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Palaemonella hachijo, a new species of shrimp (Crustacea: Decapoda: Palaemonidae) from a submarine cave in southern Japan

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Abstract.—A new species of the pontoniine shrimp genus *Palaemonella* Dana, *P. hachijo,* is described and illustrated on the basis of single male specimen from a submarine cave at Hachijo-jima Island, Izu Islands, southern Japan. It closely resembles *P. dolichodactylus* Bruce, but is readily distinguished by the antennal spine overreaching the distal margin of the antennal basicerite, the posteroventral margin of the fifth abdominal somite armed with an acute tooth, and the ambulatory propodi not segmented.

The genus *Palaemonella* Dana, 1852, is distinguished from other pontoniine genera in having a hepatic spine, a mandibular palp, a strong ventromesial spine on the fourth thoracic sternite, and slender, simple fingers of the first pereiopod (Chace & Bruce 1993, Holthuis 1993, Bruce 1994). Until now, it contained 13 species worldwide (Chace & Bruce 1993).

During a survey of the caridean shrimp fauna of Hachijo-jima Island, the Izu Islands, southern Japan, in the summer of 1998, a specimen of *Palaemonella* was captured in a submarine cave at a depth of 20 m. Although the specimen closely resembled *P. dolichodactylus* Bruce, 1991, known only from the New Caledonian waters at the depths of 44–250 m (Bruce 1991a, 1991b), the specimen differed morphologically from *P. dolichodactylus* and was found to represent a new species. Herein this new species is described and illustrated. The abbreviation CL indicates the postorbital carapace length measured in mm. The specimen is deposited in the Coastal Branch of Natural History Museum and Institute, Chiba (CMNH).

Palaemonella hachijo, new species
(Figs. 1–3)

Material.—Holotype, male, 3.3 mm CL, 33°03.5′N, 139°47.9′E, southern Japan, Izu Islands, Hachijo-jima Island, Occho-gahama, submarine cave, 20 m, 2 Sep 1998, with SCUBA gear, coll. J. Okuno, CMNH-ZC 00017.

Diagnosis.—Small sized pontoniine shrimp with subcylindrical body form. Carapace without supraorbital spine. Rostrum well developed, horizontal, dentate. Antennal spine acute, slightly overreaching dorsodistal margin of antennal basicerite. Posteroventral angle of fifth abdominal somite pointed, armed with acute tooth. Second pereiopod with merus armed with distoventral tooth and carpus lacking strong submarginal tooth. Ambulatory pereiopods long, slender, propodi not segmented.

Description.—Carapace (Fig. 1A) smooth, glabrous; orbit feebly developed, with distinct posterior marginal ridge, without supraorbital spine; antennal spine well developed, acute, slightly overreaching dorsodistal margin of antennal basicerite; hepatic spine acute, situated at lower and posterior levels of antennal spine; epigasteric spine acute; pterygostomian margin rounded.

Rostrum (Fig. 1C) well developed, horizontal and straight, 0.85 times as long as CL, falling short of distal margin of scaphocerite. Dorsal carina with 8 acute teeth, distal tooth subapical, smaller than other

