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Pliopontonia harazakii sp. nov., a New Species of Coral-Associated Shrimp (Decapoda: Caridea: Palaemonidae) from Yaku-shima Island, Southern Japan

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Abstract The second species of the pontoniine genus *Pliopontonia*, *P. harazakii* sp. nov., is described and illustrated on the basis of six specimens collected from Yaku-shima Island, southern Japan. The present new species is an associate of the scleractinian coral, *Alveopora tizardi*, and differs from the sole congeneric species, *P. furtiva*, in fewer dorsal rostral teeth, distinctly unequal second pereiopods, structure of male first and second pleopods, and considerably smaller body size.

Key words : Decapoda, Caridea, Palaemonidae, Pontoniinae, *Pliopontonia*, new species, scleractinian coral associate, Japan.

The monotypic pontoniine genus *Pliopontonia* Bruce, 1973 comprises the Indo-West Pacific species, *P. furtiva* Bruce, 1973, which is associated with corallimorpharians of the families Discosomatidae and Ricordeidae (Bruce, 1973; Fransen, 1989; Li and Bruce, 2006; Marin and Savinkin, 2007). Fransen (1994) recorded an unidentified scleractinian coral of the genus *Alveopora* de Blainville, 1830 as a host animal of *P. furtiva* at Seychelles, western Indian Ocean. In his review on the scleractinian-associated pontoniine shrimps, Bruce (1998) recognized 48 species of 16 genera as the associates of various scleractinian corals, but did not include the symbiotic relationship between *P. furtiva* and *Alveopora*.

A Japanese skillful diver, Mr. Shigeru Harazaki found association between an unidentified species of *Pliopontonia* and *Alveopora tizardi* Bassett-Smith, 1890 at shallow rocky reef of Yaku-shima Island, Osumi Islands, southern Japan. Careful examination of the shrimp specimens highlighted important morphological features distinguishing them from *P. furtiva* collected from corallimorpharian host. Therefore, a second species of *Pliopontonia* is described and illustrated here under the name of *P. harazakii* sp. nov.

Materials and Methods

The specimens were collected by Mr. S. Harazaki directly from the host corals. The illustrations were made with the aid of a drawing tube mounted on a LEICA MZ12 stereomicroscope. The postorbital carapace length is abbreviated as CL in the text. The specimens examined in this study are deposited in the Coastal Branch of Natural History Museum and Institute, Chiba (CMNH), and National Museum of Nature and Science, Tokyo (NSMT).

For comparison, the following specimens were examined:

Pliopontonia furtiva Bruce, 1973. CMNH-ZC 01773, 1 male (CL 2.3 mm), 1 ovig. female (CL 6.1 mm), Kurasaki, Kasari Bay, Amami-ohshima Island, northern Ryukyu Islands, Japan, 20 m, in association with *Amplexidiscus fenestrafer* Dunn and Hamner, 1980 (Cnidalia: Anthozoa: Discosomatidae), 6 July 2004, coll. J. Okuno.

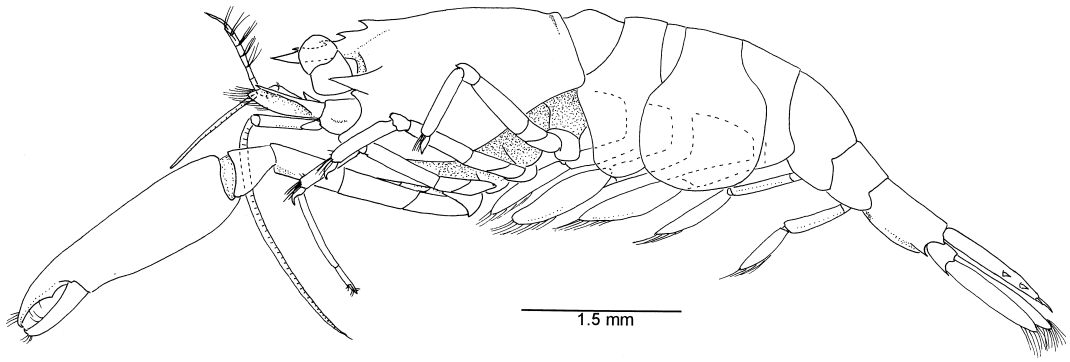

Fig. 1. *Pliopontonia harazakii* sp. nov. Holotype, female (CL 1.8 mm), NSMT-Cr 18773. Entire animal in lateral view.

Taxonomy

Pliopontonia harazakii sp. nov.

