

***Pseudopaguristes bicolor*, a new species of hermit crab (Crustacea: Decapoda: Diogenidae) from Japan, the third species of the genus**

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Abstract.—*Pseudopaguristes bicolor*, a new species of the recently established diogenid genus *Pseudopaguristes* McLaughlin, is described and illustrated from Okinawa, Japan. This is the third species assigned to this genus.

The recently established diogenid genus *Pseudopaguristes* McLaughlin, 2002, is characterized by eight functional gills, male chelipeds with the right larger than the left and dissimilar in armature, female chelipeds similar from left to right, fourth pereopods with a clump of long capsulate setae on the carpi, and the paired first and second pleopods modified as gonopods. The type species, *P. janetkae* McLaughlin, 2002, was recorded from Guam, the Mariana Islands. A second species, *P. bollandi* Asakura & McLaughlin, 2003, was recorded from Okinawa, tropical Japan. The present authors recently found the third species of this genus, again from Okinawa. The new species is very easily separated from both *P. janetkae* and *P. bollandi* by its characteristic coloration and morphology of the male chelipeds.

The holotype is deposited in the Natural History Museum and Institute, Chiba (CBM-ZC). The terminology used follows McLaughlin (1974, 2002) with the exception of the fourth pereopods as defined by McLaughlin (1997), gill structure by McLaughlin & de Saint Laurent (1998), and the posterior carapace by McLaughlin (2000). Abbreviations used are: coll., collector; and SL, shield length as measured from the tip of the rostrum to the posterior margin of the shield.

***Pseudopaguristes bicolor*, new species**
Figs. 1–8

Material.—Holotype: male, SL = 2.65 mm, 78 m, 24°25.5'N, 124°03.3'E, off Yaruabu-zaki, Ishigaki-jima Island, Okinawa, 21 Nov. 2002, coll. T. Kosuge, CBM-ZC 6759.

Description.—Eight functional pairs of quadriserial, phyllobranchiate gills (Fig. 1A). Shield (Fig. 1B) 1.30 times longer than broad; anterior margin between rostrum and lateral projections concave; lateral projections triangular, with strong submarginal spine; anterolateral angles each with strong corneous spine; lateral margins convex; posterior margin truncate; dorsal surface slightly convex, with elevated area present on each anterolateral portion; scattered tufts of short setae. Rostrum (Fig. 1B) prominent, triangular, reaching nearly to apices of ocular acicles; with terminal spine. Posterior carapace lateral elements (Fig. 1B) small, well calcified, unarmed. Branchiostegites (Fig. 1C) each with row of spines on dorsal margin anteriorly.

Ocular peduncles (Fig. 1B) moderately long, 0.75 length of shield. Corneas (Fig. 1B, C) very slightly dilated. Ocular acicles (Fig. 1B) each terminating in strong, bifid corneous spines; separated basally by more than breadth of rostrum.

