



Article

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Description of a new species of the hippolytid shrimp genus *Eualus* Thallwitz, 1892 from Japan, and clarification of the status of *E. kikuchii* Miyake & Hayashi, 1967 (Crustacea: Decapoda: Caridea)

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Abstract

This study reports on two species of the hippolytid shrimp genus *Eualus* Thallwitz, 1892 from Japan. The first, *Eualus ctenomerus* n. sp., is described on the basis of six specimens from off southern Kyushu. The new species appears closest to *E. cteniferus* (Barnard, 1950) from South Africa, *E. drachi* Noël, 1978 from the Mediterranean, *E. lebourae* Holthuis, 1951 from the eastern Atlantic, and *E. pectiniformis* Hanamura, 2008 from southeastern Australia. The second is referred to *E. kikuchii* Miyake & Hayashi, 1967, which has been considered to be synonymous with *E. bulychevae* Kobjakova, 1955, described from the South Kuril Islands, Far East Russia. *Eualus kikuchii* is redescribed as a valid species on the basis of the holotype and additional specimens from various Japanese localities. Both species occurred in the whale-fall ecosystems located off Cape Nomamisaki, Kyushu, Kagoshima Prefecture.

Key words: Crustacea, Decapoda, Caridea, Hippolytidae, *Eualus*, new species, Japan

Introduction

The hippolytid genus *Eualus* Thallwitz, 1892 currently contains 37 species from the world oceans, including the Arctic and Antarctic seas, though poorly represented in the tropics (De Grave & Fransen 2010). From Japanese waters about 14 species are known (Hayashi 1993; Komai & Yakovlev 2000; Komai & Hayashi, 2002).

Fujiwara et al. (2007) investigated whale-fall ecosystems, based on mass sinking of whale carcasses artificially implanted at shelf depths off Cape Nomamisaki, Kagoshima Prefecture, southwestern Japan. They reported the occurrence of five caridean species in this environment, amongst which was *Eualus* sp. cf. *kikuchii* Miyake & Hayashi, 1967 (Hippolytidae). Examination of the voucher specimens used in Fujiwara et al. (2007) and subsequently collected specimens from the same location in 2007 revealed that two species were actually represented in the samples. One of these is here described as new, *E. ctenomerus* n. sp., and the second is referred to *E. kikuchii*. The status of the latter taxon has been unclear, considered to be synonymous with *E. bulychevae* Kobjakova, 1955, described from the Kuril Islands by Miyake (1982) and (Hayashi 1993), while listed as a valid species in Chace (1997) and De Grave & Fransen (2010). Therefore, we attempted to clarify the status of *E. kikuchii*, herein considered to be a valid species. Detailed descriptions are provided for the two species. The new species appears closest to *E. cteniferus* (Barnard, 1950), *E. drachi* Noël, 1978, *E. lebourae* Holthuis, 1951, and *E. pectiniformis* Hanamura, 2008, all known from outside of the northwestern Pacific.

The material examined in this study is deposited in the Japan Agency of Marine-Earth Science and Technology (JAMSTEC), the Kitakyushu Museum of Natural History and Human History (KMNH-ZLKU) the National Museum of Nature and Science, Tokyo (NSMT), and the Natural History Museum and Institute, Chiba (CBM). Carapace length (cl) represents specimen size, measured from the posterior margin of the orbit to the midpoint of the posterodorsal margin of the carapace.

***Eualus ctenomerus* n. sp.**

(Figs 1–5)

Eualus sp. cf. *kikuchii*.—Fujiwara et al. 2007: 223 (list; part).

Material examined. Holotype: RV *Natsushima*, NT07-09 cruise, ROV *Hyper-Dolphin*, dive #869, off Cape Nomamisaki, Kagoshima Prefecture, 31°21.000'N, 129°59.160'E, 227 m, 8 June 2007, manipulator, male (cl 1.8 mm), NSMT-Cr 22239 (formerly JAMSTEC 071992).

Paratypes: RV *Natsushima*, NT05-12 cruise (leg 1), ROV *Hyper-Dolphin*, dive #453, off Cape Nomamisaki, Kagoshima Prefecture, 31°21.000'N, 129°59.160'E, 227 m, 27 July 2005, suction sampler, 1 male (cl 1.6 mm), JAMSTEC 20050033425; same data as holotype, 3 ovigerous females (cl 3.0–3.1 mm), JAMSTEC 071994–071996.

Non-type: TRV *Toyoshio-maru*, 1996-5 cruise, stn 11, S of Yakushima Island, Ohsumi Islands, 30°12.00'N, 125°46.0'E, 135 m, 4 June 1996, sledge, coll. T. Komai, 1 male (cl 1.4 mm), CBM-ZC 4060.

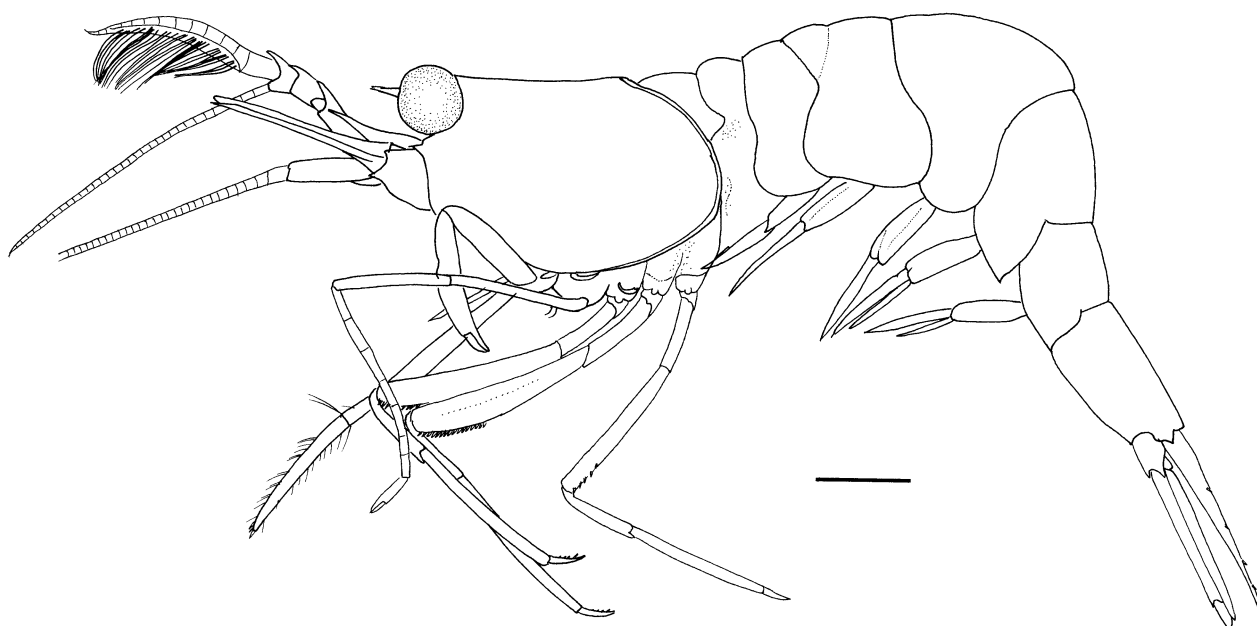


FIGURE 1. *Eualus ctenomerus* n. sp., holotype, male (cl 1.8 mm), NSMT-Cr 22239, habitus. Scale bar: 1 mm.

