

Redescription of *Palaemonella spinulata* Yokoya with Designation of a Neotype and Description of a New Species of *Palaemonella* from Japan (Decapoda: Caridea: Palaemonidae)

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Abstract Based on the topotypic material from Sagami Bay, *Palaemonella spinulata* Yokoya, 1936 is redescribed. The type material of this species is presumed no longer extant, and therefore, a neotype is designated in the interest of nomenclatural stability. A new species closely related to *P. spinulata*, *Palaemonella longidactylus* sp. nov., is described and illustrated from material from Beppu Bay, Ooita Prefecture, is described. The new species can be distinguished from *P. spinulata* by having more numerous dorsal rostral teeth, and comparatively longer dactyli of the third to fifth pereopods.

Key words: Decapoda, Caridea, Palaemonidae, *Palaemonella*, redescription, new species, Japan.

The palaemonid genus *Palaemonella* Dana, 1852 contains 18 species, of which 14 have been reported from the Indo-West Pacific region (Li, 2000; 2001; Li and Bruce, 2006; Li *et al.*, 2007; Bruce, 2008a). Most species are well known in their specific status and their type conditions (Bruce, 2002a). The few exceptions include the Japanese *Palaemonella spinulata* Yokoya, 1936 (Bruce, 1970), originally described from Misaki, located at the southernmost point of the Miura Peninsula, central Japan. There have been many records from the Indo-West Pacific region referred to this species (Bruce, 1975; 1976; 1978; 1981; 1990; 2002a; Bruce and Coombes, 1995; De Grave, 2001; Li, 2001; Li and Bruce, 2006; Li *et al.*, 2007). The original description of Yokoya's taxon, however, was not sufficient by modern standards, and there are no subsequent descriptions based on the holotype or reliable identified material. Consequently, the real specific identity of the species remains obscure. During examination of material from Japanese waters, which could be referred to *P. spinulata* based on existing literature, it has been found that more than one species is represented. My attempt to locate the holotype of *P. spinulata* in Japanese

museums and institutions has not been successful, and there is no doubt that the holotype is no longer extant. Recently I received eight specimens referable to *P. spinulata*, collected from Sagami Bay off Miura Peninsula, very close to the type locality of that species. I designate herein a neotype of *P. spinulata* in the interest of nomenclatural stability, and present a redescription of the species. This enables me to further describe a new species of this genus, *P. longidactylus*, on the basis of specimens from Beppu Bay, Ooita Prefecture. The new species is closely similar to *P. spinulata*, but can be distinguished from the latter by some minor details.

The specimens examined are deposited in the following institutions or museums: National Museum and Nature and Science, Tokyo (NSMT), National Fisheries University, Shimonoseki (NFU), and Natural History Museum and Institute, Chiba (CBM). The specimen size is indicated by the postorbital carapace length (cl in mm), measured along the middorsal line from the level of the postorbital margin of the orbit to the midpoint of the posterodorsal margin of the carapace.

For comparison purpose, the following speci-

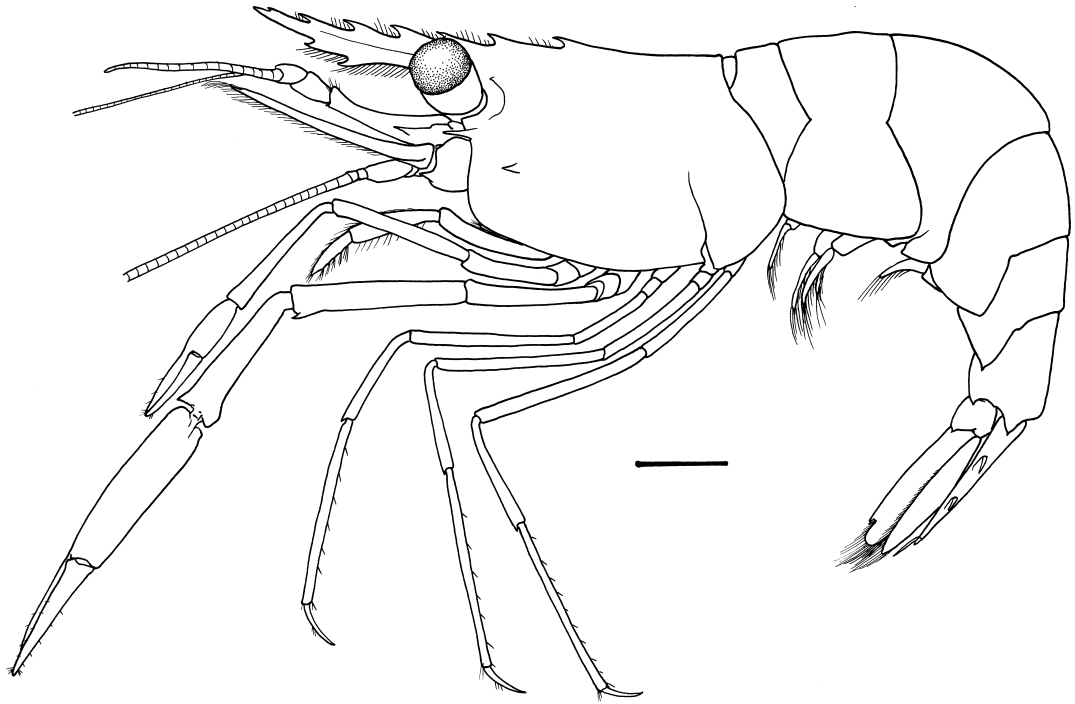


Fig. 1. *Palaemonella spinulata* Yokoya, 1936. Neotype, female (cl 2.9 mm), Sagami Bay, off Misaki to Yokosuka, habitus in lateral view. Scale bar: 1.0 mm.

mens were examined.

Palaemonella rotumana (Borradaile, 1898). NFU 530-2-2336, 1 ovig. female (cl 3.8 mm), Ise Bay, off Mie Prefecture, date uncertain, coll. S. Ooishi; NFU 530-2-2744, 1 female (cl 2.6 mm), Off Ginowan, Okinawa Island, Ryukyu Islands, 26°18.440'N, 127°43.173'E, dredge, 39–46 m, 25 August 1998; NFU 530-2-2745, 1 ovig. female (cl 3.0 mm), 1 female (cl 2.1 mm), Iko, Kuroshima Island, Yaeyama Islands, southern Ryukyu Islands, dead coral block, 18 August 1987, coll. K. Nomura; NSMT-Cr 19748, 2 ovig. females (cl 2.3, 2.5 mm), Mystery Reef, Anuha Islands, Solomon Islands, SCUBA diving, coral block, 31 August 1984, coll. K. Hayashi.

Taxonomy

Palaemonella spinulata Yokoya, 1936

[Japanese name: Mukashi-kakure-ebi]

(Figs. 1–3)

Palaemonella spinulata Yokoya, 1936: 135, fig.

4; Bruce, 1970: 285, fig. 1 (part).

Not *Palaemonella spinulata*: Bruce, 1975: 177, figs. 6A–G, 7; 1976: 471; 1978: 209, fig. 1. (= *Palaemonella maziwi* Bruce, 2002b); Bruce, 2008b: 107, figs. 2, 3.

