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An account of the Ischnomesidae (Peracarida, Isopoda) from the Kuril–Kamchatka Trench and abyssal plain (Northwest Pacific) with the description of two new species

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ABSTRACT

During the German–Russian expedition KuramBio (Kuril–Kamchatka Biodiversity Studies) from board of the RV *Sonne* to the Kuril–Kamchatka Trench and adjacent abyssal plain, benthic samples were taken by means of a camera-epibenthic sledge. Amongst one of the most diverse macrobenthic taxa, the Isopoda (Crustacea, Malacostraca), Ischnomesidae were the fifth most abundant isopod family in the Kuril–Kamchatka area and were sampled with 24 species from 5 genera in 21 hauls at 12 stations. *Fortimesus* occurs most frequently in the samples (36% of all Ischnomesidae sampled), followed by *Stylomesus* (26%), *Heteromesus* (23%), *Ischnomesus* (10%) and *Gracilimesus* (4%). Number of ischnomesid individuals is highest at station 10-12 with 35 specimens, followed by station 12-4 (30 ind.), station 6-12 (29 ind.), station 9-9 (28), and station 1-11 (24). At station 4-3 only 1 specimen was found. A key to all genera of Ischnomesidae is provided.

Two new species from two genera: *Stylomesus* Wolff, 1956 and *Fortimesus* Kavanagh and Wilson, 2007 are described from the KuramBio material. *Stylomesus malyutinae* sp. nov. is distinguished by the smooth body surface, the shape of pleotelson and the length of uropods from other species of the genus from the Northwest Pacific Ocean. *Fortimesus trispiculum* sp. nov. is characterised by anterolateral projections of pereonites 1–3 which are forming an angle of about 45° with the longitudinal body axis decreasing in length from anterior to posterior.

1. Introduction

During the joint German–Russian expedition KuramBio (Kuril–Kamchatka Biodiversity Studies) with the RV *Sonne* (SO 223) to the Kuril–Kamchatka Trench and the adjacent abyssal plain, epibenthic sledge samples were taken in abyssal depths to investigate biodiversity of the benthic macrofauna. Ischnomesidae Hansen, 1916 were the fifth most abundant isopod family. The two most specious families, the Munnopsidae Lilljeborg, 1864 (Malyutina et al., 2015) and Desmosomatidae Sars, 1879 (Golovan et al., 2015) are analysed in detail. Apart from these, Macrostylidae Hansen, 1916 and Haploniscidae were the only families more abundant than the Ischnomesidae.

Based on a revision of the large genus *Haplomesus* Richardson, 1908 of Kavanagh and Wilson (2007), we know nine genera of Ischnomesidae today. These are *Contrarimesus* Kavanagh and Wilson, 2007, *Cornuamesus* Kavanagh and Wilson, 2007, *Fortimesus* Kavanagh and Wilson, 2007, *Gracilimesus* Kavanagh and Wilson, 2007, *Haplomesus* Richardson, 1908, *Heteromesus* Richardson, 1908, *Ischnomesus* Richardson, 1908, *Mixomesus* Wolff, 1962 and *Stylomesus* Wolff, 1956.

The 106 species (including the two new species) are distributed in all oceans and occur between 10 and 9043 m depth. The genus *Ischnomesus* Richardon, 1908 occurs with the widest depth range. *I. bispinosus* (Sars, 1868), the shallowest occurring species, has been sampled in the Christiania Fjord (Oslo, Norway) between 10 and 1100 m and the deepest occurrence has been reported from the Bougainville Trench between New Guinea and the Solomon Islands, where *I. elongatus* Birstein, 1963 was sampled between 8980 and 9043 m depth.

Most of the species of Ischnomesidae found in the area studied belong to the genera *Fortimesus* and *Stylomesus* (Table 2). *Fortimesus* occurs between 810 m off South Africa and 8830 m in the Northeast Pacific, *Stylomesus* has been sampled in 698 m depth in the East Arctic ocean and in 6135 m depth in the Northwest Pacific. In the Pacific Ocean, 26 species are described from the Northwest, and only 1 species from the Northeast, 5 species are known from the South Pacific (Schotte et al., 1995, onwards; http://invertebrates.si.edu/isopod/). In this paper, two new species from these genera are described and the general composition of the ischnomesids at the stations is documented.

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2. Material and methods

The expedition KuramBio on board RV *Sonne* (21.07.2012–07.9.2012) was performed in the Kuril–Kamchatka Trench and adjacent abyssal area. A total of 21 hauls were taken at 12 stations between 30.07.2012 and 31.08.2012 in a depth ranging from 4863 to 5780 m (see Table 1 and Fig. 1). Material was collected by means of a camera-epibenthic sledge (C-EBS) (Brandt et al., 2013, Brandt et al., 2015). Two replicate samples were taken with the camera-epibenthic sledge at each station. One sample of each station was immediately transferred into pre-cooled 96% ethanol and kept cool at −20 °C for at least 48 h; the other sample was fixed in 4% formalin. The samples were sorted on board to higher taxon level and later in the laboratory of the Zoological Museum of Hamburg to species level. Specimens ascribed to the two new species were examined using a Wild M5A dissecting microscope and dissected specimens were illustrated using a Leica DM 2500 microscope equipped with a camera lucida. Other specimens were critical point dried and prepared for SEM (Scanning Electron Microscopy). Images were then prepared using a LEO 1525 emission scanning electron microscope. Digital drawings were performed using Adobe Illustrator CS5 and a Wacom Intuos 3 drawing board. Total length was measured from the frontal margin of the head to the caudal end of the pleotelson. Material is deposited in the Zoological Museum of Hamburg (ZMH).

3. Results

3.1. Faunistic composition

In total, 757 individuals from 24 species and 5 genera of the isopod family Ischnomesidae were sampled using 20 hauls at 12 stations. These are 2.6% of all Isopoda collected during the KuramBio expedition. When standardized to 1000 m², mean abundance of individuals per station is 14.0 (±10.1). Of the total 757 individuals collected, 499 were either too small juveniles or damaged and thus could not be determined to genus or species level. For the remaining 258 individuals, the genus was determined (Table 2). The most abundant genera were *Fortimesus* and *Stylomesus* (Figs. 2 and 3). The composition of genera of Ischnomesidae from this area is listed in Table 2. Elsner et al. (this issue) gives an overview and an analysis of the complete isopod fauna.

The highest abundance of Ischnomesidae was recorded at station 10-12, followed by stations 12-4, 6-12, 9-9 and 1-11 (Table 1, Fig. 3). The lowest abundance occurred at stations 4-3, 7-9, 2-10 and 11-9. Only one species was sampled at stations 4-3 in comparison to the other stations, where several different species were sampled (a maximum of 11 species in one haul; a mean of 5.6 ± 3.1 species per haul) (Table 3). With 36% of all sampled genera, *Fortimesus* was the most abundant genus, present in all hauls except 2-10, followed by *Stylomesus* (26%), *Heteromesus* (23%), *Ischnomesus* (10%) and *Gracilimesus* (4%). Ischnomesid abundance is highest at station 12-4 with 76 specimens, followed by station 6-12 (69 ind.), station 10-12 with 54 individuals, station 9-9 with 44, and station 2-9 with 40 individuals. At stations 8-9 and 6-11, 16 individuals were sampled each, at all other stations the number was lower. At station 4-3 and 11-12 only 1 specimen was found.

Determination to species level revealed that 12 species belonged to *Fortimesus*, 2 species to *Gracilimesus*, 4 species to *Heteromesus*, 4 species to *Ischnomesus* and 2 species to *Stylomesus* (Table 3).

3.2. Key to the genera of Ischnomesidae Hansen, 1916

The Ischnomesidae from the Kuril–Kamchatka Trench and adjacent abyssal area comprise six of the nine known genera. For future handling and identification of ischnomesid isopods from the Kuril–Kamchatka Trench area, an identification key of the genera is presented which is modified from Wolff, 1962 and Kavanagh and Wilson, 2007.

1. Uropods not developed……***Mixomesus*** Wolff, 1962
   Uropods developed……2
2. Uropods with one article……3
   Uropods with two articles……5
3. All pereonites and both pleonites free and movable……***Ischnomesus*** Richardson, 1908
   Certain segments of pereonites 5–7, pleonites and pleotelson fused with each other……4
4. Pereonites 7, pleonites and pleotelson completely fused with each other……***Stylomesus*** Wolff, 1956
   Pereonites 5, 6, 7 and pleonites fused with faint suture lines, pleonite and pleotelson completely fused……
   ……***Contrarimesus*** Kavanagh and Wilson, 2007
5. Pereonites 5 freely articulating with pereonite 6. ……***Heteromesus*** Richardson, 1908
   Pereonites 5 not freely articulating with pereonite 6.……6
6. Pleotelson with distinct posterolateral spines……7
   Pleotelson without distinct posterolateral spines……8
7. Pereonite 4 at least 1.5 times as long as wide……***Cornuamesus*** Kavanagh and Wilson, 2007
   Pereonite 4 less than 1.5 times as long as wide……***Gracilimesus*** Kavanagh and Wilson, 2007
8. Pleotelson dorsal surface axial ridge weakly vaulted, separated from lateral fields only by shallow elongate concavities; pleotelson without posterolateral spines……***Fortimesus*** Kavanagh and Wilson, 2007
   Pleotelson dorsal surface axial ridge strongly vaulted, separated from lateral fields by distinct indented lines….
   ……***Haplomesus*** Richardson, 1908

3.3. Taxonomy

Ischnomesidae Hansen, 1916.

4. Stylomesus Wolff, 1956

Stylomesus Wolff, 1956: 97, 1962: 83; Menzies, 1962: 123; Birstein, 1960: 15, 1963: 85, 1969: 15, 1971: 204; Kensley, 1984:

Table 1
12 Stations with 21 hauls sampled in the Kuril–Kamchatka Trench area with a camera-epibenthic sledge during KuramBio expedition on board RV *Sonne*.

