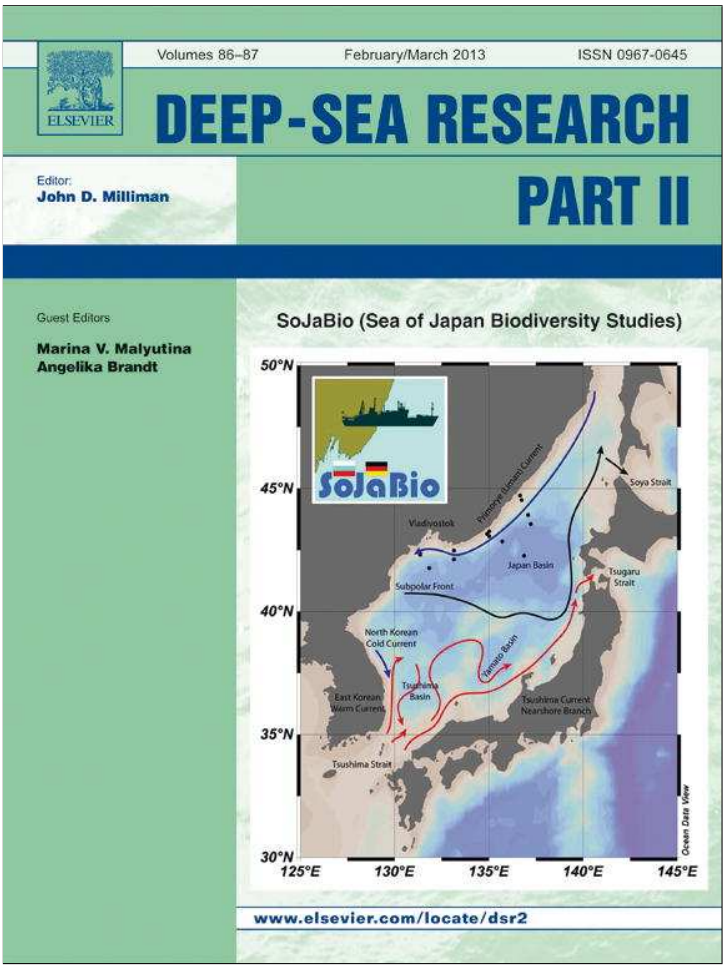

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Description of *Baeonectes brandtae* sp. nov. and redescription of *Eurycope spinifrons* Gurjanova, 1933 (Crustacea, Isopoda, Munnopsidae) from the deep-sea basin of the Sea of Japan

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ABSTRACT

A small collection of isopods of the family Munnopsidae Lilljeborg, 1864, including four species from the slope and the deep-sea basin of the Sea of Japan (Northwest Pacific), was studied. The new species *Baeonectes brandtae* sp. nov. which occurs at depths of 455–1525 m is described. It is the second species of *Baeonectes* Wilson, 1982 described from the Sea of Japan and the deepest recorded species of the genus. *Eurycope spinifrons* Gurjanova, 1933, the only *Eurycope* species known from the Sea of Japan is redescribed. It is the most abundant species in the studied deep-sea macrobenthic communities in all samples.

1. Introduction

The amazing isopod species richness in the deep sea mainly consists of representatives of the deep-sea families of Asellota, with an especially importance by the natatory family Munnopsidae. This is a widespread and one of the largest isopod families, including 42 genera and around 320 species (Schotte et al., 2010 http://www.nmnh.si.edu/iz/isopod/). About 90% of the munnopsid species occur in bathyal and abyssal depths of the World Ocean where they are often the most abundant isopod group (Brandt et al., 2007a,b; Kussakin, 2003; Malyutina and Brandt, 2007; Wilson, 1989). Species of some genera of the family inhabit shelf depths, mainly at high latitudes of both hemispheres. This is an evidence for a secondary colonization of shallow waters by this primarily deep-sea family and for the considerable ecological adaptability of the group. This adaptability allowed some representatives of the deep-sea family to compete successfully in shelf communities, to spread geographically, and perhaps to overcome shallow regions that are barriers to their further dispersal in the bathyal and abyssal zones. An example for such a process could be the beginning colonization by munnopsids of the geologically young deep basin of the Sea of Japan, which is separated from the adjacent deep-sea ocean waters by shallow straits (Malyutina and Brandt, 2013).

One of the objectives of the investigation of the deep-sea fauna is the description of new and the redescription of known but poorly described species, especially of the abundant, dominant ones that characterize the fauna. Munnopsidae is a cosmopolitan, actively evolving family, and knowledge of its taxonomy and phylogeny is important for understanding the formation of the deep-sea fauna as a whole. However, the taxonomy of this large and complicated family is currently not completely resolved. Over the past 30 years, after an accumulation of new data and revisions of only one, the central munnopsid genus *Eurycope* Sars, 1864, seven new genera have been erected for some former members of this genus (Malyutina and Brandt, 2006; Malyutina, 2008; Wilson and Hessler, 1981; Wilson, 1982; Wilson, 1989). For the Sea of Japan six munnopsid species were known (Gurjanova, 1933, 1936; Kussakin, 2003): the shelf species *Eurycope pavlenkoi* Gurjanova, 1933 and *Ilyarachna kurilensis* Kussakin and Mezhov, 1979; *I. starokadomskii* Gurjanova, 1933 and *Munnopsurus minutus* Gurjanova, 1933 from depths around 500 m; *I. zachsi* Gurjanova, 1933 from depths of 105 to 1002 m, and the deep-sea species *Eurycope spinifrons* Gurjanova, 1933 found at a depth range of 308–3350 m. Revision of the old collections allowed us to clarify the taxonomic position of two of these species. *I. starokadomskii* was synonymized with *I. zachsi* as a junior synonym (Golovan and Malyutina, 2006). *E. pavlenkoi* together with *E. ochotensis* Kussakin, 1979 from the Okhotsk Sea were transferred to the genus *Baeonectes* Wilson, 1982 (Malyutina and Golovan, 2010). *B. ochotensis* was redescribed, but unfortunately, it was not

Abbreviations: C-EBS, camera-epibenthic sledge; MIMB, Museum of A.V. Zhirmunsky Institute of Marine Biology, Vladivostok; ZMH, Zoological Museum of Hamburg; An1, antenna 1; An2, antenna 2; bAn2, basis of antenna 2; Hy, hypopharynx; lMd, left mandible; rMd, right mandible; Mx1, maxilla 1; Mx2, maxilla 2; Mxp, maxilliped; P1–7, pereopods 1–7; Plp 1–5, pleopods 1–5; Ur, uropod; m, male; f, female

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possible to study *Baeonectes pavlenkoi* because the type material was lost (communication with the curator of ZIN, St.-Petersburg).

The deep-sea Russian–German expedition SoJaBio (Sea of Japan Biodiversity studies) on board R/V *Akademik M.A. Lavrentyev* in the Sea of Japan which sampled in depths between 455–3666 m (Malyutina and Brandt, 2013) has brought extensive collections of Peracarida (Golovan et al., 2013) where Isopoda was the most abundant order. The family Munnopsidae was the most frequent isopod and peracarid, but just in terms of abundance, not species richness. The new material revealed four munnopsid species—three already known from the deep Sea of Japan: *E. spinifrons*, *I. zachsi* and *M. minutus* and one species of *Baeonectes.* Two shelf species, *I. kurilensis* and *B. pavlenkoi*, were absent in our material.

The redescription of *I. zachsi* has been published previously (Golovan and Malyutina, 2006). *M. minutus* is represented only by a few juveniles in our samples. Due to the good condition of the collected specimens, we had the opportunity to study the two most numerous munnopsid species, *E. spinifrons* and the species of *Baeonectes*. Using the illustrations and descriptions of *B. pavlenkoi* of Gurjanova (1933, 1936) and Kussakin (2003) for comparison, we suggest that the specimens of *Baeonectes* from the SoJaBio collections belong to a different and new species. The description of the new species *B. brandtae* sp. nov. is presented herein besides the redescription of *E. spinifrons.* Distribution, population structure and reproductive mode of *E. spinifrons*, the most prevalent species of the deep-sea macrobenthos of the Sea of Japan, were investigated as well (Elsner et al., 2013).

2. Material and methods

Specimens were collected using a new modified camera-epibenthic sledge (C-EBS; Brandt et al., 2013). The samples were washed onboard immediately with ice-cold water through sieves with a mesh size of 300 μm. Then the sample from the first deployment of each station was fixed in pre-cooled 96% ethanol for genetics and the sample from the second deployment was fixed in 4% formaldehyde for morphological studies. The material was sorted and identified using a stereomicroscope, drawings were made using an Olympus SZX7 compound microscope, equipped with a camera lucida and a LABOVAL 4 microscope with a Lomo RA-7U4.2 drawing tube.

Terminology and measurements mostly follow Wilson and Hessler (1980) and Wilson (1989). The total body length was measured medially from the tip of the rostrum to the posterior tip of the pleotelson. The dorsal view was used for measuring the width, while the length of body segments was measured in lateral view. For the description of the body and some further details the holotype was used, for mouthparts, pereopods and pleopods a male paratype was dissected and for the study of some sexual dimorphisms a female paratype was used. The type material is deposited in the Museum of A.V. Zhirmunsky Institute of Marine Biology, Vladivostok, Russia, and in the Zoological Museum of Hamburg, Germany.

3. Taxonomy

Munnopsidae Lilljeborg, 1864
Eurycopinae Hansen, 1916
Baeonectes Wilson, 1982

Baeonectes Wilson, 1982: 3333; Kussakin, 2003: 134–135; Malyutina and Brandt, 2006: 8–15; Malyutina and Golovan, 2010: 99.

Type species: *Baeonectes muticus* (G.O. Sars, 1864), by original designation.

Baeonectes brandtae sp. nov.

Material examined: *Holotype*: (MIMB 27223), copulatory male (1.8 mm), SoJaBio C-EBS station B7–7, 25.08.2010, 470–528 m, 43°13N 135°04E, allotype (MIMB 27224), preparatory female (1.75 mm), from the same sample with the same locality.

Paratypes: (MIMB 27225), 245 specimens: female (1.95 mm) and male (1.9 mm) used for dissection, 94 females (1.85–2.5 mm)—35 females brooding with eggs (7–16 eggs in brooding chamber), 3 females with embryos (15–16 embryos), 14 females with empty brooding chamber, 42 preparatory females; 78 copulatory males (1.3–2.3 mm), 73 mancas and juveniles (0.7–1.2 mm), the same sample from the same locality, (ZMH 43255), 28 speciments, A2–10, 14.08.2010, 455–465 m, 44°56N 137°11E—223 specimens (ZMH 43256).

Additional material: SoJaBio C-EBS stations: A3–11, 14–15.8.2010, 1494–1525 m, 44°47N 137°15E—4 specimens; B6–7, 25.08.2010, 1001–1011 m, 43°10N 135°01E—55 specimens; B7–6, 25.08.2010, 517–521 m, 43°13N 135°04E—6 specimens.

Etymology: The species is named in honor of Prof. Dr. Angelika Brandt whose enthusiasm and efforts have contributed to the success of several deep-sea expeditions and who was the leader of the German party of the SoJaBio expedition.

Diagnosis: Rostrum of cephalon 1.4 of antenna 1 article 1 width. Antenna 1 article 3 about half of article 2 length and width. Maxilliped palp article 3 smaller than article 2. Pereopod 4 longest, twice longer than body and pereopod 1 in male and about 1.7 in female. Propodus of pereopods 5–7 with serrated dorsal margin. Male pleopod 1 distolateral lobes slender, acute, and curved to form rounded hooks at same level as distomedial lobes. Stylet of male pleopod 2 0.6 of protopod length. Uropod protopod as long as wide, endopod twice longer than protopod, exopod half of endopod length.

Description: Holotype, male: *body* (Fig. 1) length 2.0 width, body height 0.3 body length, dorsal surface with sparse small setae. *Cephalon* length 0.45 width; rostrum length 0.9 mid-length width, 0.55 cephalon length, rostrum width 1.4 antenna 1 article 1 width; clypeus length 0.9 labrum length, width 0.6 labrum width (Fig. 2F). *Pereonites 1–4* gradually broadening from 1 to 4, width of pereonites 1 and 4 1.1 and 1.4 cephalon width; pereonites 1–4 medial length/cephalon length behind antennular sockets: 0.7; 0.7; 0.5; 0.5; pereonite 1 shortest laterally, pereonites 2–4 subequal in lateral length; anterior lobes of coxae 1–4 not extended anterolaterally of margin of corresponding pereonites. *Natasome* length 0.7 body length; width 1.4 cephalon width, pereonite 5 longest, lateral length 0.9 lateral length of pereonites 6 and 7 together; pereonite 7 shortest, 0.45 of pereonite 5 length, width of fused mediodorsal part of natasome between sutures 0.4 natasome width; anterolateral margin of pereonites 2–5 pointed with long distal seta, of pereonites 6 and 7 with few setae. *Pleotelson* length 0.6 width and 0.2 body length; lateral margin in front of uropods insertion with row of setae, 5–6 distolateral setae longer than others; uropod inserted ventrally; preanal ridge low and rounded.

Antenna 1 (Fig. 3) 0.4 of body length, article 1 length 0.95 width, slightly extending beyond rostrum anterior margin, distolateral projection and distomedial margin with 1 broom and 1 small unequal bifid setae each; articles 2–5 length–width ratios: 1.8; 1.4; 1.0; 3.5, articles 2–5 to article 1 length ratios: 0.7; 0.3; 0.2; 0.6; article 2 with 1 broom and 2 simple distal setae; article 3 without setae; article 4 with 1 distal broom seta, article 5 as long as articles 3 and 4 together, following 6 flagellar articles subequal in length or shorter than article 5, last article with 4 aesthetascs equal in length to last 3 articles together.

