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## Records of the hermit crab genus *Pagurixus* Melin, 1939 (Crustacea: Decapoda: Anomura: Paguridae) from Europa Island, western Indian Ocean, with descriptions of two new species

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### Abstract

Three species of the pagurid hermit crab genus *Pagurixus* Melin, 1939, are reported from Europa Island in the Mozambique Strait, western Indian Ocean: *P. haigae* Komai & Osawa, 2007, *P. annulus* **n. sp.**, and *P. europa* **n. sp.** *Pagurixus haigae* is recorded from the western Indian Ocean for the first time. *Pagurixus annulus* **n. sp.** and *P. europa* **n. sp.** are referred to the *P. boninensis* (Melin, 1939) species group and *P. anceps* (Forest, 1954) group, respectively. Diagnostic characters of these two new species are discussed.

### Introduction

The hermit crab genus *Pagurixus* Melin, 1939 (Paguridae) is well represented in shallow coral reefs in the Indo-West Pacific, currently including 36 species. The genus is characterized by the possession of a prominent tuft of setae directed mesially on the right coxa of the fifth pereopod in the male. Recent studies using materials collected by SCUBA diving (e.g., Komai & Myorin 2005; Komai & Osawa 2006; Osawa et al. 2006; Komai & Okuno 2009; Komai 2010; Komai & Rahayu, in press) have much contributed to discovery of species of the genus from the subtidal zone, where access for collections is not easy. Nevertheless, discovery of new species and new records from little investigated areas is still highly expected. From the western Indian Ocean, eight species have been reported, viz., *P. anceps* (Forest, 1954), *P. carinimanus* Komai & Osawa, 2006, *P. crosnieri* Komai, 2010, *P. nomurai* Komai & Asakura, 1995, *P. patiae* Komai, 2006, *P. pupureus* Komai & Okuno, 2009, *P. ruber* Komai & Osawa, 2006, *P. rubrovittatus* Komai, 2010 (Komai 2010; Poupin et al. in press a). All but *P. crosnieri* are widely distributed in the Indo-West Pacific.

Europa Island is one of the French Iles Eparses, otherwise including Bassas da India, Juan de Nova, Les Glorieuses and Tromelin. It is the southernmost island of this group located at 22°21'S, 40°21'E, 550 and 300 km far from Mozambique and Madagascar coasts respectively. It is broadly circular, with diameter of 6–7 km and the surface area of approximately 30 km<sup>2</sup>. Due to its isolation and very low population, anthropogenic influence is limited at Europa Island and there is, therefore, a strong willingness of the TAAF administration (Terres Australes et Antarctiques Françaises) to give the island the status of a Marine Protected Area (MPA). In the Mozambique Channel, the BIORECIE programme (2011–2013), led by the French Institut de Recherche pour le Développement (IRD) has been funded to improve our knowledge on the fauna and flora of the French Iles Eparses. Main objective of the 7–12 November leg to Europa Island was to update the previous inventories of the fauna already made in the island. Material studied herein is part of the decapod collections made during this field survey. Three species of *Pagurixus*, including two new to science, are reported herein: *P. haigae* Komai & Osawa, 2007, *P. annulus* **n. sp.** and *P. europa* **n. sp.** *Pagurixus haigae* is recorded from the western Indian Ocean for the first time. *Pagurixus annulus* **n. sp.** and *P. europa* **n. sp.** are referred to the *P. boninensis* (Melin, 1939) species group and to the *P. anceps* species group, respectively (cf. Komai & Osawa 2006).

All specimens were collected in the intertidal zone, in tide pools of the reef flat, at low tide. They are deposited in the Muséum national d'Histoire naturelle, Paris (MNHN). General terminology follows McLaughlin *et al.*

(2007), except for numbering of thoracic sternites. Shield length (sl), measured from the tip of the rostrum to the midpoint of the posterior margin of the shield, indicates specimen size. Others abbreviations are: coll., collected by; stn, station.

## Taxonomic account

### Family Paguridae

### Genus *Pagurixus* Melin, 1939

#### *Pagurixus haigae* Komai & Osawa, 2007

(Fig. 1A)

*Pagurixus haigae* Komai & Osawa, 2007: 97, figs 1–4.—Komai 2010: 1287.—Poupin et al. in press b.

**Material examined.** BIORECIE, stn 1, Europa Island, 22°33.644'S, 40°38.37'E, intertidal, reef flat, 7 November 2011, coll. J. Poupin, N. Gravier-Bonnet & M. Zubia, 1 male (sl 1.6 mm), 2 ovigerous females (sl 1.5, 1.6 mm), MNHN-IU-2012-603.

**Distribution.** Previously known from Japan, Guam, Philippines, Indonesia, New Guinea, Malaysia, New Caledonia, and Phuket in Thailand, intertidal to shallow subtidal. The present material greatly extends the geographical range of this species to the western Indian Ocean.

**Remarks.** The present specimens agree well with the original description in both morphology and color pattern, though markings on the appendages are lighter in the present specimens than in the type specimens (Fig. 1).

#### *Pagurixus annulus* n. sp.

(Figs 1B, 2, 3)

*Pagurixus* sp. nov. 1.—Poupin et al. in press b.

