

A new species of the hermit crab genus *Michelopagurus* McLaughlin, 1997 (Crustacea: Decapoda: Paguridae) from Moorea, French Polynesia

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ABSTRACT

A new species of the family Paguridae Latreille, 1802, *Michelopagurus tangaloo* n. sp., is described from deep waters (485-1145 m) off the coast of Moorea, French Polynesia, South Pacific. This new species is the fifth known in the genus *Michelopagurus* McLaughlin, 1997, and the third from the Indo-West Pacific; the other two species are distributed in the Atlantic Ocean. All five species are rarely collected and most are known from a few type specimens. The new species most closely resembles its Indonesian congener *M. chacei* McLaughlin, 1997 but can be differentiated by having an acutely triangular rostrum terminating in a small spine, instead of the broadly rounded, terminally unarmed rostrum in *M. chacei*. Other subtle differences are: corneas reduced, not dilated or wider than distal width of peduncle in *M. tangaloo* n. sp., whereas corneas are weakly dilated and wider than distal width of peduncle in *M. chacei*; right cheliped dorsal surface of palm lacking spines, and carpi at most with weak dorsomesial distal row of small blunt spines in *M. tangaloo* n. sp., whereas the dorsal surface of the palm has a row of distinct spines, and carpus with dorsolateral and dorsomesial rows of distinct spines in *M. chacei*. A key to assist in the identification of all species of the genus is provided.

KEY WORDS

Crustacea,
Decapoda
Paguridae,
Michelopagurus,
hermit crab,
Moorea,
French Polynesia,
new species.

RÉSUMÉ

Une nouvelle espèce de Bernard l'hermite du genre Michelopagurus McLaughlin, 1997 (Crustacea: Decapoda: Paguridae) originaire de Moorea, Polynésie française.

Une nouvelle espèce de la famille des Paguridae Latreille, 1802, *Michelopagurus tangaloo* n. sp. est décrite des eaux profondes (485-1145 m) au large de Moorea, Polynésie française, Pacifique Sud. Cette nouvelle espèce est la cinquième espèce connue du genre *Michelopagurus* McLaughlin, 1997, et la troisième de l'Indo-Ouest Pacifique; les deux autres espèces sont originaires de l'Atlantique. Ces cinq espèces sont rarement collectées et la plupart ne sont connues que par quelques spécimens types. La nouvelle espèce ressemble fortement à *M. chacei* McLaughlin, 1997, d'Indonésie. Elle s'en distingue par un rostre triangulaire pointu, se terminant en spinule, alors que chez *M. chacei* le rostre est largement arrondi, non épineux à son extrémité. Les autres différences, plus ténues, sont : des cornées réduites, non dilatées et pas plus larges que le cinquième de la largeur distale du pédoncule chez *M. tangaloo* n. sp., alors que les cornées sont légèrement dilatées et plus larges que le pédoncule de la base chez *M. chacei*; la face dorsale de la paume du chélopède droit sans épines avec le carpe ayant tout au plus une faible rangée dorsomésiale de petites épines émoussées alors que, chez *M. chacei*, la face dorsale de la paume a une rangée d'épines marquées et le carpe présente des rangées dorsolatérales et dorsomésiales d'épines marquées. Une clé du genre est proposée pour faciliter l'identification de toutes les espèces du genre.

MOTS CLÉS

Crustacea,
Decapoda,
Paguridae,
Michelopagurus,
bernard l'hermite,
Moorea,
Polynésie française,
espèce nouvelle.

