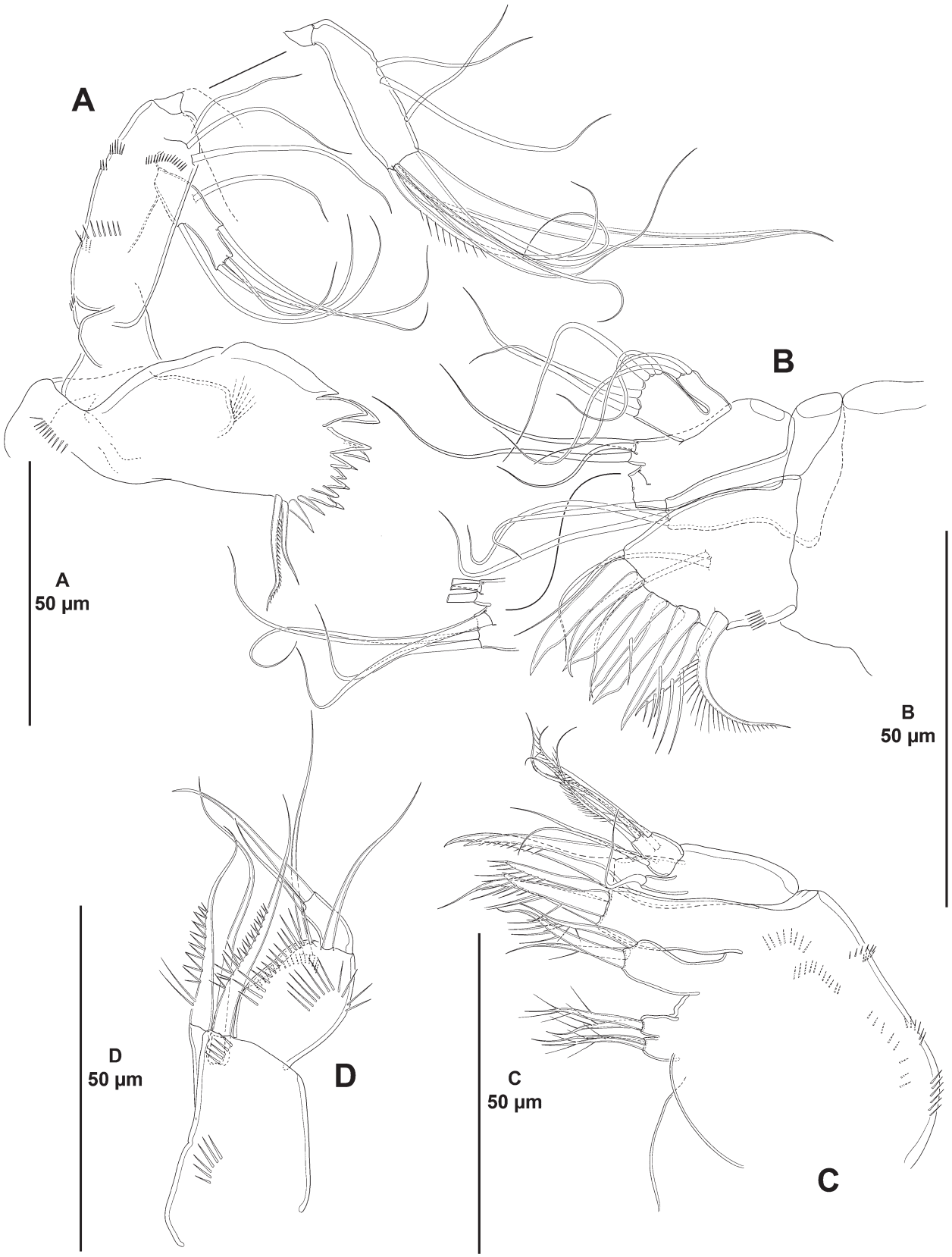


**FIGURE 16.** *Delavalia asetosa* **sp. nov.**, female: A, mandible (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10645); B, maxillule (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10648); C, maxilla (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10646); D, maxilliped (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10647).

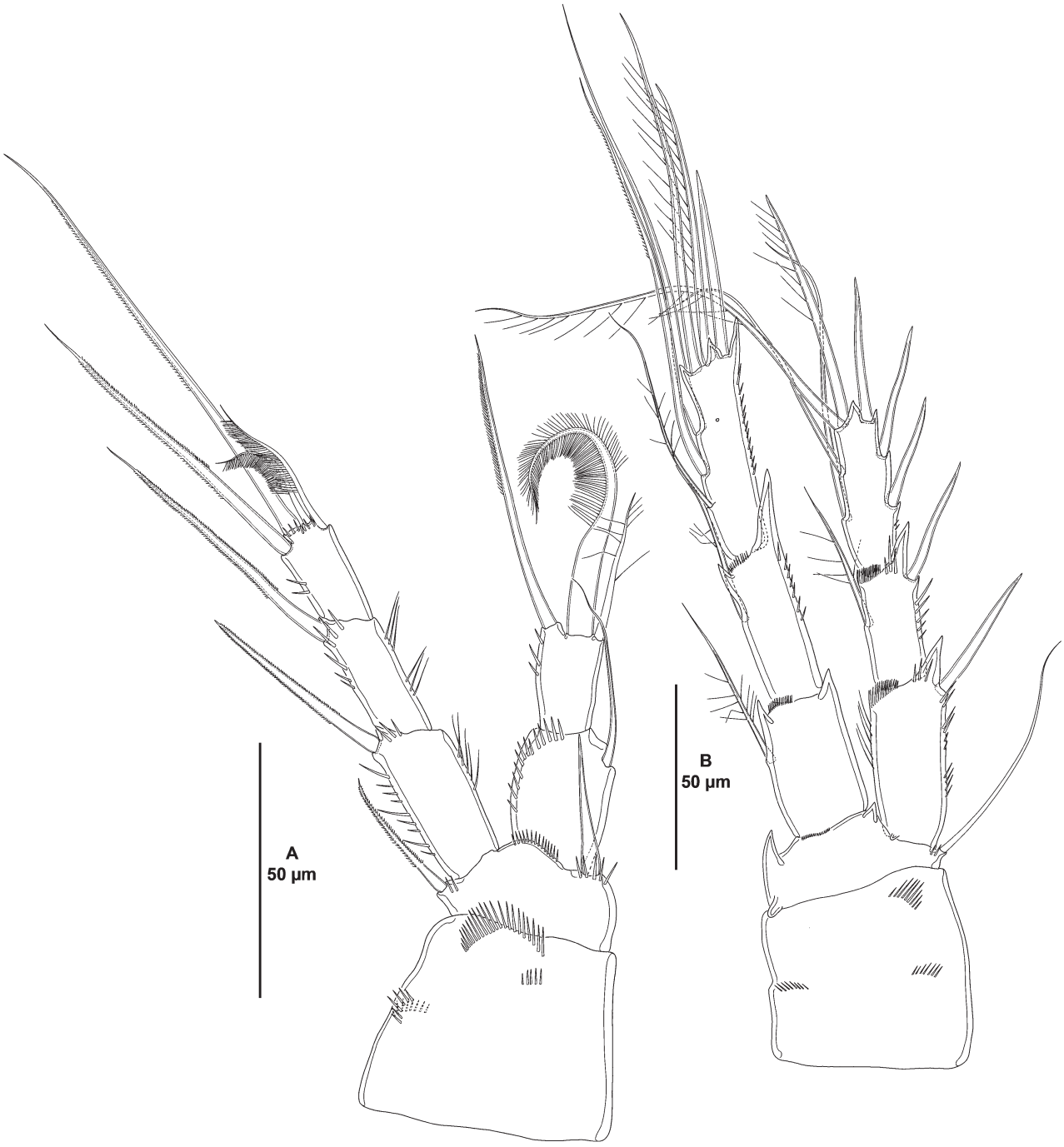


**FIGURE 17.** *Delavalia asetosa* **sp. nov.**, female: A, P1, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10649); B, P3, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10650).

P1 (Fig. 17A). Intercoxal sclerite (not shown) transversely elongate, nearly straight, without surface ornamentation. Coxa massive, 0.8 times as wide as long, with two outer medial, one subdistal, and one medial row of spinules. Basis with spinules at the base of outer and inner spines, and at base of endopod. Exopod three-segmented, longer than endopod; no pores detected on exopodal segments; EXP1 longest, EXP3 shortest; all segments without outer nor inner acute distal processes; EXP1 and EXP2 with longitudinal row of outer spinules and inner slender setules, outer spines elongate, without inner armature; EXP3 with few outer spinules, with two outer elongate spines (distalmost spine displaced apically) and two apical small plumose setae (innermost apical seta displaced inwards). Endopod two-segmented, reaching middle of EXP2, segments without inner nor outer acute distal processes, no

pores detected on endopodal segments; ENP1 barely reaching tip of EXP1, 1.2 times as long as wide, slightly longer than ENP2, with outer and distal spinules as shown, with one inner seta; ENP2 rectangular, about 1.6 times as long as wide, and 0.8 times as long as ENP1, with few outer spinules, with three distal elements, of which outermost a long element, medial a long strongly plumose seta, innermost a slender seta.

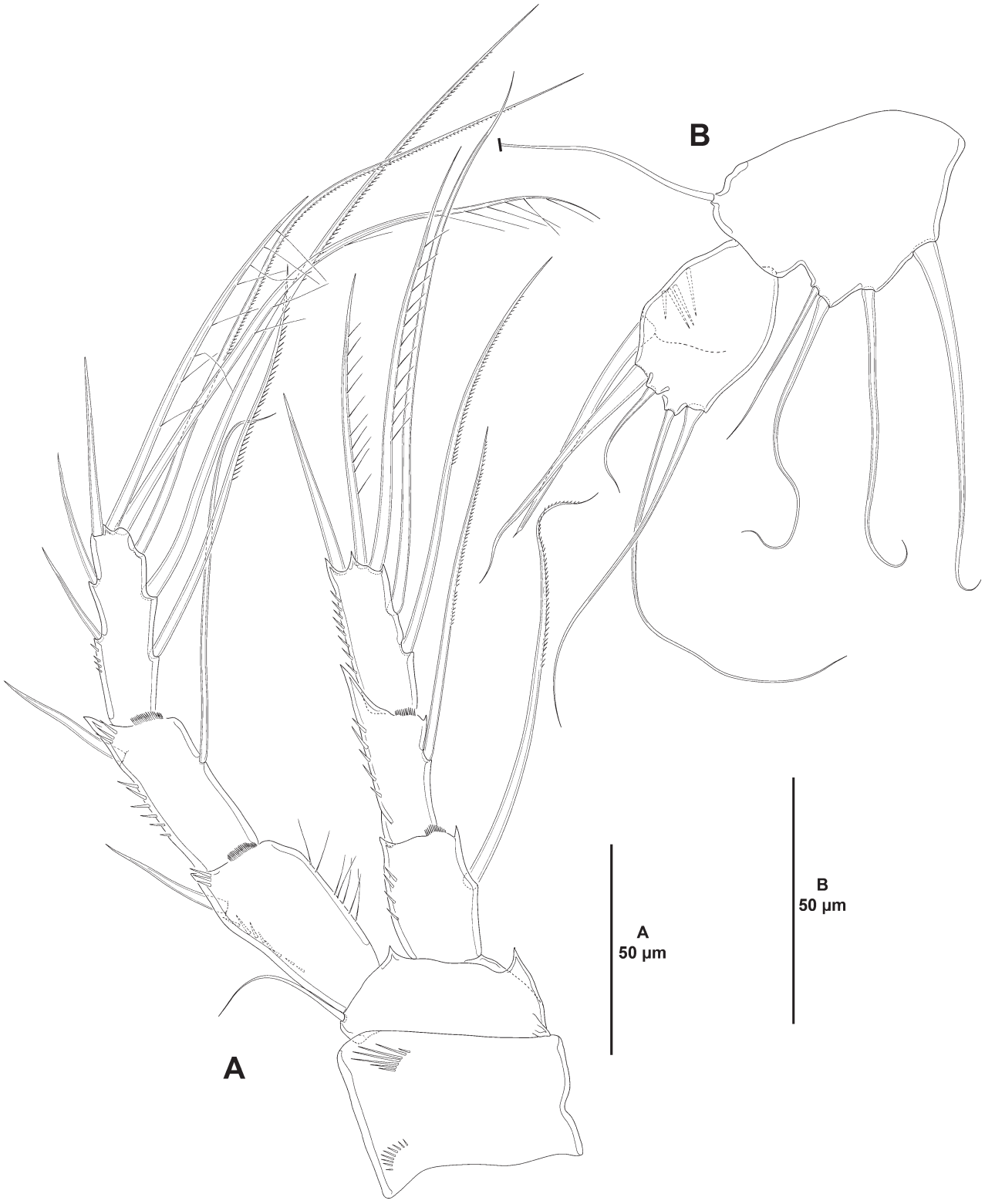


**FIGURE 18.** *Delavalia asetosa* **sp. nov.**, female: A, P4, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10651); B, P5, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10652).

P2 (not shown) badly damaged. Intercoxal sclerite (not shown) not transversely elongate, trapezoidal, with strong pointed process on distal outer corners, without surface ornamentation. Coxa and basis as in P3. Exopod badly damaged, lost. Endopod three-segmented; no pores detected on endopodal segments; ENP1 and ENP2 with inner distal spinules; ENP1 shortest, ENP3 longest; ENP1 and ENP2 with outer acute and inner small distal process, outer process of ENP2 visibly longer; ENP1 with one, ENP2 with two inner elements; ENP3 with one apical outer spine, two apical elements, and one inner seta.

P3–P4 (Figs. 17B, 18A). Intercoxal sclerite (not shown) not transversely elongate, trapezoidal, with strong pointed process on distal outer corners, without surface ornamentation. Coxa with spinules as depicted. Basis of P3 with, of P4 without minute spinules at base of endopod and at base of outer basal seta, with acute process between rami and at inner distal corner, the latter larger. Exopod three-segmented, of P3 reaching middle of ENP3, of P4 visibly longer than ENP; no pores detected on exopodal segments; EXP1 and EXP2 with outer acute distal process (of P4 less developed), with longitudinal row of outer spinules and with inner distal frill, EXP3 with distal processes as shown; EXP1 without, EXP2 with inner armature; EXP3 with few outer spinules proximally, with three outer spines and two apical setae, of P3 with two, of P4 with three inner setae. Endopod three-segmented, of P3 visibly longer than, of P4 reaching middle of EXP3; pore present on P3 ENP3; spinular ornamentation of endopodal segments as shown; ENP1 shortest, ENP3 longest; ENP1 and ENP2 with outer acute and inner small distal process, outer process of ENP2 visibly longer, ENP3 with distal processes as shown; ENP1 with inner element, of P3 a slender plumose seta, of P4 a long stiff element with inner margin pinnate; P3 ENP2 with one slender inner seta, P4 ENP2 with long stiff inner element; P3 ENP3 with one apical outer spine, two apical elements, and three inner setae, of which proximal slender, medial and distal setae visibly thicker; P4 ENP3 with one apical outer spine, two apical elements, and two inner setae.

Setal formula of swimming legs as follows:

| | P1 | P2 | P3 | P4 |
|---|---|---|---|---|
| EXP | 0,0,022 | unknown | 0,1,223 | 0,1,323 |
| ENP | 1,111 | 1,2,121 | 1,1,321 | 1,1,221 |

P5 (Fig. 18C). Baseoendopod pentagonal; endopodal lobe poorly-developed, with four setae, of which outermost shortest and set closely to adjacent seta. Exopod oval, with outer spinules and five setae, of which medial shortest.

P6 (Fig. 14B) represented by a minute flap covering ventrolateral genital aperture, fused to somite, without surface ornamentation, with one slender seta.

**Male.** Unknown.

**Variability.** No variability was detected in the single female found in the sediment samples.

### *Delavalia reducta* sp. nov.

(Figs. 19–23)

urn:lsid:zoobank.org:act:4490AD3C-AB74-4025-B975-2D89DD7CB309

**Type locality.** Off Todos Santos Bay, Baja California (Eastern Tropical Pacific), Mexico; Talud XVIB cruise, sampling station 25 (31.805°N, 116.925°W); depth 825 m; organic carbon content, 4.17%; organic matter content, 7.17%; sand 2.13%; clay, 10.36%; silt, 87.51%.

**Specimens examined.** Adult female holotype dissected and mounted onto ten slides (EMUCOP-260514-01); May 26, 2014; coll. S. Gómez.

**Etymology.** The specific epithet from the Latin *reducta*, reduced, makes reference to the loss of the inner seta of P1 ENP1, and to the reduced armature complement of P1 ENP2 from three to two. It is in the nominative singular. Gender feminine.

**Description of female.** Total body length measured from tip of rostrum to posterior margin of caudal rami, 525 µm; habitus pyriform, widest at posterior end of cephalothorax, tapering posteriad (Fig. 19A); cephalothorax/body length ratio, 0.35.

Prosome and pedigerous somites (Fig. 19A) largely as in previous species.

Urosome (Fig. 19A–C) consisting of fifth pedigerous somite (first urosomite), genital double-somite (genital—

second urosomite—and third urosomites fused), two free urosomites, and anal somite. Urosomites without expansions laterally nor dorsally; integument weakly sclerotized.

Fifth pedigerous somite (Fig. 19A) narrower than preceding somites; with two dorsolateral sets of small spinules.

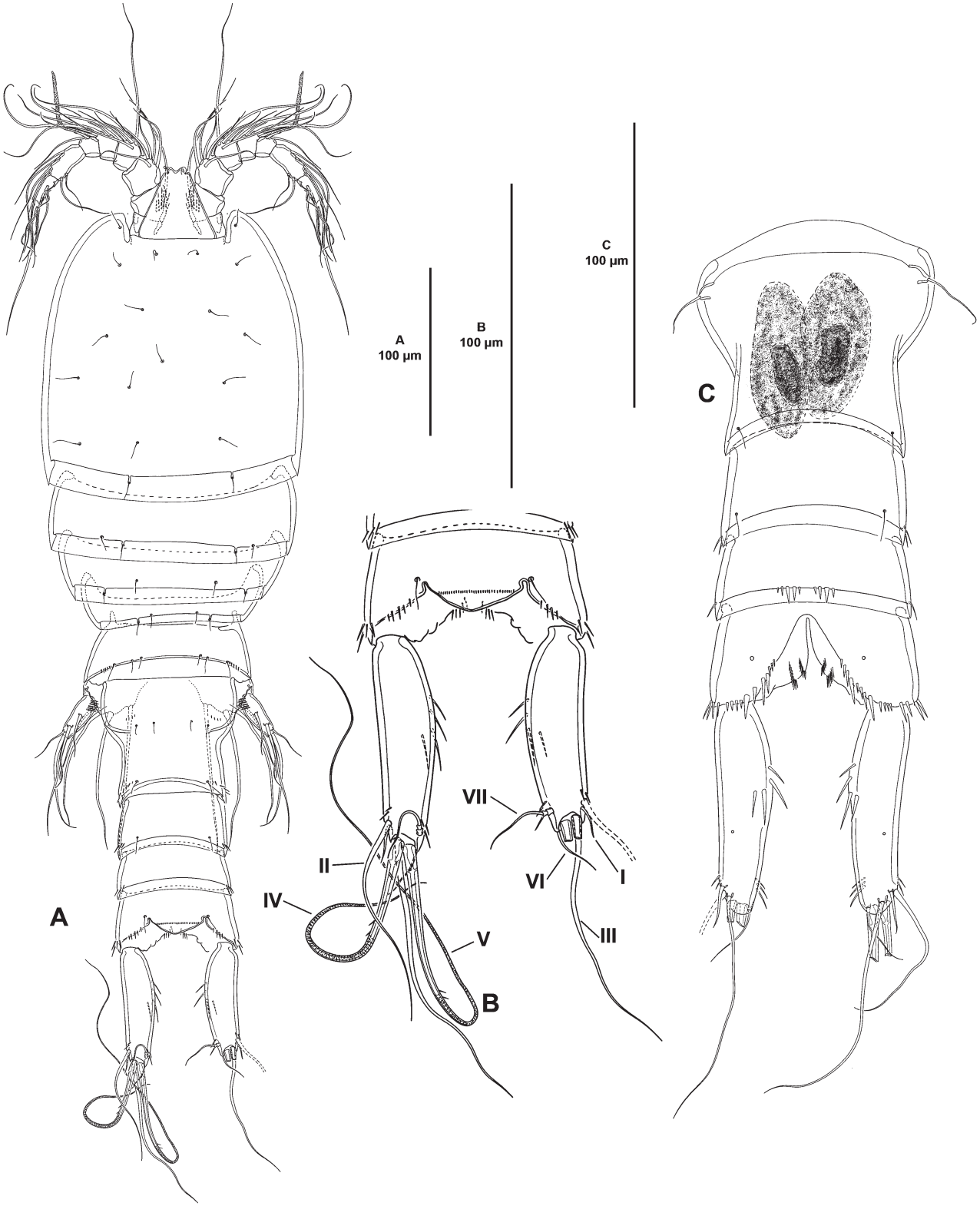


**FIGURE 19.** *Delavalia reducta* **sp. nov.**, female: A, habitus, dorsal; B, anal somite and caudal rami, dorsal; C, urosome, ventral (P5-bearing somite omitted).

Second and third urosomites completely fused dorsally and ventrally forming genital double-somite (Fig. 19C), with dorsolateral trace of division (Fig. 19A); genital double-somite as long as wide, widest part measured in proximal third close to P6; proximal half of genital double-somite with sensilla and two sets of small spinules dorsally (Fig. 19A), ventrally without sensilla nor spinules (Fig. 19C); distal half of genital double-somite with posterior sensilla and dorsolateral spinular rows (Fig. 19A), ventrally with few sensilla and without spinules (Fig. 19C); posterior hyaline fringe broad and smooth; genital complex hardly distinguishable, copulatory pores not exposed, paired genital apertures located ventrolaterally and covered by P6 (Fig. 19C).

Fourth urosomite (Fig. 19A, C) as distal half of genital double-somite; no ventral pores detected.

Fifth urosomite with dorsolateral spinules and without dorsal sensilla (Fig. 19A); ventrally without sensilla but with two medial sets of spinules (Fig. 19C); no ventral pores detected.

Anal somite about 2.2. times as wide as long (Fig. 19A–B); with dorsal, ventrolateral and ventral spinules around joint of caudal rami (Fig. 19A–C); with spinules along medial cleft ventrally (Fig. 19C); with one ventral pore on each side (Fig. 19C); anal operculum with transverse row of minute spinules, semicircular, flanked by one sensilla on each side (Fig. 19B).

