

**A new species of *Pseudopaguristes* McLaughlin, 2002
(Crustacea: Decapoda: Diogenidae) from Japan**

Akira Asakura and Patsy A. McLaughlin

(AA) Natural History Museum and Institute, Chiba. 955-2, Aoba-cho, Chuo-ku,
Chiba 260-8682, Japan;

(PM) Shannon Point Marine Center, Western Washington University, 1900 Shannon Point Road,
Anacortes, Washington 98221-9081B, U.S.A.

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

A distinctive and unfamiliar hermit crab from Okinawa was recently sent to the first author for identification. This specimen superficially looked very much like a species of the diogenid genus *Paguristes* Dana, 1851, particularly in having paired first and second pleopods modified as gonopods. However, the right cheliped was larger than the left, a character uncommon in species of that genus. Further examination revealed a gill formula aberrant for *Paguristes*.

McLaughlin (2002) recently established the new genus *Pseudopaguristes*, for *P. janetkae* McLaughlin, 2002, a brilliantly colored and strikingly sexually dimorphic species from Guam, Micronesia. Females of *Pseudopaguristes* could easily be assigned to the genus *Paguristes*, because the chelipeds are similar in size and armature, a character commonly seen in *Paguristes*. However, the males differ appreciably in having chelipeds quite dissimilar in armature, with the right largest. McLaughlin reported that males and females of *Pseudopaguristes* share with *Paguristes* the distinctive character of sexually modified pleopods. However, *Pseudopaguristes janetkae* has only eight functional pairs of gills, whereas *Paguristes* species have 13 pairs. In *Pseudopaguristes janetkae*, the paired arthrobranchs at the base of the third maxillipeds and chelipeds are rudimentary or vestigial, and there

is no pleurobranch on the thoracic wall above the second pereopod. The specimen from Okinawa clearly belongs to *Pseudopaguristes* and represents a new species described herein. The holotype is deposited in the Natural History Museum and Institute, Chiba (CBM-ZC). Terminology used follows McLaughlin (1974) with the exception of the fourth pereopods as defined by McLaughlin (1997), and gill structure as defined by McLaughlin & de Saint Laurent (1998). Abbreviations used are; coll., collector; and SL, shield length, measured from the tip of the rostral lobe to the posterior margin of the shield.

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

Material examined.—Holotype: male, SL = 3.2 mm, 69 m, Seragaki, Onna-son, Kunigami-gun, Okinawa-hontow, 14 Aug 2000, coll. R. F. Bolland, CBM-ZC 6442.

Description.—Eight functional pairs of weakly quadriserial, phyllobranchiate gills (Fig. 1A, B). Shield (Fig. 1C) 1.2 times longer than broad; anterior margin between rostrum and lateral projections concave; lateral projections (Fig. 1D) triangular, right with small, submarginal, corneous spine, left unarmed; anterolateral angles (Fig. 1E) each with strong corneous spine (not visible