? *Palaemonella spinulata*: Bruce, 1981: 9; 1990: 16; 2002a: 292; Hayashi *et al.*, 1994: 269; Bruce and Coombes, 1995: 111; Li, 2001: 80; Hayashi, 2001: 163, figs. 409e, 410, 411e, j; Davie, 2002: 317; Li and Bruce, 2006: 668; Li *et al.*, 2007: 242, fig. 116.

Material examined. Neotype: NSMT-Cr 19744, female (cl 2.9 mm), Sagami Bay, off Misaki to Yokosuka, Miura Peninsula, 35°10.53'N, 139°34.56'E to 39°10.53'N, 139°34.53'E, 73–62 m, oyster beds, 8 March 2002, gill net, FB *Aokimaru* No. 2, coll. T. Komai.

Non-type: CBM-ZC 9515, 2 males (cl 2.2, 2.4 mm), 2 females (cl 1.9, 2.2 mm), same data as neotype; NSMT-Cr 19755, 1 male (cl 1.7 mm), 1 female (cl 2.4 mm), similar locality, 35°11.02'N,

139°34.55'E to 35°11.01'N, 139°35.12'E, 67–60 m, 8 March 2002, gill net, FB *Aoki-maru* No. 2, coll. T. Komai; CBM-ZC 9516, 1 male (cl 2.3 mm), similar locality, 35°11.23'N, 139°34.40'E to 35°11.30'N, 139°34.96'E, 68–63 m, 8 March 2002, gill net, FB *Shou-maru*, coll. T. Komai.

Diagnosis. Rostrum reaching nearly to distal margin of lamella of scaphocerite, about as long as carapace, slender, dentition 2+5/2. Carapace with small, acute supraorbital spine, orbit demarcated by postorbital ridge. Mandible with two-segmented palp. Palm of first pereopod with several transverse rows of short setae. Second pereopods subequal, similar; carpus with subacute terminal spine; merus with acute distoventral spine; ischium unarmed. Each dactylus of third to fifth pereopods moderately long, length about 5 times of proximal height, 0.2–0.3 times as long as respective propodus, ventral margin regularly concave; propodi each with moderately long distoventral spines and numerous ventral spines.

Description. Neotype. Body relatively small for genus, glabrous (Fig. 1). Rostrum (Figs. 1, 2a–c) slender, proximally straight, distally slightly curved upward, 0.9 times as long as carapace, not reaching distal end of scaphocerite; dorsal margin armed with 7 teeth including 2 on carapace and 5 on rostrum proper, posteriormost tooth at 0.3 of carapace length, 5 teeth on rostrum equidistantly arranged, distal tooth much smaller than others, subterminal, each tooth bearing some short plumose setae anteriorly; ventral margin setose, with 2 similar teeth on distal half, just below fifth and sixth dorsal tooth. Carapace (Figs. 1, 2a–c) with small but acute supraorbital spine situated at dorsal end of postorbital ridge; orbit depressed and well demarcated by postorbital ridge; hepatic spine arising slightly posterior to level of supraorbital spine, and much larger than supraorbital spine; antennal spine acute, exceeding triangular suborbital angle; pterygostomial margin bluntly angular, unarmed.

Abdomen (Fig. 1) smooth, third somite not produced posterodorsally. Pleura of first three somites rounded; fourth pleuron (Fig. 2e) bluntly subrectangular, not acute; fifth pleuron (Fig. 2e)

posteroventrally acute; sixth somite (Fig. 2e) 1.3 times as long as proximal depth, 0.4 times as long as carapace, posterolateral and posteroventral angles acute. Telson (Fig. 2f, g) about 0.7 of carapace length, 1.6 times as long as sixth somite, tapering posteriorly, with transverse row of few setae proximomedially, 2 pairs of dorso-lateral spines robust, submarginal, situated at about 0.4 and 0.6 of telson length; posterior margin with minute median point, lateral spines slightly smaller than dorsal spines, intermediate spines long, slender, submedian spines robust, about half length of intermediate spines.

Cornea of eye globular, well pigmented, with small accessory pigment spot; eyestalk subcylindrical, about as long as wide and as long as cornea diameter (Fig. 2h).

Antennular peduncle (Fig. 2c, i) falling slightly short of rostral apex; proximal segment broad, lateral margin feebly convex, anterior margin slightly produced, with well-developed lateral spine, ventral margin with acute spine at mid-length; stylocerite short, slender, acute, reaching to about midlength of proximal segment; statocyst normal, with circular statolith; distal two peduncular segments subequal in length, both moderately slender, less than half length of proximal segment; upper antennular flagellum biramous, proximal 9 joints fused, shorter ramous consisting of 5 joints; lower flagellum slender, distal part broken. Scaphocerite (Fig. 2c, j) 3.1 times as long as wide, 0.9 times of carapace length, tapering distally, lateral margin concave, lamella rounded, well exceeded by strong distolateral spine; basicerite with acute spine, carpocerite short, reaching proximal third of scaphocerite.

Ophthalmic somite without bec ocellaire. Paragnaths distally bilobed, heart-shaped. Epistome with low median carina ventrally.

Mouthparts not dissected. Third maxilliped (Fig. 3f–h) with moderately long endopod, reaching beyond distal margin of first segment of antennular peduncle. Antepenultimate segment long, expanded distally, length about 8.5 times of distal width, lateral margin with 7 short, stout subequal spines along distal half. Penultimate