Antennular peduncles (Fig. 1D) stout, with few setae on each segment; when fully

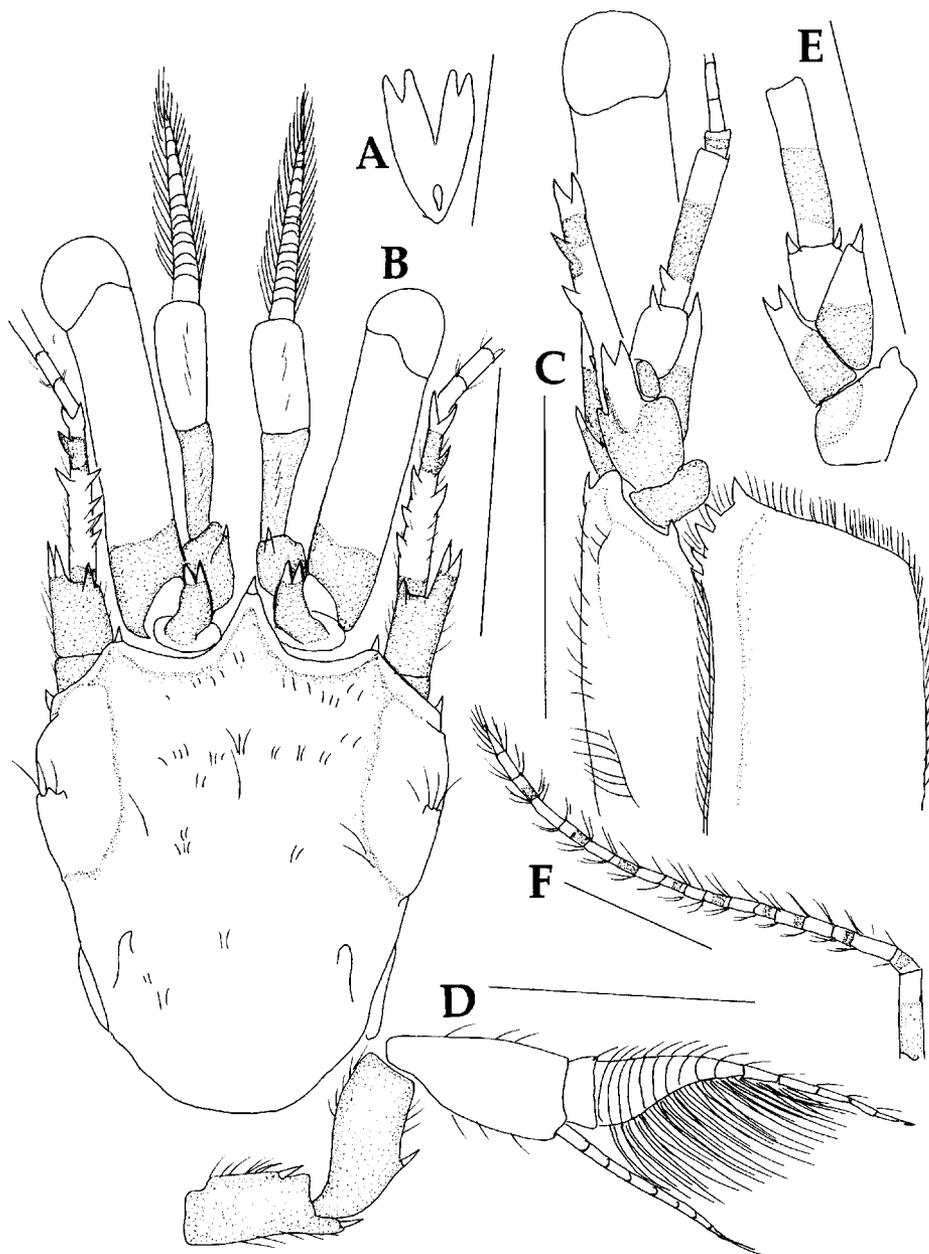


Fig. 1. *Pseudopaguristes bicolor*, new species: holotype male (CBM-ZC 6759), SL = 2.65 mm, off Yarabuzaki, Ishigaki-jima Is., Okinawa. A, arthrobranch gill lamella; B, shield and cephalic appendages, dorsal; C, distal half of cephalothorax and cephalic appendages, right, lateral; D, right antennule, lateral; E, right antennal peduncle, ventral; H, right antennal flagellum. Scales equal 0.5 mm (A) and 1 mm (B-F).

extended, distal margins of ultimate segments reaching distal margins of corneas; ultimate segments unarmed; penultimate segments with ventral margins each bearing acute spine; basal segments with ventrod-

istal angles each bearing acute spine and dorsolateral margins each bearing acute subdistal spine.

Antennal peduncles (Fig. 1B, C, E) moderately long, when fully extended, reaching

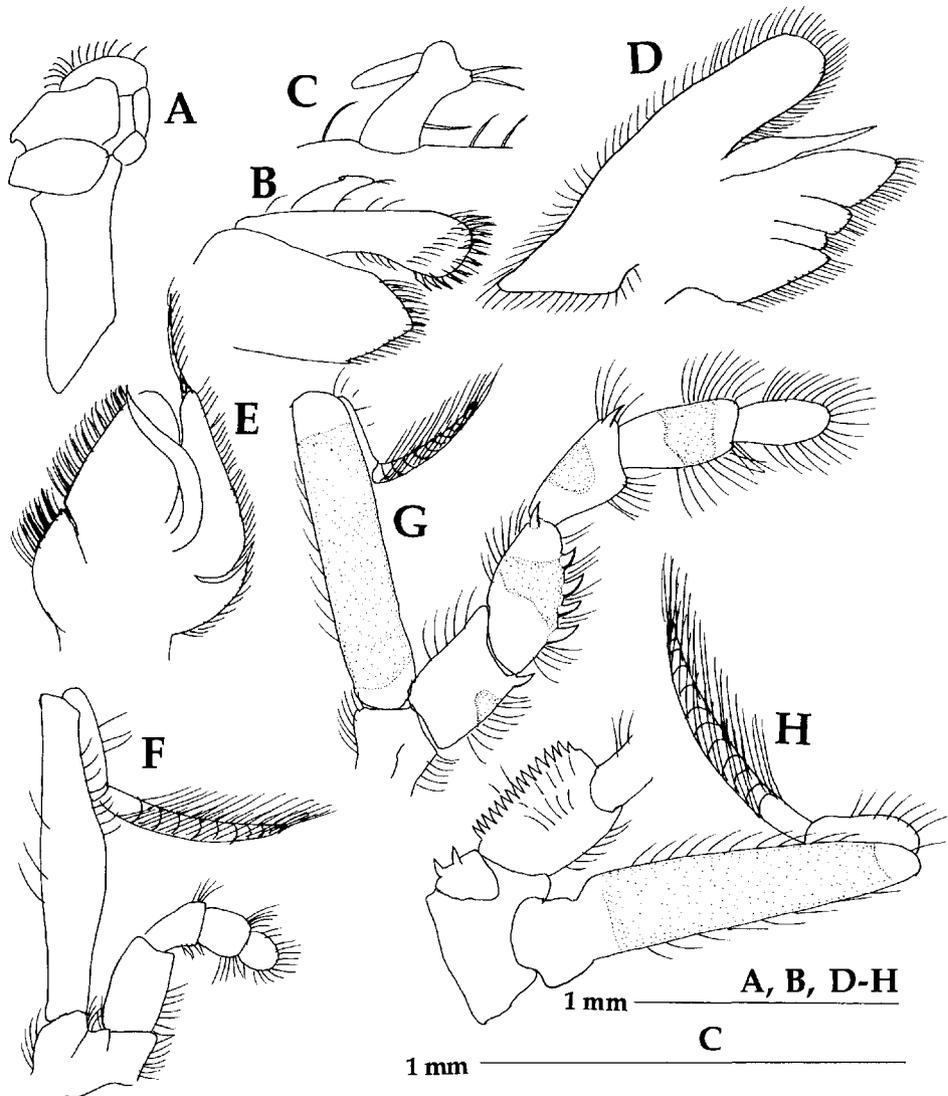


Fig. 2. *Pseudopaguristes bicolor*, new species: holotype male (CBM-ZC 6759), SL = 2.65 mm, off Yarabuzaki, Ishigaki-jima Is., Okinawa. Right mouthparts: A, mandible, internal; B, maxillule, external; C, same, endopod; D, maxilla, external; E, first maxilliped, internal; F, second maxilliped, external; G, third maxilliped, external; H, same, internal.

