

***Pylopaguropsis lemaitrei*, a new species of hermit crab (Decapoda: Anomura: Paguridae) from French Polynesia.**

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Abstract.—*Pylopaguropsis lemaitrei*, new species, is described from French Polynesia. It closely resembles *P. lewinsohni* McLaughlin & Haig, 1989, in having three longitudinal sulci on the lateral face of the propodus of the right third pereopod. The new species is easily distinguished from the latter by the coloration and morphology of the chelipeds, ambulatory pereopods and telson. Coloration of the chelipeds and ambulatory pereopods of the new species is very similar to that of *P. keijii* McLaughlin & Haig, 1989. However, coloration of the ocular peduncles and antennae and morphology of the right third pereopod separate the new species from *P. keijii*.

Introduction

McLaughlin & Haig (1989) reviewed the pagurid genus *Pylopaguropsis* Alcock, 1905, and they recognized eleven species worldwide. Subsequently, in his review of *Pylopaguropsis* from Japanese waters, Asakura (2000) described two additional species from tropical Japan. During a recent visit by the first author to the National Museum of Natural History, Smithsonian Institution (USNM), an undescribed species of *Pylopaguropsis* was found, collected from the Marquesas Islands, French Polynesia, during a cruise by the research vessel Pele in 1967. The second author also recently found this species in the Tuamotu Islands of French Polynesia. He provided a photograph of this species as *Pylopaguropsis* cf. *keijii* to the web database of French

Polynesia (Marquesas, Society, Tuamotu, Australs, and Gambier Islands) by Poupin (2002, onwards). This species is morphologically close to *P. lewinsohni* McLaughlin & Haig, 1989, but in coloration, it is very similar to *P. keijii* McLaughlin & Haig, 1989. Here, we describe this French Polynesian species as new and compare it with *P. lewinsohni* and *P. keijii*.

McLaughlin & Haig (1989) divided *Pylopaguropsis* into the *teevana* group and *magnimanus* group based on morphology of the third pereopods. The former includes species in which the pair of third pereopods morphologically similar. The latter is characterized by dissimilar third pereopods; the right dactyl and propodus broader and more elongate, the dorsolateral margins prominently angular, and the lateral face of the propodus flattened or with one to three deep longitudinal sulci. This group includes *Pylopaguropsis magnimanus* (Henderson, 1896), *P. zebra* (Henderson, 1893), *P. atlantica* Wass, 1963, *P. keijii* McLaughlin & Haig, 1989, *P. speciosa* McLaughlin & Haig, 1989, and *P. lewinsohni* McLaughlin & Haig, 1989. The possession of dissimilar third pereopods in the present new species places it in the *magnimanus* group.

Materials, Abbreviations, and Terminology

The holotype and paratypes of the new species are deposited at USNM and Florida Museum of Natural History, University of Florida (UF), respectively. For comparative purposes, the paratype of *P. lewinsohni* (Alan Hancock Foundation, AHF, now housed in Museum of Los Angeles County,

LACM), non-type material of the same species (USNM and Western Australian Museum, WAM), the paratype of *P. keijii* (USNM), and non-type material of the same species (Natural History Museum and Institute, Chiba, CBM-ZC) were examined.

Abbreviations used are; SL, shield length as measured from the tip of the rostrum to the posterior margin of the shield; coll., collector; R/V, research vessel.

The terminology used herein generally follows McLaughlin (1974) and Asakura (2000), with those for gills, fourth pereopods, and posterior carapace following McLaughlin & de Saint Laurent (1998), McLaughlin (1997), and McLaughlin (2000), respectively.

Taxonomy

Pylopaguroopsis lemaitrei, new species

Figs. 1–5

Type material.— Holotype: ♀, SL = 2.35 mm, 4.6–12.2 m, north side of Baie Hikeu, Ua Pou, Marquesas Isls., French Polynesia, 23 Sept. 1967, R/V Pele, coll. H. A. Rehder, USNM 1015381. Paratypes: 1 ♂, SL = 3.00 mm, 15 m, under rocks, outer reef slope, outer end of Passe Tuheiava and adjacent outer reef slope on west side of atoll, Tikehau Atoll, Tuamotu Arch., French Polynesia, coll. G. Paulay, 10 July 2001, station BTK-004, photo GP 896: 12–18, UF 1763; 5 ♂, SL = 2.15–2.55 mm, 1 juvenile, SL = 1.25 mm, 6–12 m, under rocks, outer reef slope, ca. 1 km south of north west point of atoll off Motu Maeherehona, Rangiroa Atoll, Tuamotu Arch., French Polynesia, 14°55.72'S, 147°51.47'W, coll. G. Paulay, 10 Nov. 2001, station BRNG-020, UF 1846.

Comparative material examined. — *Pylopaguroopsis lewinsohni*: paratype, 1 ♀, SL = 3.00 mm, 0–8 m, Saparua Is., Banda Isls., Indonesia, 29 Mar. 1975, Alpha Helix Expedition Sap. St. 1, AHF 754 (LACM); 1 ♀, SL = 2.35 mm, Niuafu'ou Is., Tonga Isls., Oceania, 1 Oct. 1930, coll. H. C. Kellers, JF 0653, USNM 1012620; 1 ♀, SL = 2.30 mm,

CSIRO St. Dm 6/192/63, 24°04'S, 112°52'E, 140 m, off Cape Cuvier, western Australia, Indian Ocean, 8 Oct. 1963, coll. G. J. Morgan, WAM C20229. *Pylopaguroopsis keijii*: paratype, 1 ♀, SL = 3.20 mm, GUM St. 119D, 13–17 m, Uruno Point, Guam, Mariana Isls., 13°37'N, 144°48'E, 4 May 1984, coll. V. Tyndzik, USNM 231415; 1 ♂, SL = 3.45 mm, 10 m, Tonbarazashi, Kumejima Is., Okinawa, 26°20'N, 126°50'E, 16 May 1997, coll. Shinji Ogawa, CBM-ZC 5646.