Description. *Male holotype.* Body (Fig. 1) moderately stout for genus. Rostrum (Fig. 2A, B) 0.5–0.6 length of carapace, nearly straight, spiniform, directed forward, far falling short of distal margin of first segment of antennular peduncle; basal part moderately widened; dorsal margin armed with 3 teeth, distal 0.2 unarmed; ventral margin with minute subterminal tooth; no conspicuous lateral carina. Carapace (Fig. 2A) with dorsal margin nearly straight, rostral carina reaching slightly beyond orbital margins; antennal tooth moderately strong; inferior orbital angle obtuse, not clearly separated from antennal tooth; pterygostomial margin rounded; anterolateral margin between antennal and pterygostomial teeth slightly sinuous.

Abdomen (Fig. 1) rounded dorsally. Posterodorsal margin of third tergite moderately produced. Fourth and fifth pleura each with small posteroventral tooth. Sixth somite 1.8 times longer than fifth, 1.8 times longer than high; posterolateral tooth terminating in acute tooth; small posteroventral tooth present. Telson (Fig. 2C) about 1.3 times longer than sixth abdominal somite, about 3.5 times longer than anterior width; lateral margins parallel in anterior 0.4, narrowing thereafter to convex posterior margin; dorsal surface with 4 pairs of dorsolateral spines (excluding 1 pair at posterolateral corner); posterior margin with 2 pairs of spines (mesial pair more than 4 times longer than lateral pair) and 1 mesial pair of stiff setulose setae.

Eye (Figs 1, 2B) subpyriform; cornea bearing ocellar spot, its maximal width about 0.4 of carapace length.

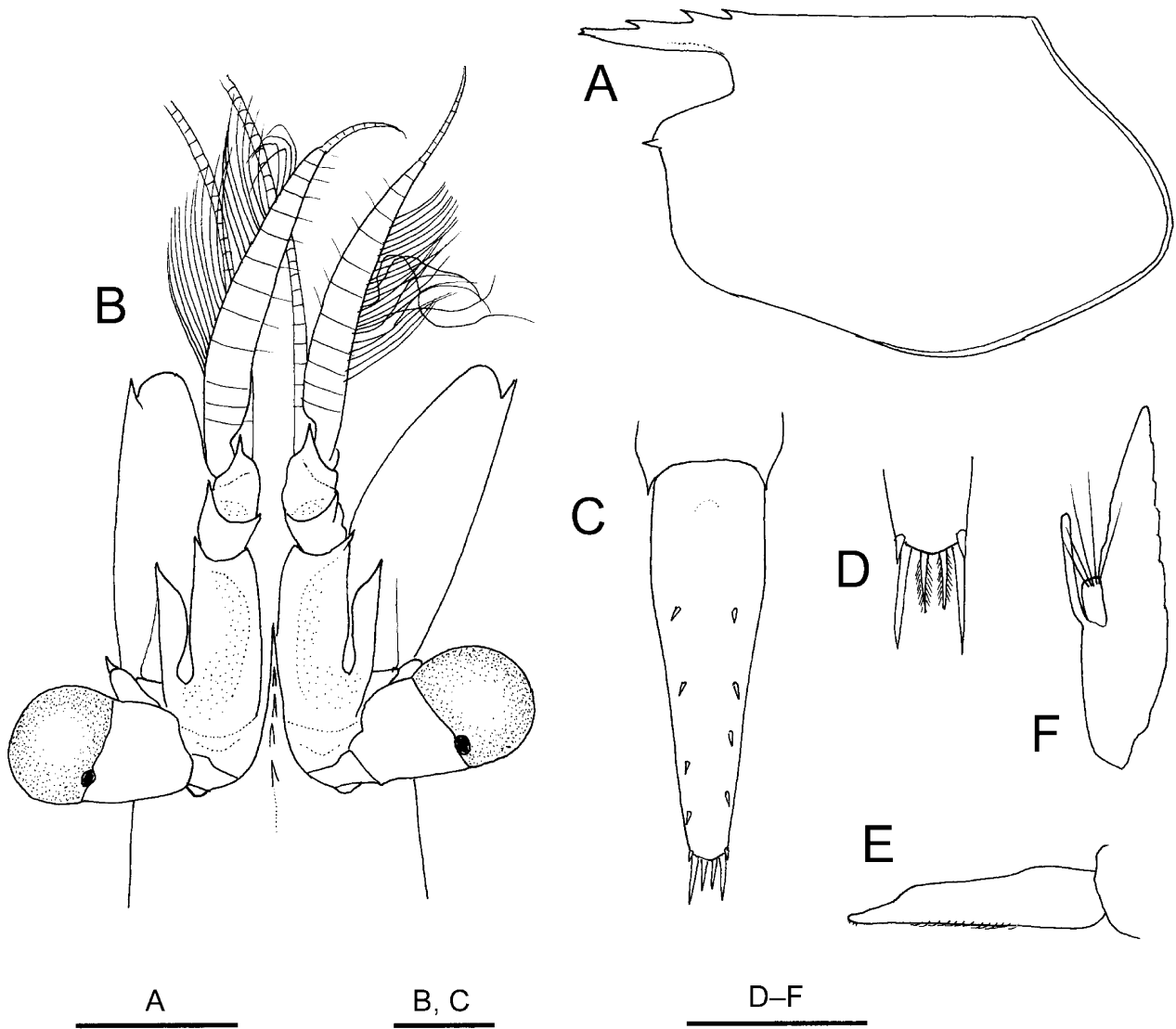


FIGURE 2. *Eualus ctenomerus* n. sp., holotype, male (cl 1.8 mm), NSMT-Cr 22239. A, carapace, lateral view; B, anterior part of carapace and cephalic appendages, dorsal view (marginal setae of antennal scale omitted); C, telson, dorsal view; D, close up of posterior part of telson, dorsal view; E, endopod of left first pleopod, ventral view (setae partially omitted); F, endopod of left second pleopod, ventral view (setae partially omitted). Scale bars: 1 mm for A; 0.5 mm for B–F.

Antennular peduncle (Fig. 2B) reaching distal 0.3 of antennal scale. Basal segment reaching nearly to midlength of antennal scale, armed with 1 strong distolateral tooth; ventromesial ridge with prominent tooth subdistally; stylocerite reaching or slightly falling short of distal margin of basal segment, terminating in acute tooth, without proximolateral process. Distal two segments combined much shorter than basal segment, each with distinct spiniform distal tooth. Outer flagellum with thickened aesthetasc-bearing portion subequal in length to carapace. Inner flagellum elongate, about twice length of outer flagellum.

Antennal peduncle (Figs 1, 2B) with basicerite bearing small ventrolateral distal tooth, dorsolateral distal angle rounded. Carpocerite nearly reaching midlength of antennal scale. Antennal scale 1.1 times longer than carapace, 2.9 times longer than wide; lateral margin faintly convex; distolateral tooth slightly falling short of rounded distal margin of blade.