Caudal rami elongate, about 3.6 times as long as wide (Fig. 19A–C) and about as long as fifth and anal somites combined; outer margin nearly straight, inner margin convex; with spinules at base of setae I and II, and VII, and with inner medial spinules (Fig. 19A–C), with one medial pore ventrally (Fig. 19C); with seven elements (Fig. 19B); setae I and II subdistal, lateral, the former a small seta ventral to seta II, the latter long; seta III subdistal, arising ventrally (Fig. 19B–C); setae IV and V distal, rat-tail like in distal half, with fracture plane; seta VI small, issuing at inner distal corner; dorsal seta VII triarticulate at base, situated subdistally close to inner margin.

Rostrum (Fig. 20A) trapezoidal, not fused to cephalothorax, bifid, with two subdistal sensilla, without dorsal pore.

Antennule (Fig. 20A) seven-segmented; all segments smooth, except for first segment with proximal spinular row; first segment without pore. All setae smooth, except for one pinnate seta on second, third and last segments; second and third segments with one seta with fracture plane each; sixth segment with two, seventh segment with three articulated setae. Armature formula: 1(1); 2(10); 3(9); 4(5 + (1 + ae)), 5(3); 6(8); 7(5 + acro). Acrothek consisting of two setae and one minute aesthetasc fused basally.

Antenna (Fig. 20B). Coxa short, with some outer spinules. Allobasis as long as free endopodal segment; with some slender spinules at base of exopod, and with few long slender inner spinules at proximal third; with one abexopodal seta arising slightly above the middle of segment. Free endopodal segment elongate; proximal half with longitudinal row of strong inner spinules, distal half with subdistal outer strong spinules, with two outer subdistal frills; armature composed of two lateral spines and two setae, distally with one inner apical element, three apical geniculate setae and one slender element, and one outer distal pinnate element fused basally to slender seta. Exopod three-segmented; first and third segments longest; first and middle segment without, third segment with spinules as shown; first and second segment with one distal seta each, third segment with one proximal and three apical setae, two of which seemingly fused basally.

Mandible (Fig. 21A). Coxa relatively short. Gnathobase wide; ventral distal corner produced into small sharp semi-hyaline process; with two strong and several smaller teeth, two spines and two setae, one of which pinnate. Basis elongate, spinular ornamentation difficult to see, not detected, with three subdistal outer setae. Exopod arising from short pedestal, one-segmented, elongate, about 2.2 times as long as wide, and 0.3 times as long as basis, with three lateral and three apical setae, none of which fused basally. Endopod recurved, twisted over exopod, with three lateral setae, and five distal elements (three slender setae, one of which spinulose and one strong element, and longest element fused to endopod basally and with hyaline flange in middle part).

Maxillule (Fig. 21B). Arthrite of praecoxa with two surface setae and some dorsal spinules; distal armature composed of seven strong spines as shown —no setiform elements detected—, and one lateral pinnate seta. Coxal endite with three setae, spinular ornamentation not detected. Basis with two endites; proximal endite with four, distal endite with three slender setae. Exopod and endopod fused basally, separated from basis, one-segmented; endopod larger than exopod, with four setae; exopod with two setae.

Maxilla (Fig. 21C). Large syncoxa with outer spinules as shown; with three endites; proximal endite bilobed, each lobe with one seta; middle and distal endites elongate, the latter slightly longer, with three spinulose setae each. Basis drawn out into strong claw, with strong spinulose spine and two slender setae, one of which arising from elongate setophore. Endopod one-segmented, with six slender setae (one arising basally, two medially, and three apically).

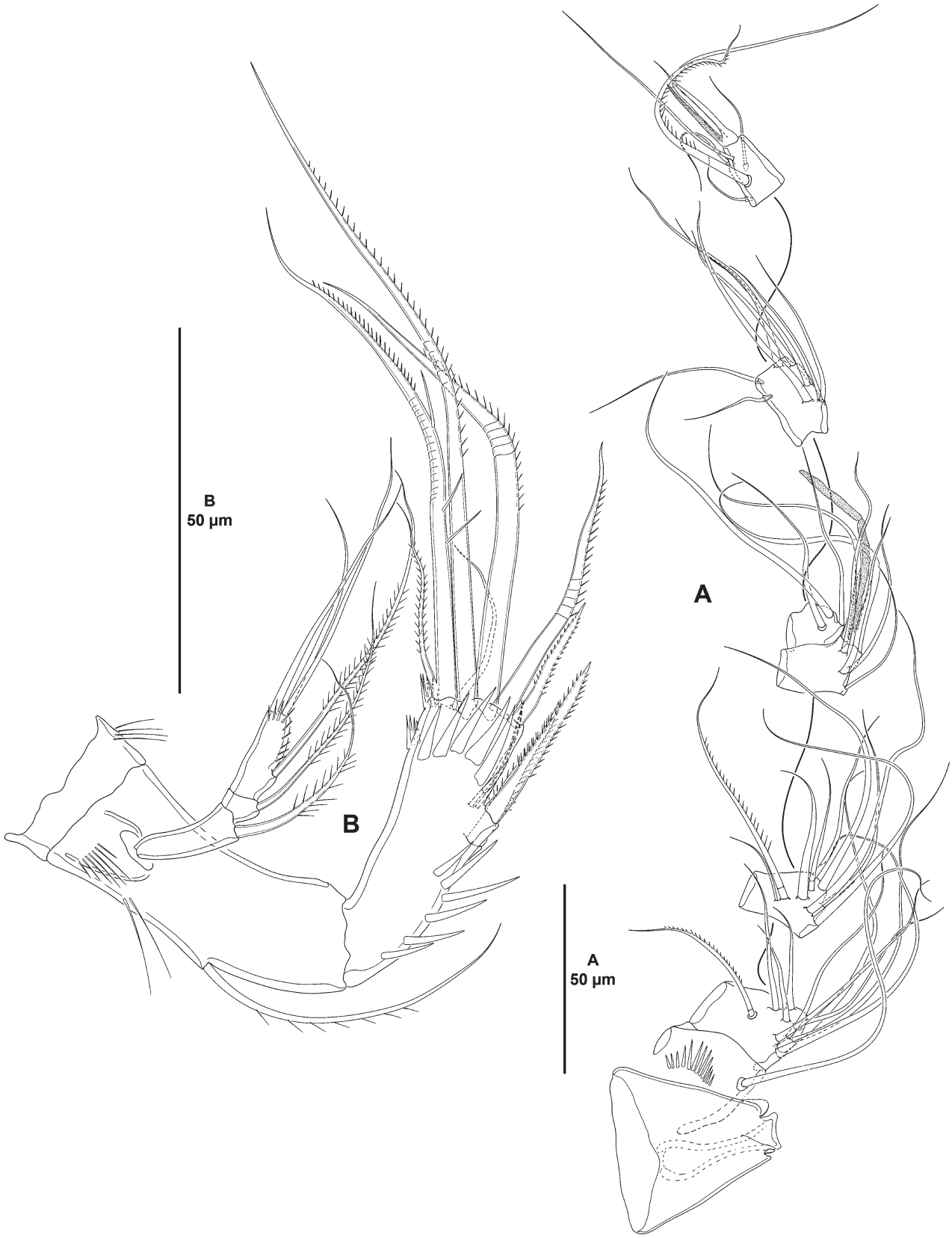


**FIGURE 20.** *Delavalia reducta* **sp. nov.**, female: A, rostrum and antennule (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10625); B, antenna (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10618).

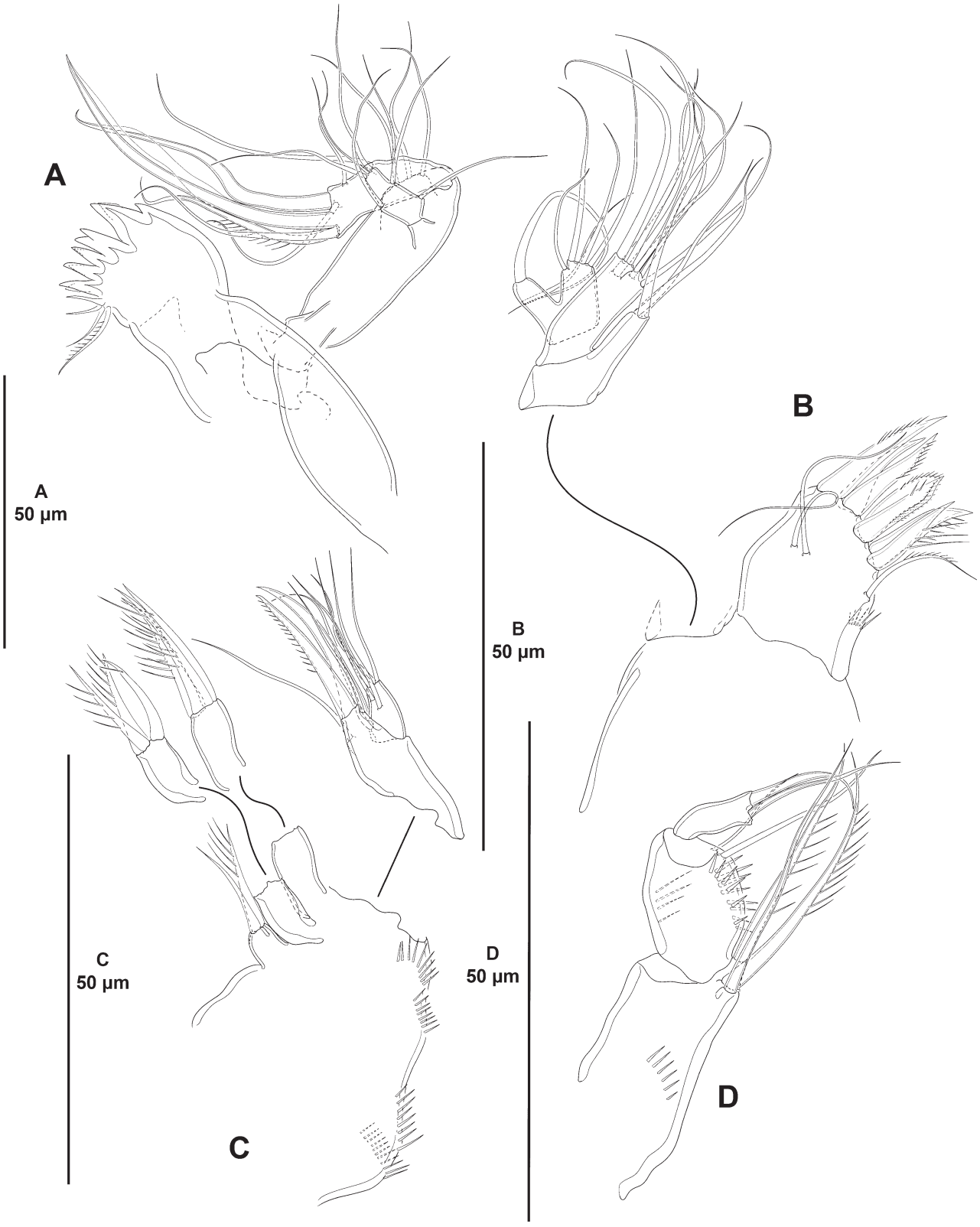


**FIGURE 21.** *Delavalia reducta* **sp. nov.**, female: A, mandible (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10622); B, maxillule; C, maxilla; D, maxilliped (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10616).

Maxilliped (Fig. 21D) subchelate. Syncoxa rectangular; about two times as long as wide; with medial spinules as shown; with one bare and two spinulose strong elements, of which bare seta and one spinulose element at the same level, the other arising distally from long pedestal. Basis shorter than syncoxa, oval, with some outer spinules, with one anterior and one posterior inner spinular row, with two slender distal setae subequal in length. Endopod one-segmented, with one claw-like element and one seta.

P1 (Fig. 22A). Coxa massive, 1.6 times as wide as long; with two outer, and one medial subdistal row of spinules. Basis with outer and inner pinnate spines, with spinules at base of endopod and at base of inner spine, and with few inner setules. Exopod three-segmented, longer than endopod; no pores detected on exopodal segments; EXP1 longest, EXP3 shortest; all segments without outer nor inner acute distal processes; EXP1 and EXP2 with longitudinal row of outer spinules, EXP1 without, EXP2 with inner seta; EXP3 with spinules at the base of setae/spines, with two outer spines and two apical elements, of which outermost apical element spine-like, innermost apical element pinnate and rat-tail like in distal half. Endopod two-segmented, reaching middle of EXP2, segments without inner nor outer acute distal processes; no pores detected on endopodal segments; ENP1 barely reaching tip of EXP1, 1.5 times as long as wide, visibly longer than ENP2, with outer and distal spinules, without armature; ENP2 small, rectangular, about 1.4 times as long as wide, and 0.7 times as long as ENP1, with few outer spinules, with one inner and one apical seta, both strong and plumose.

P2–P4 (Figs. 22B, 23A–B). Intercoxal sclerite (not shown) not transversely elongate, trapezoidal, with strong pointed process on distal outer corners, without surface ornamentation. Coxa with outer spinules proximally and subdistally. Basis with strong acute process between rami and at inner distal corner, the latter larger, of P2 largest, of P4 smallest; seemingly without spinular ornamentation. Exopod three-segmented, of P3 slightly shorter than, of P4 visibly longer than ENP, relative length of P2 EXP uncertain due to bad condition of endopod; pores detected on last exopodal segments only; EXP1 and EXP2 with outer distal process (of P4 less developed), with longitudinal row of outer spinules, of P2 and P3 with, of P4 seemingly without inner distal frill, with inner seta; EXP3 with distal processes as shown, with few spinules proximally, with three outer spines and two apical setae, of P2 with two, of P3 and P4 with three inner setae. Endopod three-segmented (P2 badly damaged and second and third endopodal segments lost during dissection), of P2 most probably longer than, of P3 slightly longer than EXP, of P4 reaching proximal third of EXP3; pores present on the last endopodal segments of P3 and P4 (P2 ENP2–3 unknown); P3–P4 ENP1 shortest, ENP3 longest; ENP1 and ENP2 (of P2 unknown) with outer acute and inner small distal process, outer process of ENP2 (at least of P3 and P4) visibly longer, outer process of P4 ENP2 bifurcate, most probably aberrant, distal processes of ENP3 as shown; ENP1 with inner element, of P2 a slender seta, of P3 and P4 a stiff element with inner margin pinnate, of P4 very long; armature of P2 ENP2 unknown (most probably two setae), P3 and P4 ENP2 with one inner seta; P2 ENP3 unknown, P3–P4 ENP3 with one apical outer spine, two apical elements, and three (P3), or two (P4) inner setae.

Setal formula of swimming legs as follows:

| | P1 | P2 | P3 | P4 |
|---|---|---|---|---|
| EXP | 0,1,022 | 1,1,223 | 1,1,323 | 1,1,323 |
| ENP | 0,110 | 1,?,? | 1,1,321 | 1,1,221 |

P5 (Fig. 23C). Baseoendopod pentagonal, transversely elongate; endopodal lobe poorly-developed, with four setae, of which outermost shortest and set closely to adjacent seta, all setae naked, except for innermost seta pinnate. Exopod oval, with some outer spinules proximally, with five setae as shown.

P6 (Fig. 19C) represented by a minute flap covering ventrolateral genital aperture, fused to somite, without surface ornamentation, with one slender seta.

**Male.** Unknown.

**Variability.** No variability was detected in the single female found in the sediment samples.

**Remarks.** The genus *Delavalia* is the most diverse genus within Stenheliinae both in number of species and morphologically. Due to the latter, the monophyly of the genus has been questioned repeatedly (*e.g.* Karanovic & Kim 2014; Mu & Huys 2002; Willen 2000, 2002, 2003). Several studies have focused their efforts towards the monophyly of the genus and several authors have contributed importantly (see Gómez & Cruz-Barraza 2021). The disparity in maxilliped structure (Gómez & Cruz-Barraza 2021), the different positions of caudal setae I and II (either subdistally or more proximally) (Gómez & Cruz-Barraza 2021), the disparity in structure and armature of the male

P5 (Mu & Huys 2002; Willen 2003), the different shapes of the anal operculum (Mu & Huys 2002; Willen 2003), the different shapes of caudal seta I (either a spine or a small seta) (Gómez & Cruz-Barraza 2021), the different shapes of the 2-segmented endopod of P1, the disparity in swimming leg pattern, and morphology of the dimorphic endopod of the male P2 (Mu & Huys 2002) in different species of *Delavalia* support the di- or polyphyletic status of the genus (Mu & Huys 2002). Some authors have subdivided the genus *Delavalia* with diagnostic purposes only. Willen (2003) subdivided the genus *Delavalia* into a number of groups and subgroups based on the shape of the anal operculum, on the combination of a specialized setation pattern on the female P5 and presence/reduction/absence of the distal inner setae on P2–P4 EXP3, shape of the male and female P5, and reduction of the setation of swimming legs. In their key to the genera of Stenheliinae, Huys & Mu (2008) subdivided the genus *Delavalia* into four groups based on the segmentation pattern of the antennary exopod and number of outer spines on P2–P4 EXP3.

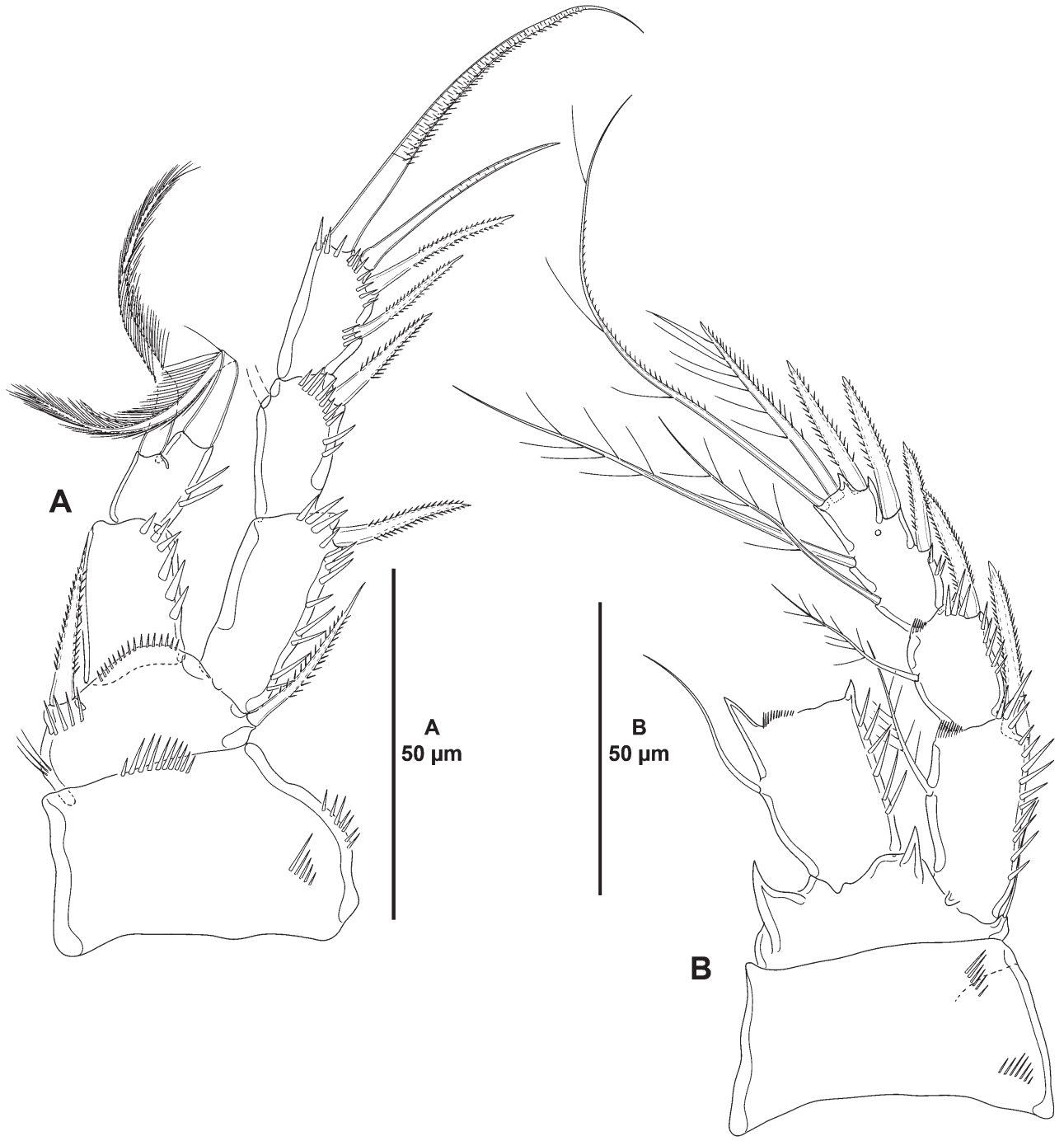


**FIGURE 22.** *Delavalia reducta* **sp. nov.**, female: A, P1, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10620); B, P2, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10621).

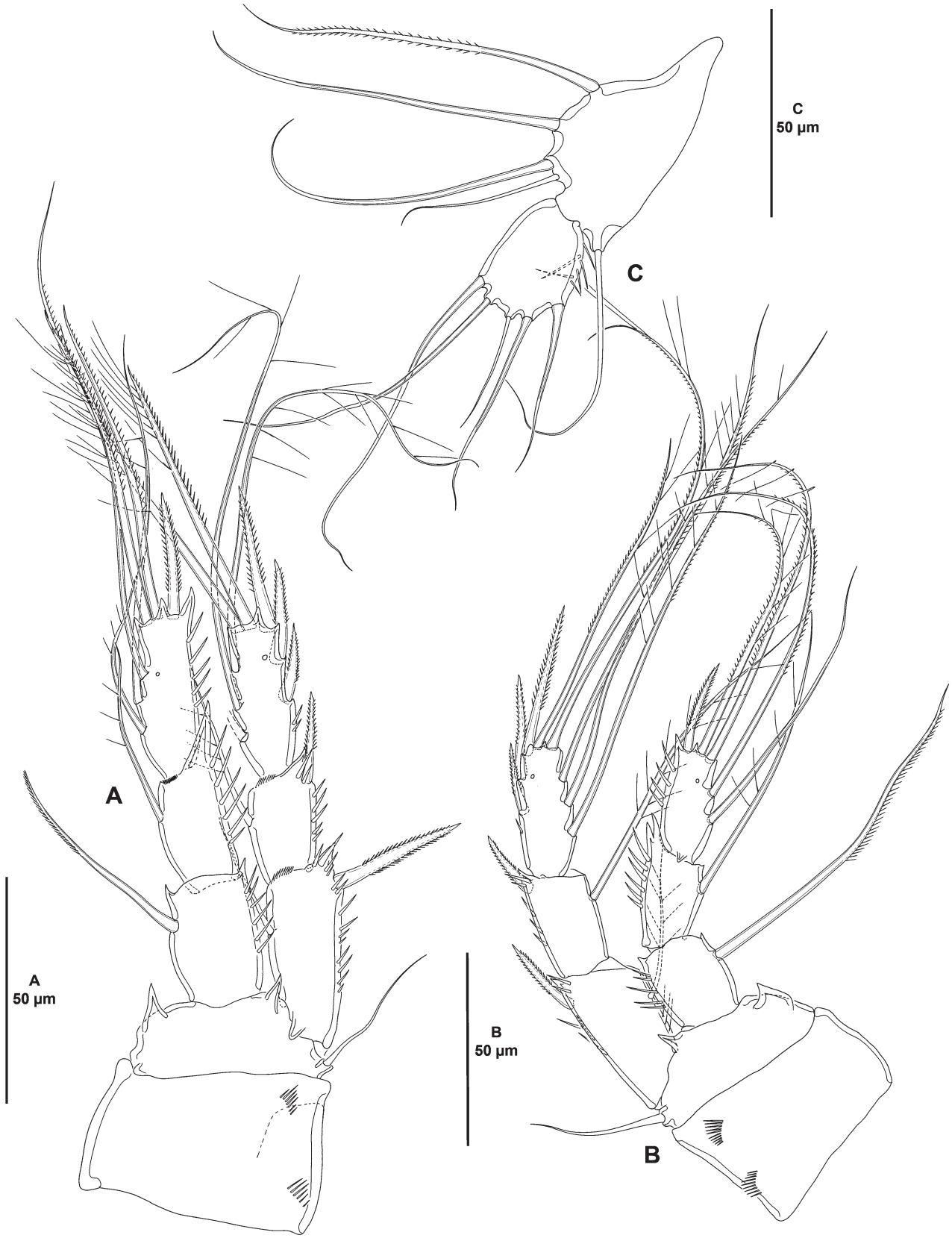


**FIGURE 23.** *Delavalia reducta* **sp. nov.**, female: A, P3, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10617); B, P4, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10623); C, P5, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10624).