INTRODUCTION

The genus *Michelopagurus* McLaughlin, 1997 was defined by McLaughlin (1997) to accommodate four rare deep-water pagurid species, one of which she described from Indonesia, *M. chacei* McLaughlin, 1997, and three others previously in the genus *Pagurodes* Henderson, 1988, *M. limatulus* (Henderson, 1888), *M. atlanticus* (Bouvier, 1922), and *M. richardi* (Bouvier, 1922). Two of these are distributed in the Indo-West Pacific, *M. limatulus* known from the Philippine Islands, Taiwan, New Caledonia, French Polynesia and possibly the south coast of India off Travancore, at depths of 209 to 1414 m, and *M. chacei* from the Kai Islands, Indonesia, at depths of 264 to 425 m (McLaughlin 1997, 2007; McLaughlin *et al.* 2007; Legall & Poupin 2015). The other two species are distributed in the Atlantic, *M. richardi* known only from the northeastern Atlantic off the coast of Morocco, at a depth of 2165 m, whereas *M. atlanticus* is Amphi-Atlantic, found in the eastern Atlantic in the Azores, and in the western Atlantic, off Espirito Santo, Brazil, in depths of 790 to 1575 m (Ingle 1993, as *Pagurodes*, Lemaitre & Tavares in press). Seventy-four specimens are known of *M. limatulus*, the type species of the genus; however, all other species of *Michelopagurus* are known based on few (1–4) type specimens collected at a single locality, or as in the case of *M. atlanticus*, from only two additional specimens recently collected off Brazil (Lemaitre & Tavares in press). Only scant biology information is known on species of this genus, some of which have been found using scaphopod tubes as housing.

Species of *Michelopagurus* are characterized primarily by having 11 pairs of quadriserial gills, third maxilliped cristadentata with single accessory tooth, subequal chelipeds (length), fourth pereopod with one row (at least distally) of scales on propodal rasp, males with short sexual tube on one or both coxae of fifth pereopods, females with paired first pleopods modified as gonopods, and telson terminal margins rounded (McLaughlin 2003). Although similar in most diagnostic features to species of *Pagurodes*, at least females of species of *Michelopagurus* can be immediately differentiated by the presence of paired first gonopods which are absent in females of the only species of *Pagurodes*, *P. inarmatus* Henderson, 1888.

During benthic explorations of the fauna from the Tarava Seamounts and other deep water mountain chains of the Society Islands, French Polynesia, conducted by the Muséum national d'Histoire naturelle, Paris (MNHN) and Institut de Recherche pour le Développement (IRD) (for expedition background see Rabiller & Richard 2014), four specimens of an undescribed species of *Michelopagurus* were collected off Moorea. This new species, the fifth in the genus, is herein described and fully illustrated. Fortunately, all previously known species of *Michelopagurus* have been described and illustrated in detail by modern standards, the Atlantic species by Ingle (1993, as *Pagurodes*) and Lemaitre & Tavares (in press), and the Indo-Pacific species by McLaughlin (1997), so that comparisons and identifications are facilitated when using the key herein provided to all five known species.

MATERIAL AND METHODS

All specimens were collected on board the R/V *Alis* during the second leg of the TARASOC expedition conducted by MNHN and IRD to the Tarava Seamounts and Society Islands chain in French Polynesia. The acronym TARASOC is a combination of letters from the names of the seamounts and islands explored. The holotype is deposited in MNHN, with paratypes at Florida Museum of Natural History, University of Florida, Gainesville, USA (UF), and National Museum of Natural History, Smithsonian Institution, Washington DC, USA (USNM). General morphological terminology follows that of McLaughlin (2003) and Tudge *et al.* (2012). The measurement indicated for the specimens refers to shield length, measured from the midpoint of the rostral lobe to the midpoint of the posterior margin of the shield.

ABBREVIATIONS

DW	Warén dredge;
ov	ovigerous female;
sta	station.

SYSTEMATICS

Family PAGURIDAE Latreille, 1802
Genus *Michelopagurus* McLaughlin, 1997

Michelopagurus tangaloo n. sp.
(Figs 1–4)

TYPE MATERIAL. — **Holotype**: Moorea, French Polynesia, ♂ 2.7 mm, sta DW3461, 17°27'S, 149°49'W, 844–877 m, 19.X.2009 (MNHN IU-2013-5647 ex UF23537).

Paratypes: Moorea, French Polynesia, sta DW3459, 17°28'S, 149°48'W, 485–560 m, 19.X.2009: 1 ♂ 2.5 mm, in scaphopod shell (UF23534); sta DW3460, 17°28'S, 149°50'W, 660–680 m, 19.X.2009: 1 ♀ 3.1 mm (USNM 1253315 ex UF 23526); sta DW3462, 17°27'S, 149°50'W, 1000–1145 m, 19.X.2009: 1 ov ♀ 2.1 mm, in scaphopod shell (UF23504).