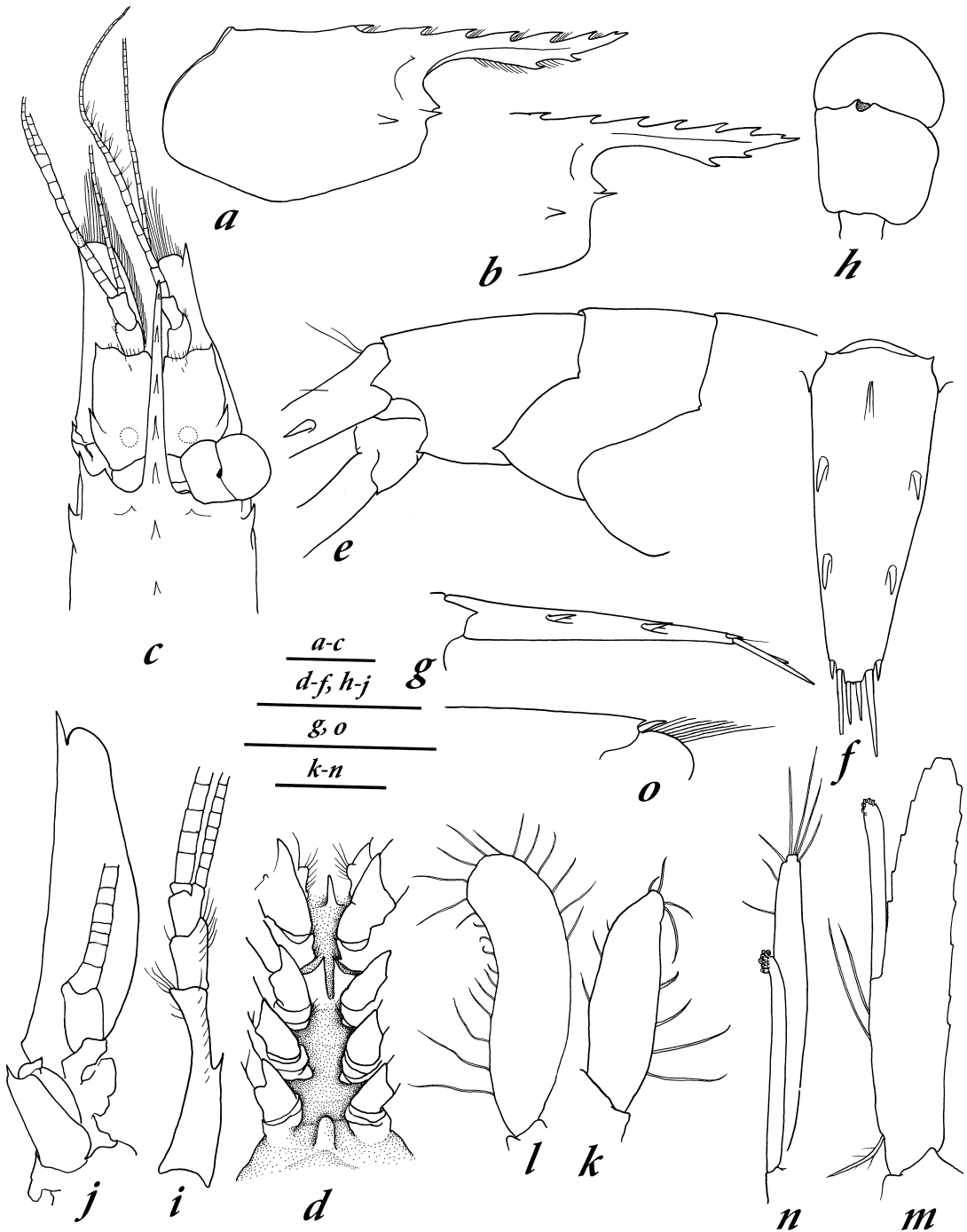


Fig. 2. *Palaemonella spinulata* Yokoya, 1936. *a, d, l, n, o*, male (cl 2.4 mm), Sagami Bay, off Misaki to Yokosuka; *b*, male (cl 2.3 mm), same locality; *c, e, f, h, k, m*, neotype, female (cl 2.9 mm), same locality; *g*, male (cl 2.2 mm), same locality; *i, j*, female (cl 2.4 mm), same locality. *a*, carapace, lateral; *b*, anterior part of carapace and rostrum, lateral; *c*, anterior part of body, dorsal; *d*, thoracic sternite; *e*, fourth abdominal somite to anterior part of telson, lateral; *f*, telson, dorsal; *g*, same, lateral; *h*, left eye, dorsal; *i*, left antennular peduncle, mesial; *j*, left antenna, ventral; *k, l*, left endopod of first pleopod; *m*, left endopod of second pleopod; *n*, appendices masculina and interna on endopod of second pleopod; *o*, outer distal part of exopod of uropod. Scale bars: 1.0 mm for *a-j, o*; 0.2 mm for *k-n*.

segment subcylindrical, length about 9.0 times distal width, and about 0.9 of antepenultimate segment length, with several groups of long setae. Ultimate segment tapering distally to long spine, 0.7 of penultimate segment length, densely furnished with numerous groups of long setae, forming grooming apparatus, on mesial surface. Exopod overreaching distal margin of antepenultimate segment, with numerous long plumose setae. Epipod present as small rounded plate; arthrobranch reduced to unequally bilobed small process.

First pereopod (Fig. 3*i, j*) slender, reaching beyond rostral apex by tip of chela; chela (Fig. 3*j*) about 0.6 of carapace length; palm about 3.1 times as long as high, proximally with 5 transverse rows of very short setae, forming grooming apparatus; fingers slender, 0.7 times as long as palm, sparsely setose, terminating in small acute tips, cutting edges sharp, entire; carpus as long as chela, length 5.5 times distal width; merus as long as carpus, slightly swollen at midlength; ischium 0.7 times as long as carpus, ventrally feebly compressed, sparsely setose. Left second pereopod (Fig. 3*k-o*) reaching beyond rostral apex by articulation between carpus and merus; chela (Fig. 3*m*) about 1.2 times as long as carapace; palm 2.9 times as long as high, smooth, subcylindrical, fingers 0.9 times as long as palm, sparsely setose; dactylus 6.8 times as long as high, terminating in acute hooked tip, cutting edge with diastema with few obtuse teeth proximally; fixed finger similar to dactylus in general structure, but more sharply dentate proximally; carpus 0.9 times as long as palm, expanded distally with small pointed lobe ventrolaterally, length 3.6 times of distal width; merus 1.1 times as long as palm, 4.8 times as long as high, with strong distoventral spine; ischium 0.8 times as long as merus, 4.8 times as long as high, unarmed. Right second pereopod in process of regeneration, as simple rod-like process. Third pereopod (Fig. 3*p, q*) relatively slender, overreaching rostral apex by length of two distal segments; dactylus about 0.3 times as long as propodus, 7.0 times as long as high, unguis not clearly

demarcated, ventral margin evenly concave, dorsal margin with group of few setae at midlength. Propodus uniform, about 20 times as long as high, with 2 long distoventral spines, reaching proximal third of dactylus, ventral margin with about 10 spines arranged as single row; carpus about half as long as propodus, unarmed, without distinctive features; merus slightly shorter than propodus, uniform, unarmed; ischium 0.6 times as long as propodus, slightly tapering proximally, unarmed. Fourth pereopod (Fig. 3*r*) similar to third pereopod, reaching beyond rostral apex by length of dactylus and distal 0.6 of propodus. Fifth pereopod (Fig. 3*s, t*) reaching beyond rostral apex by length of dactylus and distal half of propodus, generally similar to third and fourth pereopods.

Fourth thoracic sternite (Fig. 2*d*) with long slender finger-like median process, fifth sternite with pair of acute triangular teeth medially, sixth and seventh sternites without distinctive features, eighth sternite with robust finger-like median process.

First pleopod normal, endopod (Fig. 2*k*) half length of exopod, lamellate, sparsely setose, rounded distally. Second pleopod with endopod slightly shorter and narrower than exopod, with slender appendix interna exceeded by endopod (Fig. 2*l*). Uropod with exopod about 2.4 times as long as wide; lateral margin straight, sparsely setose, ending in short fixed spine; long movable spine immediately mesial to fixed posterolateral spine (Fig. 2*o*); endopod equal in length to exopod, 3.7 times as long as wide.

Males and other females. Generally similar to neotype. Rostrum 0.9–1.1 times as long as carapace in both sexes, reaching just to or slightly beyond lamella of scaphocerite. Rostral dentition identical with that of neotype (2+5/2) in all specimens except for one male, in which distal part of rostrum broken off. Supraorbital spine small, always acute; postorbital ridge always conspicuous.