The species described above were attributed to Willen's (2003) *longicaudata*-group based on the apomorphic endopod of P1 in which ENP1 is longer than ENP2, the latter being short and with one multiplumose and flagellate apical seta. To the *longicaudata*-group belong *De. noodti*, *De. islandica*, *De. lima*, *De. diegensis*, *De. longipilosa*, *De. longicaudata*, *De. coineauae*, *De. intermedia*, *De. mastigochaeta* and *De. nuwukensis* (Willen 2003). Some of these are marine shallow water species (*e.g. De. longipilosa*, *De. longicaudata*, *De. coineauae*, *De. intermedia*, *De. mastigochaeta* and *De. nuwukensis*), but some have been described from the deep sea. *Delavalia noodti* and *De. islandica* were described from the Iceland-Faroe Ridge at 500 m depth (Schriever 1982), *De. lima* was described from the Peru Trench at 920 m depth (Becker & Schriever 1979), *De. diegensis* was found in the San Diego Trough at 1,200 m depth (Thistle & Coull 1979), and an undescribed species (*Stenhelia* spec. 6 in Willen (2003)), probably related to *De. lima*, was found in the Angola Basin at 5,389 m depth (Willen 2003). Also, in their appendix A, George *et al*. (2014) reported four unidentified species of *Delavalia* found in deep-sea sediment samples (5,389 m depth) from the Angola Basin; it is conceivable that one of George's *et al*. (2014) species of *Delavalia* could be conspecific to Willen's (2003) *Stenhelia* "spec 6". The depth distribution of this and some other lineages (see Gómez & Cruz-Barraza 2021; Gómez 2021) support the view that deep-sea harpacticoids may have originated from shallow-water ancestral stocks as suggested earlier by Mu & Huys (2002). The shallow-water species *De. longicaudata* and *De. nuwukensis* are assumed here to be the most primitive species of the *longicaudata*-group based on the retention of four setae on P1 ENP2.

The deep-sea *De. reducta* **sp. nov.** is unique within the genus by the autapomorphic P1 ENP2 with reduced armature from three to two well-developed and densely setulose setae. Amongst the species of the *longicaudata*-group, the loss of the inner seta of P1 ENP1 is shared with the deep-sea *De. noodti* only, but a close relationship between these two species seems unlikely given the remarkable differences in the general structure and setation of the antennary exopod (one-segmented and with two setae in *De. noodti*, and typical for the genus in *De. reducta* (three-segmented with one, one, and four setae on the first, second and third segments, respectively), armature formula of the swimming legs (P1 ENP2 with three setae in *De. noodti*, but two setae only in *De. reducta* **sp. nov.**, loss of the inner seta on P2 ENP1 in *De. noodti* —*De. noodti* also lacks the inner seta on P2 ENP2 and possesses two inner setae on P2 ENP3, but these segments are unknown for *De. reducta* **sp. nov.**—, presence of two inner setae on P3 and P4 EXP3 in *De. noodti*, but three in *De. reducta* **sp. nov.**, and loss of the inner seta on P3 ENP1 in *De. noodti*).

The deep-sea *Delavalia asetosa* **sp. nov.** and the shallow-water *De. mastigochaeta* are the only species within the *longicaudata*-group without inner armature on P1 EXP2. Amongst the species of the *longicaudata*-group, the deep-sea species *Delavalia asetosa* **sp. nov.**, *De. noodti*, *D, islandica*, and the shallow water species *De. longipilosa* share the reduction of the inner armature of P3 EXP3 from three to two setae. However, *De. asetosa* **sp. nov.** seems to be unique within the *longicaudata*-group by the loss of inner armature on P3–P4 EXP1.

Amongst the species of the *longicaudata*-group, only four species, the shallow-water *De. coineauae*, and the deep-sea *De. californiensis* **sp. nov.**, *De. profunda* **sp. nov.**, and *De. lima* share exactly the same armature formula of P1–P4 (P1 EXP/ENP: 0,1,022/1,111; P2 EXP/ENP: 1,1,223/1,2,121; P3 EXP/ENP: 1,1,323/1,1,321; P4 EXP/ENP: 1,1,323/1,1,221). All the other species display some reduction in the armature complement of one or more swimming legs. Within this core of species, *De. californiensis* **sp. nov.** and *De. coineauae* display a combination of six and five setae on the exopod and endopodal lobe, respectively, of the female P5. *Delavalia profunda* **sp. nov.** retained the plesiomorphic armature complement of six setae on the exopod of the female P5, but the armature of the endopodal lobe is reduced from five to four setae, while the armature complement of the female P5 EXP and baseoendopod is reduced from six to five and from five to four setae, respectively, in *De. lima.*

The polyphyletic status of *Delavalia* is evident from the disparity in the structure and armature complement of a number of appendages both in the female and male (see above). The monophyly of the *longicaudata*-group is not clear yet. Willen (2003) commented on the apomorphic status of the P1 ENP, and noted that in the groundpattern of this taxon the male P5 EXP is discrete, the armature complement of the female P5 is complete and that the setae on the third exopodal segment of swimming legs are not reduced. Although the shape and structure of the maxilliped seem to be constant within this group, other appendages need some attention. For example, the mandible of *De. coineauae* seems to possess a two-segmented exopod and four setae on the basis, and the exopod and endopod of the maxillule appear as discrete in Soyer (1971), the maxillulary rami of *De. lima* and *De. diegensis* appear also as discrete in Becker & Schriever (1979) and Thistle & Coull (1979), respectively, and the female antenna of *De. noodti* seems to bear a basis with a one-segmented exopod with two setae and a two-segmented endopod with two inner setae on the first segment (Schriever 1982: 28, Fig. 1(A2)). The female of all the species of the *longicaudata*-

group have been described, but the male is known only for the shallow-water *De. longipilosa*, *De. coineauae*, and *De. mastigochaeta*, and for the deep-sea *De. noodti* and *De. californiensis* **sp. nov.** Although the disparity in the structure and shape of the male P2 ENP in the species of *Delavalia* is indicative of the polyphyletic status of the genus (Mu & Huys 2002), the male P2 ENP seems to be similar in those species of the *longicaudata*-group for which the male has been described.

### Genus *Archaeohuysia* gen. nov

urn:lsid:zoobank.org:act:F020C32F-50CB-4900-B840-A1DD3B494A2F

**Type and only species.** *Archaeohuysia huysi* **gen. et sp. nov.**

**Etymology.** The prefix from the Greek *ἀρχαῖος,* arkhaîos, primitive, makes reference to the primitive shape of the P1 ENP. The suffix is taken from Dr. Rony Huys' family name, to whom the species is dedicated for his effort to edit this special volume dedicated to Prof. J. B. J. Wells. Gender masculine.

**Diagnosis (based on the female only).** Stenheliinae. Rostrum discrete, bifid, without dorsal pore, without spinular ornamentation. Antennule eight-segmented; all segments smooth, except for proximal spinular row on first segment, the latter without pore; all setae smooth except for pinnate seta on first segment. Antenna with allobasis; free endopodal segment with two spines and two setae laterally, and seven distal elements, of which outer distalmost fused basally to slender seta; exopod three-segmented, first and second segments with one distal seta each, third segment with one proximal and three apical setae. Mandible with elongate basis bearing three subdistal outer setae; exopod one-segmented, with three lateral and three apical setae; endopod recurved, twisted over exopod, with three lateral setae, and five distal elements. Maxillulary basis with two endites; proximal endite with four, distal endite with three slender setae; exopod and endopod fused basally, separated from basis, one-segmented; endopod with four, exopod with two setae. Maxilla with three endites; proximal endite bilobed, each lobe with two setae; middle and distal endites elongate, with three elements each; endopod one-segmented, with six slender setae. Maxilliped subchelate, not or weakly prehensile; syncoxa with one bare and two spinulose elements; basis with two setae; endopod one-segmented, with hyaline distal part, with two seta-like elements. P1 with intercoxal sclerite transversely elongated and without surface ornamentation; with three-segmented exopod and two-segmented endopod, the former longer; EXP2 and EXP3 imperfectly subdivided; ENP1 with semicircular row of modified outer spinules distally; ENP2 with one anterior medial small element and three strong setae; armature formula of exopod/endopod 0,1,022/1,121. P2–P4 with three-segmented rami; intercoxal sclerites with pointed distal processes, without spinular ornamentation; basis with acute pointed projection at inner distal corner and between rami; ENP1 with inner stiff element, of P4 visibly longer; armature formula of exopod/endopod (P2) 1,1,223/1,2,121, (P3) 1,1,323/1,1,321, (P4) 1,1,323/1,1,221. P5 with endopodal lobe poorly-developed, with five setae, of which outermost and adjacent seta set close together; all setae naked; exopod with six setae, of which medial shortest. Caudal rami elongate, about 3 times as long as wide, with seven elements, of which seta I spine-like.

### *Archaeohuysia huysi* sp. nov.

(Figs. 24–30)

urn:lsid:zoobank.org:act:10744E2C-9B90-49E2-8A5D-B15A98ED94C7

**Type locality.** San Isidro Basin, off west coast of Baja California (Eastern Tropical Pacific), Mexico; Talud XVIB cruise, sampling station 21 (30.9247°N, 116.8267°W); depth 2,037 m; organic carbon content, 2.21%; organic matter content, 3.81%; sand, 1.08%; clay, 12.54%; silt, 86.38%.

**Specimens examined.** Adult female holotype dissected and mounted onto nine slides (EMUCOP-280514-02); May 28, 2014; coll. S. Gómez.

**Etymology.** The species is named in honour of Dr. Rony Huys (Natural History Museum, London) for his contribution to the systematics and taxonomy of harpacticoid copepods. It is a noun in the genitive case. Gender masculine.

**Description of female.** Total body length measured from tip of rostrum to posterior margin of caudal rami, 440 µm; habitus pyriform, widest at posterior end of cephalothorax, tapering posteriad (Fig. 24A); cephalothorax/body length ratio, 0.35.

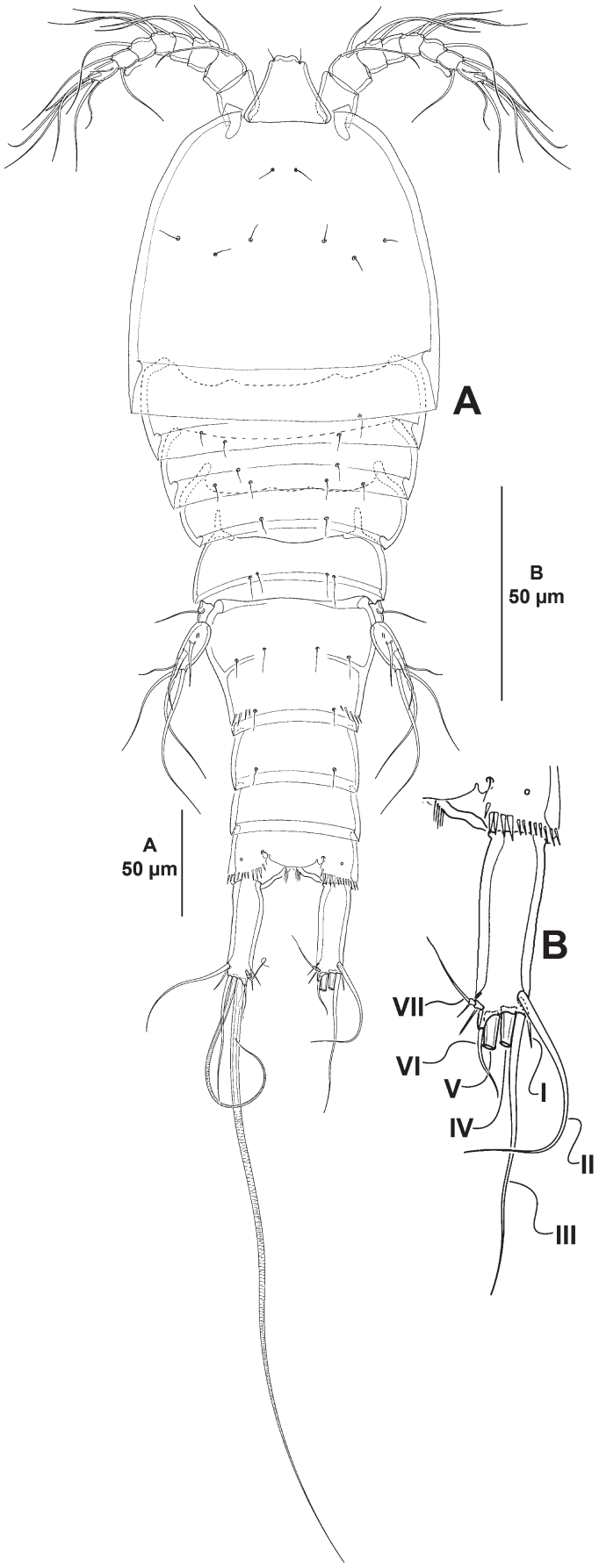


**FIGURE 24.** *Archaeohuysia huysi* **gen. et sp. nov.**, female: A, habitus, dorsal; B, right caudal ramus, dorsal.

Prosome and pedigerous somites (Figs. 24A) largely as in previous species.

Urosome (Figs. 24A, 25A–B) consisting of fifth pedigerous somite (first urosomite), genital double-somite (genital—second urosomite—and third urosomites fused), two free urosomites, and anal somite. Urosomites without expansions laterally nor dorsally; integument weakly sclerotized.

Fifth pedigerous somite (Fig. 24A) narrower than preceding somites; with some sensilla dorsally (Fig. 24A) and laterally (Fig. 25A), without spinular ornamentation.

Second and third urosomites completely fused dorsally and ventrally forming genital double-somite (Fig. 25B), with dorsolateral trace of division (Figs. 24A, 25B); genital double-somite 1.4 times as long as wide, widest part measured close to P6; proximal half with sensilla and without spinules dorsally (Fig. 24A), ventrally without sensilla nor spinules (Fig. 25B); distal half with dorsolateral sensilla and spinular rows (Figs. 24A, 25A), ventrally with few sensilla and without spinules (Fig. 25B); posterior hyaline fringe broad and smooth; genital complex hardly distinguishable, copulatory pores not exposed, paired genital apertures located ventrolaterally and covered by P6 (Fig. 25B).

Fourth urosomite (Figs. 24A, 25A–B) as distal half of genital double-somite but without spinular ornamentation; no pores detected.

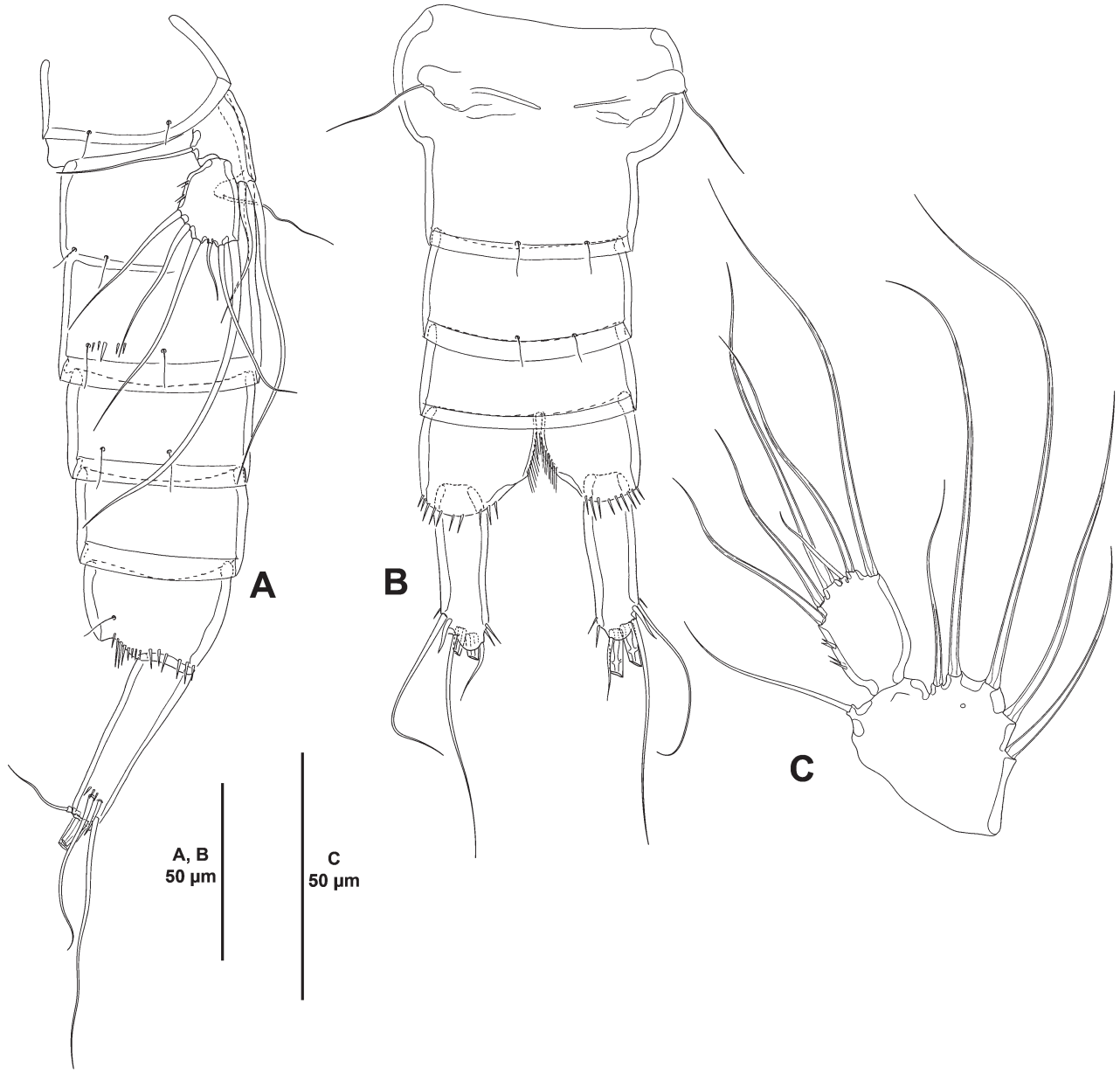


**FIGURE 25.** *Archaeohuysia huysi* **gen. et sp. nov.**, female: A, urosome, lateral; B, urosome, ventral (P5-bearing somite omitted); C, P5, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10615).

Fifth urosomite without sensilla nor spinules (Figs. 24A, 25A–B); no pores detected.

Anal somite about 2.5. times as wide as long (Fig. 24A); with spinules around joint of caudal rami (Figs. 24A, 25A–B); medial cleft with row of setules ventrally (Fig. 25B); with one dorsal pore on each side (Fig. 24A); anal operculum without spinular ornamentation, semicircular, flanked by one sensilla on each side (Fig. 24A).

Caudal rami elongate, about 3 times as long as wide (Figs. 24A–B) and about as long as fifth and anal somites combined; outer margin nearly straight, inner margin slightly convex proximally; with outer spinules at base of setae I and II (Fig. 25A), and with inner spinules subdistally (Figs. 24A–B, 25B); with seven elements (Fig. 24B); setae I and II subdistal, lateral, seta I spine-like and ventral to seta II, the latter long; seta III subdistal, arising ventrally (Figs. 25A–B); setae IV and V distal, rat-tail like in distal half, with fracture plane; seta VI small, issuing at inner distal corner; dorsal seta VII triarticulate at base, situated subdistally close to inner margin.

Rostrum (Fig. 26C) trapezoidal, elongate, not fused to cephalothorax, weakly bifid, with two subdistal sensilla, without dorsal pore.

Antennule (Fig. 26A) eight-segmented; all segments smooth, except for first segment with proximal spinular row; first segment without pore. All setae smooth, except for one pinnate seta on first segment; no setae with fracture plane detected; seventh segment with two, eighth segment with three articulated setae. Armature formula: 1(1); 2(11); 3(10); 4(6 + (1 + ae)), 5(3); 6(4); 7(4); 8(5 + acro). Acrothek consisting of two setae and one minute aesthetasc fused basally.