Description — Thirteen pairs of biserial phyllobranchiate gills: 2 arthrobranchiae on each third maxilliped and first through fourth pereopods plus single pleurobranchia on each pleural plate of fifth through seventh thoracic somites (= above second through fourth pereopods).

Shield (Fig. 1A) 1.1–1.2 times longer than broad; anterior margin between rostrum and lateral projections slightly concave; anterolateral margins sloping; lateral margins convex; posterior margin truncate; dorsal surface slightly convex, with scattered tufts of short setae. Rostrum well developed, elongate triangular, considerably exceeding lateral projections. Lateral projections obtusely triangular, each terminating in small spinule. Posterior carapace lateral lobes very small, well calcified, unarmed. Branchiostegites not calcified; anterior margins unarmed, produced, with fringe of setae.

Ocular peduncles (Fig. 1A) moderately long, 0.7–0.8 length of shield; slender, inflated basally; with row of short setae dorsally. Corneas slightly dilated. Ocular acicles (Fig. 1A) elongate triangular, simple, acute.

Antennular peduncles (Fig. 1A) moderately long, exceeding ocular peduncles by 0.2–0.3 length of ultimate segments, when fully extended; ultimate and penultimate segments unarmed; basal segment with acute spine laterally.

Antennal peduncles (Fig. 1A, B) moderately long, exceeding ocular peduncles by 0.1–0.3 length of fifth segments, when fully extended; fifth segment with tufts of setae

dorsally; fourth segment with few scattered setae; third segment with strong spine at ventrodistal margin; second segment with dorsolateral distal angle produced, terminating in strong spine, dorsomesial distal angle with acute spine; first segment with ventrodistal margin produced. Antennal articles moderately long, strongly arcuate, each terminating in blunt-tipped spine; dorsomesial margins with row of moderately long setae. Antennal flagella with 2–4 moderately long setae on every 2 or 3 articles, interspersed by short setae.

Third maxilliped with carpus and merus each bearing single, small blunt-tipped spine on dorsodistal margin; ischium (Fig. 1C) with well-developed crista dentata and strong accessory tooth; basis (Fig. 1C) with 1 or 2 small, acute corneous teeth.

Sternite of third maxillipeds (Fig. 1D) with median suture; unarmed, with several setae on either side of midline.

Right cheliped (Fig. 2) massive, sparsely setose; chela bent downward; similar in males and females. Dactyl terminating in small corneous claw (Fig. 2D); dorsal surface with scattered tufts of short setae, and only in large individual (SL = 3.00 mm), with scattered very tiny tubercles or spinules, dorsomesial margin with row of strong, tooth-like spines; cutting edge with variously-sized, blunt calcareous teeth and, on distal 0.2, several tiny corneous teeth. Fixed finger terminating in small, bifid, corneous claw (Fig. 2D); cutting edge with 2 very large teeth proximally and many tiny calcareous teeth on remainder of cutting edge. Dorsolateral margin of fixed finger and palm armed with row of strong, tooth-like spines. Palm 1.5–1.7 length of carpus; dorsal surface with scattered tubercles mesially and several small tubercles on lateral half; ventral surface tuberculate. Carpus 1.0–1.2 length of merus; dorsal surface with several spines on distal margin, scattered tubercles on lateral half, few spines on mesial half, and one strong spine at dorsomesial distal angle; ventral surface tuberculate. Merus with dorsal margin unarmed; ventral surface tubercu-

late, ventrolateral distal angle with strong spine, ventromesial margin with row of sharp spines. Ischium unarmed.

Left cheliped (Fig. 3A–C) slender; propodal-carpal articulation rotated counter-clockwise 60° from perpendicular when viewed dorsally. Dactyl 0.6–0.7 length of palm, terminating in strong corneous claw (Fig. 3B); dorsal and mesial surfaces unarmed, with scattered tufts of setae; distal half of cutting edge with row of small corneous teeth (Fig. 3A; not visible in Fig. 3B, as this figure showing ventral face of slightly lateral view). Fixed finger terminating in strong, bifid, corneous claw (Fig. 3B); overlapping terminal claw of dactyl; dorsal and lateral surfaces unarmed, with scattered tufts of setae; distal half of cutting edge with row of small corneous teeth. Palm 0.6–0.7 length of carpus; dorsal, mesial and lateral surfaces unarmed, with scattered setae. Carpus 1.1–1.2 length of merus; dorsal, mesial and lateral surfaces unarmed except for dorsodistal spine, with scattered tufts of setae. Merus with ventrolateral margin bearing strong subdistal spine and several tiny spines. Ischium unarmed.

Second pereopods (Fig. 3D, E) similar from left to right. Dactyls 1.0 (right) or 1.1 (left) length of propodi; each terminating in strong, elongate corneous claw; ventral margins each with row of 7 or 8 corneous spines; mesial faces moderately convex, each with 1 corneous spine dorsodistally or unarmed. Propodi 1.8 (left) or 1.9 (right) length of carpi; ventrodistal margins each with strong corneous spine. Carpi 0.6 length of meri; dorsodistal angles each with acute spine. Meri with ventrolateral margins each bearing sharp subdistal spine (Fig. 3D–a), ventral margins unarmed (Fig. 3D–b). Ischia unarmed.

Left third pereopod (Fig. 3F, G) generally similar to second pair but spination and proportions different. Dactyl 1.1 length of propodus; terminating in strong, elongate corneous claw; ventral margin with row of 7 or 8 corneous spines; mesial face convex, with dorsal row of 3–6 corneous spines and ventral row of 3–5 corneous spines.

Propodus 1.4 length of carpus; ventrodiscal margin unarmed. Carpus 0.8 length of merus; dorsodiscal angle with acute spine. Merus and ischium unarmed.