Mouthparts examined from one female specimen (cl 2.4 mm). Mandibular corpus (Fig. 3*a*) robust but molar process rather slender (distal part

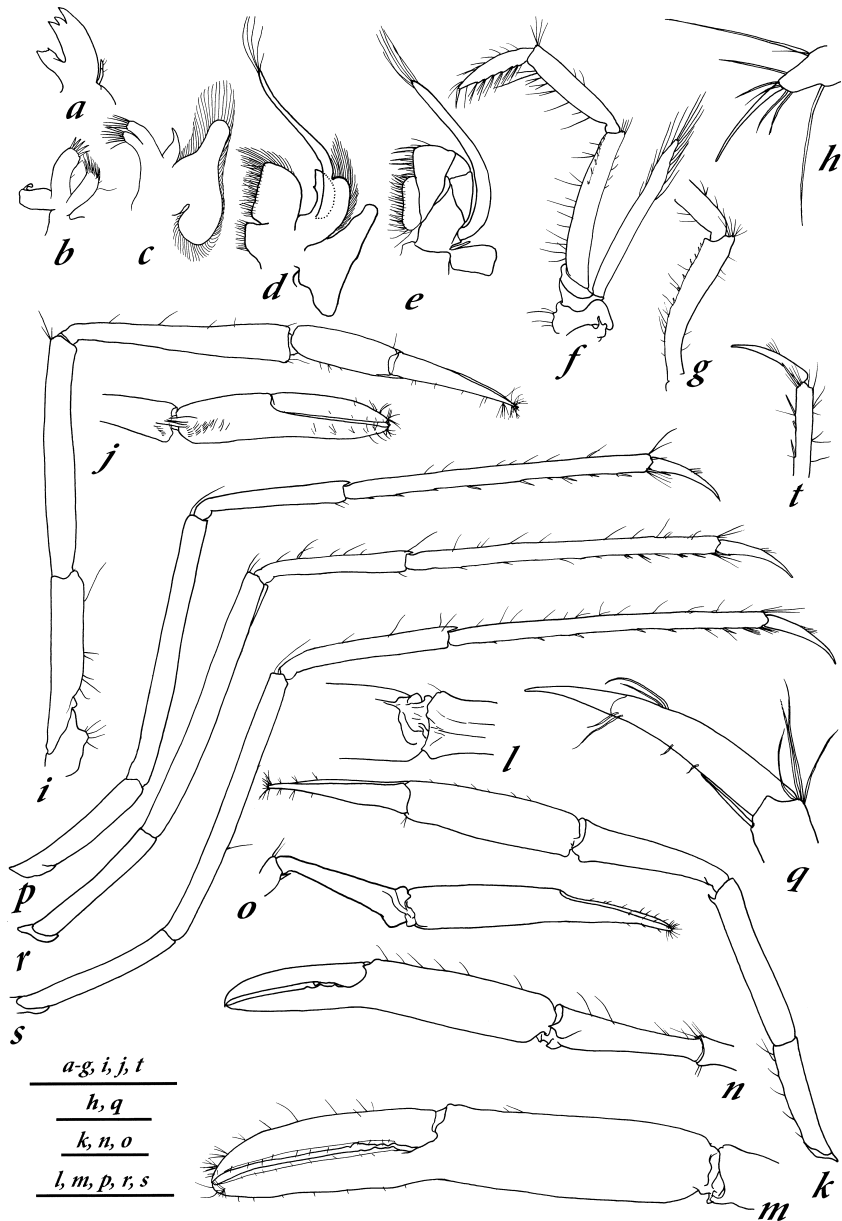


Fig. 3. *Palaemonella spinulata* Yokoya, 1936. *a-g*, female (cl 2.4 mm), Sagami Bay, off Misaki to Yokosuka; *h-m*, *p-t*, neotype, female (cl 2.9 mm), same locality; *n*, male (cl 2.4 mm), same locality; *o*, male (cl 2.3 mm), same locality. *a*, left mandible, lateral, distal part of molar process broken; *b*, right maxillule, lateral; *c*, left maxilla, lateral; *d*, left first maxilliped, lateral; *e*, left second maxilliped, lateral; *f*, left third maxilliped, lateral; *g*, same, penultimate and antepenultimate segments, mesial; *h*, same, distal part of ultimate segment, mesial; *i*, right first pereopod, lateral; *j*, same, chela, mesial; *k*, left second pereopod, lateral; *l*, same, articulation between carpus and chela, mesial; *m*, same, chela, mesial; *n*, *o*, same, distal three segments, dorsal; *p*, left third pereopod, lateral; *q*, same, dactylus and anterior part of propodus, lateral; *r*, left fourth pereopod, lateral; *s*, left fifth pereopod, lateral; *t*, same, dactylus and anterior part of propodus, lateral. Scale bars: 1.0 mm for *a-g*, *i-p*, *r-t*; 0.2 mm for *h*, *q*.

damaged during dissection), incisor process moderately broad, with 3 stout teeth distally, middle tooth smaller than others; palp short, two-segmented, with few setae. Maxillule (Fig. 3*b*) with distally curved endopod; upper lacinia narrow, with 5 slender short setae distally, lower lacinia also narrow, curved medially, with many setae distally. Maxilla (Fig. 3*c*) with non-setose palp, distal endite equally bilobed, both lobes with several slender setae distally, proximal endite feebly convex; scaphognathite large, posterior lobe rounded. First maxilliped (Fig. 3*d*) with moderately broad palp, distal endite moderately large, broad, medially truncated, with many setae distally; coxal endite sparsely setose distally; exopodal flagellum well developed, with long setae, caridean lobe narrow; epipod moderately large, feebly bilobed. Second maxilliped (Fig. 3*e*) with normal endopod, without distinctive features; exopod well developed, with long setae; epipod subquadrate, with slender, non-lamellate podobranch.

In 2 males (CBM-ZC 9515, cl 2.4 mm; 9516, cl 2.3 mm), second pereopods subequal, similar on right and left; both second pereopods missing in 4 females, only left preserved in 1 male (CBM-ZC 9516); merus with distoventral spine always large and acute; carpus with terminal spine variable in shape from only small triangular process to acute spine.

First pleopod normal, endopod (Fig. 2*l*) rounded distally, emarginate medially with short curved setae, slightly convex with long setae proximally. Second pleopod with appendices masculina and interna well developed even in smallest male (cl 1.7 mm), both slender rod-like, appendix interna with some hooks on distal part, appendix masculina with several simple setae marginally (Fig. 2*n*).

Size. The holotype was a female, cl about 2.8 mm, estimated from Yokoya's (1936) figure. The neotype is a female, 2.9 mm; the other females of the present series are cl 1.9–2.4 mm and the males are 1.7–2.4 mm.

Remarks. This species was described based on the single female holotype, which was collected

at Misaki, southernmost point of the Miura Peninsula (Yokoya, 1936). In spite of efforts by myself and other colleagues no information on the holotype has been obtained. It was probably deposited at the University Museum, the University of Tokyo, but no specimen of *Palaemonella* could be found there. There is little doubt that the holotype is no longer extant.