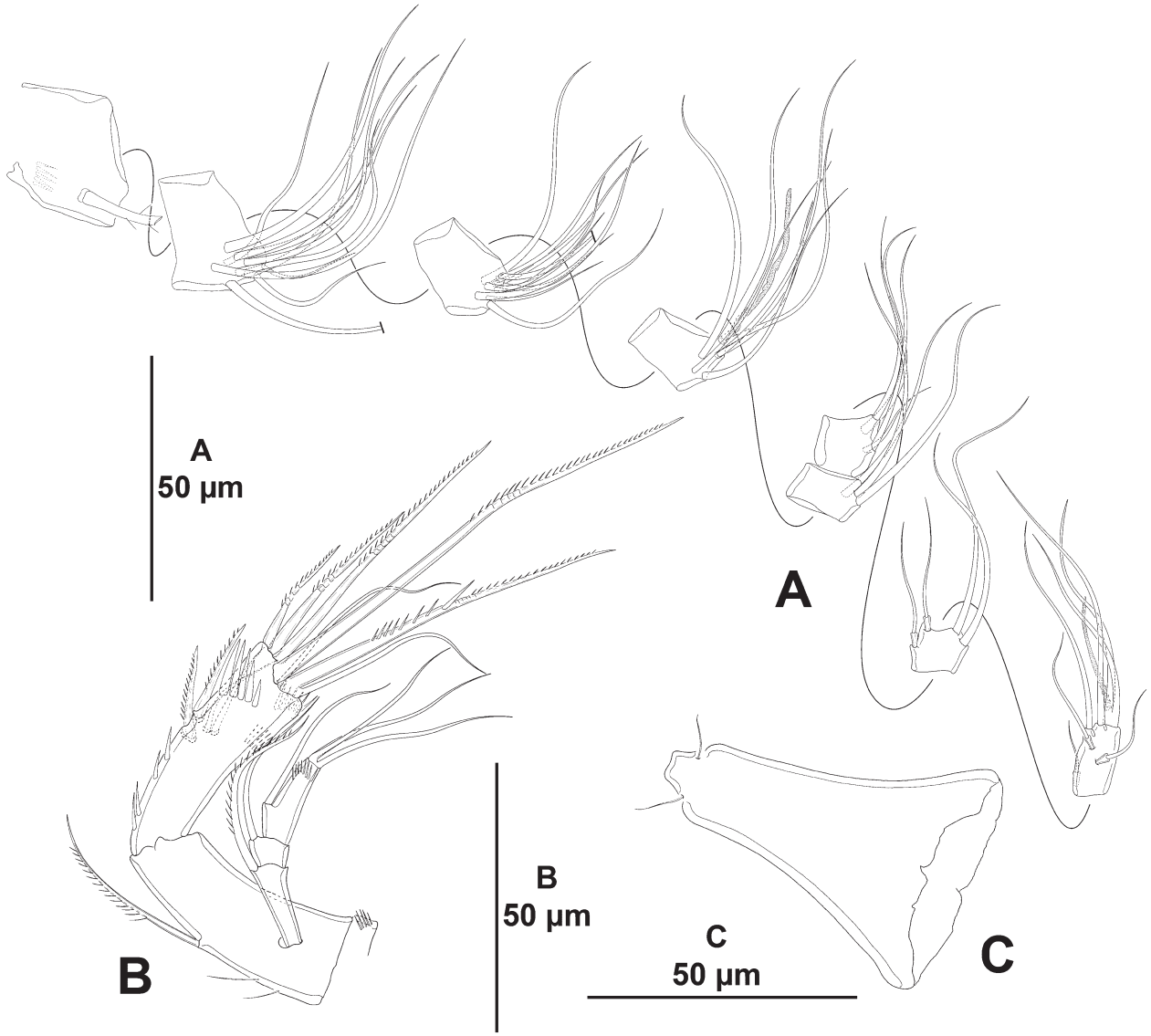


**FIGURE 26.** *Archaeohuysia huysi* **gen. et sp. nov.**, female: A, antennule (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10608); B, antenna (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10607); C, rostrum.

Antenna (Fig. 26B). Coxa short, with some outer spinules. Allobasis as long as free endopodal segment; with few slender outer spinules proximally; with one abexopodal seta arising midway inner margin. Free endopodal segment elongate; proximal half with longitudinal row of strong inner spinules, with subdistal outer strong spinules, with two outer subdistal frills; armature composed of two lateral spines and two setae, distally with one inner apical geniculate element, three apical geniculate setae and one slender element, and one outer distal strongly spinulose element fused basally to slender seta. Exopod three-segmented; first and third segments longest; first and middle segment without, third segment with spinules as shown; first and second segments with one distal seta each, third segment with one proximal and three apical setae, two of which seemingly fused basally.

Mandible (Fig. 27A). Coxa relatively short. Gnathobase wide; ventral distal corner produced into small sharp semi-hyaline process; with two strong and several smaller teeth, two spines and two setae. Basis elongate, with spinular ornamentation as shown, with three subdistal outer setae. Exopod arising from short pedestal, one-segmented, elongate, about 5 times as long as wide, and 0.5 times as long as basis, with three lateral and three apical setae, none of which fused basally. Endopod recurved, twisted over exopod, with three lateral setae, and five distal elements (three slender setae, two of which fused basally, one strong element, and longest element fused to endopod basally and with hyaline flange in middle part).

Maxillule (Fig. 27B). Arthrite of praecoxa with two surface setae and some dorsal spinules; distal armature composed of one ventral seta and seven strong spines as shown, and one lateral pinnate recurved seta. Coxal endite with three setae; spinular ornamentation not detected. Basis with two endites separated by small notch; proximal endite with four, distal endite with three slender setae. Exopod and endopod fused basally, separated from basis, one-segmented; endopod larger than exopod, with four setae; exopod with two setae.

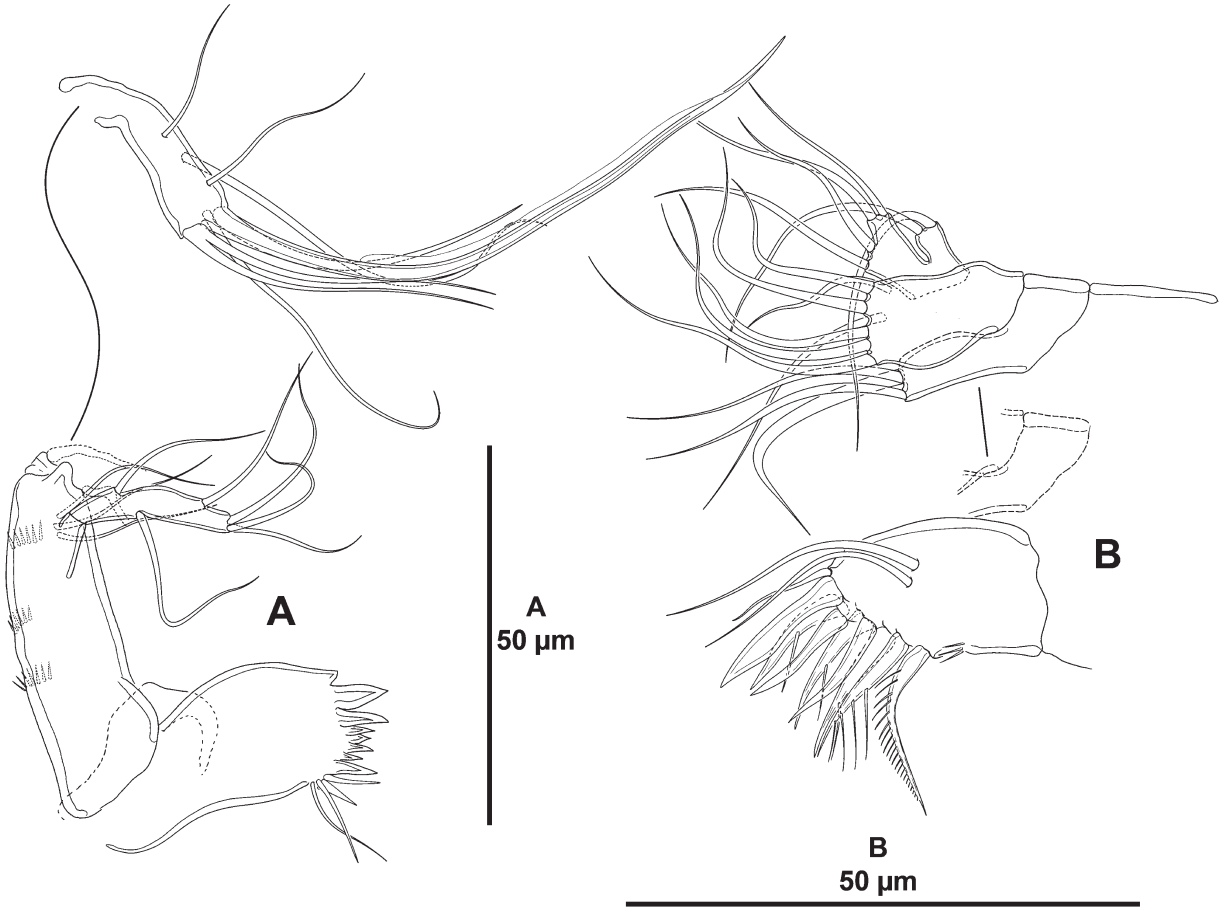


**FIGURE 27.** *Archaeohuysia huysi* **gen. et sp. nov.**, female: A, mandible (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10609); B, maxillule.

Maxilla (Fig. 28A). Large syncoxa with outer spinules as shown; with three endites; proximal endite bilobed, each lobe with two setae; middle and distal endites elongate, the latter slightly longer, with one naked and two spinulose setae each. Basis drawn out into strong claw, with strong spine and two slender setae. Endopod one-segmented, with six slender setae (one arising basally, one medially, and four apically).

Maxilliped (Fig. 28B) subchelate, not or weakly prehensile. Syncoxa slightly longer than wide, visibly shorter than basis, with medial inner spinules, with one bare and two spinulose strong elements, of which bare seta and one spinulose element at the same level, the other arising distally from pedestal. Basis longer than syncoxa, rectangular, with some outer spinules, with one anterior and one posterior inner spinular row as figured, with two slender distal setae subequal in length. Endopod one-segmented, with hyaline distal part, with two seta-like elements, of which distalmost homologue to endopodal claw.

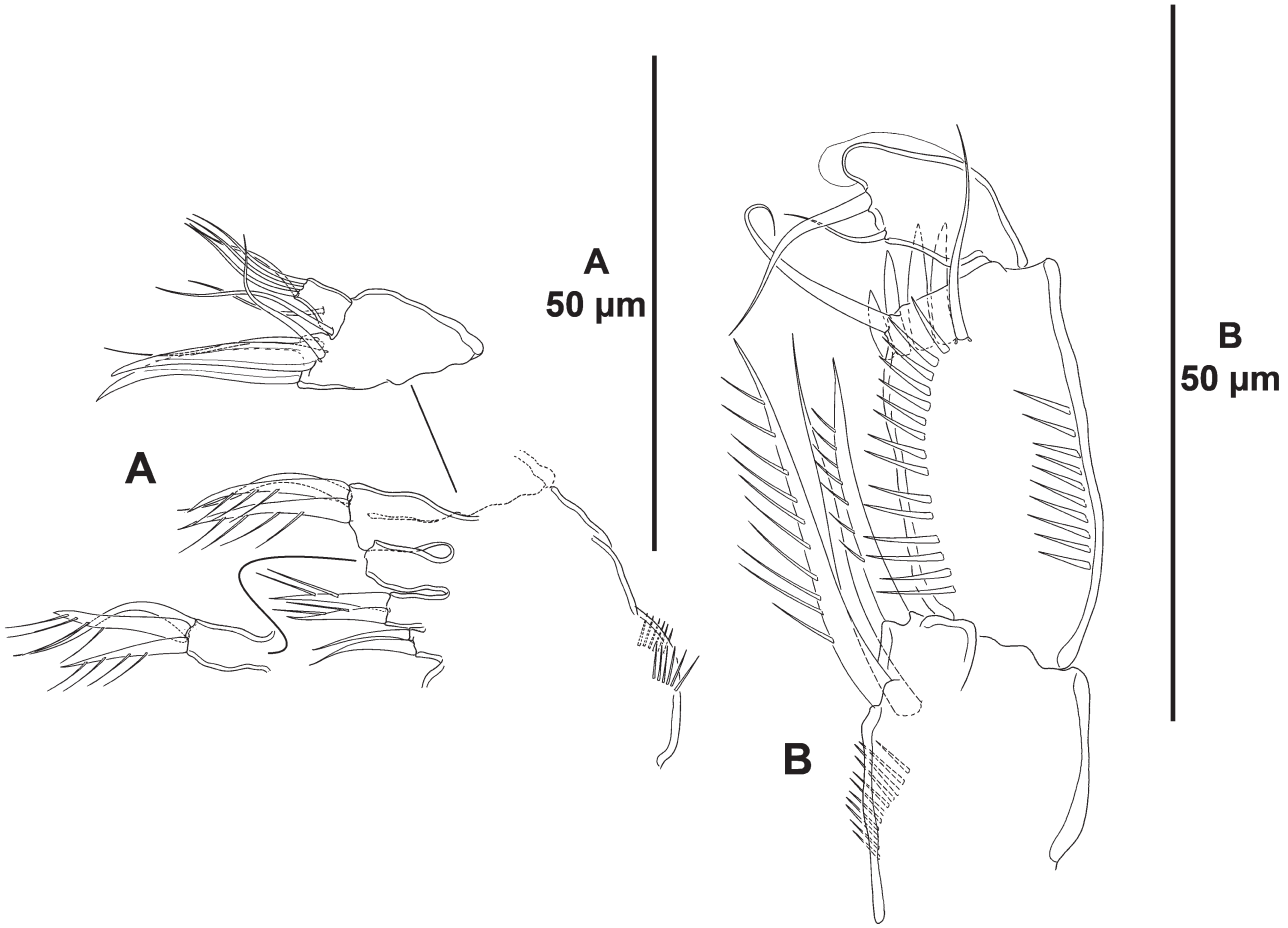


**FIGURE 28.** *Archaeohuysia huysi* **gen. et sp. nov.**, female: A, maxilla; B, maxilliped (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10610)

P1 (Fig. 29A). Coxa massive, 1.5 times as wide as long, with outer and medial spinules as shown. Basis with spinules at base of outer and inner spines and between rami, with long slender inner spinules. Exopod three-segmented, longer than endopod; division between EXP2 and EXP3 observable from posterior view; no pores detected on exopodal segments; EXP1 longest, EXP3 shortest; all segments without outer nor inner acute distal processes; EXP1 with, EXP2 without inner setules and outer spinules; EXP1 without, EXP2 with inner seta; EXP3 without outer spinules, with two outer spines and two apical elements. Endopod characteristic, two-segmented, reaching tip of EXP2, segments without inner nor outer acute distal processes; no pores detected on endopodal segments; ENP1 massive, barely reaching tip of EXP1, nearly as long as wide, visibly longer than ENP2, with few inner long spinules, outer distal corner produced and with semicircular row of modified spinules, with inner seta; ENP2 small, rectangular, about 1.1 times as long as wide, and 0.6 times as long as ENP1, inner distal margin with few slender spinules, without outer spinules, with one inner (medial?) short seta, and two apical and one outer rat-tail like elements.

P2 (Fig. 29B). Intercoxal sclerite (not shown) not transversely elongate; trapezoidal; with strong pointed process on distal outer corners; without surface ornamentation. Coxa with outer spinules proximally and subdistally, with few inner long spinules. Basis with strong acute process between rami and at inner distal corner, seemingly without spinular ornamentation; with outer seta. Exopod three-segmented, reaching middle of ENP3; first and third segments longest; EXP1 and EXP2 with outer acute distal process, with outer spinules and with distal inner frill

as shown, distal processes of EXP3 as shown; EXP1 with, EXP2 without posterior spinules; EXP1 without, EXP2 with subdistal outer pore; EXP1 and EXP2 with one inner seta; EXP3 with two inner setae, two apical elements and three outer spines. Endopod three-segmented, slightly longer than exopod; ENP1 shortest, about 0.7 times as long as ENP2; ENP2 and ENP3 subequal in length; all endopodal segments with longitudinal row of outer spinules; ENP1 with outer and inner small acute processes subequal in length, outer distal process on ENP2 visibly stronger, ENP3 with one strong outer process only; no pores detected on endopodal segments; ENP1 with one, ENP2 with two stiff inner setae with serrate inner margin; ENP3 with one inner strong element, two apical setae and one outer spine.

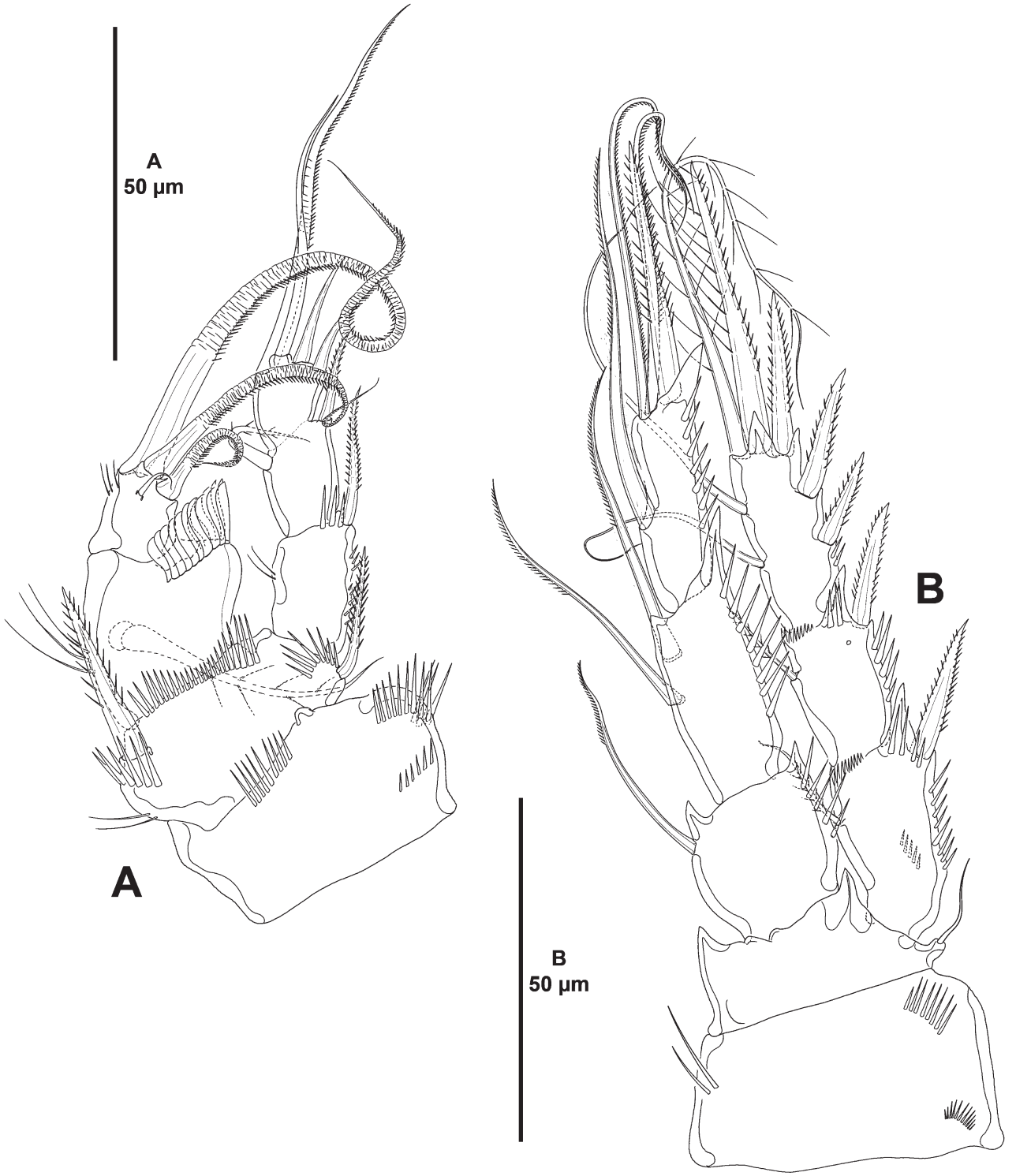


**FIGURE 29.** *Archaeohuysia huysi* **gen. et sp. nov.**, female: A, P1, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10611); B, P2, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10612).

P3 (Fig. 30A). Intercoxal sclerite (not shown), coxa and basis largely as in P2. Exopod and endopod subequal in length. Exopod as in P2, except for less developed outer acute distal process and for lack of pores on EXP2, and for inner armature of EXP3 (with three inner setae instead of two). Endopod as in P2, except distal processes on ENP3, for inner complement of ENP2 (with one seta instead of two) and ENP3 (with three inner setae instead of two).

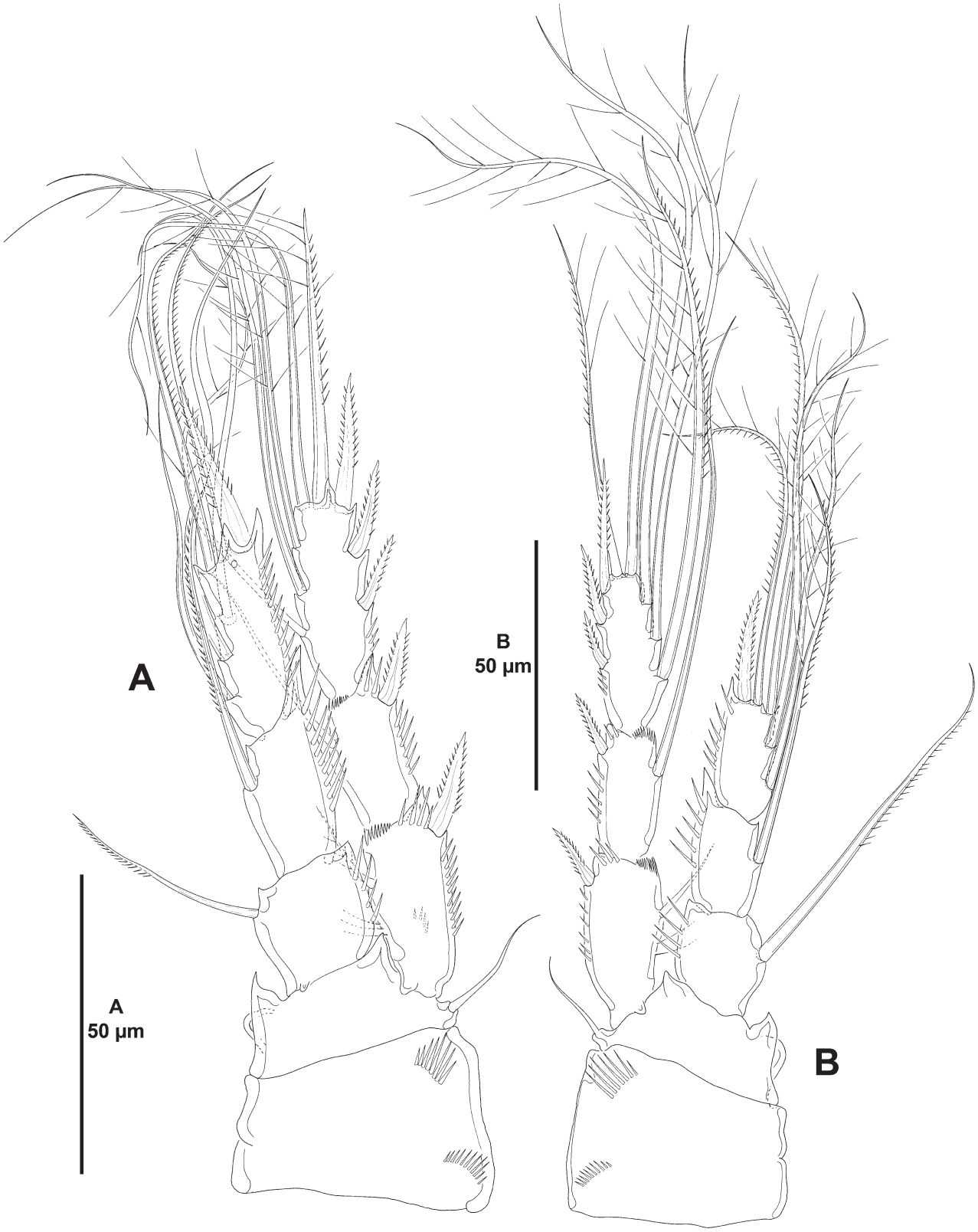


**FIGURE 30.** *Archaeohuysia huysi* **gen. et sp. nov.**, female: A, P3, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10613); B, P4, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10614).