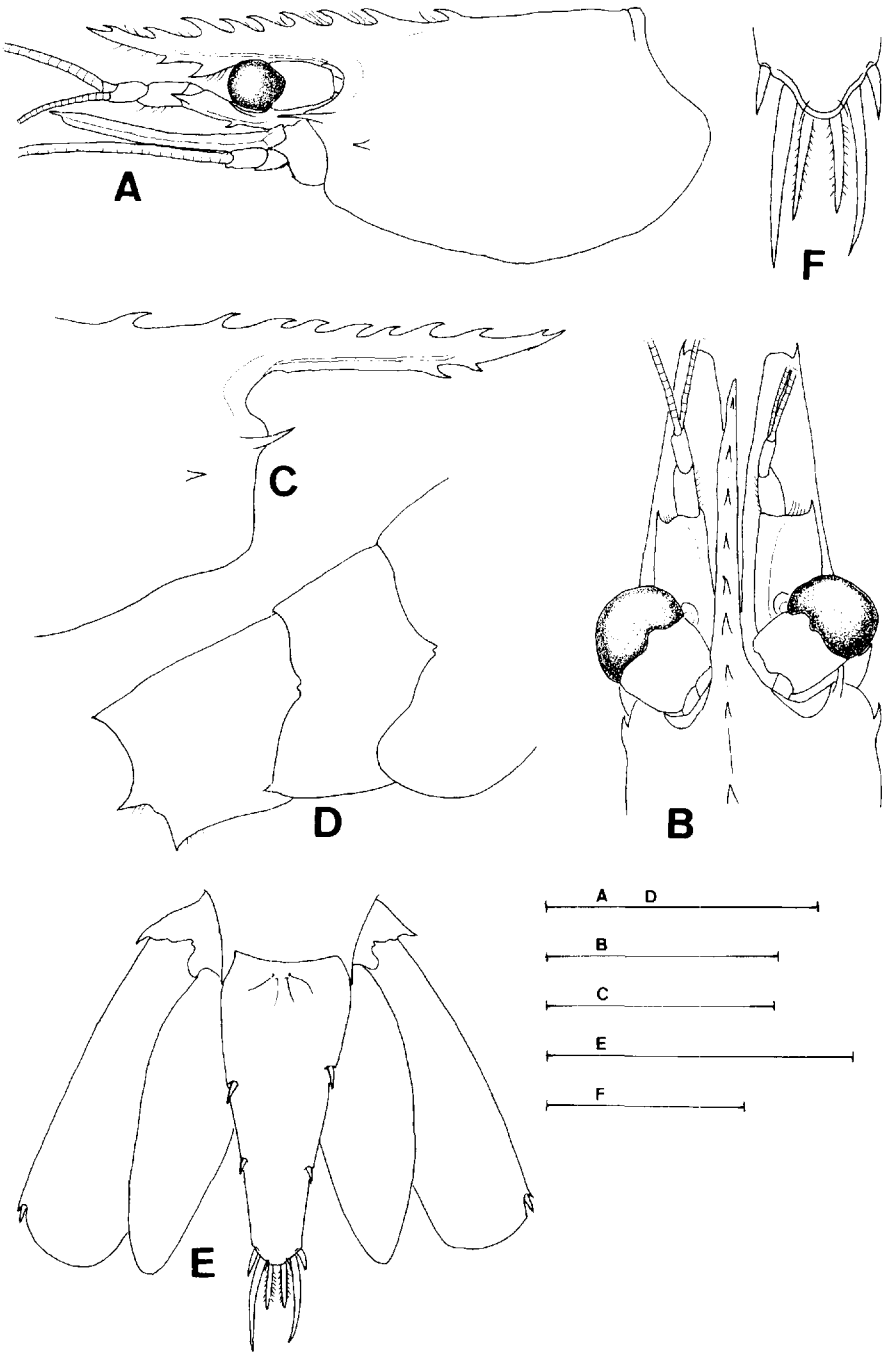

Fig. 1. *Palaemonella hachijo*, new species. Holotype male (CMNH-ZC 00017). A, carapace and left cephalic appendages, lateral view; B, anterior part of carapace with cephalic appendages, dorsal view; C, anterior part of carapace with rostrum, lateral view; D, fourth to sixth abdominal somites, right view; E, telson with uropods, dorsal view; F, posterior margin of telson, dorsal view. Scales: A, 3 mm; B–E, 2 mm; F, 0.5 mm.

posterior teeth, second to eighth teeth equidistant, seventh tooth just above orbit, proximal tooth posterior to postorbital margin, interspaces setose. Ventral carina with 2 acute teeth, situated at distal half of length; lateral carina feebly developed.

Abdominal somites smooth, glabrous; pleura of first to third somites broad, rounded. Posteroventral margin of fourth somite with pleuron produced posteriorly. Fifth somite (Fig. 1D) armed with acute tooth at posteroventral margin of posteriorly produced pleuron. Sixth somite (Fig. 1D) 0.51 times as long as CL, posteroventral margin armed with acute tooth. Telson (Fig. 1E) 0.67 times as long as CL, 2 pairs of acute submarginal dorsal spine; posterior margin (Fig. 1F) rounded, with 3 pairs of spines, intermediate spines longest, lateral and intermediate spines simple, submedian spines with setules.

Eye with large globular cornea, stalk slightly longer than corneal diameter.