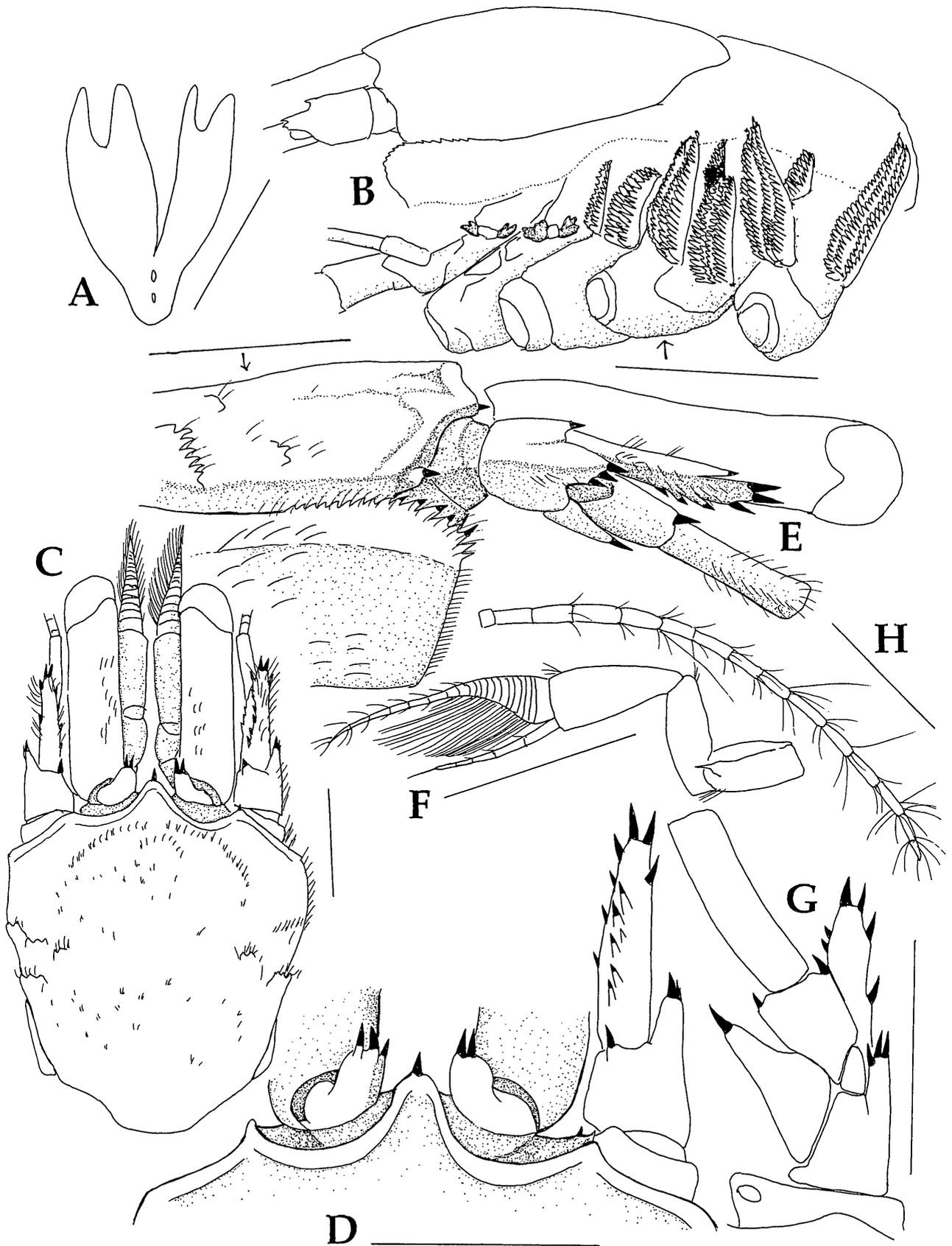


Fig. 1. *Pseudopaguristes bollandi*, new species, holotype male (CBM-ZC 6442), SL = 3.2 mm, Seragaki, Onna-son, Kunigami-gun, Okinawa-hontow. A, arthrobranch gill lamella; B, position and shape of gills; C, shield and cephalic appendages; D, ocular acicles and anterior portion of shield; E, right lateral view of ocular peduncle, antenna and anterior portions of branchiostegite and shield; F, left antennule, lateral view; G, left antenna, lateral view; H, antennal flagellum. Scales equal 0.33 mm (A) and 1 mm (B-H).

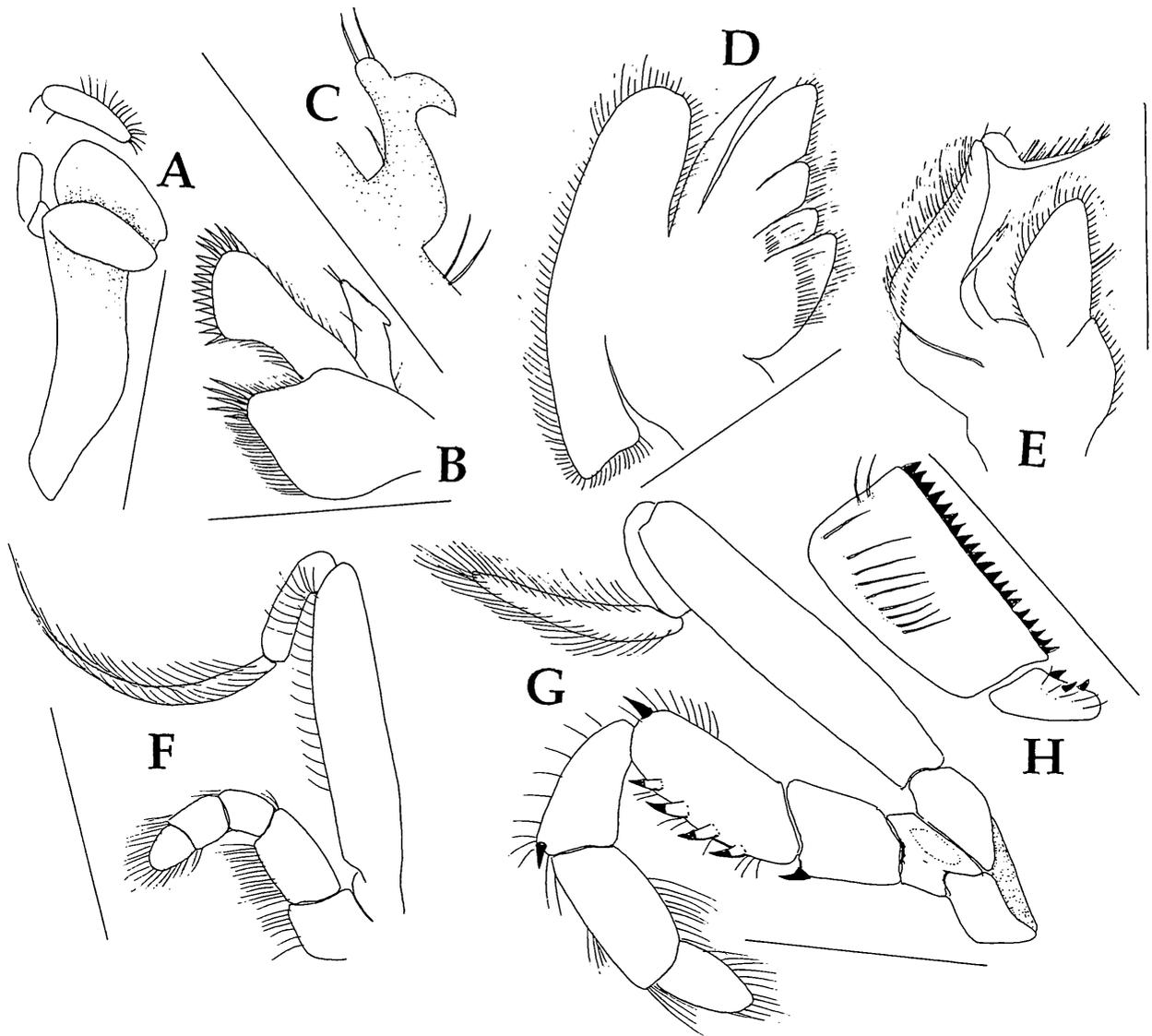


Fig. 2. *Pseudopaguristes bollandi*, new species, holotype male (CBM-ZC 6442), SL = 3.2 mm, Seragaki, Onna-son, Kunigami-gun, Okinawa-hontow. Left mouthparts: A, mandible, external; B, maxillule, external; C, same, endopod; D, maxilla, internal; E, first maxilliped, internal; F, second maxilliped, external; G, third maxilliped, external; H, ischium and basis of same, internal. Scales equal 1 mm.

in dorsal view); lateral margins straight; posterior margin truncate; dorsal surface slightly convex, with scattered tufts of short setae and 1 or 2 short ridges laterally. Rostrum (Fig. 1D) prominent, triangular, produced beyond bases of ocular acicles, with terminal corneous spine. Accessory portions of shield (Fig. 1C) small, well calcified, unarmed. Branchiostegites (Fig. 1E) partially calcified anterodorsally, with row of acute, slender spines, several corneous-tipped, on dorsodistal and anterodorsal margins.