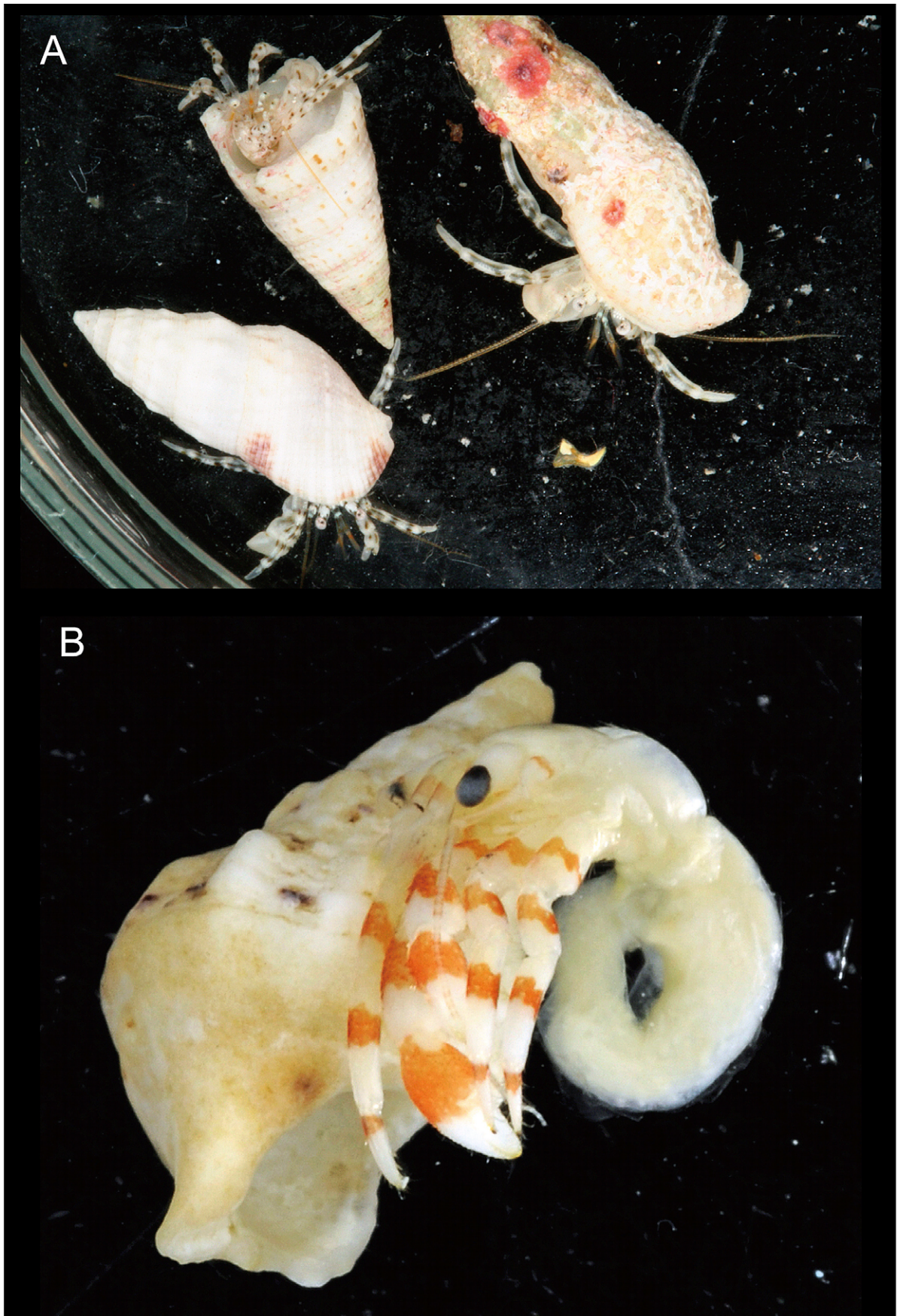
**Material examined.** Holotype: BIORECIE, stn 10, Europa Island, 22°33.644'S, 40°38.37'E, intertidal, reef flat and lagoon channel, 10 November 2011, coll. J. Poupin, N. Gravier-Bonnet & M. Zubia, male (sl 1.5 mm), MNHN-IU-2012-604.

**Description.** Shield (Fig. 2A) about 1.2 times longer than wide; anterior margin between rostrum and lateral projections slightly concave; anterolateral margins sloping; dorsal surface slightly convex, with few tufts of short setae laterally. Rostrum triangular, moderately produced, terminating acutely. Lateral projections obsolete, each with submarginal spinule.

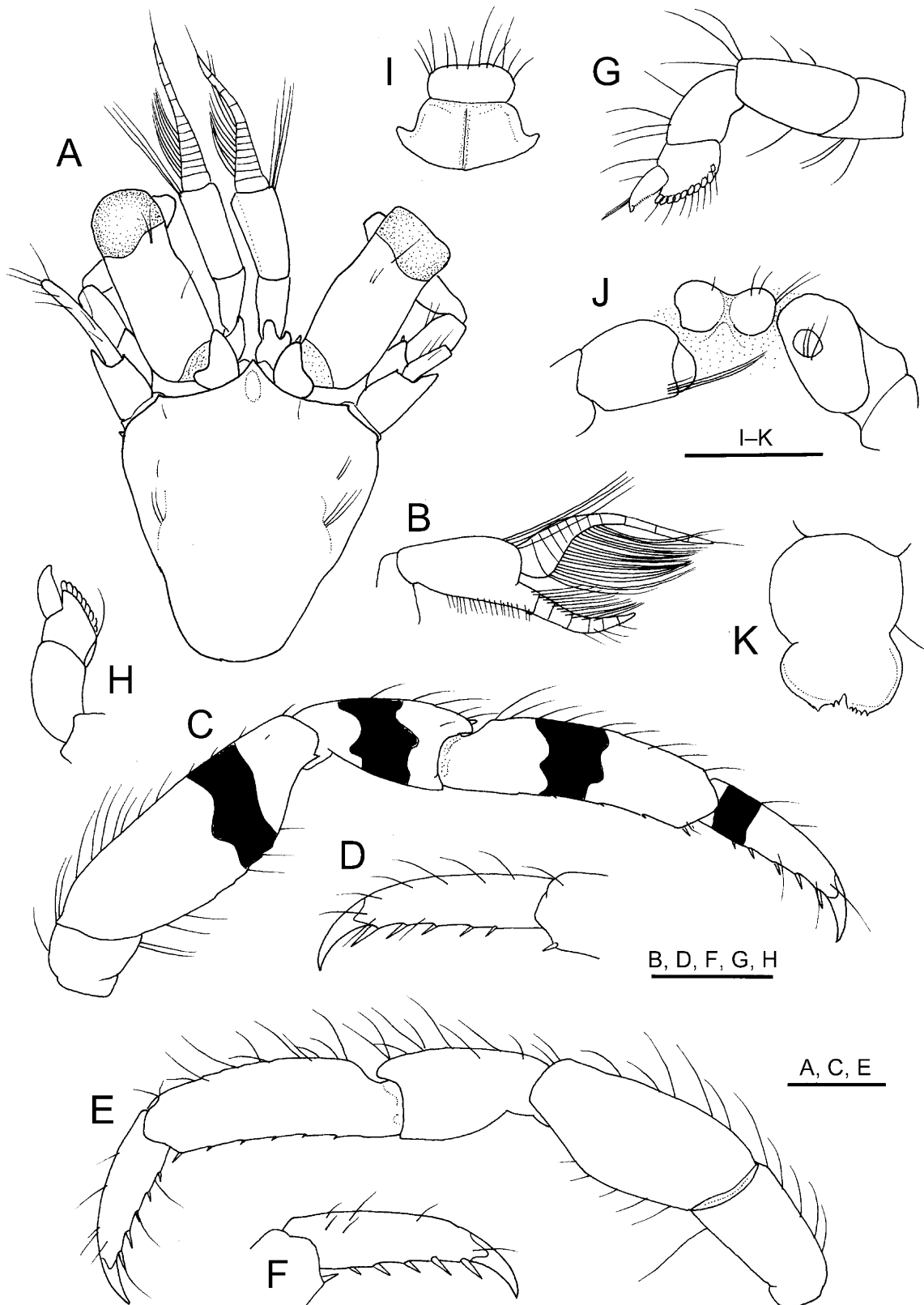
Ocular peduncle (Fig. 2A) moderately long and stout, about 0.7 length of shield, with few tufts of short stiff setae on dorsal surface mesially; cornea not dilated, corneal diameter about 0.4 of peduncular length; basal part not inflated, as wide as cornea. Ocular acicle subtriangular, each with submarginal spinule.