P4 (Fig. 30B). Intercoxal sclerite (not shown), coxa and basis largely as in P2. Endopod shorter than exopod, reaching proximal third of EXP3. Spinular ornamentation of exo- and endopodal segments as in previous legs; seemingly without pores. Exopod with outer acute distal processes on EXP1 and EXP2 less developed than in P3, EXP3 seemingly without distal process; armature complement as in P3, but inner seta on EXP2 visibly longer. Endopod with outer distal process of ENP1 and ENP2 less developed than in P3, of ENP3 as shown; armature complement as in P3 but inner seta on ENP1 visibly stronger and longer, and ENP3 with two inner setae instead of three.

Setal formula of swimming legs as follows:

| | P1 | P2 | P3 | P4 |
|---|---|---|---|---|
| EXP | 0,1,022 | 1,1,223 | 1,1,323 | 1,1,323 |
| ENP | 1,121 | 1,2,121 | 1,1,321 | 1,1,221 |

P5 (Fig. 25C). Baseoendopod pentagonal; endopodal lobe poorly-developed, with subdistal pore, with five setae, of which outermost and adjacent seta set close together; all setae naked. Exopod oval; with two sets of outer spinules, with six setae, of which medial shortest.

P6 (Fig. 25B) represented by a minute flap covering ventrolateral genital aperture, fused to somite, without surface ornamentation, with one slender seta.

**Male.** Unknown.

**Variability.** No variability was detected in the single female found in the sediment samples.

## Genus *Diarthropodella* gen. nov

urn:lsid:zoobank.org:act:7E6661DE-FCFC-4C75-9B61-385F9C8109C2

**Type species.** *Diarthropodella prima* **gen. et sp. nov.**

**Other species.** *Diarthropodella secunda* **sp. nov.**

**Etymology.** The genus name is derived from the Ancient Greek *δίς*, dís, twice, *ἄρθρον,* árthron, joint, ποδός podós, foot, and the Latin diminitive suffix *–ella*, and makes reference to the small two-segmented exopod of P1.

**Diagnosis.** Stenheliinae. Rostrum discrete, bifid, without dorsal pore, without spinular ornamentation. Female and male antennule eight-segmented, male antennule not sexually dimorphic. Antenna with allobasis; free endopodal segment with two spines and two setae laterally, and seven distal elements, of which outer distalmost fused basally to slender seta; exopod three-segmented, first and second segments with one distal seta each, third segment with one proximal and three apical setae. Mandible with elongate basis bearing three subdistal outer setae; exopod one-segmented, with three lateral and three apical setae; endopod recurved, twisted over exopod; with three lateral setae, and four distal elements. Maxillulary exopod and endopod fused basally, separated from basis, one-segmented; endopod with four, exopod with two setae. Maxilla with three endites; proximal endite bilobed, proximal lobe with one, distal lobe with two setae; middle and distal endites with three elements each; Endopod one-segmented, with six setae. Maxilliped subchelate; syncoxa with one bare and two spinulose elements; basis with two setae; endopod one-segmented, with claw-like element and one accompanying seta. P1 with intercoxal sclerite transversely elongated and without surface ornamentation; exopod two-segmented, shorter than endopod; EXP1 without inner armature; EXP2 with five elements; endopod two segmented; ENP1 shorter than ENP2, the former with one inner seta, the latter with one inner and three apical elements; armature formula of exopod/endopod 0,122/1,121. P2–P4 with three-segmented rami; intercoxal sclerites without surface ornamentation, with pointed distal processes; basis with acute pointed projection between rami and at inner distal corner; ENP1 with inner element, that of P4 visibly longer; armature formula of exopod/endopod (P2) 1,1,223/1,2,121, (P3) 1,1,323/1,1,321, (P4) 1,1,323/1,1,221. P5 with endopodal lobe poorly-developed, with three or four setae; exopod with four or five setae. Caudal rami elongate, about four times as long as wide, with seven elements, of which seta I very small. Sexual dimorphism expressed in the genital somite and third urosomite separated, P5 and P6. Baseoendopods of the male P5 fused medially, endopodal lobes with one (or two?) setae; exopod small, with three setae. Both male P6 fused forming a continuous plate fused to somite, each leg with three setae.

***Diarthopodella prima* sp. nov.**
(Figs. 31–35)
urn:lsid:zoobank.org:act:5B42B0DD-57F1-4B3F-96B2-5B93800F4FB1

**Type locality.** Guaymas Basin, between San Pedro Nolasco Island and Tortuga Island, Gulf of California, Mexico; Talud X cruise, sampling station 15 (27.7°N, 111.6333°W); depth 1,570 m; organic carbon content, 4.48%; organic matter content, 8.37%; sand, 4.49%; clay, 11.96%; silt, 84%.

**Other locality.** Off Sinaloa State, east of Pescadero Trough, Gulf of California, Mexico; Talud IV cruise, sampling station 19 (24.26667°N, 108.4019°W); depth, 1,240 m; organic carbon content, 3.96%; sand, 1.77%; clay, 49.12%; silt, 49.12%.

**Specimens examined.** From the type locality. Adult female holotype dissected and mounted onto ten slides (EMUCOP-110207-05); February 11, 2007; coll. S. Gómez.

From other localities. Copepodite CV paratype dissected and mounted onto six slides (EMUCOP-250800-02); August 25, 2000; coll. S. Gómez.

**Etymology.** The specific epithet from the Latin *prima*, first, makes reference to the first species attributed to the new genus. It is in the nominative singular. Gender feminine.

**Description of female.** Total body length measured from tip of rostrum to posterior margin of caudal rami, 660 μm; habitus pyriform, widest at posterior end of cephalothorax, tapering posteriad (Fig. 31A); cephalothorax/body length ratio, 0.3.

Prosome and pedigerous somites (Fig. 31A) largely as in previous species.

Urosome (Fig. 31A, D) consisting of fifth pedigerous somite (first urosomite), genital double-somite (genital—second urosomite—and third urosomite fused), two free urosomites, and anal somite. Urosomites without expansions laterally nor dorsally; integument weakly sclerotized.

Fifth pedigerous somite (Fig. 31A) narrower than preceding somites, with some sensilla dorsally, without spinular ornamentation.

Second and third urosomites completely fused dorsally and ventrally forming genital double-somite (Fig. 31D), with dorsolateral trace of division (Fig. 31A); genital double-somite 1.2 times as long as wide, widest part measured in proximal third close to P6; proximal half with few dorsal sensilla and with two dorsolateral sets of spinules (Fig. 31A), ventrally without sensilla nor spinules (Fig. 31D); distal half with dorsolateral sensilla and spinular rows (Fig. 31A), ventrally with few sensilla and without spinules (Fig. 31D); posterior hyaline fringe broad and smooth; genital complex hardly distinguishable, copulatory pores not exposed, paired genital apertures located ventrolaterally and covered by P6 (Fig. 31D).

Fourth urosomite (Figs. 24A, 25A–B) as distal half of genital double-somite; no pores detected.

Fifth urosomite as previous somite but without sensilla (Fig. 31A, D); no pores detected.

Anal somite about twice as wide as long (Fig. 31A), with spinules around joint of caudal rami (Figs. 31A, D), medial cleft with ventral spinules as shown (Fig. 31D), with one dorsolateral pore on each side (Fig. 31A); anal operculum without spinular ornamentation, semicircular, flanked by one sensillum on each side (Fig. 31A).

Caudal rami elongate, about 4.4 times as long as wide (Fig. 31A, D) and slightly longer than fifth and anal somites combined, outer and inner margins nearly straight, with outer spinules at base of setae I and II, III, V, and VII (Fig. 31A–E); with seven elements (Fig. 31B, C, E); setae I and II situated more proximally than in the previous species, in distal third, lateral, seta I setiform and ventral to seta II, the latter long; seta III subdistal, arising at distal sixth, ventrolateral (Fig. 31B, C,. E; detached during dissection in Fig. 31C–D); setae IV and seta V distal, rat-tail like in distal half, with fracture plane; seta VI small, issuing at inner distal corner; dorsal seta VII triarticulate at base, aligned with seta III, arising close to inner margin.

Rostrum (Fig. 31A) trapezoidal, elongate, not fused to cephalothorax, bifid, with two subdistal sensilla, without dorsal pore.

Antennule (Fig. 32A) eight-segmented, all segments smooth; first segment without pore. All setae smooth; only one seta with fracture plane detected on third segment; seventh segment with one, eighth segment with four articulated setae. Armature formula: 1(1); 2(10); 3(8); 4(6 + (1 + ae)), 5(3); 6(3); 7(4); 8(5 + acro). Acrothek consisting of two setae and one minute aesthetasc fused basally.

Antenna (Fig. 32B). Coxa short, with some outer spinules. Allobasis as long as free endopodal segment, with spinules midway inner margin, with one abexopodal seta arising slightly above the middle of inner margin. Free endopodal segment elongate; proximal half with longitudinal row of strong inner spinules, distal half with subdistal

outer strong spinules, with two outer subdistal frills; armature composed of two spines and two setae laterally, distally with one inner apical spine, three apical geniculate setae and one slender element, and one outer distal pinnate element fused basally to slender seta. Exopod three-segmented; first and third segments longest; first and middle segments without, third segment with spinules as shown; first and second segments with one distal seta each, third segment with one proximal and three apical setae, two of which seemingly fused basally.

Mandible (Fig. 33A). Coxa relatively short. Gnathobase wide; ventral distal corner produced into small sharp semi-hyaline process; with one strong and several smaller teeth, two spines and two setae, of which one pinnate. Basis elongate, spinular ornamentation as shown, with three subdistal outer setae. Exopod arising from short pedestal, one-segmented, elongate, about 3.5 times as long as wide, and 0.4 times as long as basis; with three lateral and three apical setae, none of which fused basally. Endopod recurved, twisted over exopod; laterally with two proximal subequal setae and one subdistal comparatively longer element, distally with four distal elements, of which longest fused to endopod basally and with hyaline flange in middle part.

Maxillule (Fig. 33B). Arthrite of praecoxa with two surface setae and few dorsal spinules; distal armature composed of seven elements as shown, one medial small seta, and one lateral pinnate recurved seta. Coxal endite with three setae and with apical spinules. Basis with two endites; proximal endite seemingly with three, distal endite seemingly with two slender setae. Exopod and endopod fused basally, separated from basis, one-segmented; endopod larger than exopod, with four setae; exopod with two setae.

Maxilla (Fig. 33C–E). Large syncoxa with outer spinules as shown; with three endites; proximal endite bilobed, proximal lobe with one, distal lobe with two setae; middle and distal endites elongate, the latter slightly longer, with three spinulose setae each (Fig. 33E). Basis drawn out into strong claw, with strong spine and two slender setae, one of which arising from elongate setophore (Fig. 33D). Endopod one-segmented, with six slender setae (one arising basally, one medially, and four apically).

Maxilliped (Fig. 33F) presumably subchelate, endopod lost during dissection. Syncoxa slightly longer than wide, visibly longer than basis; seemingly without spinular ornamentation; with one bare and two spinulose strong elements, of which bare seta and one spinulose element at the same level, the other arising distally from pedestal. Basis shorter than syncoxa; rectangular; with some outer spinules; with one anterior and one posterior inner spinular row as figured; with two slender distal setae.

P1 (Fig. 34A). Intercoxal sclerite (not shown) transversely elongate, nearly straight, without surface ornamentation. Coxa massive, 1.4 times as wide as long, with outer and medial spinules as shown. Basis with spinules at base of outer and inner spines and between rami, with spinules midway inner margin. Exopod two-segmented, visibly shorter than endopod, reaching proximal third of ENP2; segments without outer nor inner acute distal processes; no pores detected on exopodal segments; EXP1 and EXP2 subequal in length; both segments with outer spinules as depicted; EXP1 without inner seta, EXP2 with five elements, of which outermost spine probably homologous to the outer spine of the second exopodal segment of other species of the subfamily, and two innermost setae short, setulose and rat-tail like in distal half. Endopod two-segmented, visibly longer than exopod; segments without outer nor inner acute distal processes; no pores detected on endopodal segments; ENP1 reaching proximal fourth of EXP2, 2.3 times as long as wide, and 0.7 times as long as ENP2, with few inner long spinules and with longitudinal outer and apical spinules as shown, with inner seta; ENP2 elongate, visibly longer than ENP1, six times as long as wide, inner proximal margin with few slender spinules, with longitudinal rows of outer spinules, with one inner seta issuing at proximal third, one inner apical slender seta, one medial apical pinnate element, and one outer apical spine.

P2 (Fig. 34B). Intercoxal sclerite (not shown) not transversely elongate, trapezoidal, with strong pointed process on distal outer corners, without surface ornamentation. Coxa with outer spinules proximally and medial minute spinules subdistally. Basis with strong acute inner process, with much smaller process between rami, with inner long and selender spinules, with outer seta. Exopod three-segmented, reaching slightly below middle of ENP3; first and third segments longest; EXP1 and EXP2 with outer acute distal process, with outer and distal spinules, and with distal inner frill as shown, distal processes of EXP3 as shown; EXP1 without, EXP2 with subdistal outer pore; EXP1 and EXP2 with one inner seta; EXP3 seemingly without spinular ornamentation, with two inner setae, two apical elements and three outer spines. Endopod three-segmented, longer than exopod; ENP1 shortest, about 0.7 times as long as ENP2; ENP2 and ENP3 subequal in length; all endopodal segments with longitudinal row of outer spinules; ENP1 and ENP2 with outer and inner acute distal processes, but outer process of ENP2 remarkably longer, both segments with apical minute spinules, distal processes of ENP3 as shown; ENP3 with subdistal medial pore; ENP1 with one, ENP2 with two inner setae; ENP3 with one inner seta, two apical elements and one outer spine.

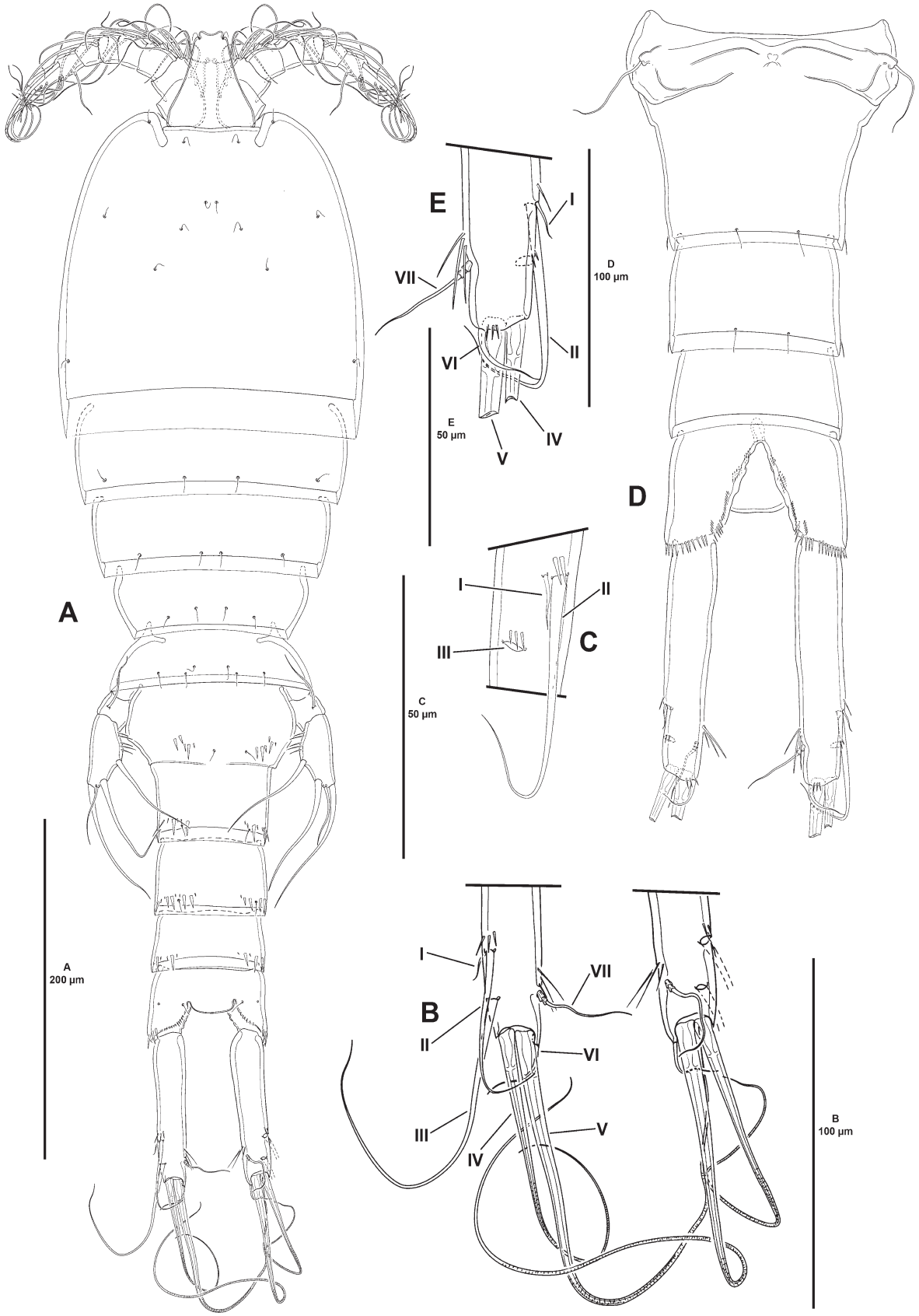


**FIGURE 31.** *Diarthropodella prima* **gen. et sp. nov.**, female: A, habitus, dorsal (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10628); B, posterior part of caudal rami, dorsal; C, posterior part of left caudal ramus showing insertion site of caudal setae I–III, lateral; D, urosome, ventral (P5-bearing somite omitted); E, posterior part of left caudal ramus, ventral.

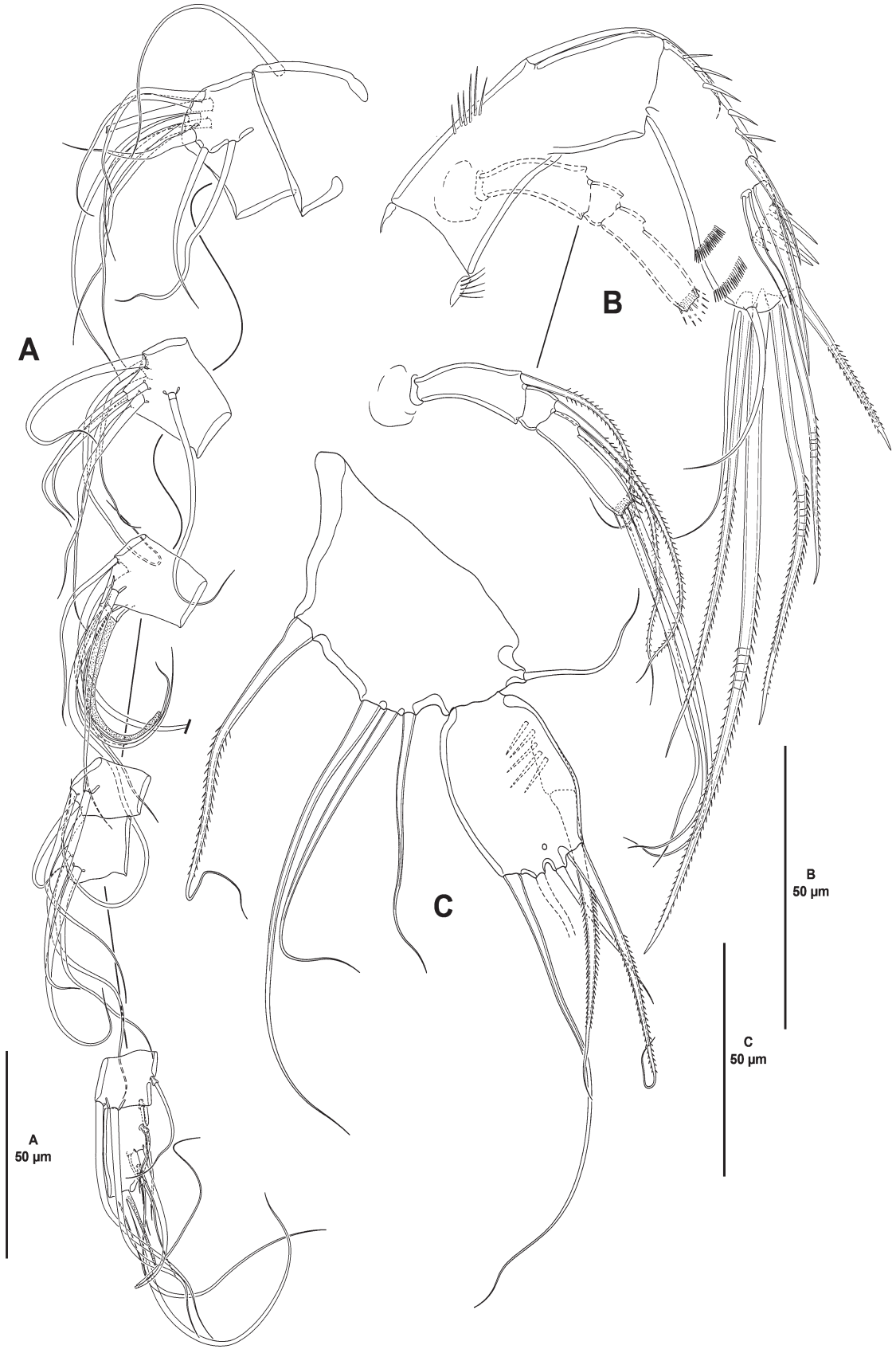


**FIGURE 32.** *Diarthropodella prima* **gen. et sp. nov.**, female: A, antennule (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10627); B, antenna (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10626); C, P5, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10634).