Right third pereopod (Fig. 4) dissimilar from left third. Dactyl broad, with distinct dorsolateral margin; lateral face with 1 or 2 rows of setae near dorsal margin, longitudinally concave dorsally and ventrally, with intervening ridge; mesial face strongly convex, with dorsal row of 6 or 7 and ventral row of 5 or 6 strong corneous spines; ventral margin with row of 10–12 strong corneous spines. Propodus broad, with distinct dorsolateral margin; lateral face with 1–3 irregular rows of setae near dorsal margin, longitudinally concave in upper third, with deep concavity in midline, and concave ventrally, producing 3 longitudinal sulci; ventral face with row of widely-spaced corneous spinules, ventrodiscal margin with single, elongate, corneous spine. Carpus, merus and ischium similar to those of left third.

Sternite of third pereopods (Fig. 1E) with anterior lobe subsemicircular.

Fourth pereopod (Fig. 1F, G) semi-chelate; dactyl moderately short, terminating in strong corneous claw, without preungual process, ventral margin with row of corneous spines; propodal rasp of single row of corneous scales; carpus with blunt-tipped dorsodiscal spine mesially.

Fifth pereopod chelate; dactyl and propodus with well-developed rasps.

Abdomen dextrally twisted. Female with paired first pleopods fringed with setae; left second to fourth each with exopod slightly longer than endopod, fringed with long, finely-plumose setae, endopod and protopod with few tufts of setae; left fifth with elongate endopod fringed with long, finely-plumose setae and short exopod with setae laterally. Male with left third to fifth pleopods, each with elongate endopod and short exopod fringed with setae.

Tergite of first abdominal somite small, chitinous, unarmed, fringed with setae dorsolaterally; second to fifth membranous; sixth well calcified, subrectangular,

unarmed, divided into anterior and posterior lobes by shallow transverse groove, short curved row of setae on each anterior lobe.

Uropods strongly asymmetrical, left distinctly larger than right; rasps of exopods and endopods well developed; protopods unarmed.

Telson (Fig. 1H) with lateral constriction; posterior lobes asymmetrical, left distinctly larger than right; partially calcified marginally; terminal margin of left rounded, right oblique, each with row of 10–13 (left) or 3–5 (right) spines.

Coloration (Fig. 5). — Shield mottled cream, white and light brown; rostrum cream. Antennules with ultimate segments and flagella purple, penultimate segments light purple. Antennas with flagella and fifth segments purple or deep magenta, fourth to first segments and acicles cream. Ocular peduncles purple or deep magenta, lighter proximally. Corneas silver. Ocular acicles white. Right cheliped generally fawn or yellow-orange, lighter distally. Chela, carpus and distal margin of propodus of left cheliped and dactyls, propodi, carpi and distal margins of meri of second and third pereopods purple or deep magenta. Fourth and fifth pereopods whitish.

Etymology. — This species is named for Dr. Rafael Lemaitre, USNM, who hosted the first author during his visit to USNM, supported by the Smithsonian visiting scientist program and in recognition of his dedication to the study of hermit crab taxonomy.

Affinities. — The possession of three longitudinal sulci on the lateral face of the propodus of the right third pereopod in the new species (Fig. 4) is shared by only one other known species of *Pylopaguroopsis*, *P. lewinsohni*. However, coloration is very different between the two species. In *P. lewinsohni*, the left cheliped, the ambulatory legs, and the carpus and merus of the right cheliped have distinct red and white stripes, all of which are lacking in the new species.

Morphologically, the new species is distinguished from *P. lewinsohni* by several characters, particularly, of both chelipeds,