Antennular peduncle (Fig. 2A) stout, reaching distal corneal margin by tip of ultimate segment. Ultimate segment (Fig. 2B) 2.0 times longer than high, with prominent tuft of long setae on dorsolateral distal portion; ventral surface with 2 rows of soft, comparatively long setae directed outward. Basal segment with small laterodistal spine on statocyst lobe. Ventral flagellum with row of dense long setae directed outwards on lateral and mesial margins (Fig. 2B).

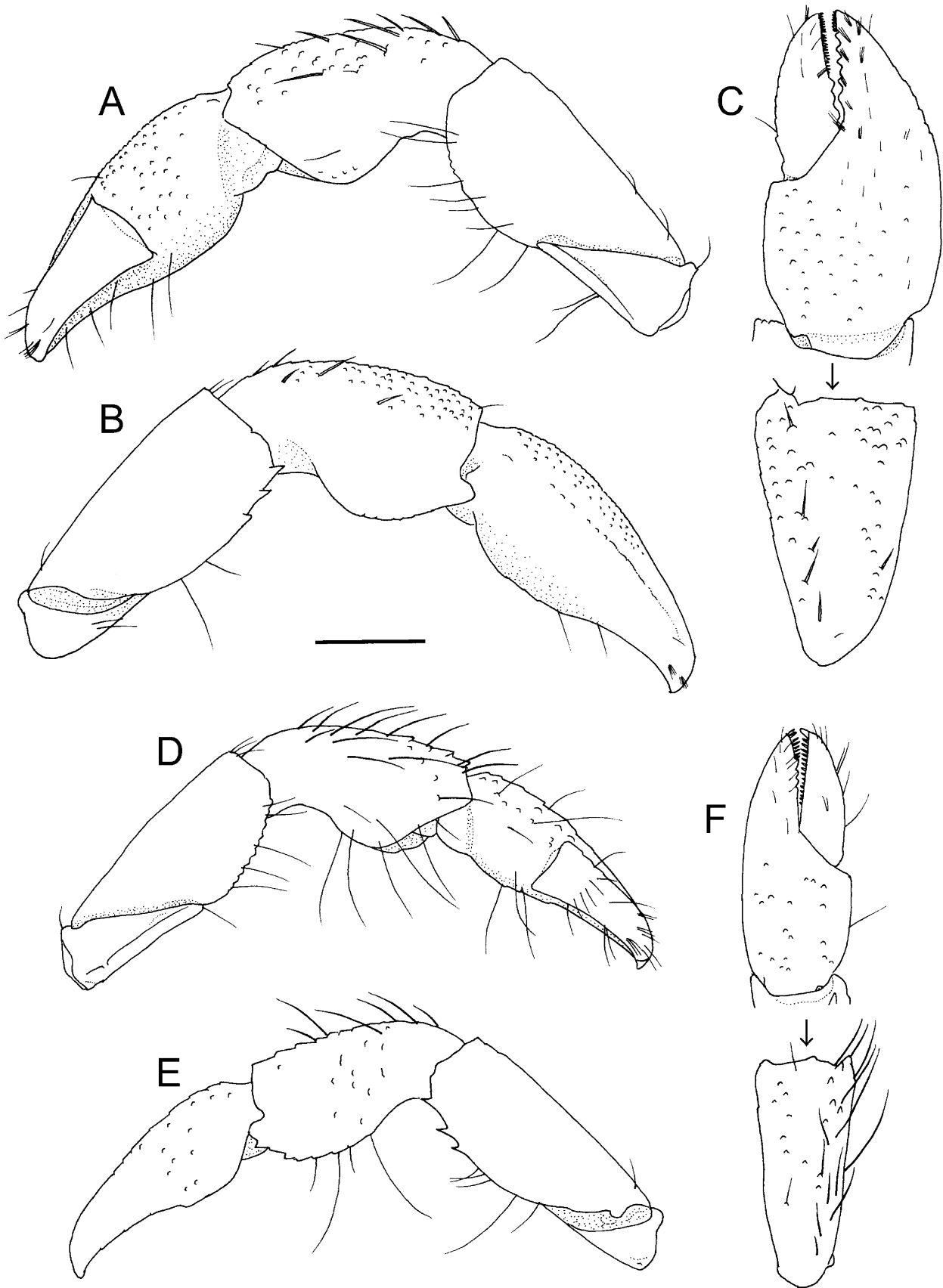
Antennal peduncles (Fig. 2A) reaching distal corneal margins by tip of fifth segment. Third segment with small spine at ventromesial distal angle. Second segment with spinule at dorsomesial distal angle; laterodistal projection far falling short of midlength of fourth segment, terminating in subacute spine. First segment with laterodistal spinule; ventromesial distal margin with small projection. Antennal acicle moderately long, slightly arcuate, slightly falling short of base of cornea, terminating in spinule obscured by tuft of stiff setae; mesial and lateral margin with sparse stiff setae. Antennal flagellum not reaching extended right cheliped; each article with few short setae on distal margin.



**FIGURE 1.** A, *Pagurixus haigae* Komai & Osawa, 2006, 1 male (sl 1.6 mm), 2 ovigerous females (sl 1.5, 1.6 mm), BIORECIE, stn 1, MNHN-IU-2012-603; B, *Pagurixus annulus* n. sp., holotype, male (sl 1.5 mm), BIORECIE, stn 10, MNHN-IU-2012-604, showing color pattern in preservative.



**FIGURE 2.** *Pagurixus annulus* n. sp., holotype, male (sl 1.5 mm), BIORECIE, stn 10, MNHN-IU-2012-604. A, shield and cephalic appendages, dorsal view; B, ultimate segment and flagella of right antennular peduncle, lateral view; C, right second pereopod, lateral view, showing color pattern; D, same, dactylus, mesial view; E, left third pereopod, lateral view; F, same, dactylus, mesial view; G, left fourth pereopod, lateral view; H, same, distal three segments, mesial view; I, sixth thoracic sternite, ventral view; J, coxae of fifth pereopods and eighth thoracic sternite, ventral view; K, telson, dorsal view. Scale bars: 0.5 mm.



**FIGURE 3.** *Pagurixus annulus* n. sp., holotype, male (sl 1.5 mm), BIORECIE, stn 10, MNHN-IU-2012-604. A, right cheliped, mesial view; B, same, lateral view; C, same, chela and carpus, dorsal view; D, left cheliped, mesial view; E, same, lateral view; F, same, chela and carpus, dorsal view. Scale bar: 0.5 mm.