Mouthparts not dissected. Third maxilliped (Fig. 3A) moderately long and slender, overreaching antennal scale by about 0.4 length of ultimate segment; ultimate segment 2.7 times longer than penultimate segment (= carpus), tapering distally, distal part bearing some small spines; antepenultimate segment subequal in length to distal two segments combined, slightly narrowing proximally, dorsodistal margin unarmed, distolateral margin with small spine-like tooth and long stout seta just inferior to base of tooth. Coxa with strap-like, terminally hooked epipod.

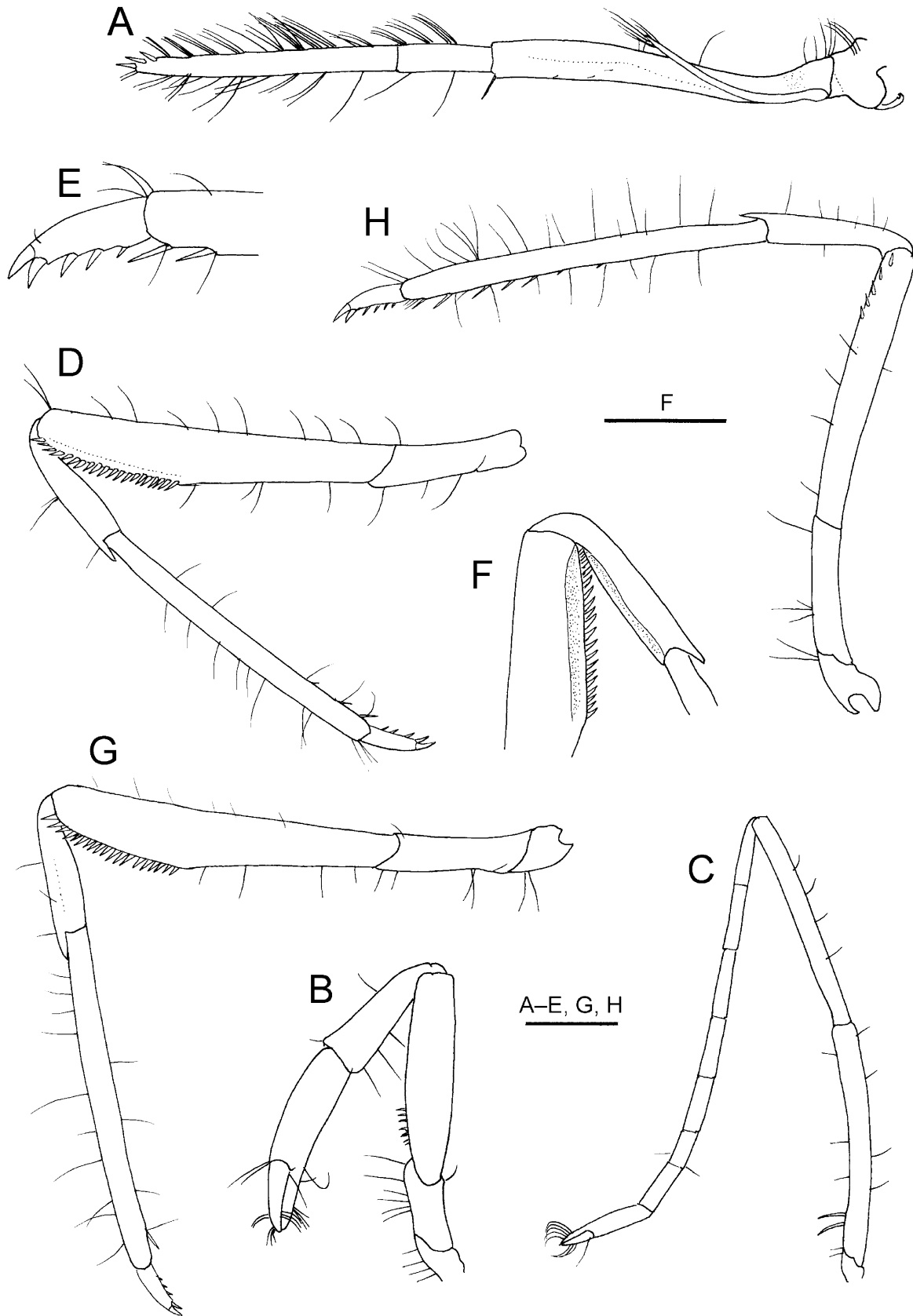


FIGURE 3. *Eualus ctenomerus* n. sp., holotype, male (cl 1.8 mm), NSMT-Cr 22239, left thoracic appendages. A, third maxilliped, dorsal (extensor) view; B, first pereopod, lateral view; C, second pereopod, lateral view; D, third pereopod, lateral view; E, same, dactylus, lateral view; F, carpus and distal part of merus, mesial view; G, fourth pereopod, lateral view; H, fifth pereopod, lateral view. Scale bars: 0.5 mm for A–D, F–H; 0.25 mm for E.

Strap-like, terminally hooked epipods on first to third pereopods.

First pereopod (Fig. 3B) moderately stout, far falling short of distal margin of antennal scale. Chela about 1.4 times longer than carpus, 4.3 times longer than wide; dactylus about 0.7 times as long as palm, with 2 terminal claws; palm subcylindrical, fixed finger terminating in single claw. Merus with short row of minute spinules on ventral margin proximally. Ischium without minute spinules on ventral margin.

Second pereopod (Fig. 3C) overreaching antennal scale by 0.4 length of carpus; carpus divided into 7 articles. Third to fifth pereopods moderately long and slender, similar in general structure and armature. Third pereopod (Fig. 3D) overreaching antennal scale by about 0.4 length of propodus; dactylus slightly more than 0.2 times as long as propodus, about 3.0 times longer than high, armed with 4 accessory spines on over entire length of flexor margin (Fig. 3E); propodus with few slender spinules on flexor margin distally; carpus about half length of propodus; merus somewhat compressed laterally, widest slightly distal to midlength, with comb-like row of closely set spines (about 20 in number) ventrolaterally in distal 0.4, without row of setae on lateral surface adjacent to comb-like spine series; ischium distinctly widened distally. Fourth pereopod (Fig. 3G) overreaching antennal scale by 0.2 length of propodus. Fifth pereopod (Fig. 3H) reaching to distal margin of antennal scale by dactylus; dactylus about 0.2 times as long as propodus; propodus with row of slender spinules on entire length of flexor margin; merus with 5 well spaced small ventrolateral spines arranged in short row in distal 0.3; ischium not particularly widened distally.

Endopod of first pleopod (Fig. 2E) with appendix interna tapering distally, mesial subdistal lobe obsolescent. Endopod of second pleopod (Fig. 2F) with appendix masculina stout (about twice as long as wide), only about one-third length of appendix interna, bearing several long stiff setae. Uropodal protopod with posterolateral tooth gradually tapering; both rami slightly overreaching posterior tip of telson.

Paratype male. Very similar to holotype male except for following: rostrum with 4 dorsal teeth, ventral margin unarmed; merus of fifth pereopod unarmed.

