

Two New Species of the Genus *Microprosthema* Stimpson, 1860 (Stenopodidea: Spongicolidae), from the Ryukyu Islands

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Abstract Two new species of the spongicolid genus *Microprosthema* Stimpson, 1860, are described. The first, *Microprosthema fujitai* sp. nov., is described on the basis of material collected from Okinawa Island, the Ryukyu Islands, southern Japan. The second, *M. lubricum* sp. nov., is described from the Kerama Islands, the Ryukyu Islands, and the Society Islands, French Polynesia. This work increases the number of the species in *Microprosthema* to 12, and of those known from the Indo-West Pacific to five. *Microprosthema fujitai* is distinguished from its congeners by having fewer spines on the carapace, the absence of a median carina on the posterior part of the third pleonal somite, the possession of lateral spines on the sixth pleonal somite, and the presence of a groove on the third pereopod carpus. *Microprosthema lubricum* is unique in the reduced armament of the body and thoracic appendages and the lack of an epipod on the fourth pereopod.

Key words: Decapoda, Stenopodidea, Spongicolidae, *Microprosthema*, new species, Ryukyu Islands, Japan, Society Islands, French Polynesia.

The spongicolid genus *Microprosthema* Stimpson, 1860, contains 10 described species distributed in tropical shallow waters in the world (Table 1). All species are small-sized, living latently in coral or rocky reefs. Although the Indo-West Pacific marine biota is generally higher in diversity than other marine biogeographical regions (Briggs, 1995), there are only three previously described species of *Microprosthema* from this region: *M. validum* Stimpson, 1860; *M. scabricaudatum* (Richters, 1880) and *M. plumicornis* (Richters, 1880), suggesting that more species await discovery. In this study, we describe two new species of the genus, *M. fujitai* and *M. lubricum*, on the basis of material primarily from the Ryukyu Islands. A single specimen of *M. lubricum* from the Society Island, French Polynesia, in the southwestern Pacific, is also included.

The postorbital carapace length is abbreviated as cl in the text. Counts of teeth on the lateral

margins of the antennal scale and the uropods include the terminal tooth. The specimens examined in this study are deposited in Natural History Museum and Institute, Chiba (CBM); Coastal Branch of Natural History Museum and Institute, Chiba (CMNH); Florida Museum of Natural History, Gainesville (FMNH); National Museum of Nature and Science, Tokyo (NSMT); National Museum of Natural History, Smithsonian Institution (USNM) and Kitakyusyu Museum of Natural History and Human History (KMNH), where the specimens of Zoological Laboratory, Faculty of Agriculture, Kyusyu University (ZLKU) have been transferred.

The following specimens were examined for comparison.

Microprosthema emmiltum Goy, 1987: holotype, female (cl 5.2 mm), USNM 231363, Isla Santa Maria, Galapagos Islands; paratype, female (cl 3.8 mm), USNM 231364, same locality

Table 1. Geographical ranges of the known species of *Microprosthema* Stimpson, 1860.

Species	Geographical Range	Reference
<i>Microprosthema emmiltum</i> Goy, 1987	Galapagos Islands; Panama; Mexico	Goy (1987)
<i>Microprosthema fujitai</i> sp. nov.	Ryukyu Islands, Japan	This study
<i>Microprosthema granatense</i> Criales, 1997	Caribbean sea, Columbia	Criales (1997)
<i>Microprosthema inornatum</i> Manning and Chace, 1990	Ascension Island	Manning and Chace (1990)
<i>Microprosthema jareckii</i> Martin, 2002	Guana Island, British Virgin Islands	Martin (2002)
<i>Microprosthema looensis</i> Goy and Felder, 1988	Looe Key, Florida	Goy and Felder (1988)
<i>Microprosthema lubricum</i> sp. nov.	Ryukyu Islands, Japan; Society Island, French Polynesia	This study
<i>Microprosthema manningi</i> Goy and Felder, 1988	Caribbean Sea; Belize; Mexico; Florida	Goy and Felder (1988)
<i>Microprosthema plumicorne</i> (Richters, 1880)	Mauritius	Richters (1880)
<i>Microprosthema scabricaudatum</i> (Richters, 1880)	Japan; Mauritius; Marshall Islands; Papua New Guinea	Richters (1880); Holthuis (1946); Baba <i>et al.</i> (1968); Devaney and Bruce (1987); von Martens (1872)
<i>Microprosthema semilaeve</i> (von Martens, 1872)	Eastern American Sea; Bahama; Columbia	
<i>Microprosthema validum</i> Stimpson, 1860	Japan; Port Jackson, Australia; Karachi, North Arabian Sea	Stimpson (1860); Holthuis (1946)

with holotype.

Microprosthema granatense Criales, 1997: holotype, male (cl 3.5 mm), USNM 275993, Tayrona National Park, Granate Bay, Colombia.

Microprosthema inornatum Manning and Chace, 1990: holotype, male (cl 1.8 mm), USNM 221894, Ascension Island, South Atlantic Ocean.

Microprosthema looensis Goy and Felder, 1988: holotype, ovigerous female (cl 4.3 mm), USNM 233999, Looe Key, Florida, USA.

Microprosthema manningi Goy and Felder, 1988: holotype, male (cl 4.3 mm), USNM 233997, Carrie Bow Cay, Belize; allotype, ovigerous female (cl 5.9 mm), USNM 233998, same locality with holotype.

Microprosthema scabricaudatum (Richters, 1880): female (cl 2.7 mm), CBM-ZC 3241, Kumejima Island, Ryukyu Islands; 2 males (cl 2.8–3.0 mm), ovigerous female (cl 3.0 mm), juv. (cl 1.5 mm), ZLKY 11094, Amami-oshima Island.

Microprosthema semilaeve (von Martens, 1872): male (cl 4.5 mm), USNM 184533, Dry Tortugas, Florida.

Microprosthema validum Stimpson, 1860: male (cl 2.0 mm), ZLKY 11098, Ishigaki-jima

Island, Ryukyu Islands; male (cl 3.1 mm), 2 females (cl 2.9–3.1 mm), NSMT-Cr 8176, Hong Kong; CMNH-ZC 00972, Kumejima-Island, Ryukyu Islands; male (cl 2.9 mm), CMNH-ZC 00973, Kumejima-Island, Ryukyu Islands.

Taxonomy

Microprosthema fujitai sp. nov.

[New Japanese Name: Ryukyu-sango-hime-ebi]

(Figs. 1–7)

Material examined. Holotype: NSMT-Cr 21265, female (cl 3.0 mm), Maeda-misaki, Okinawa Island, Ryukyu Islands, 3 m depth, 15 September 2003, coll. Y. Fujita.

Allotype: NSMT-Cr 21266, male (cl 2.0 mm), same locality as holotype, 8–6 m depth, 22 June 2003, coll. Y. Fujita.

Diagnosis. Small-sized spongiolid shrimp with somewhat depressed body form. Rostrum armed with 5 or 6 dorsal teeth and 1 or 2 ventral teeth. Carapace with cervical groove, armed posteriorly with cinctures of spines. Pleura of second to fifth somites each with anterolateral and posterolateral sulci; pleuron of sixth somite armed with 1 or 2 lateral spines. Cornea darkly

pigmented. Antennal scale armed with 4 or 5 lateral teeth. Carpus of third pereopod having deep longitudinal groove along dorsomesial margin. Dactyli of fourth and fifth pereopods biunguiculate; propodi and carpi indistinctly subdivided.

Description of female. Rostrum (Figs. 1, 2A, B) slender, directed forward, overreaching midlength of antennal scale, 0.63 of carapace length, narrowly triangular in dorsal view; dorsal margin armed with 6 large acute teeth, proximal tooth posterior to orbital margin; ventral margin with 1 large acute tooth subdistally, directed ventrad; lateral margin unarmed.

Carapace (Figs. 1, 2A, B) with postrostral median ridge extending to epigastric region; postorbital region armed with 3 stout spines directed anteriorly; orbital margin concave, inferior orbital angle obsolete; antennal spine small, acuminate; pterygostomial margin produced, with several spines of various sizes; gastric region with 3 pairs of postrostral submedian spines; cervical groove distinct, posterior margin armed with cincture of several spines of various size, directed anteriorly; branchial region armed with scat-

tered spines of various sizes, directed anteriorly.