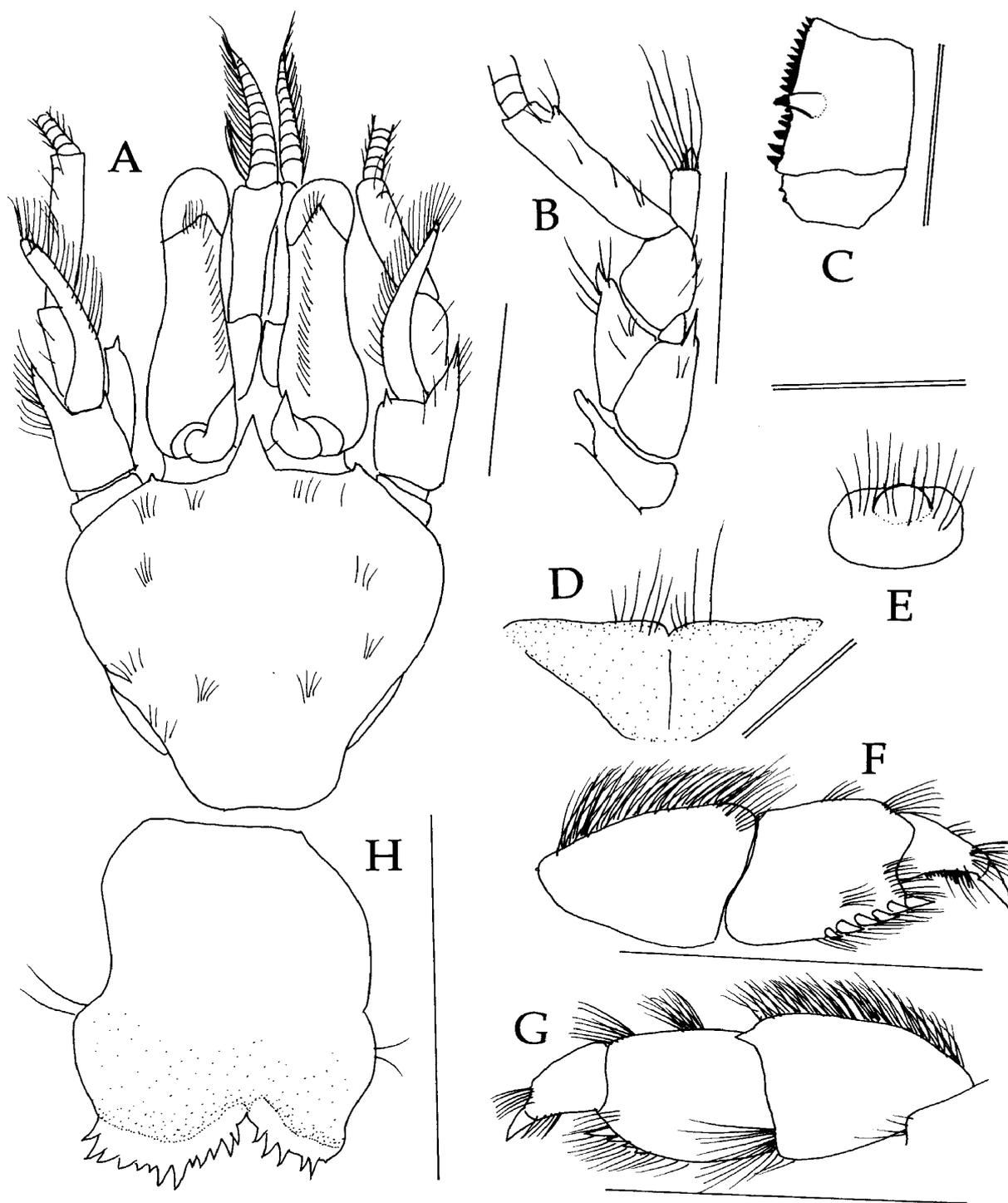


Fig. 1. *Pylopaguopsis lemaitrei*, new species: holotype, ♀, SL = 2.35 mm, Marquesas, French Polynesia, USNM 1015381. A, shield and cephalic appendages, dorsal; B, left antenna, lateral; C, ischium and basis of left third maxilliped, external; D, sternite of third maxilliped; E, anterior lobe of sternite of third pereopod; F, right fourth pereopod, lateral; G, same, mesial; H, telson, dorsal. Scales equal 1 mm for A–B and F–H and 0.5 mm for C–E.

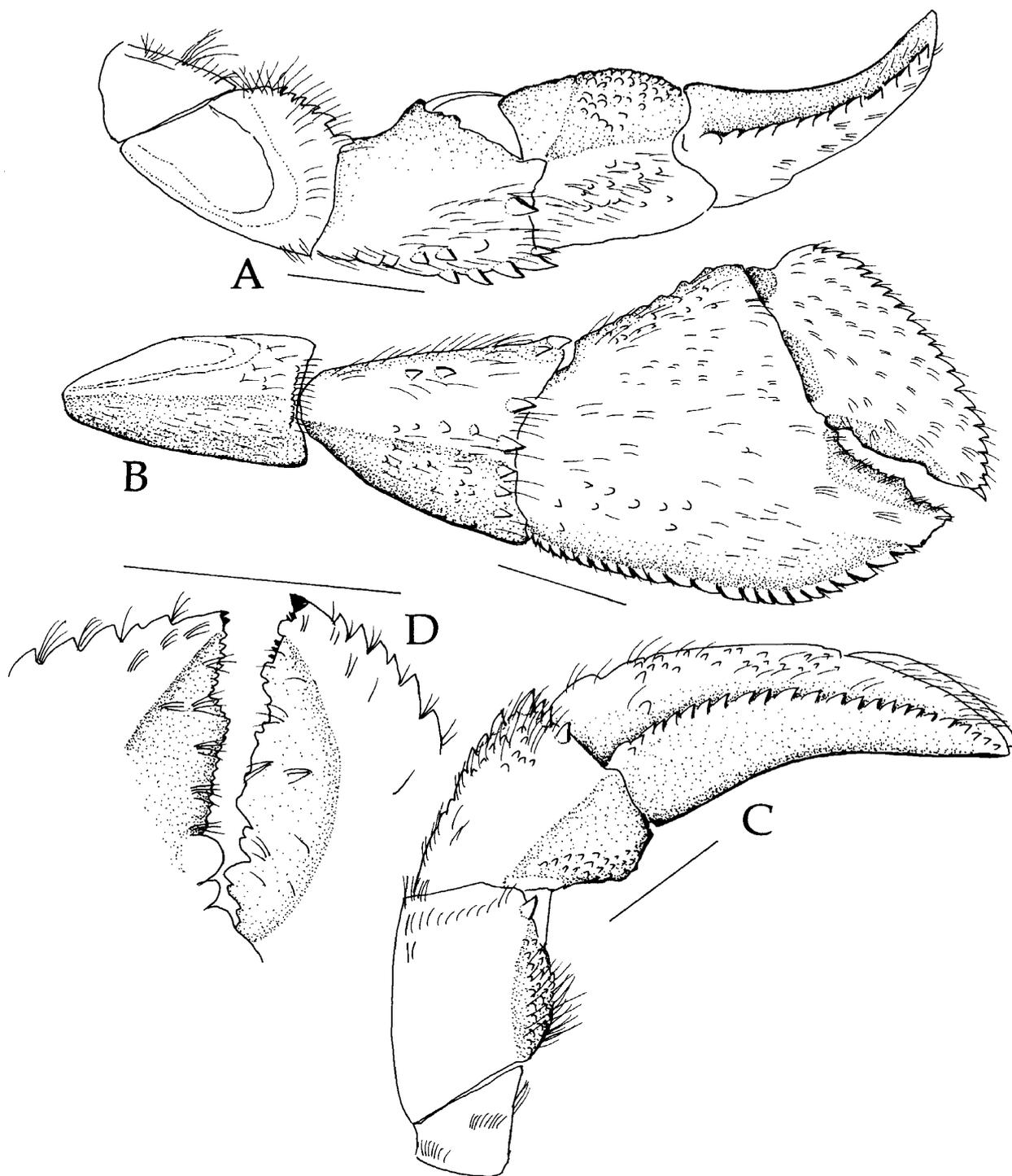


Fig. 2. *Pylopaguropsis lemaitrei*, new species: holotype, ♀, SL = 2.35 mm, Marquesas, French Polynesia, USNM 1015381. Right cheliped: A, mesial; B, dorsal; C, lateral; D, distal portions of dactyl and fixed finger, ventral. Scales equal 1 mm.