EBS #	Date	Stat.-haul #	depth [m]	Lat°N	Long°E
EBS #1	30.07.2012	01-10	5418	43.9710	157.3278
EBS #2	30.07.2012	01-11	5412	43.9725	157.3290
EBS #3	02.08.2012	02-09	4864	46.2268	155.5567
EBS #4	03.08.2012	02-10	4863	46.2260	155.5595
EBS #5	05.08.2012	03-09	4863	47.2307	154.6982
EBS #6	06.08.2012	04-03	5780	46.9640	154.5398
EBS #7	11.08.2012	05-09	5379	43.5913	153.9647
EBS #8	11.08.2012	05-10	5379	43.5912	153.9635
EBS #9	15.08.2012	06-11	5291	42.4927	154.0005
EBS #10	15.08.2012	06-12	5291	42.4915	153.9989
EBS #11	17.08.2012	07-09	5216	43.0473	152.9905
EBS #12	17.08.2012	07-10	5218	43.0463	152.9882
EBS #13	20.08.2012	08-09	5140	42.2447	151.7351
EBS #14	21.08.2012	08-12	5115	42.2453	151.7391
EBS #15	23.08.2012	09-09	5408	40.5913	150.9987
EBS #16	24.08.2012	09-12	5397	40.5918	150.9976
EBS #17	26.08.2012	10-09	5248	41.2077	150.0940
EBS #18	27.08.2012	10-12	5249	41.1939	150.0928
EBS #19	29.08.2012	11-09	5362	40.2210	148.1038
EBS #20	31.08.2012	11-12	5351	40.2184	148.1088
EBS #21	31.08.2012	12-04	5228	39.7300	147.1813

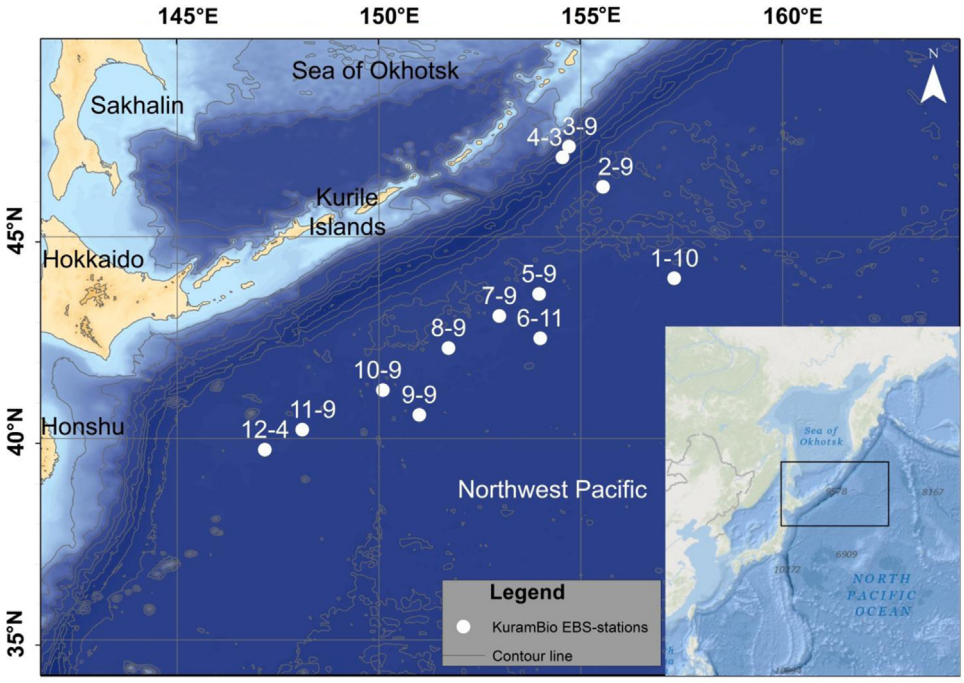

Fig. 1. Location of station-hauls sampled with a camera-epibenthic sledge in the Kuril–Kamchatka Trench area during KuramBio expedition. Isobaths in 1000 m intervals.

295; Kussakin, 1988: 437; Merrin and Poore, 2003: 300; Brökeland and Brandt, 2004: 1770; Brandt and Andres, 2008: 263.

Gomphomesus Wolff, 1962: 84.

Helomesus Wolff, 1962: 84.

Type species: *Rhabdomesus inermis* (Vanhöffen, 1914).

Diagnosis: The generic diagnosis of *Stylomesus* given recently by Merrin and Poore (2003) and revised by Brökeland and Brandt (2004) is followed here, except for the neoteny regarding the absence of the seventh pereopods described for some *Stylomesus* species in the latter.

5. Stylomesus Malyutinae sp. nov. Brandt and Stüven (Figs. 4–9)

5.1. Material examined

Holotype: 1 non-ovigerous ♀ (7.2 mm), ZMH K-44122, RV *Sonne* (SO 223), KuramBio C-EBS station 2-9, supranet, (46° 14.78′ N–155° 32.63′ E, 46° 14.92′ N–155° 32.57′ E); depth: 4830–4863 m; 03.08.2012, RV *Sonne* (SO 223).

Allotype: 1 adult ♂ (7 mm), ZMH K-44123, 10-9, supranet, (41° 11.37′ N–150° 05.63′ E, 41°11.17′ N–150° 05.60′ E); depth: 5264–5266 m; 26.08.2012, RV *Sonne* (SO 223).

Paratypes: 1 adult ♀ (7.3 mm), ZMH K-44124, 2-9, supranet (46° 14.78′ N–155° 32.63′ E, 46° 14.92′ N–155° 32.57′ E); depth: 4830–4863 m; 03.08.2012, RV *Sonne* (SO 223). 1 manca (5.2 mm), ZMH K-44124, same locality.

Additional material: 1 non-ovigerous ♀ (described and illustrated), ZMH K-44125 (slides), Kuril–Kamchatka abyssal plain, 9-9, supranet (40° 34.51′ N–150° 59.92′ E, 40° 34.25′ N–150° 59.91′ E); depth: 5399–5421 m; 23.08.2012, RV *Sonne* (SO 223), and 1 non-ovigerous ♀ (described and illustrated), ZMH K-44126 (slides), same locality. 1 manca (5 mm), ZMH K-44228 (prepared for SEM), Kuril–Kamchatka abyssal plain, 5-9, supranet (43° 34.46′

N–153° 58.13′E, 42° 34.30′N–153° 58.16′ E); depth: 5376–5380 m; 11.08.2012, RV *Sonne* (SO 223).

5.2. Etymology

The name is chosen in honour of our very good friend and colleague, Dr. Marina Valentinova Malyutina for her help and engagement in the KuramBio project.

Table 2
Ischnomesid species for each genus showing densities expressed as individuals/1000 m^2. Damaged species and juveniles should be taken into account.

Station-haul #	*Fortimesus*	*Gracilimesus*	*Heteromesus*	*Ischnomesus*	*Stylomesus*	Total
01-11	5	3	11	1	4	24
02-09	3	2	5	0	3	13
02-10	0	0	0	3	1	4
03-09	8	0	0	0	0	8
04-03	1	0	0	0	0	1
05-09	2	0	1	0	3	6
05-10	3	0	0	1	7	11
06-11	3	1	1	1	3	9
06-12	7	0	7	1	14	29
07-09	1	0	1	0	1	3
07-10	3	1	0	1	1	6
08-09	4	0	1	0	0	5
08-12	6	0	3	0	0	9
09-09	12	1	7	3	5	28
09-12	7	2	2	1	5	17
10-09	4	0	2	3	1	10
10-12	11	1	7	8	8	35
11-09	1	0	2	0	1	4
11-12	2	0	3	0	1	6
12-04	11	0	6	3	10	30
Total	94	11	59	26	68	258
Percentage	36.4%	4.3%	22.9%	10.1%	26.4%	100.0%

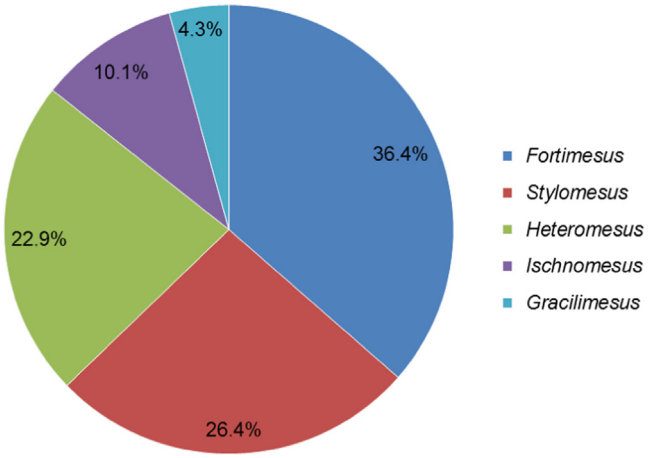

Fig. 2. Percentage of occurrence of ischnomesid genera in the KuramBio samples identified.

5.3. Diagnosis

Stylomesus with smooth body surface; uropod short, with sympod not exceeding pleotelson caudal margin.

5.4. Description

Female holotype and additional material examined (Figs. 4–9): body surface smooth, about 6.0 times as long as wide (Fig. 4A–B). Head 0.5 times as long as wide, antennae inserting on dorsolateral projections (Fig. 9A). Pereonite 1 about as wide as head; pereonite 2 and 3 slightly wider; pereonite 4 as long as wide slightly narrowing after about one third of length, broadest part 1.6 times as wide as narrowest part; pereonite 5 about 0.3 times as long as body, with continuous width of 0.25 times length, broadening at coxa of pereopod 5; pereonite 6 and 7 narrowing; pereonite 7 fused to pleotelson; pleotelson about as long as wide with fringed lateral setae, slightly elevated mediodorsally; uropods short, sympods not exceeding pleotelson distal margin (Fig. 4C).

Antenna 1 (Fig. 7A) 0.2 times as long as body; consisting of 6 articles; article 1 almost quadrangular with 1 lateral broom seta; article 2 about 7 times as long as wide with 6 lateral setae of varying lengths, 3 almost as long as article with long slender sensory seta each, 2 simple and 1 broom; articles 3–6 together almost as long as article 2, terminally shortening; article 4 with 2 short setae with 1 slender sensory seta each (Fig. 9E); tip of article 6 with 2 simple setae, 1 broom seta and 1 with sensory seta, plus number of smaller setae.

