

A New Species of Sponge-dwelling Shrimp of the Genus *Alpheus* (Decapoda: Caridea: Alpheidae) from the Ryukyu Archipelago

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Abstract A new alpheid shrimp, *Alpheus fushima*, is described and illustrated based on specimens collected from the internal canals of a large unidentified sponge from a shallow coral reef in the Yaeyama Islands, Ryukyus, southern Japan. The new species is assigned to the *Alpheus edwardsi* group of the genus, and is characterized by the combination of the following features: orbital hoods rounded, unarmed; rostrum relatively broad, somewhat flattened; dorsal shoulder on the palm of the major chela low, bluntly acute, distinctly overhanging the very narrow transverse groove; and merus of the third pereiopod armed with a ventrodiscal tooth.

Key words: Decapoda, Caridea, Alpheidae, *Alpheus*, new species, association, sponge.

During an ongoing survey of the alpheid fauna of Japan, a male-female pair of an unusual species of *Alpheus* Fabricius, 1798 were found from internal canals of a large unidentified sponge, collected from a shallow coral reef of the Kuro-shima Island in the Yaeyama Islands, Ryukyus, southern Japan. Detailed examination has revealed that these specimens represent an undescribed species of the *A. edwardsi* group, easily distinguished from the known members of the group by a suite of morphological characters and their coloration.

The type specimens are deposited in the following institutions: National Museum of Nature and Science, Tokyo (NSMT); Natural History Museum and Institute, Chiba (CBM). The carapace length (CL) was measured in mm from the base of the rostrum to the midpoint of the posterodorsal margin of the carapace. The total length (TL) was measured in mm from the tip of the rostrum to the posterior margin of the telson.

Taxonomic Account

Alpheus fushima sp. nov.

[New Japanese name: Fushima-teppou-ebi]

(Figs. 1–3)

Material examined. Holotype: NSMT-Cr 17990, ovigerous female (CL 13.8 mm; TL about 35.0 mm), Nishinohama, Kuro-shima Island, Yaeyama Islands, southern Ryukyu Archipelago, Japan, 5 m depth, internal canals of large colony of an unidentified sponge, 9 December 1999.

Paratype: CBM-ZC 9472, 1 male (CL 9.4 mm, TL about 26.0 mm), same data as holotype.

Diagnosis. *Alpheus edwardsi* group. Orbital hood and postrostral region unarmed. Rostrum relatively broad, equilateral triangular in dorsal view. Adrostral furrow not abruptly delimited, moderately deep. Antenna with basicerite bearing small tooth. Major chela not setose, dorsal shoulder of palm low, bluntly acute, distinctly overhanging very narrow transverse groove. Dactylus of minor chela without balaeniceps setae in both sexes. Second carpal segment of second pereiopod about twice as long as first. Third pereiopod rather stout, dactylus simple, ventrodiscal margin of carpus with sharply point-