[New Japanese name: Yakushima-kakure-ebi]

(Figs. 1–5A, B, 6)

? *Pliopontonia furtiva* – Fransen, 1994: 133 (see "Remarks").

Material examined. Holotype: NSMT-Cr 18773, female (CL 1.8 mm), Onoaida, Yakushima Island, Osumi Islands, Japan, 30°14.1′N, 130°33.2′E, 3 m, 15 February 2008, coll. S. Harazaki.

Paratypes: CMNH-ZC 02254, 1 male (CL 1.4 mm), 1 femlae (CL 1.6 mm), 1 ovig. female (CL 2.1 mm), same locality as holotype, 30 December 2007, coll. S. Harazaki; NSMT-Cr 18774, 1 ovig. female (CL 2.6 mm), same locality as holotype, 15 February 2008, coll. S. Harazaki; CMNH-ZC 02255, 1 ovig. female (CL 1.9 mm), Issoh, Yakushima Island, 30°27.3′N, 130°29.5′E, 15 m, 21 February 2008, coll. S. Harazaki.

Description. Small-sized pontoniine shrimp with somewhat depressed body (Fig. 1).

Carapace (Fig. 1) smooth, glabrous; supraorbital, epigastric and hepatic spines absent; orbit well developed, inferior orbital angle broad, produced (Fig. 2B); antennal spine large, stout, submarginal, far overreaching distal margin of inferior orbital angle in lateral view; pterygostomial margin produced, broadly rounded.

Rostrum (Fig. 2B) short, 0.3–0.5 times as long as carapace, reaching midlength of intermediate segment of antennular peduncle (Fig. 2A); dorsal carina slightly raised proximally, armed with 4 teeth, interspaces feebly setose, proximalmost tooth situated posteriorly to orbital margin; ventral carina low, unarmed, nearly horizontal; lateral carina weak, gradually obsolete distally.

Fourth thoracic sternite without finger-like median process.

Abdominal somites (Fig. 1) smooth, glabrous; third tergite not produced posterodorsally; pleuron of second somite most enlarged; sixth somite short, 0.3 times as long as carapace, posteroventral angle acute. Telson (Fig. 2C) 1.4–2.0 times as long as sixth abdominal somite, gradually tapering posteriorly to rounded posterior margin; dorsal surface armed with 2 pairs of small submarginal spines at 0.6 and 0.8 of telson length; posterior margin (Fig. 2D) with 3 pairs of spines, lateral spines considerably smaller than other spines, intermediate and submedian spines subequal in length, intermediate spines with setules distally.

Ophthalmic somite without interocular beak. Eye (Fig. 2A) stout, falling slightly short of level of rostral apex: cornea large, globular, lightly pigmented, with minute accessory pigment spot; eyestalk slightly tapering distally, basal part inflated, maximum width greater than corneal diameter.

Antennular peduncle (Fig. 2E) slightly falling short of distal margin of scaphocerite. Proximal