Ocular peduncles (Fig. 1C) moderately short, 0.6 length of shield. Corneas (Fig.

1C, E) very slightly dilated. Ocular acicles (Fig. 1D) with 2 (right) or 3 (left) strong corneous spines on distal margin; separated basally by more than breadth of rostrum.

Antennular peduncles (Fig. 1C, F) stout; when fully extended, distal margins of ultimate segments very slightly exceeding distal margins of corneas; ultimate and penultimate segments each with tuft of setae dorsodistally; basal segment with acute spine laterally.

Antennal peduncles (Fig. 1C–E, G) moderately long, when fully extended, reaching bases of corneas; fifth segment with row of setae dorsally and laterally; fourth segment

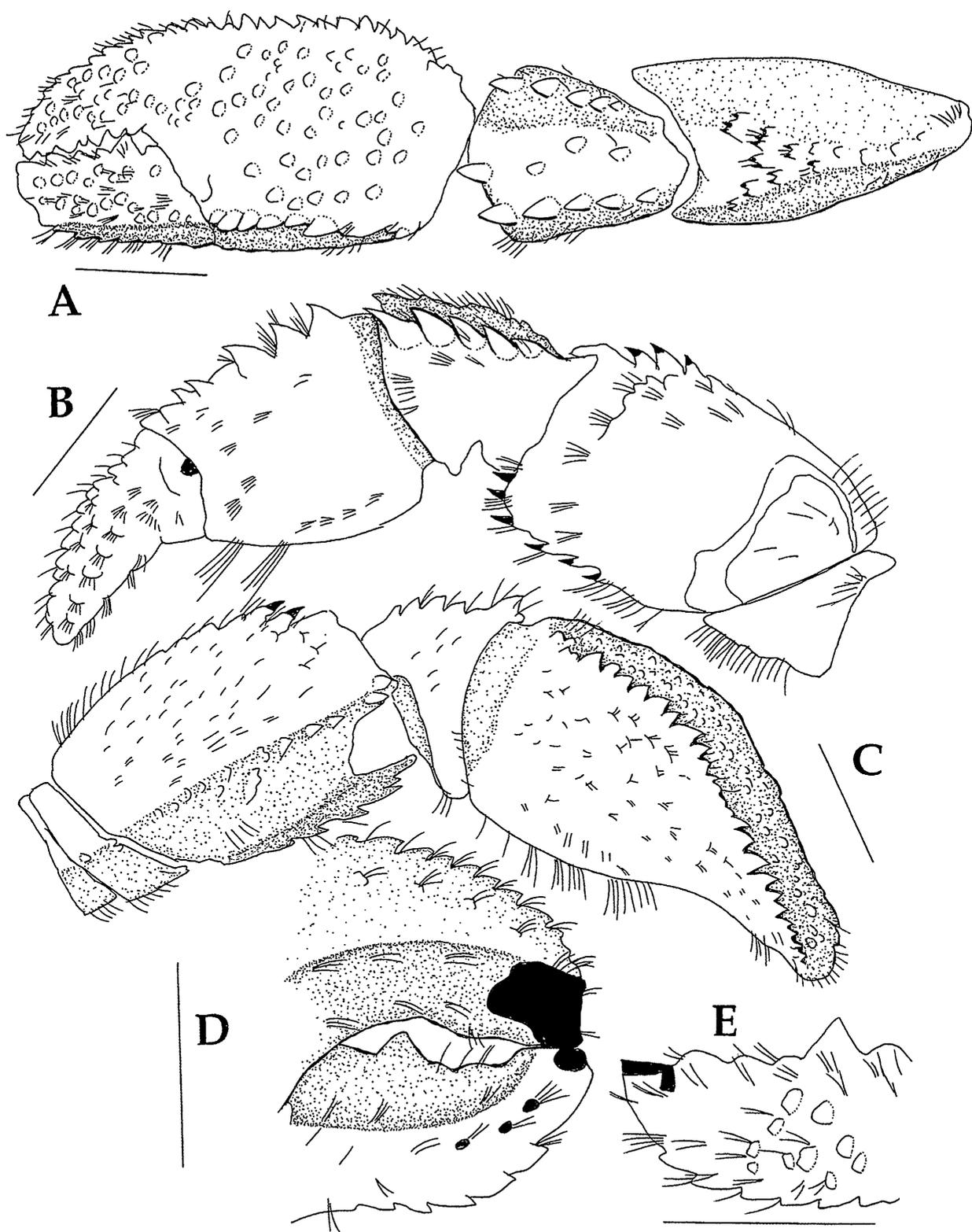


Fig. 3. *Pseudopaguristes bollandi*, new species, holotype male (CBM-ZC 6442), SL = 3.2 mm, Seragaki, Onna-son, Kunigami-gun, Okinawa-hontow. Right cheliped: A, dorsal; B, mesial; C, lateral; D, dactyl and fixed finger, ventral; E, fixed finger, dorsal. Scales equal 1 mm.

with strong corneous spine at dorsodistal margin and another corneous spine at ventrodistal margin; third segment with prominent corneous spine at ventrodistal margin; second segment with dorsolateral distal an-

gle produced, bearing 3 strong corneous spines, dorsomesial distal angle with acute corneous spine; first segment unarmed. Antennal acicles moderately long, straight; laterally compressed; dorsomesial and ventro-