Male right cheliped (Fig. 3A–C) moderately stout, not particularly elongate. Chela suboval, about 1.9 times longer than wide. Dactylus subequal in length to palm measured along mesial margin, terminating in small corneous claw; dorsomesial or mesial margin not delimited; slightly rounded dorsal surface without conspicuous spines or tubercles, mesial surface slightly granular, ventral surface nearly smooth; cutting edge with 2 obtuse calcareous tooth in proximal 0.4 and row of minute, corneous teeth in distal 0.6. Palm not widened distally, distinctly shorter than carpus; dorsal surface convex, slightly granular, no conspicuous spines, with scattered sparse very short setae; dorsolateral margin faintly delimited; dorsomesial margin not delimited; lateral and mesial faces almost glabrous; ventral surface also smooth, gently convex, with few short setae. Fixed finger terminating in corneous claw; cutting edge with row of 4 small, rounded or subtriangular teeth in proximal 0.8 and row of minute corneous teeth in distal 0.2. Carpus subequal in length to merus, widened distally, length about 1.6 of distal width; dorsal surface with sparse coarse granules and mesial row of long bristle-like setae, but without conspicuous spines; dorsodistal margin without conspicuous spines; lateral surface without trace of division; ventral surface convex, ventrolateral and ventromesial margins faintly granulate. Meral-carpal articulation lacking any pronounced clockwise rotation. Merus unarmed on dorsodistal margin, dorsal surface also unarmed and glabrous; lateral and mesial faces also smooth, glabrous; ventrolateral margin armed with row of 3 small spines in distal 0.3; ventromesial margin slightly tuberculate in distal 0.4; ventral surface slightly convex, with sparse long setae. Ischium with smooth ventromesial margin; surfaces smooth.

Left cheliped (Fig. 3D–F) moderately short, stout, distinctly shorter than right. Chela elongate subovate in shape, about 2.5 times longer than wide, about 1.2 times longer than carpus. Dactylus slightly longer than palm, terminating in small corneous claw, with tufts of stiff setae on mesial surface; dorsal surface rounded, smooth; cutting edge with row of small corneous teeth. Palm about half length of carpus; dorsal surface with sparse granules; dorsolateral and dorsomesial margins not delimited; lateral surface with sparse granules; mesial and ventral surfaces smooth; scattered long setae on ventral surface (including fixed finger). Fixed finger terminating in small corneous claw, cutting edge with row of small calcareous teeth and distal row of small corneous teeth distal to midlength. Carpus somewhat compressed laterally, slightly shorter than merus; length 2.3 of distal width and 2.0 of height; dorsolateral margin without conspicuous spines, dorsomesial margin with row of tiny tubercles and bristle-like stiff setae; dorsodistal margin without conspicuous spines; lateral surface nearly perpendicular, without trace of division, bearing sparse granules, ventrolateral margin minutely denticulate; mesial surface nearly smooth, ventrodistal margin unarmed; ventral surface convex, with sparse long setae. Merus glabrous on dorsal surface, dorsodistal margin unarmed; lateral almost smooth, ventrolateral margin with row of 3 small spines in distal 0.3; mesial face also smooth, ventromesial margin with row of minute tubercles; ventral surface slightly convex, smooth, with sparse setae. Ischium unarmed.

Ambulatory legs (Fig. 2C, E) relatively stout, similar on right and left. Dactyli (Fig. 2D, F) about 0.8 times as long as propodi, 4.2–4.4 times longer than wide, terminating in large corneous claws; dorsal surfaces with sparse short setae; lateral and mesial faces smooth; ventral margins each with 5 moderately long corneous spines increasing in size distally. Propodi not tapering distally, 3.2–3.4 times longer than wide; dorsal surfaces with sparse tufts of moderately long setae; lateral and mesial faces smooth; ventral margins each with 3–5 minute corneous spinules, ventrodistal margins each with single or paired small corneous spines. Carpi each with small dorsodistal spine, dorsal surfaces smooth, bearing tufts of stiff setae. Meri with sparse setae on smooth dorsal and ventral margins; lateral surfaces nearly smooth; ventrolateral distal margins each with one small spine (second) or unarmed (third).

Only left fourth pereopod preserved (Fig. 2G, H). Dactylus moderately broad, straight, terminating in small corneous claw, with tuft of short setae subterminally. Propodus with few setae on dorsal margin; mesial faces nearly flat or slightly convex, with few short setae, but without prominent tuft of setae; propodal rasp of single row of corneous scales. Carpus without prominent tuft of setae on mesial face.

Coxae of male fifth pereopods unequal (Fig. 2J); right coxa with prominent tuft of setae not reaching mesial margin of left coxa; no development of posteromesial protrusion apparent; papilla-like protrusion of vas deferens present. Left coxa with gonopore posteriorly encircled by short setae; no protrusion of vas deference seen.

Anterior lobe of sixth thoracic sternite (Fig. 2I) roundly subrectangular, with row of sparse short setae on anterior margin. Eighth thoracic sternite (Fig. 2J) composed of two subequal narrowly separated, rounded lobes; each lobe bearing few short setae laterally to anteriorly.

Pleon without distinctive features. Telson (Fig. 2K) with terminal margins nearly horizontal, with 2 (left) and 5 (right) spinules.

**Coloration.** In preservative. Shield white. Ocular peduncle white, without conspicuous markings; cornea darkly pigmented. Antennular peduncle generally white, ultimate segment with orange distal ring. Antennal peduncle generally white, only first segment orange. Chelipeds and ambulatory legs banded with white and orange. Right chela orange in palm, white in fingers; carpus white in distal half, orange in proximal half; merus with orange transverse band distal to midlength. Left cheliped showing similar pattern of markings to right cheliped. Ambulatory legs with dactyli bearing orange ring occupying proximal 0.3; propodi each with orange ring at about midlength (third); carpi each with orange ring crossing at midlength; meri each with orange ring distal to midlength. (See Figs 1B, 2C).