Antennular peduncle (Fig. 2A) falling slightly short of rostral apex. Proximal segment with anterolateral margin produced, distal lobe slightly convex, armed sparsely with short setae, with acute distolateral spine overreaching distal lobe, ventromedial margin armed with acute tooth, statocerite well developed, acute, reaching level of proximal third of the segment, statocyst well developed, rounded; intermediate segment with lateral margin feebly convex, armed densely with short setae, medial margin fringed sparsely with moderately long setae; distal segment non-setose, obliquely articulated with flagella. Upper flagellum (Fig. 2B) biramous, divided at distal third of flagellum length, longer ramus about 4 times as long as shorter ramus, with segments neighboring shorter ramus fringed with simple setae (Fig. 2C).

Antenna (Fig. 2D) with well developed scaphocerite 3.82 times as long as maximum width, with distolateral tooth acute, overreaching distal margin of lamella; carpocerite reaching proximal fifth of scaphocerite; basicerite armed anterolaterally with acute tooth.

Mandible (Fig. 2E) robust, with one-segmented palp with sparse setae; molar process obliquely truncated distally, with blunt teeth; incisor process well developed, with 3 acute distal teeth.

Maxillula (Fig. 2F) with bilobed palp, upper lobe tapering distally, lower lobe slightly curved; upper lacinia slender, with distal margin truncated, armed with 2 rows of acute spines; lower lacinia broken, but probably typical of *Palaemonella.*

Maxilla (2G) with simple palp tapering distally; basal endite developed, deeply bilobed, with numerous short setae distally; coxal endite obsolete; scaphognathite fringed densely with setae.

First maxilliped (Fig. 2H) with simple seta on palp; caridean lobe well developed, with sparse setae, exopod with well developed flagellum; basal endite with medial margin with 3 rows of dense setae, coxal endite with medial margin with numerous short setae; epipod large, triangular, feebly bilobed.

Second maxilliped (Fig. 2I) with oval epipod without podobranch. Dactylar segment laterally with 2 rows of dense setae, distal margin truncated, with dense setae. Propodal segment with broadly rounded distal margin, with dense setae; dorsodistal and ventrodistal margins of carpal segment acute. Distal margin of ischiomeral segment about twice as long as carpal segment. Basal segment with exopodal flagellum well developed.

Third maxilliped (Fig. 2J) with oval epipod. Endopod slender, slightly overreaching midlength of scaphocerite; ultimate segment tapering, with group of short distolateral setae medially, fringed with long setae distally; penultimate segment slightly longer than ultimate segment, lateral and medial margins fringed with setae; ischiomerus widening, with 6 distolateral spinules. Exopod well developed, fringed distally with long setae. Small arthrobranch present.