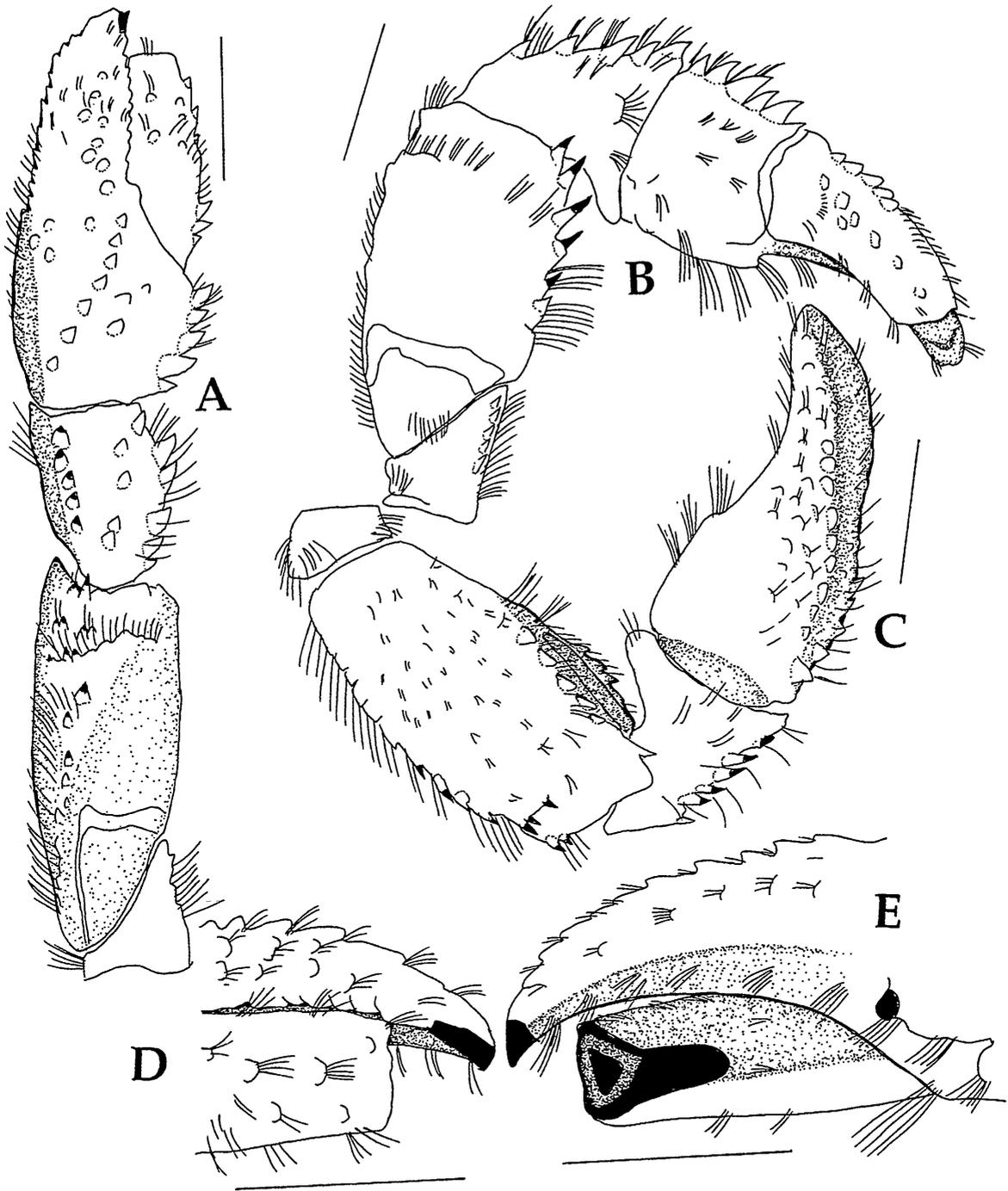


Fig. 4. *Pseudopaguristes bollandi*, new species, holotype male (CBM-ZC 6442), SL = 3.2 mm, Seragaki, Onna-son, Kunigami-gun, Okinawa-hontow. Left cheliped: A, dorsal; B, mesial; C, lateral; D, anterior portions of dactyl (tip broken) and fixed finger, dorsal; E, same, ventral. Scales equal 1 mm.

mesial margins each with row of corneous-tipped slender spines; distal margins each with 3 strong corneous spines; lateral margins each with strong, subdistal corneous spine. Antennal flagella (Fig. 1H) consisting of about 15 articles, each article with several setae of various lengths.

Mandible (Fig. 2A) without distinguishing characters. Maxillule (Fig. 2B, C) with external lobe of endopod 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 (Figs. 2G, H, 7A) with dorso-distal margin of carpus bearing acute corneous spine; merus with ventral margin bearing row of slender corneous-tipped spines, and dorsodistal margin bearing

acute corneous spine; ischium with well-developed crista dentata, no accessory tooth, strong corneous spine at ventrodistal margin; basis with few corneous spines.

Right cheliped (Fig. 3) larger than left. Dactyl 0.4 length of palm; terminal margin slightly convex, with very broad corneous claw (Fig. 3D); dorsal face flat, with scattered tubercles; cutting edge with 1 strong and 4 broad, low calcareous teeth. Fixed finger terminating in small corneous-claw (Fig. 3E); ventral face with row of 3 corneous tubercles (Fig. 3D); dorsal face flat, with scattered tubercles; cutting edge with 7 strong calcareous teeth. Palm 1.5 length of carpus; dorsal surface flat, with scattered tubercles; dorsomesial margin with row of very strong spines; dorsolateral margin with row of spines. Carpus 0.6 length of merus; dorsal face with scattered spines, dorsolateral and dorsomesial margins each with row of very strong spines. Merus with numerous spines, some corneous-tipped, on distal half of dorsal face; ventromesial margin with strong corneous or corneous-tipped spines; ventrolateral margin with row of spines or tubercles. Coxa (Fig. 7B) with strong corneous spine ventromesially.

Left cheliped (Fig. 4) with armature much weaker than right. Dactyl (terminal portion broken off) (Fig. 4D, E) with dorsal face flat, bearing few tubercles; cutting edge generally straight. Fixed finger terminating in broad corneous claw (Fig. 4D, E); dorsal face flat, with few tubercles; cutting edge with small, blunt calcareous teeth. Palm 1.3 length of carpus; dorsal surface flat, with scattered tubercles, dorsomesial margin with row of strong spines, dorsolateral margin with row of spines, some corneous-tipped. Carpus 0.5 length of merus; dorsal face with scattered spines, several corneous-tipped; ventrolateral and ventromesial margins each with row of spines. Merus with numerous spines, most corneous-tipped on dorsal face; ventromesial margin with row of spines, subdistal spine sharp; ventrolateral margin with row of spines. Ischium (Fig. 4B) with row of small

spines and sparse setae on ventromesial margin. Coxa (Fig. 7B) with strong corneous spine ventromesially.