**Distribution.** So far known only from Europa Island, Mozambique Strait, western Indian Ocean; intertidal.

**Remarks.** This new species is assigned to the subgroup B of the *Pagurixus boninensis* species group (cf. Komai & Osawa 2006) by having two setal rows on the ventral surface of the ultimate segment of the antennular peduncle and the lack of lateral ridge on the lateral surface of the carpus of either cheliped, and is very similar to *P. pseliophorus* Komai & Osawa, 2006, known only from southwestern Japan, in both morphology and color pattern. Shared diagnostic characters include: antennular peduncle relatively short, not overreaching distal corneal margin; setae on ventral surface of ultimate segment of antennular peduncle arranged in single row, not clustered in tufts or short transverse rows; carpus of right cheliped without conspicuous dorsomesial spines; carpus of left cheliped without dorsolateral spines; dactyli of ambulatory legs short and stout, about 0.8 times as long as propodi and less than 4.5 times longer than wide; and ambulatory legs having distinct transverse bands. *Pagurixus annulus* n. sp. is distinguished from *P. pseliophorus* by the absence of conspicuous dorsomesial spines (except for one spine located at the dorsomesial distal angle) on the carpus of the left cheliped and the lack of a ventromesial protrusion of the right coxa of the male fifth pereopod. In *P. pseliophorus*, the carpus of the left cheliped bears a dorsomesial row of conspicuous spines; the coxa of the male fifth pereopod is provided with a distinct, collar-like ventromesial protrusion. Furthermore, the ocular peduncle seems to be stouter in *P. annulus* n. sp. than in *P. pseliophorus* (the corneal width is about 0.4 times in the new species versus 0.3 or less in *P. pseliophorus*) (Komai & Osawa 2006).

*Pagurixus brachydactylus* Komai & Osawa, 2006, known only from the Ogasawara (Bonin) Islands, Japan, is also similar to *P. annulus* n. sp. Nevertheless, the new species is distinguished from *P. brachydactylus* by the different pattern of the setation of the ventral surface of the ultimate segment of the antennular peduncle, the presence of bristle-like setae on the dorsomesial surface of the right cheliped carpus, and the lack of prominent setal tufts on the mesial face of the propodus and carpus of the left fourth pereopod. In *P. brachydactylus*, the setal row on the ventral surface of the ultimate segment of the antennular peduncle consists of mixture of longer setae clustered in tufts and interspersing shorter setae; the carpus of the right cheliped is devoid of bristle-like setae on the dorsomesial surface; the propodus and carpus of the fourth pereopod bear prominent tuft setae respectively (Komai & Osawa 2006). In addition, the shield may be proportionally narrower in *P. annulus* n. sp. than in *P. brachydactylus* (1.2 times longer than wide versus 1.0–1.1 times as wide as long). The color pattern of the ambulatory legs is also similar between these two species, but the dactyli have a proximal ring in *P. annulus*, whereas they have short proximal longitudinal stripes in *P. brachydactylus* (cf. Komai & Osawa 2006: fig. 45C).

**Etymology.** From the Latin *annulus*, meaning ring, in reference to the color pattern of the ambulatory legs. Used as a noun in apposition.

### ***Pagurixus europa* n. sp.**

(Figs 4–6)

*Pagurixus* sp. nov. 2. — Poupin et al. in press b.

**Material examined.** Holotype: BIORECIE, stn 10, Europa Island, 22°33.644'S, 40°38.37'E, intertidal, reef flat and lagoon channel, 10 November 2011, coll. J. Poupin, N. Gravier-Bonnet & M. Zubia, male (sl 1.3 mm), MNHN-IU-2012-762.

Paratypes: same data as holotype, 3 males (sl 1.1–1.5 mm), 4 ovigerous females (sl 1.1–1.2 mm), MNHN-IU-2012-763.

Non-type: same data as holotype, 1 juvenile (sl 0.9 mm), MNHN-IU-2012-764.

**Description.** *Males.* Shield (Fig. 4A) about 1.1 times longer than wide; anterior margin between rostrum and lateral projections slightly concave; anterolateral margins sloping; dorsal surface slightly convex, with few short setae laterally. Rostrum triangular, moderately produced, terminating acutely. Lateral projections obsolete, without submarginal spinule.

Ocular peduncle (Fig. 4A) moderately long and stout, about 0.6–0.7 length of shield, slightly inflated at midlength, with few tufts of short stiff setae on dorsal surface mesially; cornea slightly dilated, corneal diameter about 0.3 of peduncular length; basal part not inflated, as wide as cornea. Ocular acicle subtriangular, each with submarginal spinule.

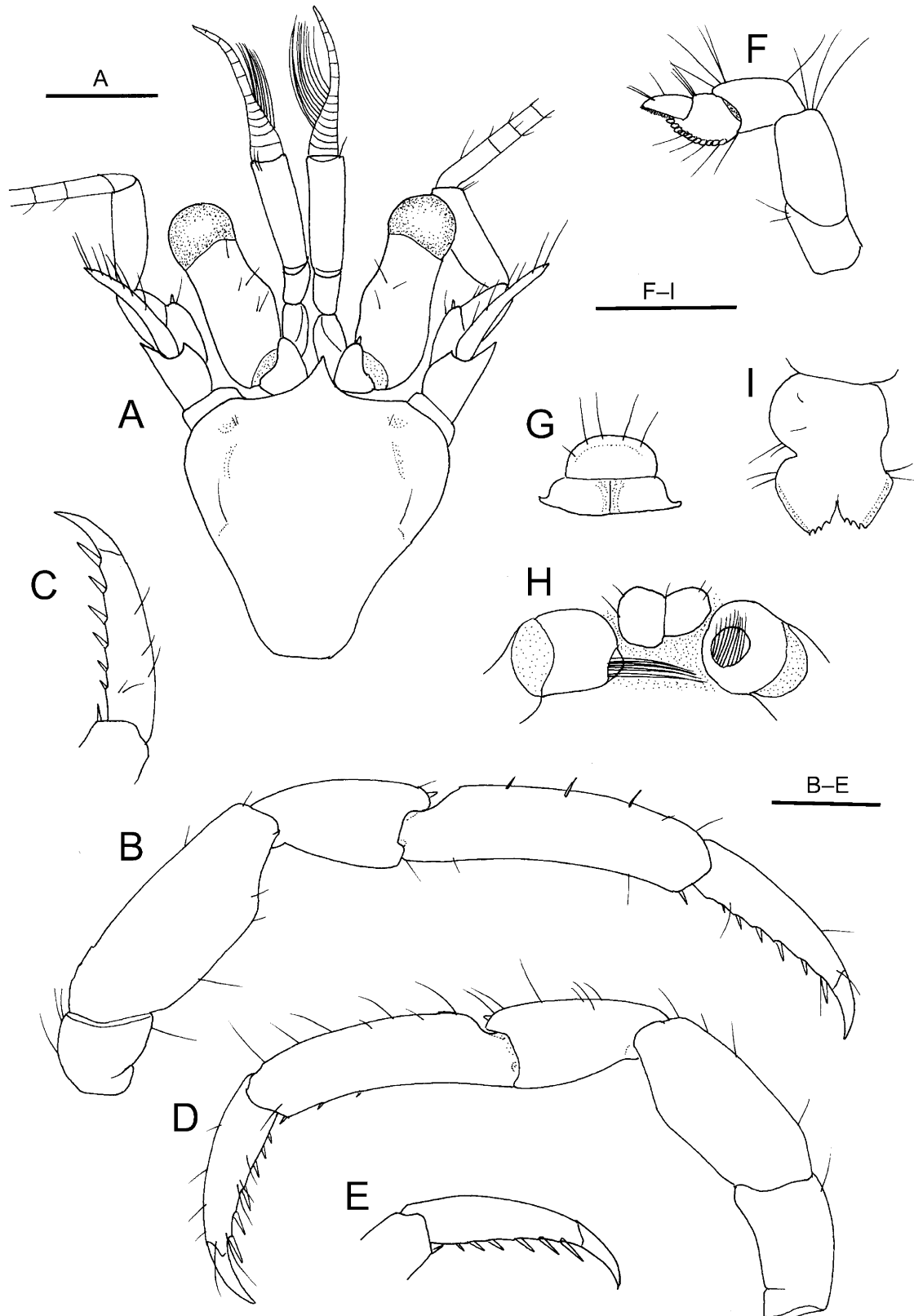
Antennular peduncle (Fig. 4A) moderately stout, overreaching distal corneal margin by 0.2–0.3 length of ultimate segment. Ultimate segment about 2.0 times longer than high, with 1 or 2 short setae at dorsolateral distal portion; ventral surface without setal rows. Basal segment with small laterodistal spine on statocyst lobe. Ventral flagellum without row of dense long setae directed outwards on lateral and mesial margins.