Antenna 2 (Fig. 3) broken off from article 4 in males. Article 1 triangular in dorsal view; lateral margin of article 2 shorter than

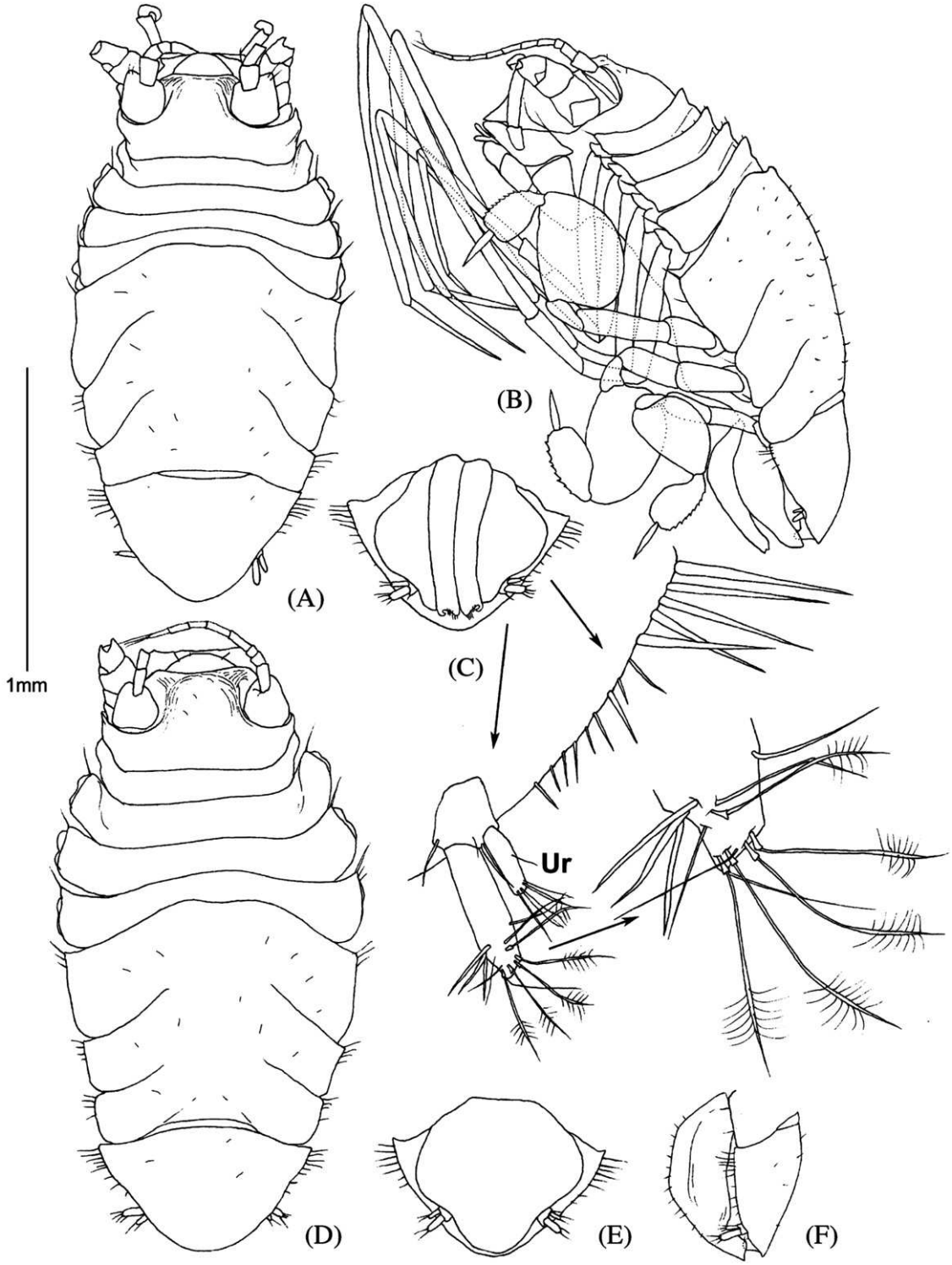

Fig. 1. ***Baeonectes brandtae*** sp. nov. Holotype, copulatory male (MIMB 27223), total view. (A) Dorsal view, (B) lateral view, (C) pleotelson, ventral view with enlarged lateral margin and uropod. Allotype, preparatory female (MIMB 27224). (D) Dorsal view, (E) pleotelson, ventral view, and (F) pleotelson lateral view.

article 1; article 3 noticeably longer than article 2; scale on article 3 small, with long distal seta; article 4 slightly shorter than article 3.

Mandible (Fig. 3) incisor process with 4 cusps; *lacinia mobilis* of left mandible length 0.9 incisor length, with 5 teeth; spine row with 4 and 5 spines on left and right mandibles respectively; molar process stout, rounded distally, ventral margin with 2 setae; condyle length 1.7 M process length, palp length 0.9 mandiblular body length, article 2 2.4 of article 1 length, with several slender distal setae; article 3 subequal in length to article 1, weakly twisted, with 1 long and few shorter distal setae.

Hypopharynx (Fig. 3) outer lobes 1.2 as wide and 1.7 as long as inner lobes, with 1 stout and dense fine seta distally.

Maxilla 1 (Fig. 4) lateral endite 1.4 times as wide as mesial endite; 2 setae of 12 distal spine-like seta denticulate.

Maxilla 2 (Fig. 4) mesial endite longest with 6 stout and some slender distal setae; middle and lateral endites with 2 long and

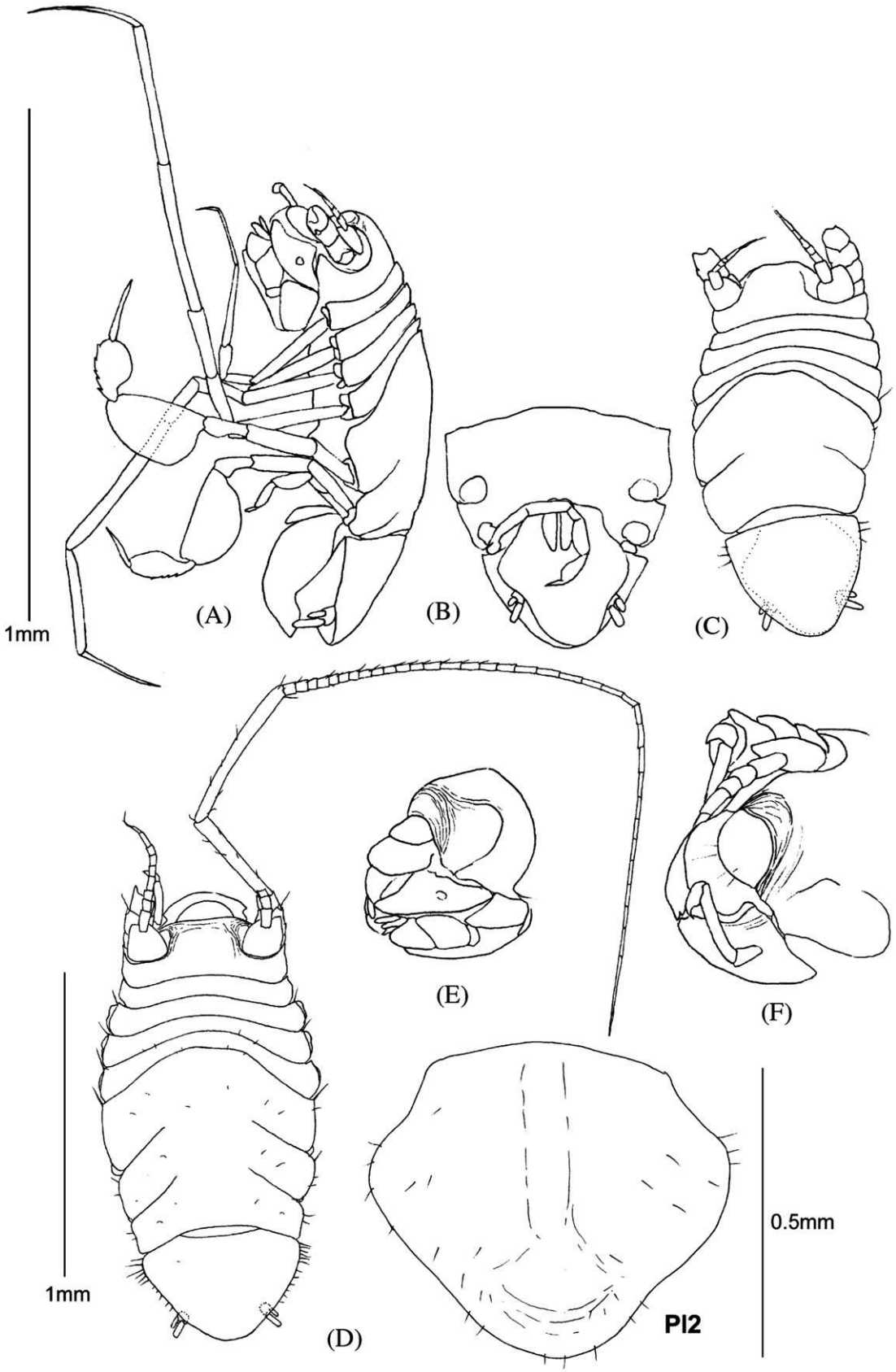

Fig. 2. ***Baeonectes brandtae*** sp. nov. Paratypes (MIMB 27225). Juvenile male at stage 4. (A) Dorsal view, (B) ventral view of natasome. (C) Juvenile female, dorsal view. (D) female, Pl2—operculum. (E) Female, cephalon without antennae, oblique lateral view. (F) Male, cephalon, oblique dorsal view.

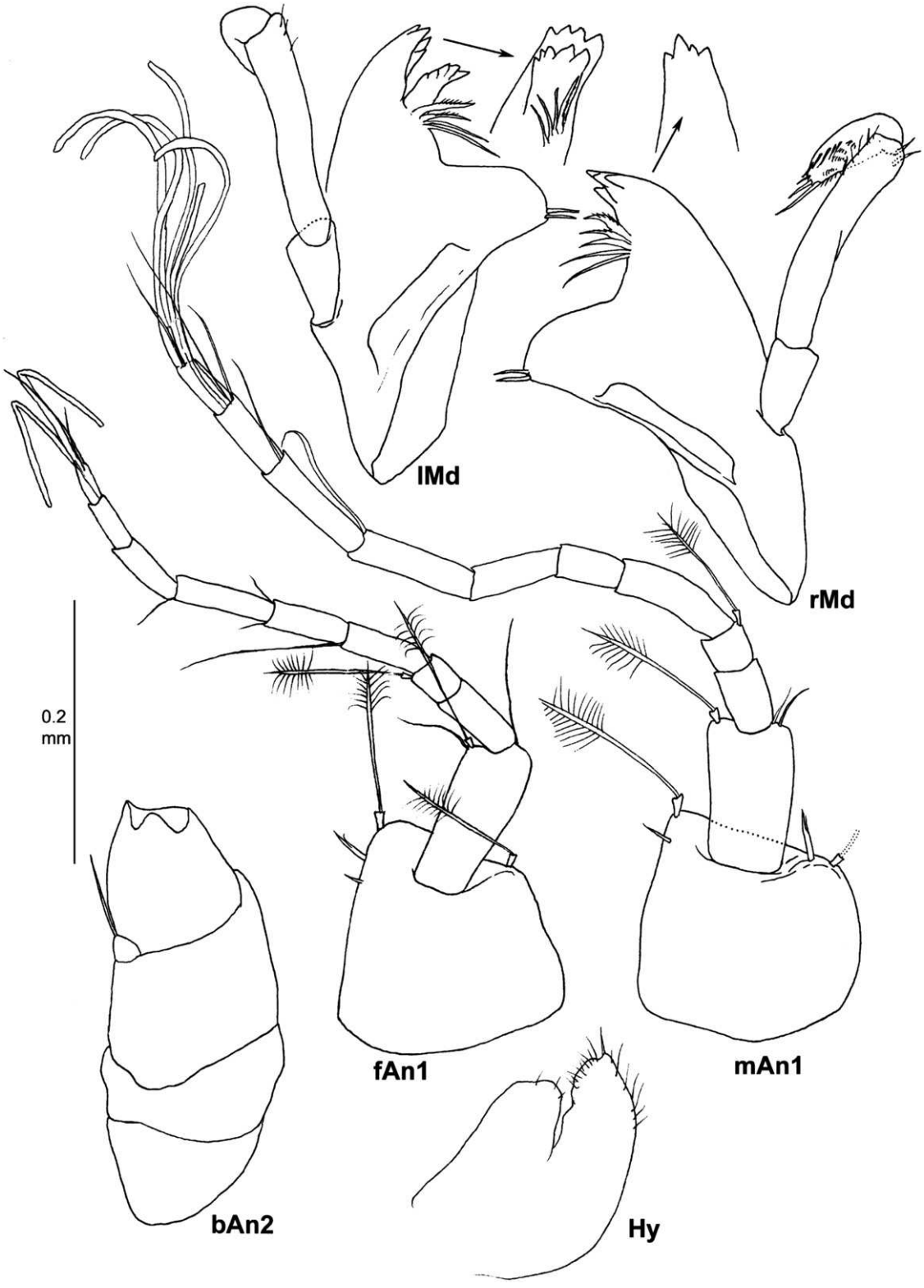

Fig. 3. ***Baeonectes brandtae*** sp. nov. Paratypes (MIMB 27226), male and female: antenna 1, basal articles of antenna 2, mandibles and hypopharynx.

2 shorter distal setae each, long setae with short comb of fine setulae; middle endite shortest.

Maxilliped (Fig. 4) basis length 3.0 width; endite 0.5 of basis length and width, length 2.5 width, with 3 retinaculae; distal margin with 4 fan and numerous simple slender setae; palp as long as basis; article 2 1.1 of basis width, with 1 distomedial whip seta and 3 small simple lateral setae, lateral length 1.8 medial length; article 3 0.85 of article 2 width, medial length 1.3 medial length of article 2, lateral length 0.15 lateral length of article 2; medial margin rounded, denticulate, with 12 long setae, articles 2 and 3 with sparse ventral setae; article 4 laterally twice as long as article 3 and as long as article 5; medial lobe tapering distally, with 6 long distal setae, length 0.6 article 5 length; article 5 with 8 long setae. Epipod straightly truncated distally, length

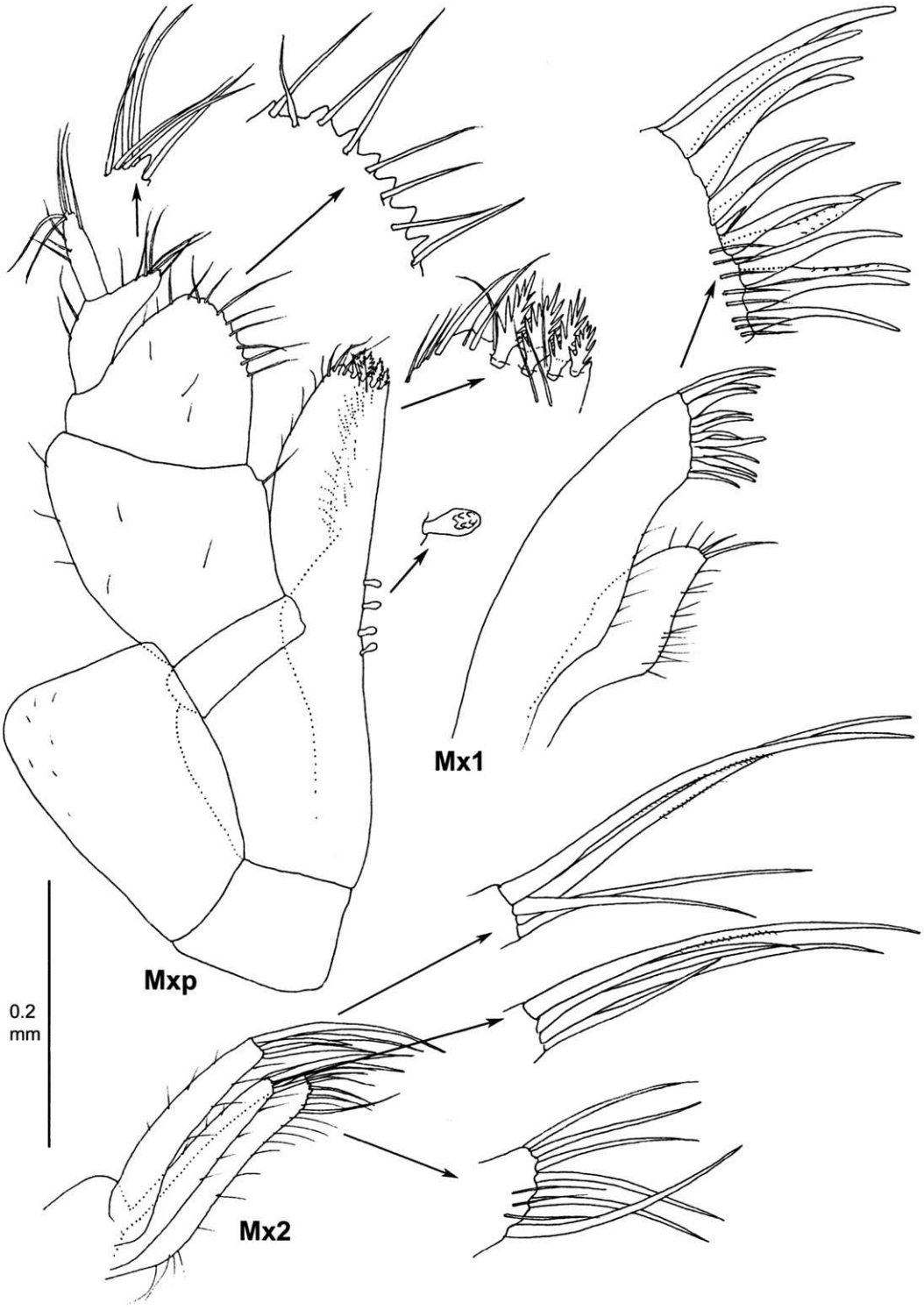

Fig. 4. ***Baeonectes brandtae*** sp. nov. Paratype (MIMB 27226), male: maxilliped and maxillae with enlarged parts.