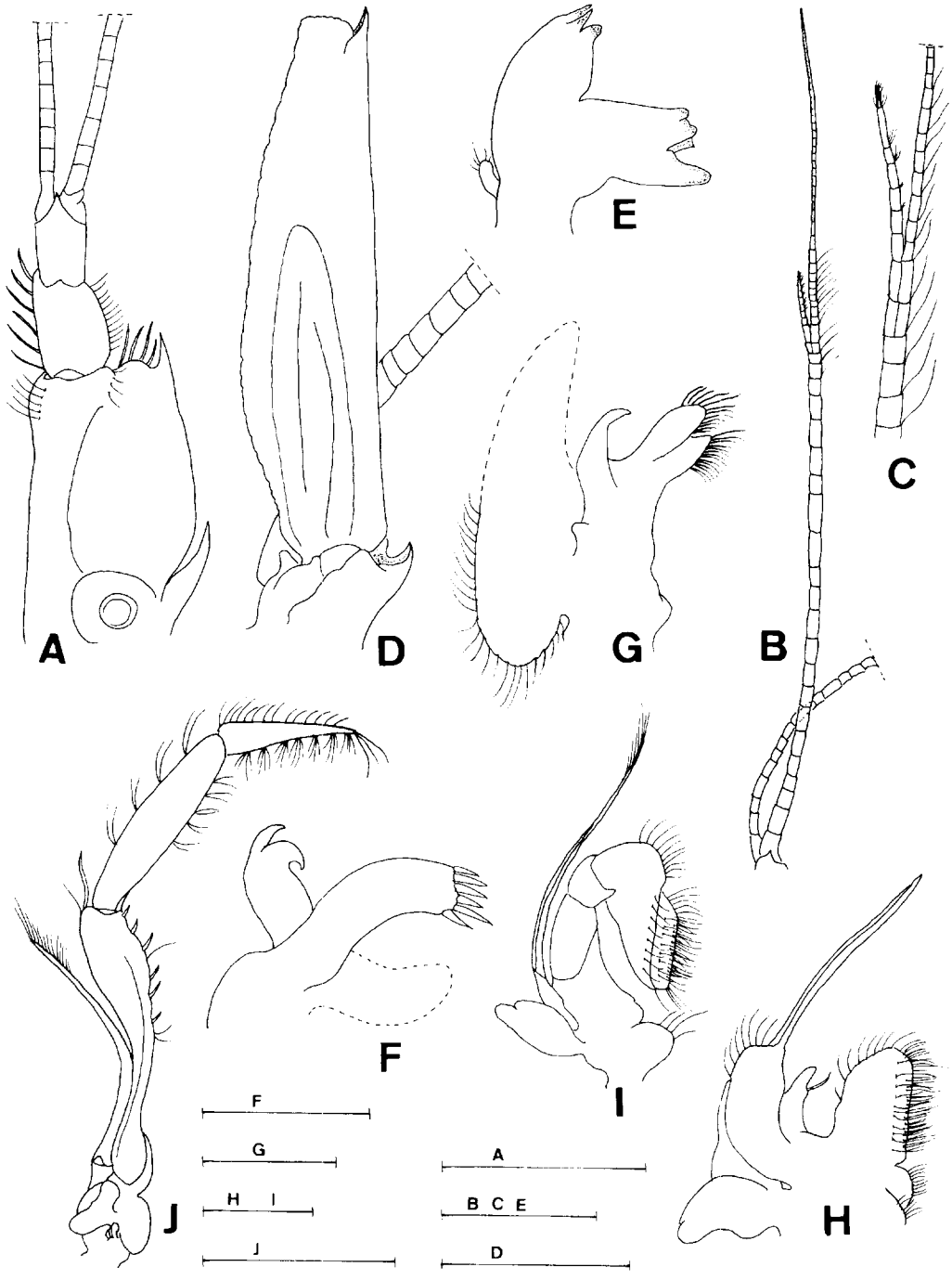

Fig. 2. *Palaemonella hachijo,* new species. Holotype male (CMNH-ZC 00017). A, right antennular peduncle, dorsal aspect; B, same, upper flagellum; C, same, shorter ramus; D, right antenna, dorsal aspect; E, right mandible; F, right maxillula; G, right maxilla; H, right first maxilliped; I, right second maxilliped; J, right third maxilliped. Scales, A, D, J, 1 mm; B, 1.5 mm; C, E–I, 0.5 mm.

Table 1.—Branchial formula of *Palaemonella hachijo*, new species.

	Maxillipeds			Pereiopods				
	I	II	III	I	II	III	IV	V
Pleurobranchs	—	—	—	1	1	1	1	1
Arthrobranchs	—	—	1	—	—	—	—	—
Podobranchs	—	—	—	—	—	—	—	—
Epipods	1	1	1	—	—	—	—	—
Exopods	1	1	1	—	—	—	—	—

Branchial formula as in Table 1.

First pereiopod (Fig. 3A) slender, overreaching distal margin of scaphocerite by proximal fourth of carpus. Chela (Fig. 3B) 0.52 times as long as CL, palm with transverse rows of setae proximally; fingers tapering with small hooked tip, with dense setae distally, cutting edges entire. Carpus 0.73 times as long as CL, 1.63 times as long as chela, slightly widening distally, distal margin not denticulate, distoventrally with dense setae.

Second pereiopods (Fig. 3C) long, slender, symmetrical, overreaching distal margin of scaphocerite by distal fourth of meri. Chela 1.70 times as long as CL, 1.26 times as long as carpus, with palm subcylindrical, compressed, entire, flexor margin expanded proximally, slightly shorter than fingers; movable finger (Fig. 3D) with acute hooked tip, distal 2/3 of cutting edge entire, proximal third armed with 2 large blunt teeth; fixed finger (Fig. 3D) with acute hooked tip, distal 3/4 of cutting edge entire, proximal fourth armed with large blunt tooth and quadrate conical projection, marginally serrate, opposite to the teeth on movable finger. Carpus slender, entire, 1.30 times as long as CL, widening distally, without subterminal spine. Merus slender, armed with acute distal tooth on flexor margin, with long setae dorsodistally. Ischium unarmed.

