

A new species of *Bathypalaemonella* Balss (Decapoda: Caridea: Bathypalaemonellidae) from Japan

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Abstract. — A new species of rare deep-sea caridean genus *Bathypalaemonella* (Bathypalaemonellidae), *B. hayashii*, is described and illustrated on the basis of two female specimens obtained from southeast of Amami-oshima Island at depth of 789–815 m and Tosa Bay at depths of 440–510 m, Japan. The new species appears closest to the Atlantic species *B. serratipalma* Pequegnat, from which it is readily distinguishable in a number of characters. It is the first representative of *Bathypalaemonella* from Japanese waters.

The genus *Bathypalaemonella* Balss, 1914, has been known to have a circum-tropical distribution at continental slope depths, with five Indo-Pacific, two Atlantic and one eastern Pacific species (Rathbun, 1906; Balss, 1914; Bruce, 1966; 1986; Pequegnat, 1970; Crosnier & Forest, 1973; Wicksten & Mendez, 1983). Bruce (1986) briefly reviewed all of the known species and provided a key for their identification. Recently, Toriyama *et al.* (1990) recorded an unidentified species from Tosa Bay, Japan, with a colored photograph.

During the KT 94-9 cruise of the R.V. Tansei-Marui of the Ocean Research Institute, University of Tokyo, to the Ryukyus, the macro- or megalobenthos were collected at one station southeast of Amami-oshima Island at depth of 789–815 m by means of a beam trawl with 2 m opening. Amongst the specimens collected was one specimen of the genus *Bathypalae-*

monella. I have also been able to examine one of six specimens of *Bathypalaemonella* from Tosa Bay reported by Toriyama *et al.* (1990) and found that the specimen belongs to a same species. The Japanese species appears to be close to the Atlantic species *B. serratipalma* Pequegnat, 1970, and a comparison with the original description and the specimens identified as the latter species by Crosnier & Forest (1973) clearly shows the existence of a number of differences which justify the separation of the Japanese specimen as a distinct species. The present paper describes a new species based on the two specimens. This species is the first of the genus extending its distribution to temperate region of the western Pacific Ocean.

The drawings were prepared with the aid of a camera lucida mounted on an OLYMPUS SZH. The following abbreviations are used: CBM=Natural History Museum and Institute, Chiba; CL = postorbital carapace length; MNHN = Muséum National d'Histoire Naturelle, Paris; SUF = Shimonoseki University of Fisheries. The holotype is deposited in CBM; the paratype will be deposited in SUF. For comparative purpose, the following specimens were examined: *Bathypalaemonella serratipalma* reported by Crosnier & Forest (1973), off Morocco, 32°34'N, 9°49'W, 1590 m, *Talisman* St. 33, 17 June 1883, 1 ovig. female (CL 12.1 mm) and 1 female (CL 9.3 mm), MNHN Na 1128; same location, 1 female (CL 11.8 mm), MNHN Na 1129.