Sixth thoracic sternite (Fig. 2C) with medially jointed pair of triangular lobes, each lateral margin unarmed, ventral surface concave. Seventh sternite with paired, broad trapezoid plates, each distolateral angle weakly produced, ventral surface concave, unarmed. Eighth sternite with paired smaller trapezoid plates, each distolateral angle rounded, ventral surface concave, unarmed.

Pleonal somites (Fig. 1) not sculptured. First pleonal somite short, divided in two sections by distinct transverse carina; anterior section with pleuron unarmed laterally, posteroventrally ending in process supported by short transverse carina, posterior section with pleuron unarmed laterally, posteroventral margin unarmed. Second to fifth pleura with shallow transverse sulci anterolaterally and posterolaterally; pleura unarmed laterally; ventral margins produced, terminating in large acute tooth, armed with a few anterior and posterior teeth. Second pleonal somite with rather distinct transverse carina, ending at middle of pleuron. Third somite longest, with transverse carina anteriorly, ending at middle of pleuron.

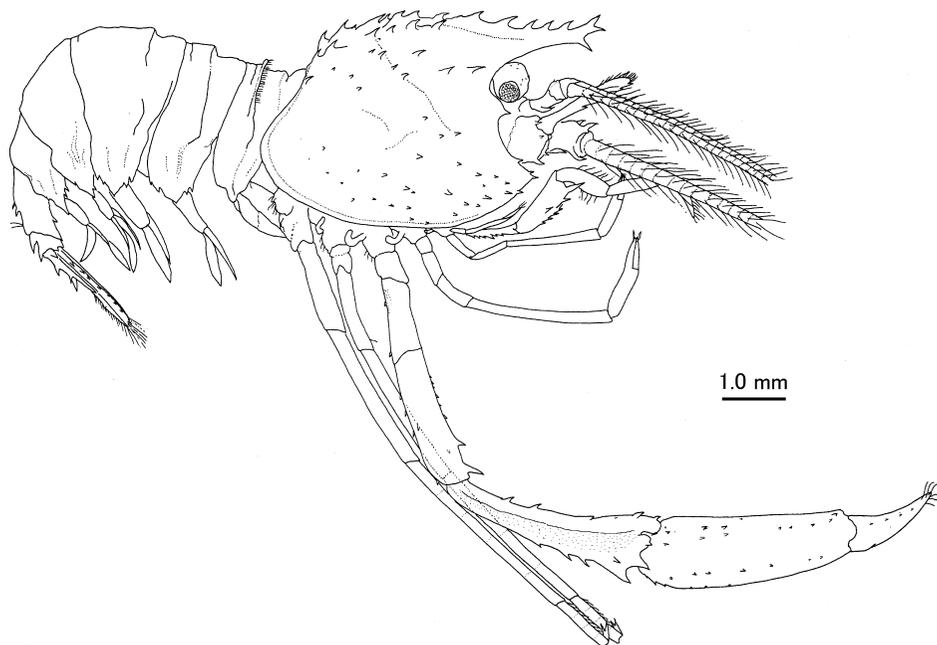


Fig. 1. *Microprosthema fujitai* sp. nov. Holotype, female (cl 3.0 mm), NSMT-Cr 21265, Okinawa Island, the Ryukyu Islands. Whole animal in lateral view.

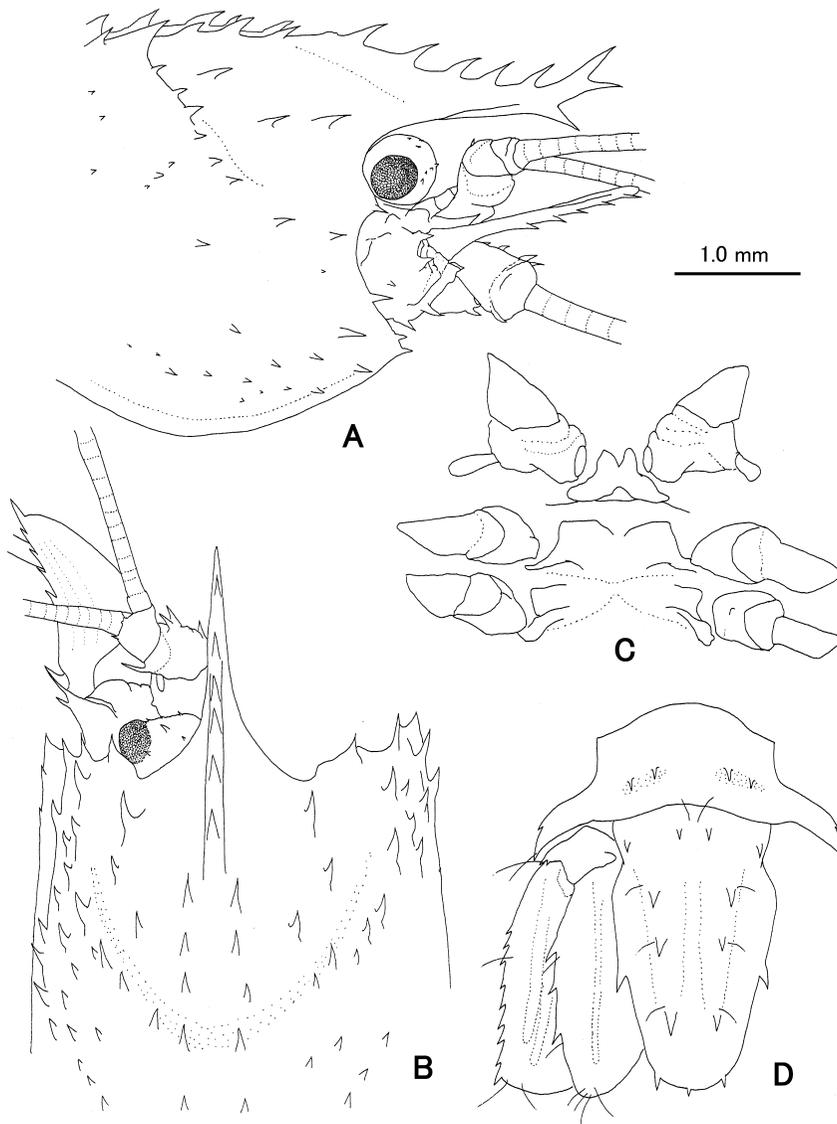


Fig. 2. *Microprosthema fujitai* sp. nov. Holotype, female (cl 3.0 mm), NSMT-Cr 21265, Okinawa Island, the Ryukyu Islands. A: carapace and cephalic appendages, lateral; B: same, dorsal; C: sixth to eighth thoracic sternites; D: sixth pleonal somite, telson and left uropods, dorsal. Setae omitted.

Fourth and fifth somites lacking transverse carina. Sixth somite (Fig. 2D) armed with short transverse row of 2 strong lateral spines on either side; distoventral angle terminating in large tooth, armed with an anterior accessory tooth. Telson (Fig. 2D) oblong, slightly constricted near base, feebly narrowing distally, length 1.8 times of maximum width; dorsal surface with shallow median groove flanked by dorsolateral carinae

each bearing row of 3 strong, symmetrically situated spines, and 2 pairs of small spines proximally; lateral margins each armed 1 strong spine at midlength; posterior margin rounded, armed with 3 small spines.

Eye (Fig. 2A, B) well developed, cornea hemispherical, darkly pigmented; eyestalk armed with several spines of various sizes on dorsal and frontal regions. Antennular peduncle (Fig. 2A, B)

reaching midlength of antennal scale; first segment subequal to distal two segments combined, with longitudinal, distolateral row of plumose setae; stylocerite acute, straight; second segment with a few strong mesial spines and rather strong distolateral spines; third segment armed with small distolateral spine; flagella slender, long, 2.1 times longer than carapace. Antenna (Fig. 2A, B) with stout basicerite bearing 1 or 2 moderately large spines at distolateral angle, and with a few

strong additional spines on ventrolateral margin; mesial margin with laminate process; antennal scale 2.6 times longer than broad, lateral margin nearly straight, armed with 5 teeth, dorsal surface with 2 longitudinal carinae; carapocerite short, overreaching level of third segment of antennular peduncle, armed with a few strong spines on mesial and lateral margins; flagellum slender, long, 4.8 times longer than carapace.