Antenna 2 (Fig. 7B) broken off in all specimens, only article 1–4 present; article 3 with small cuticular teeth; article 3 and 4 with 1 simple seta each.

Mandible (Fig. 5A, left side) with smooth outer margin. Incisor with 5, *lacinia mobilis* with 4 blunt teeth; spine row of 5 setae, 1–3 serrated, seta 4 distally serrated and seta 5 simple. Molar with smooth grinding surface and fine setules at lateral margin.

Hypopharynx (Fig. 5F) consisting of 2 inner and 2 outer lobes; outer lobes larger than inner lobes with 4 distomedial situated setae and setules on outer and inner margins. Inner lobes without setae on outer margins.

Maxilla 1 (Fig. 5D) consisting of 2 lobes; outer lobe with 11 spine-like apical setae, serrated either on one or both sides; apical and medial margin with fine setules; outer margin with fine pairwise arranged setules decreasing in length distally. Inner lobe with one apical spine-like setulated seta and fine setules.

Maxilla 2 (Fig. 5E) consisting of 3 lobes; inner lobe with setules on inner, distal and outer margin, outer margin with 2 long hemiplumose setae and smaller simple setae, apical margin with 13 setae of different lengths and widths, one of them hemiplumose; middle lobe apical margin with 1 hemiplumose and 2 simple

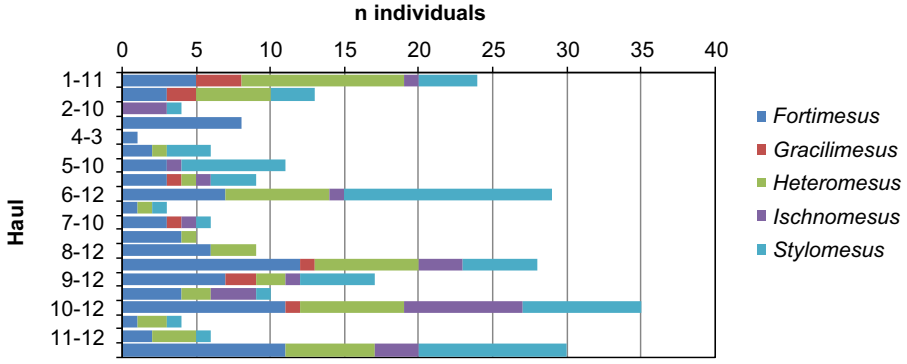

Fig. 3. Numbers of individuals of ischnomesid genera per station-haul.

Table 3
Ischnomesid species per station-haul (individuals/1000 m^2). Damaged species and indeterminable juveniles not taken into account.

Species	1-11	2-9	2-10	3-9	4-3	5-9	5-10	6-11	6-12	7-9	7-10	8-9	8-12	9-9	9-12	10-9	10-12	11-9	11-12	12-4
Fortimesus aff. *concinnus* (Birstein, 1960)	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Fortimesus aff. *profundicolus* (Birstein, 1971)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fortimesus aff. *thompsoni* (Beddard, 1886)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fortimesus cf. *concinnus* (Birstein, 1960)	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fortimesus cf. *profundicolus* (Birstein, 1971)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	2	0	0	0
Fortimesus sp. 1	0	0	0	7	0	0	3	1	1	0	0	2	0	0	1	0	3	1	1	0
Fortimesus sp. 2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fortimesus sp. 3	1	3	0	0	0	1	0	0	2	1	0	2	6	3	3	2	3	0	1	8
Fortimesus sp. 4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0
Fortimesus sp. 5	2	0	0	0	0	0	0	1	0	0	3	0	0	8	0	0	0	0	0	0
Fortimesus sp. 6	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3
Fortimesus trispiculum Elsner & Caurant, 2014	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3	0	0	0
Gracilimesus aff. *gorbunovi* (Gurjanova, 1946)	3	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Gracilimesus cf. *insignis* Hansen 1916	0	1	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0
Heteromesus sp. 1	4	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0
Heteromesus sp. 2	0	1	0	0	0	1	0	1	0	0	0	0	3	4	1	0	4	1	1	5
Heteromesus sp. 3	7	1	0	0	0	0	0	0	6	0	0	1	0	2	1	1	1	0	1	0
Heteromesus sp. 4	0	2	0	0	0	0	0	0	1	0	0	0	0	1	0	0	2	1	1	1
Ischnomesus sp. 1	1	0	3	0	0	0	1	1	0	0	1	0	0	2	1	3	7	0	0	3
Ischnomesus sp. 2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Ischnomesus sp. 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Ischnomesus sp. 4	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Stylomesus malyutinae Brandt & Stüven, 2014	4	3	1	0	0	3	7	2	14	1	1	0	0	5	5	1	8	1	1	9
Stylomesus sp. 2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1

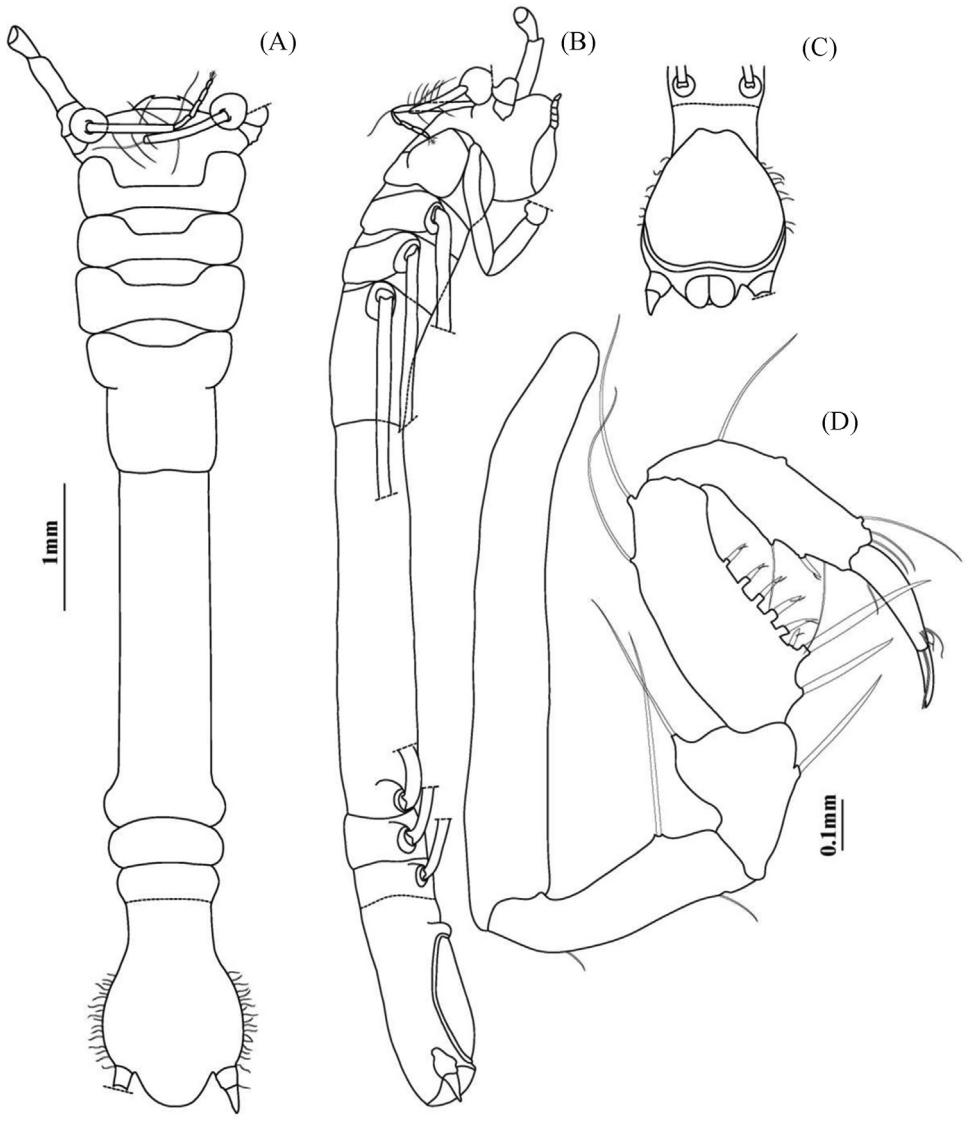

Fig. 4. *Stylomesus malyutinae* sp. nov., holotype ♀ (7.2 mm) ZMH K-44122. (A) Habitus, dorsal view, (B) habitus, lateral view, (C) pleotelson, ventral view. *Stylomesus malyutinae* sp. nov., paratype ♀, ZMH K-44126 and (D) pereopod 1. Scale bars: A–C = 1 mm; D = 0.1 mm.