ETYMOLOGY. — The specific name is given using one of the names of the Polynesian creator-god or god of the sea, who made himself a wife by carving her from stone, and after throwing the spare fragments of stone into the primordial ocean, these became the islands of the Pacific.

DISTRIBUTION. — So far known only from the South Pacific, in Moorea, Society Islands, in French Polynesia; depth: 485–1145 m.

DESCRIPTION

Shield (Fig. 1A)

About as broad as long; anterolateral margins sloping; posterior margin truncate; dorsal surface smooth and glabrous, or with scattered short tufts of setae, weakly calcified medially. Rostrum acutely triangular, reaching slightly beyond tip of lateral projections, with small terminal spine. Lateral projections triangular, terminating sharply or bluntly. Posterior carapace with lateral lobes slender, fused to shield.

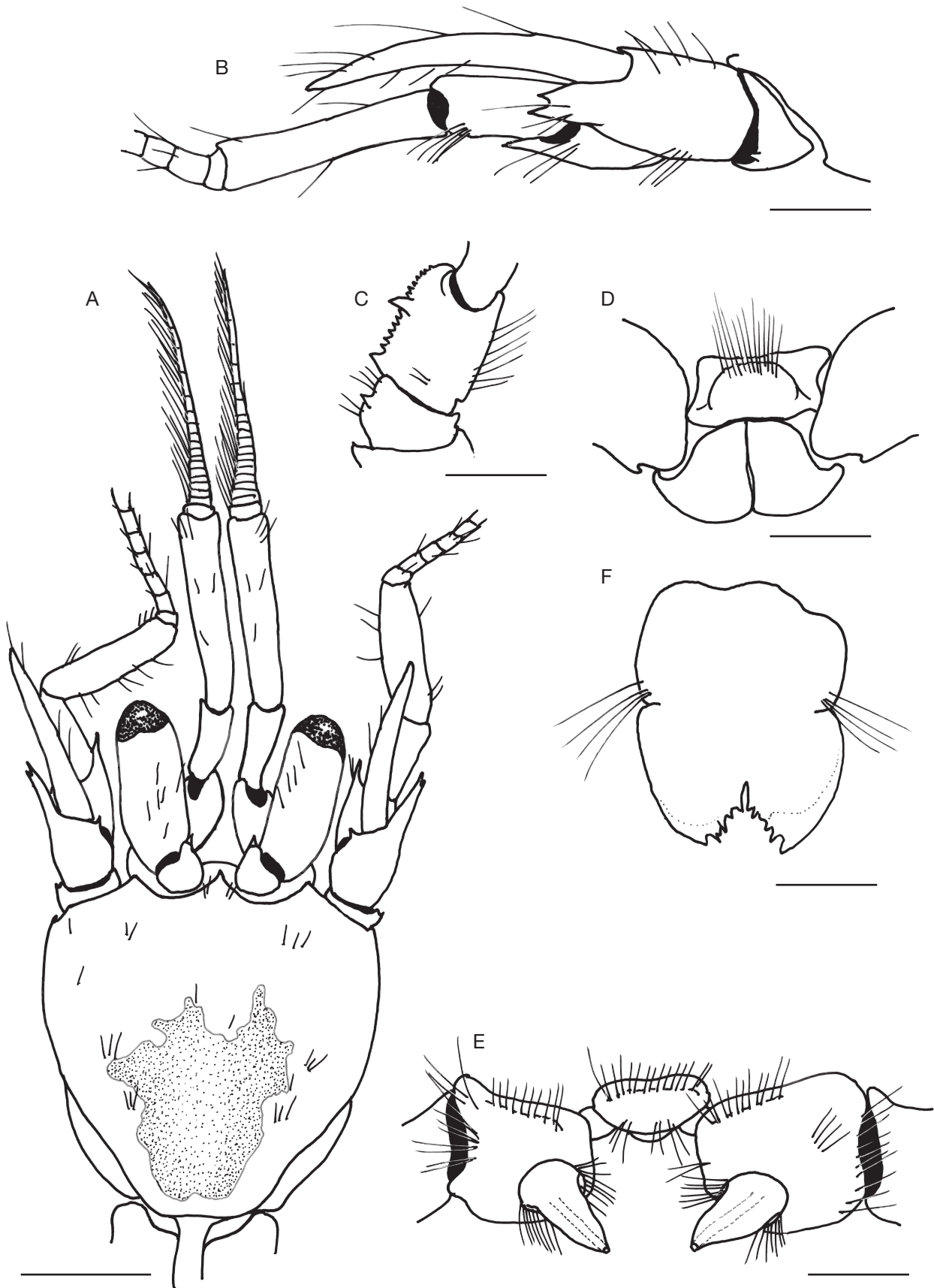


FIG. 1. — *Michelopagurus tangaloa* n. sp., holotype ♂ 2.7 mm, Moorea, French Polynesia (MNHN IU-2013-5647 ex UF23537): **A**, shield and cephalic appendages, dorsal view; **B**, left antennal peduncle, lateral view; **C**, basis and ischium with crista dentata of left third maxilliped, inner view; **D**, sternite XII (of third pereopods), ventral view; **E**, sternite XIV and coxae of fifth pereopods with sexual tubes, ventral view; **F**, telson, dorsal view. Scale bars: A, 1 mm; B-F, 0.5 mm.