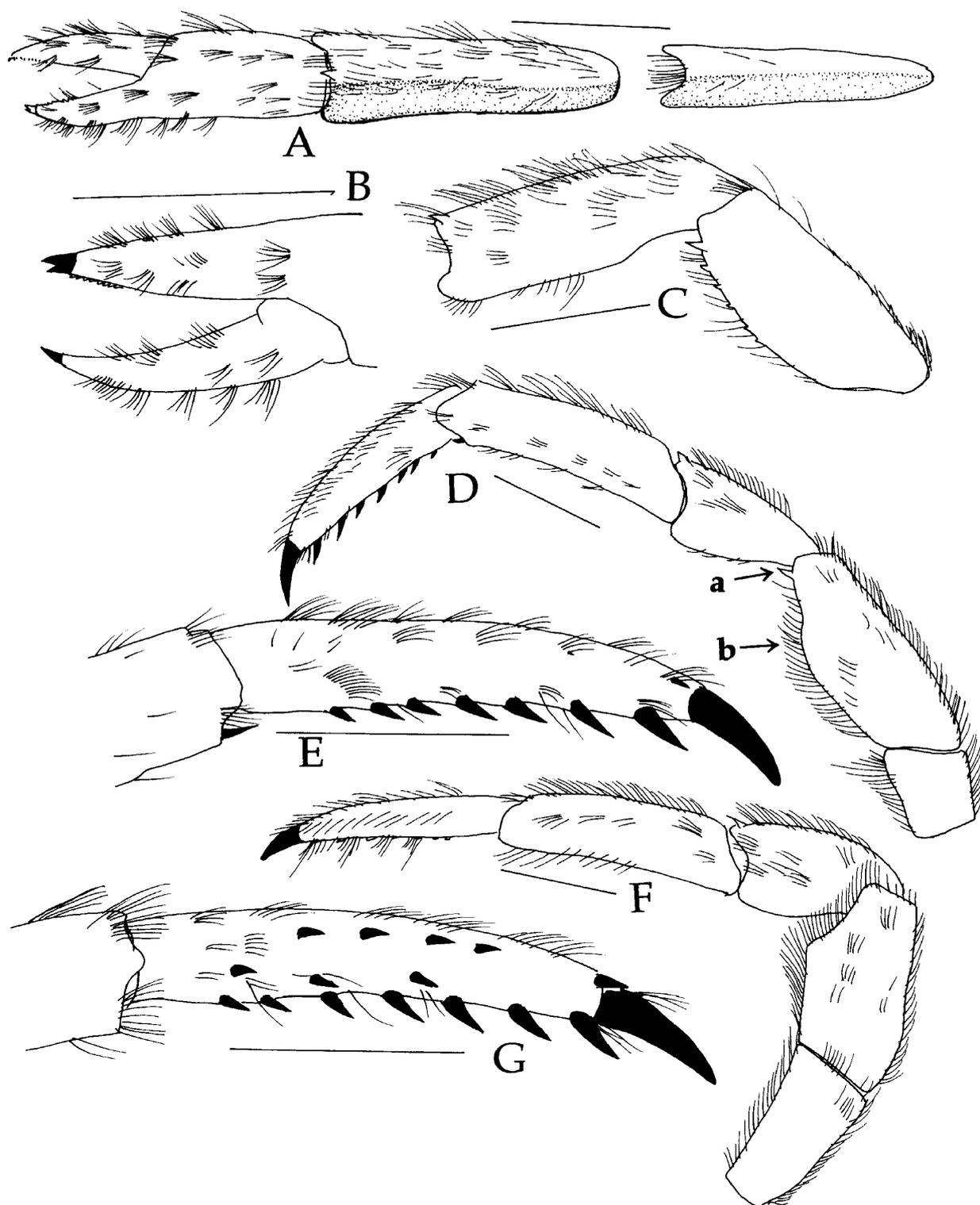


Fig. 3. *Pylopaguropsis lemaitrei*, new species: holotype, ♀, SL = 2.35 mm, Marquesas, French Polynesia, USNM 1015381. Left cheliped: A, dorsal; B, dactyl and fixed finger, ventral (slightly lateral view, emphasizing bifid condition of fixed finger claw); C, carpus and merus, lateral. Left second pereopod: D, lateral; E, dactyl and distal portion of propodus, mesial; arrows "a" and "b" indicate subdistal spine on ventrolateral margin and unarmed ventral margin, respectively, of merus. Left third pereopod: F, lateral; G, dactyl and distal portion of propodus, mesial. Scales equal 1 mm.