P3 (Fig. 35A). Intercoxal sclerite (not shown) as in P2. Coxa as in P2 but with additional subdistal outer spinular row, seemingly without medial minute spinules subdistally. Basis as in P2 but with exceedingly long outer seta. Exopod three-segmented, shorter than endopod, reaching distal fourth of ENP; EXP1 and EXP2 as in P2, but will less developed outer distal processes and with ninner setules; EXP3 with distal processes as shown, with few outer proximal spinules, with subdistal pore, with three inner setae, of which distalmost thicker, two apical elements, and three outer spines. Endopod largely as in P2, except for inner seta of ENP1 long as stiff, and armature complement of ENP2 (with one instead of two inner setae) and ENP3 (with three instead of one inner seta).

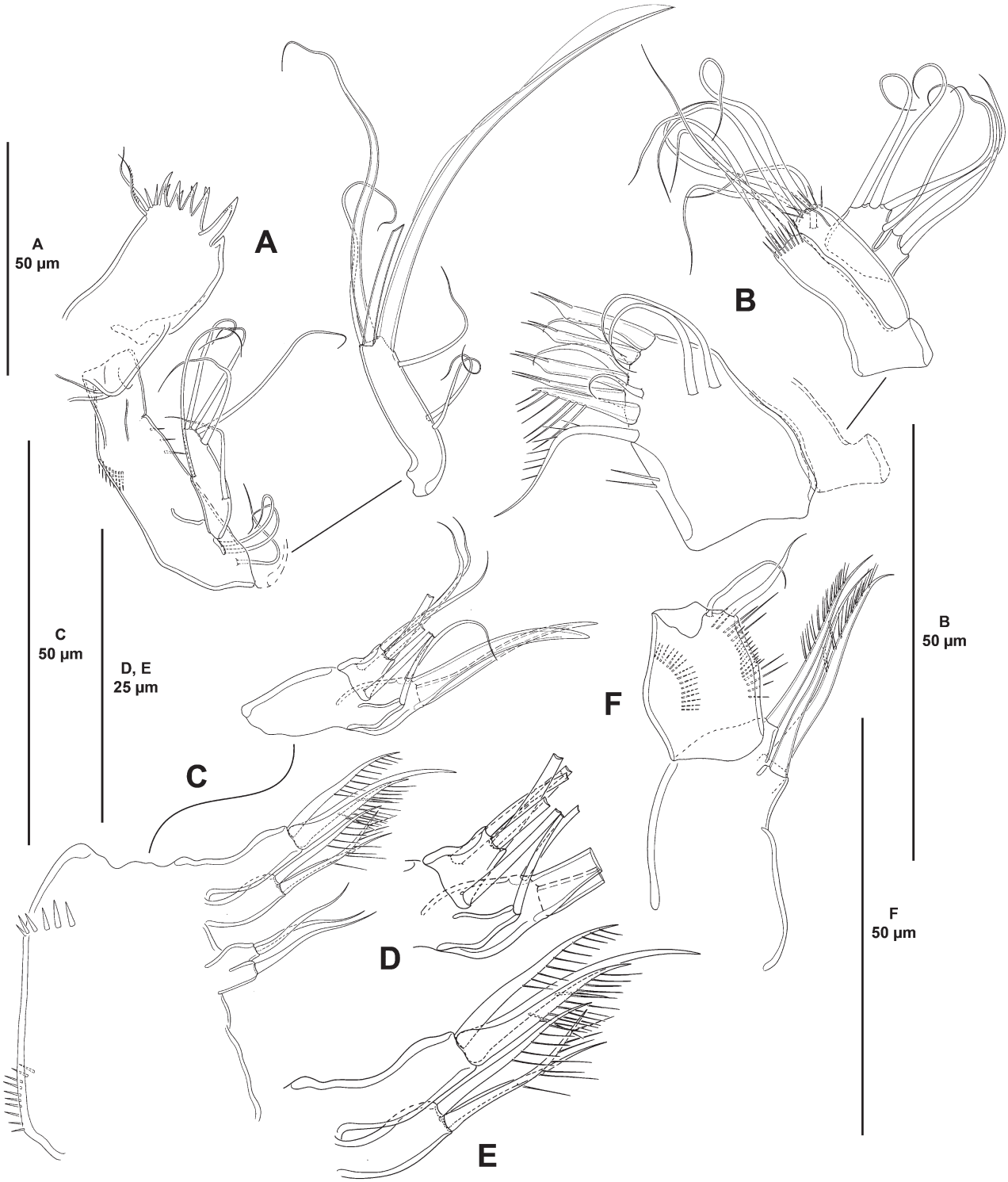


**FIGURE 33.** *Diarthropodella prima* **gen. et sp. nov.**, female: A, mandible (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10629); B, maxillule; C, maxilla; D, allobasis of maxilla; E, middle and distal endites of maxilla; F, maxilliped.

P4 (Fig. 35B). Intercoxal sclerite (not shown), coxa and basis largely as in P3, except for shorter outer seta of basis. Exopod visibly longer than endopod; EXP1 and EXP2 with outer acute distal process less developed than in P3, of EXP3 as shown; EXP1 and EXP2 without, EXP3 with subdistal pore; ornamentation and armature complement as in P3. Endopod three-segmented, shorter than exopod, reaching middle of EXP3; outer distal processes of endopodal segments largely as in P3 except for less developed outer process of P4 ENP2; spinular ornamentation as in P3; ENP3 with subdistal inner pore; ENP1 and ENP2 as in P3, but with longer inner elements; ENP3 with two inner, two apical and one outer spine.

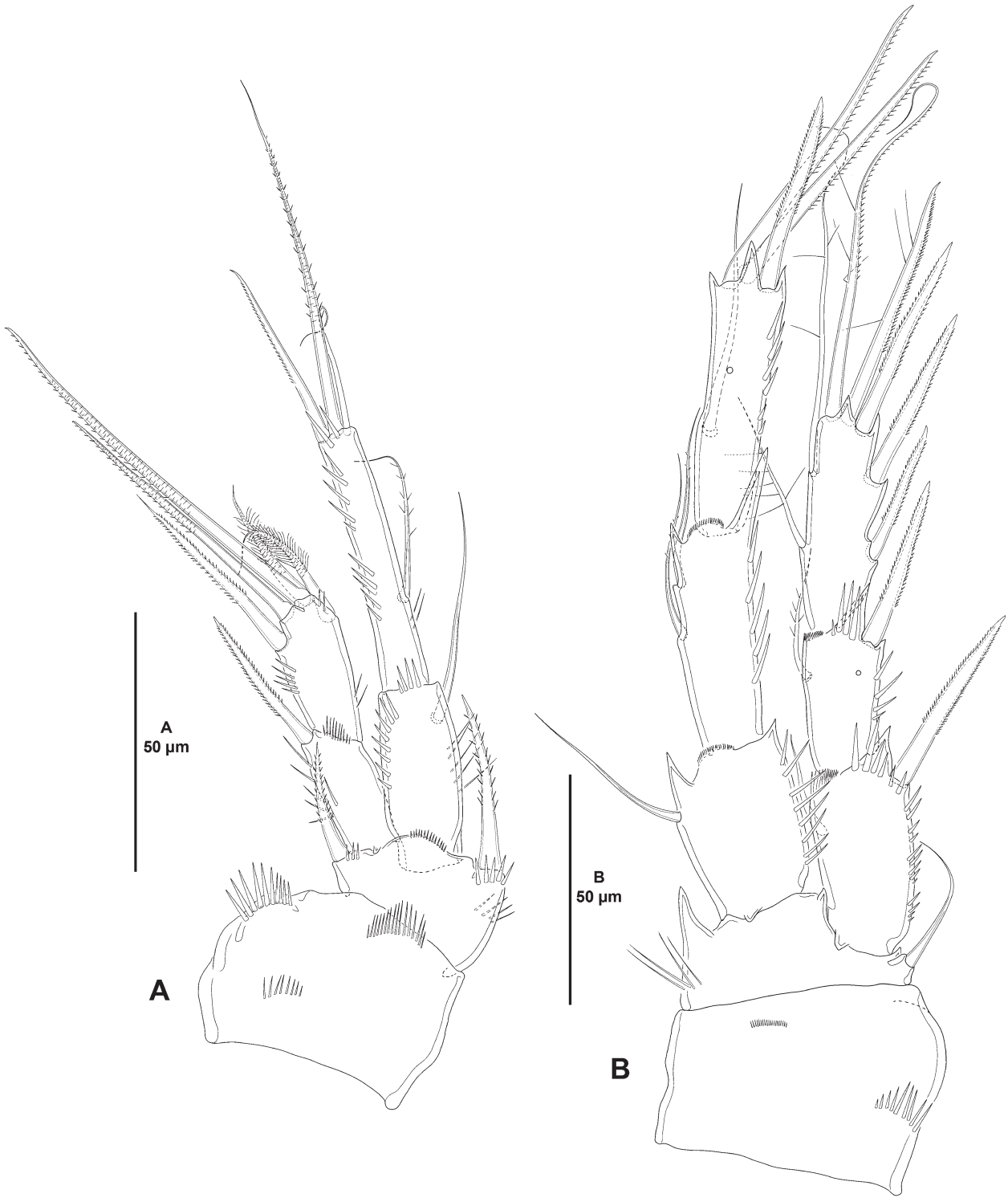


**FIGURE 34.** *Diarthropodella prima* **gen. et sp. nov.**, female: A, P1, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10630); B, P2, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10631).

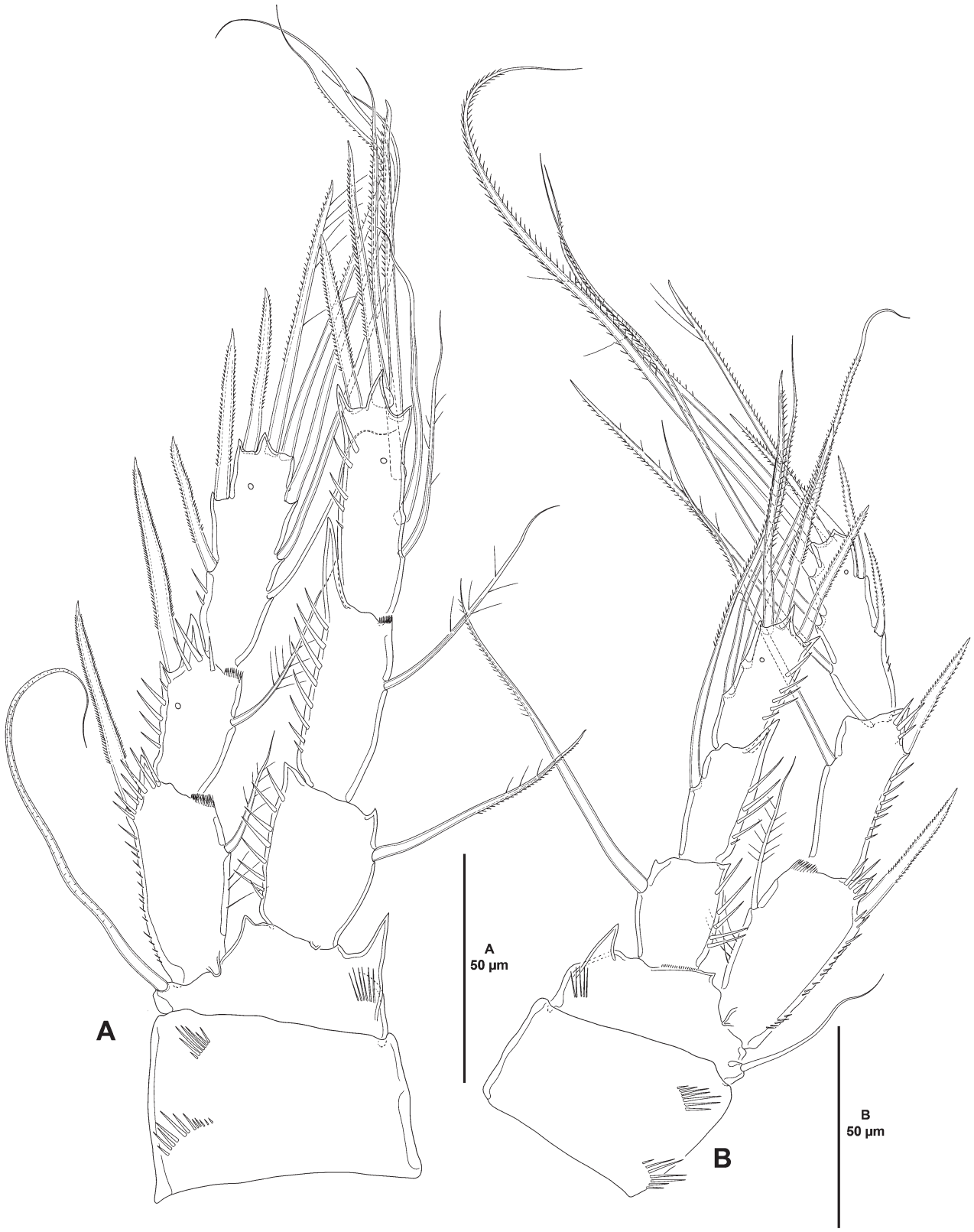


**FIGURE 35.** *Diarthropodella prima* **gen. et sp. nov.**, female: A, P3, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10632); B, P4, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10633).

Setal formula of swimming legs as follows:

| | P1 | P2 | P3 | P4 |
|---|---|---|---|---|
| EXP | 0,221 | 1,1,223 | 1,1,323 | 1,1,323 |
| ENP | 1,121 | 1,2,121 | 1,1,321 | 1,1,221 |

P5 (Fig. 32C). Baseoendopod pentagonal; endopodal lobe poorly-developed, with four setae, of which two outermost and adjacent two setae smooth and set close together, innermost seta separated by wide gap and pinnate. Exopod oval, with some outer spinules, with five setae, of which outer and distal outer setae pinnate, others smooth (innermost medial seta lost during dissection).

P6 (Fig. 31D) represented by a minute flap covering ventrolateral genital aperture, fused to somite, without surface ornamentation, with one slender seta.

**Male.** Unknown.

**Variability.** No variability was detected in the single female found in the sediment samples.

***Diarthropodella secunda* sp. nov.**

(Figs. 36–41)

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**Type locality.** Guaymas Basin, off Mulegé, Gulf of California, Mexico; Talud X cruise, sampling station 18 (27.1522°N, 111.6658°W); depth 1,440 m; organic carbon content, 4.14%; organic matter content, 7.13%; sand, 17.2%; clay, 11.19%; silt, 71.62%.

**Specimens examined.** Adult female holotype dissected and mounted onto nine slides (EMUCOP-120207-05), and one male allotype dissected and mounted onto seven slides (EMUCOP-120207-06); February 12, 2007; coll. S. Gómez.

**Etymology.** The specific epithet from the Latin *secunda*, second, makes reference to the second species attributed to the new genus. It is in the nominative singular. Gender feminine.

**Description of female.** Total body length measured from tip of rostrum to posterior margin of caudal rami, 405 μm; habitus pyriform, widest at posterior end of cephalothorax, tapering posteriad (Fig. 36A); cephalothorax/body length ratio, 0.3.

Cephalothorax and pedigerous somites (Fig. 36A) largely as in previous species.

Urosome (Fig. 36A, C, E) consisting of fifth pedigerous somite (first urosomite), genital double-somite (genital—second urosomite—and third urosomite fused), two free urosomites, and anal somite. Urosomites without expansions laterally nor dorsally; integument weakly sclerotized.

Fifth pedigerous somite (Fig. 36A) narrower than preceding somites; with some sensilla dorsally (Fig. 36A), without spinular ornamentation.

Second and third urosomites completely fused dorsally and ventrally forming genital double-somite (Fig. 36E), with dorsolateral trace of division (Fig. 36A, C); genital double-somite nearly as long as wide, widest part measured in proximal third close to P6; proximal half with few dorsal sensilla and with two dorsolateral sets of spinules (Fig. 36A, C), ventrally without sensilla nor spinules (Fig. 36E); distal half with posterior sensilla and dorsolateral spinular rows (Fig. 36A, C), ventrally with few sensilla and without spinules (Fig. 36E); posterior hyaline fringe broad and smooth; genital complex hardly distinguishable, copulatory pores not exposed, paired genital apertures located ventrolaterally and covered by P6 (Fig. 36E).

Fourth urosomite (Fig. 36A, C, E) as distal half of genital double-somite; no pores detected.

Fifth urosomite as previous somite but without sensilla nor spinules (Fig. 36A, C, E); no pores detected.

Anal somite about twice as wide as long (Fig. 36A), with spinules around joint of caudal rami laterally and ventrally (Fig. 36A, C, E), medial cleft without spinules ventrally (Fig. 36E), with one ventral pore on each side (Fig. 36E); anal operculum with minute spinules close to posterior margin, semicircular, flanked by one sensillum on each side (Fig. 36A).

Caudal rami elongate, about four times as long as wide (Fig. 36A) and as long as fifth and anal somites combined; outer and inner margins nearly straight; with outer spinules at base of setae I and II, and III, and with inner spinules subdistally (Fig. 36A–D); with seven elements (Fig. 36B, D); setae I and II situated subdistally,

lateral, seta I very small and setiform, and ventral to seta II, the latter detached during dissection and missing in figures but its position indicated by scar; seta III subdistal, ventral (Fig. 36B), detached and missing in some figures but its position indicated by scar; setae IV and seta V distal; seta VI small, issuing at inner distal corner; dorsal seta VII triarticulate at base, subdistal, arising close to inner margin.

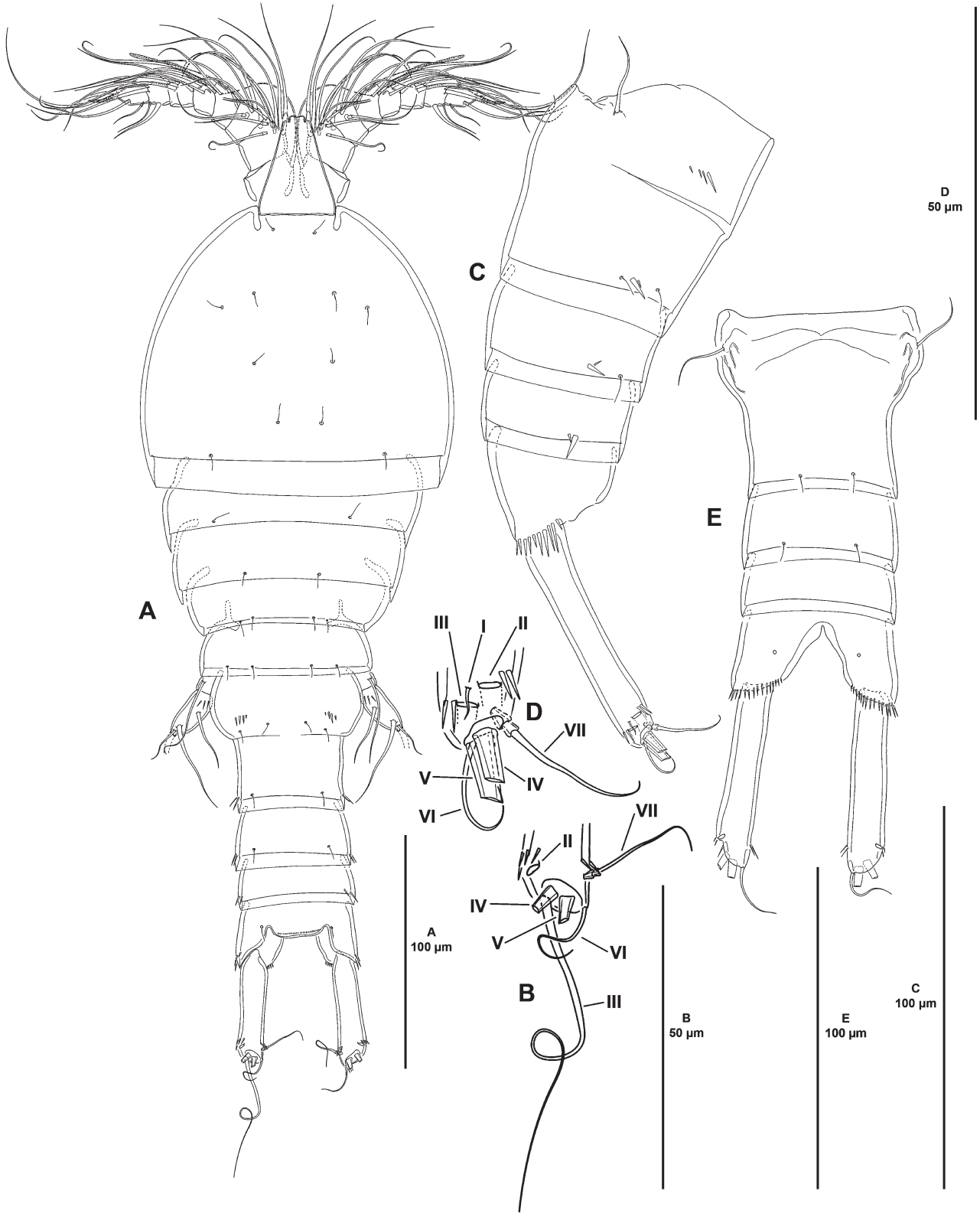


**FIGURE 36.** *Diarthropodella secunda* **sp. nov.**, female: A, habitus, dorsal; B, posterior part of left caudal ramus, dorsal; C, urosome, lateral (P5-bearing somite omitted); D, posterior part of left caudal ramus, dorsal; E, urosome, ventral (P5-bearing somite omitted).

Rostrum (Fig. 37A) trapezoidal, elongate, not fused to cephalothorax, bifid, with two subdistal sensilla, without dorsal pore.

Antennule (Fig. 37A) eight-segmented; all segments smooth, except for first segment with proximal spinular row; first segment without pore. All setae smooth; second and third segments with one seta with fracture plane each; seventh segment with one, eighth segment with four articulated setae. Armature formula: 1(1); 2(11); 3(7); 4(5 + (1 + ae)), 5(3); 6(4); 7(4); 8(4 + acro). Acrothek consisting of two setae and one minute aesthetasc fused basally.