Females. Body stouter than in males (Fig. 4). Rostrum (Fig. 5A) straight or slightly curved dorsally, 0.5–0.6 times as long as carapace, with 3 or 4 teeth in proximal half, distal half unarmed; ventral margin unarmed or armed with 1 tiny subterminal tooth. Carapace (Fig. 5A) with dorsal margin slightly convex. Third and fourth pereopods normal (Fig. 5B, C); meri subcylindrical, with 3 or 4 (third) and 2 or 3 (fourth) lateral spines located in distal 0.2–0.3. Merus of fifth pereopod unarmed or armed with 1 ventrolateral distal spine (Fig. 5D). Pleopods without distinctive features.

Coloration in life. Not known.

Distribution. Off southern Kyushu, Japan; 135–227 m.

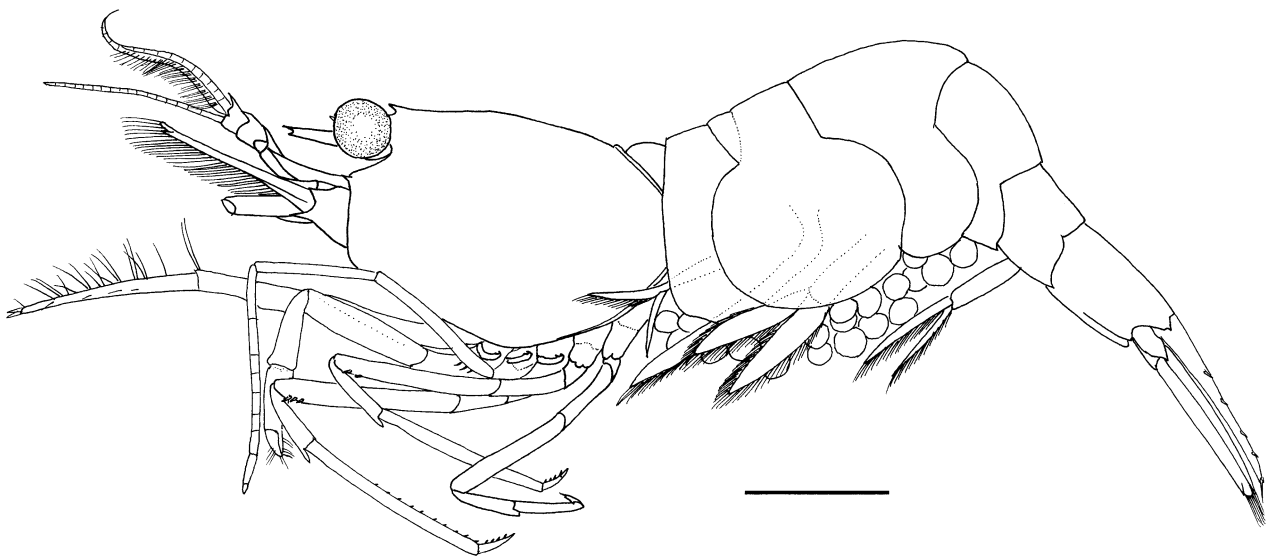


FIGURE 4. *Eualus ctenomerus* n. sp., paratype, ovigerous female (cl 3.1 mm), JAMSTEC 071994–071996, habitus. Scale bar: 2 mm.

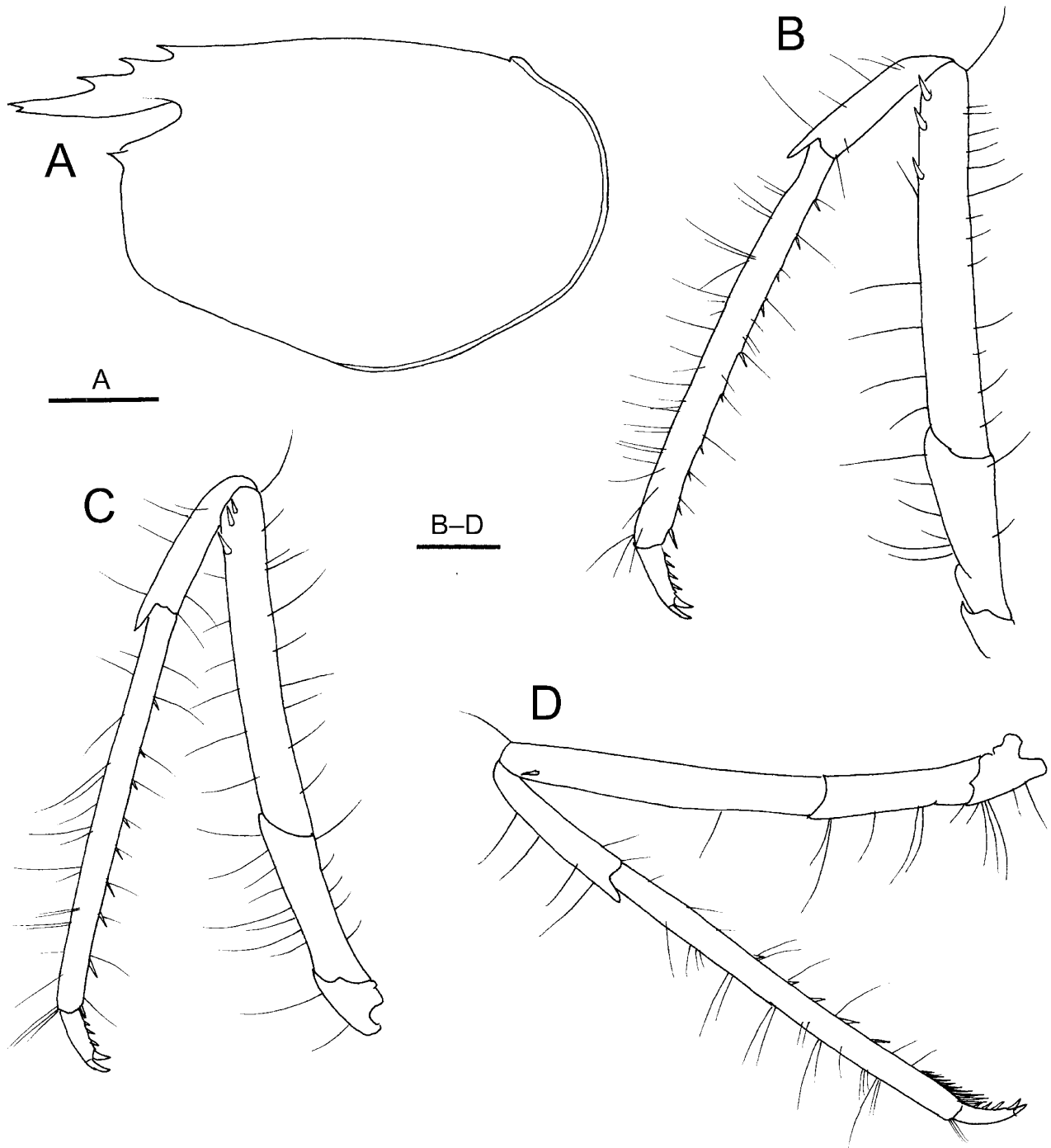


FIGURE 5. *Eualus ctenomerus* n. sp., paratype, ovigerous female (cl 3.1 mm), JAMSTEC 071994–071996. A, carapace, lateral view; B, left third pereopod, lateral view; C, left fourth pereopod, lateral view; D, left fifth pereopod, lateral view. Scale bars: 1 mm.