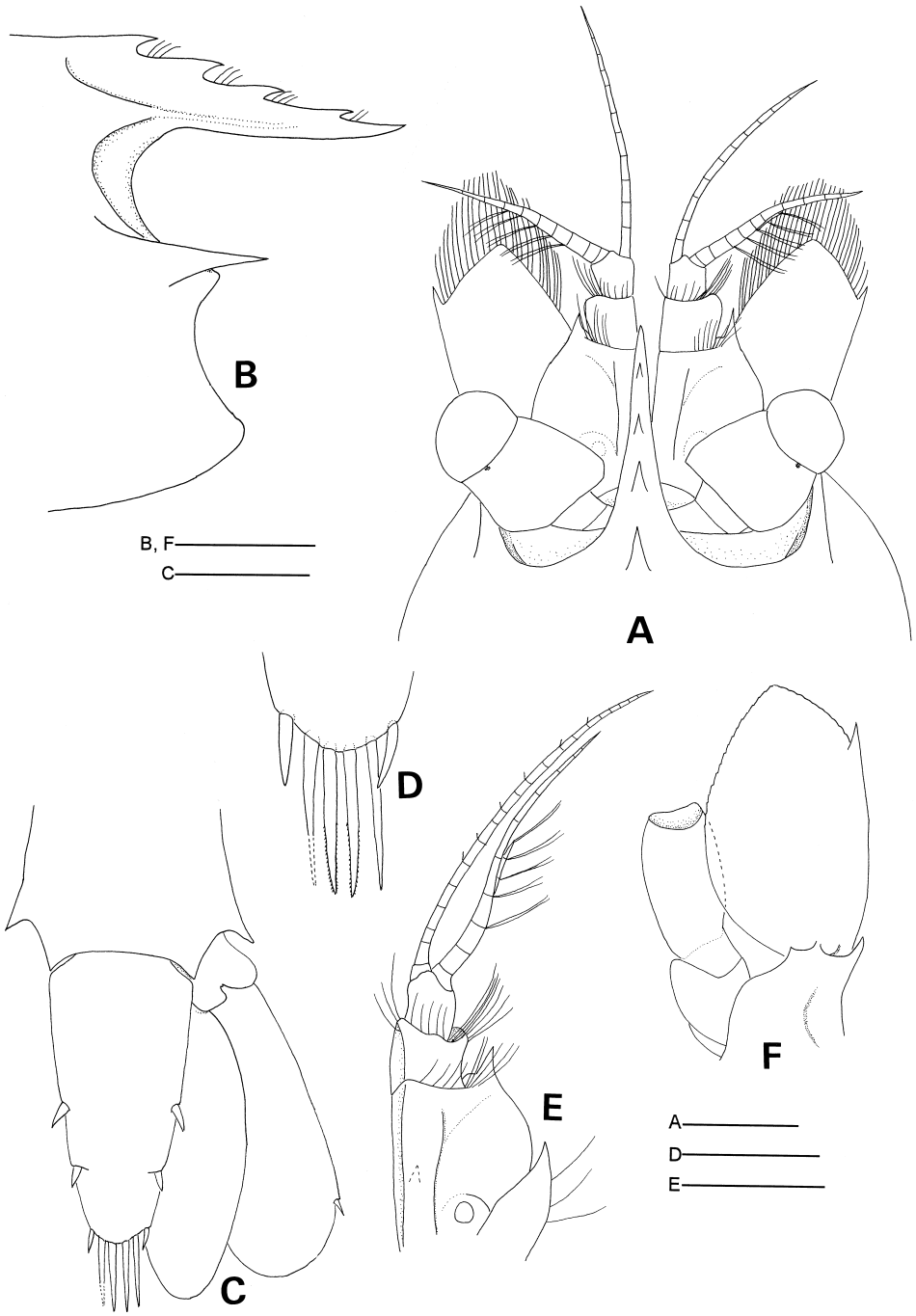

Fig. 2. *Pliopontonia harazakii* sp. nov. Holotype, female (CL 1.8 mm), NSMT-Cr 18773. A, anterior carapace, rostrum and cephalic appendages, dorsal view; B, anterior carapace and rostrum, lateral view; C, telson and right uropod, dorsal view; D, posterior part of telson, dorsal view; E, right antennule, dorsal view; F, right antenna, dorsal view (setae omitted). Scale bars: A–C, E, F, 0.50 mm; D, 0.25 mm.