distal 0.30 of ocular peduncles, scarcely setose; fifth segments with dorsal margins each bearing acute subproximal spine; fourth segments with dorsodistal margins each bearing acute spine and ventrodistal margins each bearing another acute spine; third segments with prominent spine at ventrodistal margin; second segments with dorsolateral distal angles produced, terminating in prominent bifid spine, dorsomesial distal

angles each with acute corneous spine; first segment unarmed. Antennal acicles moderately long, straight; dorsomesial margins each with 3 (right) or 4 (left) spines; dorsolateral margins each with 2 strong spines; distal margins each with 2 strong spines. Antennal flagella (Fig. 1F) consisting of about 18 articles, each article with several short setae.

Mandible (Fig. 2A) without distinguish-

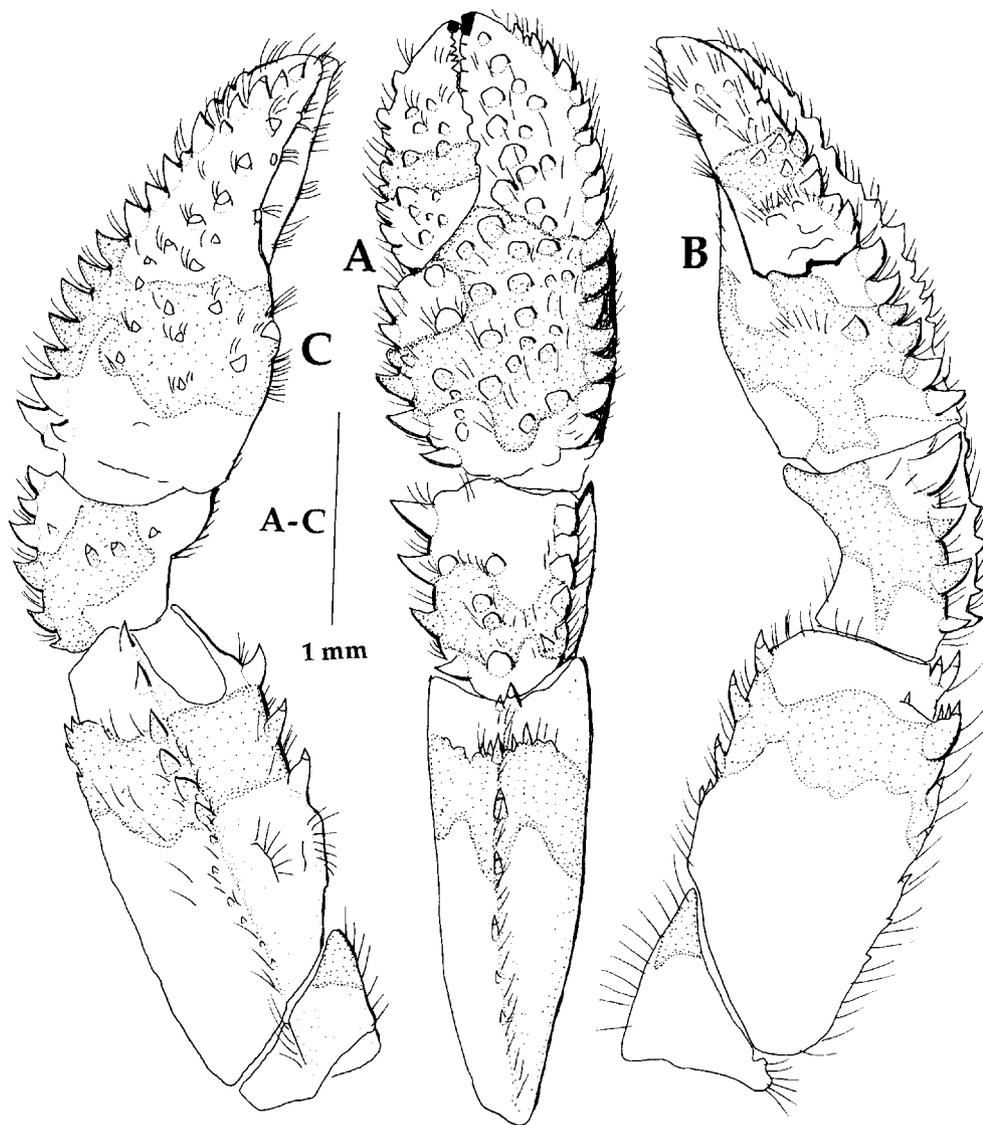


Fig. 3. *Pseudopaguristes bicolor*, new species: holotype male (CBM-ZC 6759), SL = 2.65 mm, off Yarabuzaki, Ishigaki-jima Is., Okinawa. Right cheliped: A, dorsal; B, mesial; C, lateral.

ing characters. Maxillule (Fig. 2B, C) with external lobe of endopod well developed, articulated, and recurved; internal lobe with 2 bristles. Maxilla (Fig. 2D) with moderately narrow scaphognathite. First maxilliped (Fig. 2E) with well developed, setose epipod. Second maxilliped (Fig. 2F) without distinguishing characters. Third maxilliped (Fig. 2G, H) with carpus bearing dorsodistal spine; merus with dorsodistal spine,

ventral margin bearing 4 spines; ischium with strong ventrodistal spine, crista dentata well-developed, no accessory tooth; basis with 2 sharp spines.