1.6 width, 0.6 basis length and as wide as basis, with few tiny setae.

Pereopods 1–4 (Fig. 5) becoming longer from 1 to 4, pereopod 1 as long as body; pereopod 4 length 2.1 body length; pereopod 1 narrowest, pereopod 2 broadest. Bases of pereopods 1–4 of similar length, with sparse simple setae and with few dorsal broom setae on pereopods 2–4, basis of pereopod 3 narrower than basis of pereopods 2 and 4, ischii and meri with several simple setae, carpus of pereopods 2–4 with set of 1 broom and 4 long whip setae distodorsally, carpus of pereopod 2 broadest; propodus of pereopods 2–4 with long broom dorsal seta on mid-length. *Pereopod 1* (Fig. 5) length ratios of ischium–dactylus to basis 0.4; 0.35; 1.0; 0.75, and 0.2; ischium with 2 ventral and 2 dorsal setae; merus length 2.4 width, with 6 ventral setae; carpus length 11.7 width, with 2 distodorsal and 12 ventral unequal bifid setae (5 small setae proximally and 7 stronger setae distally); propodus half as wide as carpus, with 3 distoventral setae; dactylus with three small simple dorsal setae near claws.

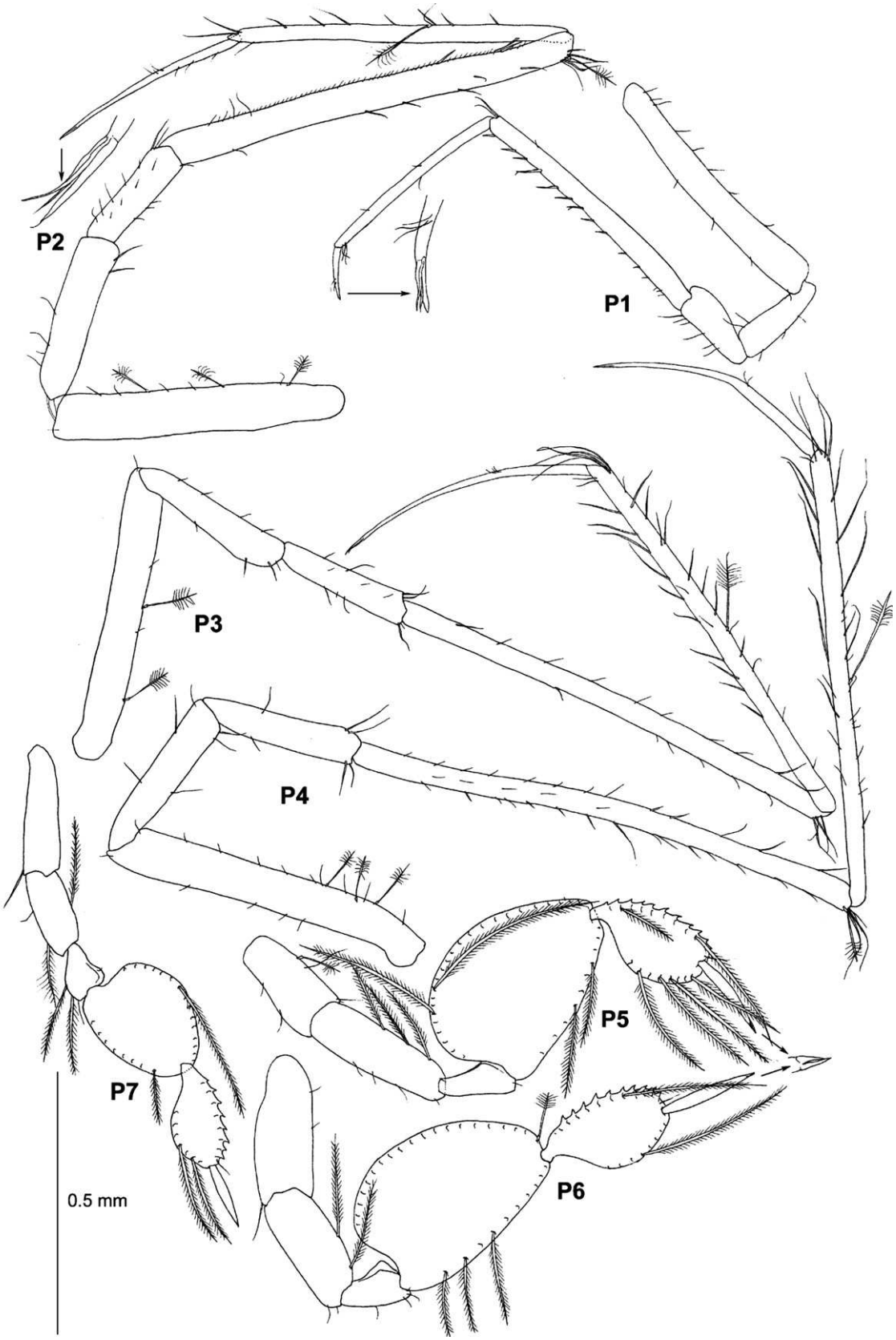

Fig. 5. ***Baeonectes brandtae*** sp. nov. Paratype (MIMB 27226), male: pereopods 1–7.

Pereopod 2 (Fig. 5) length ratios of ischium–dactylus to basis 0.6; 0.4; 1.5; 1.2, and 0.7; ischium with 2 distodorsal and 3 ventral setae; merus length 3.3 width, with 6 ventral and 4 dorsal setae; carpus as wide as merus, length 12.9 width, with 5 dorsal, 1 broom and 5 whip distodorsal setae, ventral margin fringed with setulae, 2 unequal bifid setae and 4 simple setae proximally; propodus with 8 dorsal and 3 distal setae, dactylus slender, length 3.5 of pereopod 1 dactylus.

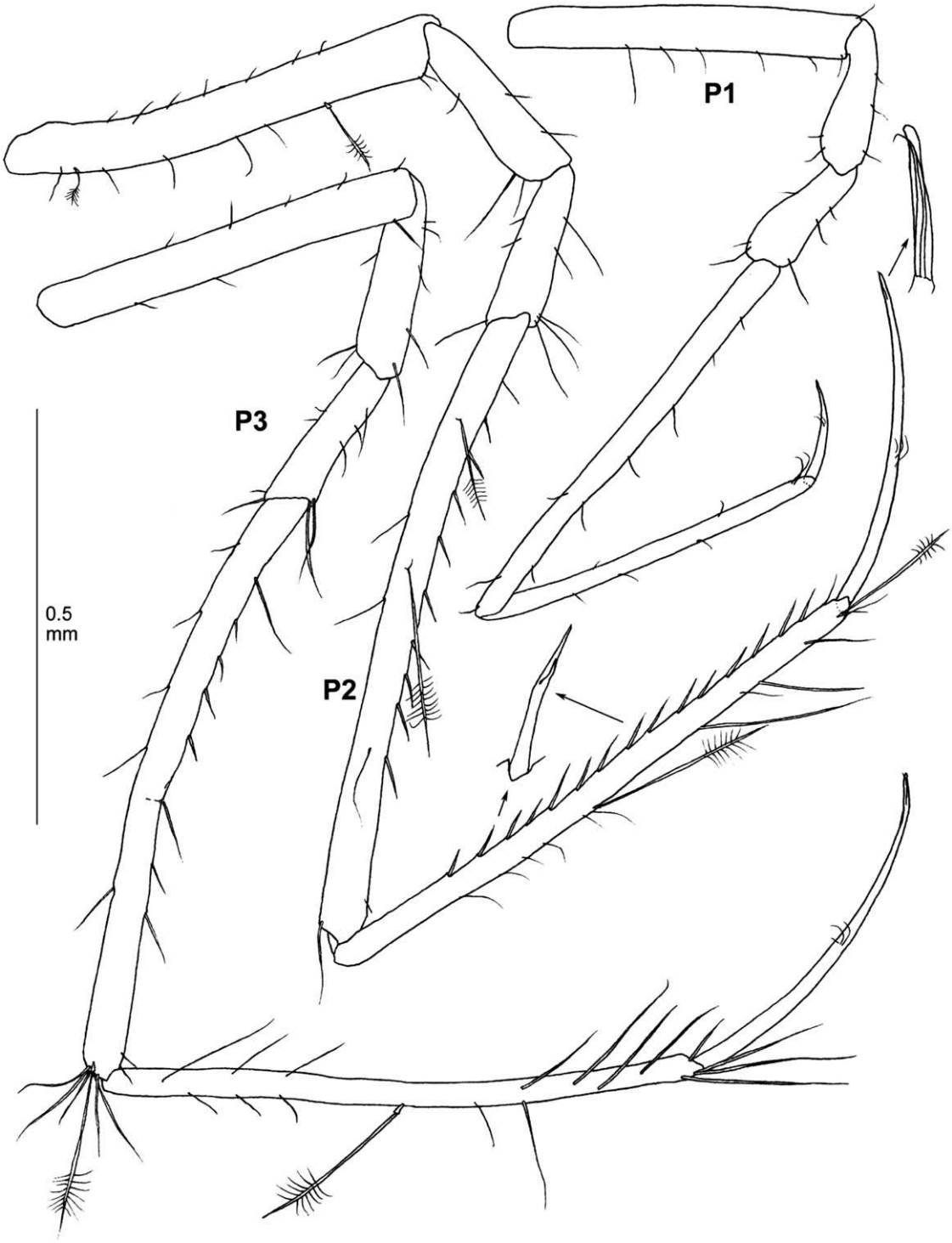

Fig. 6. ***Baeonectes brandtae*** sp. nov. Paratype (MIMB 27227), female: pereopods 1–3.

Pereopod 3 (Fig. 6) length ratios of ischium–dactylus to basis 0.55; 0.45; 1.6; 1.4; and 0.8; basis with two dorsal broom setae; ischium with 2 dorsal and 3 ventral setae; merus length 4.2 width, with 3 ventral and 4 distodorsal setae; carpus length 20.0 width, with 5 dorsal, 1 broom and 4 whip distodorsal setae and 8 simple ventral setae; propodus with 1 long broom dorsal seta on mid-length, proximally with more than 10 short setae and 12 long whip setae on distal half.

Pereopod 4 (Fig. 5) similar to pereopod 3, but slightly longer, length ratios of ischium–dactylus to basis 0.55; 0.5; 1.6; 1.5; and 0.8.

Pereopods 5–7 (Fig. 5) similar in shape, propodi dorsal margin serrated, dactyli shorter than plumose setae of propodi, length about 0.7 propodi length, with 2 minute claws; pereopod 5 length 0.75 pereopod 1 length; pereopod 6 slightly longer than pereopod 5; pereopod 7 length 0.7 pereopod 6 length.

Pereopod 5 (Fig. 5) ischium – dactylus to basis length ratios 1.55; 0.75; 2.0; 1.25 and 0.8; ischium with 3 plumose dorsal setae; carpus length 1.5 width, with 24 dorsal and 10 ventral plumose setae; propodus length 1.8 width with 10 dorsal and 8 ventral plumose setae; dactylus 0.3 as long as dactylus of pereopod 4.

Pereopod 6 (Fig. 5) ischium–dactylus to basis length ratios 0.85; 0.5; 1.4, 0.9; and 0.65; carpus length 1.5 width, with 20 dorsal and 10 ventral plumose setae; propodus length 1.8 width, with 10 dorsal and 8 ventral plumose setae.

Pereopod 7 (Fig. 5) ischium–dactylus to basis length ratios 0.7; 0.4; 0.95; 0.8, and 0.5; ischium with 1 plumose dorsal seta and 2 simple ventral setae; merus with 2 plumose ventral setae; carpus 1.3 times as long as wide, with 15 dorsal and 8 plumose ventral setae; propodus length 2.1 width, with 8 dorsal and 7 ventral plumose setae.

Pleopod 1 (Fig. 8) significantly bent ventrally, length 2.7 basal width and 5.1 distal width; ventral surface with simple setae; distomedial lobes rounded, each with 5 distal and 6 smaller subdistal setae; distolateral lobes slender acute and curved in rounded hooks in same level as medial lobes.

Pleopods 2 (Fig. 8) protopod length 1.8 width; lateral projection and distoventral surface with small setae; stylet 0.6 of protopod length; sperm duct opening at midline; distal part needle-shaped; exopod distal width 0.5 endopod basal article width.

Pleopod 3 (Fig. 8) endopod length 1.7 width; distal plumose setae arising from medial half of distal margin, length 0.4 endopod length; exopod not reaching distal margin of endopod, 0.3 of endopod width, with slender lateral setae; distal article length 0.25 basal article length; distal plumose seta as long as endopod distal setae.

Pleopod 4 (Fig. 8) endopod length 1.4 width; exopod as long as endopod, distal plumose seta as long as pleopod 3 plumose setae.

Pleopod 5 (Fig. 8) endopod length 1.7 width.

Uropod (Fig. 1) length 3 pleotelson length. Protopod as long as wide, with 2 distal unequal bifid setae; endopod 0.4 width and 2.1 length of protopod, with 5 broom, 4 unequal bifid and 4 whip distal setae; exopod 0.5 length and width of endopod, with 5 distal setae.

Female: Proportions of habitus and body parts of females and juveniles (Figs. 1 and 2) are similar to those of males, brooding females with broader ambulosome.

Antenna 1 (Fig. 3) 0.35 of body length, article 1 as long as wide, not surpassing rostrum anterior margin, have 2 broom and 2 small unequal bifid setae distally; following articles more slender than in male, last article with 2 aesthetascs equal in length to last 3 articles together.

Antenna 2 (Fig. 2) length 2.4 body length. Peduncle articles 1–4 as in males, article 1 triangular in dorsal view; lateral margin of article 2 shorter than article 1; article 3 noticeably longer than article 2; scale on article 3 small, with long distal seta; article 4 slightly shorter than article 3, article 5 length 1.8 length of articles 1–4 together, article 6 1.5 of article 5 length. Flagellum length 2.5 of peduncle length, of about 40 articles.

Pereopods 1–4 (Figs. 6 and 7) of females shorter than those of males, length difference between pereopod 1 and pereopod 4 less than in male—1.7, pereopod 3 shorter than pereopod 2, with smaller basis than that in pereopods 2 and 4. Carpus of pereopod 2 same width as in pereopods 3 and 4, whereas in male carpus twice as broad. In comparison with male, pereopod 2 carpus and especially propodus having more numerous setal armament: many stout sensory ventral setae and long broom setae. *Pereopods 5–6* (Fig. 7) equal to those in male.