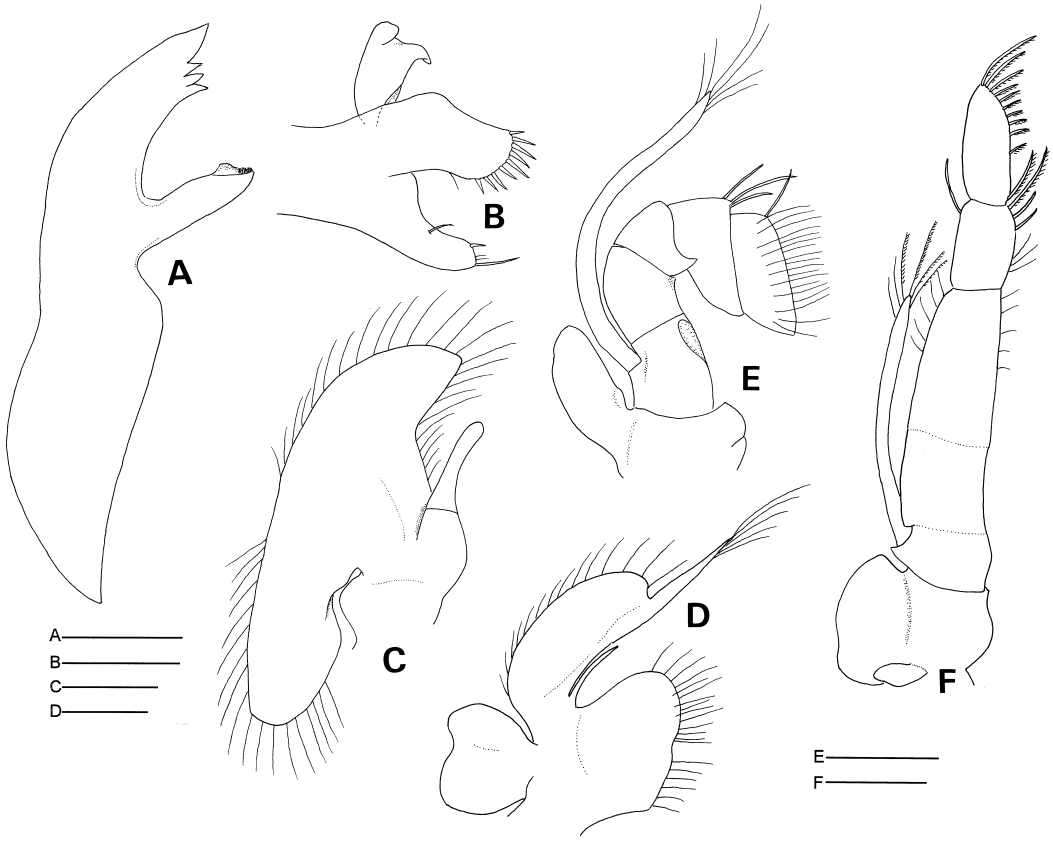

Fig. 3. *Pliopontonia harazakii* sp. nov. Paratype, ovigerous female (CL 2.6 mm), NSMT-Cr 18774, mouthparts from right side, external view. A, mandible; B, maxillula; C, maxilla; D, first maxilliped; E, second maxilliped; F, third maxilliped. Scale bars: 0.25 mm.

peduncler segment longer than distal two segments combined; anterolateral margin feebly convex, basal part with transverse row of sparse, long setae, lateral margin broadly convex, terminating in stout acute tooth slightly falling short of distal margin of intermediate segment; ventromedial tooth present; stylocerite, acute, reaching level of midlength of proximal segment; statocyst normally developed. Intermediate segment robust, distolateral angle feebly expanded laterally, setose. Distal segment narrower than intermediate segment, naked. Upper flagellum biramous, proximal 3 segments fused, shorter free ramus consisting of 3 segments; groups of long, sparse aesthetascs present on free ramus and distal part of fused rami; lower flagellum slightly longer than upper flagellum.

Antenna (Fig. 2F) with stout, unarmed basicerite; carpocerite stout, reaching distal 0.4 of scaphocerite, flagellum slightly longer than carapace; scaphocerite oval, broad, 1.4–2.0 times as long as wide, convex lateral margin terminating in acute tooth, lamella feebly angular, overreaching tip of distolateral tooth.

Epistome unarmed.

Mandible (Fig. 3A) with stout corpus, lacking palp; molar process slender, obliquely truncated distally; incisor process well developed, sinuous mesially, anterodistal angle acutely produced, distal margin slightly oblique, with 3 acute teeth proximomesially. Maxillula (Fig. 3B) with distinctly bilobed, non-setose palp, internal lobe with small distal protuberance; upper lacinia broad, distal margin armed with 9 simple spines;

Table 1. Gill formula of *Pliopontonia harazakii* sp. nov.

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

lower lacinia narrow, distal margin with few short and single long setae. Maxilla (Fig. 3C) with simple palp; distal and proximal endites obsolete; scaphognathite broad, distomesially angular, posterior lobe short, slightly narrower than basal part of anterior lobe. First maxilliped (Fig. 3D) with slender, elongate, non-setose palp; distal endite broad, sparsely setose mesially, proximal endite fused to distal endite, mesial margin sparsely setose; exopod with flagellum slender, with sparse long setae distally, caridean lobe large, rounded; epipod rounded, feebly bilobed, external margin concave. Second maxilliped (Fig. 3E) with normal endopod; dactylus moderately broad, mesial margin almost straight, densely setose; propodus broad, with sparse long setae distolaterally; carpus short, distomesially angular, obliquely articulated with merus; ischium completely fused to basis, mesial surface slightly concave; exopod with well developed flagellum, with sparse long setae distally; epipod elongate, distal margin rounded; podobranch absent. Third maxilliped (Fig. 3F) with endopod reaching distal margin of antennal basicerite; ultimate segment tapering distally, with long serrulate setae, ventral surface with transverse rows of short serrulate setae; penultimate segment short, dorsodistally with long seta, ventral margin sparsely setose; merus, ischium and basis incompletely fused, suture between segments partially demarcated, distodorsal and distomesial margins of merus sparsely setose; exopod with developed flagellum slightly falling short of distal margin of merus, with long serrulate setae distally; coxal plate broadly oval; small unilamellate arthrobranch present.

Gill formula shown in Table 1.