Second pereopods (Fig. 5A–C) similar from left to right. Dactyls 1.1 length of propodi, each terminating in strong corneous claw; mesial faces each with row of corneous or corneous-tipped spines dorsally (Fig. 5B); ventral margins each with row of 9 (left) or 10 (right) strong corneous spines. Propodi 1.8 length of carpi, each with row of 10 (left) or 12 (right) strong corneous spines on dorsal margin and 1 (right) or 2 (left) acute corneous spines at ventromesial distal margin (Fig. 5B). Carpi 0.6 length of meri, each with strong, corneous-tipped, slender spine at dorsodistal angle and row of 5 (left) or 4 (right) slender, corneous-tipped spines on dorsal face mesially (Fig. 5C). Meri with ventral margins each bearing acute subdistal spine and row of slender corneous-tipped spines; dorsal margins each with proximal row of corneous-tipped spines. Ischia each with few, slender corneous-tipped spines dorsally. Coxae (Fig. 7B) unarmed.

Third pereopods (Fig. 6A, B) similar from left to right. Dactyls 1.1 length of propodi, each terminating in strong corneous claw; mesial faces each with row of small corneous spines ventrally (Fig. 6B); dorsal margins unarmed; ventral margins each with row of 10 (left) or 11 (right) strong corneous spines. Propodi 1.6–1.7 length of carpi; dorsal faces unarmed; acute corneous spine at each ventromesial distal angle (Fig. 6B). Carpi 0.6 length of meri, each with strong, corneous-tipped slender spine at dorsodistal angle; other portions unarmed. Meri with ventral margins each bearing small, subdistal corneous spine; dorsal margins each with row of corneous spines. Ischia each with few slender, corneous-tipped spines dorsally and acute corneous spine ventrally. Coxae (Fig. 7B) unarmed.

Sternite of third pereopods (Fig. 7B) with anterior lobe rectangular, unarmed.

Fourth pereopod (Fig. 6C, D) subchelate. Dactyl terminating in strong corneous claw;

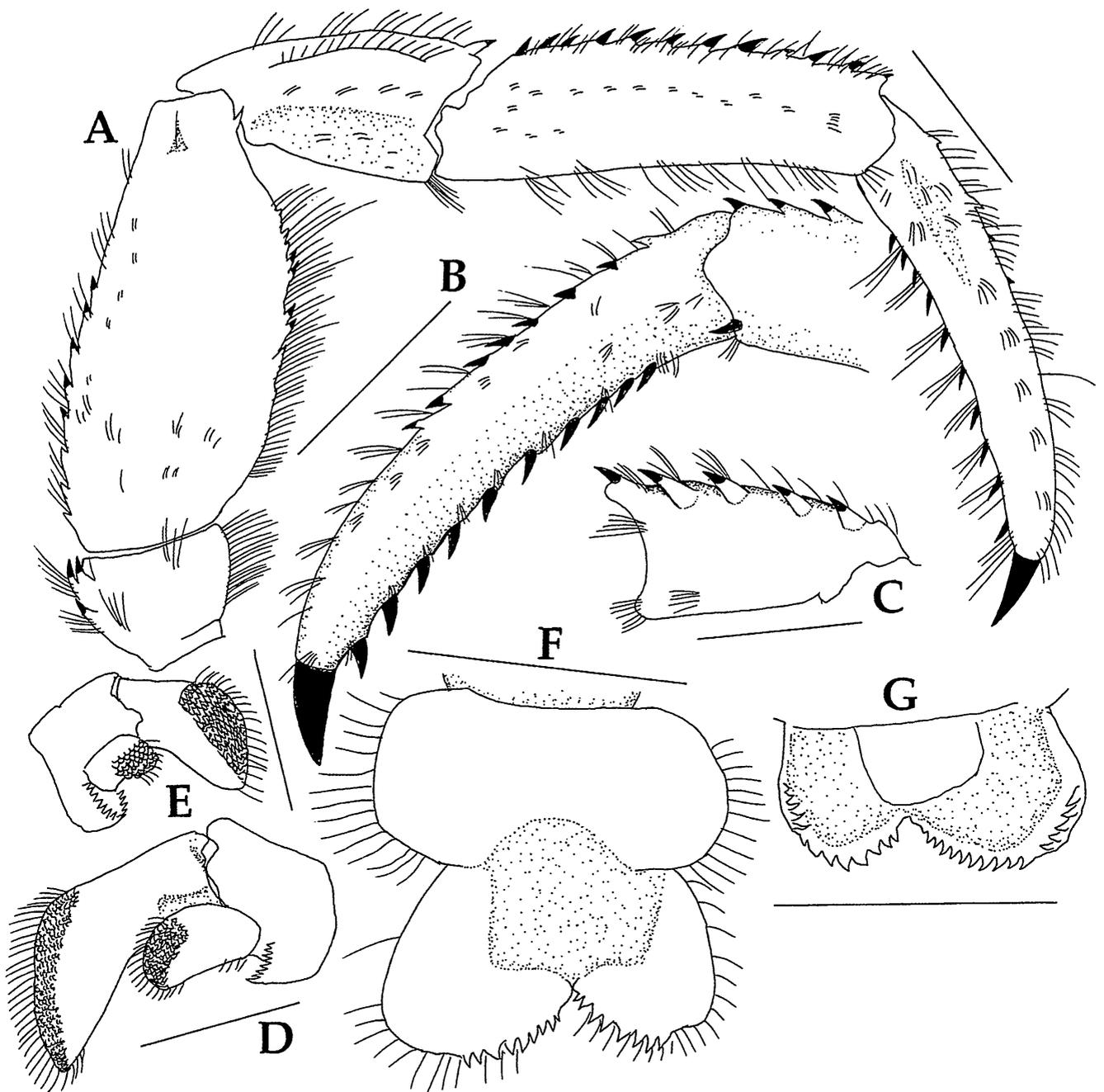


Fig. 5. *Pseudopaguristes bollandi*, new species, holotype male (CBM-ZC 6442), SL = 3.2 mm, Seragaki, Onna-son, Kunigami-gun, Okinawa-hontow. A, second right pereopod, lateral; B, dactyl and distal portion of propodus of same, mesial; C, carpus of same, mesial; D, left uropod; E, right uropod; F, telson, dorsal; G, posterior lobes of same, ventral. Scales equal 1 mm.