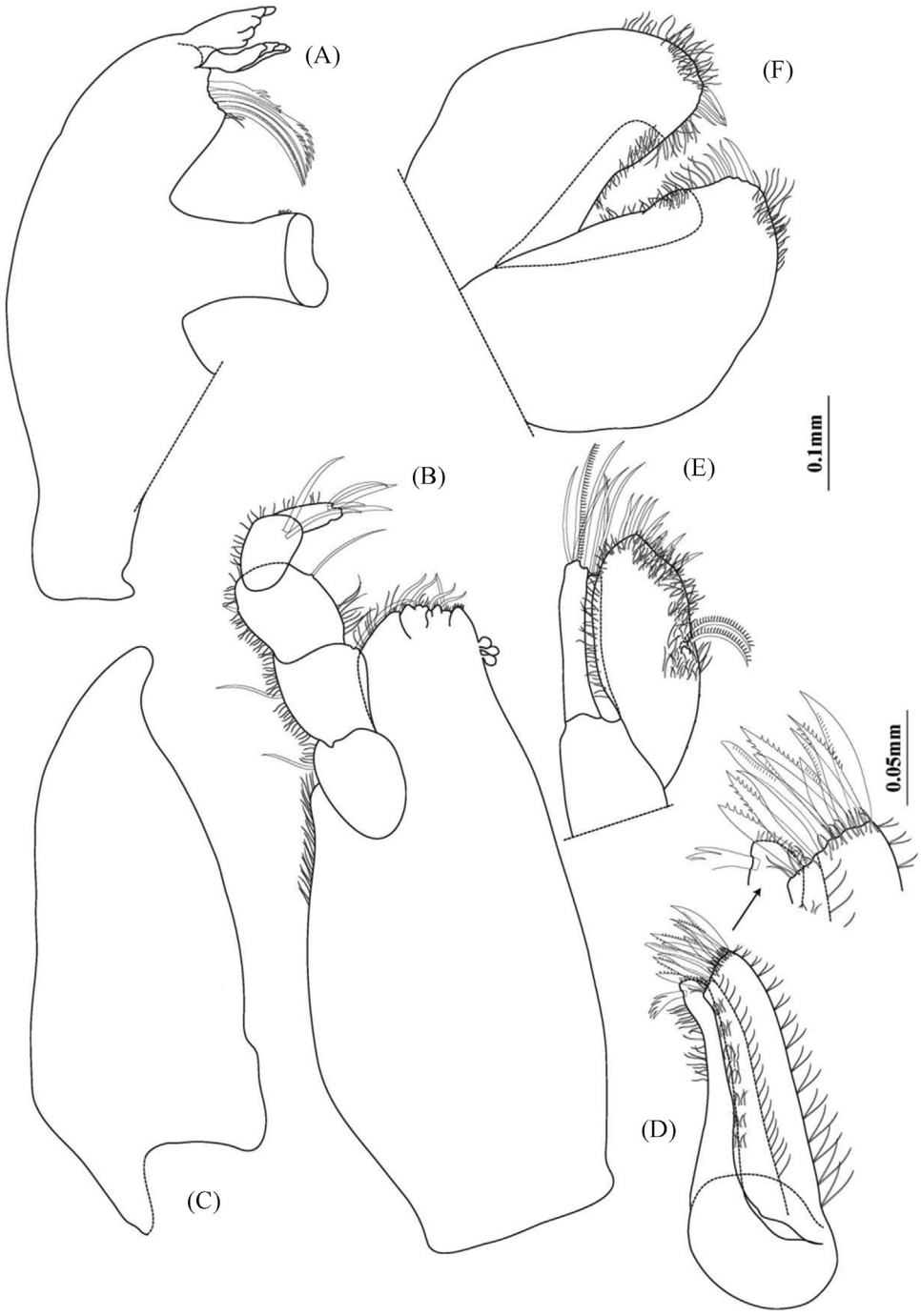

Fig. 5. *Stylomesus malyutinae* sp. nov., paratype ♀ ZMH K-44126. (A) Mandible, (B) maxilliped, (C) epipod 4, (D) maxilla 1, (E) maxilla 2, (F) hypopharynx. Scale bars 0.1, of details 0.05 mm.

setae; outer lobe apical margin with 1 hemiplumose and 3 simple setae.

Maxilliped (Fig. 5B) palp consisting of 5 articles, decreasing in length and width distally; article 1 with 1 lateral seta; article 2 and 3 with 2 lateral setae; article 4 with 2 dorsal setae; tip of article 5 with 4 setae; all articles with lateral setules. Endite distal margin with 5 simple setae and fine setules, distomedial margin with 3 coupling hooks, lateral margin with long setules. Epipod (Fig. 3C) slightly smaller than endite, with smooth margin.

Pereopods (Figs. 4D, 6A–F) bases longest articles, smooth, without cuticular structures.

Pereopod 1 (Figs. 4D, 9A–B) basis as long as ischium to carpus, without setae; ischium as long as propodus with two smaller setae and one long simple seta at upper third of dorsal margin about equal in length to ischium; merus shortest article, with 2 long setae, ventral one stronger and thicker than dorsal one; carpus slightly narrowing posteriorly, 2 long setae on dorsal margin, ventral margin with row of 8 spine-like setae of varying lengths, proximal setae simple and about half as long as carpus, setae 3–8 small, bearing sensory seta each; propodus with 7 setae of varying lengths, one bearing sensory seta; dactylus with 6 short setae, 2 of them inserting near base of dactylar claw.

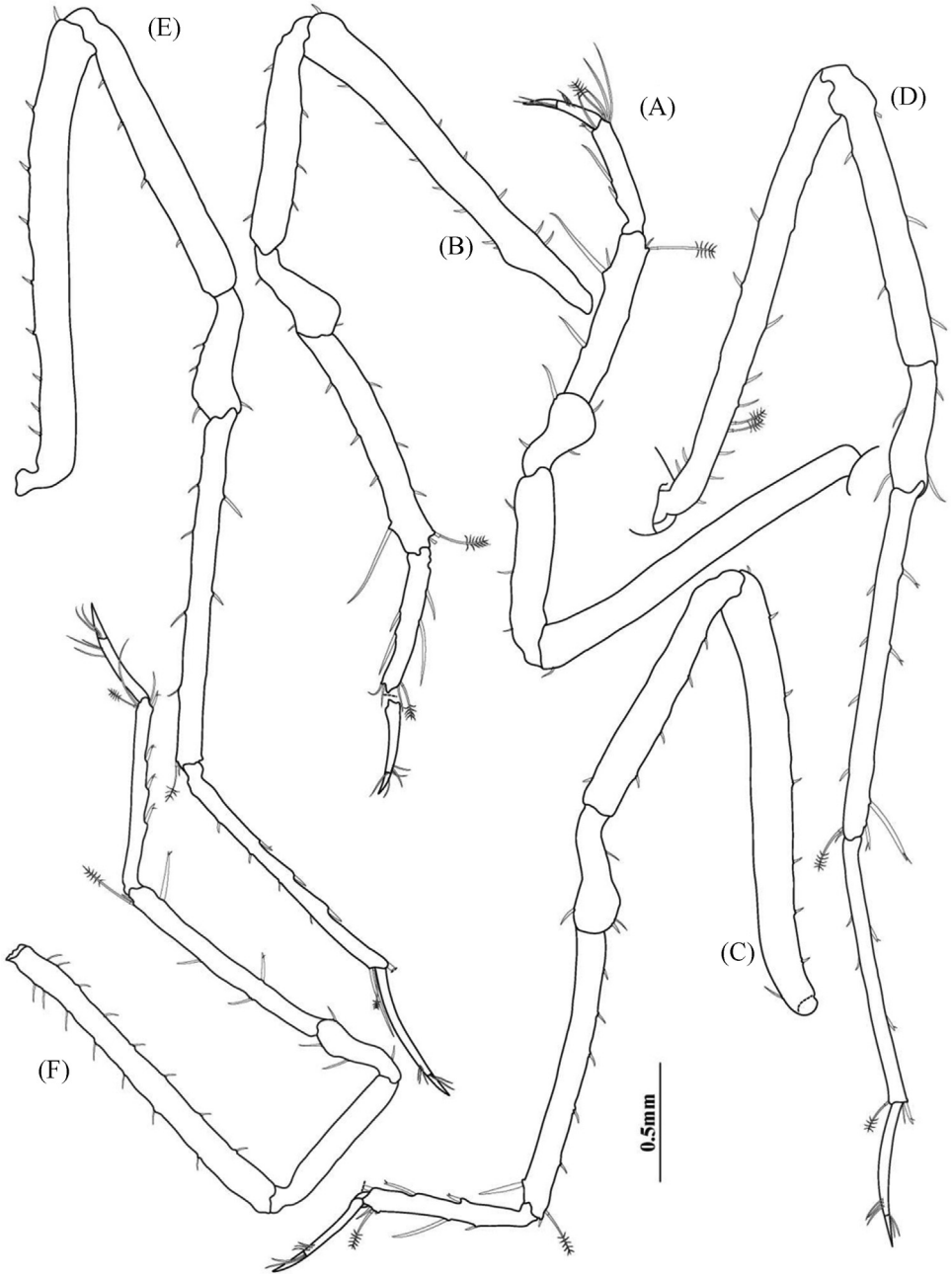

Fig. 6. *Stylomesus malyutinae* sp. nov., paratype ♀ ZMH K-44125. (A) pereopod 2, (B) pereopod 3, (C) pereopod 4, (D) pereopod 5, (E) pereopod 6 and (F) pereopod 7.

Pereopods 2–7 (Fig. 6A–F) all pereopods present, generally increasing in length from pereopod 2 to pereopod 6, with pereopod 7 being reduced in its length. Bases of pereopods 2–7 with scattered lateral setae, pereopod 5 with 2 broom setae; ischia of pereopod 2–7 about half as long as bases, with scattered setae; meri shortest articles with 3 or 4 simple setae of varying lengths; carpi with scattered setae of different lengths and 1 broom distodorsal seta, setae usually increasing in length towards propodus, pereopod 5 and 7 with sensory setae; propodi with 1 distodorsal broom seta posteriorly and number of normal and spine-like setae of varying lengths, some with sensory seta; dactyli with 3 setae and 2 setae inserting at base of dactylar claw (Fig. 9C). Dactylar claw and setae with chemosensory tips Fig. 9D).

Pleopod 2 (Fig. 7D) (operculum) subcircular, 0.8 times as long as pleotelson with plumose setae on margin.

Pleopod 3 (Fig. 7E) endopod almost rectangular, 0.6 times as long as wide with 3 distal plumose setae of different lengths; exopod 0.7 times as long as endopod with fringe of fine setules on lateral margin and long apical plumose seta.

Pleopod 4 (Fig. 7F) uniramous, about 0.5 times as long as wide with smooth margin, no setation.

Pleopod 5 absent.

Uropod (Fig. 7C) two-articulated; sympod and ramus about equal in length, ramus narrowing terminally, only ramus exceeding caudal margin of pleotelson; uropod with 11 setae of varying lengths, 1 of them broom.