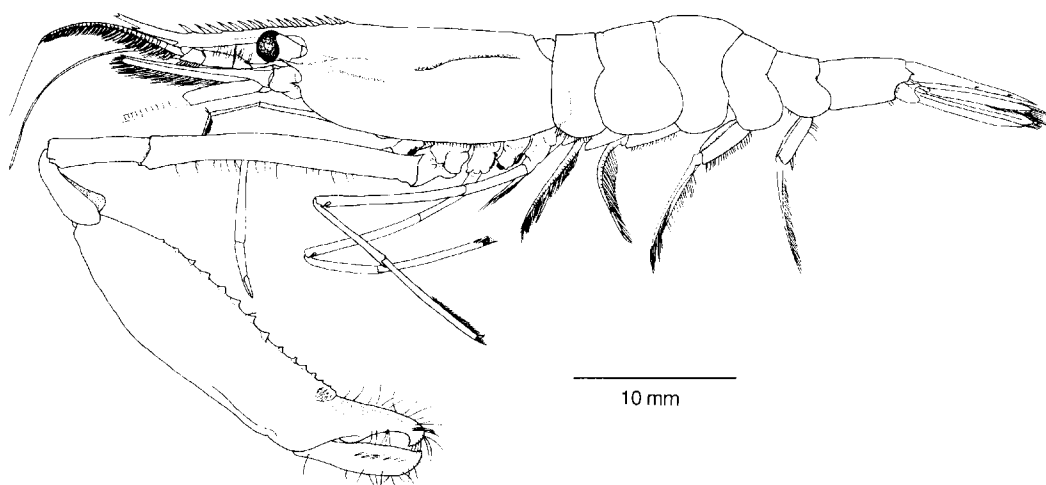


Fig. 1. *Bathypalaemonella hayashii* new species, holotype female (CL 13.9 mm), lateral view.

Bathypalaemonella hayashii

new species

Figs. 1–4

Bathypalaemonella sp.: Toriyama, Horikawa & Kishida, 1990: 16, pl. 1a.

Type Material. — Holotype: female (CL 13.9 mm), southeast of Amami-oshima Island, 28°02.5'N, 129°34.5'E / 28°02.8'N, 129°34.9'E, 815–789 m, sandy mud bottom mixed with shell fragments, beam trawl with 2 m opening, 1 July 1994, coll. T. Komai (R/V Tansei-Marui), CBM-ZC 1216. Paratype: female (CL 13.0 mm), Tosa Bay, 33°09.5'N 133°38.2'E, 440–510 m, trawl, 20 April 1987, SUF.

Description of holotype. — Body form (Fig. 1) generally slender; integument firm, surface glabrous.

Rostrum (Figs. 1, 2A) slightly overreaching scaphocerite, 0.87 times as long as carapace, feebly tapering, descending in proximal two-thirds, curved dorsad therefrom; dorsal margin armed with 16 relatively long, basally articulated teeth in proximal two-thirds, including 4 on carapace posterior to level of orbital margin, posteriormost tooth situated at anterior one-sixth of carapace, and with 1

small subterminal tooth, without basal suture; ventral margin with 2 acute teeth in distal one-third, anterior tooth somewhat posterior to apex; lateral carina rather weak, not broadened basally, confluent with lateral margin of orbit. Carapace (Figs. 1, 2A, B) with postrostral carina extending to midlength carapace, highest at base of posteriormost dorsal tooth; infraorbital angle feebly developed, obtusely triangular; antennal spine slender, supported by blunt ridge extending posteriorly to anterior one-third of carapace; branchiostegal spine much smaller than antennal spine; pterygostomian angle broadly rounded; short blunt ridge extending from slightly posterior to orbital margin to level of posteriormost median tooth; hepatic sulcus long, extending nearly to level of midlength of carapace; branchial ridge distinct, accompanied dorsally with shallow sulcus.

Abdomen (Fig. 1) smooth; pleura of first to fifth somites small, rounded. Sixth somite twice length of fifth somite, 1.8 times as long as proximal depth, posteroventral angle blunt; posterolateral process with small acute tooth; posterodorsal margin (Fig. 2C) straight, with shallow notch slightly mesial to base of posterolat-