Mandible (Fig. 3A, B) robust; palp consisting

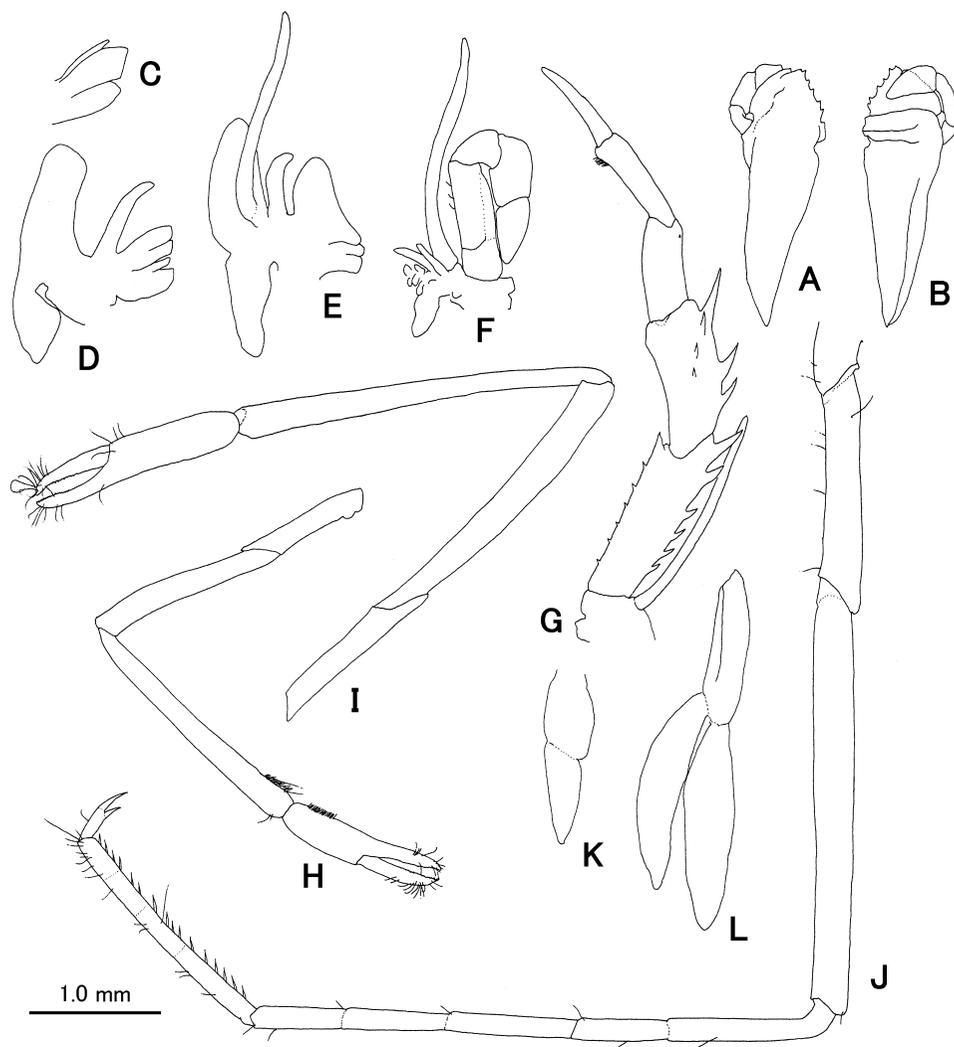


Fig. 3. *Microprosthema fujitai* sp. nov. Holotype, female (cl 3.0 mm), NSMT-Cr 21265, Okinawa Island, the Ryukyu Islands. A: right mandible, ventral; B: same, dorsal; C: right maxillule, ventral; D: right maxilla, ventral; E: right first maxilliped, ventral; F: right second maxilliped, ventral; G: left third maxilliped, ventral; H: left first pereopod, lateral; I: left second pereopod, lateral; J: right fourth pereopod, lateral; K: right first pleopod, dorsal; L: right second pleopod, lateral. C–G, K, L, setae omitted.

of 3 articles, distal article oval, furnished with dense setae, intermediate article longest, distally with tuft of setae; molar and incisor processes clearly separated; molar surface oval, without distinct tooth, distal margin of incisor process truncated, armed with short, stout teeth. Maxillule (Fig. 3C) robust, with simple, slender endopod tapering distally; coxal endite suboval, with submarginal row of stiff setae on outer surface; basal endite moderately broad, truncated distally, with several slender spines and sparse, long spiniform setae. Maxilla (Fig. 3D) with curved, slender endopod; coxal and basal endites both bilobed; scaphognathite well developed, anterior lobe subquadrate distally, posterior lobe short, widened posteromesially. First maxilliped (Fig. 4E) with broad endopod, tapering distally; coxal endite bilobed; basal endite large, subtriangular, with concave mesial margin; exopod with well-developed flagellum; epipod large, feebly bilobed. Second maxilliped (Fig. 3F) with endopod; dactylus tapering distally; propodus anteromesially truncated, subequal in length to dactylus; carpus cup-shaped; merus about twice as long as carpus, oblong, mesial margin pecti-

nate; ischium about half of meral length; basis and coxa incompletely fused with one another, trace of articulation still discernible; epipod oval, with well-developed, lamellate podobranch; exopod with well-developed flagellum. Third maxilliped (Fig. 3G) overreaching tip of antennal scale by lengths of dactylus and propodus; dactylus tapering distally, lateral margins of dactylus and propodus furnished with long setae, distomesial surface with shallow depression filled with dense grooming setae; carpus armed with tiny lateral spine; merus armed with dorsolateral row of 3 strong spines and lateral row of 3 spines, decreasing in size posteriorly; ischium compressed, armed with ventromesial row of 7 small spines and dorsolateral row of 6 strong spines, decreasing in size posteriorly; exopod with well developed, unsegmented flagellum, distally with dense setae.

Gill formula shown in Table 2.

First pereopod (Fig. 3H) small, slender, unarmed, overreaching tip of antennal scale by length of chela, with well-developed grooming apparatus; dactylus 0.5 of chela length; palm subcylindrical; carpus slender, 1.5 of chela

Table 2. Gill formulae of *Microprosthema fujitai* sp. nov. and *M. lubricum* sp. nov.

<i>M. fujitai</i>								
	Maxillipeds			Pereopods				
	1	2	3	1	2	3	4	5
Pleurobranchs	—	—	1	1	1	1	1	1
Arthrobranchs	1	1	2	2	2	2	2	—
Podobranch	—	1	—	—	—	—	—	—
Epipods	1	1	1	1	1	1	1	—
Exopods	1	1	1	—	—	—	—	—
<i>M. lubricum</i>								
	Maxillipeds			Pereopods				
	1	2	3	1	2	3	4	5
Pleurobranchs	—	—	1	1	1	1	1	1
Arthrobranchs	1	1	2	2	2	2	2	—
Podobranch	—	1	—	—	—	—	—	—
Epipods	1	1	1	1	1	1	—	—
Exopods	1	1	1	—	—	—	—	—

length; merus 0.8 of carpal length; ischium 0.7 of meral length. Second pereopod (Fig. 3I) longer than first pereopod, unarmed, overreaching tip of

antennal scale by lengths of chela and carpus; dactylus 0.4 of chela length; palm subcylindrical; carpus 1.7 times as long as chela; merus 0.9 of