Antennal peduncles (Fig. 4A) overreaching distal corneal margins by 0.3 length fifth segment. Third segment with small spine at ventromesial distal angle. Second segment with spinule at dorsomesial distal angle; laterodistal projection falling short of midlength of fourth segment, terminating in acute spine. First segment with or without laterodistal spinule; ventromesial distal margin with small projection. Antennal acicle moderately long, slightly arcuate, slightly overreaching base of cornea, terminating in spinule partially obscured by tuft of stiff setae; mesial margin with sparse stiff setae. Antennal flagellum somewhat overreaching extended right cheliped; each article with 1–3 very short setae (length less than one article) distally.

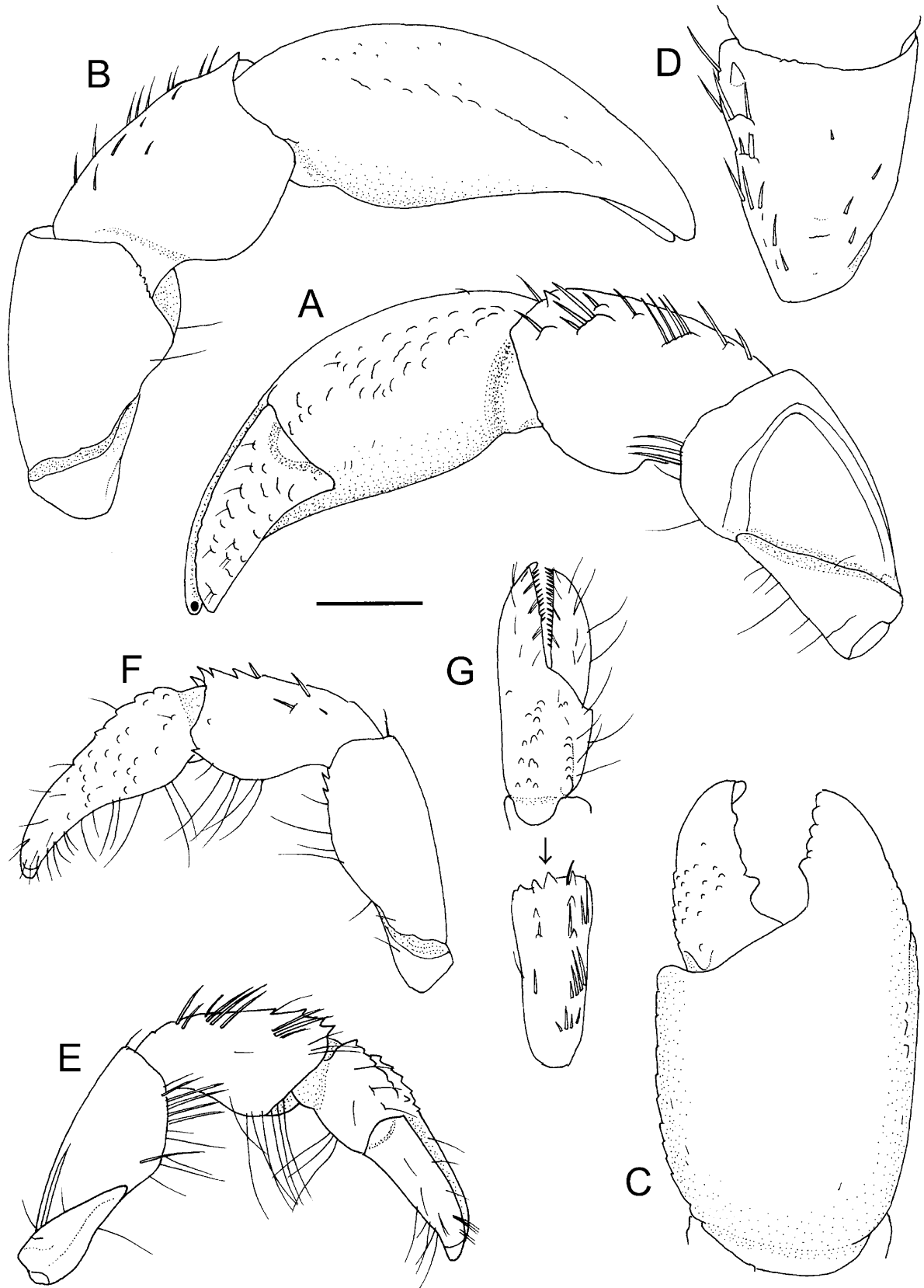
Male right cheliped (Fig. 5A–D) moderately stout to stout, not particularly elongate. Chela suboval, 1.8–2.0 times longer than wide. Dactylus about 0.8 length of palm measured along mesial margin, terminating in calcareous claw, slightly curved ventrally; dorsomesial or mesial margin not delimited; dorsal surface with sparse rounded granules; mesial surface with scattered row granules or low tubercles and sparse very short setae; ventral surface nearly smooth; cutting edge variable, bearing faint to distinct calcareous teeth, distal half occasionally with row of minute corneous teeth. Palm not widened distally, subequal in length to carpus; dorsal surface convex, microscopically granular, smooth to having several small, low tubercles, almost glabrous; dorsolateral margin faintly to slightly delimited; dorsomesial margin not particularly delimited, but with row of short oblique ridges; lateral and mesial faces almost glabrous; ventral surface also glabrous, gently convex. Fixed finger terminating in calcareous claw; cutting edge with row of 4 or 5 small, rounded or subtriangular calcareous teeth. Carpus subequal in length to merus, widened distally, length about 1.2 of distal width; dorsal surface almost smooth, mesially with 1 subdistal spine and low protuberances or oblique ridges each bearing 1–4 short to long bristle-like setae, and laterally with short bristle-like setae in proximal half; dorsodistal margin without conspicuous spines; lateral surface without trace of division, ventral lateral margin smooth; mesial surface smooth, ventromesial distal margin faintly tuberculate; ventral surface strongly convex. Meral-carpal articulation lacking any pronounced clockwise rotation. Merus unarmed on dorsodistal margin, dorsal surface also unarmed and glabrous; lateral and mesial faces also smooth, glabrous; ventrolateral distal margin minutely denticulate; ventromesial margin unarmed, bearing bristle-like stiff setae distally; ventral surface convex, with few long setae. Ischium with smooth ventromesial margin; surfaces smooth.