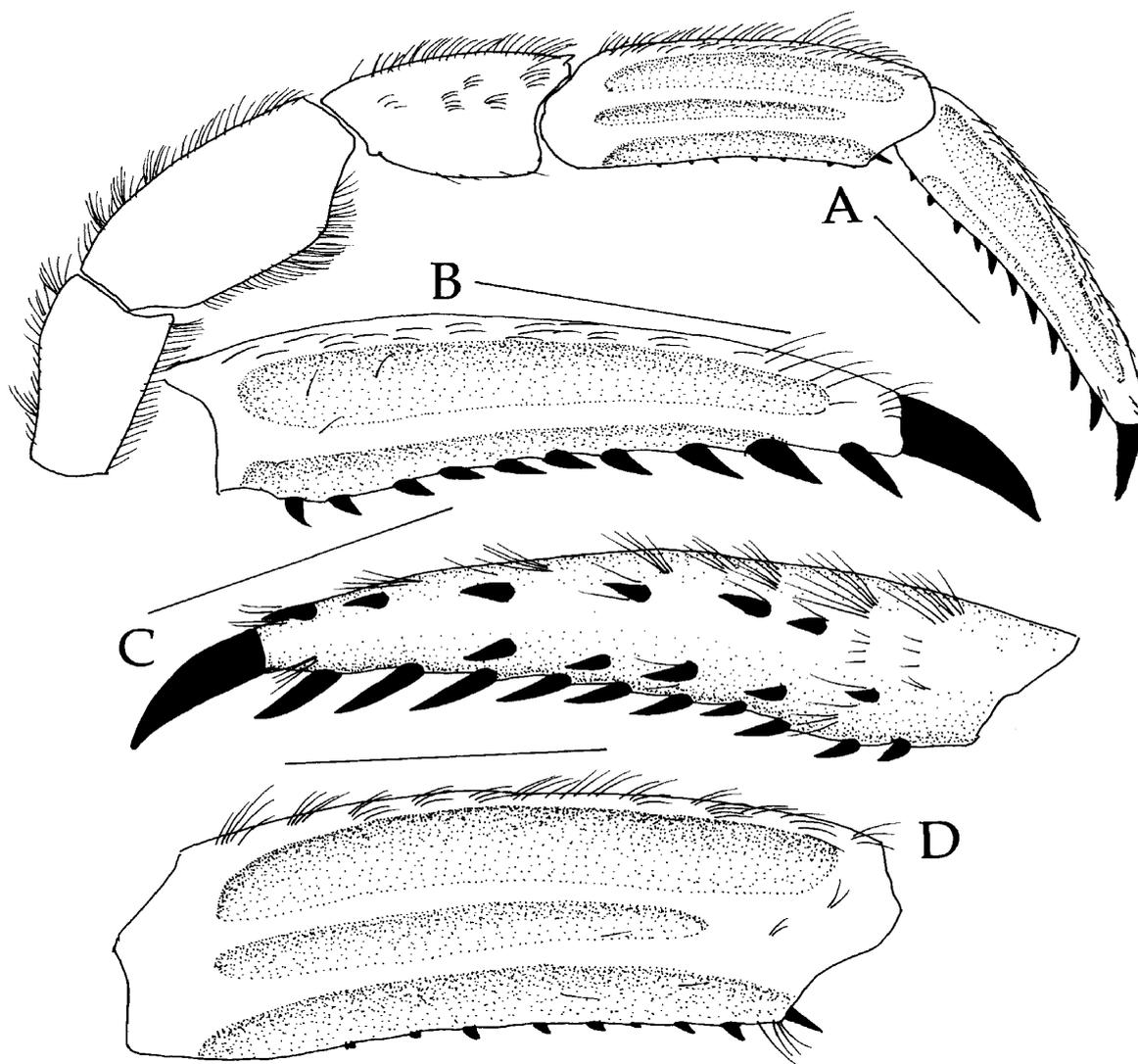


Fig. 4. *Pylopaguropsis lemaitrei*, new species: holotype, ♀, SL = 2.35 mm, Marquesas, French Polynesia, USNM 1015381. Right third pereopod: A, lateral; B, dactyl, lateral; C, same, mesial; D, propodus, lateral. Scales equal 1 mm.

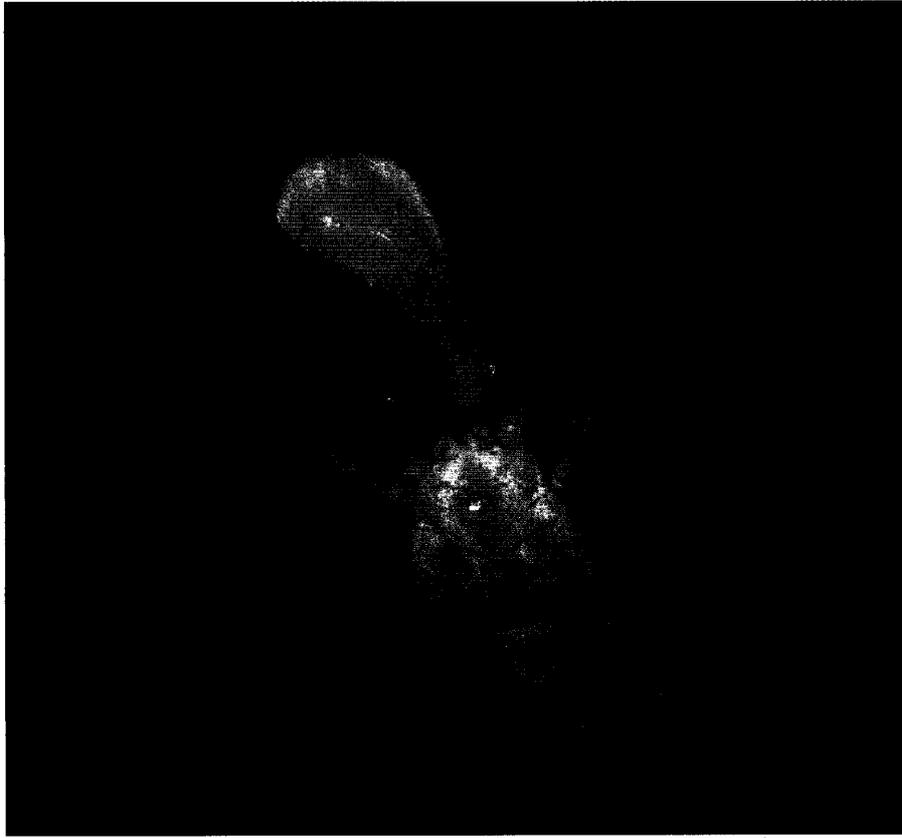


Fig. 5. *Pylopaguopsis lemaitrei*, new species: paratype, ♂, SL = 3.00 mm, Tikehau, Tuamotu, French Polynesia, UF 1763. Color in life, photo and copyright by G. Paulay.

ambulatory pereopods, and telson. In the new species, the dorsal face of the palm of the right cheliped is almost smooth, except for several small tubercles on the lateral half (Fig. 2B); the lateral faces of the carpus and merus are also nearly smooth except for several tubercles on the dorsolateral face of the carpus (Fig. 2C). However, in *P. lewinsohni*, the dorsal face of the palm of the right cheliped is armed with a mesial row of small, widely-spaced tubercles and two lateral rows of spines (see Fig. 7g in McLaughlin & Haig, 1989); the lateral faces of the carpus and merus are covered with granules or minutely spinulose (Fig. 6A).