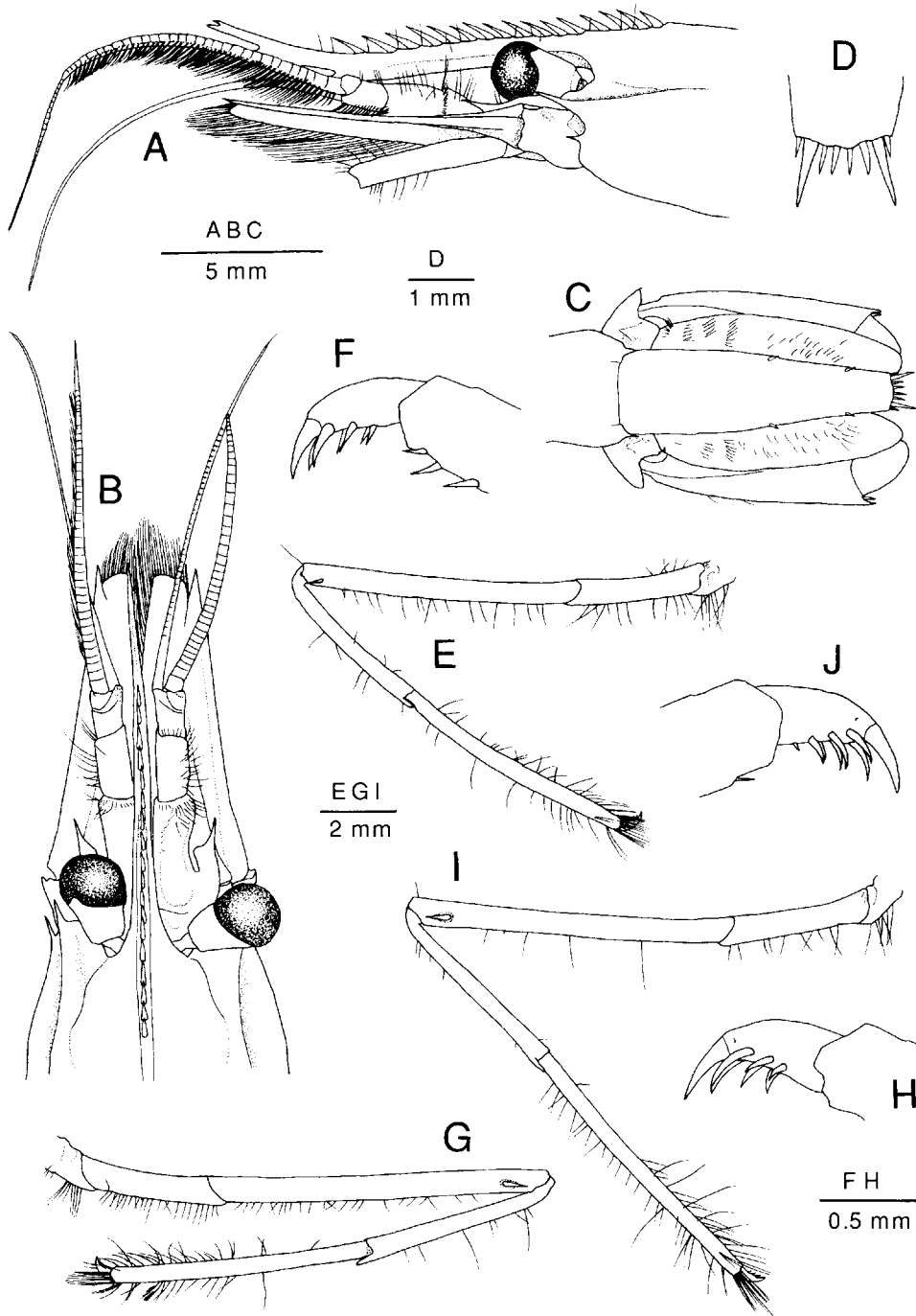


Fig. 2. *Bathypalaemonella hayashii* new species, holotype female (CL 13.9 mm): A, anterior part of carapace and cephalic appendages, lateral; B, same, dorsal; C, posterior part of sixth abdominal somite, telson and uropods, dorsal, marginal setae on uropodal rami omitted; D, posterior part of telson, dorsal; E, left third pereopod, lateral; F, same, dactyl, lateral; G, right fourth pereopod, lateral; H, same, lateral; I, left fifth pereopod, lateral; J, same, dactyl.

eral process. Telson (Fig. 2C) 1.57 times as long as sixth somite, 3.4 times as long as anterior width, with 2 pairs of submarginal spines in posterior half, lateral margins parallel in anterior three-fifth, tapering to moderately broad, slightly convex posterior margin; posterior margin (Fig. 2D) armed with 4 pairs of spines, 1 pair at posterolateral angle smallest, next mesial pair largest, mesial 2 pairs subequal.

Eye (Fig. 2A, B) subpyliform with well developed, globular cornea, equal to about 0.14 times of postorbital carapace length. Ocellus absent.