Pleopod 2 of female (Fig. 2) length 0.9 width, height 0.5 length, ventral keel high, rounded; distal 1/3 of length narrowing, bent dorsally, ventral surface and distal margin covered with small simple setae.

Remarks: *Baeonectes brandtae* sp. nov. differs from other known species of the genus by the longer pereopods 1–4 and the larger difference between pereopod 1 and pereopod 4. Thus, in males of the new species pereopod 1 is as long as the body, pereopods 3–4 are twice as long as the body, whereas for *B. improvises* it is 0.9 and 1.4 times as long respectively, for *B. ochotensis* 0.8 and 1.2, for *B. pavlenkoi* it is known that "pereopods 2–4 are not too long" (Kussakin, 2003: p. 50). *B. brandtae* sp. nov. has carpi of pereopods 2–4 of a length of about 1.5 of the corresponding bases, in contrast to the other mentioned species with the basis of pereopod 3 being subequal or slightly shorter (in *B. improvises*, *B. muticus*, *B. pygmaea*, and *B. ochotensis*) or even longer than the carpus, as in *B. pavlenkoi. B. brandtae* sp. nov. has article 3 of antenna 1 1.5 times as long as article 4, in *B. ochotensis* this ratio is more than twice, whereas in *B. muticus*, *B. pygmaea*, and *B. improvises* the articles 3 and 4 are similar in length. *B. brandtae* sp. nov. has a more elongated body than in the most species except *B. ochotensis*. The uropod of *B. brandtae* sp. nov. is more slender than that in other species, only *B. ochotensis* has uropods even longer and more slender than in *B. brandtae*: 0.4 of the pleotelson length, and the endopod length is 2.5 times the protopod length in contrast to 0.3 and 2.1 respectively in *B. brandtae* sp. nov. The new species has the distolateral lobes of male pleopod 1 more acute than in other species and curved into rounded hooks. By such characters as the serrated dorsal margin of the propodus of pereopods 5–7, the proportions of maxilliped palp articles 2 and 3 (article 3 is smaller than article 2), *B. brandtae* sp. nov. is more similar to *B. muticus*, *B. pygmaea* and *B. improvisus* than to the geographically closer species *B. pavlenkoi*, *B. ochotensis* and *B. abberantis*, possessing a smooth dorsal margin and a maxilliped palp article 3 equal in size to article 2. But the new species' epipod of the maxilliped is more slender than in *B. muticus*, *B. pygmaea* and *B. improvisus*.

Distribution: The species is known only from the type locality in the northwest of the Sea of Japan at 455–1525 m depth.

Eurycope G.O. Sars, 1864

Synonymy see: Kussakin (2003: p. 21).

Type species: Eurycope cornuta Sars, 1864, by original designation.

Eurycope spinifrons Gurjanova, 1933

Gurjanova, 1933: 85, Fig 11a, 12a–д; 1936: 62, Fig. 26; Wilson and Hessler, 1981: 404; Kussakin, 2003: 92, Fig. 65; Golovan and Malyutina, 2010: 120, Tabl. L.

Material examined: SoJaBio C-EBS stations: B4–7, 21.08.2010, 3298–3353 m, 43°01N 135°26E—2757 specimens (2–5.5 mm), copulatory male (5.3 mm) and preparatory female (5.5 mm) with oostegites in early stages are used for dissection; A2–10, 14.08.2010, 455–465 m, 44°56N 137°11E—18 specimens; A3–11, 14–15.8.2010, 1494–1525 m, 44°47N 137°15E—29 specimens; A6–7, 14.08.2010, 2511–2534 m, 44°00N 137°31E—66 specimens; A6–8, 14.08.2010, 2545–2555 m, 44°18N 137°24E—399 specimens; A7–8, 17.08.2010, 3345–3357 m, 44°00N 137°29E—2234 specimens; St. A7–9, 18.08.2010, 3340–3347 m, 44°00N 137°31E—829 specimens; B1–7, 19.08.2010, 3345–3357 m, 42°15N 136°43E—1903 specimens; St. B4–8, 21–22.8.2010, 3312–3334 m, 43°01N 135°28E—2789 specimens; B5–7, 23.08.2010, 2661–2688 m, 43°01N 135°05E—202 specimens; St. B5–8, 23.08.2010, 2609–2655 m, 43°01N 135°06E—881 specimens; B6–7, 25.08.2010, 1001–1011 m, 43°10N 135°01E—10 specimens; B7–6, 25.08.2010, 517–521 m, 43°13N 135°04E—1 specimen; B7–7, 25.08.2010, 470–528 m, 43°13N 135°04E—57 specimens; C1–8, 27.08.2010, 2670–2681 m, 42°26N 133°09E—1061 specimens; C1–9, 27.08.2010, 2693–2725 m, 42°26N 133°08E—725 specimens; C3–3, 28.08.2010, 3431–3435 m, 42°01N 133°09E—3021 specimens; C3–4, 28.08.2010, 3427–3431 m, 42°01N 133°09E—1754 specimens; D1–3, 30.08.2010, 3355–3357 m, 41°28N 131°46E—1034 specimens; D1–4, 30.08.2010, 3356 m, 41°28N 131°46E—4 specimens; D2–7, 01.09.2010, 2619–2637 m, 42°07N 131°21E—1230 specimens; D2–8, 01.09.2010, 2653–2683 m, 42°06N 131°21E—102 specimens.

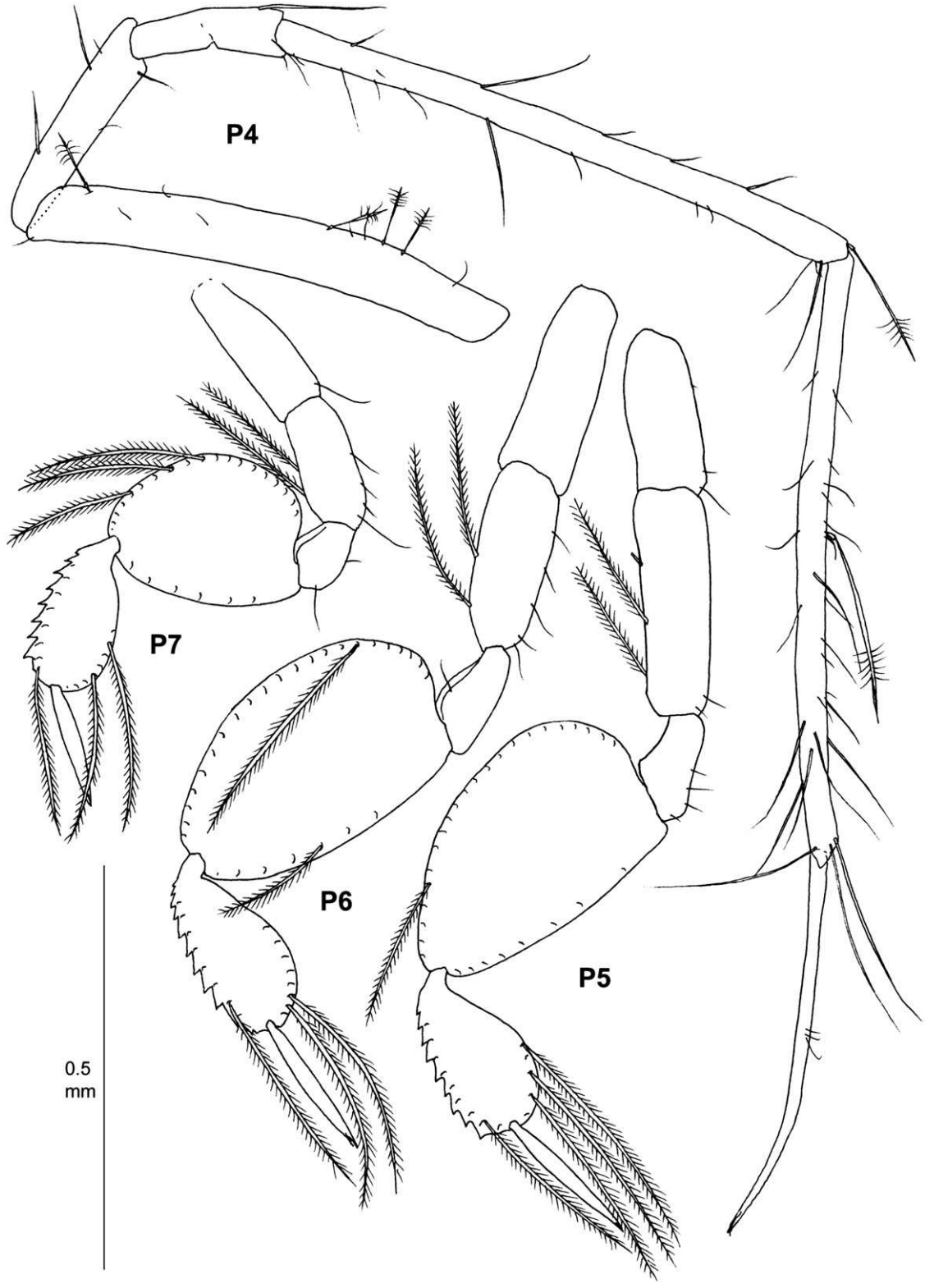

Fig. 7. ***Baeonectes brandtae*** sp. nov. Paratype (MIMB 27227), female: pereopods 4–7.

Diagnosis: Pleotelson lateral margins bent ventrally, forming angles in dorsal view. Rostrum broad, slightly narrowing distally, not overhanging frons, anteriorly with 2 stout setae on each side, mid-length width 0.8 antenna 1 article 1 width. Distomedial lobe of antenna 1 article 1 shorter than article 2, extending slightly beyond tip of rostrum. Antenna 1 article 3 as long as or longer than article 2. Epipod of maxilliped narrow without pronounced lateral extension. Male pleopod 1 distomedial lobes rounded, projected, length 0.1 pleopod 1 length; distolateral lobes almost not expressed, as wide as distomedial lobes. Protopod of male pleopod 2 with distomedial excavation from which exopod emerging, stylet 0.6 of protopod length. Endopod of uropod slightly longer than protopod, exopod 0.6 of endopod length.

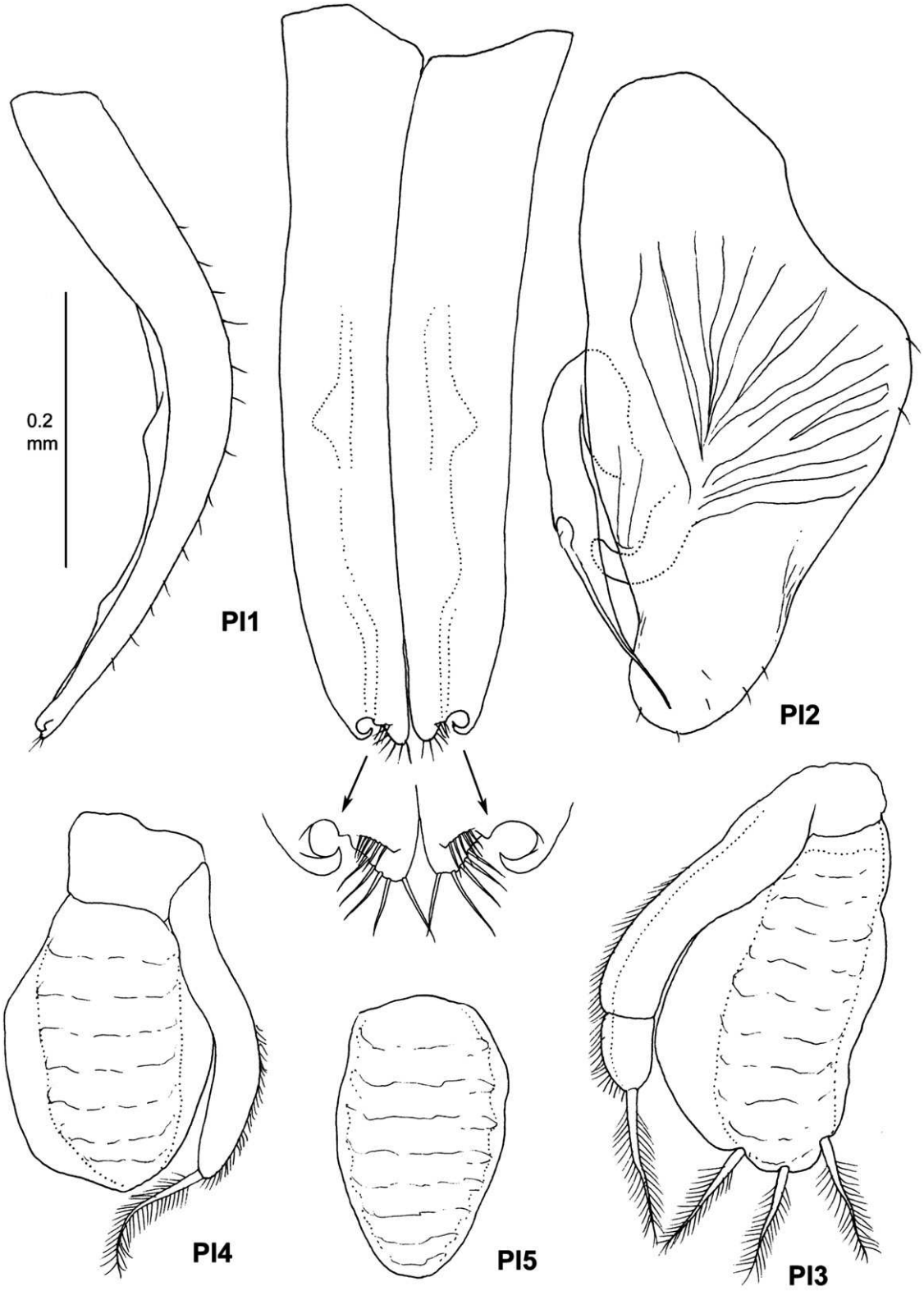

Fig. 8. ***Baeonectes brandtae*** sp. nov. Paratype (MIMB 27226), male: pleopods.

Description: *Male*: Body (Fig. 9) length 2.3–2.7 pereonite 5 width; height at pereonites 6–7 0.2 length, dorsal surface with sparse fine setae. *Cephalon* width about 2.7 length, length 0.1 body length. Rostrum broad, slightly narrowing distally, not overhanging frons, anteriorly with 2 stout unequally bifid setae on each side, length 0.7 medial cephalic length, anterior width 0.15 cephalic width, width at base of antennae 1 0.35 cephalic width. Cephalic keels well developed. Frons (Fig. 9D and E) subvertical, height equal to mouth-field depth, cephalic length behind antennae about 0.2 cephalic width; lateral spine blunt, triangular, 0.4 frons height.

Pereonite 1 length 0.2 width, and 1.1 cephalon length behind antennae; pereonites 2–7 to pereonite 1 length ratios: 0.9; 0.8; 0.7; 1.5; 1.7; 2.7; length–width ratios: 0.2, 0.1; 0.1; 0.2; 0.3; 0.4.