Chelipeds subequal; right (Fig. 3) larger than left. Dactyl as long as palm; terminating in broad corneous claw; dorsal face flat, with scattered large tubercles; cutting edge with several calcareous teeth. Fixed finger terminating in corneous claw; dorsal face

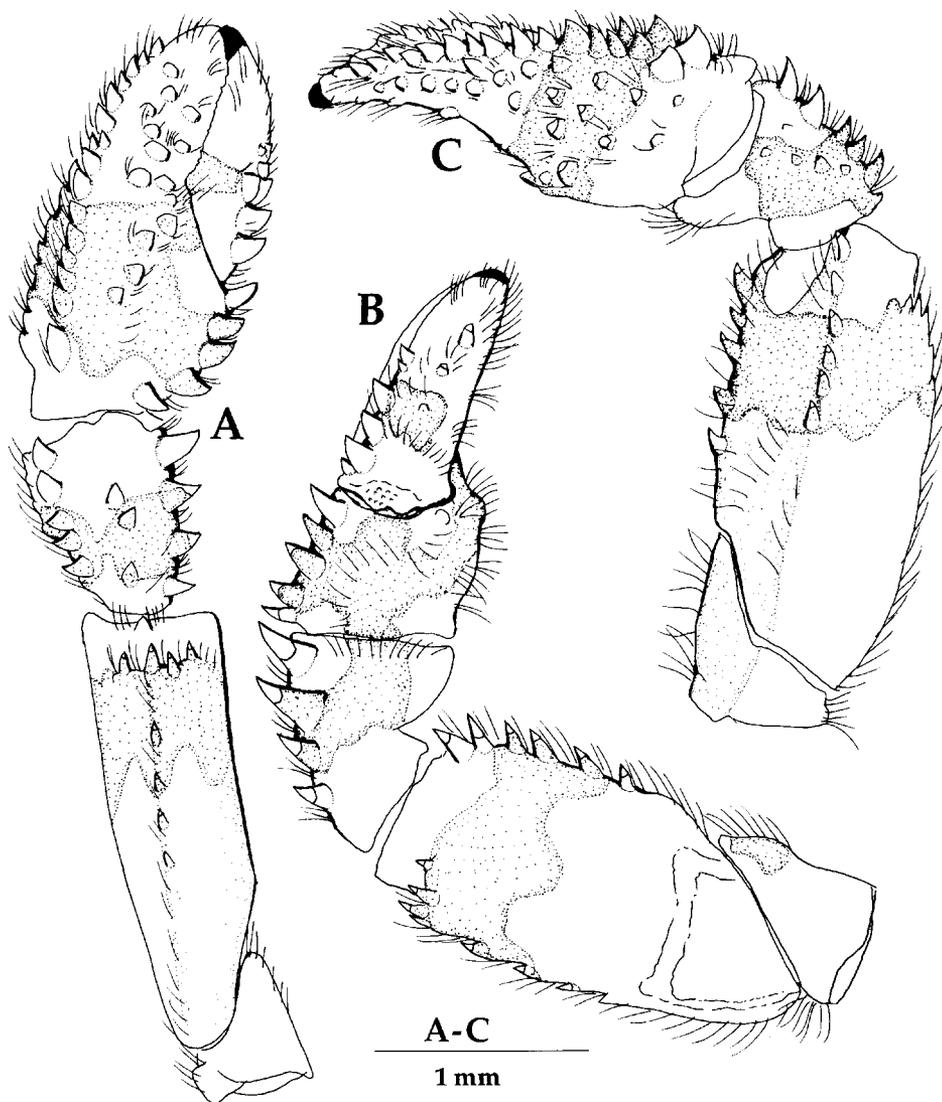


Fig. 4. *Pseudopaguristes bicolor*, new species: holotype male (CBM-ZC 6759), SL = 2.65 mm, off Yarabuzaki, Ishigaki-jima Is., Okinawa. Left cheliped: A, dorsal; B, mesial; C, lateral.

flat, with scattered large tubercles; cutting edge with several calcareous teeth. Palm 1.07 length of carpus; dorsal surface flat, with scattered large tubercles; dorsomesial margin with row of very strong spines; dorsolateral margin of palm and fixed finger with row of strong spines. Carpus 0.50 length of merus; dorsal face with scattered large tubercles, dorsolateral margin with row of strong conical-shaped spines, dorsomesial margin with row of very strong

spines. Merus with dorsal face bearing 2 distal spines, subdistal transverse row of several spines, and row of spines on remainder of dorsal margin, tips semitransparent; ventromesial margin with 3 widely-separated strong spines, tips semitransparent, ventrolateral margin with row of spines or tubercles. Ischium unarmed. Coxa with acute spine ventromesially.