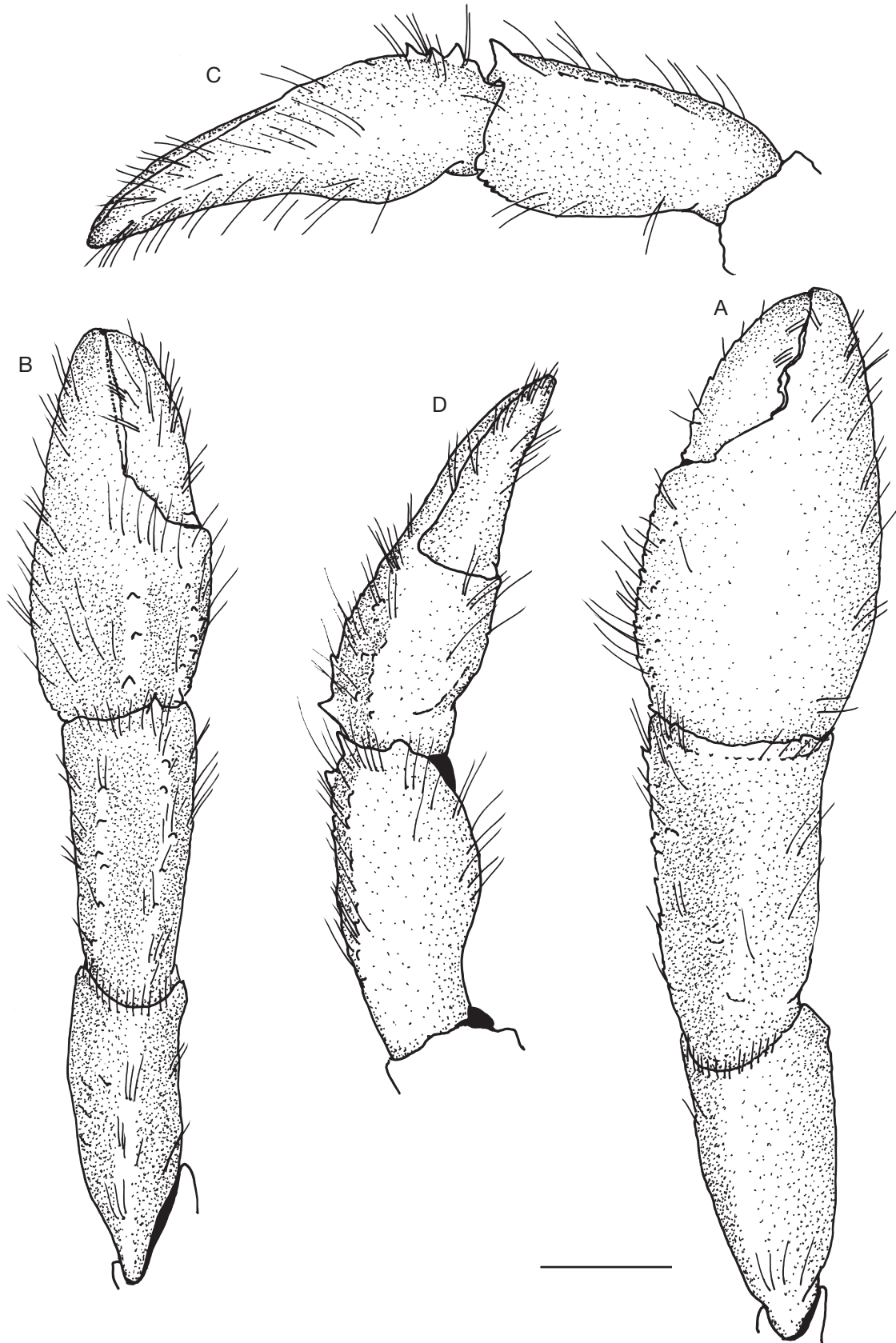


FIG. 2. — *Michelopagurus tangaloo* n. sp., holotype ♂ 2.7 mm, Moorea, French Polynesia (MNHN IU-2013-5647 ex UF23537), chelipeds: **A**, right, dorsal view; **B**, left, dorsal view; **C**, **D**, carpus and chela of same in lateral (**C**) and mesial (**D**) views. Scale bar: 1 mm.