Third pereiopod (Fig. 3E) long, slender, overreaching distal margin of scaphocerite by level of midlength of carpus. Dactylus (Fig. 3F) slightly sinuous, uniunguiculate, midlength to distal third of external margin armed sparsely with long setae. Propodus 4.75 times as long as dactylus, 1.39 times as long as carpus, not segmented, distoventral and dorsodistal angles with long setae, dorsal margin armed with sparse setae. Carpus 0.70 times as long as CL, fringed with sparse setae dorsodistally. Merus 1.05 times as long as CL, 1.48 times as long as carpus, dorsodistal angle fringed with 2 long setae (Fig. 3G). Ischium with sparse setae ventrally.

Fourth thoracic sternite (Fig. 3H) armed with long slender median spine between coxae of first pereiopods. Fifth thoracic sternite (Fig. 3H) armed with pair of acute submedian spines with sinuous lateral borders proximal coxae of second pereiopods. Eighth thoracic sternite (Fig. 3H) armed with stout median process directed anteriorly.

Endopod of first pleopod (Fig. 3I) oblong, fringed with sparse setae distally.

Endopod of second pleopod armed with appendices interna and masculina (Fig. 3J); appendix interna slightly overreaching tip of appendix masculina, with cincinnuli distally; appendix masculina with numerous long setae.

Uropod (Fig. 1E) with protopodite posteroventrally acute; exopod broad, reaching subequal to posterior telson margin, posterior margin feebly rounded, lateral margin straight, with acute distolateral tooth, with strong mobile spine medially; endopod reaching subequal to distal margin of exopod, slightly tapering distally.

Coloration.—Body and appendages transparent. Posterodorsal region of carapace with short, oblique rusty red line. Anterolateral angle of carapace with oblique, feebly undulate rusty red line. Ventral midline and external margin of telson colored with rusty red. Abdominal somites each with transverse rusty red line along posterodorsal margin. Second pereiopod with reddish brown patches at distal margins of merus and carpus, and junction of palm and movable finger.