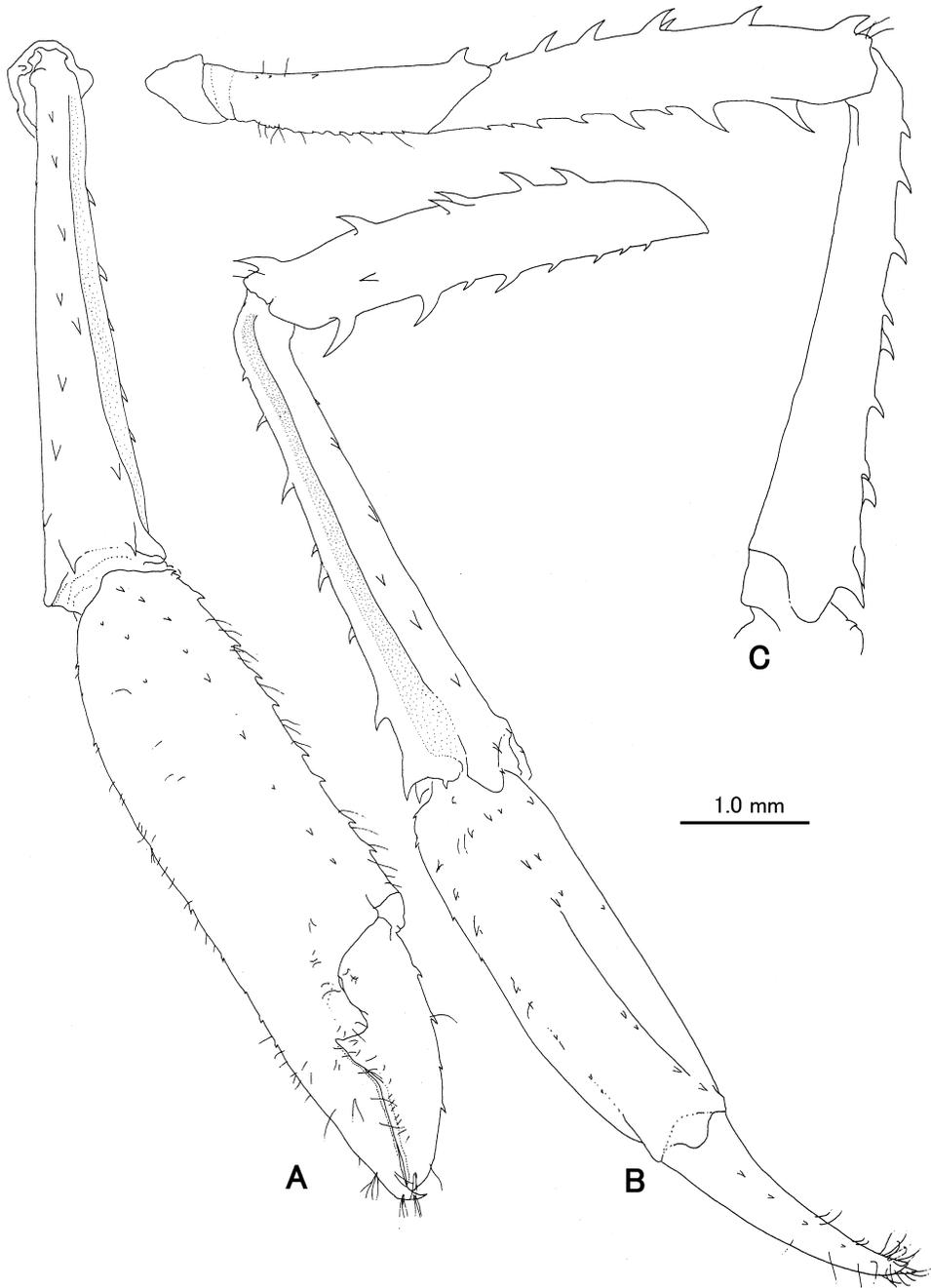


Fig. 4. *Microprosthema fujitai* sp. nov. Holotype, female (cl 3.0 mm), NSMT-Cr 21265, Okinawa Island, the Ryukyu Islands. A: right third pereopod, chela, carpus and merus, mesial; B: same, chela and carpus, dorsal; C: same, carpus, merus and ischium, lateral.

carpal length; ischium 0.6 of meral length. Third pereopod (Fig. 4A–C) strongest, overreaching tip of antennal scale by lengths of chela and carpus; chela 1.6 times as long as carapace; dactylus 0.4 of chela length, terminating in hooked unguis, armed with 4 small spines on dorsal margin, cutting edge armed proximally with stout, triangular tooth, remaining parts entire; fixed finger generally similar to dactylus, cutting edge armed proximally with large blunt teeth opposed into depression on dactylus; palm subcylindrical, 2.4

times longer than wide, dorsomesial surface armed with 2 rows of several spines, ventromesial margin armed with irregular rows of several small spines, dorsolateral surface armed with row of several smaller spines; carpus slightly widened distally, about 4.2 times longer than wide, 1.3 of chela length, dorsal surface armed with 2 rows of 5 or 6 large spines, distalmost strongest, dorsomesial margin grooved longitudinally, ventromesial margin armed with irregular row of several small spines; merus 0.8 carpal

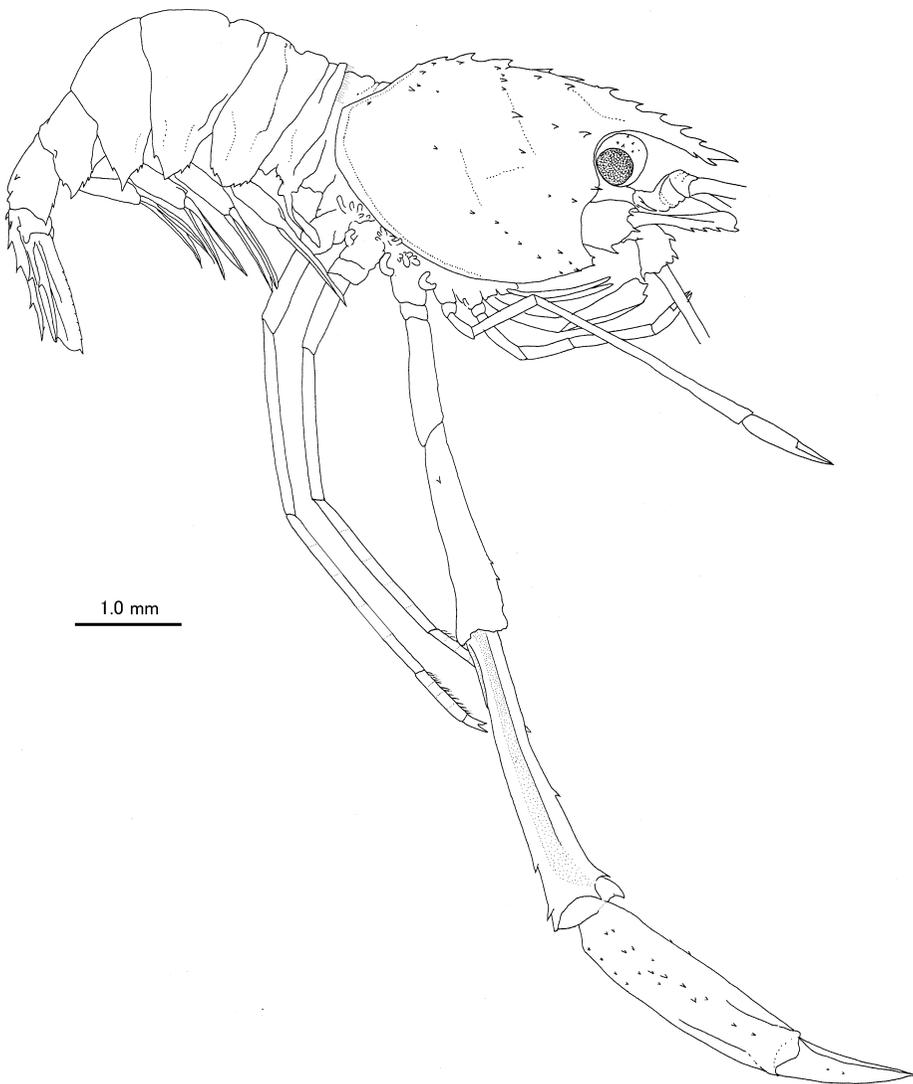


Fig. 5. *Microprosthema fujitai* sp. nov. Allotype, male (cl 2.0 mm), NSMT-Cr 21266, Okinawa Island, the Ryukyu Islands. Whole animal in lateral view.

length, dorsal margin armed with row of 6 strong spines, ventral margin armed with row of 8 spines, decreasing in size posteriorly, mesial surface armed with 1 spine; ischium 0.6 meral length, dorsal margin armed with 1 strong spine and 2 or 3 additional small spines, ventral margin serrated.

Fourth and fifth pereopods (Fig. 3J) similar, long, slender; dactyli compressed laterally, 5.7 times longer than wide, biunguiculate; propodi 3.5 of dactylar length, subdivided into 4 articles, ventral surfaces armed with about 20 movable spines; carpi 2.4 of propodal length, subdivided into 5 articles; meri entire, 0.8 of carpal length; ischia entire, 0.6 meral length.

First pleopod (Fig. 3K) uniramous, shortest. Second to fifth pleopods biramous. Second pleopod (Fig. 3L) with basipodite shorter than exopodite, but longer than endopodite, mesial mar-

gin unarmed. Third to fifth pleopods generally similar, decreasing in size posteriorly.