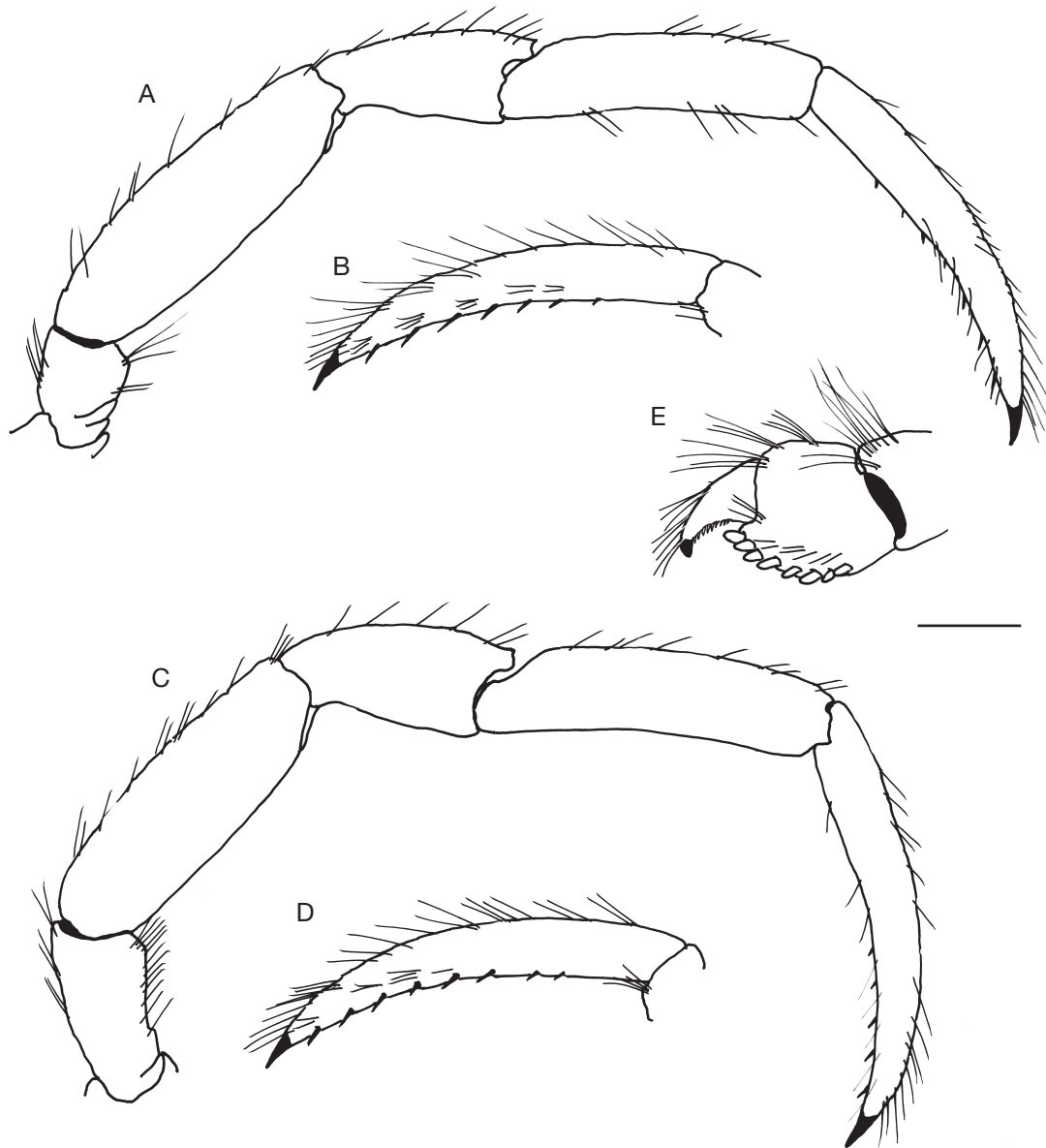


FIG. 3. — *Michelopagurus tangaloa* n. sp., holotype ♂ 2.7 mm, Moorea, French Polynesia (MNHN IU-2013-5647 ex UF23537): **A**, right second pereopod, lateral view; **B**, dactyl of same, mesial view; **C**, right third pereopod, lateral view; **D**, dactyl of same, mesial view; **E**, propodus and dactyl of left fourth pereopod, lateral view. Scale bars: A-D, 1 mm; E, 0.5 mm.

Ocular peduncles

Short and stout, less than half (including corneas) length of shield, dorsal surface with scattered short tufts of setae; corneas not dilated, as wide as distal width of ocular peduncle. Ocular acicles triangular, terminating bluntly and with strong submarginal spine; separated basally by about 0.8 basal width of 1 acicle.

Antennular peduncles

Overreaching ocular peduncles (including corneas) by full length of ultimate peduncular segment. Ultimate segment with tufts of short setae dorsodistally and scattered setae elsewhere. Penultimate segment glabrous. Basal segment with acute spine on dorsolateral margin. Flagellum long,

about as long as combined length of ultimate and penultimate peduncular segments; ventral flagellum usually with seven articles.

Antennal peduncle (Fig. 1B)

Overreaching ocular peduncles (including corneas) by full length of fifth peduncular segment. Fifth and fourth segments with scattered short setae. Third segment with strong spine at ventrodistal margin. Second segment with dorsolateral distal angle produced, terminating in strong bifid spine minutely serrated dorsally; dorsomesial distal angle with small sharp spine. First segment with small spine on laterodistal margin and one on ventrodistal margin. Antennal acicle long, weakly curved outward and reaching to distal half of fifth peduncular