Remarks. This new species is characterized by the possession of epipods on the anterior three pairs of pereopods, the rounded pterygostomial angle of the carapace and the male with meri of the third and fourth pereopods bearing a row of closely set spines in a comb-like arrangement. As such, it appears closest to *E. cteniferus* known only from Algoa Bay, Durban, South Africa; *E. drachi* known only from the Mediterranean; and *E. pectiniformis* known only from southeastern Australia (Barnard 1950; Noel 1978; Hanamura 2008). *Eualus ctenomerus* n. sp. can be distinguished from *E. cteniferus*, by the following characters: (1) the ventral margin of the rostrum is unarmed or armed with a single subterminal tooth in *E. ctenomerus*, rather than bearing two or three ventral teeth in *E. cteniferus* (cf. Barnard 1950; Kensley 1972); (2) all dorsal rostral teeth are placed on the rostrum

proper in *E. ctenomerus*, whereas the posteriormost tooth is located posterior to the level of orbital margin (postrostral) in *E. cteniferus* (cf. Barnard 1950; Hanamura 2008).

From *E. drachi*, the new species can be distinguished by the following characters (Noël 1978; d'Udekem d'Acoz & Wirtz 2002): (1) the rostrum is relatively short, not reaching beyond the distal margin of the first segment of the antennular peduncle in *E. ctenomerus*, rather than reaching to the distal margin of the second segment in *E. drachi*; (2) the dorsal rostral teeth are all placed on the rostrum proper in *E. ctenomerus*, whereas the posteriormost tooth is postrostral in *E. drachi*; (3) the ischium of the first pereopods is unarmed ventrally in *E. ctenomerus*, rather than having a few minute spinules on the ventral surface distally in *E. drachi*.

Eualus pectiniformis is very similar to the present new species, but the following minor differences could differentiate these two taxa: (1) the merus of the first pereopod lacks a proximolateral process in *E. ctenomerus*, though a small but distinct proximal process on the lateral surface of the segment is present in *E. pectiniformes* (cf. Hanamura 2008: fig. 2i); (2) spines comprising the comb-like row on the merus of the third pereopod in males are proportionally longer in the new species than in *E. pectiniformes* (cf. Fig. 3D, F and Hanamura 2008: fig. 3b); (3) the merus of the third pereopod is glabrous in *E. ctenomerus* (Fig. 3D), whereas it bears a short row of setae on the lateral surface adjacent to comb-like spine series on the ventrolateral margin (Hanamura 2008: fig. 3b).

Eualus lebourae Holthuis, 1951, known from the eastern Atlantic and Azores, is also closely similar to the above-mentioned species, though no morphological information on the male is available so far. d'Udekem d'Acoz & Wirtz (2002) suspected that *E. drachi* might be a geographical variant of *E. lebourae*. *Eualus ctenomerus* n. sp. can be distinguished from *E. lebourae* by the following minor points (cf. Holthuis 1951; Crosnier & Forest 1973): (1) the rostrum does not overreach the distal margin of the first segment of the antennular peduncle in *E. ctenomerus*, rather than overreaching it in *E. lebourae*; (2) the posterior margin of the telson is rounded in *E. ctenomerus*, but in *E. lebourae*, it bears a sharp median tooth; (3) the stylocerite reaches or slightly falls short of the distal margin of the first segment of the antennular peduncle in *E. ctenomerus*, rather than somewhat overreaching it in *E. lebourae*.

In the presence of a comb-like row of spines on the meri of the third and fourth pereopods in the male and the possession of epipods on the anterior three pairs of pereopods, *Eualus butleri* Jensen, 2004, known from Alaska to Puget Sound is also similar to this new species. Nevertheless, the presence of a pterygostomial tooth on the carapace, the short stylocerite (far falling short of the first segment of the antennular peduncle) and the comb-like spinules extending over the entire length of the merus of the third pereopod immediately distinguish *E. butleri* from *E. ctenomerus* (cf. Jensen 2004).

The characteristic comb-like row of spines on the meri of the third and fourth pereopods in the male is also seen in *E. cranchii* (Leach, 1817) and *E. occultus* (Lebour, 1936), both known from the northeastern Atlantic. However, these two species are readily distinguished from *E. ctenomerus* and other related species in the lack of an epipod on the third pereopod (Holthuis 1951; d'Udekem d'Acoz & Wirtz 2002).

Etymology. From the combination of the Greek “kteis” (= comb) “merus” (= femur), in reference to the comb-like spines on the meri of the third and fourth pereopods.

Eualus kikuchii Miyake & Hayashi, 1967

(Figs 6–8)

Eualus kikuchii Miyake & Hayashi, 1967: 261, figs 6, 7; Hayashi & Miyake 1968: 129, fig. 4; Noël 1978: 32 (key); Chace 1997: 43 (list); De Grave & Franssen 2010: 417 (list).

Eualus bulychevae.—Miyake 1982: 184 (part; list); Hayashi 1993: 311, figs 244a, 245a; Komai & Hayashi 2002: 390 (list).

Eualus sp. cf. *kikuchii*.—Fujiwara et al. 2007: 223 (list; part).

Material examined. Holotype. Tomioka Bay, Amakusa Islands, Kyushu, 21 April 1964, coll. T. Kikuchi, male (cl 1.8 mm), KMNH-ZLKU 8072.

Non-type. Off Uze, Amakusa, Kyushu, 45 m, 14 April 1964, dredge, coll. T. Kikuchi, 1 male (cl 1.5 mm), 3 females (cl 1.4–2.4 mm), 7 ovigerous females (cl 1.9–2.4 mm), KMNH-ZLKU 8406. RV *Tansei-maru*, KT95-5 cruise, stn TB18-1, Okinoyama Bank, Sagami Sea, 34°58.7'N, 139°40.0E, 102–103 m, 21 April 1995, dredge, coll. T. Komai, 1 female (cl 2.4 mm), CBM-ZC 1821. TRV *Shin'yo-maru*, 1996 cruise, stn 7, Takase Bank, Izu Islands, 34°26.80'N, 139°11.17'E, 87–93 m, 23 October 1996, dredge, 1 ovigerous female (cl 2.2 mm), coll. T. Komai, CBM-ZC 4629. Sagami Bay, off Arasaki, Miura, 35°11.02'N, 139°34.55'E, 60–67 m, 8 March 2002, commercial

gill net, coll. T. Komai, 1 male (cl 1.4 mm), 1 female (cl 2.2 mm), CBM-ZC 10334; same locality, 35°10.53'N, 139°34.56'E, 62–73 m, 8 March 2002, commercial gill net, coll. T. Komai, 1 male (cl 1.8 mm), 3 females (cl 1.8–1.9 mm), 3 ovigerous females (cl 1.7–2.3 mm), CBM-ZC 10336. RV *Natsushima*, NT05-12 cruise (leg 1), ROV *Hyper-Dolphin*, dive #452, off Cape Nomamisaki, Kagoshima Prefecture, 31°21.000'N, 129°59.160'E, 227 m, 27 July 2005, manipulator, 1 ovigerous female (cl 2.8 mm), JAMSTEC 20050033423; same data, 1 male (cl 1.7 mm), JAMSTEC 20050033424; RV *Natsushima*, NT07-09 cruise, ROV *Hyper-Dolphin*, dive #869, same locality, 8 June 2007, manipulator, 2 ovigerous females (cl 2.7, 3.0 mm), JAMSTEC 071997–071998.