Uropod (Fig. 2D) with protopodite stout, lateral margin terminating in acute process, with 1 acute tooth posteroventrally; exopod broad, overreaching to posterior margin of telson, lateral margin nearly straight, terminating in acute tooth, with row of 8 or 9 acute teeth, dorsal surface with 2 smooth longitudinal carinae, unarmed; endopod tapering distally, overreaching posterior margin of exopod, lateral margin armed with 3 or 4 acute teeth, distal part unarmed, dorsal surface with a longitudinal carina, unarmed or armed with spine proximally.

Male characteristics. Rostrum (Fig. 5) 0.69 of carapace length; dorsal margin armed with 5 teeth, ventral margin with 2 subdistal teeth. Sixth thoracic sternite (Fig. 6A) with pair of narrow, triangular lobes, each distolateral angle armed

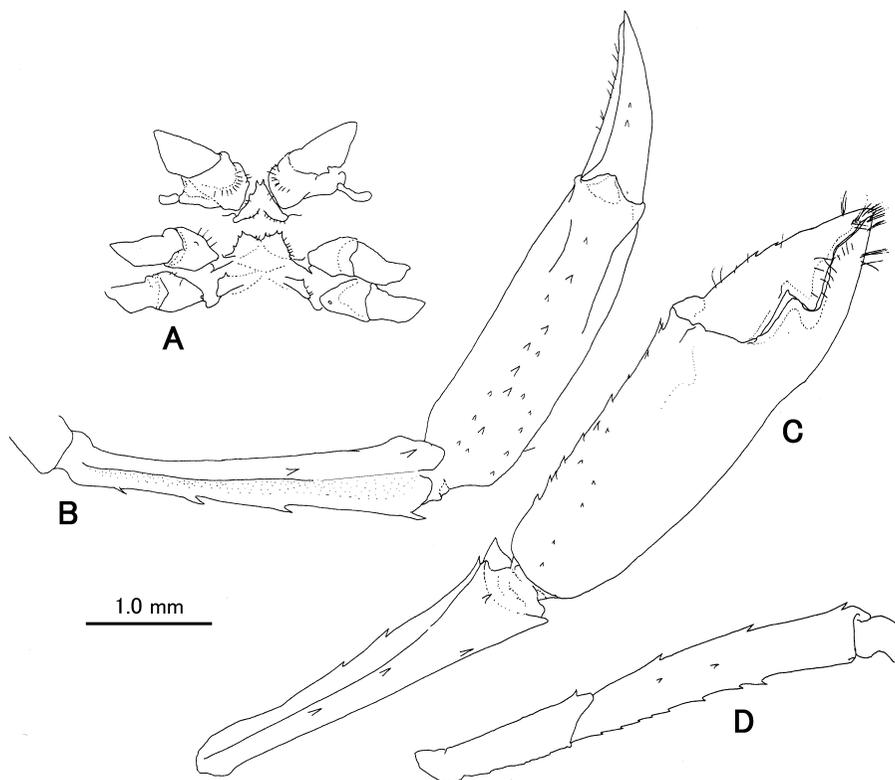


Fig. 6. *Microprosthema fujitai* sp. nov. Allotype, male (cl 2.0 mm), NSMT-Cr 21266, Okinawa Island, the Ryukyu Islands. A: sixth to eighth thoracic sternites. B: right third pereopod, chela and carpus, mesial; C: same, chela and carpus, dorsal; D: same, merus and ischium, lateral.

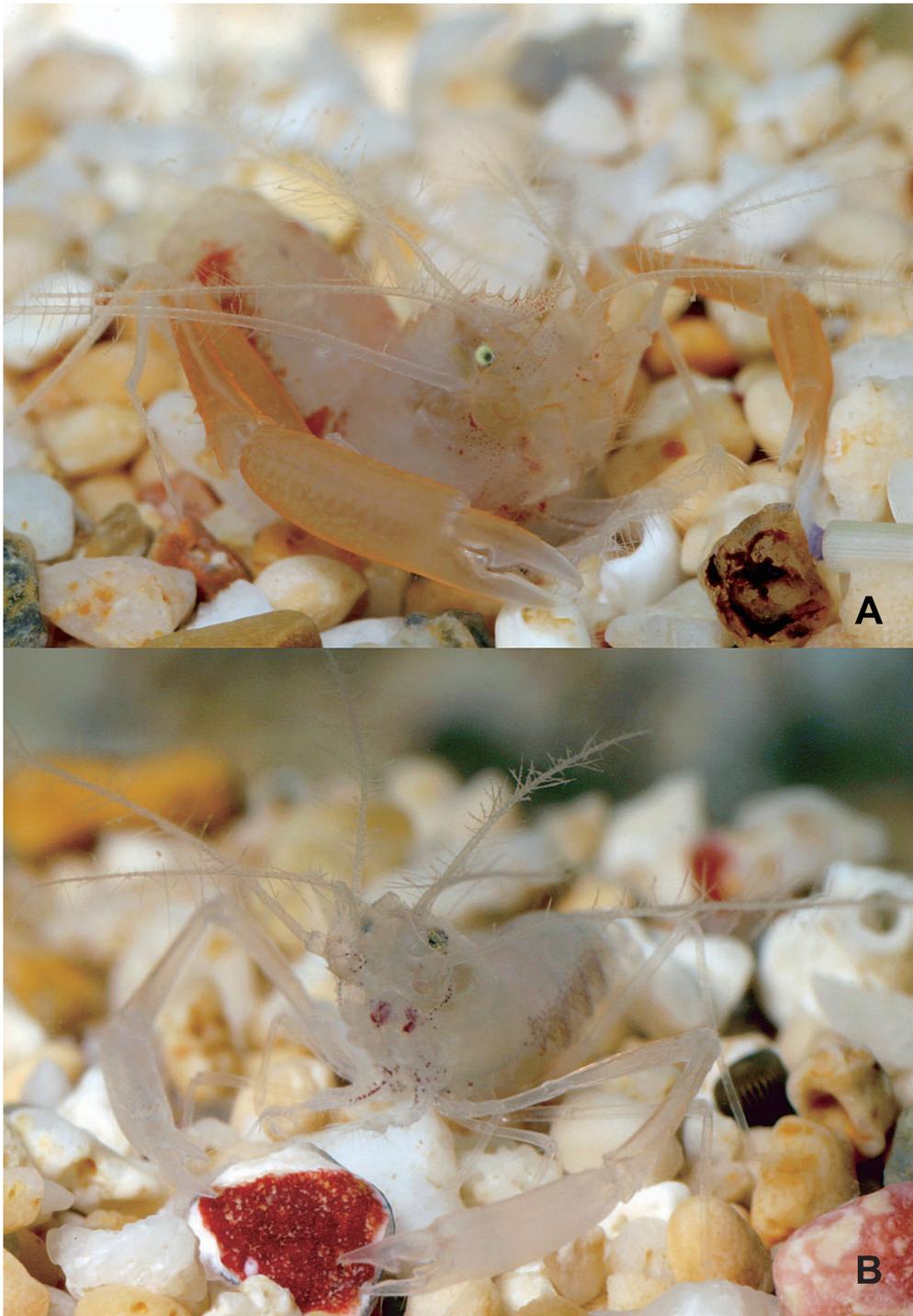


Fig. 7. *Microprosthema fujitai* sp. nov. Photographs showing living animals in an aquarium, Maeda-misaki, Okinawa Island, the Ryukyu Islands; A: NSMT-Cr 21265, holotype female (cl 3.0 mm), B: NSMT-Cr 21266, allotype male (cl 2.0 mm).

with 1 acute spine; seventh sternite with pair of broad, triangular lobes, each distolateral angle produced with acute spine, lateral and anteromesial margins armed with a few acute spines; eighth sternite with pair of trapezoid lobes, each distolateral angle rounded or produced anteriorly terminating in acute spine, each lateral margin unarmed. First pleonal somite (Fig. 5) with posterior section of pleura bearing a few small teeth ventrally. Chela of third pereopod (Fig. 6B–D) 1.9 times as long as carapace.