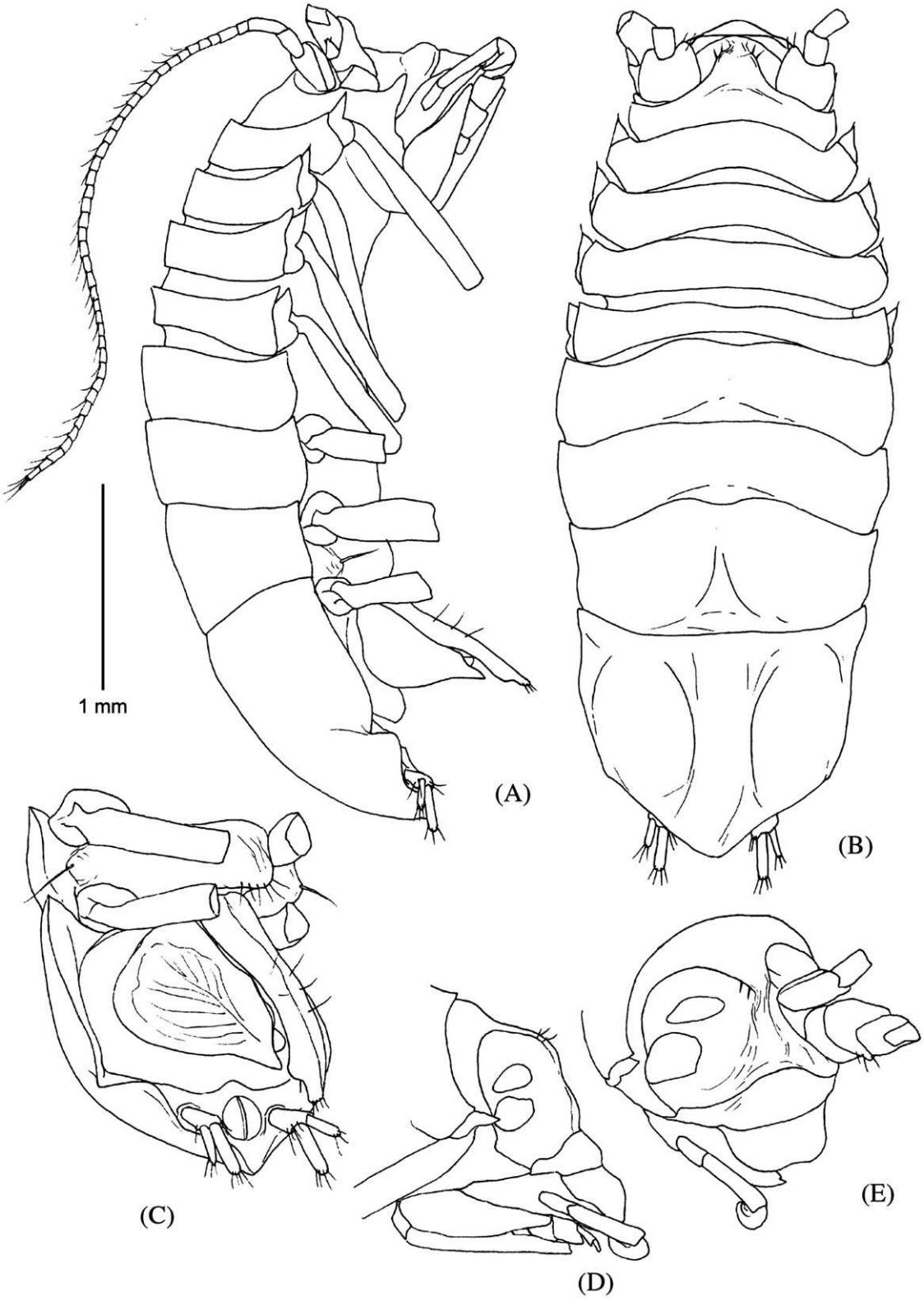

Fig. 9. ***Eurycope spinifrons*** Gurjanova, 1933. Copulatory male: (A) lateral view, (B) dorsal view. (C) Pleotelson and pereonite 7, ventral oblique view. (D) Cephalon, without antennae, lateral view. (E) Cephalon, frontal oblique view.

Lateral margins of pereonites 1–6 convex, of pereonite 7 slightly concave. Coxae 1–4 similar in size and shape, in lateral view length subequal to pereonites lateral length, anterior processes in dorsal view triangular, near half of corresponding pereonites length, ending with small unequally bifid seta. *Natasome* 0.6 body length, ventral surface with cuticular ridges, medioventral area convex, pereonite 7 posterior margin overhanging base of pleotelson, with few setae, anteriorly of pereopods coxa with bulla, bearing long seta (Fig. 10C). *Pleotelson* length 0.3 body length, width subequal length, lateral margins in mid-length bent ventrally into fold looking like angular protrusions in dorsal view.

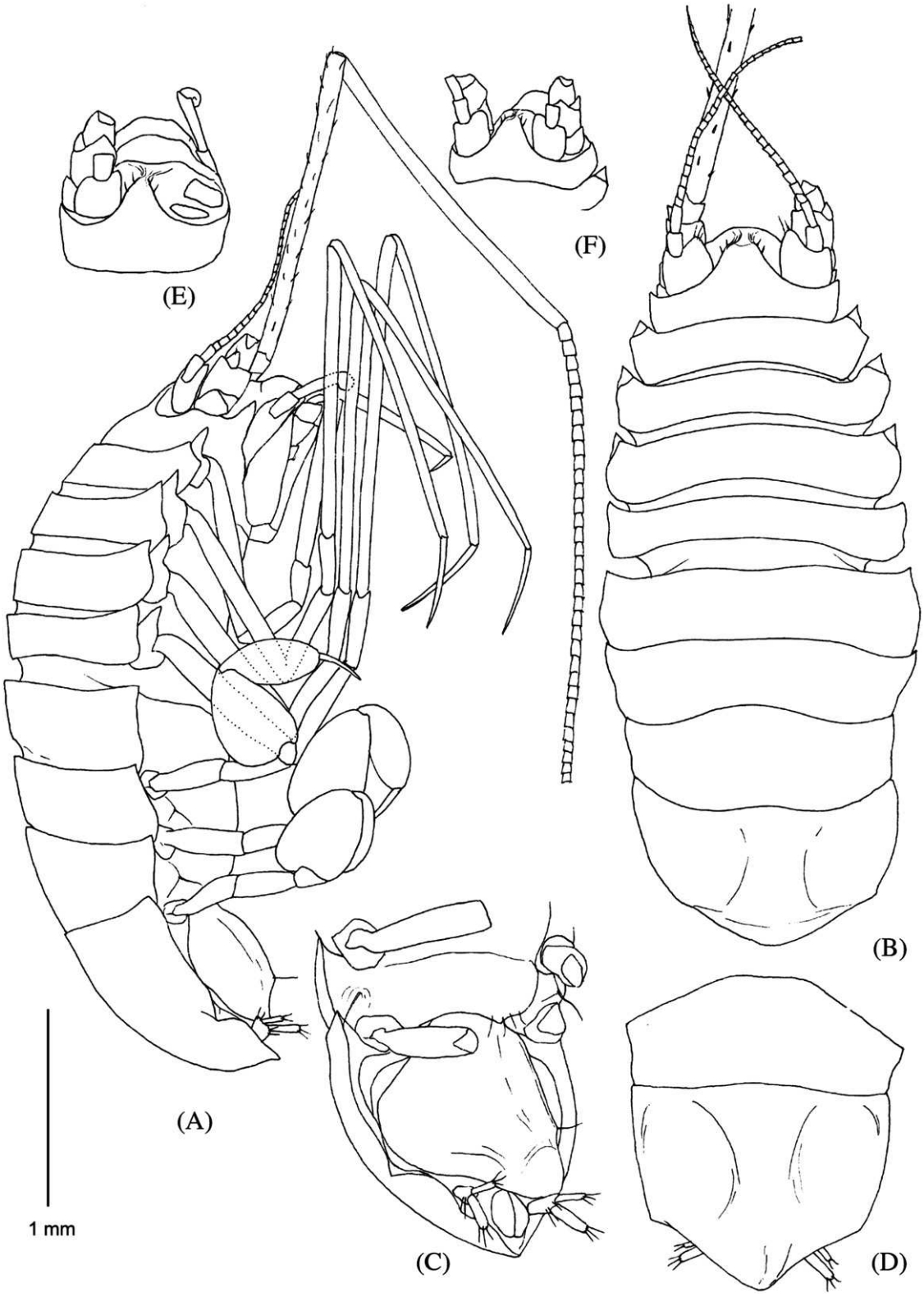

Fig. 10. ***Eurycope spinifrons*** Gurjanova, 1933. Preparatory female: (A) lateral view, (B) dorsal view. (C) Pleotelson and pleonite 7, ventral oblique view. (D) Pleotelson and pereonite 7, dorsal view. (E, F) Cephalon of females of different sizes, dorsal view.

Antenna 1 (Figs. 9 and 11) 0.7 body length, article 1 length subequal to width, slightly extending beyond tip of rostrum, with 2 medial and 1 lateral unequally bifid setae distally, distomedial projection weakly developed, not reaching distal margin of article 2; length–width ratios of articles 2–5: 1.5, 2.3, 0.7, 2.6; length ratios of articles 2–5 to article 1: 0.7, 0.5, 0.15, 0.4; article 2 with 7 unequally bifid setae and 2 broom setae distally; article 3 with 1 distal broom seta; article 4 with 2 broom setae, flagellum of more than 30 articles (distal articles broken off), articles 7–30 with aesthetascs.

Antenna 2 (Fig. 11) articles 1–6 length–width ratios: 0.6, 0.5, 1.5, 1.4, 16.7, 23.0; length ratios of articles 2–6 to article 1: 0.7,

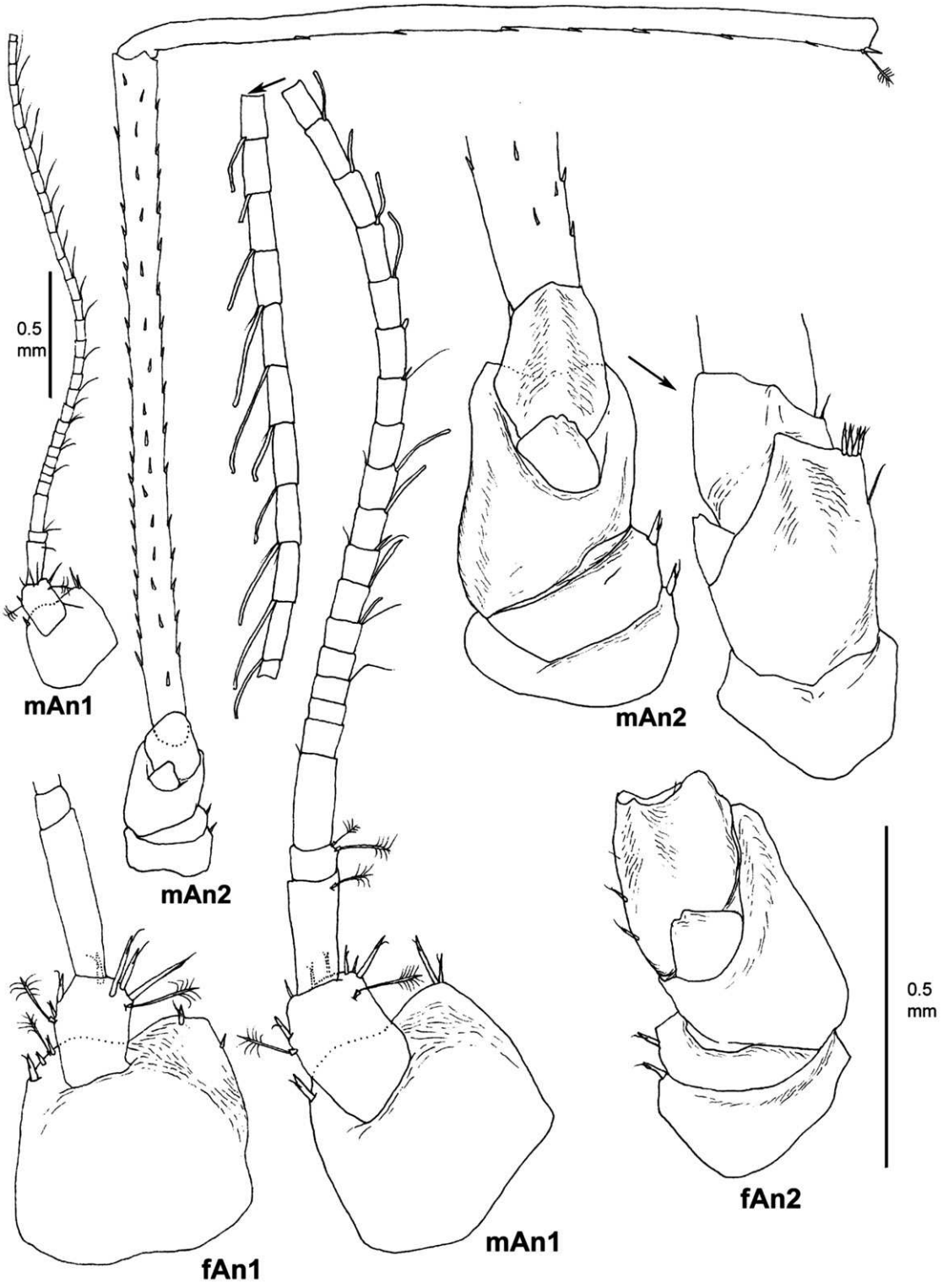

Fig. 11. ***Eurycope spinifrons*** Gurjanova, 1933. Copulatory male and preparatory female: antenna 1 and antenna 2.

2.2, 1.4, 15.0, 16.1; articles 1 and 2 with 1 distodorsal unequally bifid seta, article 3 with 4 distomedial unequally bifid setae and 1 medial simple seta, squama length 0.7 width and 0.4 article 3 length, article 4 with 1 distomedial simple seta, articles 5 and 6 with small unequally bifid setae more numerous on article 5.

Mandibles (Fig. 12) incisor with 4 cusps, on right mandible cusps 2 and 3 with one additional tip each; *lacinia mobilis* of left mandible stout, with 7 denticles; spine row with 7 spines on left and 8 spines on right mandible; molar triturative surface oval, concave, posterior margin with 5 setae. Palp length 1.1 mandibular body length, article 1 with distolateral seta; article 2 1.9 of article 1 length, with about 9 long medial setae and 2 stout distal setae; article 3 1.3 article 1 length, with about 20 marginal cleaning setae.