First pereiopod (Fig. 4A) slender, overreaching distal margin of scaphocerite by lengths of distal third of carpus and chela. Chela (Fig. 4B) short, about 0.3 length of carpus, palm subcylindrical, slightly compressed, slightly longer than dactylus, with 2 transverse rows of short grooming setae proximoventrally; fingers acute, with cutting borders straight, unarmed, with dense groups of long setae distally. Carpus feebly tapering proximally, distoventrally with longitudinal row of setae. Merus slightly shorter than carpus, entire. Ischium about 0.7 length of merus, ventral margin feebly convex distally. Distoventral margin of coxa angular, with sparse long setae.

Second pereiopods similar in form but unequal in size. Major second pereiopod (Fig. 4C) overreaching distal margin of scaphocerite by length of chela. Chela 1.3–1.5 times as long as that of minor pereiopod, palm subcylindrical, smooth, feebly inflated proximally, about twice as long as dactylus; dactylus (Fig. 4D) slightly arched, terminating in hooked, acute unguis, cutting edge situated laterally, armed proximally with 1 large, triangular tooth and 1 low, blunt tooth, remaining part unarmed; fixed finger (Fig. 4D) straight, armament generally similar to that of dactylus. Carpus short, unarmed, widening distally. Merus laterally compressed, about twice as long as carpus, entire. Ischium laterally compressed, slightly longer than merus, entire. Minor second pereiopod (Fig. 4E) overreaching distal margin of scaphocerite by length of distal 0.3 of chela.

Ambulatory pereiopods, short, somewhat robust, similar to each other. Third pereiopod (Fig. 4G) reaching level of distal margin of scapho-