Etymology.—From locality of capture, Hachijo-jima Island. This island is com-

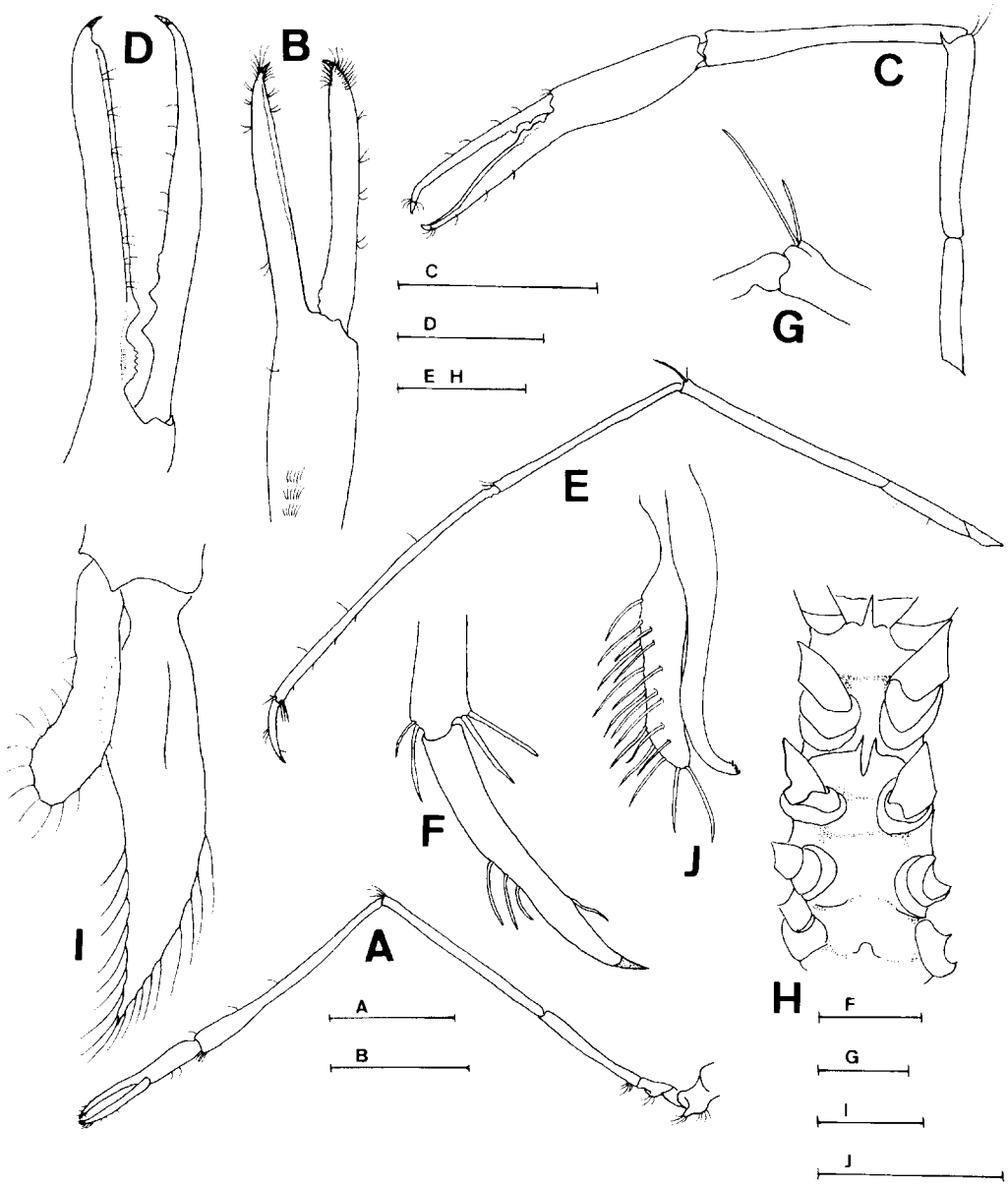

Fig. 3. *Palaemonella hachijo*, new species. Holotype male (CMNH-ZC 00017). A, left first pereiopod; B, same, chela; C, left second pereiopod; D, same, fingers; E, left third pereiopod; F, same, dactylus; G, same, carpomeral articulation; H, thoracic sternites, ventral aspect; I, left first pleopod; J, left second pleopod, appendices interna and masculine. Scales: A, E, 1.5 mm; B, 0.5 mm; C, 3 mm; D, H, 1 mm; F, G, I, J, 0.25 mm.

monly abbreviated to "Hachijo". In this case, the word *hachijo* is used as a noun in apposition.

Distribution.—Known only from the type locality.

Ecological notes.—The collection site of the specimen was in a small crevice in a submarine cave at a depth of 20 m. The crevice was naked, without any sponges or coelenterates, therefore, *P. hachijo* may be considered as a free-living species. This point was about 15 m distance from the

cave entrance, and not influenced by incidence of daylight. Several specimens of *Urocaridella* sp. (Palaemonidae) and some *Cinetorhynchus concolor* (Okuno) and *C. erythrostictus* Okuno (Rhynchocinetidae) were also collected.

Remarks.—All ambulatory pereiopods but the left third pereiopod were detached before the specimen was scrutinized. Three unnumbered (probably right fourth and fifth and left fourth) ambulatory pereiopods remained in the bottle. These appendages were similar in form to that of the third pereiopod.

Palaemonella hachijo closely resembles *P. dolichodactylus* sharing the following characters: supraorbital spine absent; merus of second pereiopod armed with distal tooth on flexor margin; carpus of second pereiopod lacking strong submarginal tooth; and ambulatory pereiopods long and slender. The new species differs from *P. dolichodactylus* in the antennal spine overreaching the distal margin of the antennal basicerite, posteroventral angle of the fifth abdominal somite armed with acute tooth posteroventrally, and the ambulatory propodi not segmented. In *P. dolicodactylus,* the antennal spine falls slightly short of the level of the distal margin of the antennal basicerite, and the fifth abdominal somite has the pleuron rounded posteroventrally, and the propodi of ambulatory pereiopods are obscurely segmented (Bruce 1991a, 1991b).

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