Maxilla 1 (Fig. 13) both endites with lateral fine simple setae, lateral endite with 12 distal robust serrated setae and simple slender setae on distomedial half; mesial endite 0.6 of lateral

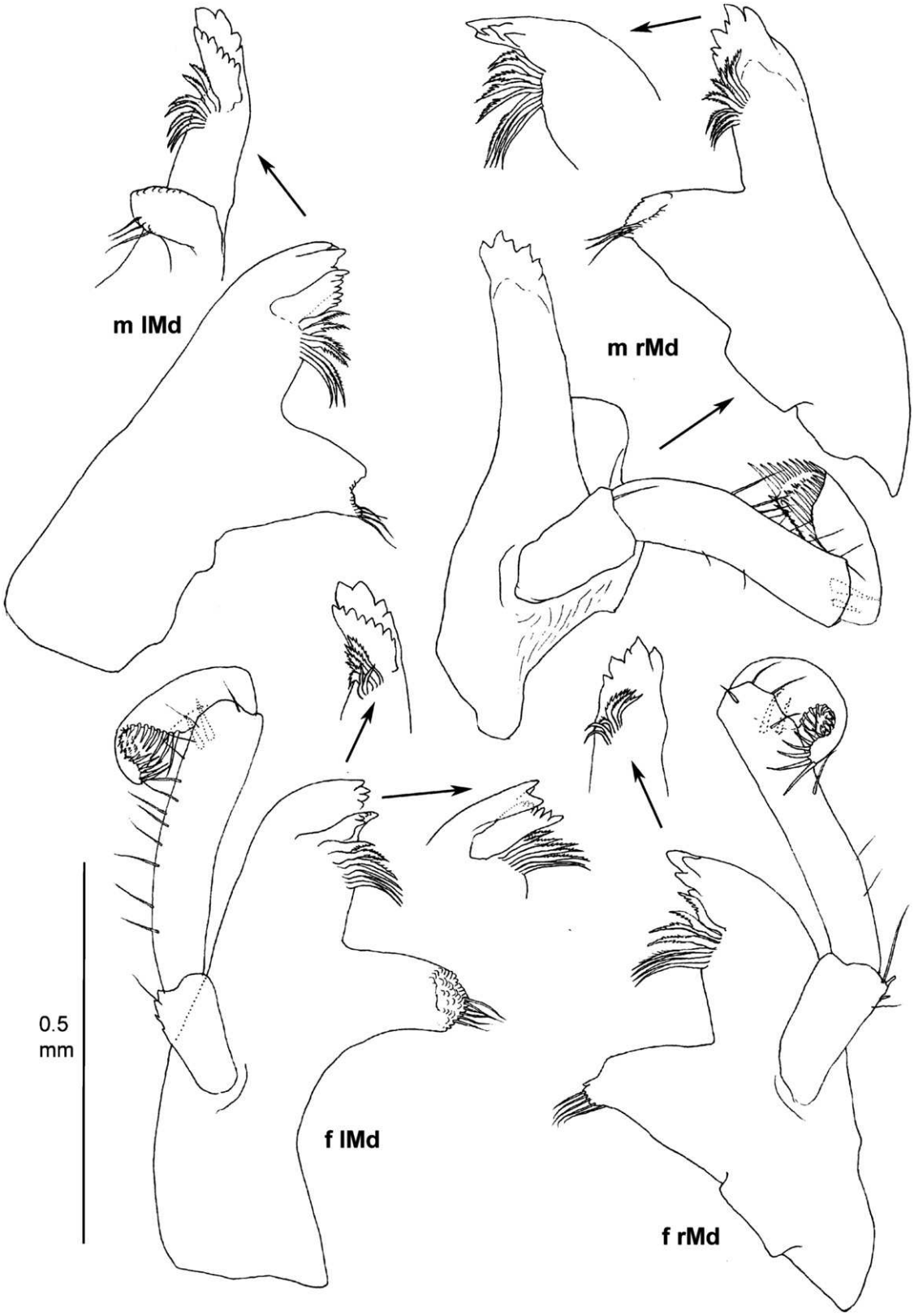

Fig. 12. ***Eurycope spinifrons*** Gurjanova, 1933. Copulatory male and preparatory female: mandibles.

endite width, distal margin angled, with numerous fine simple setae and 1 long stout setulated seta.

Maxilla 2 (Fig. 13) lateral endite longest, with 2 long and 2 twice shorter setulated distal setae; middle endite shortest, with 2 long and 1 short setulated setae and slender medial seta. Mesial endite width 1.6 lateral lobe width, distal margin with 3 setulated setae and numerous fine simple setae. All endites with fine simple marginal setae.

Maxilliped (Fig. 13) basis length 2.4 width, with distolateral projection near palp insertion, endite length 2 width and 0.45

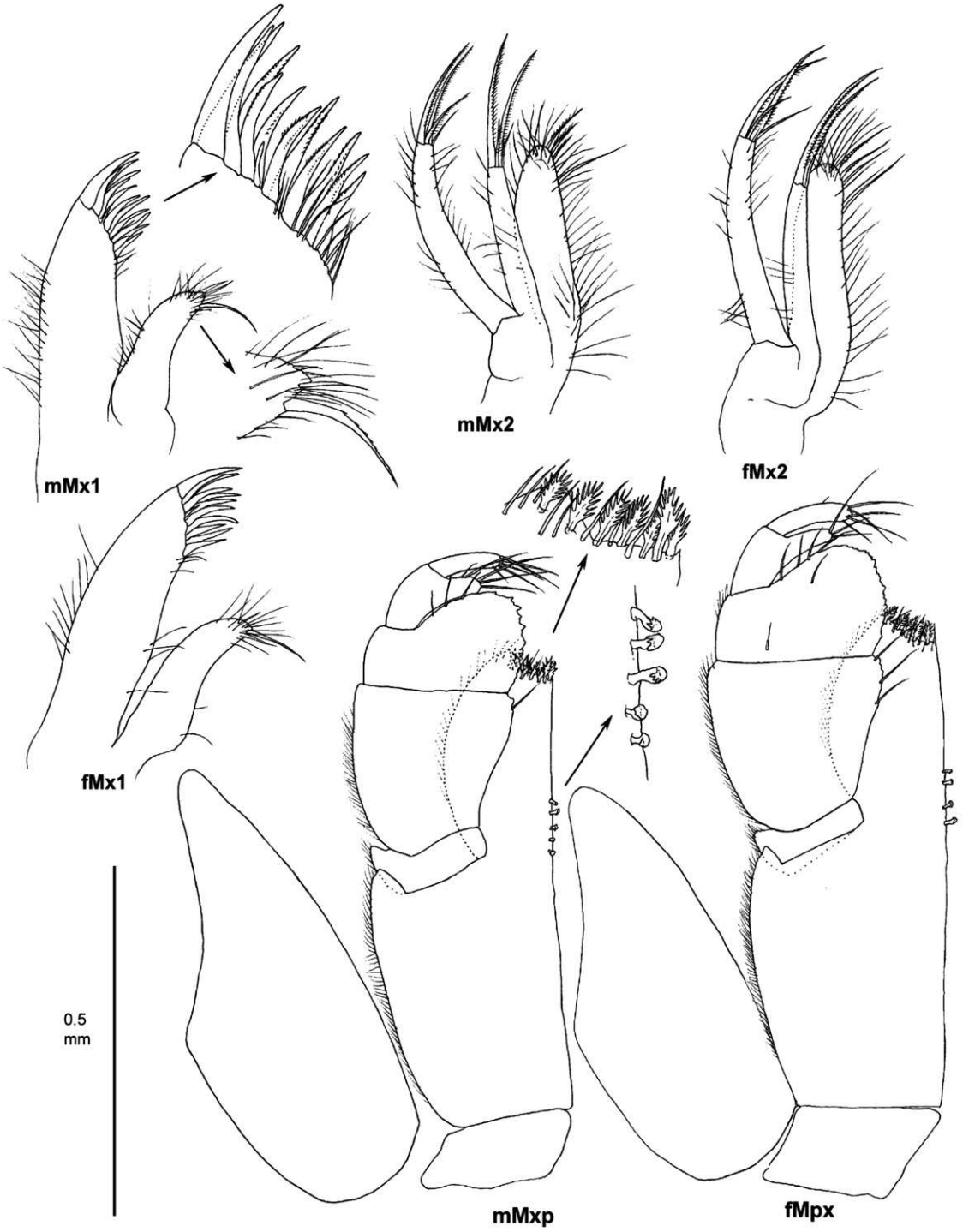

Fig. 13. ***Eurycope spinifrons*** Gurjanova, 1933. Copulatory male and preparatory female: maxillae and maxilliped.

basis length, extending 1/3 of palp article 3 medial length, with 5 retinaculae, distal margin with 7 fan setae and some simple slender setae, lateral margin with fine simple setae. Palp 0.8 of basis length and width, articles 1–5 lateral length–width ratios: 0.5, 1.1, 0.4, 1.6, 3.8; article 1 lateral length 1.7 medial length; article 2 width 1.5 endite width, lateral length 1.2 medial length, with 1 distomedial simple seta; article 3 as wide as article 2, lateral length 0.6 medial length and 0.35 article 2 lateral length, medial margin rounded, serrated, distally with 3 simple setae; article 4 slightly longer than article 3 laterally, medial lobe length 0.5 lateral margin length, with 5 long simple distal setae, article 5 subequal to article 4 in lateral length, with 4 simple distal setae; lateral margin of basis and palp articles 1–3 fringed with fine simple setae. Epipod subequal to basis in length and width, distal angle narrow, rounded, lateral margin weakly angular in mid-length.

Pereopod 1 (Fig. 14) basis to dactylus length–width ratios: 7.8; 4.6; 3.4; 9.6; 12.2; 5.6; length ratios of ischium–dactylus to basis: 0.5; 0.4; 1.1; 0.8; 0.2; basis with some small simple dorsal and unequally bifid ventral setae; ischium with 3 small proximal unequally bifid setae and few distal simple setae on ventral margin; merus and carpus with numerous long simple setae on ventral margin and 1–2 distodorsal setae; propodus with numerous simple

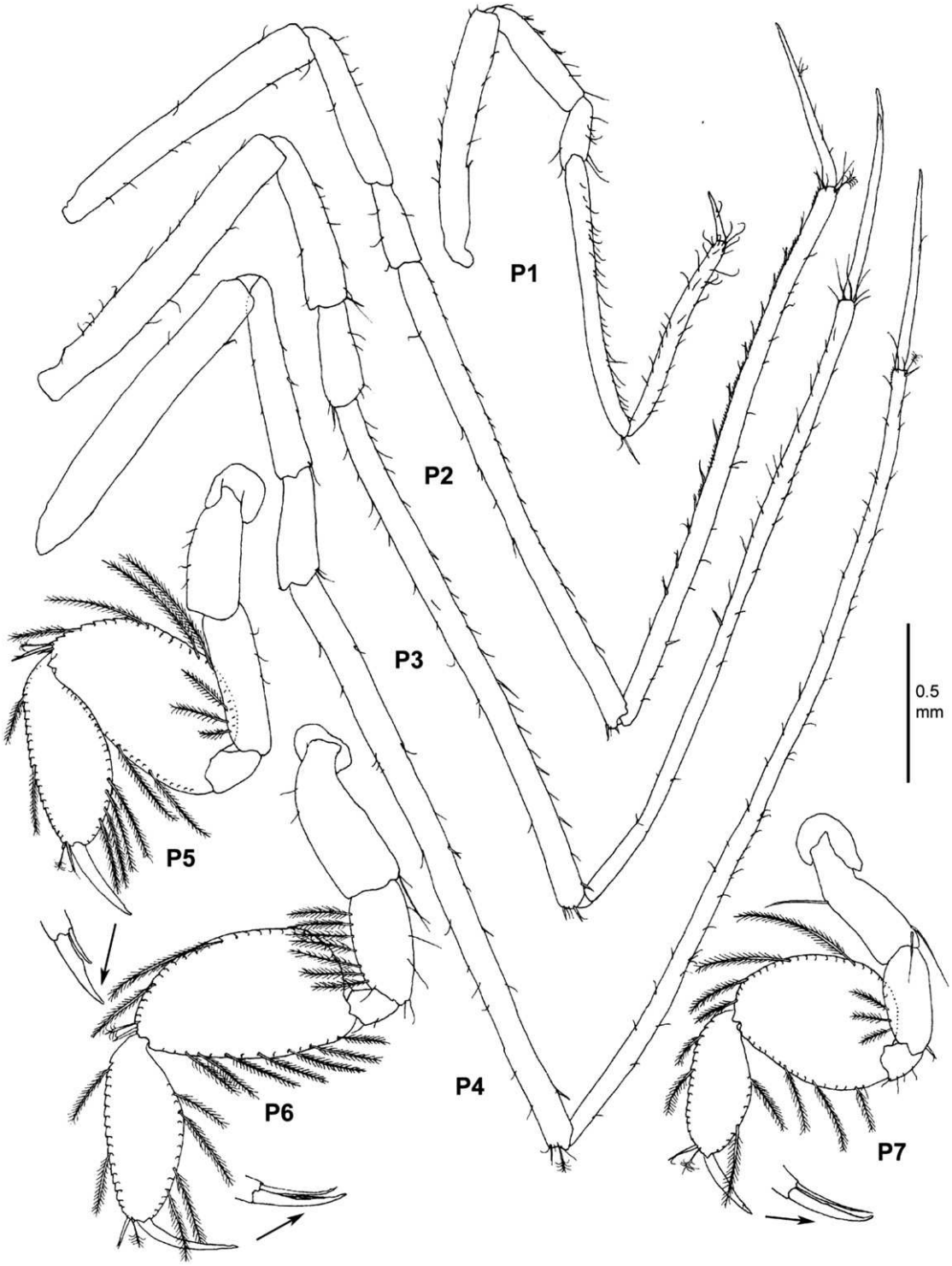

Fig. 14. ***Eurycope spinifrons*** Gurjanova, 1933. Copulatory male: pereopods 1–7.

setae, longest in distal part of article; dactylus with 4 fine simple seta, claws 0.3 dactylus length, ventral claw slightly longer than dorsal, 1 seta inserting between claws.

Pereopod 2 (Fig. 14) basis to dactylus length–width ratios: 6.3; 5.3; 2.5; 15.9; 20.0; 17.5; length ratios of ischium–dactylus to basis length: 0.6; 0.3; 1.8; 1.4; 0.6; dorsal margin of all articles with sparse fine setae; ventral margin of ischium and carpus with small unequally bifid setae, ventral unequally bifid setae of propodus longer with fringe of dense setulae in between; carpus and propodus with distodorsal set of 1 broom, few simple and unequally bifid setae; dactylus with 4 fine simple setae, claws 0.1 of dactylus length.

Pereopod 3 (Fig. 14) basis to dactylus length–width ratios: 7.0; 4.4; 2.4; 19.4; 38.5; 19.7; length ratios of ischium–dactylus to basis: 0.5; 0.3; 1.7; 2.0; 0.6; basis to propodus dorsal margins and merus ventral margin with sparse simple setae, basis ventral margin with sparse small unequally bifid setae, ischium, carpus and propodus ventral margins with more long and slender unequally bifid setae; carpus and propodus with a distodorsal set of 1 broom, few simple and unequally bifid setae.

Pereopod 4 (Fig. 14) basis to dactylus length–width ratios: 7.8; 5.4; 2.8; 17.9; 41.7; 24.0; length ratios of ischium–dactylus to basis: 0.6; 0.3; 1.9; 2.6; 0.6; ischium–dactylus ventral margins with sparse small unequally bifid setae, longest in propodus, carpus and propodus dorsal margin with fine simple setae, with distal set of 1 broom and few simple and unequally bifid setae; dactylus with 4 fine simple setae.

Pereopod 5 (Fig. 14) basis to dactylus length–width ratios: 2.5; 3.1; 1.7; 1.7; 2.5; 7.9; length ratios of ischium–dactylus to basis: 1.2; 0.4; 1.6; 1.4; 0.7; basis dorsally and ischium ventrally with few simple setae, ischium dorsal margin with row of 6 plumose setae; merus with 1 dorsal plumose seta; carpus with 24 dorsal and about 13 ventral submarginal plumose setae, distodorsal angle with 1 broom seta, 2 short and 1 long unequally bifid setae; propodus with about 21 dorsal and 17 ventral submarginal plumose setae, 2 distodorsal and 1 short distoventral unequally bifid setae; dactylus with 1 simple dorsal seta, claw 0.1 dactylus length, acute.

Pereopod 6 (Fig. 14) basis to dactylus length–width ratios: 2.5; 3.6; 0.3; 2.7; 17.8; 10.3; length ratios of ischium–dactylus to basis: 0.8; 0.3; 1.4; 1.2; 0.7; basis with few fine setae, 1 distodorsal broom seta and 1 distoventral long unequally bifid seta; ischium dorsal margin with row of 9 plumose setae, ventral margin with 6 long unequally bifid setae; carpus with 28 dorsal and 14 ventral submarginal plumose setae, distodorsally 1 broom and 4 unequally bifid setae; propodus with 2 proximodorsal, 1 stout distodorsal and1 distoventral unequally bifid setae, 1 distodorsal broom seta, 18 dorsal and 14 ventral submarginal plumose setae; dactylus with 1 simple dorsal seta, claw 0.1 dactylus length.