Coloration in life. Body and appendages (Fig. 7A, B) generally transparent. Rostrum transparent with sparse small red dots extending to epigastric region. Carapace transparent with sparse red dots on anterior and posterior margins. First to fifth pleura red. Telson and uropods transparent. Antennal scale with sparse red dots and flagellum transparent. Eye stalk transparent. Third maxillipeds generally transparent, with sparse red dots on dorsomesial margin of ischia. Third pereopods generally orange in female, colorless in male; fingers white in distal halves; carpus and merus orange in female, light orange in male; ischia transparent.

Distribution. Presently known only from Okinawa Island, the Ryukyu Islands, Japan; at depths of 3–8 m.

Remarks. The new species *Microprosthema fujitai* is most similar to *M. plumicorne* in the general armature of the pleonal somites, the shape of the third pereopod, and the subdivision of the carpi and propodi of the fourth and fifth pereopods. Comparison with the original description of *M. plumicorne* (Richters, 1880) revealed that the new species is distinguished from the latter by the following characters: (1) the rostrum is short, not reaching to the tip of the antennal scale, and the rate of the rostral length against that of the postorbital carapace is 0.63–0.69 in *M. fujitai*, whereas it extends beyond the tip of the antennal scale and it is about 1.0 in *M. plumicorne*; (2) spines on the carapace are much fewer in *M. fujitai* than in *M. plumicorne* (cf. Richters, 1880: 167, pl. 18, fig. 16); and (3) the posterior part of the third pleonal somite is smooth in *M.*

fujitai, whereas it possesses a median carina in *M. plumicorne*.

Etymology. Named after Dr. Yoshihisa Fujita of University Education Center, University of the Ryukyus and Marine Learning Center, for his contributions to the survey on the crustacean diversity in the Ryukyu Islands.

***Microprosthema lubricum* sp. nov.**

[New Japanese Name: Subesube-sango-hime-ebi]

(Figs. 8–11)

Material examined. Holotype: CMNH-ZC 01067, ovigerous female (cl 3.3 mm), Agenashiku Islet, the Kerama Islands, the Ryukyu Islands, 3 m, 25 July 1999, coll. A. Ono.

Non-type: FLMNH UF Arthropoda 16363, ovigerous female (cl 2.4 mm), French Polynesia, Society Islands, Moorea, mid-way between Sheraton and Gump station, backreef lagoon, sand flat with coral rubble, under massive corals and coral rubble, 2–4 m, hand and dip net, 11 November 2008, coll. A. Anker.

Diagnosis. Small-sized spongicolid shrimp with somewhat depressed body form. Rostrum armed with 1 dorsal and 1 ventral subdistal tooth. Carapace glabrous, with cervical and branchiostegal grooves. Pleura of second to fifth somites each lacking sulci; pleuron of sixth somite unarmed. Cornea darkly pigmented. Antennal scale armed with 4 lateral teeth. Ischium of third maxilliped possessing dorsolateral spine. Palm of third pereopod glabrous. Dactyli of fourth and fifth pereopods biunguiculate; propodi and carpi indistinctly subdivided. Fourth pereopod lacking epipod.

Description of holotype female. Rostrum (Figs. 8, 9A, B) slender, directed slightly downward, feebly ventrad overreaching antennal basicerite, 0.24 of carapace length, narrowly triangular in dorsal view; dorsal margin armed with 1 small subapical tooth; ventral margin with 1 small subapical tooth, situated posterior to level of dorsal tooth; lateral margin unarmed.

Carapace (Figs. 8, 9A, B) with postrostral median ridge extending to epigastric region; postor-

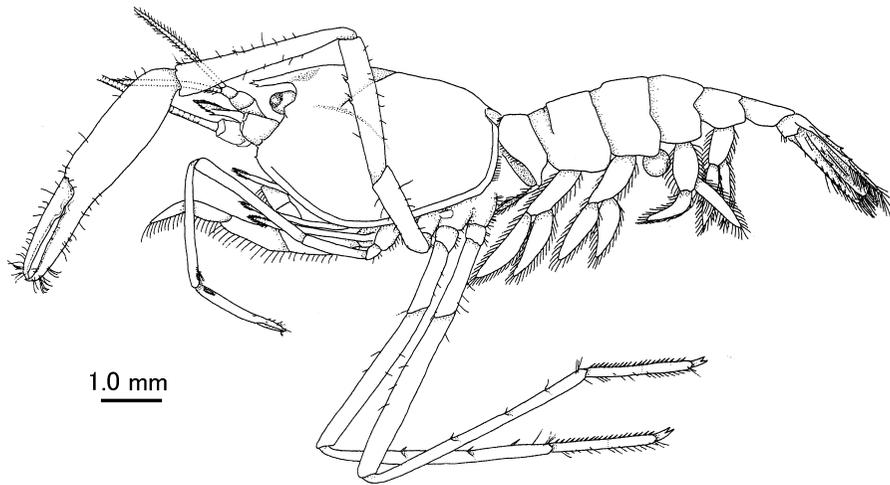


Fig. 8. *Microprosthema lubricum* sp. nov. Holotype, ovigerous female (cl 3.3 mm), CMNH-ZC 01067, Agenashiku Islet, the Kerama Islands, the Ryukyu Islands. Whole animal in lateral view.

bital region unarmed; orbital margin concave, inferior orbital angle low, rounded; pterygostomial margin rounded, with a few minute spines; gastric region unarmed; cervical and branchiostegal grooves distinct, posterior margins unarmed; branchial region unarmed.

Sixth thoracic sternite (Fig. 9C) with medially jointed triangular lobe, each distolateral angle ending in large acute spine, ventral surface concave. Seventh sternite with paired, circular lobes, each distolateral angle rounded, ventral surface concave, unarmed. Eighth sternite with paired triangular plates, each distolateral angle rounded, ventral surface concave, unarmed.

Pleonal somites (Fig. 8) not sculptured. First pleonal somite short, divided in two sections by distinct transverse carina; anterior section with pleuron unarmed laterally, posteroventrally ending in process supported by short transverse carina, posterior section with pleuron unarmed laterally, posteroventral margin unarmed. Second to fifth pleura without sulci, ventral margins rounded, unarmed. Second pleonal somite anteriorly with two transverse carinae, anterior one feeble, posterior one distinct, ending at middle of pleuron (Fig. 8). Third somite longest, posterodorsal margin not produced posteriorly. Telson (Fig. 9D) oblong, slightly constricted near base, slight-

ly narrowing distally, length 1.9 times maximum width; dorsal surface with shallow median groove flanked by dorsolateral carinae each bearing row of 3 and 1 strong, symmetrically situated spines, and a pair of small spines proximally; lateral margins each armed 1 strong spine at midlength; posterior margin rounded, armed with 3 small spine.

Eye (Fig. 9A, B) well developed, cornea hemispherical, darkly pigmented; eyestalk unarmed. Antennular peduncle (Fig. 9A, B) reaching midlength of antennal scale; first segment subequal to distal two segments combined, stylocerite acute, slightly curved inward; second segment with strong distomesial and strong distolateral spine; third segment with rounded distal margin; flagella slender, long, 3.5 times longer than carapace. Antenna (Fig. 9A, B) with stout basicerite bearing moderately small spine at distolateral angle, ventrolateral margin unarmed; antennal scale twice as broad, lateral margin nearly straight, armed with 4 teeth, dorsal surface with 2 longitudinal carinae; carpocerite short, reaching distal end of antennular peduncle, unarmed or armed with small distolateral spine; flagellum slender, long, 5.2 times longer than carapace.