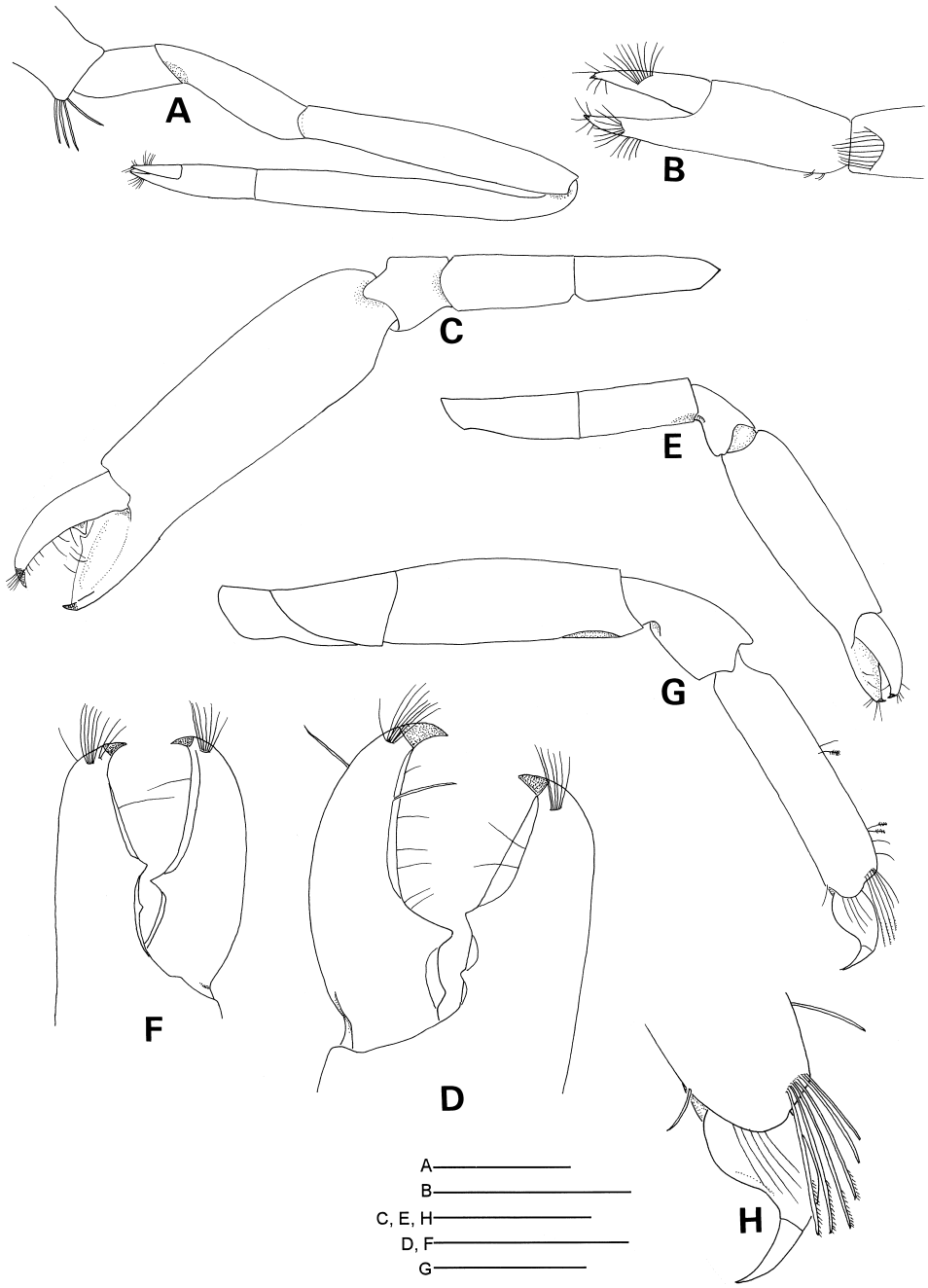

Fig. 4. *Pliopontonia harazakii* sp. nov. Holotype, female (CL 1.8 mm), NSMT-Cr 18773. A, right first pereiopod, lateral view; B, same, chela, mesial view; C, left major second pereiopod, dorsolateral view; D, same, fingers, mesial view, E, right minor second pereiopod, dorsolateral view; F, same, fingers, mesial view; G, right third pereiopod, lateral view; H, same, dactylus, lateral view. Scale bars: A, B, D, F, G, 0.50 mm; C, E, 1.00 mm; H, 0.25 mm.

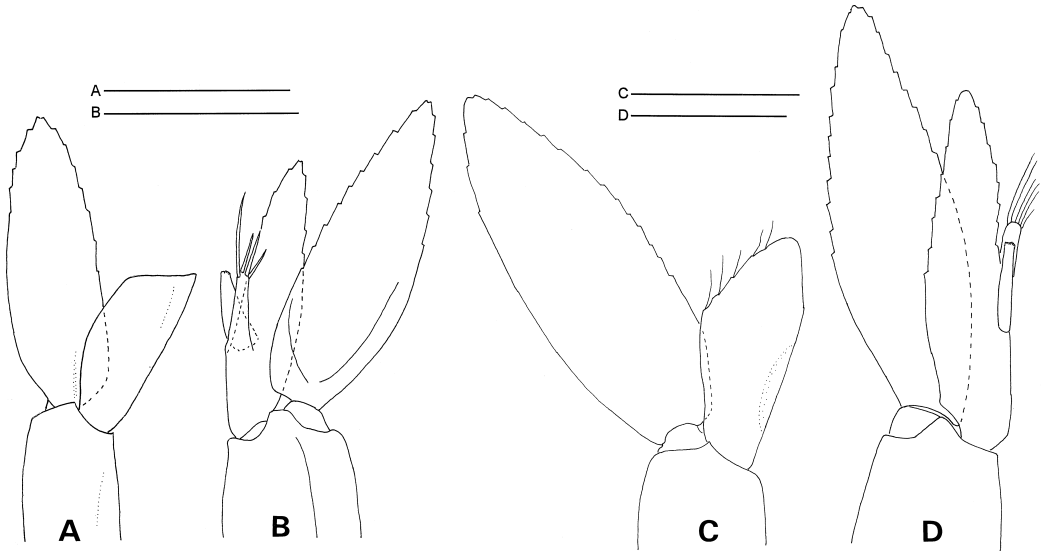

Fig. 5. *Pliopontonia harazakii* sp. nov. Paratype, male (CL 1.4 mm), CMNH-ZC 02254 (A, B); *Pliopontonia furtiva* Bruce, 1973, male (CL 2.3 mm), CMNH-ZC 01773 (C, D). A, C, right first pleopods, posterior view; B, right second pleopod, anterior view, D, same, posterior view. Marginal setae omitted. Scale bars: 0.5 mm.

cerite. Dactylus (Fig. 4H) hamate, with short, stout, curved corpus, ventral margin considerably convex proximally; unguis slender, feebly arched, distinctly demarcated from corpus. Propodus about 2.5 times as long as dactylus, non-dentate, dorsodistal angle with sparse long setae with setules distally, distolateral margin broadly rounded, slightly produced, with long simple setae sparsely, ventral surface with minute distoventral seta. Carpus about half length of propodus, slightly widening distally, dorsodistal angle and midpoint of distal margin bluntly produced. Merus about twice as long as carpus, entire. Ischium short, obliquely articulated with basis. Fourth pereiopod reaching level of midlength of scaphocerite. Fifth pereiopod slightly overreaching level of distal margin of antennal basicerite.