Description of male allotype (only proportional differences of the body shape to female are described, pleopods 1 and 2 are only illustrated in ventral view of pleotelson (Fig. 8C), in order to avoid damage of the allotype) (Fig. 8A–C): Body 5.9 as long as wide;

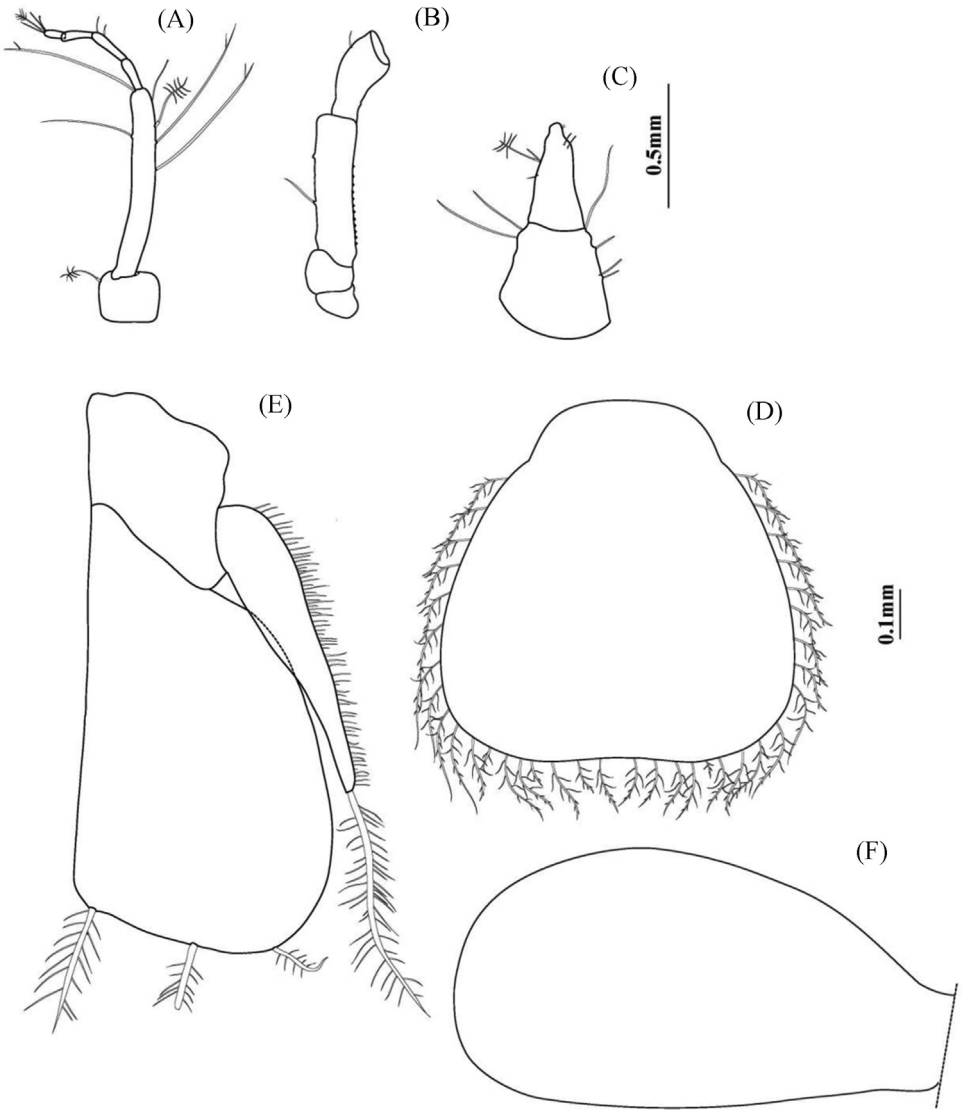

Fig. 7. *Stylomesus malyutinae* sp. nov., paratype ♀ ZMH K-44126. (A) Antenna 1, (B) antenna 2, nov., additional specimen ♀ ZMH K-44125, (C) uropod, (D) pleopod 2 (operculum), (E) pleopod 3 and (F) pleopod 4. Scale bars A–C=0.5, D–F=0.1 mm.

pereonite 2 and 3 narrower than pereonite 1; pereonite 4 narrowing continuously towards pereonite 5, broadest part 1.8 times wider than narrowest part; pereonite 5 0.4 times as long as body and narrower than female pereonite 5, 6.8 times longer than narrowest and 3 times longer than broadest part, proximally narrowing.

Distribution: Northwest Pacific, Kuril–Kamchatka Trench area, only known from type locality.

Remarks: Stylomesus malyutinae sp. nov. is most similar to *S. menziesi* Birstein, 1960 and *S. gracilis* Birstein, 1960, but can easily be distinguished by some characters like the shape and proportions of its pleotelson. The pleotelson of *S. menziesi* is clearly wider than long, with uropods that are almost equal in length to the pleotelson. *S. malyutinae* has a pleotelson which is about as long as wide, with short uropods and only the uropod's ramus exceeding the caudal pleotelsonic margin. Pereonites 2 and 3 of *S. menziesi* show a small medial dorsal elevation, which is absent on the pereonites of *S. malyutinae* and pereonite 5 of *S. menziesi* is narrowest near coxa of pereopod 5, unlike *S. malyutinae* which has a pereonite 5 narrowest near pereonite 4. *S. malyutinae* can be distinguished from *S. gracilis* in lacking the few blunt teeth laterally of the first pereonite which are present in the latter species. The head of *S. gracilis* is clearly triangular shaped, whereas the head of *S. malyutinae* is more quadrangular in shape and *S. gracilis* is also missing the set of 6 setae on the ventral margin of the carpus of pereopod 1 of *S. malyutinae*. Moreover, *S. malyutinae* is more than twice as long as *S. gracilis*. All other species can easily be distinguished from the new species.

6. Fortimesus Kavanagh and Wilson, 2007

Fortimesus Kavanagh and Wilson, 2007: 501, 510
Type species *Fortimesus thomsoni* (Beddard, 1886)
Ischnosoma thomsoni Beddard, 1886 (basionym)

6.1. Diagnosis

The diagnosis of Kavanagh and Wilson, 2007 is not changed.

Species included: F. concinnus (Birstein, 1960); *F. consanguineous* Mezhov, 1980; *F. cornutus* (Birstein, 1971); *F. formosus* (Mezhov, 1981); *F. gigas* (Birstein, 1960); *F. profundicolus* (Birstein, 1971); *F. robustus* (Birstein, 1960); *F. scabriusculus* (Birstein, 1960); *F. thomsoni* (Beddard, 1886); *F. zuluensis* (Kensley, 1984).

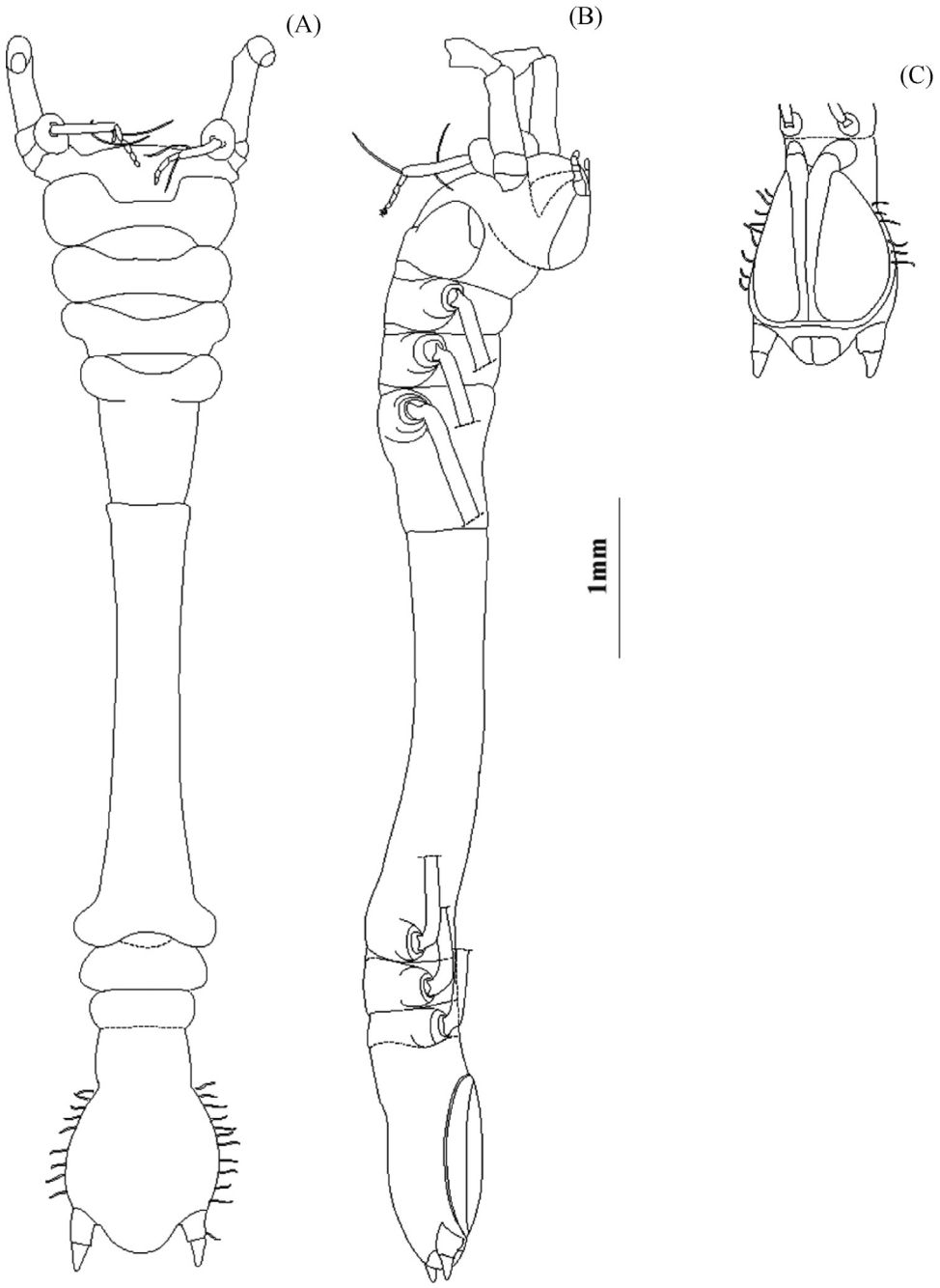

Fig. 8. *Stylomesus malyutinae* sp. nov., allotype ♂ (7 mm) ZMH K-44123. (A) Habitus, dorsal view, (B) habitus, lateral view, (C) pleotelson, ventral view. Scale bar 1 mm.