Left cheliped (Fig. 5E–G) moderately short, stout, distinctly shorter than right. Chela elongate subovate in dorsal view, about 2.7 times longer than wide, about 1.3 times longer than carpus. Dactylus longer than palm, terminating in small corneous claw, with tufts of stiff setae on dorsal and mesial surfaces; dorsal surface rounded, unarmed; cutting edge with row of small corneous teeth. Palm about half length of carpus; dorsal surface with low, tuberculate crest mesial to midline and double row of small tubercles along midline; dorsolateral and dorsomesial margins not delimited; lateral surface with sparse granules; mesial and ventral surfaces smooth; few long setae on ventral surface. Fixed finger terminating in corneous claw; cutting edge with row of small corneous teeth in distal half. Carpus somewhat compressed laterally, slightly shorter than merus; length 2.4 of distal width and 1.7 of height; dorsolateral margin with 2 small spines and few bristle-like setae, dorsomesial margin with 3 small spines and bristle-like stiff setae (proximal setae arranged in few short oblique rows); dorsodistal margin with 1 small spine flanked by spines in dorsolateral and dorsomesial rows; lateral surface nearly perpendicular, without trace of division, smooth ventrolateral margin unarmed; mesial surface nearly smooth, ventrodistal margin unarmed; ventral surface convex, with sparse long setae. Merus glabrous on dorsal surface, dorsodistal margin unarmed; lateral surface almost smooth, ventrolateral margin with 3 small spines in distal 0.2; mesial face also smooth, ventromesial margin without spines, but with several bristle-like stiff setae; ventral surface convex, smooth, with sparse setae. Ischium unarmed.

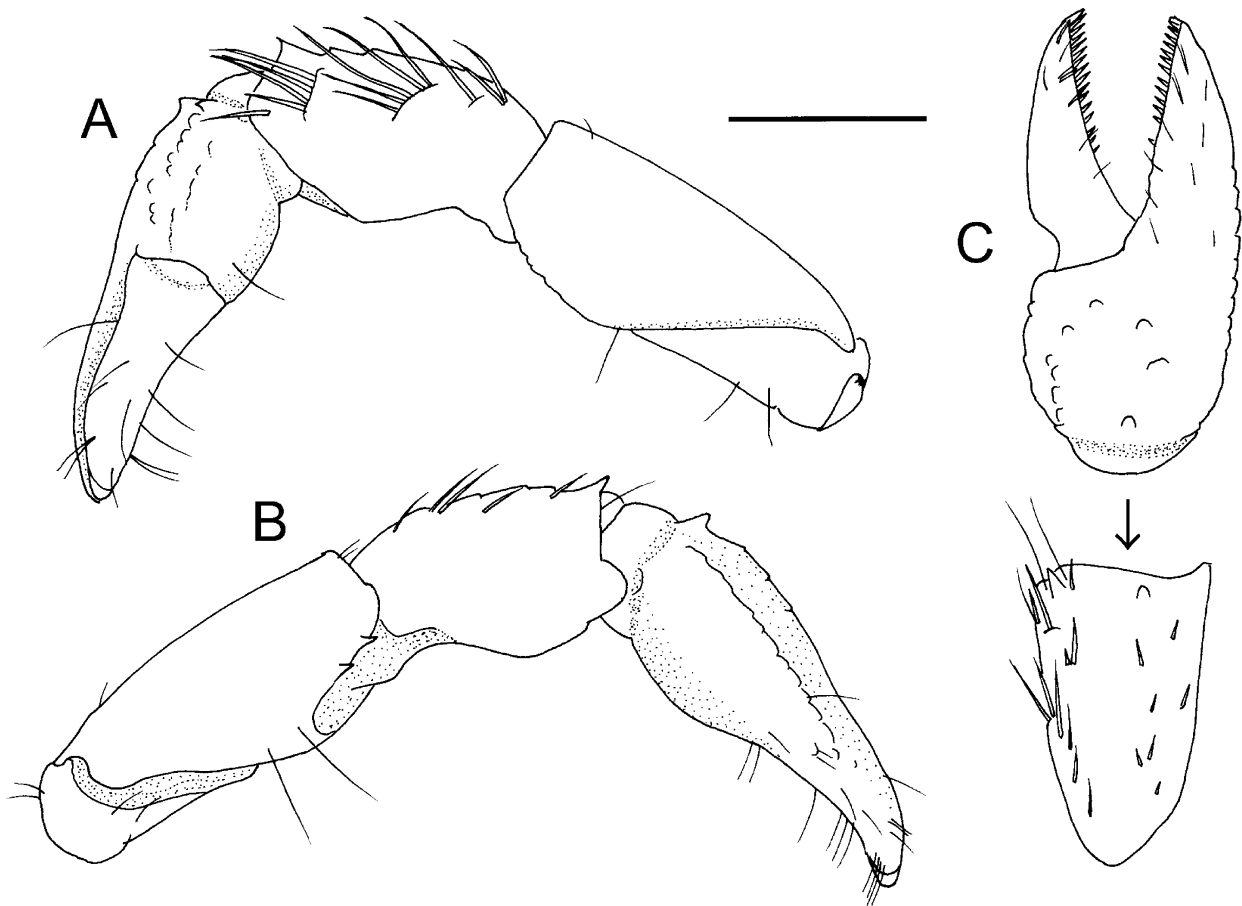




**FIGURE 4.** *Pagurixus europa* n. sp., holotype, male (sl 1.3 mm), BIORECIE, stn 10, MNHN-IU-2012-762. A, shield and cephalic appendages, dorsal view; B, right second pereopod, lateral view, showing color pattern; C, same, dactylus, mesial view; D, left third pereopod, lateral view; E, same, dactylus, mesial view; F, left fourth pereopod, lateral view; G, sixth thoracic sternite, ventral view; H, coxae of fifth pereopods and eighth thoracic sternite, ventral view; I, telson, dorsal view. Scale bars: 0.5 mm.