The specimens examined in this study were collected from Sagami Bay, off Misaki to Yokosuka, which is in close proximity to the type locality of *P. spinulata*. In order to stabilize the nomenclature of the species, I designate a neotype from this topotypic series. The neotype is a female of the same size as the holotype.

The present material is very similar to the holotype in general morphology. However, there are some minor differences between the original description and the present material, as follows: (1) in the holotype the postorbital ridge was neither specifically described nor figured (Yokoya, 1936: 135, fig. 4A), but it is well demarcated in all specimens examined (Figs. 1, 2*a–c*); (2) The hepatic spine is small, subequal in size to the supraorbital spine in the original figure (Yokoya, 1936, fig. 4A), whereas, in the present material the hepatic spine is distinctly larger than the supraorbital spine (Figs. 1, 2*a–c*); (3) A minute median process is present on the posterior margin of the telson in the material examined (Fig. 2*f*), although such a process is not shown in the original figure (Yokoya, 1936, fig. 4B); (4) Yokoya (1936, fig. 4F) specifically noted that there was no podobranch on the second maxilliped in the holotype, but in the present material there is a rudimentary, rod-like podobranch (Fig. 3*e*); (5) In the holotype the palm of the second pereopod was twice as long as the carpus and 1.5 times as long as the fingers, whereas in the six second pereopods, including those detached, of the present material, the carpus is same length as the fingers and the palm is only 1.1 times as long as the carpus and fingers; (6) The holotype has a distinct terminal spine on the carpus of the second pereopod (Yokoya, 1936, fig. 4A), but in the present specimens, the terminal spine of the car-

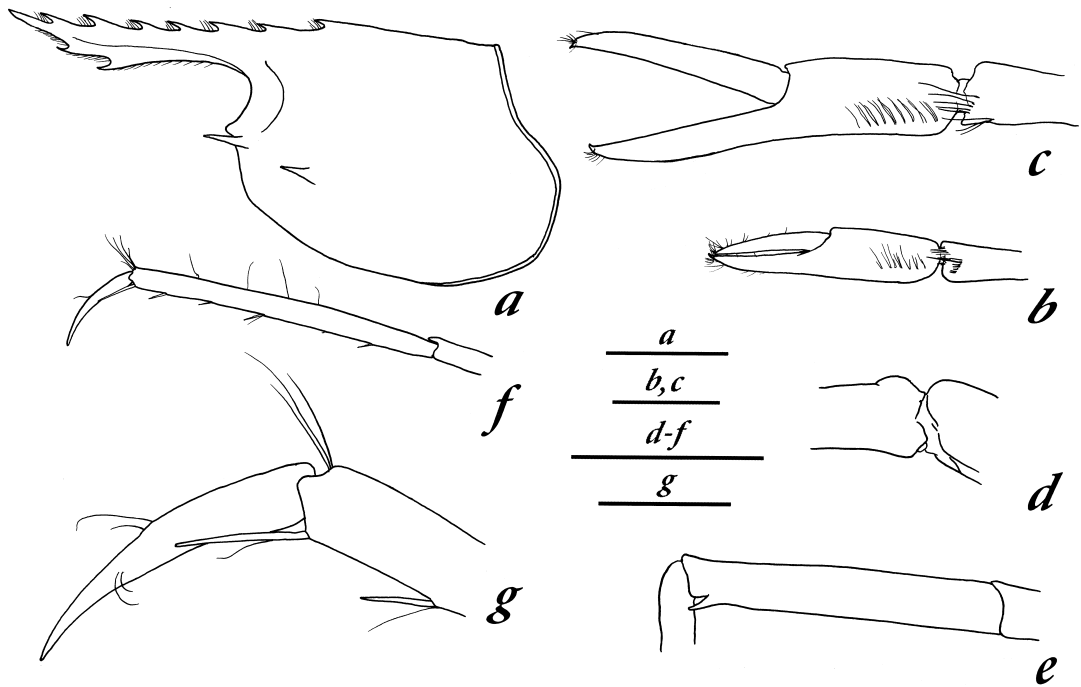


Fig. 4. *Palaemonella rotumana* (Borradaile, 1898). *a*, *b*, *d*–*g*, ovig. female (cl 2.5 mm), Solomon Islands; *c*, female from Ise Bay, (cl 3.8 mm). *a*, carapace, lateral; *b*, *c*, chela of left first pereopod, mesial; *d*, articulation of chela and carpus of left second pereopod, mesial; *e*, same, merus, lateral; *f*, distal two segments of left third pereopod, lateral; *g*, same, dactylus, lateral. Scale bars: 1.0 mm for *a*–*f*; 0.2 mm for *g*.

pus of the second pereopod is always small, not acute in the five examples, or small but acute in one specimen in the present material (Fig. 3*k*, *n*, *o*). These discrepancies are probably due to oversight or artistic inaccuracy for first to fourth points, or due to individual variations for the fifth and sixth points.

Holthuis (1952) and Fujino (1970) considered that *Palaemonella spinulata* was synonymous with *P. rotumana* (Borradaile, 1898), although it has been clarified that these two taxa are distinct (Bruce, 1970, 2002a; Chace and Bruce, 1993; Fransen, 1994; De Grave, 2000). The two taxa are indeed similar to each other in many diagnostic aspects, such as the rostral dentition, the spination of the second pereopod and the armature and the shape of the third and fourth pereopods (Fig. 4*a*–*g*). As already indicated by Yokoya (1936), however, the acute supraorbital spine is one of the most distinctive characters of *P. spinulata*. *Palaemonella rotumana* usually

lacks the supraorbital spine, but if present, it is at most a small blunt tubercle (Borradaile, 1898; Kemp, 1922 as *P. vestigialis*; Bruce, 1970; Fransen, 1994; De Grave, 2000). Furthermore, the postorbital ridge is occasionally absent in *P. rotumana* (De Grave, 2000). In seven specimens (cl 2.1–4.9 mm) of *P. rotumana* here examined all have the postorbital ridge, but six do not have any supraorbital tubercle (Fig. 4*a*). The palm of the first pereopod bears setae on the proximomesial surface in these two species, but the present study has shown that the development of it is rather different. Four or five transverse rows of short setae are present in *P. spinulata* but 7 or 8 groups of long setae are arranged at a longitudinal line in *P. rotumana* (Fig. 4*b*, *e*).