7. Fortimesus trispiculum sp. nov. Elsner and Caurant (Figs 10–13)

7.1. Material examined

Holotype: male, 4.1 mm, ZMH K-44127, RV *Sonne*, 5125–5126 m, station 8-9 supranet, 42° 14.32′ N, 151° 42.68′ E to 42° 14.27′ N, 151° 42.49′ E, 20.08.2012.

Paratypes: 2 males, paratype 1, ZMH K-44128, 3.5 mm (without head), paratype 2 split in half, station 6-11, supranet, 5305–5305 m, 42° 28.61′ N, 153° 59.68′ E to 42° 28.47′ N, 153° 59.66′ E, 15.08.2012.

7.2. Etymology

The name was chosen to refer to the anterolateral projections on pereonites 1–3.

7.3. Diagnosis

Pereonites 1–3 with anterolateral projections forming an angle of about 45° with the longitudinal body axis. Anterolateral projections decreasing in size from Pereonite 1–3. Pereonite 7 with 2 small dorsal spines. Pleotelson with 3 lateral spines.

7.4. Description

Description of male (female unknown). *Body* (Fig. 10A) 6.8 times as long as wide. Body surface covered with small cuticular tubercles (see detail in Figs. 10A and 13 A,B). Head trapezoidal, 0.75 times as long as wide, antennae inserting on lateral processes. Pereonite 1 widest, with large anterolateral processes, processes 1.5 times as long as pereonite, forming an angle of about 45° with

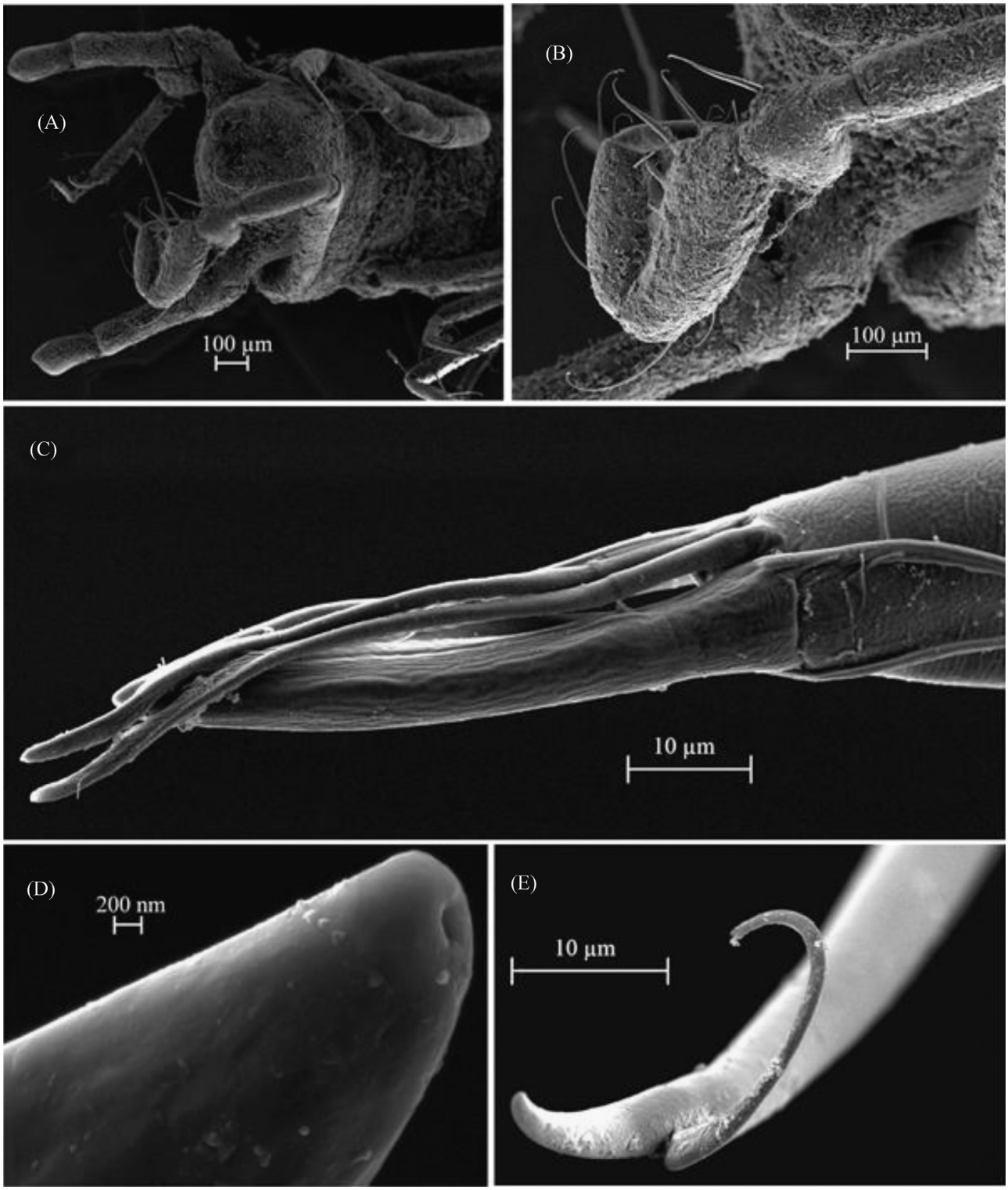

Fig. 9. *Stylomesus malyutinae* sp. nov., manca, ZMH K-44228. (A) Head, ventral view, (B) pereopod 1, (C) pereopod 2 dactylar claw, (D) pereopod 2 dactylus tip and (E) seta on antenna 1 article 4.

the longitudinal body axis and exceeding frontal margin of head, with a distal rounded widening (Fig. 13D).

Pereonite 2 with anterolateral projections similar to pereonite 1 but about one third shorter. Pereonite 3 with very short anterolateral projections, about one third of the length of the projections of pereonite 2. Pereonite 4 1.1 times as long as wide, narrowing abruptly after half length, broadest part 1.4 times as broad as narrowest part; pereonite 5 about 3.4 times as long as wide, with triangular space not covered with tubercles anteriorly, 0.4 times as long as body, broadening posteriorly, broadest part 1.9 times as broad as narrowest part; pereonites 5–7, pleonite 1 and pleotelson lacking intersomite articulations, but suture lines visible; pereonite 7 with 2 dorsal spines. All pleonites fused with pleotelson (Fig. 10 A). Pleotelson 2.4 times as long as wide, with vaulted axial ridge with 4 proximomedial dorsal spines, separated from lateral fields only by shallow elongate

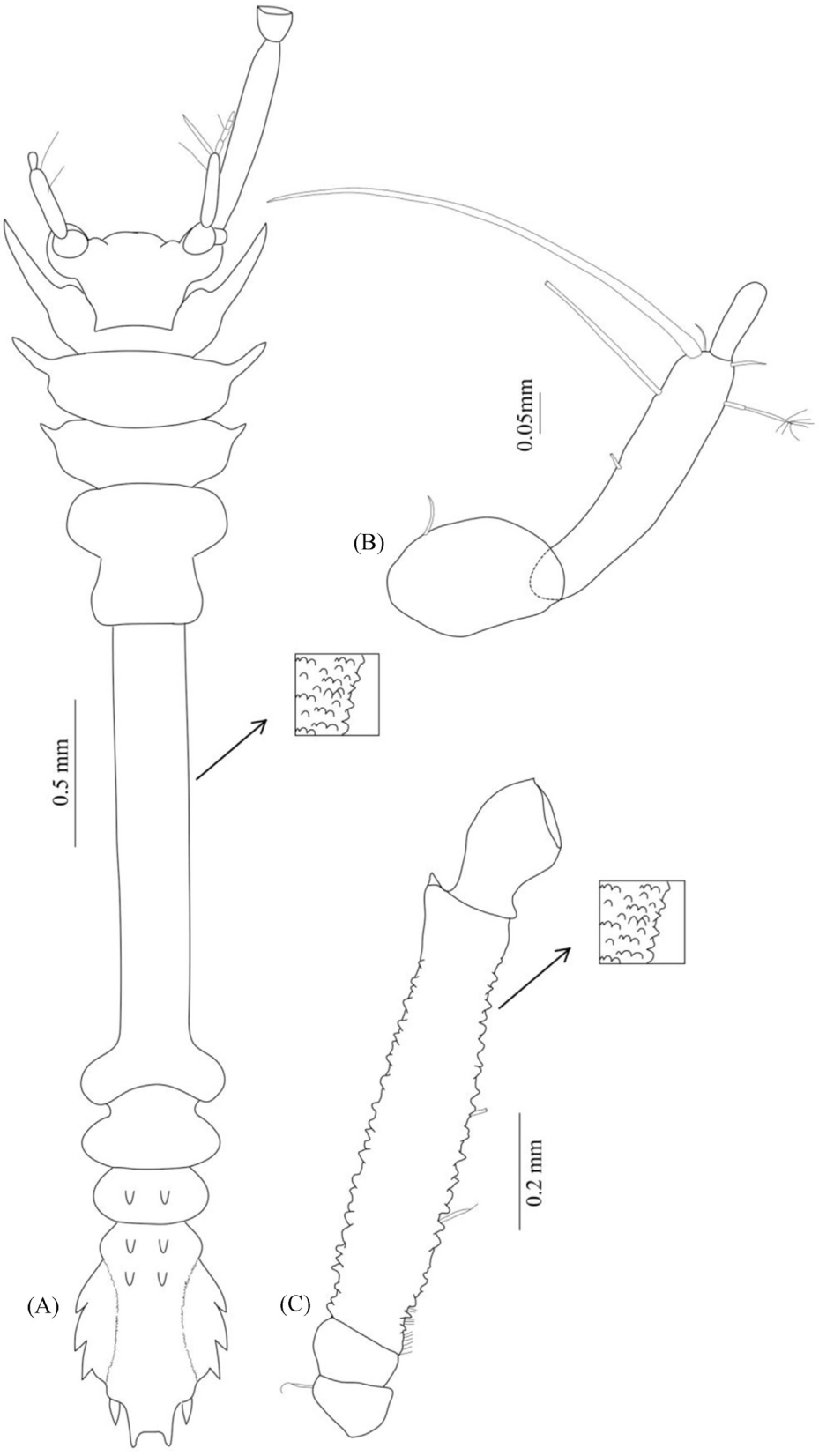

Fig. 10. *Fortimesus trispiculum* sp. nov. Holotype male, ZMH K-44127. (A) Habitus dorsal view, (B) antenna 1and (C) antenna 2.

concavities, lateral margin with 3 similar sized smaller lateral spines, posterior margin produced, with 2 large posterior spines of about the same size as the uropods, caudolaterally of the anus (Figs. 12F and 13C).