Redescription. *Female.* Body (Fig. 6) moderately stout for genus. Rostrum (Fig. 7A, B) 0.5–0.6 length of carapace, almost straight, directed forward or downward, reaching or slightly falling short of distal margin of first segment of antennular peduncle, fairly broadened proximally; dorsal margin slightly sloping anteriorly, armed with 4–6 teeth (posteriormost tooth located just above orbital margin or slightly posterior to orbital margin); ventral margin not forming limb or blade, unarmed or armed with 1 (rarely 2) tiny subterminal tooth; no conspicuous lateral carina. Carapace (Fig. 7A, B) with dorsal margin slightly convex, rostral carina reaching or slightly extending beyond rostral base; antennal tooth moderately strong; inferior orbital angle obtuse, not clearly separated from antennal tooth; pterygostomial tooth tiny, but always present at least in females; anterolateral margin between antennal and pterygostomial teeth convex.

Abdomen (Fig. 6) rounded dorsally. Posterodorsal margin of third tergite moderately produced, unarmed. Fourth and fifth pleura each with sharp posteroventral tooth. Sixth somite 1.6–1.7 times longer than fifth, 1.9–2.0 times longer than high; posterolateral tooth terminating in acute tooth; small posteroventral tooth present. Telson (Fig. 7C) about 1.4 times longer than sixth abdominal somite, about 3.0 times longer than anterior width; lateral margins parallel in anterior 0.4, tapering thereafter to convex posterior margin; dorsal surface with 4 or 5 pairs of dorsolateral spines (excluding 1 pair at posterolateral corner); posterior margin with 2 pairs of spines (mesial pair more than 4 times longer than lateral pair) and 1 mesial pair of stiff setulose setae.

Eye (Figs 6, 7B) subpyriform; cornea bearing ocellar spot, its maximal width about 0.3 of carapace.

Antennular peduncle (Fig. 7A, B) reaching distal 0.3–0.4 of antennal scale. Basal segment reaching nearly to midlength of antennal scale, armed with 1 strong distolateral tooth; ventromesial ridge with prominent tooth subdistally; stylocerite just reaching level of distal margin of basal segment, terminating in acute, slender tooth, without proximolateral process. Distal two segments combined much shorter than basal segment, each with distinct spiniform distal tooth.

Antennal peduncle (Fig. 7A, B) with basicerite bearing small ventrolateral distal tooth, dorsolateral distal angle rounded. Carpocerite slightly falling short of midlength of antennal scale. Antennal scale 0.7–0.8 times as long as carapace, about 2.6 times longer than wide; lateral margin nearly straight; distolateral tooth slightly falling short of or just reaching rounded distal margin of blade.

Mouthparts not dissected. Third maxilliped (Fig. 8A) moderately long and slender, overreaching antennal scale by 0.3–0.5 length of ultimate segment; ultimate segment 2.8 times longer than penultimate segment (= carpus), tapering distally, distal part bearing some small spines; antepenultimate segment shorter than distal two segments combined, narrowing proximally, dorsodistal margin with tiny tooth, distolateral margin with small spine-like tooth and long stout seta just inferior to base of tooth. Coxa with strap-like, terminally hooked epipod.

Strap-like, terminally hooked epipods on first to third pereopods.

First pereopod (Fig. 8B) moderately stout, not reaching distal margin of antennal scale. Chela about 1.5 times longer than carpus, about 3.5 times longer than wide; dactylus about 0.6 times as long as palm, with 2 terminal claws; palm subcylindrical, fixed finger terminating in single claw. Merus with minute spinules on ventral margin proximally. Ischium also with minute spinules on ventral margin distally.

Second pereopod (Fig. 8C) overreaching antennal scale by length of chela and half of carpus; carpus divided into 7 articles.

Third to fifth pereopods moderately long and slender, similar in general structure. Third pereopod (Fig. 8D) overreaching antennal scale by about 0.4 length of propodus; dactylus slightly less than 0.3 times as long as propodus, about 3.0 times longer than high, armed with 4–6 accessory spines over entire length of flexor margin (Fig. 8E); propodus with row of spinules on flexor margin; carpus about half length of propodus; merus with 2 or 3 lateral spines located in distal one-third; ischium not particularly widened distally. Fourth pereopod (Fig. 8F) overreaching antennal scale by 0.2–0.3 length of propodus; merus with 1–3 lateral spines located in distal 0.3. Fifth pereopod (fig. 8G) reaching to distal margin of antennal scale by dactylus; merus unarmed or armed with 1 spine located subdistally.

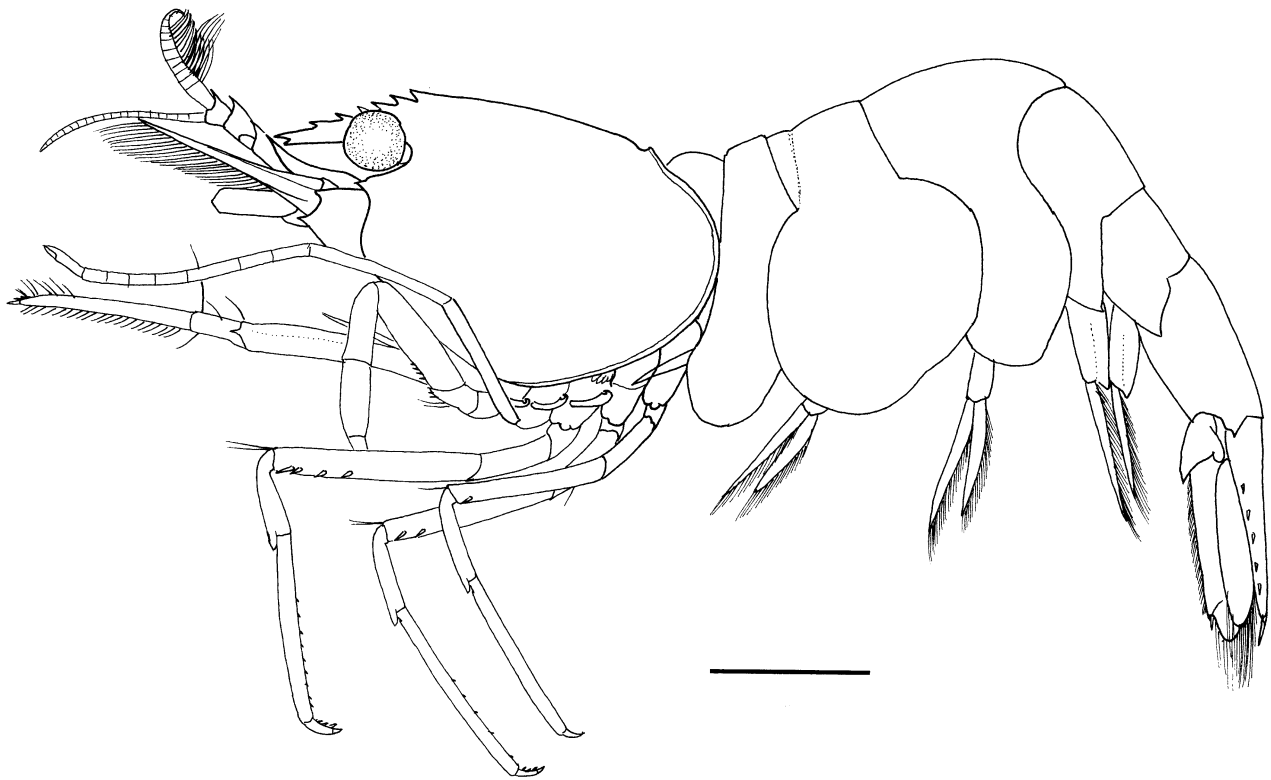


FIGURE 6. *Eualus kikuchii* Miyake & Hayashi, 1967, ovigerous female (cl 3.0 mm), JAMSTEC 071997–071998, habitus. Scale bar: 2 mm.