Forty years had passed since the original description when Bruce (1975) subsequently reported *P. spinulata* from Tanzania and Kenya, eastern Africa. Since then the species has been reported several times from the Indo-West Pacific

region (Bruce, 1975; 1976; 1978; 1981; 1990; 2002a; Hayashi *et al.*, 1994; Bruce and Coombes, 1995; Li, 2001; Li and Bruce, 2006; Li *et al.*, 2007; Bruce, 2008b). However, these records need to be verified, as it appears that more than one species might be mixed in the previous reported specimens. For example, the African specimens referred to *P. spinulata* by Bruce (1975; 1976; 1978) were recently described as a new species, *Palaemonella maziwi* Bruce, 2002, which bears short rostrum, large supraorbital spine, well developed terminal spine on the carpus of second pereopod, comparatively short dactyli of the third to fifth pereopods, single segment of mandibular palp, relatively long appendix masculina and others (Bruce, 2002b). Very recently Bruce (2008b) described and figured one male and one ovigerous female from Western Australia under the name of *P. spinulata*. They are small, cl 3.2 mm in the male and 2.5 mm in the ovigerous female. These Australian specimens differ from the present topotypic series in having more numerous dorsal rostral teeth, no postorbital ridge and more robust third pereopod. There is little doubt that these specimens from Western Australia represent a species other than *P. spinulata*. Other specimens from Australia (Bruce, 1981; 1990; Bruce and Coombes, 1995; Davie, 2002), Hainan Island (Li, 2001; Li *et al.*, 2007), and New Caledonia and Loyalty Islands (Li and Bruce, 2006), all referred to Yokoya's species, have neither been described nor figured. Therefore, these references are questionably included in the synonymy.

Recently Hayashi (2001) identified several specimens from Japan as *P. spinulata* on account of the presence of a clearly demarcated postorbital ridge with a supraorbital spine and comparatively short dactyli of the last three pereopods. They are large, cl 5.8 mm in ovigerous female, 6.6 mm in the largest female, and 3.5 mm in the largest male. Nevertheless, the setation of the palm of the first pereopod is intermediate between those observed in the present specimens of *P. spinulata* and *P. rotumana*. Final determination of the identity of these specimens with *P. spinu-*

lata is postponed, as they are all larger than the present topotypic series.

***Palaemonella longidactylus* sp. nov.**

[New Japanese name: Yubinaga-mukashi-kakure-ebi]

(Figs. 5–7)

Material examined. Holotype: NSMT-Cr 19746, ovig. female (cl 4.6 mm), Beppu Bay, Oita Prefecture, small Danish seine, 25 August 1977, coll. K. Ogawa.

Paratypes: NFU 530-2-2339, 5 males (cl 3.6–4.3 mm), 7 ovigerous females (cl 3.9–5.1 mm); NSMT-Cr 19747, 1 male (cl 4.0 mm), 1 ovig. female (cl 4.1 mm), same data as holotype.

Other material: NFU 530-2-2340, 2 males (cl 4.3, 4.6 mm), 6 ovig. females (cl 4.4–5.5 mm), Kii Strait, off Wakayama Prefecture, small Danish seine, 14 June and 9 August 1975, coll. T. Sakamoto

Diagnosis. Rostrum reaching nearly to distal margin of lamella of scaphocerite, about as long as carapace, slender, dentition 1, 2+6, 7/1, 2. Carapace with small, acute supraorbital spine, orbit demarcated by postorbital ridge; mandible with two-segmented palp. Palm of first pereopod with several transverse rows of short setae. Second pereopods subequal, similar; carpus with small triangular process or small, acute terminal spine; merus with acute distoventral spine; ischium unarmed. Each dactylus of third to fifth pereopods slender, length about 10–15 times as long as proximal height, about 0.4 times as long as respective propodus, ventral margin regularly concave; propodi each with short distoventral spines, few ventral spines.

Description. Holotype. Left first and right second pereopods and distal part of propodus of left fourth pereopod missing. Rostrum (Figs. 5, 6a–c) comparatively shorter, 0.8 times as long as carapace, but reaching distal end of scaphocerite; dorsal margin with 8 teeth including 2 on anterior third of carapace, and 6 arranged equidistantly on rostrum proper, distal tooth smaller, placed near rostral apex; ventral margin with single sim-

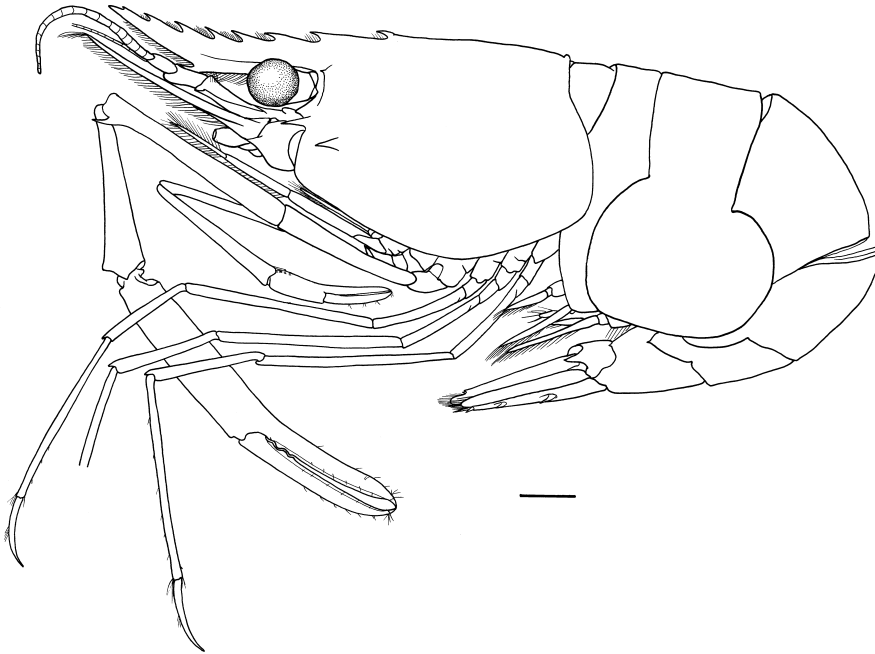


Fig. 5. *Palaemonella longidactylus* sp. nov. Holotype, ovig. female (cl 4.8 mm), Beppu Bay, Ooita Prefecture, habitus in lateral view (left first pereopod is missing, and right first pereopod is shown). Scale bar: 1.0 mm.

ilar tooth on distal part, just below between fifth and sixth dorsal tooth. Spines and ridge on carapace (Figs. 5, 6a–c) similar to those of *P. spinulata* in size and position.

Sixth abdominal somite (Fig. 6f) about 1.6 times as long as proximal depth, 0.47 times as long as carapace. Telson (Fig. 6g, h) 0.65 times as long as carapace, 1.4 times as long as sixth somite; 2 pairs of dorsal spines robust, situated at about 0.3 and 0.7 of telson length.

Eye (Fig. 6c) and antennular peduncle (Fig. 6c, i) without special features. Eyestalk subcylindrical, slightly shorter than wide and cornea diameter. Upper antennular flagellum biramous, filiiform, proximal 14 joints of rami fused, free ramus broken. Scaphocerite (Fig. 6c, j) well developed, 3.2 times as long as maximum width, 0.7 times as long as carapace.

Third maxilliped (Fig. 7g, h) with long endopod, reaching distal end of antennular peduncle. Antepenultimate segment long, about 7.8 times as long as distal width, lateral margin with 8 similar spines along distal half; penultimate segment

about 8.1 times as long as distal width, about 0.8 times as long as antepenultimate segment. Exopod well developed, slightly overreaching distal margin of antepenultimate segment.