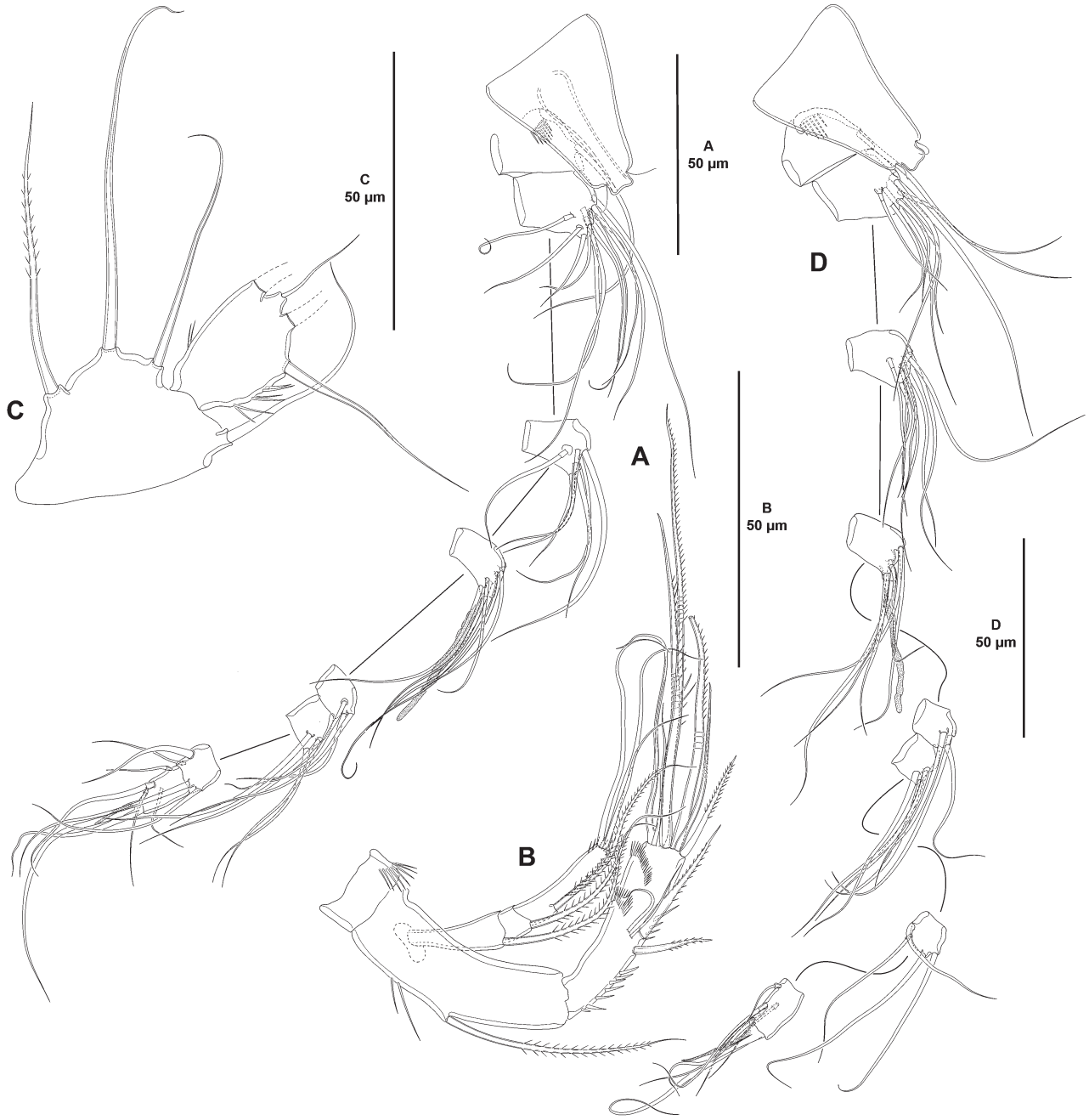


**FIGURE 37.** *Diarthropodella secunda* **sp. nov.**, female (A–C) and male (D): A, rostrum and antennule; B, antenna (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10635); C, P5, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10640); D, rostrum and antennule (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10641).

Antenna (Fig. 37B). Coxa short, with some outer spinules. Allobasis slightly longer than free endopodal segment; with few long inner spinules; with one abexopodal seta arising midway inner margin. Free endopodal segment elongate; with longitudinal row of spinules on proximal half and midway inner margin, without subdistal spinules, with two outer subdistal frills; armature composed of two spines and two setae laterally, distally with one

inner apical spine, three apical geniculate setae and one slender element, and one outer distal strongly spinulose element fused basally to slender seta. Exopod three-segmented; first and third segments longest; first and middle segment without, third segment with spinules as shown; first and second segments with one distal seta each, third segment with one proximal and three apical setae, two of which seemingly fused basally.

Mandible (Fig. 38A). Coxa relatively short. Gnathobase wide; ventral distal corner produced into small sharp semi-hyaline process; with one strong and several smaller teeth, two spines and two setae. Basis elongate, spinular ornamentation as shown, with three subdistal outer setae. Exopod arising from short pedestal, one-segmented, elongate, about 3.3 times as long as wide, and 0.4 times as long as basis, with three lateral and three apical setae, none of which fused basally. Endopod recurved, twisted over exopod, laterally with two proximal setae, one of which much longer, and one subdistal element, distally with four distal elements, of which longest fused to endopod basally and with hyaline flange in middle part.

Maxillule (Fig. 38B). Arthrite of praecoxa with two surface setae and few dorsal spinules; distal armature composed of one ventral apical seta, seven apical elements, of which dorsalmost spinulose, and one lateral pinnate curved seta. Coxal endite with three setae. Basis with two endites, each seemingly with four setae. Exopod and endopod fused basally, separated from basis, one-segmented; endopod larger than exopod, with four setae; exopod with two setae.

Maxilla (Fig. 38C–E). Large syncoxa with spinular ornamentation as depicted; with three endites; proximal endite bilobed, proximal lobe very small, with one seta, distal lobe with two setae; middle and distal endites elongate, the latter slightly longer, with one bare and two spinulose setae each. Basis drawn out into strong claw, with strong spine and two slender setae, one of which arising from elongate setophore. Endopod one-segmented, with six slender setae (one arising basally, two medially, and three apically).

Maxilliped (Fig. 38F) subchelate. Syncoxa slightly longer than wide, nearly as long as basis; with medial spinular row midway inner margin, and with distal spinules as shown; with one bare and two spinulose strong elements, of which bare seta and one spinulose element at the same level, the other arising distally from long pedestal. Basis oval, with some outer spinules, with one anterior and one posterior inner spinular row, with two distal setae, one of which visibly longer. Endopod one-segmented, with apical claw-like element and slender seta.

P1 (Fig. 39A). Intercoxal sclerite (not shown) transversely elongate, nearly straight, without surface ornamentation. Coxa massive, 1.4 times as wide as long, with outer spinules proximally. Basis with spinules at base of outer and inner elements and between rami, with long inner proximal spinules. Exopod two-segmented, visibly shorter than endopod, reaching proximal third of ENP2; segments without outer nor inner acute distal processes; no pores detected on exopodal segments; EXP1 shorter than EXP2, with few outer spinules; EXP2 without outer ornamentation, with five elements (outermost spine probably homologous to the outer spine of the second exopodal segment of other species of the subfamily), and three elements, of which innermost long and rat-tail like in distal half, and adjacent seta short and densely setulose). Endopod two-segmented, visibly longer than exopod; ENP1 without outer nor inner outer acute distal processes, distal process of ENP2 as shown; no pores detected on endopodal segments; ENP1 reaching distal third of EXP2, 1.9 times as long as wide, and 0.8 times as long as ENP2, with longitudinal outer spinular row and with some spinules apically, with inner seta; ENP2 elongate, visibly longer than ENP1, 3.5 times as long as wide, with row of outer and apical spinules, with one inner seta issuing at proximal third, one inner apical slender seta, one medial apical pinnate element, and one outer apical spine.

P2–P4 (Figs. 39B, 40A–B). Intercoxal sclerite (not shown) as in *De. prima* **sp. nov.** Coxa and basis largely as in *Diarthropodella prima* **sp. nov.** but with minor differences in spinular ornamentation. Exopod and endopod largely as in *Diarthropodella prima* **sp. nov.**

Setal formula of swimming legs as follows:

| | P1 | P2 | P3 | P4 |
|---|---|---|---|---|
| EXP | 0,221 | 1,1,223 | 1,1,323 | 1,1,323 |
| ENP | 1,121 | 1,2,121 | 1,1,321 | 1,1,221 |

P5 (Fig. 37C). Baseoendopod pentagonal; endopodal lobe poorly-developed, with three equidistant setae separated by wide gap. Exopod oval, with some outer spinules, with four setae, of which second innermost slender.

P6 (Fig. 37E) represented by a minute flap covering ventrolateral genital aperture, fused to somite, without surface ornamentation, with one slender seta.

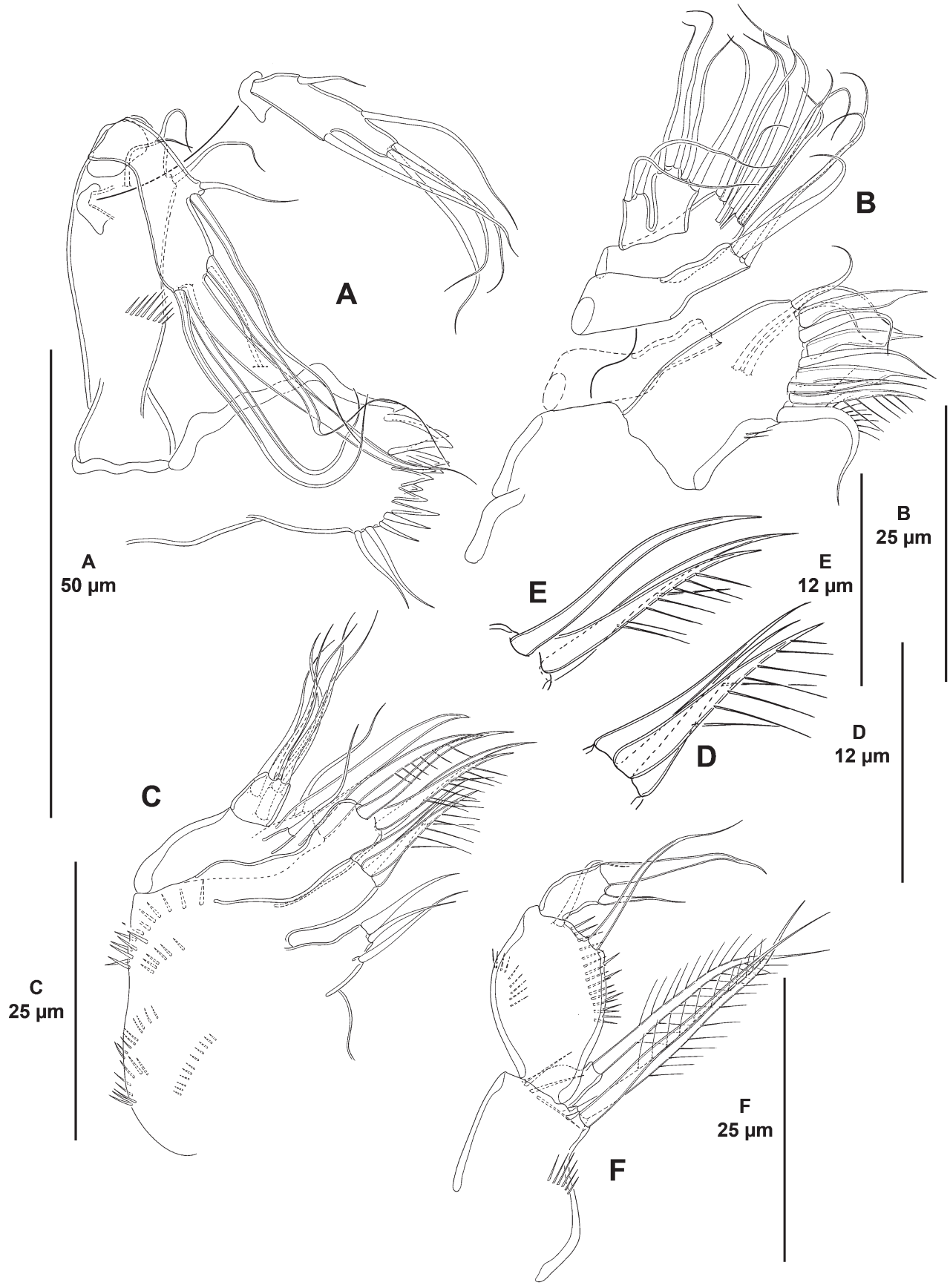


**FIGURE 38.** *Diarthropodella secunda* **sp. nov.**, female: A, mandible; B, maxillule; C, maxilla; D, setae of the middle endite of maxilla; E, setae of the distal endite of maxilla; F, maxilliped.

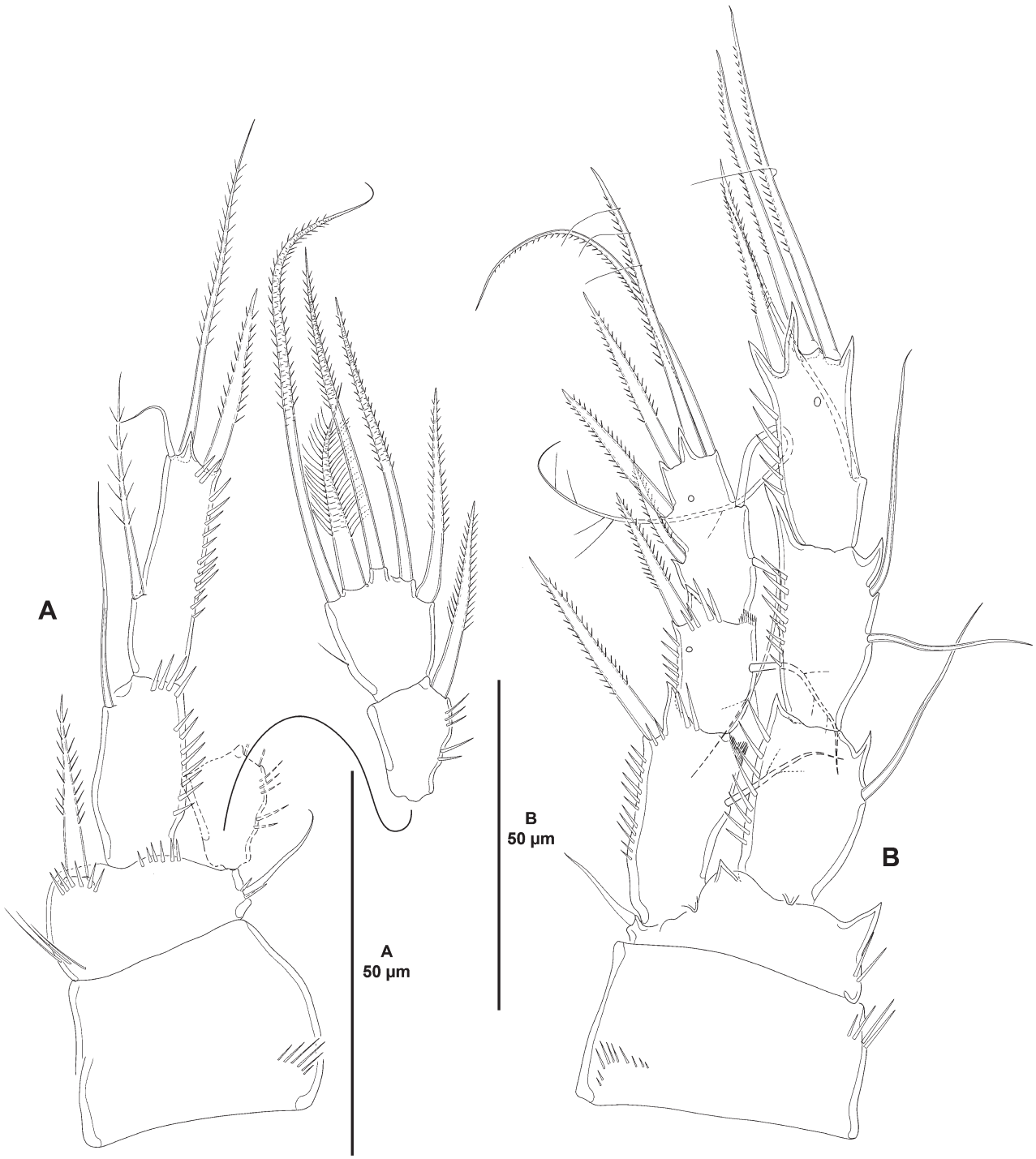


**FIGURE 39.** *Diarthropodella secunda* **sp. nov.**, female: A, P1, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10636); B, P2, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10637).

**Description of male.** Total body length measured from tip of rostrum to posterior margin of caudal rami, 440 µm; general shape of habitus (Fig. 41A) as in female.

Sexual dimorphism expressed in the genital somite and third urosomite not fused, P5 and P6.

Pedigerous somites largely as in female.

Genital somite and third urosomite not fused (Fig. 41A–C); both somites with dorsolateral spinules and with posterior sensilla dorsally (Fig. 41A–B); ventral surface of genital somite without spinular ornamentation, of third urosomite with two sets of spinules and few sensilla (Fig. 41C).

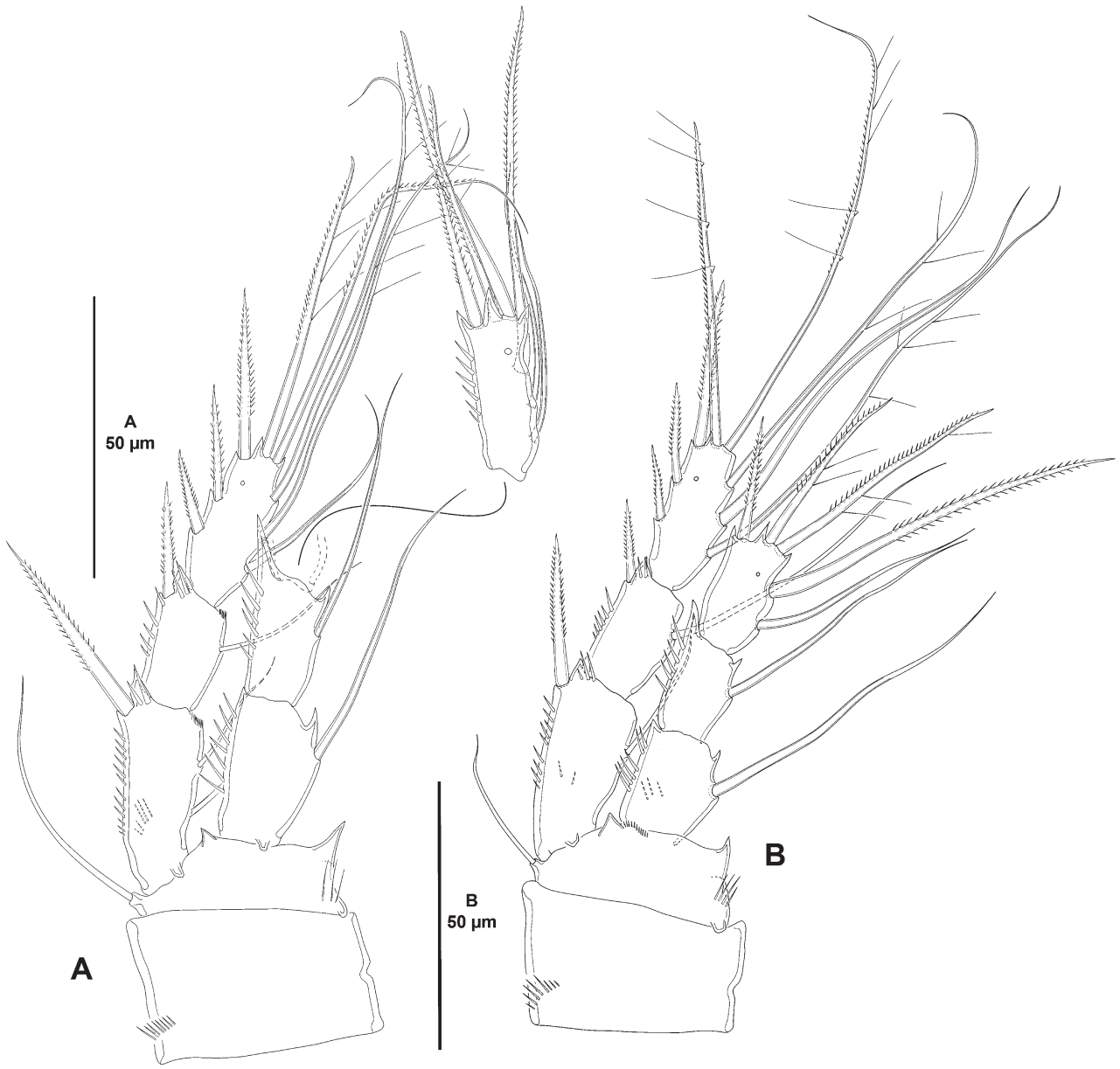


**FIGURE 40.** *Diarthropodella secunda* **sp. nov.**, female: A, P3, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10638); B, P4, anterior (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10639).

Fourth urosomite with dorsolateral spinules and sensilla as shown (Fig. 41A–B), ventrally with few sensilla and without spinules, no pores detected (Fig. 41C).

Fifth urosomite as preceding somite but without sensilla (Fig. 41A–C).

Anal somite and caudal rami (Fig. 41A–C), and rostrum (Fig. 37D) as in female.

Antennule (Fig. 37D) as in female, not sexually dimorphic.

Antenna, mandible, maxillule, maxilla and maxilliped, P1, P2, P3, and P4 (not shown) as in female.

P5 (Figs. 41B, C). Both legs fused medially forming a continuous plate; endopodal lobe poorly-developed; the left endopodal lobe possesses two seta, but the right endopodal lobe bears one seta only, being the normal condition of the armature complement uncertain; EXP small, oval, with three setae as figured.

P6 (Figs. 41B, C) symmetrical, fused to somite, each leg with outer basal seta and two elements, of which innermost shortest.

**Variability.** No variability was detected in the female. The left endopodal lobe of the male P5 bears two setae, the right endopodal lobe bears one seta only.