Pleopods without distinctive features. Uropodal protopod with posterolateral tooth gradually tapering; both rami slightly overreaching posterior top of telson.

Males. Generally similar to females. Rostrum shorter, usually falling short of distal margin of first segment of antennular peduncle. Third and fourth pereopods similar to those of females, not showing sexual dimorphism in armature of merus. Endopod of first pleopod (Fig. 7D) with appendix interna tapering distally, mesial subdistal lobe angular. Endopod of second pleopod (Fig. 7E) with appendix masculina slightly shorter than appendix interna, slightly broadened distally, bearing several long stiff setae.

Coloration in life. Body and appendages generally translucent.

Distribution. Known only from the Pacific side of Japanese mainland, from Sagami Sea to Amakusa, Kyushu, 60–227 m.

Remarks. *Eualus kikuchii* was originally described on the basis of six specimens from Amakusa, Kyushu, Japan (Miyake & Hayashi 1967). However, Miyake (1982: 184) regarded this taxon as a junior synonym of *E. bulychevae*, described on the basis of material from the South Kuril Strait, Kuril Islands, but he gave no comments to potentially justifying this action. Later Hayashi (1993) supported Miyake's (1982) synonymy, and noted that there were no significant morphological differences between the type series of *E. kikuchii* and the original description of *E. bulychevae*. On the other hand, Chace (1997) and De Grave & Fransen (2010) listed *E. kikuchii* as a valid species, though no comments were given.

During this study, we compared material from various sources, including the holotype and topotypic material from Amakusa, and the original description of *E. bulychevae* by Kobjakova (1955). The type material of *E. bulychevae* may have been deposited in the Zoological Institute, St. Petersburg, but no information as such has been forthcoming. We are now convinced that *E. kikuchii* is a valid species, distinguished morphologically from *E. bulychevae*, as follows: (1) the rostrum is relatively shorter in *E. kikuchii* than in *E. bulychevae* (slightly falling short of or reaching the first segment of the antennular peduncle in *E. kikuchii* versus reaching to the second segment of the antennular peduncle in *E. bulychevae*); (2) the carapace is provided with a small pterygostomial tooth in *E. kikuchii*, whereas there is no tooth at the pterygostomial angle in *E. bulychevae*; (3) the postrostral median carina does not reach beyond the rostral base in *E. kikuchii*, whereas it reaches beyond the midlength of the

carapace in *E. bulychevae*; (4) the stylocerite reaches the distal margin of the first segment of the antennular peduncle in *E. kikuchii*, rather than falling short of it in *E. bulychevae*. Furthermore, in spite of recent collecting activities in northern Japan, no specimens referable to *E. kikuchii* have been collected, suggesting that this species is restricted to the southwestern part of Japanese mainland and its adjacent waters.

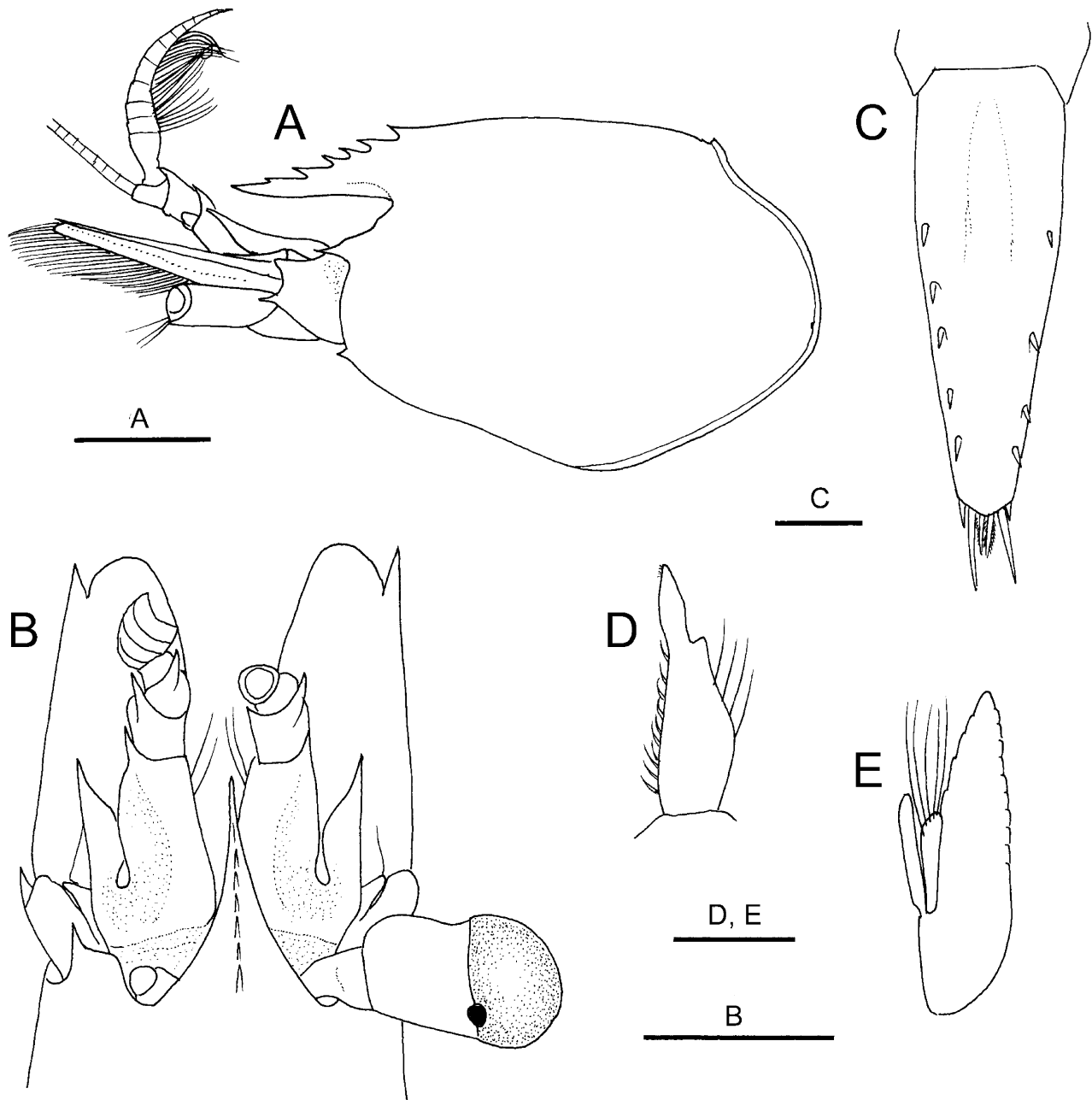


FIGURE 7. *Eualus kikuchii* Miyake & Hayashi, 1967. A, B, ovigerous female (cl 2.4 mm), KMNH -ZLKU 8406; C, ovigerous female (cl 3.0 mm), JAMSTEC 071997–071998; male (cl 1.7 mm), JAMSTEC 20050033424. A, carapace and antennae, lateral view (inner flagellum of antennule and antennal flagellum damaged); B, anterior part of carapace and cephalic appendages (antennular flagella omitted; left eye removed; setae partially omitted); C, telson, dorsal view; D, endopod of left first pleopod, ventral view; E, endopod of second pleopod, ventral view. Scale bars: 1 mm for A–C; 0.25 mm for D, E.