Armature and general shape of pereopods very similar to those of *P. spinulata*, but comparatively longer and more slender in new species. First pereopod (Fig. 7i, j) slender, reaching beyond rostral apex by chela and distal half of carpus; chela (Fig. 7j) about 0.5 times as long as carapace, palm 2.4 times as long as high; fingers similar, slender, 1.3 times as long as palm, sparsely setose, with small acute tips; carpus as long as chela, length 8.7 times as long as distal width; merus 1.1 times as long as carpus, nearly uniform; ischium 0.6 times as long as carpus. Left second pereopod (Fig. 7k–m) well developed, reaching beyond rostral apex by chela, carpus and distal part of merus; chela (Fig. 7k) about 1.5 times as long as carapace, palm 3.5 times as long as high, fingers as long as palm; dactylus 8.7 times as long as high, ending in stout acute hooked tip; fixed finger similar to dactylus; car-

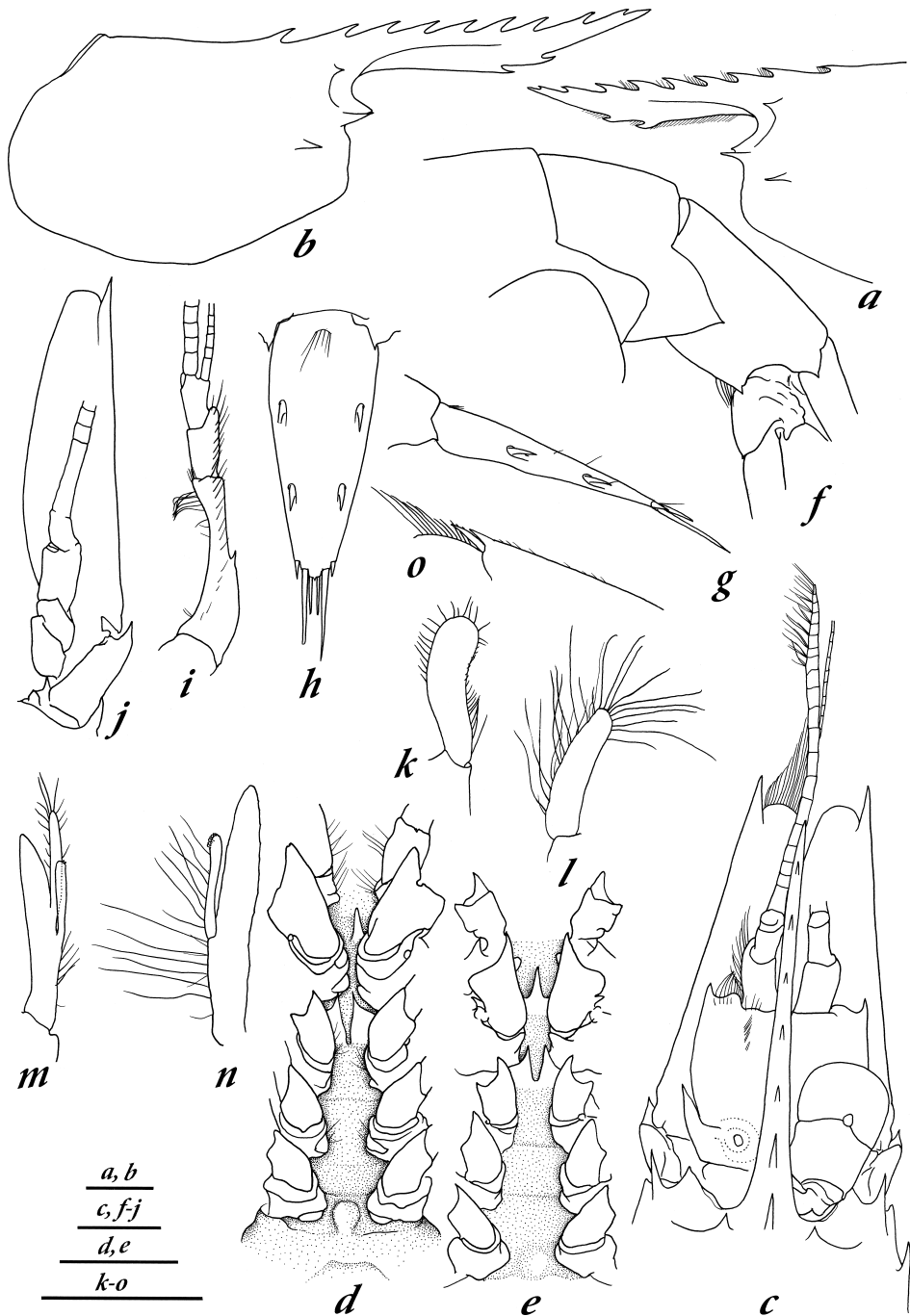


Fig. 6. *Palaemonella longidactylus* sp. nov. *a*, paratype, ovig. female (cl 4.4 mm), Beppu Bay, Ooita Prefecture; *b*, *d*, *k*, *m*, paratype, male (cl 4.0 mm), same lot; *c*, *f*, *h*-*j*, paratype, ovig. female (cl 5.1 mm), same lot; *e*, paratype, ovig. female (cl 4.0 mm), same lot; *g*, *l*, *n*, *o*, holotype, ovig. female (cl 4.6 mm). *a*, anterior part of carapace, lateral; *b*, carapace, lateral; *c*, anterior part of body, dorsal; *d*, *e*, thoracic sternite; *f*, fourth abdominal somite to anterior part of telson, lateral; *g*, telson, lateral; *h*, same, dorsal; *i*, left antennular peduncle, mesial; *j*, left antenna, ventral; *k*, *l*, left endopod of first pleopod; *m*, appendices masculina and interna on endopod of second pleopod; *n*, endopod of second pleopod; *o*, distal part of lateral margin of left exopod of uropod. Scale bars 1.0 mm