Mouthparts similar to those of *M. fujitai* sp. nov. Mandible (Fig. 10A) robust; palp consisting

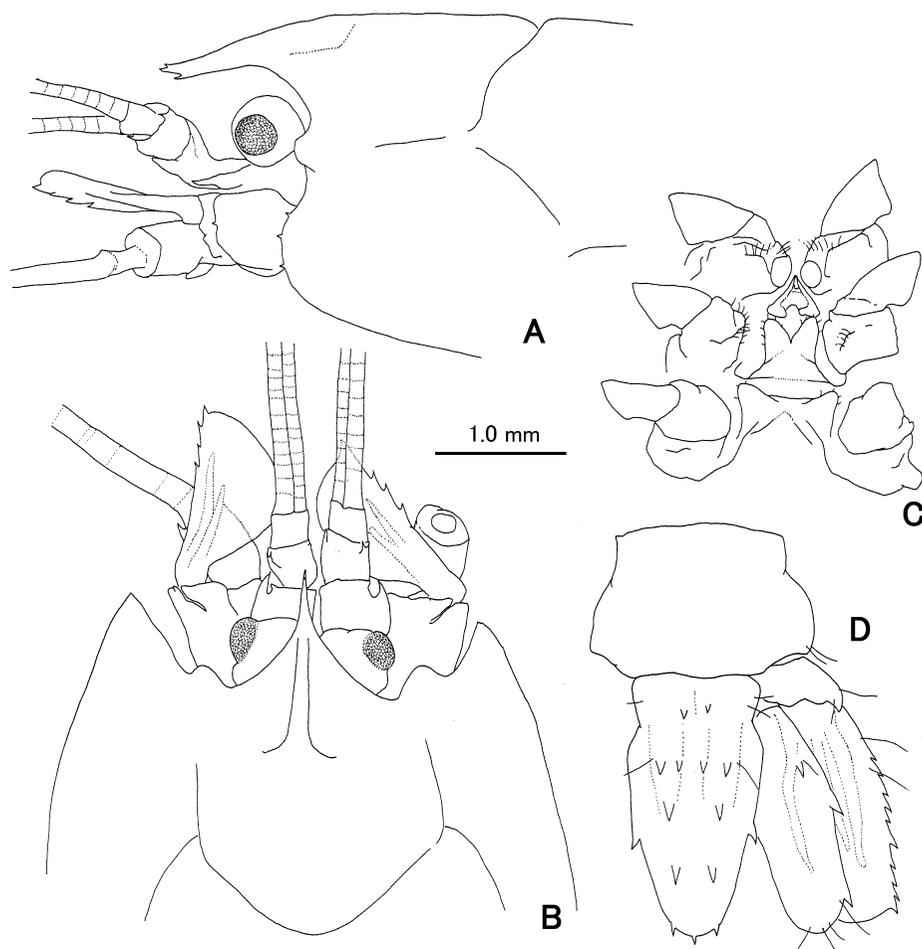


Fig. 9. *Microprosthema lubricum* sp. nov. Holotype, ovigerous female (cl 3.3 mm), CMNH-ZC 01067, Agenashiku Islet, the Kerama Islands, the Ryukyu Islands. A: carapace and cephalic appendages, lateral; B: same, dorsal; C: sixth to eighth thoracic sternites; D: sixth pleonal somite, telson and right uropods, dorsal. Setae omitted.

of 3 articles, distal article oval, intermediate article longest; molar and incisor processes clearly separated; molar surface oval, without distinct tooth, distal margin of incisor process truncated, armed with short, stout teeth. Maxillule (Fig. 10B) robust, with simple, slender endopod tapering distally; coxal endite suboval; basal endite moderately broad, truncated distally. Maxilla (Fig. 10C) with slender endopod; coxal and basal endites both bilobed; scaphognathite well developed, anterior lobe subquadrate distally, posterior lobe short, widened posteromesially. First maxilliped (Fig. 10D) with broad endopod,

tapering distally; coxal endite bilobed; basal endite large, subtriangular; exopod with well-developed flagellum; epipod large, feebly bilobed. Second maxilliped (Fig. 10E) with endopod; dactylus tapering distally; propodus anteromesially truncated, subequal in length to dactylus; carpus cup-shaped; merus about twice as long as carpus, oblong; ischium about half of meral length; basis and coxa incompletely fused with one another, trace of articulation still discernible; epipod oval, with well-developed, lamellate podobranch; exopod with well-developed flagellum. Third maxilliped (Fig. 10F) reaching tip of

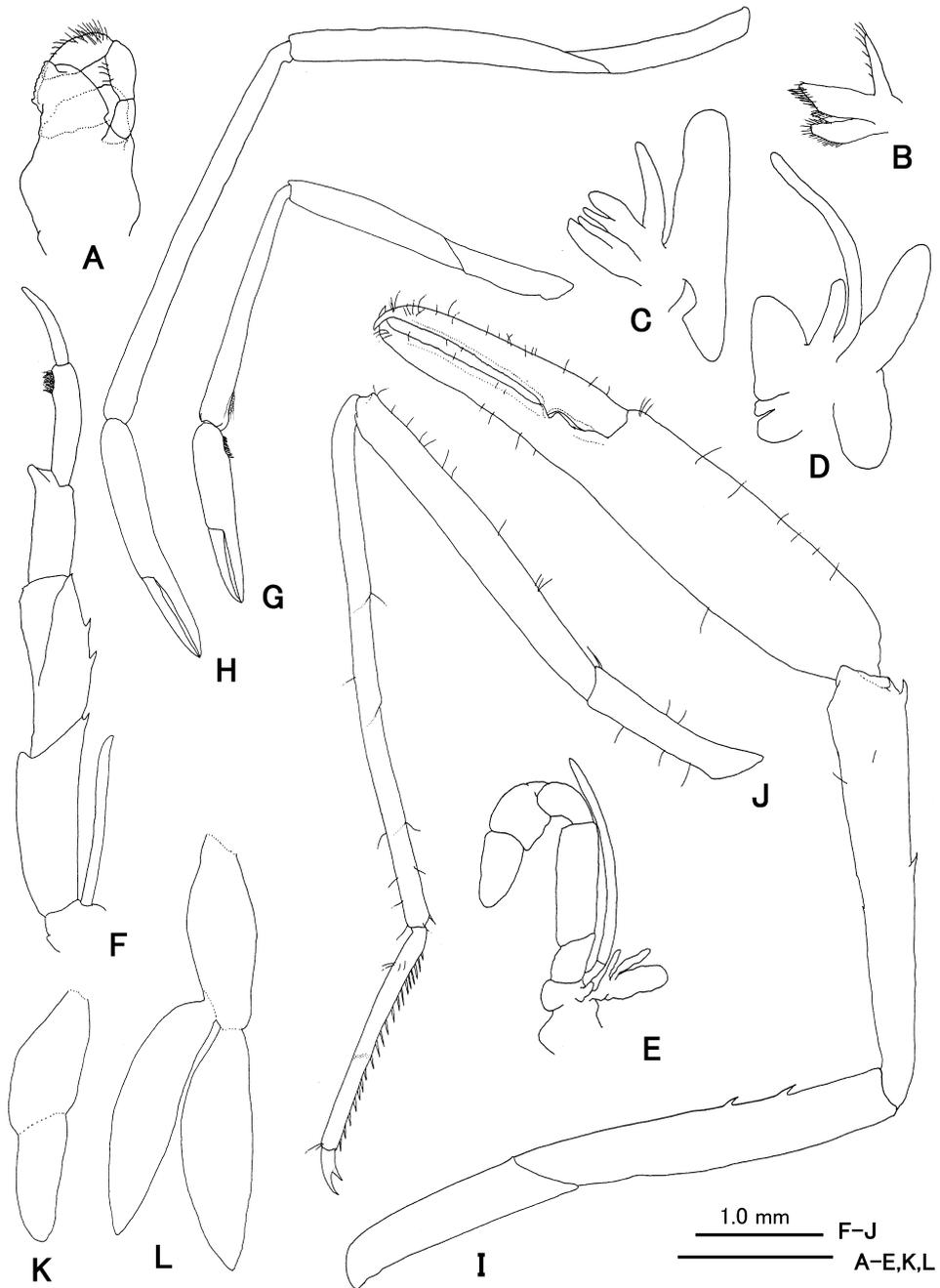


Fig. 10. *Microprosthemella lubricum* sp. nov. Holotype, ovigerous female (cl 3.3 mm), CMNH-ZC 01067, Agenashiku Islet, the Kerama Islands, the Ryukyu Islands. A: left mandible, ventral; B: left maxillule, ventral; C: left maxilla, ventral; D: left first maxilliped, ventral; E: left second maxilliped, ventral; F: left third maxilliped, ventral; G: left first pereopod, lateral; H: left second pereopod, lateral; I: left third pereopod, lateral; J: left fourth pereopod, lateral; K: left first pleopod, dorsal; L: left second pleopod, lateral. C–F, K, L, setae omitted.

antennal scale by length of dactylus; dactylus tapering distally, lateral margins of dactylus and propodus furnished with long setae, distomesial surface with shallow depression filled with dense grooming setae; carpus unarmed, ventrodiscal margin produced into blunt process; merus with 1 small distolateral spine and dorsolateral row of 2 larger spines; ischium compressed, armed with 1 larger distolateral spine; exopod with well-developed, unsegmented flagellum, distally with dense setae.