Kobjakova (1955) mentioned one ovigerous female specimen that differed from other specimens in the proportionally longer rostrum reaching to the distal end of the antennal peduncle, though she assigned this specimen to *E. bulychevae*. It is likely that this specimen might actually represent a species other than *E. bulychevae*.

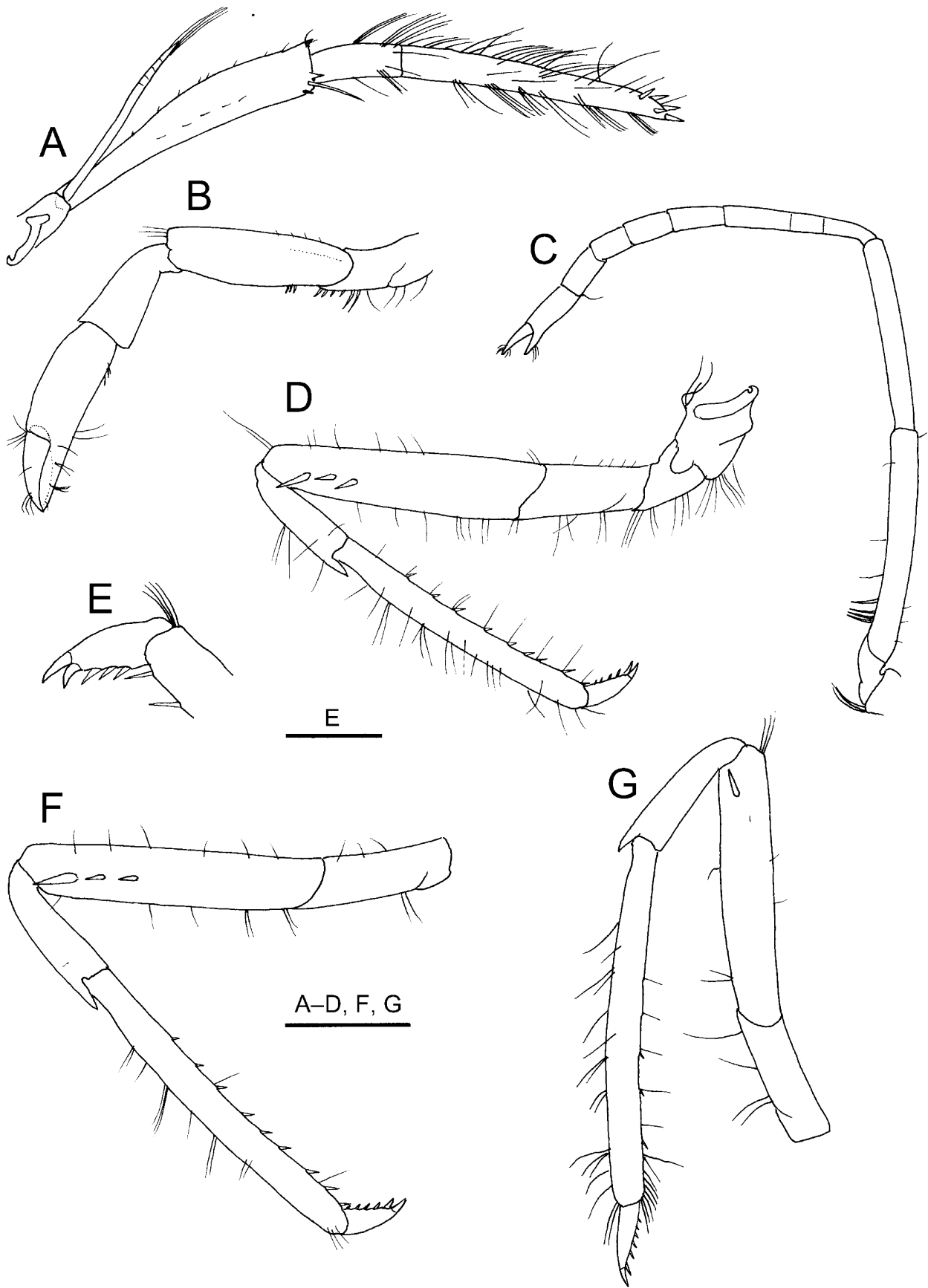


FIGURE 8. *Eualus kikuchii* Miyake & Hayashi, 1967. ovigerous female (cl 2.4 mm), KMNH-ZLKU 8406. A, right third maxilliped, lateral view; B, left first pereopod, lateral view; C, left second pereopod, lateral view; D, left third pereopod, lateral view; E, same, dactylus, lateral view; F, left fourth pereopod, lateral view; G, left fifth pereopod, lateral view. Scale bars: 1 mm for A–D, F, G; 0.5 mm for E.

Among the species characterized by the possession of epipods on the anterior three pairs of pereopods, *E. dozei* (A. Milne-Edwards, 1891) known from Chile and *E. pusiolus* (Krøyer, 1841) from the northern North Pacific and the northern North Atlantic are similar to *E. kikuchii*. Shared characters are: rostrum comparatively short, with posteriormost dorsal tooth rostral or slightly postrostral; ventral margin of rostrum unarmed or at most two subterminal teeth; carapace with pterygostomial tooth. *Eualus kikuchii* is distinguished from both *E. dozei* and *E. pusiolus* by the possession of two or three distolateral spines, instead of only a single spine (Holthuis 1952; Komai & Yakovlev 2000) on the merus of the third pereopod. *Eualus dozei* further differs from *E. kikuchii* in the longer stylocerite, distinctly overreaching the distal margin of the first segment of the antennular peduncle (Holthuis 1952) vs. in *E. kikuchii* the stylocerite reaching or falling short of margin. *Eualus pusiolus* further differs from *E. kikuchii* in the following characters (Komai & Yakovlev 2000; d'Udekem d'Acoz & Wirtz 2002): (1) rostrum reaching to the distal margin of the first segment of the antennular peduncle in *E. kikuchii* vs. falling short in *E. pusiolus*; four to six dorsal rostral spines in *E. kikuchii* versus less than four in *E. pusiolus*; lateral rostral carina poorly developed in *E. kikuchii* versus sharply defined, extending onto gastric region of carapace in *E. pusiolus* and inferior orbital angle rounded in *E. kikuchii* versus but distinct, triangular lobe in *E. pusiolus*.

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