Antennular peduncle (Fig. 2A, B) reaching level of distal two-fifths of scaphocerite; stylocerite well developed, falling somewhat short of anterior margin of proximal peduncular segment, distomedial margin obliquely concave, proximomesial margin convex, without tooth at junction. Proximal segment with acute tooth proximodorsally and another small tooth ventromesially; mesial margin with row of setae. Intermediate segment about 1.9 times as long as wide, with scattered setae dorsally and laterally, mesial margin with row of setae; anterodorsal margin unarmed. Distal segment distinctly shorter than intermediate segment, mesially and ventrally with row of setae. Outer flagellum uniramous, with thickened aestetasc bearing part about 1.2 times as long as peduncle. Inner flagellum slightly longer than outer flagellum.

Antenna (Fig. 2A, B) with scaphocerite 0.66 times as long as carapace and about 3.8 times as long as greatest width, widest proximally, lateral margin very slightly concave with strong distolateral tooth reaching beyond rounded distal margin of blade. Basicerite robust, unarmed laterally. Carpocerite relatively slender, reaching nearly to level of anterior end of antennular peduncle. Flagellum well developed, slightly shorter than total body length.

Mandible (left) (Fig. 3A) with incisor

process not clearly separated from molar process, bearing 13 irregular acute teeth on cutting edge; molar process obliquely truncated distally, posterior margin with 1 small spine, occlusal surface slightly uneven, with rows of setules; palp two-articulated, distal article about half length of proximal article, with numerous long setae, proximal article somewhat curved, with long setae distally and mesially. Maxillule (Fig. 3B) with elongated, feebly bilobed palp, distal lobe with 2 short setae laterally and proximal lobe with single robust seta; distal endite truncated mesially, with double row of spines and stiff setae on mesial margin, external surface with irregular row of setae, proximomesial margin slightly concave, with row of setae; proximal endite tapered with numerous spiniform setae. Maxilla (Fig. 3C) with palp broadened basally, with setae distomesially; distal endite deeply bilobed, posterior lobe smaller than distal lobe; proximal endite bilobed, anterior lobe very small, rounded, with sparse setae, proximal lobe rounded, with row of long setae mesially; scaphognathite broad, posterior lobe not elongate, mesially with fringe of long setae becoming noticeably long posteriorly. First maxilliped (Fig. 3D) with slender, two-articulated palp, extending to level of anterior margin of caridean lobe, mesial margin and apex with long setae; distal endite broad, mesial margin sinuous, with dense setae, external surface with irregular row of setae; proximal endite somewhat thickened mesially, with dense setae; exopod with well developed, slender flagellum; caridean lobe very wide, with few long setae on external surface; epipod deeply bilobed. Second maxilliped (Fig. 3E) with normal endopod, dactyl subtriangular in external view, mesial margin slightly concave, with dense setae, but without spines, shallow concavity on external surface concealed by erected stiff setae; propodus densely setose mesially, but without spines; carpus with postero-