no preungual process; ventral face with 2 corneous spines slightly laterally. Propodal rasp with 2 rows of corneous scales. Carpus with large dorsodistal spine directed slightly mesially; ventral face with long, simple setae and clump of long capsulate setae (Fig. 6D).

Fifth pereopod (Fig. 6E) chelate; dactyl and propodus with well-developed rasps; carpus with dorsodistal spine.

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. 7B, E, F) paired, modified as gonopods; basal seg-

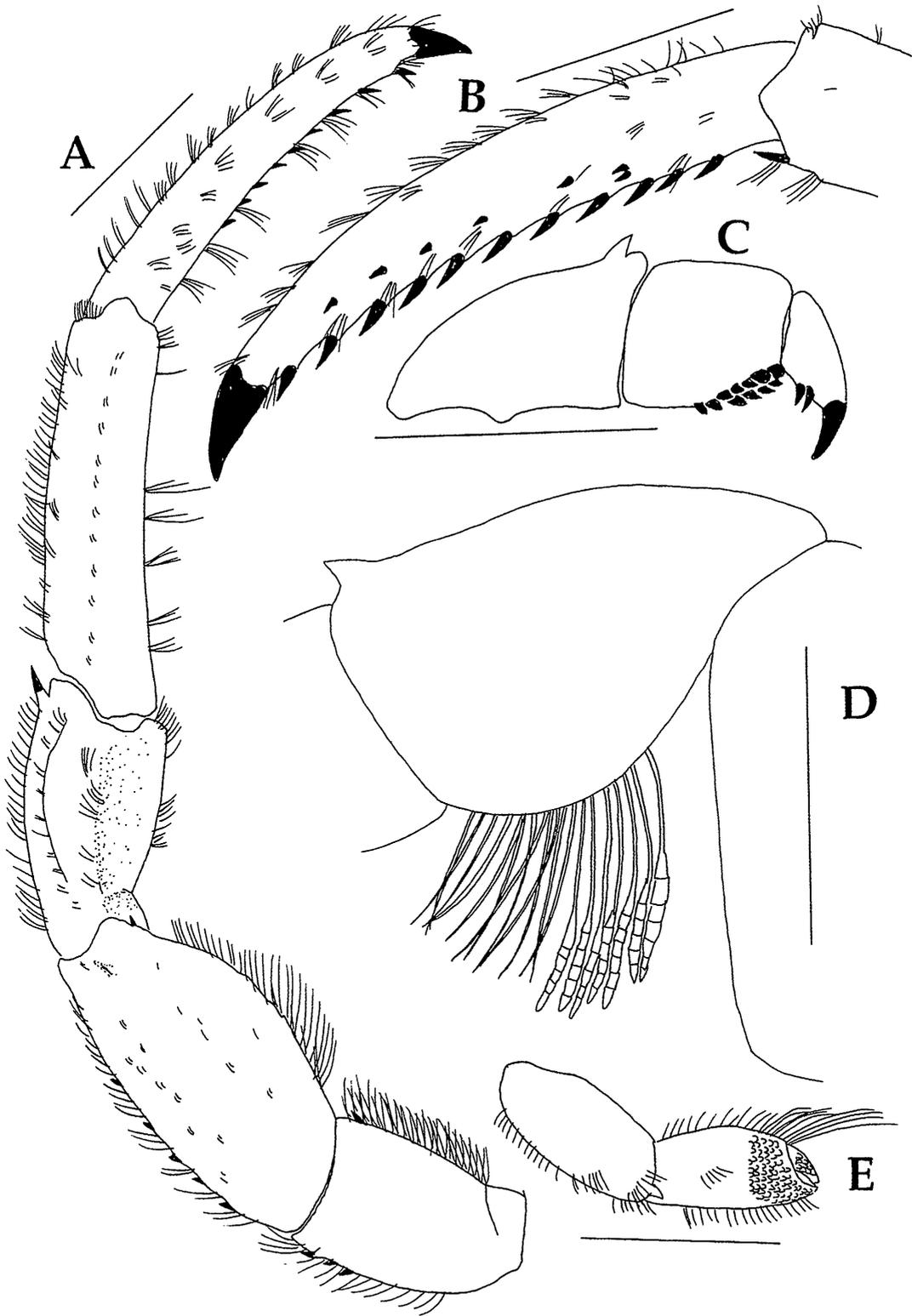


Fig. 6. *Pseudopaguristes bollandi*, new species, holotype male (CBM-ZC 6442), SL = 3.2 mm, Seragaki, Onna-son, Kunigami-gun, Okinawa-hontow. A, third right pereopod, B, dactyl and distal portion of propodus of same, mesial; C, fourth right pereopod, lateral; D, carpus and ventral setae of same, mesial; E, fifth right pereopod. Scales equal 1 mm (A-C, E) and 0.5 mm (D).

ment naked; endopod with several long setae; appendix masculina strongly twisted; lateral and distal margins and inferior face with moderately long setae. Third (Fig. 7G)

to fifth left pleopods each with exopod well developed, endopod reduced.