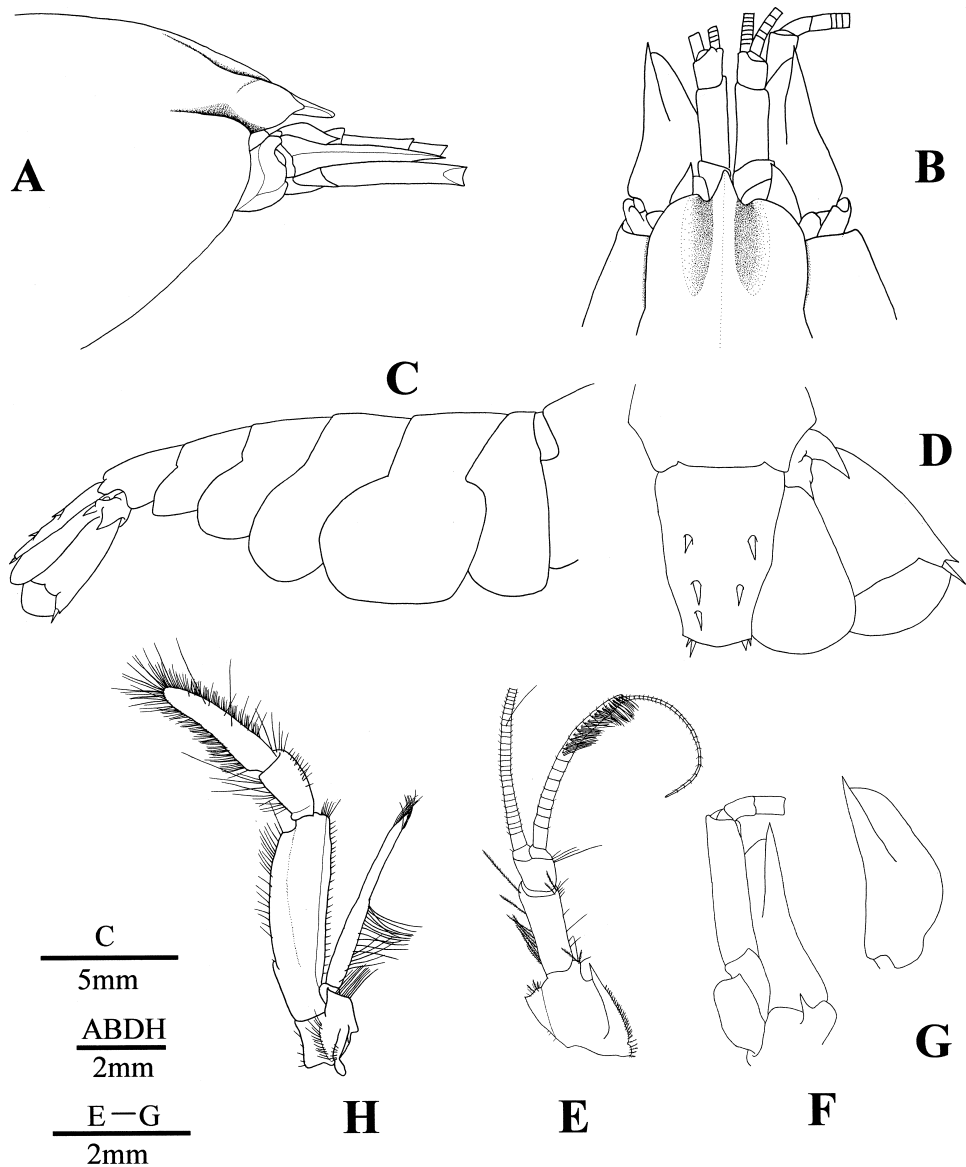


Fig. 1. *Alpheus fushima* sp. nov., NSMT-Cr 17990, holotype, ovig. female (CL 13.8 mm), Kuro-shima Island, Yaeyama Islands. A, anterior carapace and cephalic appendages, lateral view, setae omitted; B, same, dorsal view; C, abdomen, telson and uropods, lateral view, setae omitted; D, telson and right uropod, dorsal view, setae omitted; E, left antennular peduncle, ventro-lateral view; F, left antenna, ventral view, setae omitted; G, same, scaphocerite, dorsal view, setae omitted; H, left third maxilliped, mesial view.

ed tooth, merus about 4.0 times as long as wide, with acute ventrodistal tooth.

Description. Carapace (Fig. 1A, B) glabrous, without setae. Orbital hoods unarmed, inflated, slightly higher than rostrum; adrostral furrow not abruptly delimited, moderately deep. Postfrontal

region unarmed. Frontal margin between rostrum and orbital hood indented in dorsal view. Rostrum relatively broad, 1.0–1.1 times as long as wide at base in dorsal view; tip subacutely pointed, slightly falling short of distal margin of first segment of antennular peduncle; dorsal surface

rounded, ventral surface with rounded median ridge.