Antenna 1 (Fig. 10A,B) 3 articles in paratype male (articles 4–6 broken off in dissected paratype) (6 articles in holotype, but the Antenna 1 of holotype is not dissected in order not to damage it further); article 1 globular with 1 lateral simple short

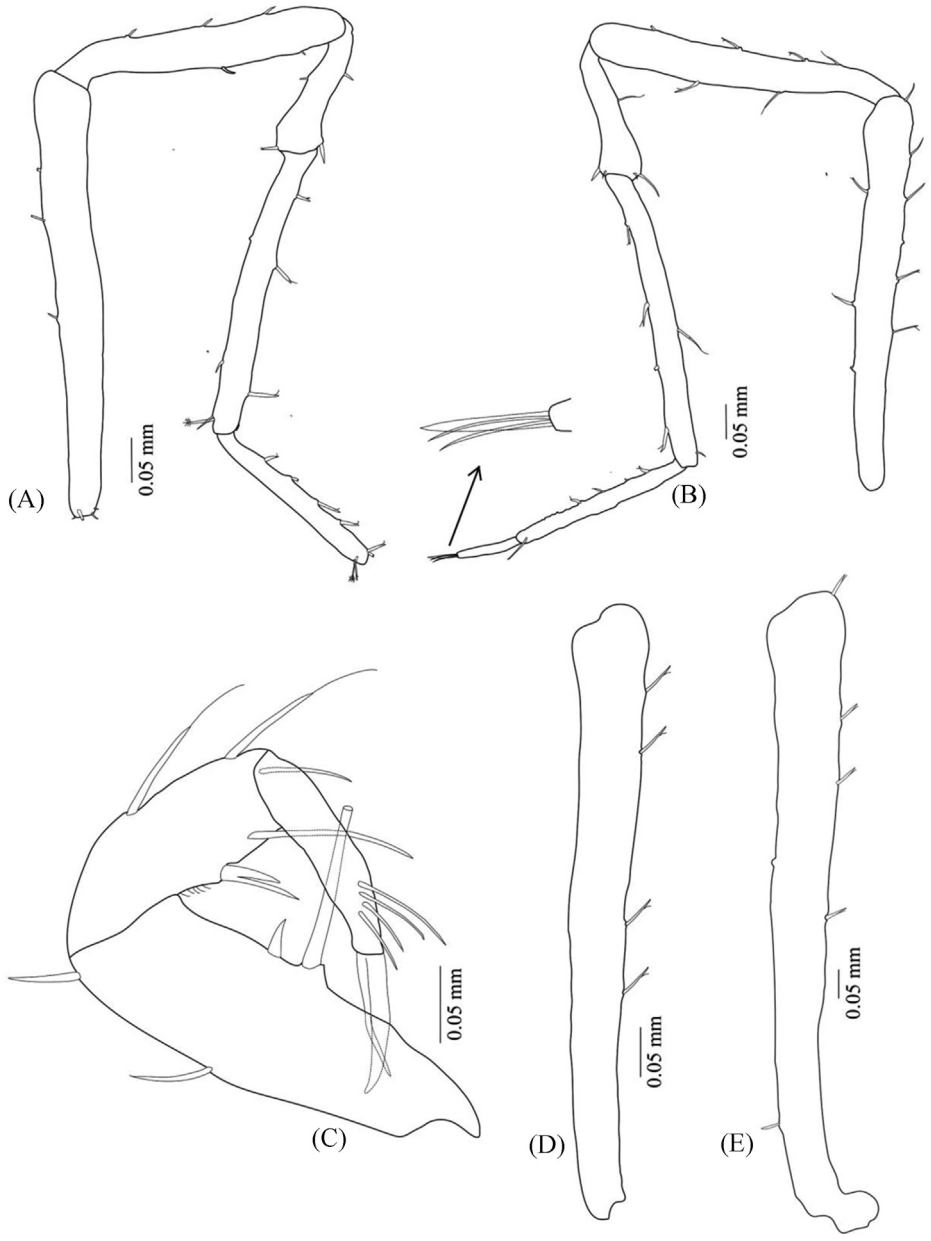

Fig. 11. *Fortimesus trispiculum sp. nov.* paratype male, ZMH K-44128. (A) pereopod 5, (B) pereopod 7, (C) pereopod 1, (D) pereopod 4 and (E) pereopod 3.

seta, article 2 slender, about 2 times as long as article 1 with 1 dorsodistal broom seta and 1 simple seta, 1 long distolateral seta with associated small simple seta; article 3 without setae.

Antenna 2 (Fig. 10C) with 4 articles in paratype male, additional articles broken off; article 1 0.7 times as long as wide, with medial sensory setae, article 2 0.6 times as long as wide, article 3 4.9 times as long as wide, covered with tubercles, lateral margin with proximal fine setule and 2 sensory setae, medial margin with distal spine.

Mandible, maxillas 1 and 2 damaged and not illustrated as we did not want to dissect the holotype.

Maxilliped (Fig. 12A) medial margin with 3 coupling hooks; palp article 1 without seta, but small simple seta close to medioproximal insertion of article 1 on endite; article 2 with 2 and article 3 with 3 simple setae; article 4 with 2 setae and article 5 with 1 longer and 4 slightly shorter terminal setae. Endite with vaulted distal margin bearing 2 simple setae and numerous fine setules, outer margin also with fringe of fine setules. Epipodite half-moon shaped and 3 times as long as wide (not illustrated in (Fig. 12A).

Pereopod 1 (Fig. 11C) basis, ischium and merus destroyed in preparation; carpus 3.2 times as long as wide, with 1 very large ventral simple seta, one small simple seta and 2 dorsal simple setae; propodus 2.8 times as long as wide, with 2 dorsal simple setae, 1 ventral spine-like seta and 1 ventral sensory seta; proximoventral margin covered with several thin setule; dactylus 4.9 times as long as wide with one lateroproximal simple seta and 4 laterodistal simple setae, terminal with 1 long accessory claw, 0.6 as long as article, and 1 long seta.

Pereopod 2 broken off.

Pereopods 3 and 4 (Fig. 11D,E) bases with 4 dorsal, spine-like sensory setae.

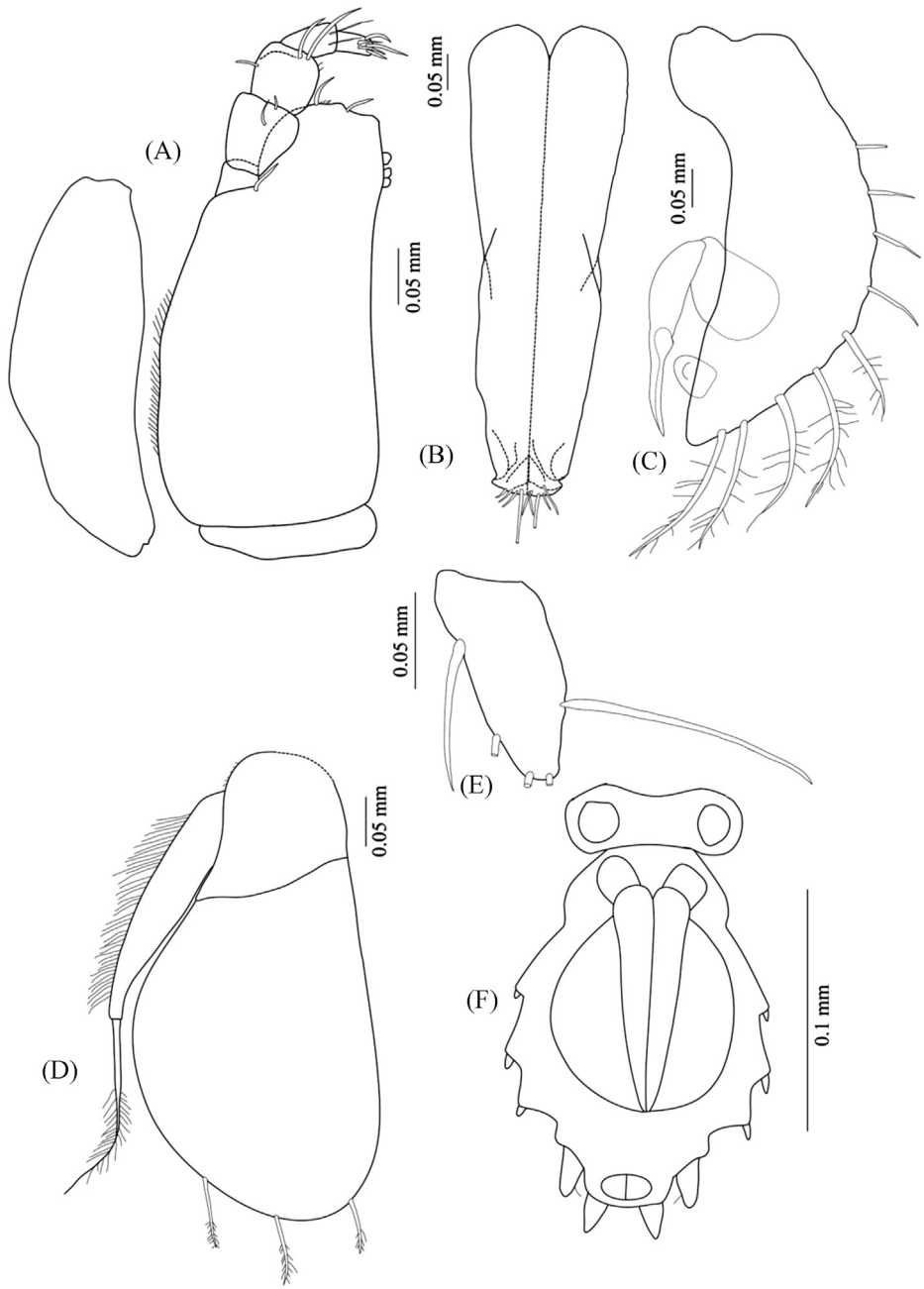

Fig. 12. *Fortimesus trispiculum sp. nov.* paratype male, ZMH K-44128. (A) Maxilliped, (B) pleopod 1, (C) pleopod 2, (D) pleopod 3, (E) uropod and (F) ventral side of pleotelson.