Uropods (Fig. 5D, E) asymmetrical, left larger than right; rasps of exopods and en-

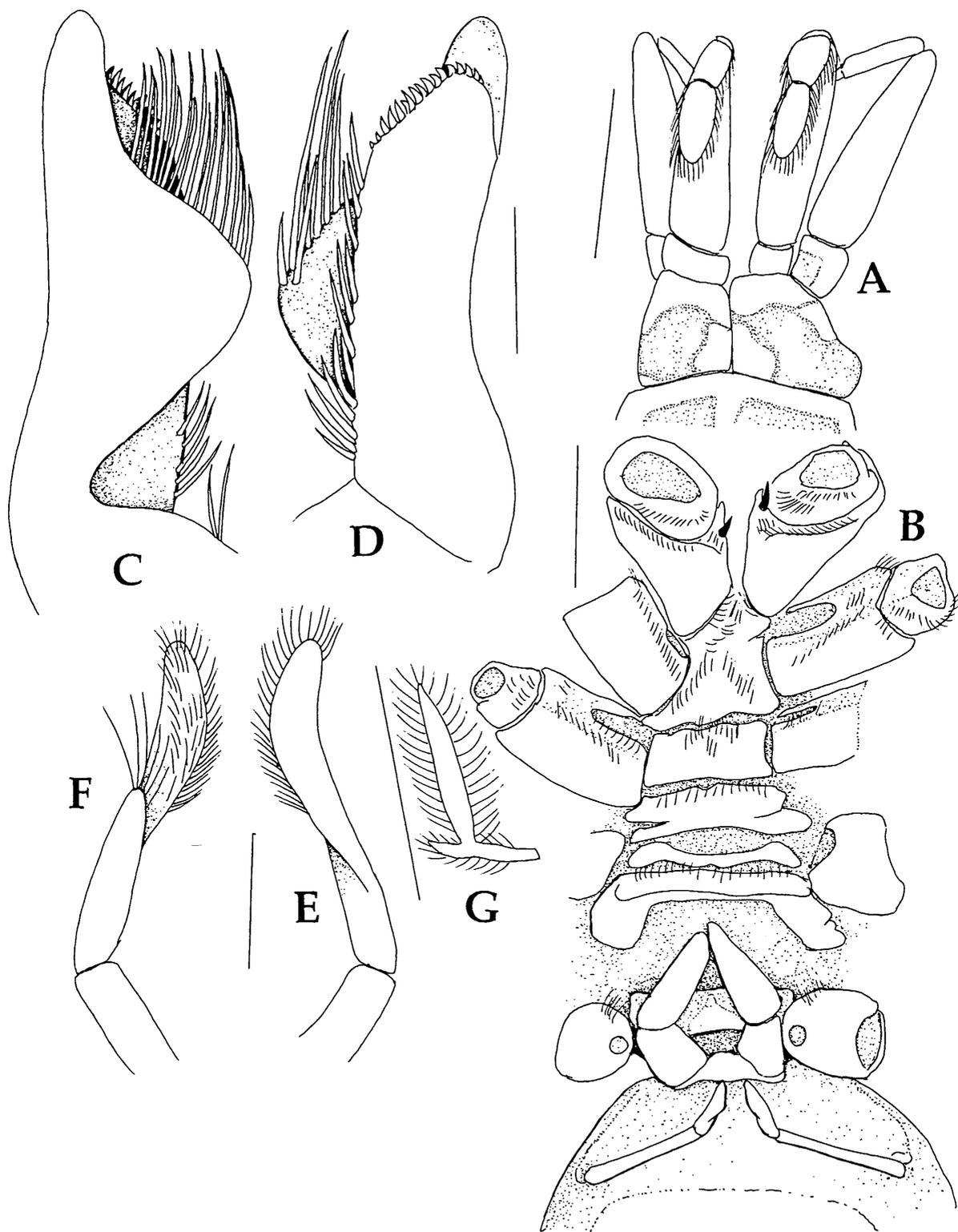


Fig. 7. *Pseudopaguristes bollandi*, new species, holotype male (CBM-ZC 6442), SL = 3.2 mm, Seragaki, Onna-son, Kunigami-gun, Okinawa-hontow. A, third maxillipeds, ventral; B, ventral view of cephalothorax and anterior portion of abdomen; C, first pleopod, external; D, first pleopod, internal; E, second pleopod, external; F, second pleopod, internal; G, third pleopod. Scales equal 1 mm (A, B, G) and 0.2 mm (C-F).

dopods well developed; protopods each with row of spines posteriorly.

Telson (Fig. 5F, G) with lateral constrictions; anterior portion unarmed; posterior lobes separated by moderately deep median

cleft, left lobe larger than right, terminal margins fringed with spines.

Color in life.—Shield white; antennular flagella yellow; antennal flagella with alternative red and white bands; antennular, oc-