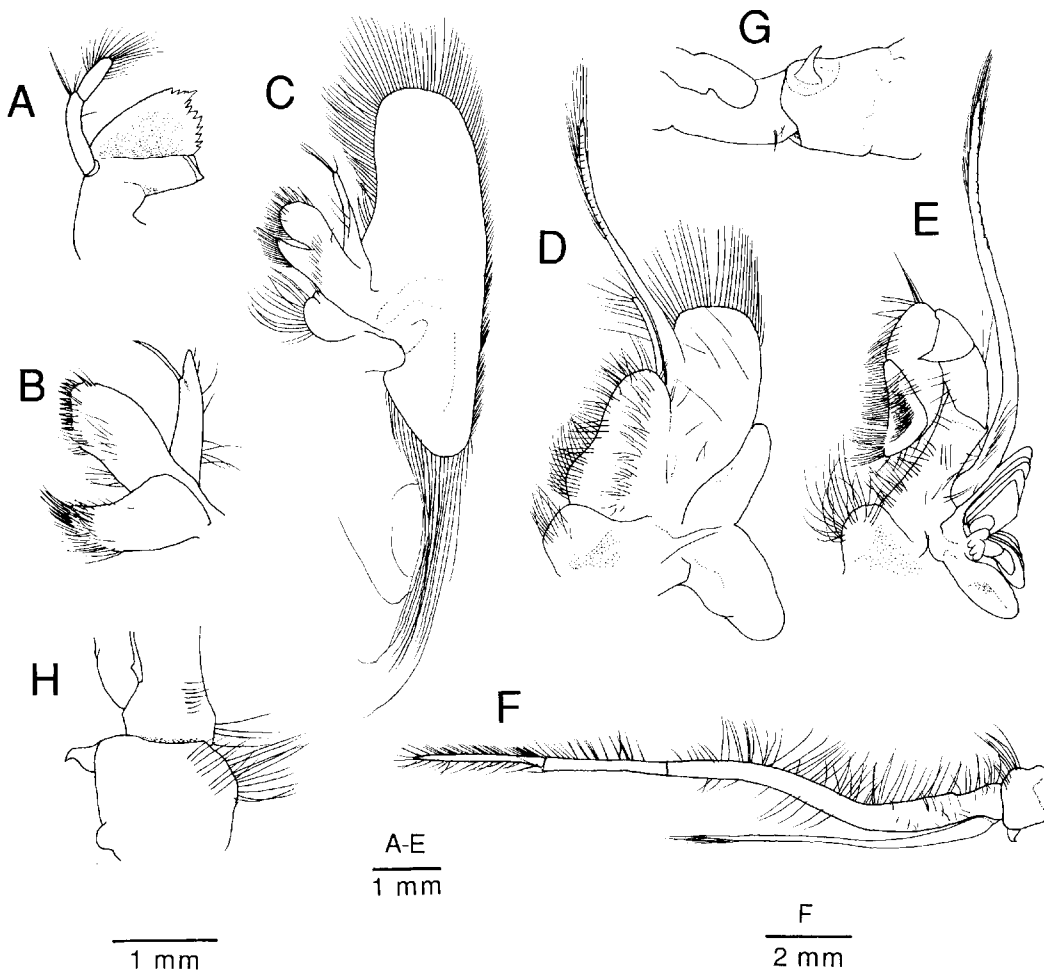


Fig. 3. *Bathypalaemonella hayashii* new species, holotype female (CL 13.9 mm), left mouthparts: A, mandible, internal; B, maxillule, external; C, maxilla, external; D, first maxilliped, external; E, second maxilliped, external; F, third maxilliped, dorsal; G, same, coxa and basal part of antepenultimate segment, lateral; H, same, dorsal.

mesial angle produced into acute spine, anteromesial angle produced but rounded; ischium and basis completely fused, mesial excavation poorly developed; exopod well developed; coxa inflated mesially, with long setae; epipod suboval, with well developed podobranch. Third maxilliped (Fig. 3F) slender, reaching beyond level of anterior end of antennular peduncle by half length of ultimate segment; ultimate segment 1.06 times as long as penultimate segment, densely setose mesially with numerous transverse

rows of stiff setae, with scattered stiff setae laterally; ultimate segment with tuft or single stiff setae mesially; merus-ischium fused segment slightly tapered, somewhat bowed, mesially setose, armed with 1 subterminal spine at ventrodistal angle; basis (Fig. 3G, H) completely fused with merus-ischium fused segment; exopod well developed, flexible, not reaching distal end of merus-ischium fused segment; coxa (Fig. 3G, H) feebly bilobed ventrally, mesial surface convex, not produced, setose, lateral process curved

posterodorsally with acute tip, lacking strap-like epipod.

First pereopod (Fig. 4A) slender, overreaching scaphocerite by half length of chela; chela (Fig. 4B) with palm oval in cross section, 3.4 times as long as central depth, with tufts of stiff setae on flexor surface including fixed finger; dactyl 0.68 times as long as palm, with scattered tufts of stiff setae on extensor surface, tip concealed by tuft of stiff setae, acute, hooked; fixed finger with terminal tuft of setae. Carpus 1.7 times as long as chela, tapered proximally, 8.3 times as long as greatest width. Merus obliquely articulated to ischium, 0.76 times as long as carpus measured along dorsal margin, 7.3 times as long as distal depth. Ischium slightly inflated ventrally, 0.66 times as long as merus measured along dorsal margin, with row of long setae ventrally. Basis and coxa normal.