In the left cheliped of the new species, the dorsal face of the carpus is unarmed except for one dorsodistal spine (Fig. 3A), and the ventrolateral margin of the merus is armed with only one large subdistal spine and several tiny spines (Fig. 3C). However,

in *P. lewinsohni*, the carpal dorsal face is armed with a row of sharp spines (Fig. 6B-a), and the ventrolateral margin of the merus is also armed with a row of well-developed spines (Fig. 6C-b).

In the new species, the ventrolateral margins of the meri of the second pereopods are each armed with a sharp subdistal spine (Fig. 3D-a), and the ventral margins are unarmed (Fig. 3D-b). In contrast, the ventrolateral margins of the same surfaces in *P. lewinsohni* are without a subdistal spine (Fig. 7A-a), and the ventral margins each is armed with 1-3 sharp spines (Fig. 7A-b). When the specimens are directly compared, it is clear that the ambulatory pereopod dactyls are generally stouter and shorter in the new species (Fig. 3D for second and Fig. 3F, 4A for third pereopods) than in *P. lewinsohni* (Fig. 7A, B for second and Fig. 7C-E for third).

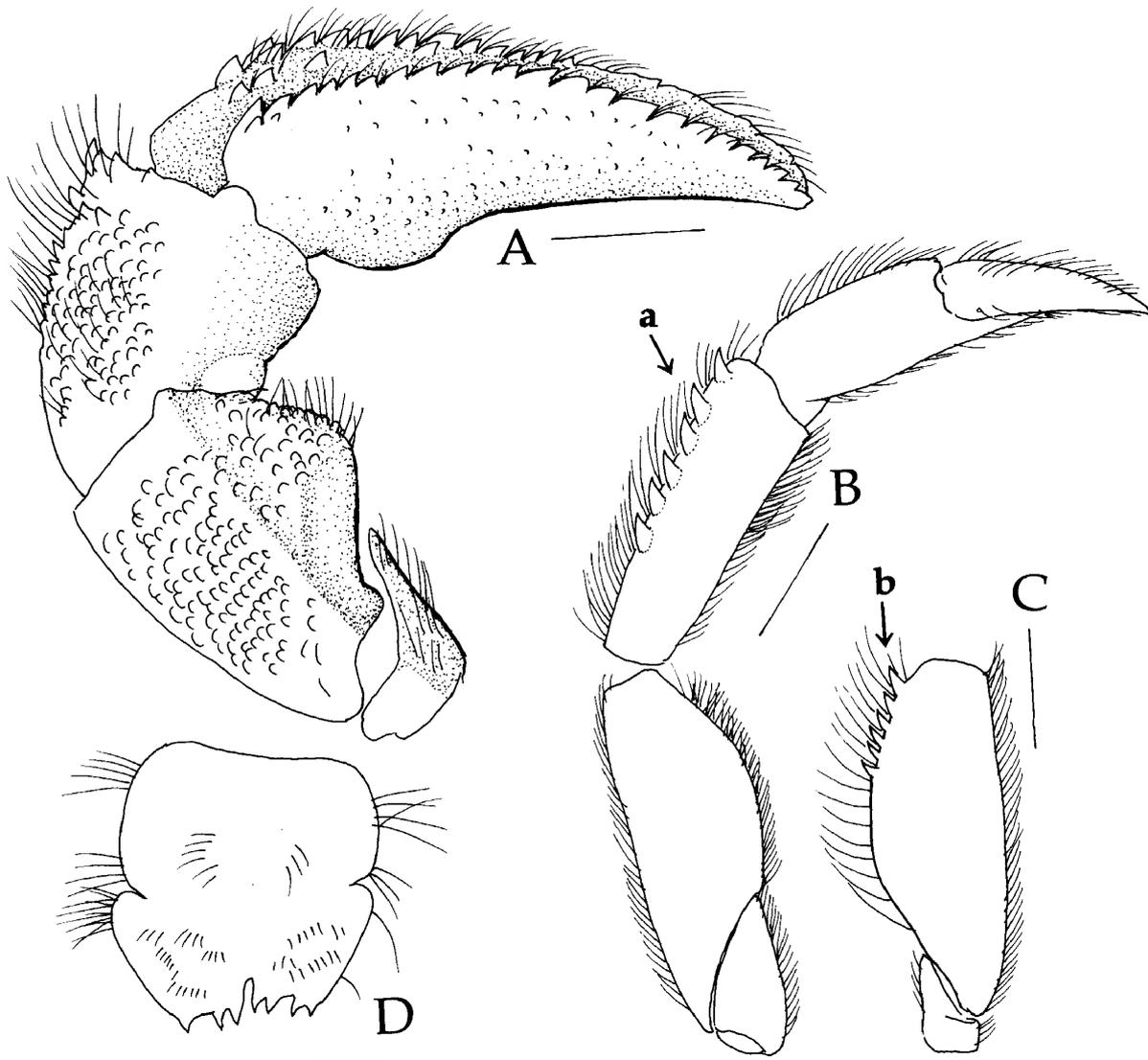


Fig. 6. *Pylopaguropsis lewinsohni* McLaughlin and Haig, 1989: A, D, paratype, ♀, SL = 3.00 mm, Indonesia, AHF 754; B, C, ♀, SL = 2.35 mm, Tonga Isls., Oceania, USNM 1012620. A, right cheliped, lateral. Left cheliped: B, mesial (slightly dorsal view); C, merus and ischium, lateral; arrows "a" and "b" indicate row of sharp spines on carpal dorsal face and row of well-developed spines on ventrolateral margin of merus, respectively. D, telson, dorsal. Scales equal 1 mm.