Abdominal pleura (Fig. 1C) smooth, rounded; posteroventral margin of fifth pleuron subacute. Telson (Fig. 1D) 1.2–1.4 times as long as anterior width; dorsal surface with 2 pairs of moderately strong spines, anterior pair situated in anterior half to mid-length, with 1 additional spine behind posterior pairs in holotype; posterior margin moderately convex, with 2 pairs of spines at posterolateral angles, mesial spines longer than lateral.

Antennular peduncle (Fig. 1A, B, E) overreaching distal margin of blade of scaphocerite; first segment with small tooth on ventromesial carina; stylocerite distally acute, slightly falling short of distal margin of first segment; second segment 1.9–2.0 times as long as wide at mid-length, 1.8–1.9 times as long as visible part of first segment in dorsal view, and 1.6–1.9 times as long as third segment. Lateral flagellum (Fig. 1E) biramous; shorter branch composed of 1 segment with aesthetascs; proximal fused portion composed of 14–16 segments, distal 8 bearing aesthetascs.

Antenna (Fig. 1A, 1B, 1F) with basicerite usually bearing small ventrolateral tooth (lacking in right basicerite of holotype). Carpocerite overreaching distal margin of third segment of antennular peduncle or scaphocerite. Scaphocerite 2.3–2.4 times as long as wide, overreaching third segment of antennular peduncle; distolateral tooth strong; blade well-developed, broad.

Mouthparts typical for genus. Third maxilliped (Fig. 1H) rather slender; ultimate segment 4.2–5.0 times as long as wide at base, tapering distally; exopod reaching to distal margin of antepenultimate segment; coxa with distally subacute lateral plate.

Major right cheliped of male paratype missing. Major cheliped of female holotype (Fig. 2A–D) with chela 2.7 times as long as wide. Dactylus 0.4 times as long as palm, compressed, somewhat twisted in dorsal view, tip rounded; plunger relatively small, subtriangular. Pollex with broad base, tip blunt, crossing with tip of dactylus.

Palm somewhat compressed, length 2.0 times of proximal width; dorsal surface (Fig. 2A) with deep, very narrow transverse groove near dactylar articulation adjoining to lateral and mesial side by depression, proximal shoulder low, bluntly acute, distinctly overhanging groove, distal shoulder small, rounded; lateral surface (Fig. 2C, D) with narrow quadrangular depression extending from base of proximal shoulder to linea impressa, longitudinal ridge below this depression distinct; mesial surface (Fig. 2B) with short, longitudinal depression and ridge near dactylar articulation, longitudinal depression narrower than lateral depression; ventral surface with shallow transverse groove and small rounded shoulder. Carpus short, cup-shaped. Meral length 2.1 times distal width; ventral surface shallowly excavated; ventromesial margin with obtuse distal projection, without movable spine.

Minor left cheliped similar in shape between male and female (Fig. 2E–H). Chela slightly compressed laterally, 4.4–4.6 times as long as wide. Fingers slightly curved mesially, tips acute, crossing, cutting edges sharp. Dactylus subequal to palm in length, without balaeniceps setae in both sexes. Pollex without row of plumose setae on lateral and mesial surface in both sexes. Palm 2.7–2.3 times as long as wide, dorsomesial margin with blunt subtriangular tooth flanking dactylar articulation. Carpus short, cup-shaped. Meral length 1.9–2.3 times distal width; ventral surface shallowly excavated; ventromesial margin with small, acute distal tooth, without movable spine.

Second pereopod (Fig. 2I) with chela 3.1–3.8 times as long as wide; fingers subequal in length to palm, tips crossing, cutting edges sharp; carpus subdivided into 5 segments, second segment 0.6 times as long as first.