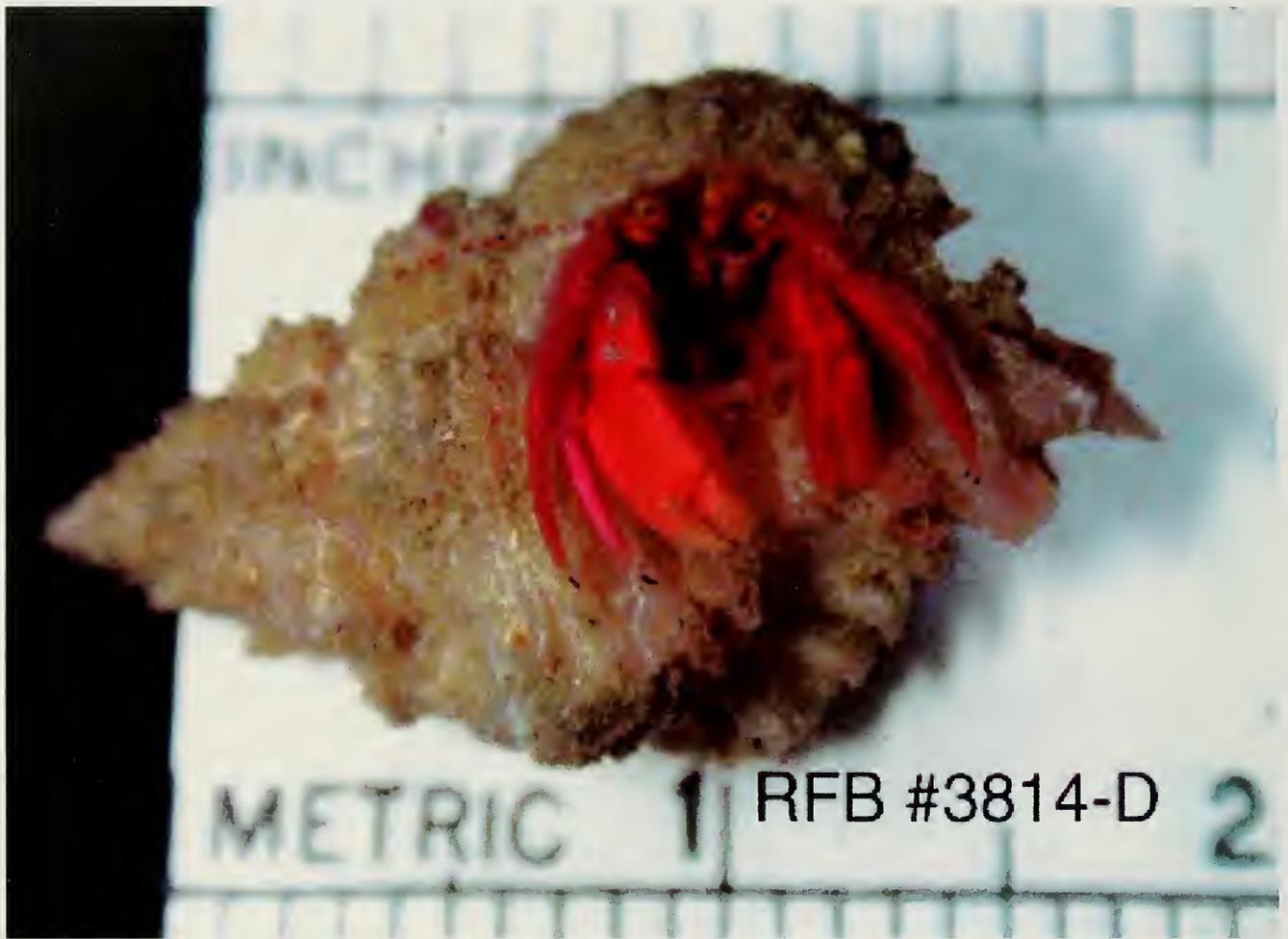


Fig. 8. *Pseudopaguristes bollandi*, new species: holotype male (CBM-ZC 6442), SL = 3.2 mm, Seragaki, Onna-son, Kunigami-gun, Okinawa-hontow. Photo by Robert F. Bolland.

ular and antennal peduncles red; corneas yellow; second and third maxillipeds, chelipeds and second and third pereopods uniform red (Fig. 8).

Etymology.—This species is named for Professor Robert F. Bolland who collected the specimen.

Distribution.—Known only from the type locality.

Remarks.—Morphologically, *P. bollandi* new species is quite similar to *P. janetkae* but minor differences are seen between them. Although the general shapes of the shield and cephalic appendages are quite comparable between *P. janetkae* and *P. bollandi*, the majority of the spines of *P. janetkae* lack the corneous tips found in *P. bollandi*. That the dorsal surfaces of the chelae are provided with spines in *P. janetkae* but only tubercles in *P. bollandi* may be diagnostic, or may be attributable

to intraspecific variations, such as observed in many hermit crab species. However, with so few specimens known it is not possible to evaluate variability. The minor differences in the armature of the ambulatory legs and telson seen in the males of these species may also reflect simple variability. One distinct difference between these two species is seen in the dactyls of the fourth pereopods. In *P. janetkae* a very prominent preungual process is developed at the base of the claw, giving the dactyl a quasi-chelate appearance. No preungual process is present in the holotype and only known specimen of *P. bollandi*.

Despite their general similarities in morphology, the two species are readily distinguished in life by differences in coloration of the ambulatory legs. These appendages are uniformly red in *P. bollandi*, whereas the carpi, propodi and dactyls of *P. janetkae*

are light cream, tinged with yellow. Differences in color of the ocular and antennal peduncles also have been observed. The peduncles of both are similarly uniform red in *P. bollandi*, while those of *P. janetkae* are cranberry-red proximally, but yellow-orange in the distal 0.7 of the ocular peduncles and yellow in the distal three segments of the antennal peduncles.

The morphology of the female of *P. bollandi* is unknown.

Acknowledgments

We are indebted to Professor Robert F. Bolland, Okinawa Campus, University of Maryland, for making the specimen with a beautiful photograph available for study. 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). This is, in part, a scientific contribution from the Shannon Point Ma-

rine Center, Western Washington University.

Literature Cited

- Dana, J. D. 1851. Conspectus crustaceorum quae in orbis terrarum circumnavigatione, Carolo Wilkes e classe republicae foederatae duce, lexit et descript.—(Preprint from) Proceedings of the Academy of Natural Sciences, Philadelphia 5: 267–272.
- McLaughlin, P. A. 1974. The hermit crabs (Crustacea, Decapoda, Paguridae) of northwestern North America.—Zoologische Verhandelingen 130:1–396.
- McLaughlin, P. A. 1997. Crustacea Decapoda: hermit crabs of the family Paguridae from the KARUBAR cruise in Indonesia. In A. Crosnier and P. Bouchet, eds., Résultats des Campagnes MUSORSTOM, 16.—Mémoires du Muséum national d'Histoire naturelle, 172:433–572.
- McLaughlin, P. A. 2002. *Pseudopaguristes*, a new and aberrant genus of hermit crabs (Anomura: Paguridea: Diogenidae).—Micronesica 34(2):185–199.
- McLaughlin, P. A., & M. de Saint Laurent. 1998. A new genus for four species of hermit crabs formerly assigned to the genus *Pagurus* Fabricius (Decapoda: Anomura: Paguridae).—Proceedings of the Biological Society of Washington 111:158–187.