Left cheliped (Fig. 4) slenderer than right. Dactyl with dorsal face without tu-

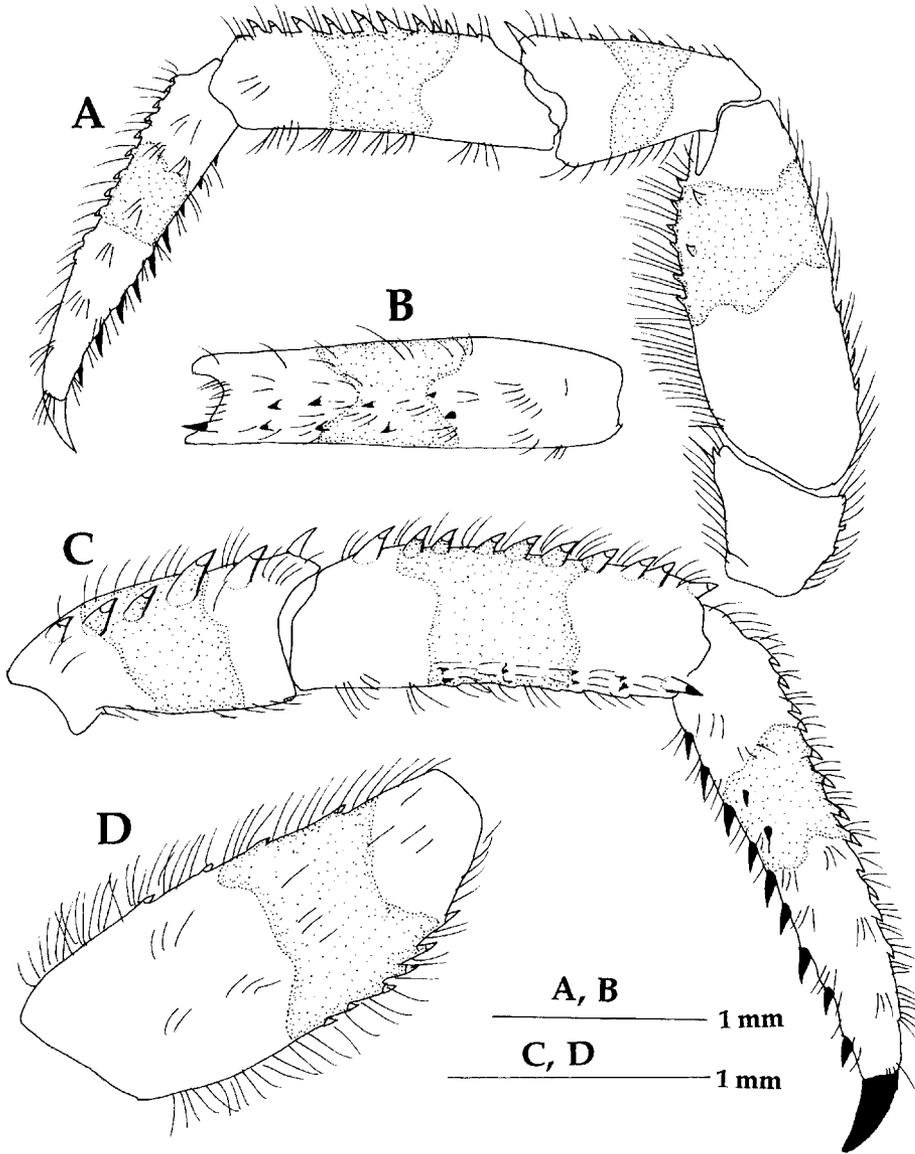


Fig. 5. *Pseudopaguristes bicolor*, new species: holotype male (CBM-ZC 6759), SL = 2.65 mm, off Yarabuzaki, Ishigaki-jima Is., Okinawa. Second left pereopod: A, lateral; B, propodus, ventral; C, dactyl, propodus, and carpus, mesial; D, merus, mesial.

bercles; number of tubercles or spines on dorsal faces of palm and carpus fewer; merus with ventromesial and ventrolateral margins bearing 6 and 5 spines, respectively; other surfaces similar to right.

Second pereopods (Fig. 5) with armature similar from left to right; right 1.10 length of left. Basically, spines on ambulatory pereopods with semitransparent tips. Dactyls

1.10 (left) or 1.25 (right) length of propodi, each terminating in strong corneous claw; dorsal margins each with row of strong spines; ventral margins each with row of 9 strong corneous spines and, on left, accompanied with 2 tiny corneous spines mesially. Propodi 1.60 (left) or 1.55 (right) length of carpi, each with row of 10 strong spines on dorsal margin; ventral faces each with 2