Gill formula shown in Table 2.

First pereopod (Fig. 10G) small, slender, unarmed, reaching tip of antennal scale by lengths of chela and half of carpus, with well-developed grooming apparatus; dactylus half of chela length; palm subcylindrical; carpus slender, 1.4 of chela length; merus 0.8 of carpal length; ischium 0.7 of meral length. Second pereopod (Fig. 10H) longer than first pereopod, unarmed, overreaching tip of antennal scale by lengths of chela and carpus; dactylus 0.4 of chela length; palm subcylindrical; carpus 1.6 times as long as chela; merus 0.8 of carpal length; ischium 0.6 of meral length. Third pereopod (Fig. 10I) strongest, reaching tip of antennal scale by lengths of chela and carpus; dactylus 0.4 of chela length, terminating in strongly hooked unguis, unarmed on dorsal and lateral margins, cutting edge armed proximally with stout, triangular tooth, remaining parts entire; fixed finger generally similar to dactylus, cutting edge armed proximally with large blunt teeth opposed into depression on dactylus; palm subcylindrical, 3.0 times longer than wide, dorsolateral and ventromesial margins unarmed, lateral surface unarmed; carpus slightly widened distally, about 5.7 times longer than wide, 0.7 of chela length, dorsal margin armed with sparse row of 2 strong spines, ventral margin armed with 1 tiny spine on midlength; merus subequal to slightly shorter than carpal length, ventral margin armed with row of 2 strong spines; ischium 0.6 of meral length, unarmed.

Fourth and fifth pereopods (Fig. 10J) similar, long, slender; dactyli compressed laterally, 3.8 times longer than wide, biunguiculate; propodi

5.0 times longer than dactylar length, indistinctly subdivided into 2 articles, ventral surfaces armed with about 20 movable spines; carpi 2.3 times longer than propodal length, indistinctly subdivided into 3 or 4 articles, with small spine on ventrodiscal angle; meri entire, 0.7 of carpal length; ischia entire, half meral length.

First pleopod (Fig. 10K) uniramous, shortest. Second to fifth pleopods biramous. Second pleopod (Fig. 10L) with basipodite shorter than exopodite, but longer than endopodite, mesial margin unarmed. Third to fifth pleopods generally similar, decreasing in size posteriorly.

Uropod (Fig. 9D) with protopodite stout, lateral margin terminating in acute process; exopod broad, falling slightly short of posterior margin of telson, lateral margin nearly straight, terminating in acute tooth, with row of 10 acute teeth, dorsal surface with 2 smooth longitudinal carinae, unarmed; endopod rounded distally, overreaching posterior margin of exopod, proximal half of lateral margin armed with acute tooth, distal part armed with acute tooth, dorsal surface with 1 longitudinal carina, armed with 1 strong spine subproximally.

Coloration in life. Body and appendages generally transparent (Fig. 11). Third pereopods whitish transparent.

Distribution. Known from Agenashiku Islet, Kerama Islands, the Ryukyu Islands, Japan, and Society Islands, French Polynesia; at depths of 2–4 m.

Remarks. The specimen from Moorea, Society Islands, French Polynesia (FLMNH UF Arthropoda 16363) is slightly variable in the following characters: 1) the lateral margin of antennal scale is armed with 3 teeth; 2) the carpi of fourth and fifth pereopods are subdivided into 4–5 articles; 3) the lateral margins of the uropodal exopods are armed with 8–9 teeth; and 4) the lateral margin of the right uropodal endopod is armed with 3 acute teeth.

In the reduced armature on the body and thoracic appendages, this new species superficially resembles species of some other spongicolid genera, such as *Spongicoloides* or *Spongiocaris*, but



Fig. 11. *Microprosthema lubricum* sp. nov. Ovigerous female (cl 2.4 mm), FLMNH UF Arthropoda 16363, Society Islands, French Polynesia. Photographs showing living animal under a microscope. A: whole animal, dorsal; B: same, lateral.

the following characters place the new species in *Microprosthema*: (1) the telson is oblong, with the posterior margin rounded with three spines; (2) the uropodal endopod provides a single longitudinal carina; (3) the third maxilliped has a long and slender exopod; (4) the first pereopod has a grooming apparatus; (5) the lateral margin of the telson is armed with a single tooth; and (6) the dactyli of the fourth and fifth pereopods are biunguiculate (Holthuis, 1993). However, *Microprosthema lubricum* sp. nov. appears unique within the genus in the generally glabrous carapace and third pereopodal chela, the rostrum having a single tiny subdistal tooth on the dorsal and ventral margins, and the lack of epipod on the fourth pereopod.

Etymology. The specific name is derived from the Latin, *lubricus* (=smooth), in reference to the generally reduced armature on the body and thoracic appendages in this new species.

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References

Baba, K., Y. Nakasone and M. Takeda. 1968. Two species of *Microprosthema* found on the coral reefs of the

- Ryukyu Islands (Stenopodidae, Crustacea). *Ohmu, Occasional Papers of Zoological Laboratory, Faculty of Agriculture, Kyushu University*, (1): 173–181.
- Briggs, J. C. 1995. *Global Biogeography. Development in Palaeontology and Stratigraphy*, 14. 452 pp. Elsevier Science B. V., Amsterdam.
- Criales, M. M. 1997. *Microprosthema granatense*, new species, from the southern Caribbean, with a key to shrimps of the genus *Microprosthema* from the Western Atlantic and a new record of *Odontozona libertae* (Decapoda: Stenopodidea). *Journal of Crustacean Biology*, **17**: 538–545.
- Devaney, D. S. and A. J. Bruce. 1987. Crustacea Decapoda (Penaidea, Stenopodidea, Caridea, and Palinura) of Enewetak Atoll. In: Devaney, D. M., E. S. Reese, B. L. Burch and P. Helfrich (eds.), *The Natural History of Enewetak Atoll, Volume II. Biogeography and Systematics*. Pp. 221–233. U. S. Department of Energy, Oak Ridge.
- Goy, J. W. 1987. *Microprosthema emmiltum*, new species, and other records of stenopodidean shrimps from the Eastern Pacific (Crustacea: Decapoda). *Proceedings of the Biological Society of Washington*, **100**: 717–725.
- Goy, J. W. and D. L. Felder. 1988. Two new species of *Microprosthema* from the Western Atlantic (Crustacea: Decapoda: Stenopodidea). *Journal of Natural History*, **22**: 1277–1292.
- Holthuis, L. B. 1946. Biological results of the Snellius Expedition. XIV. The Decapoda Macrura of the Snellius Expedition. I. The Stenopodidae, Nephropsidae, Scyllaridae and Palinuridae. *Temminckia*, **7**: 1–178.
- Holthuis, L. B. 1993. *The Recent Genera of the Caridean and Stenopodidean Shrimps (Crustacea, Decapoda) with an Appendix on the Order Amphionidacea*. 328 pp. Nationaal Natuurhistorisch Museum, Leiden.
- Manning, R. B. and F. A. Chace. 1990. Decapod and Stomatopod Crustacea from Ascension Island, South Atlantic Ocean. *Smithsonian Contributions to Zoology*, (503): i–v, 1–91.
- Martin, J. W. 2002. *Microprosthema jareckii*, a new species of stenopodidean shrimp (Crustacea: Decapoda: Stenopodidea: Spongicolidae) from Guana Island, British Virgin Islands. *Proceedings of the Biological Society of Washington*, **115**: 108–117.
- Richters, F. 1880. Decapoda. In: Möbius, K. (ed.), *Beiträge zur Meeresfauna der Insel Mauritius und der Seychellen*. Pp. 139–178, pls. 15–18.
- Stimpson, W. 1860. Prodromus descriptionis animalium evertibratorum, quae in Expeditione ad Oceanum Pacificum Septentrionalem, a Republica Federata missam Cadwaladaro Ringgold et Johanne Rodgers ducibus, observavit et descripsit. Pars VIII. Crustacea Macrura. *Proceedings of the Academy of Natural Sciences of Philadelphia*, **10**: 22–47.
- Von Martens, E. 1872. Über cubanische Crustaceen nach den Sammlungen Dr. J. Gundlach's. *Archiv für Naturgeschichte*, **38**: 77–147.