Third pereopod (Fig. 2J) rather stout; dactylus simple, slightly curved, 3.0 times as long as wide at base; propodus 0.7 times as long as merus, 4.9–5.0 times as long as wide, ventral surface with 13–15 spines; carpus 0.6 times as long as merus, ventrodistal angle with sharply pointed tooth; merus 4.1–4.4 times as long as wide, ventral margin with sharply pointed distal tooth; is-

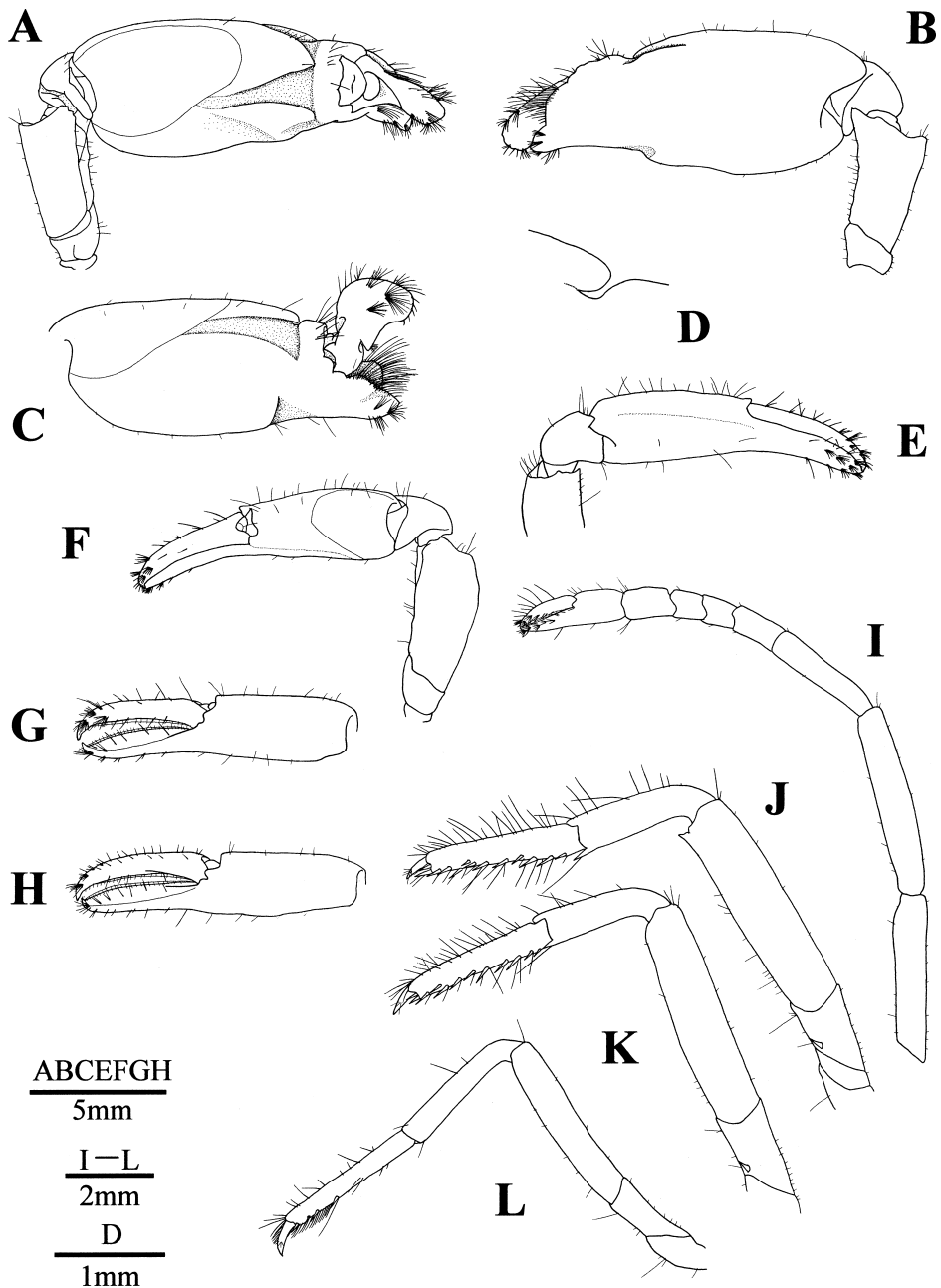


Fig. 2. *Alpheus fushima* sp. nov. A-G, I-L, NSMT-Cr 17990, holotype, ovig. female (CL 13.8 mm), Kuro-shima Island, Yaeyama Islands; H, CBM-ZC 9472, paratype, male (CL 9.4 mm), same data. A, right (major) cheliped, dorsal view (merus and ischium, lateral view); B, same, mesial view; C, same, chela, lateral view; D, same, dorsal shoulder and depression of palm, lateral view; E, left (minor) cheliped, mesial view; F, same, dorsal view (merus and ischium, lateral view); G, H, same, chela, lateral view; I, left second pereiopod, lateral view; J, left third pereiopod, lateral view; K, left fourth pereiopod, lateral view; L, right fifth pereiopod, mesial view.

chium about 0.4 times as long as merus, lateral surface ventrally with 1 spine. Fourth pereiopod (Fig. 2K) generally similar to third pereiopod; dactylus 3.3 times as long as wide at base; propodus with 12–14 spines on ventral surface; carpus with sharply pointed tooth at ventrodistal angle; merus unarmed, 4.4–5.2 times as long as wide; ischium with 1 ventrolateral spine.

Fifth pereiopod (Fig. 2L) subequal in length to

third pereiopod, but distinctly more slender; propodus 0.8–0.9 times as long as merus, ventral surface with 3 or 4 spines and row of about 10 tufts of short setae forming grooming apparatus; carpus subequal in length to propodus, unarmed; merus and ischium unarmed.

Uropod (Fig. 1D) overreaching posterior margin of telson; protopod with 2 acute posterodorsal processes; exopod longer than endopod; di-