Endopod of male first pleopod (Fig. 5A) oblong, non-setose, distal margin obliquely truncated. Endopod of male second pleopod (Fig. 5B) with moderately stout appendices interna and masculina arising proximal third of mesial margin, both appendices subequal in length; appendix interna slightly tapering distally, with a few distal cincinnuli; appendices masculina with four long spiniform setae distally, one of them elongate, about twice as long as other setae.

Fig. 6. *Pliopontonia harazakii* sp. nov., living individual in situ, in association with *Alveopora tizardi* Bassett-Smith, 1890 at Onoaida, Yakushima Island, Japan, 3 m depth. Photo S. Harazaki.

Uropod (Fig. 2C) with protopodite posterolaterally rounded; exopod broad, overreaching distal margin of telson, lateral margin nearly straight, armed with minute mobile spine distally; endopod oval, subequal to exopod.

Color in life (Fig. 6). Body and appendages generally transparent. Carapace without any con-

spicuous markings, viscera visible with greenish gray dorsally and with whitish laterally throughout the transparent integument. First to fourth abdominal somites also without markings, white muscle tissues in lateral aspect and ventral sternites visible as whitish broad transverse bands in dorsal view; in fifth somite, muscle tissues visible as three white longitudinal bands in dorsal view; sixth somite whitish. Proximal half of telson and protopodite of uropod whitish. Ophthalmic somite white anterodorsally; eyestalk whitish transparent, cornea white. Basicerite and carpocerite of antenna white. Second pereiopod with white patches on proximal part of fingers, carpus, proximal part of merus, and distal part of ischium. Third to fifth pereiopods uniformly white.

Distribution. So far known from Yaku-shima Island, Osumi Islands, southern Japan, and possibly from Seychelles, western Indian Ocean (see "Remarks").

Host. Alveopora tizardi Bassett-Smith, 1890 (Cnidaria: Anthozoa: Hexacorallia: Scleractinia: Acroporidae).

Remarks. The present new species is assigned to the genus *Pliopontonia* because of the following morphological features: the presence of large, submarginal antennal spine and strongly produced pterygostomial margin of the carapace, while the absence of hepatic, supraorbital and epigastric spines; the dorsally dentate rostrum; the lack of epistomal horns; the absence of median process on the fourth thoracic sternite; the antenna with unarmed basicerite and well-developed scaphocerite; the absence of mandibular palp and endites of the maxilla; the presence of well-developed exopodal flagella on the first to third maxillipeds; and dactyli of ambulatory pereiopods being simple and hamate (Bruce, 1973, 1994; Chace and Bruce, 1993). *Pliopontonia harazakii* can be distinguished from *P. furtiva*, the sole congeneric species, by the morphological features and coloration in life as discussed below:

(1) The rostrum of *P. harazakii* reaches the distal corneal margin, and its dorsal margin is armed with four teeth (Fig. 2B). The ovigerous female holotype of *P. furtiva* possesses a short rostrum armed dorsally with four teeth (Bruce, 1973), but subsequent authors suggested that the rostrum of the holotype was possibly damaged or regenerated (Bruce and Svoboda, 1984; Fransen, 1989). Indeed, additional specimens of *P. furtiva*, including the comparative specimens from Amami-ohshima Island used in this study, show the rostra overreaching the distal corneal margin and bear seven (rarely six) dorsal teeth (Bruce and Svoboda, 1984; Fransen, 1989; Li and Bruce, 2006; present study). Therefore, the length and dentition of the rostrum is useful in discriminating *P. harazakii* from *P. furtiva*.

(2) The second pereiopods of *P. harazakii* are similar in the structure, but considerably unequal in the length. In converse, the second pereiopods of *P. furtiva* are subequal and similar in the structure. The subequal second pereiopods have been considered as one of the generic diagnoses of *Pliopontonia* (Bruce, 1973, 1994; Chace and Bruce, 1993), but this study reveals that this feature is interspecifically variable.

(3) In *P. harazakii*, the endopod of the male first pleopod has no marginal setae (Fig. 5A), and the endopod of the male second pleopod possesses stout appendices interna and masculina, which are subequal in the length to each other (Fig. 5B). In *P. furtiva*, the endopod of the male first pleopod is furnished with sparse short setae on the distolateral margin (Fig. 5C); and the appendix masculina on the second pleopod is distinctly longer than the appendix interna (Fig. 5D). Although male specimens of *P. furtiva* were available in the previous studies (Bruce, 1981; Li and Bruce, 2006; Marin and Savinkin, 2007), the male pleopods of the species have not been illustrated, thus, in this study, these appendages are illustrated for comparative purpose.