Second pereopods grossly unequal and markedly dissimilar. Left major second pereopod (Fig. 4C, D) overreaching scaphocerite by length of distal two-thirds of merus. Chela very massive, about 4 times as long as greatest depth across midlength. Palm somewhat compressed laterally, tapered proximally from proximal one-third; lateral surface slightly sculptured, with noticeable depression at base of fixed finger, patch of fine setae proximal to depression; extensor surface sulcated in distal half, with distinct suture, extensor mesial margin delimited by blunt ridge; flexor margin bluntly delimited, with row of 14 acute or subacute tubercles becoming strong centrally, extending to base of fixed finger and sparse setae; mesial surface slightly depressed along flexor margin. Fingers somewhat directed inward; dactyl 0.38 times as long as palm, 0.35 times as long as greatest breadth across level of distal one-third, distal margin broadly rounded with small distal spine, mesial surface concave, lateral surface with row of tufts of setae and scattered setae, cutting edge laterally

situated, slightly convex, entire; fixed finger strongly hooked distally, with strong acute, proximally inclined mesial tooth at midlength of cutting edge. Carpus short and stout, obliquely articulated with palm, 0.25 times as long as palm, expanded distally, sulcated in flexor surface. Merus 1.5 times as long as carpus, not broadened distally, 4.6 times as long as distal depth. Ischium obliquely articulated with merus, 2.2 times as long as merus measured along dorsal margin, 9.0 times as long as distal depth, slightly curved, ventral margin with row of sparse setae, mesial surface slightly concave over entire length. Basis and coxa very robust, without patch of setae on coxal ventral surface.

Right minor second pereopod (Fig. 4E) overreaching scaphocerite by length of chela and distal one-fourth of propodus; chela (Fig. 4F) slender, 10.9 times as long as proximal depth, slightly curved; palm oval in cross section, 5.8 times as long as proximal depth, with scattered long setae on flexor and extensor surfaces; dactyl subequal to palm in length tip acute, cutting edge entire; fixed finger with cutting edge entire; both fingers each with tufts of long setae and subterminal tuft of setae. Carpus long and slender, slightly tapered proximally, 1.4 times as long as chela, 14.8 times as long as distal depth, with scattered setae. Merus obliquely articulated with ischium, 0.9 times as long as carpus measured along dorsal margin, 17.3 times as long as distal depth, with sparse setae ventrally; ischium about 0.7 times as long as merus measured along dorsal margin, with sparse setae ventrally. Basis without special features. Coxa with patch of setae ventrally

Posterior three pairs of pereopods moderately slender, becoming long posteriorly. Third pereopod (Fig. 2E) reaching beyond scaphocerite by length of dactyl; dactyl (Fig. 2F) 0.11 times as long as propodus, obscured by terminal setae on propodus, strongly curved, 3.5 times as