Pereopod 7 (Fig. 14) basis to dactylus length–width ratios: 2.9; 2.3; 1.3; 1.2; 2.4; 7.0; length ratios of ischium–dactylus to basis: 0.7; 0.3; 1.1; 1.0; 0.5; basis with 1 long proximodorsal seta and 2 unequally bifid distoventral setae; ischium dorsal margin with row of 8 plumose setae, 1 distoventral unequally bifid setae; merus with 2 ventral unequally bifid and few simple setae; carpus with about 25 dorsal and 12 ventral submarginal plumose setae; propodus with 15 dorsal and 10 ventral submarginal plumose setae, 1 stout distodorsal and 1 distoventral unequally bifid setae, 1 distodorsal broom seta; claw 0.2 dactylus length.

Pleopod 1 (Fig. 17) length 2.9 proximal width and 3.9 "waist" width; ventral surface with 2 rows of 4 plumose setae on mid-length of each side; dorsal keels with fine simple setae on distal half; distomedial lobes rounded, projected posteriorly, length 4.1 width and 0.1 pleopod 1 length, with row of 14 fine simple subdistal setae on each lobe; distolateral lobes almost not expressed as wide as distomedial lobes, covex distally with lateral angle acute, ventral surface with tiny subdistal setae.

Pleopod 2 (Fig. 17) protopod length 1.5 width, with 4 submarginal setae on lateral projection and 3 distal setae, distomedial margin truncated concavely, exopod emerging from this distomedial excavation, stylet as wide as endopod basal article, length 7.5 width and 0.7 protopod length, sperm duct opening at mid-length of stylet; exopod proximal part 1.6 as wide as endopod basal article, distal part 0.6 as long and 0.5 as wide as proximal part, hook with tuft of fine setae.

Pleopods 3–5 (Fig. 17) endopod cupped, with convex lateral margin.

Pleopod 3 (Fig. 17) endopod length 1.2 width, 3 distal plumose setae about 0.3 length of pleopod 3; exopod lateral margin with fine setae, basal article length 2.4 width, equal to endopod length, distal article 0.35 length and 0.25 width of basal article, with slender simple distal seta.

Pleopod 4 (Fig. 17) endopod length 1.4 width; exopod length 2.2 width and 1.3 endopod length, width 0.8 endopod width, lateral and distal margins with fine setae, distal plumose seta as long as distal setae of pleopod 3 endopod.

Pleopod 5 (Fig. 17) endopod length 1.5 width.

Uropod (Fig. 19) protopod length 1.2 width, with 1 medial unequally bifid seta and 12 unequally bifid distal setae increasing in length towards weakly expressed distomedial angle; endopod length 3.3 width and 1.15 protopod length, with 2 lateral and 6 distal broom setae and 7 distal unequally bifid setae, exopod length 3.5 width, 0.65 length and 0.6 width of endopod, with 1 simple lateral and 6 unequally bifid distal setae.

Female similar to male. Body (Fig. 10) length 2.2–2.6 width at pereonite 5; height at pereonites 6–7 0.3 length.

Antenna 1 (Fig. 11) shorter and more slender than that of male, about 0.4 body length, length–width ratios of articles 1–4: 1.0; 1.4; 4.1; 1.1; length ratios of articles 2–4 to article 1: 0.5; 0.75; 0.15; article 1 with 2 distomedial unequally bifid setae and 1 broom 3 and unequally bifid distolateral setae; article 2 with 5 unequally bifid setae and 2 broom setae distally.

Antenna 2 (Fig. 11) similar to that of male.

Mandibles (Fig. 12) similar to that of male, but spine row with 8 spines on left and right mandible. Length ratios of articles 2–3 of palp to article 1: 2.1; 1.1.

Maxilliped (Fig. 13) endite with 5 retinaculae. Remaining mouthparts (Fig. 13) and pereopods (Figs. 15 and 16) similar to those of male, insignificantly differing in proportions and number of setae.

Operculum (Fig. 18) subtriangular in ventral view, with rounded angles, length 0.7 width, height 0.3 length; ventral keel length 0.7 total operculum length, apex with long unequally bifid seta, ventral surface between apex and posterior margin flattened, with fine simple setae; lateral fields with 8–12 setae.

Pleopods 3–5 (Fig. 18) similar to those of male, but exopod of pleopod 3 without separation between articles.

Uropod (Fig. 19) similar to that of male, but protopod more stout, length 1.1 width, endopod length 3.5 width, 1.2 protopod length and 1.7 exopod length; exopod length 3.3 width.

Remarks: *Eurycope spinifrons* is the only *Eurycope* species known from the Sea of Japan. Besides *E. spinifrons* there are no other species of the genus recorded from the shallow waters of the northwestern Pacific, but three species, *E. affinis* Birstein, 1970 (5009–5900 m), *E. curticephala* Birstein, 1963 and *E. curtirostris* Birstein, 1963 (7210–7230 m) are known from the Kurile-Kamchatka Trench.

Morphologically, *E. spinifrons* is similar to *E. curticephala.* Both species possess a narrow maxillipedal epipod without a pronounced lateral extension and an article 1 of antenna 1 with a reduced distomedial lobe shorter than article 2. By these characters these two Pacific species are close to the *longiflagrata* complex from the Atlantic (Kussakin, 2003; Malyutina and Brandt, 2006; Wilson, 1983), the narrow epipod is also characteristic in *E. producta*. In all other *Eurycope* species, the epipod of the maxilliped has a more pronounced lateral extension and the antenna 1 a distomedial lobe on article 1 which is as long as or longer than article 2. Since the description of *E. curticephala* was based on female specimens and males are unknown, we cannot compare the male pleopods 1 and 2. By the shape of the uropods, the male pleopod 1 with a rounded projected distomedial lobes and the pleopod 2 with an oblique distomedial margin on the protopod *E. spinifrons* reminds of species of the group C or the *E. inermis* cluster from the Arctic (Kussakin, 2003; Malyutina and Brandt, 2006; Wilson, 1983), but the rostrum of *E. spinifrons* is longer and broader than in members of this group, having size which is comparable to article 1 of antenna 1.

Distribution: Northwestern part of the Sea of Japan, depth range 308–3665 m.

Ilyarachninae Hansen, 1916

Ilyarachna G.O. Sars, 1870

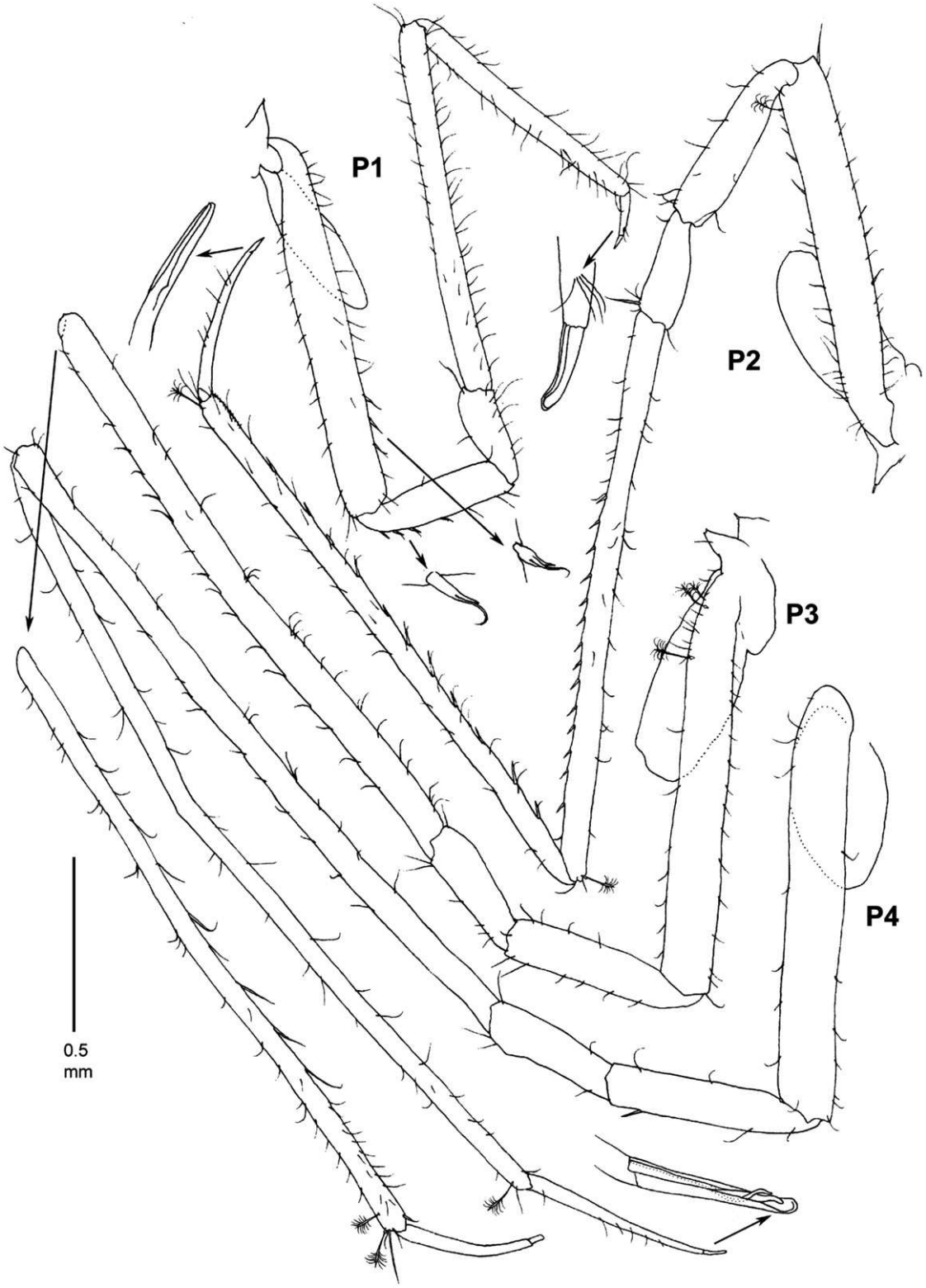

Fig. 15. ***Eurycope spinifrons*** Gurjanova, 1933. Preparatory female: pereopods 1–4.

Synonymy: see Kussakin (2003: p. 21).

Type species: *Mesostenius longicornis* G.O. Sars, 1864, by original designation.

Ilyarachna zachsi Gurjanova, 1933

Ilyarachna zachsi Gurjanova, 1933: 83, Fig. 8 (non 7), 1936: 56, Fig. 20; Kussakin, 2003: 231, fig. 165; Golovan and Malyutina, 2006: 47–60, Figs. 1–6; Golovan and Malyutina, 2010: 124, Tabl. LII.

Ilyarachna starokadomskii Gurjanova, 1933: 83, Fig. 7 (non 8), 1936: 57, Fig. 21 (part); Kussakin, 2003: 221, Fig. 155.

Material examined: SoJaBio EBS stations: A2–10, 14.08.2010, 455–465 m, 44°56N 137°11E—12 specimens; B7–6, 25.08.2010, 517–521 m, 43°13N 135°04E—2 specimens; B7–7, 25.08.2010, 470–528 m, 43°13N 135°04E—78 specimens.

Distribution: Northwestern part of the Sea of Japan, depth range 100–1100 m.

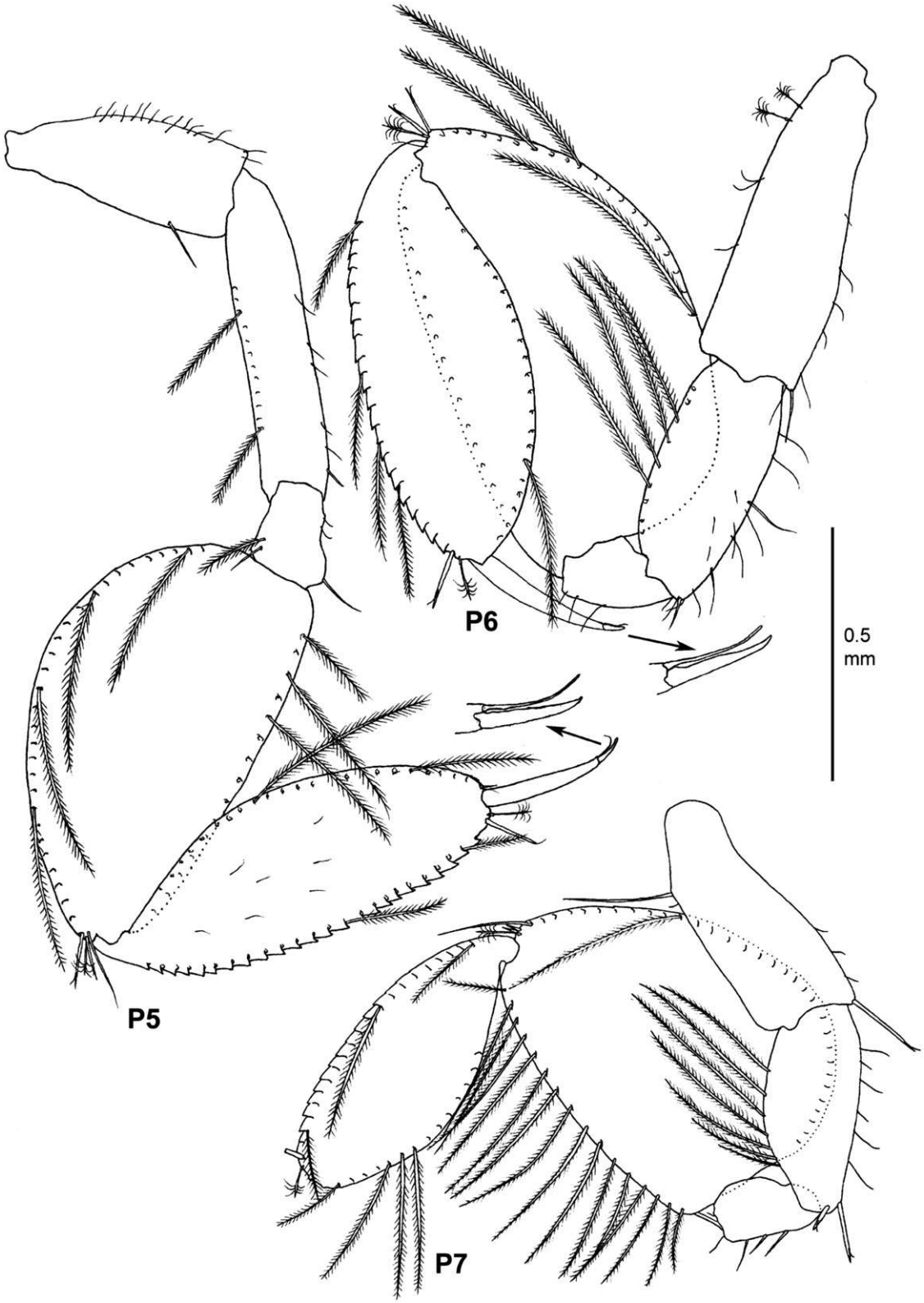

Fig. 16. ***Eurycope spinifrons*** Gurjanova, 1933. Preparatory female: pereopods 5–7.