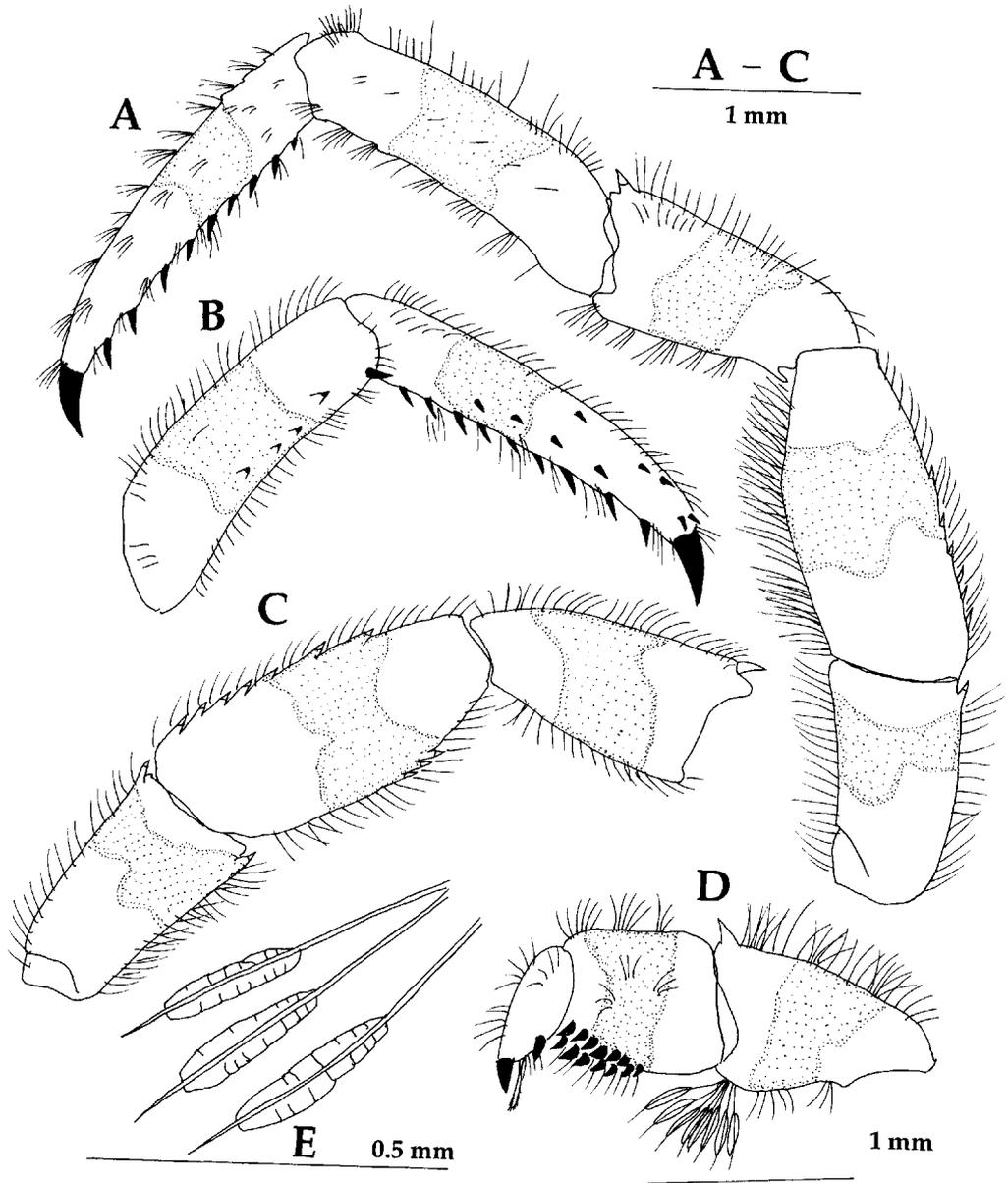


Fig. 6. *Pseudopaguristes bicolor*, new species: holotype male (CBM-ZC 6759), SL = 2.65 mm, off Yarabuzaki, Ishigaki-jima Is., Okinawa. Third left pereopod: A, lateral; B, dactyl and propodus, mesial (propodus slightly ventral view); C, carpus, merus and ischium, lateral. Fourth left pereopod: D, dactyl, propodus and carpus, lateral; E, ventral setae of carpus.

irregular rows of widely-separated, tiny corneous spines, ventromesial distal margins with 1 (right) or 2 (left) acute corneous spines. Carpi 0.55 (left) or 0.60 (right) length of meri, each with strong, corneous or corneous-tipped, slender spine at dorso-

distal angle and row of 5 slender spines on dorsal face mesially. Meri with ventral margins each with row of slender spines and, on left, accompanied with 2 small spines mesially; dorsal margins each with row of spines. Ischia each with few, slender cor-