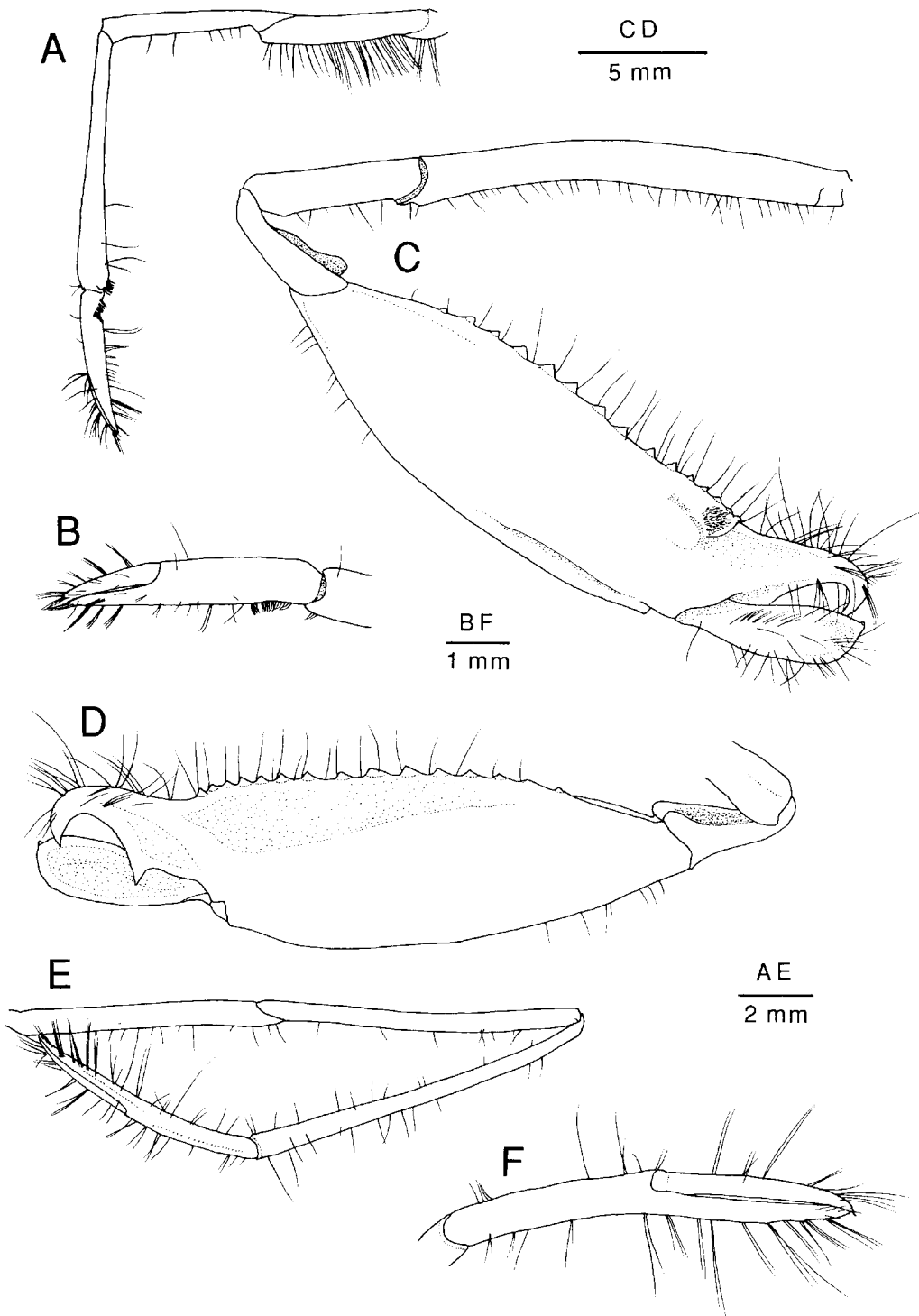


Fig. 4. *Bathypalaemonella hayashii* new species, holotype female (CL 13.9 mm): A, right first pereopod, lateral; B, same, chela, extensor; C, left major second pereopod, lateral; D, same, chela and carpus, mesial; E, right minor second pereopod, lateral; F, same, chela, extensor.

long as basal depth, unguis strong, curved, ventral surface bearing 3 pairs of strong, curved accessory spines diminishing in size proximally; propodus 15.7 times as long as basal depth, flexor surface with setae becoming dense distally, armed with double row of spines in at least distal portion; carpus 0.65 times as long as propodus, about 9.1 times as long as distal depth, slightly broadened distally; merus 1.65 times as long as carpus, 13 times as long as distal depth, not broadened distally, with 1 strong subdistal spine ventrolaterally; ischium obliquely articulated to merus; basis and coxa without special feature. Fourth pereopod (Fig. 2G) similar to third; dactyl (Fig. 2H) with unpaired spinule in addition to 3 pairs of spines. Fifth pereopod (Fig. 2I, J) generally similar to third, exceeding scaphocerite by length of dactyl and distal one-fifth of propodus; propodus about 18 times as long as proximal depth.

Branchial formula summarized in Table 1.