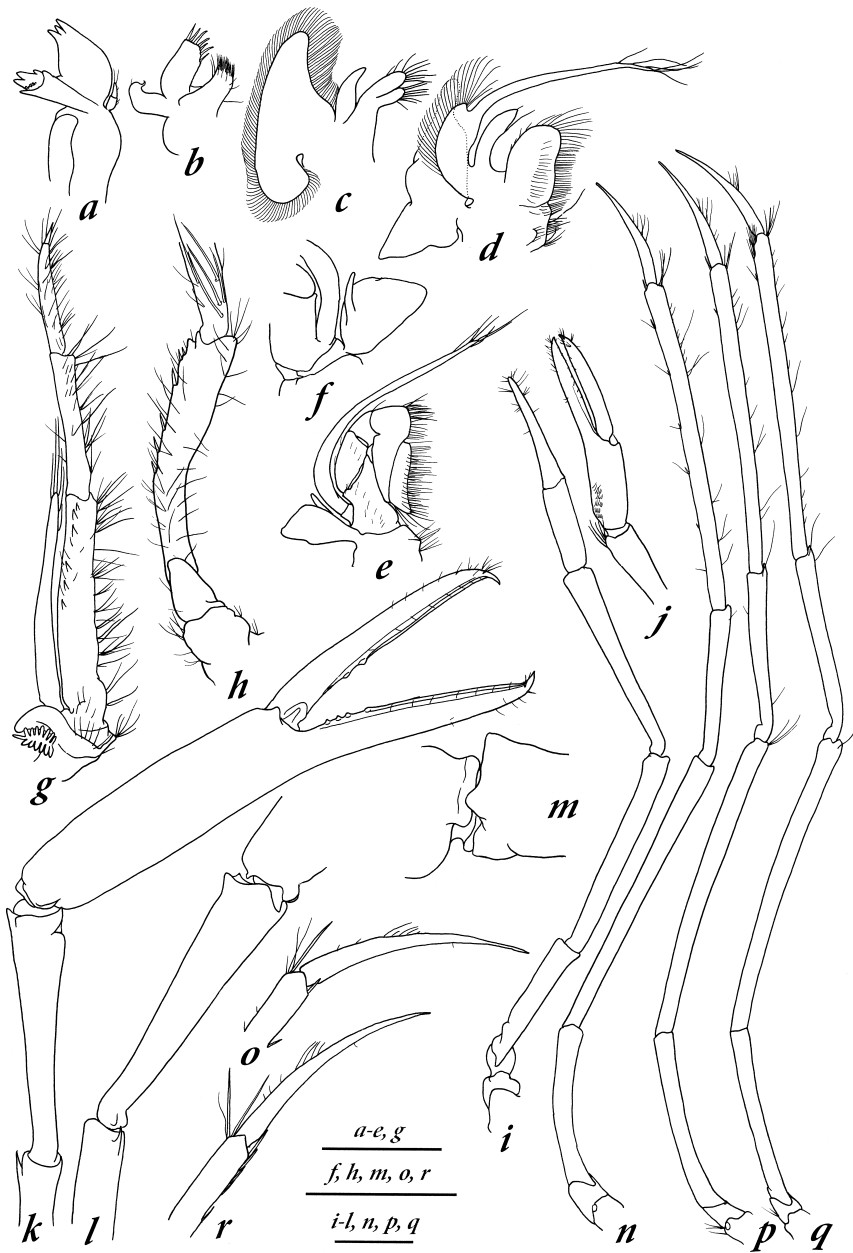


Fig. 7. *Palaemonella longidactylus* sp. nov. *a-k, m, n, p, q*, paratype, ovig. female (cl 4.7 mm), Beppu Bay, Ooita Prefecture; *l*, paratype, ovig. female (cl 5.1 mm), same lot; *o, r*, holotype, ovig. female, (cl 4.6 mm). *a*, right mandible, lateral; *b*, left maxillule, lateral; *c*, left maxilla, lateral; *d*, left first maxilliped, lateral; *e*, left second maxilliped, lateral; *f*, same, proximal part, mesial; *g*, left third maxilliped, lateral; *h*, same, proximal two segments; *i*, left first pereopod, lateral; *j*, same, chela, mesial; *k*, left second pereopod, chela, carpus and distal part of merus, lateral; *l*, right second pereopod, carpus and distal part of merus, mesial; *m*, same, articulation between carpus and chela, mesial; *n*, left third pereopod; *o*, same, dactylus and anterior part of propodus, mesial; *p*, left fourth pereopod; *q*, left fifth pereopod; *r*, same, dactylus and anterior part of propodus, mesial. Scale bars: 1.0 mm.

pus 0.5 times as long as palm, 4.2 times as long as distal width; merus 1.1 times as long as palm, 7.1 times as long as high, with strong distoventral spine; ischium 0.7 times as long as merus, 5.9 times as long as distal high. Third pereopod (Fig. 7n, o) slender, overreaching end of antennular peduncle by distal three segments and distal part of merus; dactylus slender, long, about 0.4 times as long as propodus, about 10 times as long as high; propodus about 17 times as long as high, with 2 short distoventral spines, not reaching proximal fifth of dactylus, ventral margin with about 6 spines arranged as single row; merus as long as propodus; ischium about 0.9 times as long as propodus. Fourth (Fig. 7p) and fifth pereopods (Fig. 7q, r) reaching nearly to same point as third pereopod (Fig. 5), similar to third in shape and armature.

Fourth thoracic sternite (Fig. 6e) with long slender finger-like median process, fifth sternite with pair of acute triangular submedian teeth; sixth to eighth sternites nearly flat, without median process.

First pleopod normal, endopod (Fig. 6l) lamellate, rounded distally with long plumose setae. Second pleopod with endopod lamellate, with long appendix interna setose mesially (Fig. 6n). Uropod (Fig. 6o) without special features.

Males and other females. Eight males (cl 3.6–4.6 mm) and 14 ovigerous females (3.9–5.5 mm) examined, generally similar to holotype. Rostrum 0.9–1.3 times as long as carapace in males, 0.7–1.0 in females, reaching just to or slightly beyond end of lamellar part of scaphocerite in both sexes. Rostral dentition rather variable in 17 intact specimens, 1+6/2 (1 specimen), 2+6/2 (4), 2+7/1 (1), 2+7/2 (10), 2+7/3 (1). Supraorbital spine small, acute, not tuberculiform in all specimens examined. Postorbital ridge well developed without exception.

Mouthparts (Fig. 7a–h) examined in ovigerous female (cl 4.7 mm), very similar to those of *P. spinulata*. Epipod of second maxilliped subquadrate, with slender, finger-like podobranch (Fig. 7e, f).

No specimens with second pereopods on both

sides, but they probably subequal, similar, because two right and one left legs nearly same shape and armature as the left one of holotype. Merus with distoventral spine always large and acute; carpus with terminal spine variable in shape from only small triangular process (two legs) to acute spine (one leg).

Last (eighth) thoracic sternite with rounded median process in males (Fig. 6d). First pleopod normal, endopod (Fig. 6k) lamellate, rounded distally with long plumose setae, emarginate medially with short curved setae, slightly convex with long setae proximally. Appendices masculina and interna well developed; both slender rod-like, interna with some hooks at distal part, masculina with several simple setae marginally (Fig. 6m).

Size. The holotype is an ovigerous female, cl 4.6 mm, the paratypes are 3.6–4.3 mm in males, 3.9–5.1 mm in ovigerous females. Other specimens are 4.3, 4.6 mm in males, and 4.4–5.5 mm in ovigerous females.

Remarks. Using the recent keys by Bruce (2002a) and Li *et al.* (2007) the present new species keys out *Palaemonella spinulata* in the possession of a sharp supraorbital spine and the unarmed ischium of the second pereopod. The new species is distinguished from *P. spinulata* by the following characters. (1) The dorsal rostral teeth are more numerous in the new species than in *P. spinulata*. The dentition is usually 2+7/2 in the new species (Fig. 6a–c), while 2+5/2 in *P. spinulata* (Fig. 2a–c). (2) The dactyli of the last three pereopods are long and slender, 9.0–11.0 times as long as high in *P. longidactylus* (Fig. 7n, o–r), versus 4.5–6.0 times as long in *P. spinulata* (Fig. 3p–t). (3) The median process on the last thoracic sternite in males is rounded in *P. longidactylus* (Fig. 6d), while finger-like in *P. spinulata* (Fig. 2d).

Etymology. The species name *longidactylus*, meaning “long dactylus”, refers to the relatively long, slender dactyli of the third to fifth pereopods of the new species.

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