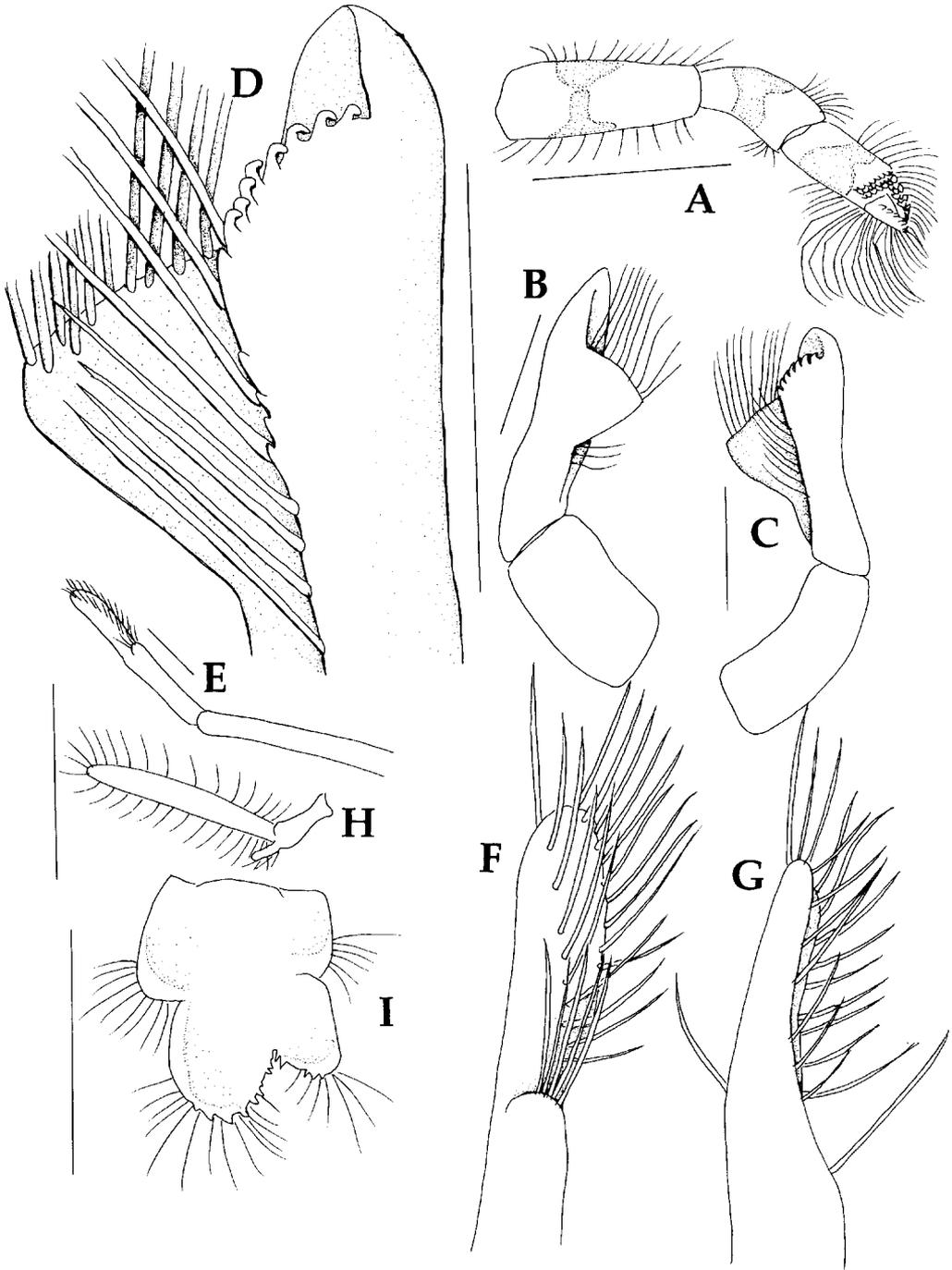


Fig. 7. *Pseudopaguristes bicolor*, new species: holotype male (CBM-ZC 6759), SL = 2.65 mm, off Yarabuzaki, Ishigaki-jima Is., Okinawa. A, right fifth pereopod. Left first pleopod: B, external; C, internal; D, distal portion, internal, enlarged. Left second pleopod: E, external; F distal portion, enlarged, external; G, same, mesial. H, third pleopod. I, telson. Scales equal 1 mm (A, H, I) and 0.2 mm (B-E).

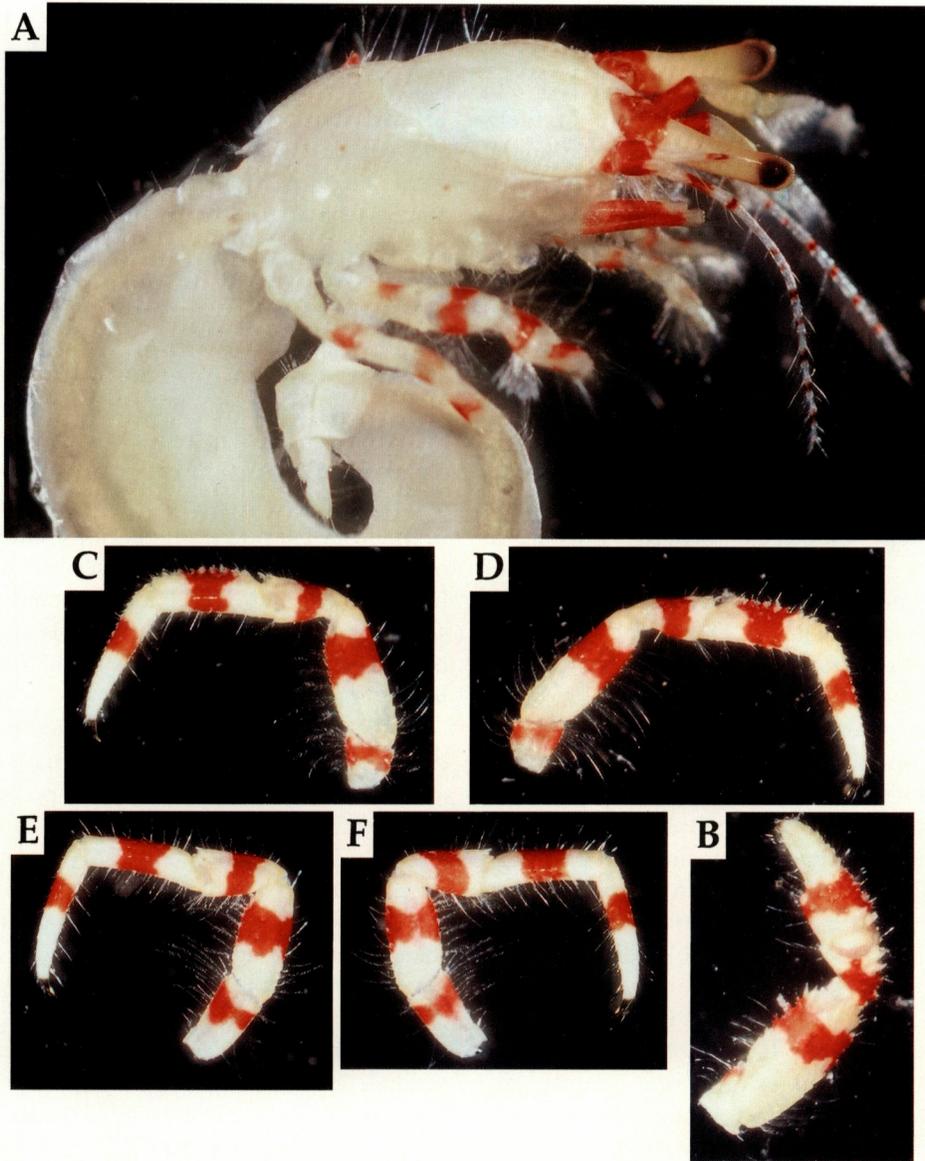


Fig. 8. *Pseudopaguristes bicolor*, new species: holotype male (CBM-ZC 6759), SL = 2.65 mm, off Yarabuzaki, Ishigaki-jima Is., Okinawa. A, dorsolateral view; B, right cheliped, mesial; C, left second pereopod, lateral; D, same, mesial; E, left third pereopod, lateral; F, same, mesial. Photo by A. Asakura.

neous-tipped spines dorsally and small spine at ventromesial distal angle. Coxae unarmed.