Uropod (Fig. 2C) with protopod posterolaterally rounded. Exopod with lateral margin slightly convex, bearing small basally articulated spine just mesial to base of moderately strong posterolateral tooth, diaeresis distinct. Endopod subequal to exopod, with transverse row of short setae anteriorly and scattered setae posteriorly.

Note on paratype. — The paratype is smaller than the holotype, only the left first, second and fifth pereopods preserved, and agrees well with the holotype.

Rostrum less curved than in holotype, with 16 dorsal teeth including 4 on cara-

pace posterior to level of orbital margin, apex damaged. Palm of second pereopod with extensor surface more deeply sulcate; flexor margin with 15 tubercles.

Coloration in fresh specimen. — Entire body pale pink, rostrum, scaphocerite and pereopods reddish; mouthparts dark red; cornea of eye darkly pigmented. Toriyama *et al.* (1990) presented a color photograph of this species.

Distribution. — Tosa Bay, 440-614 m; southeast of Amami-oshima Island, 789-815 m.

Remarks. — The present new species is remarkable particularly in the palm of the major second pereopod having a row of strong tubercles on the flexor margin. All but two species so far described have smooth palms in the major second pereopod. The Atlantic species *Bathypalaemonella serratipalma* Pequegnat, 1970, also has a single row of tubercles on the palm of the major second pereopod (Pequegnat, 1970; Crosnier & Forest, 1973). Morphology of the major second pereopod still remains unknown for *B. pandaloides* (Rathbun, 1906) described from Hawaii. The new species and *B. serratipalma* show resemblance also in the relatively short rostrum, which slightly overreaches the scaphocerite, and the possession of three pairs of accessory spines on the dactyls of the ambulatory pereopods. Comparison with the original description and three specimens of *B. serratipalma* reported by Crosnier & Forest (1973) shows a number of differences between *B. hayashii* and the former: (1) the ventrolateral tooth on the antennal basicerite, which is present in *B. serrati-*

Table 1. *Bathypalaemonella hayashii* new species. Branchial formula.

	Maxillipeds			Pereopods				
	1	2	3	1	2	3	4	5
Pleurobranchs	—	—	—	+	+	+	+	+
Arthrobranchs	—	—	+	+	+	+	+	—
Podobranch	—	+	—	—	—	—	—	—
Epipods	+	+	—	—	—	—	—	—

palma, is absent in *B. hayashii*; (2) the distolateral tooth of the scaphocerite in the new species slightly overreaches the blade, rather than far falling short of it in *B. serratipalma*; (3) the palm of the major second pereopod is much stouter in *B. hayashii* than in *B. serratipalma* (3.1 times as long as greatest depth versus 4.8 times as long); (4) the carpus of the first pereopod is relatively longer in the new species than in *B. serratipalma* (1.7 times as long as the chela versus 1.2 times as long); (5) the tubercles on the palm of second pereopod are larger and fewer in *B. hayashii* than in *B. serratipalma*; (6) the posterior spines of the telson are fewer in *B. hayashii* than in *B. serratipalma* (two pairs mesial to the longest pair versus four pairs). The present new species differs from *B. pandaloides* in the relatively shorter rostrum (0.87 times as long as the carapace versus 1.5–2.0 times as long as) with fewer ventral teeth (2 versus 13), the unarmed antennal basicerite and more numerous accessory spines on the ambulatory dactyls (3 pairs versus 1 pair) (Rathbun, 1906; Bruce, 1986).

Bathypalaemonella hayashii represents the first of this little known genus in Japanese waters. The biology of the species of *Bathypalaemonella* still remains poorly known. The presence of paired strong spines on the dactyls of the ambulatory pereopods, which is common in the genus, seems to suggest a commensal life style, though associate fauna has not been reported adequately for previously described species. The holotype of the present new species was collected on coarse sand bottom mixed with shell fragments where masses of hexactenellid sponge are rich. The functions of the unusual but diagnostic major chela remain obscure.

Etymology. — This species is named in honor of Prof. Ken-ichi Hayashi of the Shimonoseki University of Fisheries, who made great contributions to the systematics of the western Pacific dendrobran-

chiate and caridean Crustacea.

Acknowledgments

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