**FIGURE 5.** *Pagurixus europa* n. sp., holotype, male (sl 1.3 mm), BIORECIE, stn 10, MNHN-IU-2012-762. A, right cheliped, mesial view; B, same, lateral view; C, same, chela, dorsal view; D, same, carpus, dorsal view; E, left cheliped, mesial view; E, same, lateral view; F, same, chela and carpus, dorsal view. Scale bar: 0.5 mm.



**FIGURE 6.** *Pagurixus europa* n. sp., paratype, ovigerous female (sl 1.1 mm), BIORECIE, stn 10, MNHN-IU-2012-763. A, right cheliped, lateral view; B, same, mesial view; C, same, chela and carpus, dorsal view. Scale bar: 0.5 mm.

Ambulatory legs (Fig. 4B, D) moderately stout, similar on right and left. Dactyli (Fig. 4C, E) about 0.8–0.9 times as long as propodi, 5.1–5.2 times longer than wide, terminating in large corneous claws; dorsal surfaces with sparse short setae; lateral and mesial faces smooth; ventral margins each with 5–7 moderately long corneous spines increasing in size distally. Propodi not tapering distally, 4.0–4.5 times longer than wide; dorsal surfaces with sparse short setae; lateral and mesial faces smooth; ventral margins each with 2 or 3 minute corneous spinules, ventrodistal margins each with single or paired small corneous spines. Carpi each with small dorsodistal spine, dorsal surfaces otherwise unarmed, bearing few short stiff setae. Meri with few short setae on smooth dorsal and ventral margins; lateral surfaces smooth; ventrolateral distal margins each with one minute spine (second) or unarmed (third).

Fourth pereopods (Fig. 4F) similar from left to right. Dactylus moderately broad, straight, terminating in small corneous claw, with short setae subterminally. Propodus with tuft of setae on dorsal margin distally; mesial faces nearly flat or slightly convex, with few short setae, but without prominent tuft of setae; propodal rasp of single row of corneous scales. Carpus without prominent tuft of setae on mesial face.

Coxae of male fifth pereopods slightly unequal, dissimilar (Fig. 4H); right coxa with prominent tuft of setae reaching mesial margin of left coxa; no development of posteromesial protrusion apparent; papilla-like protrusion of vas deferens present. Left coxa with gonopore masked by tuft of short setae; no protrusion of vas deference seen.

Anterior lobe of sixth thoracic sternite (Fig. 4G) subsemicircular, with some short setae on anterior margin. Eighth thoracic sternite (Fig. 4H) composed of two unequal, contiguous rounded lobes; each lobe bearing few short setae anterolaterally.

Pleon without distinctive features. Telson (Fig. 4I) with terminal margins nearly horizontal to somewhat oblique, with 1–3 (left) and 3 or 4 (right) spinules; lateral plates of posterior lobes delimited.

*Female.* Chelipeds subequal in length. Right cheliped (Fig. 6A–C) relatively slender for genus. Chela subtriangular. Dactylus distinctly longer than palm, with scattered setae on surfaces; cutting edge with row of small corneous teeth. Palm with dorsal surface slightly convex, bearing longitudinal row of low, tiny tubercles mesial to midline and few low tubercles along midline; dorsolateral margin delimited by tuberculate ridge extending onto midlength of fixed finger; dorsomesial margin also delimited by interrupted, faintly tuberculate ridge; lateral and mesial faces smooth; ventral surface also smooth, gently convex. Fixed finger with row of small corneous teeth on distal half of cutting edge. Carpus slightly widened distally, 1.7–1.8 times longer than wide; dorsal surface mesially with 1 small distal spine and few low tubercles, laterally with irregular rows of short bristle-like setae; lateral surface smooth, ventrolateral margin unarmed; mesial surface with 2 oblique, low ridges each bearing some long, bristle-like setae, followed by few individual bristle-like setae; ventral surface convex, almost glabrous. Merus unarmed dorsally; ventrolateral margin with 2 small spines in distal 0.2; ventromesial margin unarmed. Unpaired left gonopore present.

**Coloration.** In preservative. Color fairly faded away, but trace of 2 brown transverse bands, occasionally interrupted medially, on propodi of the ambulatory legs. Similar pattern of the coloration of the ambulatory legs is also seen in *P. anceps*, *P. dissimilis* Osawa & Komai, 2007, *P. nanus* Komai & Takada, 2006, and *P. patiae* Komai, 2006 (Komai 2006; Komai & Takada 2006; Osawa & Komai 2007).

**Distribution.** So far known only from Europa Island; intertidal.

**Remarks.** *Pagurixus europa n. sp.* is referred to the *P. anceps* species group by the lack of setal rows on the ventral surface of the ultimate segment of antennular peduncle. It appears closest to *P. haigae*, now recorded from Europa Island. Shared characters include: ocular peduncle moderately stout, exceeded by antennular and antennal peduncles; carpi of second pereopods only with dorsodistal spine, otherwise unarmed on dorsal surfaces; fourth pereopods subequal, left without prominent tuft of setae on dactylus; dactylus and palm of right chela without dorsomesial or mesial ridges; carpus of right cheliped at least with dorsodistal spine; and dactyli of ambulatory legs each with six or seven corneous spines on ventral margin. Nevertheless, this new species can be morphologically distinguished from *P. haigae* by the following characters. The ocular peduncle is slightly inflated mesially at the midlength in *P. europa n. sp.*, but such an inflation is not seen in *P. haigae*. The carpi of the chelipeds bear several bristle-like setae arising from short oblique ridges or low protuberances on the dorsomesial surfaces in *P. europa*, whereas there are only a few stiff setae on the dorsomesial surface in *P. haigae*. Furthermore, there is only a dorsomesial distal spine on the carpus of the right cheliped in *P. europa n. sp.*, but there are several dorsomesial spines on the carpus of the right cheliped in *P. haigae*. In females, the chelipeds are subequal in *P. europa n. sp.*, rather than clearly unequal with the right larger in *P. haigae*. The left palm bears low but distinct tubercles arranged in longitudinal rows on the dorsal surface in *P. europa n. sp.*, but the dorsal surface of the left palm is only slightly granular in *P. haigae*. The color pattern of the ambulatory legs is also different between the two species. In *P. haigae*, there is a brown or dark brown longitudinal stripe on the midline of the lateral surface of each propodus, whereas no median stripe is seen on the segments in *P. europa n. sp.*

In the possession of long bristle-like setae on the dorsomesial surfaces of carpi of the chelipeds, *Pagurixus nanus* also resembles *P. europa n. sp.*, but the possession of two small proximal spines on carpi of the second pereopods distinguishes *P. nanus* from the new species.

**Etymology.** Named after the type locality, Europa Island. Used as a noun in apposition.

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