Incertae sedis

Munnopsurus Richardson, 1912

Synonymy: see (Kussakin, 2003: p. 357).

Type species: *Munnopsurus giganteus* (G.O. Sars, 1879).

Munnopsurus minutus Gurjanova, 1933

Gurjanova 1933: 84, Fig. 9 (non 10), 12а–д; 1936: 61–62, Fig. 25; Kussakin, 2003: 360–363, Fig. 258, 259; Golovan and Malyutina, 2010: 127, Tabl. LIV.

Material examined: SoJaBio EBS station B7–7, 25.08.2010, 470–528 m, 43°13N 135°04E—3 juveniles.

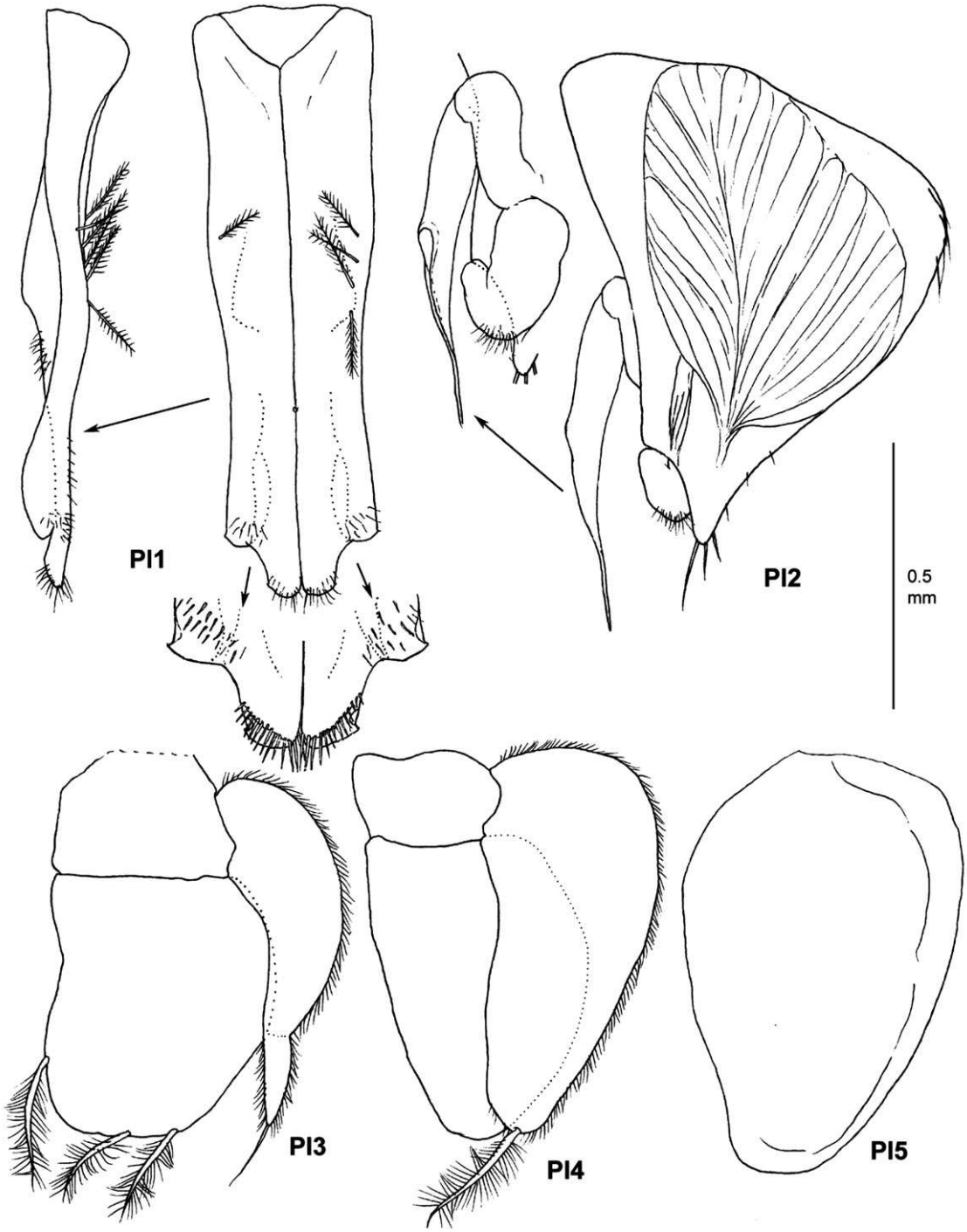

Fig. 17. ***Eurycope spinifrons*** Gurjanova, 1933. Copulatory male: pleopods 1–5.

Distribution: Northern part of Okhotsk Sea and northwestern part of the Sea of Japan, depth range 158–528 m.

4. Discussion

All four munnopsid species collected by the SoJaBio expedition occur at the shallowest stations (500 m), but most of them with a rather low abundance: with 3 specimens (*M. minutus*) or a few dozen specimens in the sample (*I. zachsi* and *E. spinifrons*). The most numerous species at those stations is *B. brandtae* sp. nov. (>300 specimens). At the deeper stations, *M. minutus* and *I. zachsi* were not collected, though *I. zachsi* is known from depths of 105–1002 m (Golovan and Malyutina, 2010; Kussakin, 2003). *B. brandtae* sp. nov. occurs at depths of down to 1525 m, but significantly less frequent there than at the shallowest stations.

In contrast, the abundance of *E. spinifrons* increases with depth. The species was found at all SoJaBio stations down to 3665 m. At the shallowest stations its abundance is moderate, with few or tens of individuals in one sample, but deeper than 2500 m the number increases sharply, and at the deepest stations (>3300 m) it was the most numerous species of macrobenthos, reaching around 3000 specimens in a sample (see also Elsner et al., 2013).

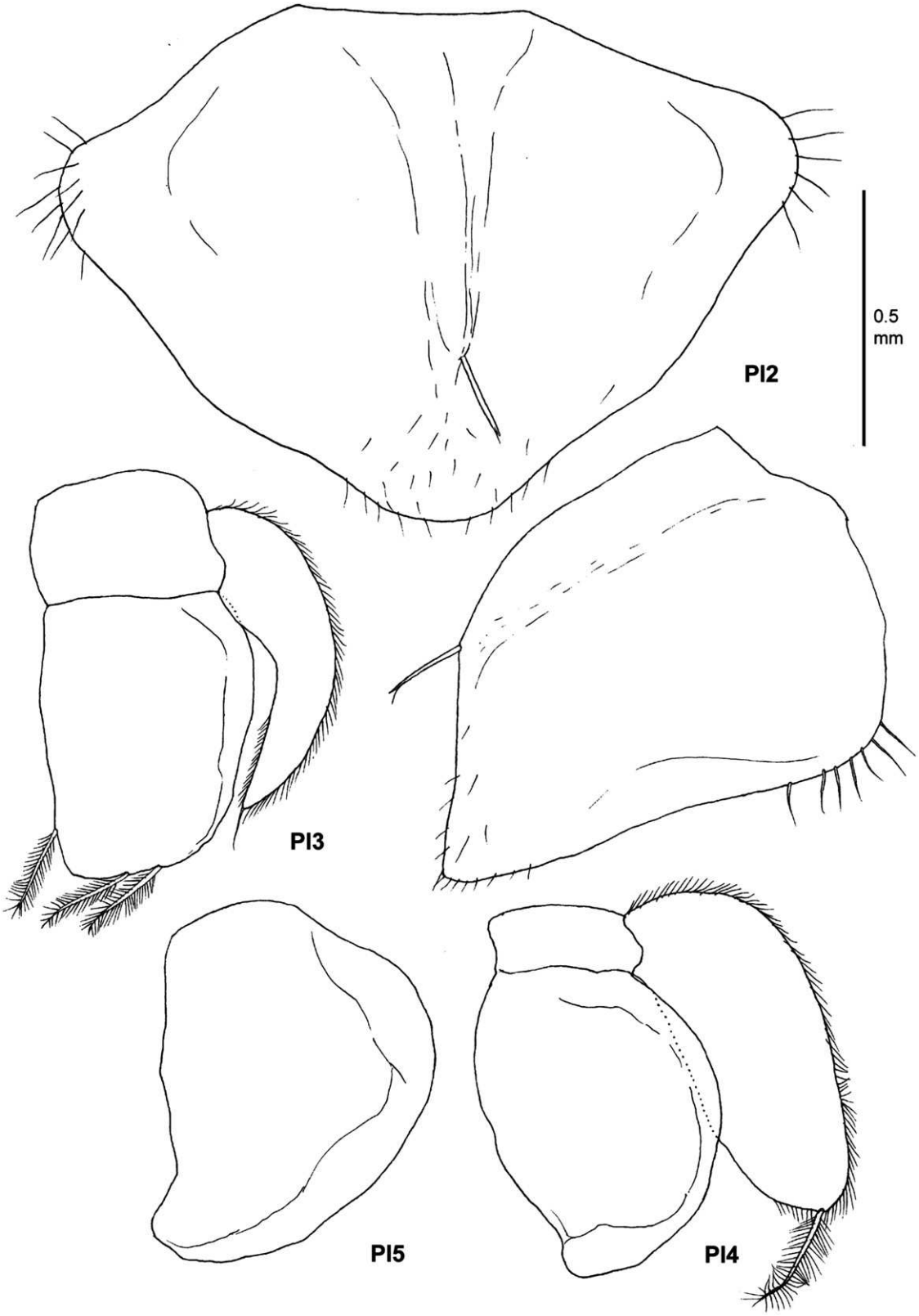

Fig. 18. ***Eurycope spinifrons*** Gurjanova, 1933. Preparatory female: pleopods 1–5.

The genera *Eurycope*, *Ilyarachna* and *Munnopsurus* have a worldwide distribution at a wide range of depths and include abyssal species along with some shelf and eurybathic species. *I. zachsi*, *I. kurilensis*, and *M. minutus* are subtidal-bathyal species which were found besides the Sea of Japan in the Okhotsk Sea (Golovan and Malyutina, 2010; Kussakin, 2003).

The genus *Eurycope* was not yet recorded from the Okhotsk Sea, but three species have been described by Birstein (1963,

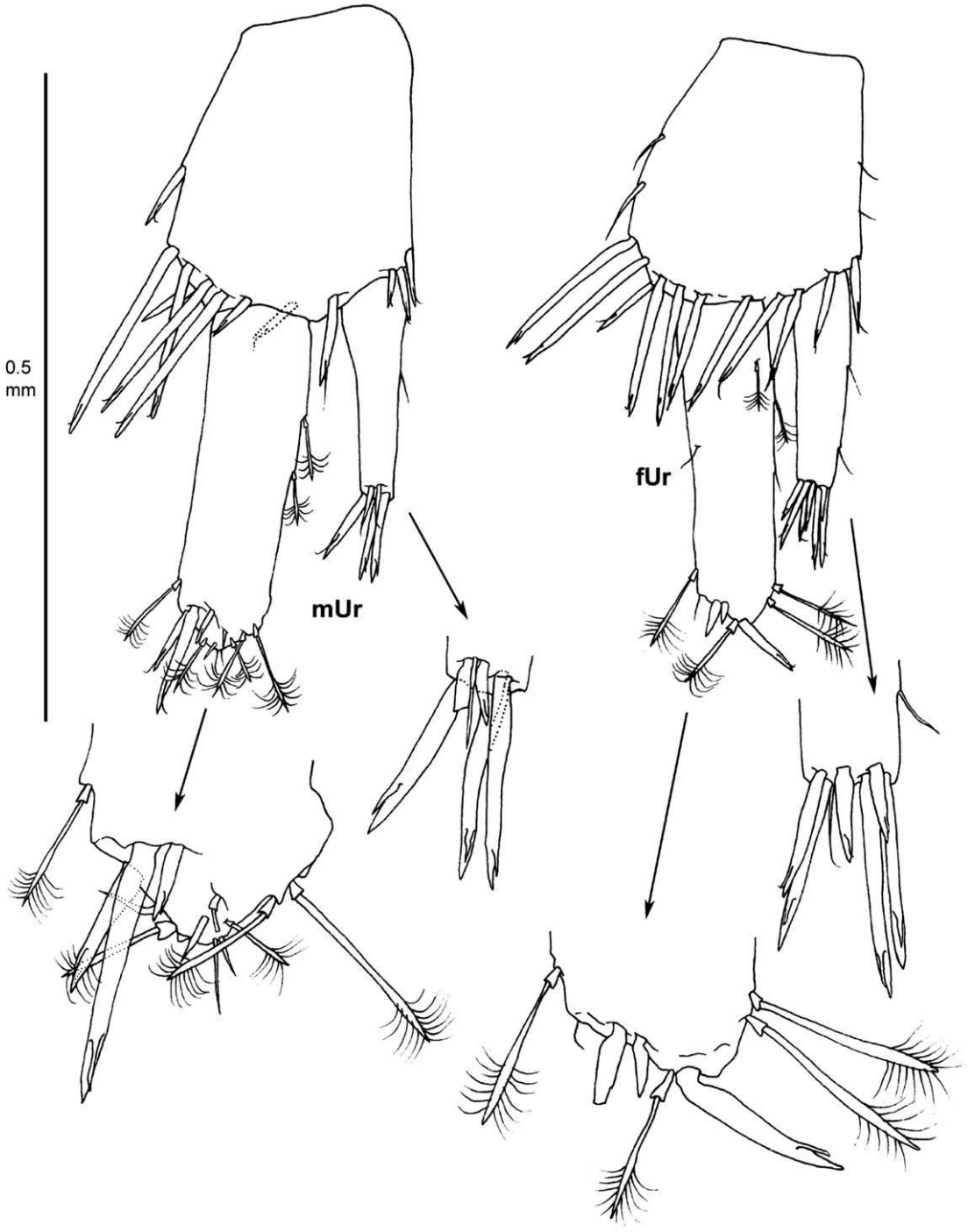

Fig. 19. ***Eurycope spinifrons*** Gurjanova, 1933. Copulatory male and preparatory female: uropod.

1970) from the Kurile-Kamchatka Trench—the adjacent open ocean abyssal. The genus *Baeonectes* is restricted in its distribution to high latitudes of the Atlantic (*B. muticus*, *B. pygmaea*) and Pacific (*B. improvisus* at the northeastern Pacific coast, *B. ochotensis* and *B. abberantis* in the Okhotsk Sea and *B. pavlenkoi* and *B. brandtae* sp. nov. in the Sea of Japan). *B. brandtae* sp. nov. is the deepest recorded species of the genus, all other species except *B. abberantis* from 787 to 961 m in the Okhotsk Sea inhabit shelf depths (9–225 m). *B. brandtae* sp. nov. possesses the longest walking pereopods 2–4 in the genus, a typical character of deep-sea species of *Eurycope*. Obviously this feature correlates with the similar deep-sea life-style of these species on a muddy substrate.

The origin of *E. spinifrons* and *B. brandtae* sp. nov. in the Sea of Japan is yet unknown, they inhabit the sea to different degrees and at various depths. Perhaps the answer to this question will be obtained with new material from the Kurile-Kamchatka area during the planned joint expedition of the project KuramBio (Kurile Kamchatka Deep Sea Biodiversity) in 2012. Since all type specimens of Birstein's deep-sea species from the Kurile-Kamchatka Trench are in bad condition or lost and not suitable for studying, we hope that future sampling in the abyssal of the

Kurile-Kamchatka area will yield new material of munnopsid species in good condition and provide an opportunity to continue the comparison and further inventory of the Munnopsidae of the northwestern Pacific.

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