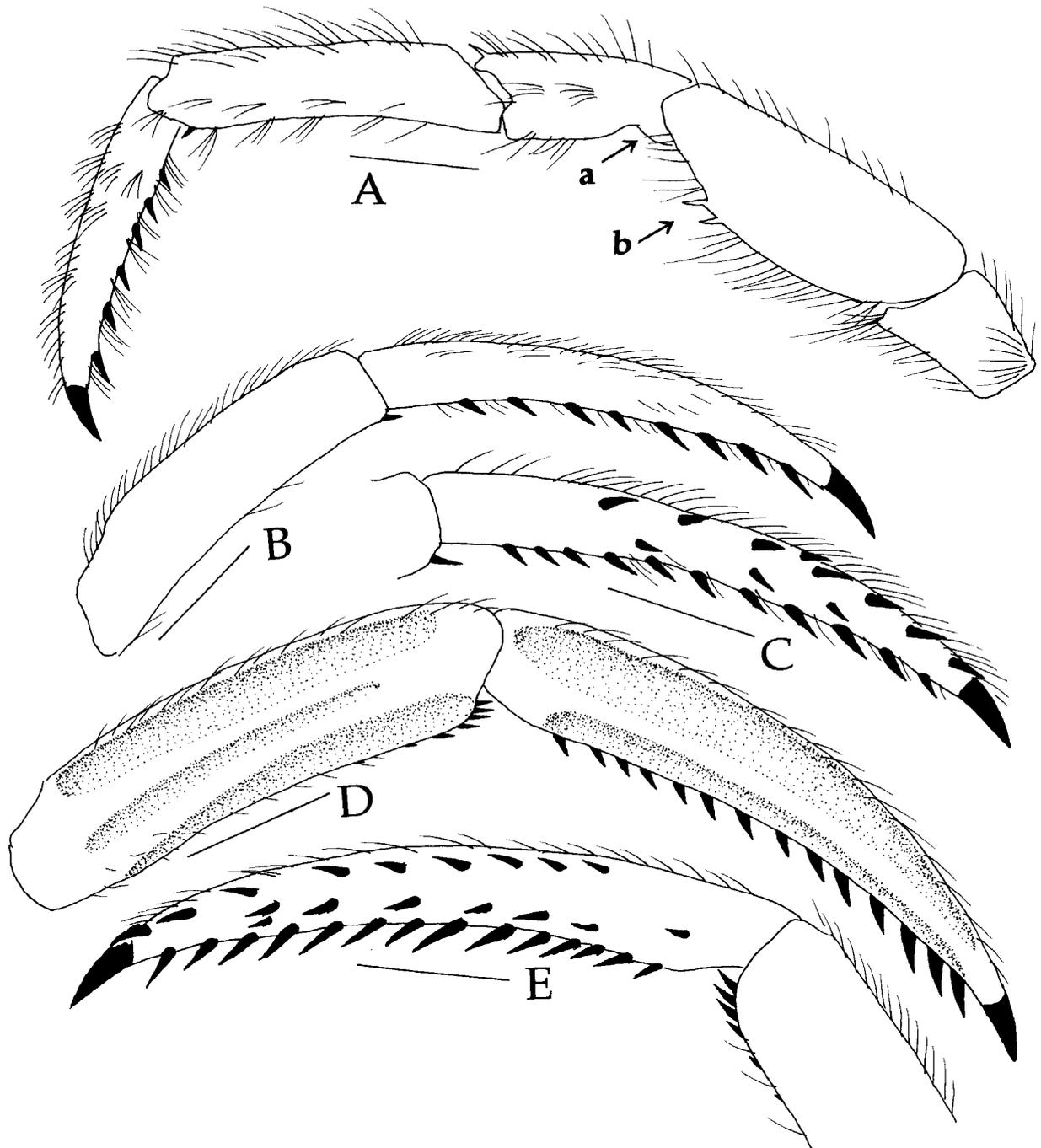


Fig. 7. *Pylopaguopsis lewinsohni* McLaughlin and Haig, 1989: A, paratype, ♀, SL = 3.00 mm, Indonesia, AHF 754; B-E, ♀, SL = 2.35 mm, Tonga Isls., Oceania, USNM 1012620. Second left pereopod: A, lateral; B, dactyl and propodus, mesial; arrows "a" and "b" indicate unarmed ventrolateral margin and spines on ventral margin, respectively, of merus. C, left third pereopod, dactyl and distal portion of propodus, mesial; D, right third pereopod, dactyl and propodus, lateral; E, same, dactyl and distal portion of propodus, mesial. Scales equal 1 mm.

Although the left posterior lobe of the telson is armed with 10–13 small spines in the new species (Fig. 1H), it is armed with 4–6 larger spines in *P. lewinsohni* (Fig. 6D, see also Fig. 13f in McLaughlin & Haig, 1989).

In its color pattern and morphology, the new species is also quite similar to *Pylopaguroopsis keijii*. The two species both have purple or deep magenta left chelipeds and ambulatory pereopods. However, in *P. keijii*, the ocular and antennal acicles have distinct longitudinal stripes (see Fig. 6A in Asakura, 2000), which are lacking in the new species (Fig. 5), although they both have a purple to deep magenta color. Further, the right cheliped of the new species is fawn-colored, but the right cheliped is purple to deep magenta color in *P. keijii*.

These two species are separated by the morphology of the right third pereopod. In *P. keijii*, the propodal lateral face has only single longitudinal sulcus (see Fig. 3d in McLaughlin & Haig, 1989 and Fig. 7F in Asakura, 2000).

Distribution. — Currently known only from the Marquesas and Tuamotu archipelagoes of French Polynesia.

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