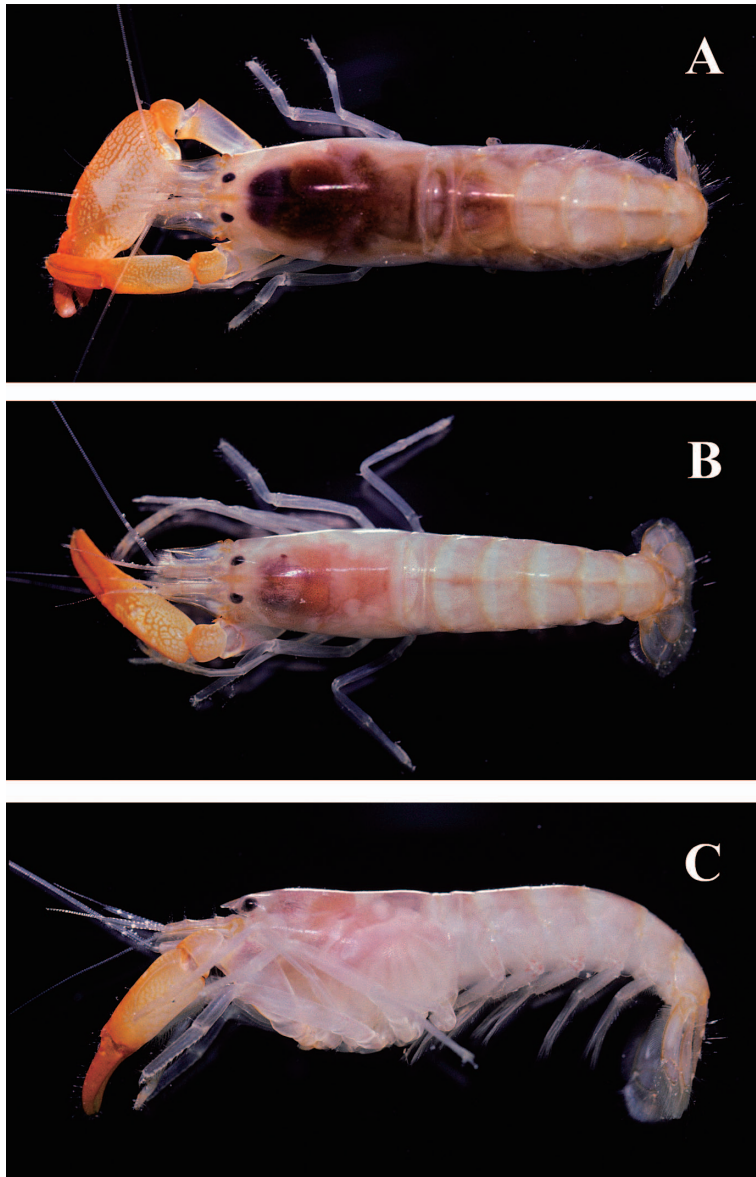


Fig. 3. *Alpheus fushima* sp. nov. A, NSMT-Cr 17990, holotype, ovig. female (CL 13.8 mm), Kuro-shima Island, Yaeyama Islands; B, C, CBM-ZC 9472, paratype, male (CL 9.4 mm), same data.

aeresis with acute distal tooth and large spine laterally.

Coloration. Ground color pale orange; cheliped fingers orange, palm and carpus with network of orange lines on mesial surface (Fig. 3).

Habitat. The specimens were found in the internal canals of a large unidentified sponge, on a shallow coral reef at a depth of 5 m. Several individuals of another alpheid shrimp, *Synalpheus coutierei* Banner, 1953 were co-inhabiting the sponge, comprising of two males (CL 4.0, 4.9 mm), three females (CL 4.2–5.6 mm), and three ovigerous females (CL 4.3–5.6 mm).

Distribution. So far known only from the type locality, Kuro-shima Island, Yaeyama Islands, southern Ryukyu Archipelago, Japan.

Remarks. The new species is assigned to the *Alpheus edwardsi* group, one of the seven informal species groups recognized in the genus *Alpheus* (see Banner and Banner, 1982; Chace, 1988; Kim and Abele, 1988), by the major chela with a compressed palm, bearing a dorsal transverse groove and with a shoulder on the opposite margin proximal to the fixed finger. Among the currently recognized about 100 species in this group, the possession of a ventrodiscal (ventro-subdistal) meral tooth on the third pereiopod links *Alpheus fushima* sp. nov. to the following 14 species: *A. edamensis* De Man, 1888, *A. euschirus* Dana, 1852, *A. funafutensis* Borradaile, 1898, *A. georgei* Banner and Banner, 1982, *A. hippothoe* De Man, 1888, *A. hoplites* Nobili, 1907, *A. hutchingsae* Banner