Pereopod 5 (Fig. 11A) basis about 9.5 times as long as wide; ischium about 7.25 times as long as wide; merus 3.3 times as long as wide, distoventrally with 2 sensory spine-like setae, 1 dorsal simple spine-like seta and 1 simple seta; carpus about 9.5 times as long as wide, ventral margin with 3 setae (distal one broken off), ventral margin with several small cuticular teeth (not illustrated) and 3 sensory setae; 1 distodorsal broom seta; propodus 8.3 times as long as wide, with 6 spine-like sensory setae ventrally and 1 broom seta and 1 simple seta dorsally, dactylus broken off.

Pereopod 6 broken off.

Pereopod 7 (Fig. 11B) basis about 8.3 times as long as wide, with 5 ventral spine-like sensory setae (one broken off) and 2 dorsal spine-like sensory setae (one broken off); ischium 8 times as long as wide, with 2 dorsal spine-like sensory setae and 4 ventral spine-like sensory setae (one broken off); merus about 3.5 times as long as wide, with 1 distoventral sensory seta and 4 terminal simple spine-like setae; carpus 12.8 times as long as wide, with 4 ventral sensory spine-like setae (one broken off) and 2 simple dorsal setae; propodus 9 times as long as wide, with 4 sensory spine-like setae (one broken off) and 1 terminal long simple seta; dactylus with dactylar claw and 2 simple setae.

Pleopod 1 (Fig. 12B) 3.2 times as long as wide; apical margin with 9 setae on both tips together, lateral margin forming rim, distal margin slightly rounded.

Pleopod 2 (Fig. 12C) sympod 2.7 times as long as wide, with 5 distolateral plumose setae and 4 lateral simple setae; endopod ending at the same height as the terminal margin of sympod, stylet 0.26 times as long as sympod; exopod simple lobe distally of endopod.

Pleopod 3 (Fig. 12D) sympod almost quadrangular, endopod of round to oval shape, 1.92 times as long as wide, with 3 small distal

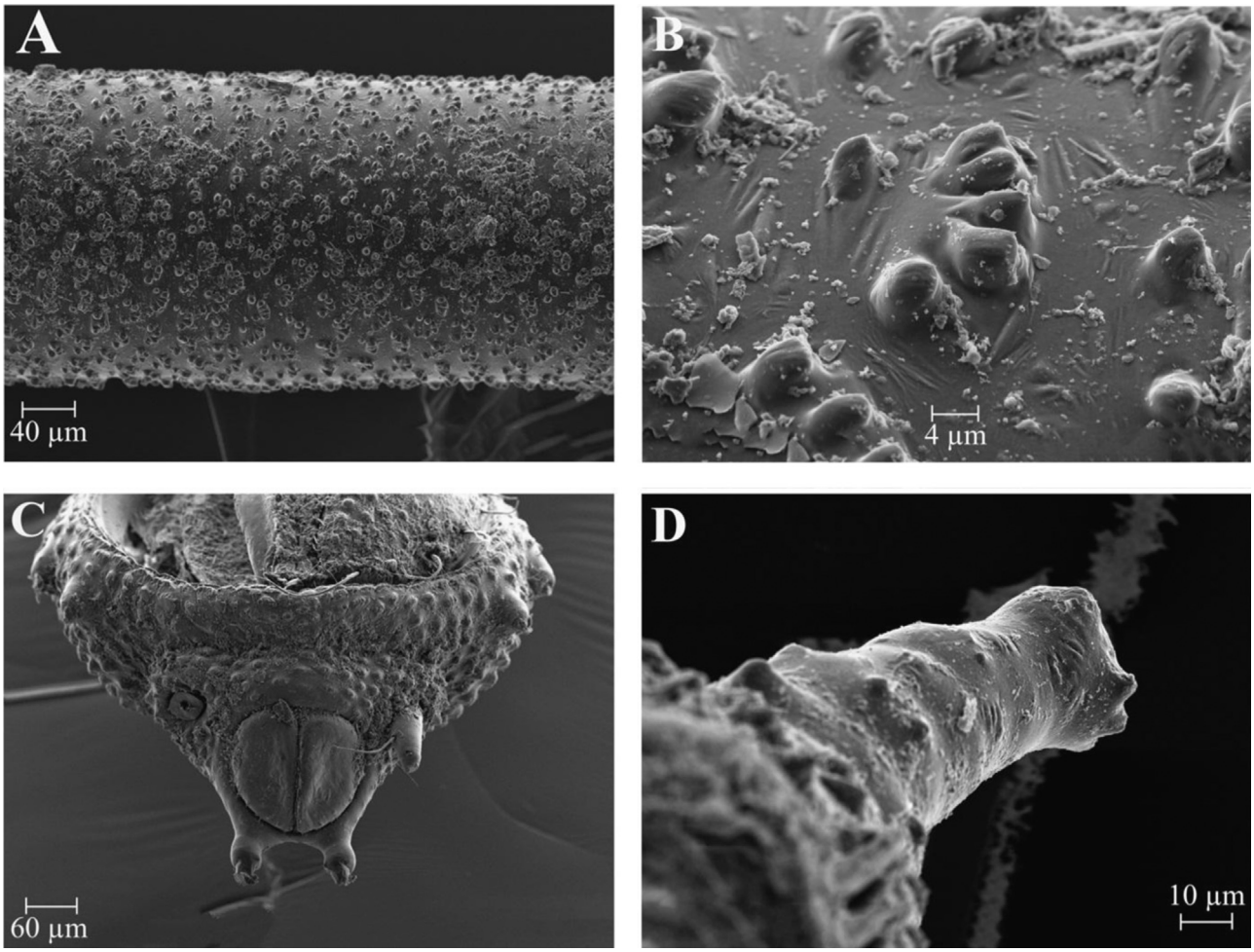

Fig. 13. *Fortimesus trispiculum sp. nov.* paratype male, ZMH K-44128. (A) tubercles covering the body, (B) close-up of tubercle, (C) anus and uropod in posteroventral view and (D) anterolateral process on pereonite 1.

plumose setae; exopod 0.5 times as long and 0.2 times as wide as endopod, fringe of long setules on outer margin.

Pleopod 4 (not illustrated) simple, uniramous, 1.7 times as long as wide, without setae.

Pleopod 5 absent.

Uropods (Figs. 10A, 12E) single-articulated, short, 2 times as long as wide, with 5 simple setae, 3 of these broken off, 0.1 times as long as pleotelson, not reaching terminal margin of pleotelson, inserting between posterolateral processes and terminal margin of pleotelson.

7.5. Distribution:

Northwest Pacific, Kuril–Kamchatka area, only known from type locality.

7.5.1. Remarks

The only other species of this genus with anterolateral projections on pereonites 1–3 is *Fortimesus cornutus* (Birstein, 1960). Apart from this, the two species differ in several characters. The projections on pereonite 1 of *F. cornutus* runs almost parallel to the body tapering anteriorly, while the projections of *Fortimesus trispiculum* sp. nov. are angled 45° to the longitudinal body axis. Furthermore, the axial ridge of *F. cornutus* only covers two thirds of the pleotelson length, whereas the axial ridge of *F. trispiculum* sp. nov. covers the whole length of the pleotelson. *F. cornutus* is characterised by numerous setae on the dorsal surface of pereonites 4 and 5 which are absent in *F. trispiculum*. The second article of antenna 1 is much longer (> 5 times of the length of article 1) than that of *F. trispiculum* (2 times as long as article 1). The third article of antenna 2 of *F. thomsoni* (Beddard, 1886) is similar to the antenna 2 of *F. trispiculum* sp. nov., as it is also covered with small tubercles. The shape of the pereonites and the distal end of the pleotelson also look similar. The lateral margins of *F. thomsoni* are covered with tubercles and spinules of different sizes and pereonites 1–4 have 2 short anterolateral processes each, whereas *F. trispiculum* sp. nov. has 1 larger anterolateral process on pereonites 1–3 each and the tubercles covering the body are less pronounced and very similar in size. Furthermore, there are no prominent dorsal spines on pereonites 1–4 of *F. trispiculum* sp. nov., as there are on *F. thomsoni*. There are 2 dorsal spines on pereonite 7 and 4 on the pleotelson on *F. trispiculum* sp. nov.. *F. thomsoni* has 4 dorsal spines on pereonite 7 and 2 small and 2 larger dorsal spines as well as 2 anterolateral spines on the pleotelson. *Fortimesus concinnus* (Birstein, 1960) has a similar shape like *F. trispiculum*, however, this species bears the three long lateral spines on pereonites 1, 3 and 4, pereonite 2 only bears a small, minute lateral spine.

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