Third pereopods (Figs. 6A–C) with armature similar from left to right, right 1.05 length of left. Dactyls 1.20 (left) or 1.25 (right) length of propodi, each terminating in strong corneous claw; mesial faces each

with row of small corneous spines ventrally and 4 (left) or 2(right) small spines dorsally; dorsal margins with few tiny spines on proximal 0.25; ventral margins each with row of 9 strong corneous spines. Propodi 1.60 length of carpi; dorsal faces unarmed (left) or row of small tubercles or spines (right); ventral faces each with row of

small, widely-separated corneous spines, ventromesial distal angles each with 1 (left) or 2 (right) acute corneous spines. Carpi 0.70 (left) or 0.80 (right) length of meri, each with strong spine at dorsodistal angle; dorsal margin unarmed (left) or with minute subproximal spine (right). Meri with ventral margins each bearing 3 (left) or 2 (right) small spines; dorsal margins each with row of spines. Ischia each with small dorsodistal spine and another small ventrodistal spine. Coxae unarmed.

Sternite of third pereopods with anterior lobe rectangular, unarmed.

Fourth pereopod (Fig. 6D) subchelate. Dactyl terminating in strong corneous claw; prominent preungual process present at base of claw; ventral face with 1 corneous spine laterally. Propodal rasp with 2 rows of corneous scales. Carpus with large dorsodistal spine; ventral face with clump of long capsulate setae (Fig. 6E).

Fifth pereopod (Fig. 7A) chelate; dactyl and propodus with well-developed rasps.

Male first pleopods (Fig. 7B–D) paired, modified as gonopods; basal lobe bearing few setae at superior mesial angle; inferior lamella with distal margin bearing row of short, hooked spines, and lateral margin with row of setae; internal lobe with row of setae on mesial margin; external lobe distinctly exceeding inferior lamella in distal extension. Second pleopods (Fig. 7E–G) paired, modified as gonopods; basal segment naked; endopod with several long setae; appendix masculina twisted; lateral and distal margins and inferior face with moderately long setae. Third (Fig. 7H) to fifth left pleopods each with exopod well developed, endopod reduced.

Uropods asymmetrical, left larger than right; rasps of exopods and endopods well developed; protopods each with row of spines posteriorly.

Telson (Fig. 7I) with lateral constrictions; anterior portion unarmed; posterior lobes separated by deep median cleft, left lobe larger than right, terminal margins fringed with spines.

Female unknown.

Color in life (Fig. 8).—Shield white; antennules with flagella and ultimate segment yellow, setae on flagella blue, penultimate and basal segments red; antennae with flagella bearing alternative red and white bands, fifth segment with middle red band, proximal half of third segment red, second segment red except for white distal spines, first segment red except for ventral face, antennal acicle with subdistal red band, other surfaces of antennae white; ocular peduncles yellow, each with red band on proximal 0.25; ocular acicles red except for white distal spines; third maxillipeds with propodus, carpus, and merus and penultimate segment of exopod each bearing middle red band, other surfaces white; second maxillipeds with middle red band on penultimate segment of exopod. Both chelipeds and second through fifth pereopods with irregular red area on each segment.

Etymology.—From the Latin *bicolor*, two colors, in reference to the alternating red and white color bands on the pereopods characteristic to this species.

Distribution.—Known only from the type locality.

Remarks.—Despite their general similarities in morphology, the new species, *P. bicolor*, is readily distinguished from both *P. janetkae* and *P. bollandi* by differences in coloration in life. The chelipeds and the second and third pereopods in *P. bicolor* have alternating red and white bands. These appendages are uniformly red in *P. bollandi*, and, in *P. janetkae*, the meri and carpi and proximal half of palm of the chelipeds are cranberry-red and the carpi, propodi and dactyls of the second and third pereopods are light cream, tinged with yellow.

Morphologically, *P. bicolor* is similar to both *P. janetkae* and *P. bollandi*, but some differences are seen among them. The most striking difference that separates *P. bicolor* from both *P. janetkae* and *P. bollandi* is the degree of dissimilarity in the chelipeds in males. In male *P. janetkae* and *P. bollandi*, the chelipeds are very unequal, and arma-

tures are much stronger in the right than in the left. However, in male *P. bicolor*, the chelipeds are subequal and the dissimilarity of the armature is not so large as in those in *P. janetkae* and *P. bollandi*. Furthermore, the dorsal surfaces of the chelae are provided with tubercles in *P. bicolor* and *P. bollandi* but with spines in *P. janetkae*.

Other minor difference includes the fact that, although a preungual process is absent in *P. bollandi*, both *P. bicolor* and *P. janetkae* have a very prominent preungual process developed at the base of the claw, giving the dactyl a quasi-chelate appearance. However, so few specimens have been reported in any of these species (four specimens in *P. janetkae*, one in *P. bollandi* and one in *P. bicolor*), it is not possible to evaluate variability. Thus, we expect future collection efforts to provide more precise information on morphological discrimination between the species.

Acknowledgements

The authors are most grateful to Dr. Patsy A. McLaughlin (Shannon Point Marine Center, Western Washington University) for her elaborate review of the manuscript and the captain Higa Koei (Okinawa) for the successful cruise to collect this important material. The comments by Jacques Forest (Muséum national d'Histoire naturelle, Paris), D. L. Rahayu (Research Center for Oceanography, Indonesia) and an anonymous reviewer greatly improve the final

draft of the manuscript. This work was partly supported by a Grant-in-Aid for Scientific Research (C) from the Ministry of Education, Science, Culture and Sports of Japan awarded to Akira Asakura (No. 14540654).

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