KEY TO SPECIES OF *MICHELOPAGURUS* McLAUGHLIN, 1997

1. Rostrum acutely triangular, terminating in small spine
 *M. tangaloa* n. sp. (South Pacific: French Polynesia; 485-1145 m)
 — Rostrum broadly rounded, terminally unarmed 2
2. Palm of right cheliped armed on dorsomesial margin with row of distinct spines 3
 — Palm of right cheliped unarmed or at most with small tubercles on dorsomesial margin 4
3. Dactyls of second and third pereopods each with ventromesial row of 11-19 corneous spines; meri of second pereopods with ventral row of spinules or tubercles *M. limatulus* (Henderson, 1888) (Indo-West Pacific: Taiwan, Philippines, Indonesia, New Caledonia, French Polynesia, possibly India; 209-1414 m)
 — Dactyls of second and third pereopods each with ventromesial row of 9-11 corneous spines; meri of second pereopod with one or two distal spinules on ventral margin
 *M. chacei* McLaughlin, 1997 (Indo-West Pacific: Indonesia; 264-425 m)
4. Palm of right cheliped with dorsal surface armed with distinct median row of small tubercles; ocular acicle terminating in small bifid spine; shield anterolateral margin rounded
 *M. richardi* (Bouvier, 1922) (northeastern Atlantic: Morocco, Mogador; 2165 m)
 — Palm of right cheliped with dorsal surface with small tubercles not arranged in rows; ocular acicles terminating bluntly, each with strong submarginal spine; shield anterolateral margins angular
 *M. atlanticus* (Bouvier, 1922) (northeastern Atlantic: Azores; 1250 m)