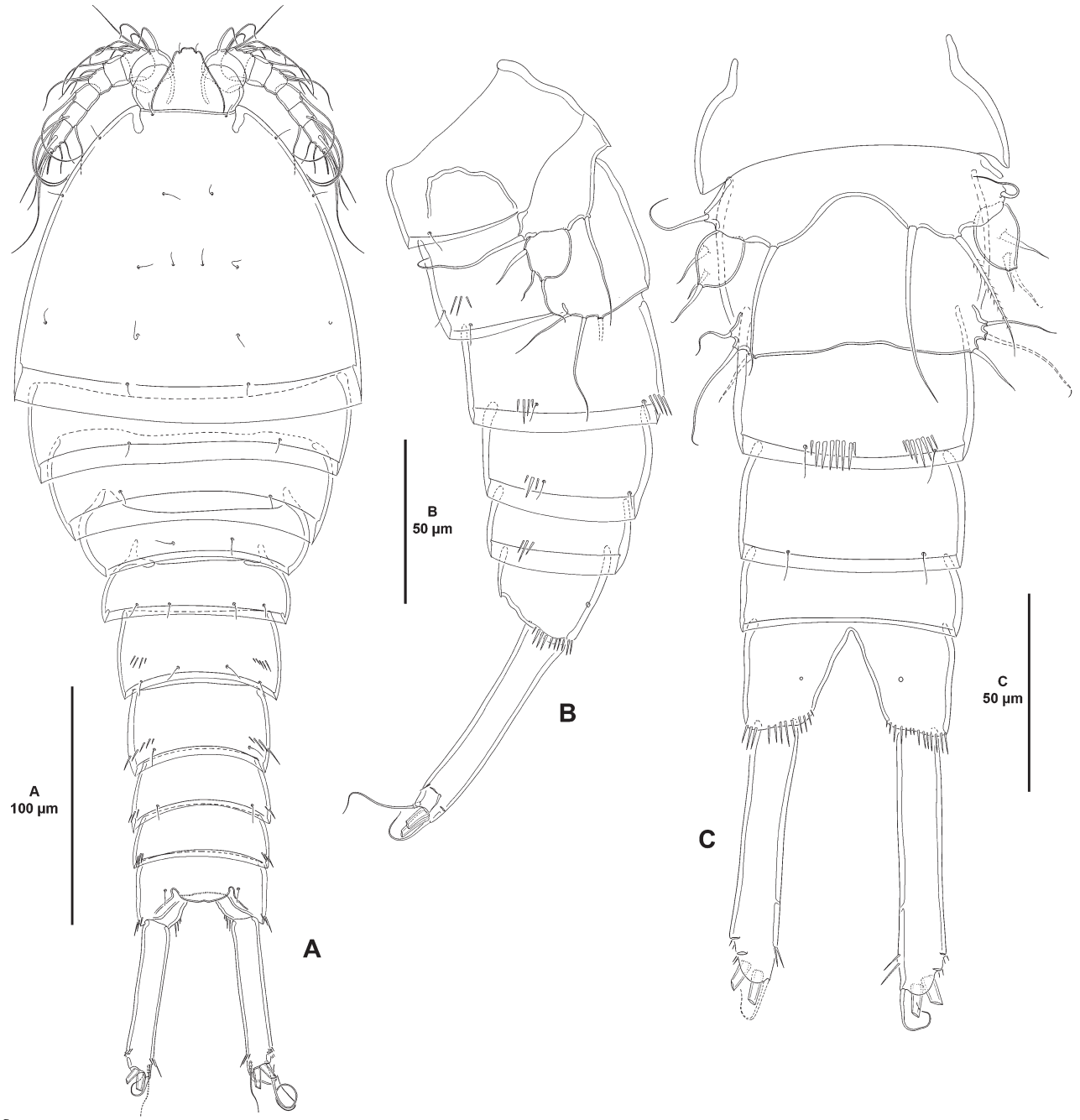


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**FIGURE 41.** *Diarthropodella secunda* **sp. nov.**, male. A, habitus, dorsal (microphotograph available in http://metadata.icmyl.unam.mx/handle/20.500.12201/10642); B, urosome, lateral; C, urosome, ventral.

**Remarks.** The basic criterion to separate the genera *Stenhelia* Boeck, 1865 and *Delavalia* was, for a long time, the segmentation pattern of the P1 ENP. The use and simplicity of this criterion, along with the subestimation of additional characters of higher significance (Mu & Huys 2002) led many researchers to erroneous conclusions, and most stenheliins with a two-segmented P1 ENP were placed into *Delavalia*. Mu & Huys (2002) provided strong evidence for the monophyly of the genus *Stenhelia*, and challenged and abandoned the use of the segmentation pattern of P1 ENP as the only discriminant for subgeneric assignment of stenheliin taxa. The monophyly of the genus *Delavalia* is far from resolved, but Mu & Huys' (2002) view was very important towards redefining the monophyly of the genus. The abandonment of the segmentation pattern of the endopod of P1 was followed by subsequent authors. Karanovic & Kim (2014) confirmed the polyphyly of *Delavalia*—previously suggested by Mu & Huys (2002) and Willen (2003), but see also Gómez & Cruz-Barraza (2021)—through molecular analyses and proposed three new genera with two-segmented P1 endopods, whose constituent species could have had easily

been attributed to *Delavalia* (Karanovic & Kim 2014). The abandonment of the segmentation pattern of P1 ENP, the utilization of more relevant characters for generic discrimination, and the search of (syn-)apomorphies to define monophyletic groups within *Delavalia* are obligate steps towards the monophyly of the genus. This reasoning was followed here. The two new genera proposed here, *Archaeohuysia* **gen. nov.** and *Diarthropodella* **gen. nov.**—with two segmented P1 endopods—could have been assigned to *Delavalia* if the segmentation pattern of that ramus as the only generic discriminant would not had been rejected previously. These two genera were attributed to the subfamily Stenheliinae on account of the lateral displacement of the genital apertures in females, triangular and bifid rostrum, mandibular basis and endopod elongated, the latter usually with a very long seta, setation of the maxillipedal syncoxa (three setae), position of the female P5 (laterally displaced), and sexual dimorphism in the male P2 when present.

The so far monotypic genus *Archaeohuysia* **gen. nov.** resembles other stenheliin genera in most respects, but is unique in the shape, structure, and ornamentation of the endopod of P1, and probably in the imperfectly subdivided P1 EXP2 and EXP3. The modified outer spinules on P1 ENP2 forming a fan-shaped unit is hypothesized here as a potential apomorphy for the genus. The role of the latter is uncertain, but seems to work as a shovel for digging into the sediment. The retention of the primitive complement of four setae on the two-segmented P1 ENP2, and comparable subchelate non- or weakly prehensile maxillipeds are present in some other stenheliin taxa (see Gómez & Cruz-Barraza 2021), supporting their independent origin in several lineages.

*Diarthropodella* **gen. nov.** also resembles other stenheliin genera including the general structure and shape of P1 ENP and the subchelate, prehensile maxilliped. As far as I know, no other stenheliin genus displays a two-segmented P1 EXP, and the reduction from three to two segments in this ramus is regarded here as autapomorphic for the genus. Another probable apomorphy is the secondary elongation of the outer basal seta of P3. Although the male is known only for *D. secunda* **sp. nov.**, the lack of sexual dimorphism in the antennule and on P2 ENP, and the fusion and symmetry of the male P6 are also potential autapomorphies for the genus. The two species presented here, *Di. prima* **sp. nov.** and *Di. secunda* **sp. nov.**, are easily distinguishable by 1) the shape of the innermost setae on P1 EXP3, short, rat-tail-like and densely plumose in *Di. prima* **sp. nov.**, but long and bipinnate in *Di. secunda* **sp. nov.**, and 2) armature complement of the baseoendopod and exopod of the female P5 (with four and five setae, respectively, in *Di. prima* **sp. nov.**, but three and four in *Di. secunda* **sp. nov.**, respectively). The stenheliin species for which the males have been described exhibit sexual dimorphism in the male antennule and P2 ENP, in the relative thickness of some setae of some swimming legs in the male, division of the genital and first abdominal somite, and male P5 and P6. The significance of the lack of sexual dimorphism in the male antennule *Di. secunda* **sp. nov.** is uncertain, and the lack of sexual dimorphism in the male P2 ENP is interpreted here as a secondary loss.

## Discussion

The world's ocean deep-sea stenheliin fauna is poorly known, and only a handful of species have been described, all of them with shallow-water relatives. Most deep-sea water species belong to Willen's (2003) *longicaudata*-group, while *De. noodti* and *De. islandica* (Iceland-Faroe Ridge), *De. lima* (Peru Trench), *De. diegensis* (San Diego Trough), and *Stenhelia* "spec. 6" (Angola Basin (Willen 2003)), the latter probably related to *De. lima* (Willen 2003), and only one species, *De. gundulae* (Edison Seamount) belongs to Willen's (2003) *normani*-group. There are, however, several reports of unidentified stehneliin species. Eckman & Thistle (1988) reported the presence of an unidentified species of *Stenhelia*—probably an undescribed species of *Delavalia*—in the San Diego Trough (1,080 m depth). George (1999, 2005) reported the presence of 12 unidentified species of *Delavalia* and one unidentified species of *Stenhelia* from the Straits of Magellan (200–459 m depth), the Beagle Channel (100–219 m depth) and the Patagonian Continental Slope (1,168 m depth). In his list of species, Baguley (2004) reported six species of *Stenhelia* (16 individuals) (of his 11 species of *Stenhelia*, *S. aff. aemula* is actually *Beatricella aff. aemula* (Scott, 1893), *S. unisegmenta* is a *nomen nudum*, *S. aff. arenicola* is actually *De. aff. arenicola*, *S. aff. bisetosa* is actually *Melima aff. bisetosa* Coull, 1971, *S. aff. confluens* is actually *De. aff. confluens*), 10 species of *Delavalia* (32 individuals) (of his 11 species of *Delavalia*, *De. hanstroemi* is actually *We. hanstroemi* (Lang, 1948), *De. indica* is actually *M. indica* (Krishnaswamy, 1957), *De. bisegmenta* is a *nomen nudum*, *S. aff. arenicola* is actually *De. aff. arenicola*, and *S. aff. confluens* is actually *De. aff. confluens*)—most of which are known from shallowater habitats only —, and one probably new and as yet undescribed species (13 individuals) of *Wellstenhelia* Karanovic & Kim,

2014 (*Delavalia aff. hanstromi* in Baguley 2004) found in deep sea samples (200–3,000 m depth) from the northern Gulf of Mexico. Interestingly, in his list of species, Baguley (2004) commented on the presence of a probable new species of the *longicaudata*-group of *Delavalia* (6 individuals) (*Delavalia aff. longicaudata* in Baguley (2004)). Sedlacek (2007) reported on the presence of the genus *Stenhelia*—probably *Delavalia*—on the continental slope off central California (3,607 m depth). Degen *et al.* (2012) reported on the presence of unidentified *Delavalia* species associated with vestimentiferan tubeworm aggregations in cold seep sites of the upper Louisiana slope in Green Canyon (538–571 m depth) and the lower slope in Atwater Valley (Gulf of Mexico). Kitahashi *et al.* (2013) found the genus *Delavalia* in samples taken at the Kuril Trench (490–7,090 m depth), and Kitahashi *et al.* (2014) reported it in the bathyal zone (430 m depth) of the Ryukyu Trench. In their appendix A, George *et al*. (2014) reported on four unidentified species of *Delavalia* from the Angola Basin found at 5,389 m depth, of which one could be conspecific to Willen's (2003) *Stenhelia* "spec 6". Brooks *et al.* (2009) and Plum *et al.* (2015) reported *De. gundulae* and an unidentified species of that genus in samples taken from natural hydrocarbon seeps of the upper Louisiana slope in the Gulf of Mexico (1,406–1,409 m depth). George *et al.* (2018) reported the presence of *De. arctica* on the eastern Mediterranean Anaximenes Seamount (1,529–2,043 m depth).

The discovery of *De. gundulae*, the only deep-sea representative of Willen's (2003) *normani*-group, prompted her (Willen 2003) to suggest two different colonization events of deep-sea habitats, those of the *longicaudata*- and the *normani*-groups. However, current evidence (see Gómez & Cruz-Barraza 2021; Gómez 2021) suggests multiple colonization events by different stenheliin lineages (*e.g. Pseudostenhelia* Wells, 1967, *Wellstenhelia*, *Wellstenvalia*, *Beatricella* Scott, 1893, the *longicaudata*- and the *normani*-groups of the genus *Delavalia*, and probably *Stenhelia*). The shallow water counterparts of *Archaeohuysia* **gen. nov.** and *Diarthropodella* **gen. nov.** are still unknown.

The monophyly of the Stenheliinae seems to be well supported. Willen (2000) recognized eight apomorphic characters supporting the monophyly of the Stenheliinae, but later listed only seven apomorphies for the subfamily (she omitted the mandibular exopod) (Willen 2002). Subsequently, Huys & Mu (2008: 64–65) reduced the list to three apomorphies including (a) setation of the maxillipedal syncoxa, palm, and endopod, (b) lateral displacement of the female P5 and shape of the baseoendopod, and (c) the laterally displaced gonopores as unique apomorphic conditions for the Stenheliinae.

At present, 16 genera have been attributed to the subfamily Stenheliinae (see also Gómez 2020, 2021; Gómez & Cruz-Barraza 2021), *Anisostenhelia* Mu & Huys, 2002 (monotypic), *Archaeohuysia* **gen. nov.** (monotypic), *Beatricella* (2 species), *Cladorostrata* Tai & Song, 1979 (two species), *Delavalia* (54 species), *Diarthropodella* **gen. nov.** (two species), *Itostenhelia* Karanovic & Kim, 2014 (two species), *Lonchoeidestenhelia* Gómez, 2020 (monotypic), *Melima* Por, 1964 (five species), *Muohuysia* Özdikmen, 2009 (monotypic), *Onychostenhelia* Itô, 1979 (two species), *Pseudostenhelia* Wells, 1967 (four species), *Stenhelia* (eight species), *Wellstenhelia* (nine species), *Wellstenvalia* (monotypic), and *Willenstenhelia* Karanovic & Kim (six species).

Pending a complete revision of *Delavalia* and a phylogenetiuc analysis of the subfamily, the following points are worth mentioning:

a) The monophyly of the genus *Stenhelia* seems to be well supported by the—autapomorphic (Mu & Huys 2002)—modified second innermost and innermost seta of the endopodal lobe in the females and males, respectively. However, a similar modified seta has been reported for *De. elisabethae* (Por 1960: 116, Plate VIII, Figs. 53, 54; Por 1964: 81, Plate II, Fig. 100) (see also Gómez & Cruz Barraza 2021). Convergent evolution would explain the presence of the modified seta on the female and male P5 endopodal lobe of *Stenhelia* and *D. elisabethae* if they prove to be real homologues.
b) *Stenhelia* and *Anisostenhelia* share a sistergroup relationship based on seven synapomorphies (Mu & Huys 2002: 197; but see also Gómez & Cruz-Barraza 2021, and Gómez 2020).
c) The lack of an inner seta on P1 EXP2 is a potential synapomorphy for *Stenhelia*, *Anisostenhelia*, *Lonchoeidestenhelia*, and *Beatricella* (Mu & Huys 2002: 197; Gómez & Cruz-Barraza 2021) and the lack of such seta in some other taxa (*e.g. Me. caulerpae* Por, *Me. indica*, and some species of *Delavalia*) could be explained by an independent loss in several stenheliin lineages (Gómez & Cruz-Barraza 2021).
d) The reduction in inner armature of P2 EXP3 from two to one seta is a synapomorphy for *Stenhelia* and *Anisostenhelia* (Mu & Huys 2002) and *Lonchoeidestenhelia* (Gómez & Cruz-Barraza 2021). The same condition in *Wellstenvalia* and *We. euterpoides* has been interpreted as secondary loss (Gómez & Cruz-Barraza 2021).
e) *Stenhelia*, *Anisostenhelia*, *Beatricella*, *Muohuysia*, *Willenstenhelia*, *Itostenhelia*, *Lonchoeidestenhelia*, and

probably few species of *Wellstenhelia* (Karanovic & Kim 2014; Gómez & Cruz-Barraza 2021) share two inner setae on P2 ENP2.

f) The reduction from three to two setae on P3 EXP3 is common to few species of *Wellstenhelia* (*We. melpomene* Karanovic & Kim, 2014 and *We. euterpoides*), and to *Stenhelia*, *Anisostenhelia*, *Lonchoeidestenhelia,* and *Willenstenhelia* (Gómez & Cruz-Barraza 2021).

g) *Anisostenhelia* and *Willenstenhelia* are the only genera without inner armature on P2–P4 EXP1.

h) The genus *Beatricella* has been defined on the basis of three apomorphies (Mu & Huys 2002: 203) of which only one, the male P2 ENP2 drawn out into sigmoid process finely pinnate and outer margin with row of long spinules, seems to be unique to the genus (Gómez & Cruz-Barraza 2021).

i) The genera *Muohuysia*, *Wellstenhelia*, and *Wellstenvalia* (the *MWW* lineage *sensu* Gómez & Cruz-Barraza 2021) and *Beatricella* seem to be closely related given the primitive armature formula of P2 EXP3 (223) and P3 EXP3 (323) (Gómez & Cruz-Barraza 2021).

j) The genera *Muohuysia*, *Wellstenhelia*, and *Wellstenvalia* (the *MWW*) bear a sistergroup relationship as evidenced by the presence of a very strong curved inner element on P2–P3 ENP1 (Mu & Huys 2002; Karanovic & Kim 2014; Gómez & Cruz-Barraza 2021).

k) Among the *MWW* lineage, *Wellstenhelia* and *Wellstenvalia* are more closely related given the combination of the two-segmented P1 ENP (it is three segmented in *Muohuysia*), the presence of a strong recurved inner element on P2–P3 ENP1, and the male sexual dimorphism expressed in the slenderness of some setae on P3 and P4 and three setae on the male P5 EXP, of which the innermost is the strongest (Gómez & Cruz-Barraza 2021).

l) The fusion of the strong recurved inner element of P2–P3 ENP to the supporting segment seems to be autapomorphic for *Wellstenvalia* (Gómez & Cruz-Barraza 2021), and *We. euterpoides* seems to be more closely related to *We. euterpe* Karanovic & Kim, 2014 by the —synapomorphic—presence of three setae only on the female P5 endopodal lobe as the result of the loss of the outermost seta (Gómez & Cruz-Barraza 2021). The three setae observed on the female P5 endopodal lobe of *Willenstenhelia* has been interpreted as the result of the loss of the second innermost seta leaving a wide gap between the innermost and the two outermost setae (Gómez & Cruz-Barraza 2021).

m) The genus *Wellstenhelia* seems to be defined by the apomorphic medial seta on the cutting edge of the mandible and by the lack of armature on the male P5 endppodal lobe. The lack of such seta in *We. euterpoides* is considered a secondary loss (Gómez & Cruz-Barraza 2021). The complete loss of armature on the male P5 endopodal lobe in *D. incerta* and *D. palustris*, in *P. wellsi* Coull & Fleeger, 1977 and *Me. caulerpae* seems to have occurred independently.

n) The significance of the confluent maxillulary rami is not well understood. These rami are fused but separated from the supporting basis in *Onychostenhelia*, *Cladorostrata*, *Delavalia*, *Pseudostenhelia*, *Archaeohuysia* **gen. nov.**, *Lonchoeidestenhelia*, *Diarthropodella* **gen. nov.**, *Wellstenhelia*, and in one species of *Beatricella* (*B. calidafornax* Gómez, 2021) (Huys & Mu 2008; Karanovic & Kim 2014; Gómez 2020, 2021; Gómez & Cruz-Barraza 2021). The confluent maxillulary rami fused to the supporting basis seems to be autapomorphic for *Willenstenhelia* (Gómez & Cruz-Barraza 2021). The discrete maxillulary rami not fused to the supporting basis seems to be a synapomorphy for *Stenhelia*, one species of *Beatricella* (*B. aemula*), *Melima*, *Anisostenhelia*, and *Muohuysia* (Huys & Mu 2008), and seems to have appeared independently also in *Itostenhelia* and *Wellstenvalia*.

o) The significance of the relative position of caudal setae I and II is uncertain, but the proximal situation of these setae —just below the middle of each caudal ramus—seems to be an apomorphy for *Wellstenvalia* (Gómez & Cruz-Barraza 2021).These setae are located at the distal fourth of the ramus in some species of *Delavalia* and in *Diarthropodella prima* **sp.nov.**, and are located subdistally in most genera of the subfamily (see Gómez & Cruz-Barraza 2021).

p) *Melima*, *Pseudostenhelia*, and some species of *Delavalia* possess a —plesiomorphic—semicircular, relatively small, weakly chitinized anal operculum flanked by a sensillum on each side (Willen 2003). The anal operculum is very short, inconspicuous or completely absent in *Wellstenhelia*, *Stenhelia*, *Anisostenhelia* and *Onychostenhelia* (see Gómez & Cruz-Barraza 2021, and references cited therein). A well developed —synapomorphic—anal operculum is common to some species of *Delavalia*, and to *Beatricella*, *Muohuysia*, *Itostenhelia*, *Willenstenhelia*, *Lonchoeidestenhelia*, and *Wellstenvalia* (Willen 2003; Gómez & Cruz-Barraza 2021).

q) The spiniform caudal seta I is common to *Stenhelia*, *Anisostenhelia*, *Lonchoeidestenhelia*, *Beatricella*, *Cladorostrata*, *Itostenhelia*, most species of *Wellstenhelia*, and *Me. papuaensis* Willen, 2002. The caudal seta I is relatively long—probably plesiomorphic—in *Pseudostenhelia*, and *Onychostenhelia*, and very small in *We. clio* Karanovic & Kim 2014, *Wellstenvalia*, and *Willenstenhelia* (Gómez & Cruz-Barraza 2021).

r) Subchelate prehensile maxillipeds are present in *Stenhelia*, *Anisostenhelia*, *Lonchoeidestenhelia*, *Beatricella*, *Muohuysia*, *Wellstenvalia* and *Melima*. Subchelate non-prehensile—probably synapomorphic—maxillipeds are shared by *Wellstenhelia*, *Itostenhelia*, and *Willenstenhelia*; the maxillipeds of *Wellstenhelia* and *Itostenhelia* possess a small one-segmented endopod, but it is incorporated to the basis—autapomorphic—in *Willenstenhelia* (see Gómez & Cruz-Barraza 2021).

s) The shape of P1 EXP (EXP3 smaller than EXP2 and EXP3), the exceedingly long outer elements of P1 EXP2 and EXP3, and the two-segmented endopod of P2–P4, seem to be synapomorphic for *Onychostenhelia* and *Pseudostenhelia* (Gómez 2021).

It is interesting to note the distribution of stenheliins in the Gulf of California and the west coast of the Baja California Peninsula (see also Fig. 1 in Gómez & Cruz-Barraza (2021), and Fig. 1 in Gómez (2021)). The distribution of the subfamily seems to be restricted to the northern, central, and southern regions of the Baja California Peninsula, and to the central and southern Gulf of California. In an unpublished postgraduate dissertation, Díaz-Álvarez (2018) noted that the species of the genus *Delavalia* (described as *Beatricella calidafornax* Gómez, 2021), *Wellstenvalia wellsi* Gómez & Cruz-Barraza, 2021 (Gómez & Cruz-Barraza 2021), *Wellstenhelia euterpoides* (Gómez & Cruz-Barraza 2021), *De. asetosa* **sp. nov.**, *Di. prima* **sp. nov.**, and *Di. secunda* **sp. nov.**) collected during Talud X cruise in the central Gulf of California, show a preference for silty sediments. The same is hypothesized here for the stenheliin fauna of the west coast of the Baja California Peninsula.

Undoubtedly, future studies of as yet unexplored deep-sea areas of the world's ocean will contribute to a better understanding of the diversity of poorly known deep-sea meiofaunal organisms.

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