(4) It is suggested that *P. harazakii* is considerably smaller than *P. furtiva* in the maximum body size; the postorbital carapace length of the largest known specimen of *P. harazakii* is 2.6 mm, instead of 6.1 mm in *P. furtiva*.

(5) In the living individuals of *P. furtiva*, the

yellow spots are present on the antennular peduncle, antennal basicerite, and pereiopods (e.g. Gosliner *et al.*, 1996; Debelius, 1999; Marin and Savinkin, 2007), whereas *P. harazakii* does not have any yellow spots on these appendages in life (Fig. 6).

Pliopontonia harazakii is associated with the scleractinian coral, *Alveopora tizardi*, whereas *P. furtiva* is known as an associate of disc anemones of the families Discosomatidae and Ricordeidae (Bruce, 1973; Fransen, 1989; Li and Bruce, 2006; Marin and Savinkin, 2007). Exceptionally, Fransen (1994) regarded *Alveopora* sp. as a host of an ovigerous female specimen referred to *P. furtiva* at Seychelles, western Indian Ocean. Concerning the possible host specificity of these two species, the *Alveopora* associate reported by Fransen (1994) might be referable to the present new species.

Etymology. This new species is named in honor of Mr. Shigeru Harazaki, who kindly provided me the actual specimens and underwater photographs of this interesting shrimp.

Acknowledgements

I am grateful to Mr. Shigeru Harazaki of "Yakushima-Umiannai Mori-to-Umi" for donating to me the valuable specimens and underwater photographs of the new species. My cordial thanks go to Dr. Zdenek Ďuriš of Department of Biology, University of Ostrava, Czech Republic, and Dr. Tomoyuki Komai of the Natural History Museum and Institute, Chiba, for reviewing the early draft of the manuscript, and giving me valuable suggestions.

References

Bruce, A. J. 1973. Notes on some Indo-Pacific Pontoniinae XXII. *Pliopontonia furtiva* gen. nov., sp. nov., a new shrimp associated with a corallimorph zoantharian. *Crustaceana*, **24**: 97–109, 1 pl.

Bruce, A. J. 1981. Pontoniine shrimps of Heron Island. *Atoll Research Bulletin*, (245): 1–33.

Bruce, A. J. 1994. *A Synopsis of the Indo-West Pacific Genera of the Pontoniinae* (*Crustacea: Decapoda: Palaemonidae*). 172 pp. Koeltz Scientific Books, Königstein.

Bruce, A. J. 1998. New keys for the identification of Indo-West Pacific coral associated pontoniine shrimps, with observations and their ecology. *Ophelia*, **49**: 29–46.

Bruce, A. J. and A. Svoboda, 1984. A report on a small collection of coelenterate-associated pontoniine shrimps from Cebu, Philippines Islands. *Asian Marine Biology*, **1**: 87–99.

Chace, F. A. Jr., and A. J. Bruce, 1993. The caridean shrimps (Crustacea: Decapoda) of the Albatross Philippine Expedition 1907–1910, Part 6: Superfamily Palaemonoidea. *Smithsonian Contributions to Zoology*, (543): 1–152.

Debelius, H. 1999. *Crustacea Guide of the World.* 321 pp. Ikan-Unterwasserarchiv, Frankfurt.

Fransen, C. H. J. M. 1989. Notes on caridean shrimps collected during the Snellius-II Expedition. I. Associates of Anthozoa. *Netherlands Journal of Sea Research*, **23**: 131–147.

Fransen, C. H. J. M. 1994. Marine palaemonid shrimps of the Netherlands Seychelles Expedition 1992–1993. *Zoologische Verhandelingen*, (297): 85–152.

Gosliner, T. M., D. W. Behrens and G. C. Williams, 1996. *Coral Reef Animals of the Indo-Pacific.* 314 pp. Sea Challengers, Monterey.

Li, X.-Z. and A. J. Bruce, 2006. Further Indo-Pacific palaemonid shrimps (Crustacea: Decapoda: Palaemonoidea), principally from the New Caledonian region. *Journal of Natural History*, **40**: 611–738.

Marin, I. N. and O. V. Savinkin, 2007. Further records and preliminary list of pontoniine (Crustacea: Palaemonidae: Pontoniinae) and hymenocerid (Hymenoceridae) shrimps from Nhatrang Bay. *In*: Britayev, T. A. and D. S. Pavlov (eds.), *Benthic Fauna of the Bay of Nhatrang, Southern Vietnam*. Pp. 175–208. KMK Scientific Press, Moscow.

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