and Banner, 1982, *A. parvirostris* Dana, 1852, *A. perezi* Coutière, 1908 and *A. serenei* Tiwari, 1963 in the Indo-West Pacific; *A. umbo* Kim and Abele, 1988 in the East Pacific; *A. bahamensis* Rankin, 1898, *A. intrinsecus* Bate, 1888 and *A. schmitti* Chace, 1972 in the Atlantic. The new species is quite distinctive in having a low, bluntly acute dorsal shoulder on the palm of the major chela, which distinctly overhangs and approximates the very narrow transverse groove. Furthermore, the combination of the following features differentiates *A. fushima* sp. nov. from the above 14 species; rostrum relatively broad (the length and width al-

most equal at base in dorsal view); ventrolateral tooth of basicerite comparatively small; dactylus of minor chela without balaeniceps setae in both sexes, palm not setose; second carpal segment of second pereiopod 0.6 times as long as first; dactyl of third pereiopod not biunguiculate, ventrodiscal tooth on carpus, and merus about 4.0 times as long as wide (Banner and Banner, 1982; Chace, 1972, 1988; Crosnier and Forest, 1966; De Man, 1911; Kim and Abele, 1988; Tiwari, 1963; Verrill, 1922). In many respects, the new species is most similar to *A. bahamensis* and *A. hippothoe*, but the more slender merus of the third pereiopod (4.1–4.4 times as long as wide in *A. fushima* versus 2.8–3.0 times in *A. bahamensis* and *A. hippothoe*) easily distinguishes the new species from the latter two species (Banner and Banner, 1982; Rankin, 1898; Verrill, 1922).

Etymology. The specific name refers to the 'Fushima', which is the old name of the type locality, Kuro-shima Island.

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