segment; terminating in acute spine with tufts of setae; mesial margin with few setae. Flagellum long, exceeding right cheliped, with short setae 0.5 to 1 × as long as one flagellar article. Mouthparts as described for other congeners (see Ingle 1993, as *Pagurodes*, McLaughlin 1997). Third maxilliped (Fig. 1C) with crista dentata having about 16 small teeth; basis with spine on mesial surface.

Chelipeds subequal

Right only slightly longer and stouter. Right cheliped (Fig. 2A) elongate, moderately slender; chela unarmed except for scattered short setae on surfaces. Dactyl about 0.8 × as long as palm (measured on mesial margin); dorsomesial margin rounded. Cutting edges of dactyl and fixed finger similarly armed, each with two widely spaced calcareous teeth, and with terminal corneous claw. Palm slightly compressed dorsoventrally, about 0.8 × as long as carpus; dorsal surface smooth or with minute tubercles mostly visible dorsomesially; lateral and dorsomesial margins rounded. Carpus with dorsomesial distal row of small blunt spines and some setae; remaining surfaces both dorsally and ventrally unarmed, smooth or with minute tubercles and scattered short setae. Merus smooth, unarmed except for scattered short setae. Ischium unarmed.

Left cheliped (Fig. 2B-D)

Only slightly shorter than right. Dactyl and fixed finger with surfaces unarmed except for scattered tufts of short setae. Dactyl about 1.1 × as long as palm (measured along mesial margin); cutting edge with distal row of minute, fused corneous spinules, terminating in corneous claw. Fixed finger with cutting edge armed with row of 2-4 well spaced, weak calcareous teeth. Palm with scattered short setae on all surfaces; dorsal surface elevated along midline and with median row of three sharp or blunt spines diminishing in size distally, and dorsomesial irregular row of small tubercles; mesial and

lateral margins rounded. Carpus about 0.7 × as long as chela, with scattered setae on all surfaces, armed with dorsolateral and dorsomesial rows of small tubercles or spines. Merus with short tufts of setae on dorsal margin, and ventromesial row of weak to moderately strong spines. Ischium unarmed.

Second and third pereopods or ambulatory legs (Fig. 3A-D)

Similar from left to right; moderately long and slender, overreaching outstretched chelipeds by about 0.3-0.5 length of dactyls. Dactyls broadly curved, about 0.8-1.1 as long as propodi; dorsal and dorsomesial margins with row of stiff setae; ventromesial margin with row of 6-8 corneous spines. Propodi unarmed except for dorsal row of setae. Carpi each with small blunt or sharp dorsodistal spine, and dorsal row of setae. Meri each with dorsal row of setae. Ischia unarmed except each with dorsal and ventral rows of setae. Anterior lobe of sternite XII (of third pereopods; Fig. 1D) subovate, with long terminal setae.

Fourth pereopod (Fig. 3E) semichelate

Propodus broad, rasp consisting of 1 row of corneous scales longer than broad.

Fifth pereopod chelate

Propodal rasp occupying about anterior half of lateral surface. Coxae subequal. Coxae of males with sexual tubes (Fig. 1E) subequal in size and shape, semitransparent; margins of gonopores with long setae on lateral and mesial sides.

Uropods

Weakly to strongly asymmetrical, left largest. Telson (Fig. 1F) nearly symmetrical, with distinct transverse suture; posterior lobes subcircular or subtriangular, separated by deep median cleft; terminal margins oblique, armed with 4-6 sharp or blunt, irregularly sized, sharp or blunt spines with or without interspersed small spines.

Ovigerous females

With few eggs (12 eggs in only ovigerous known) ranging in diameter 0.75–0.97 mm.

Colour (Fig. 4)

Freshly caught specimens have an overall more or less uniform light orange color on the cephalothorax and thoracic appendages, with the color lighter on shield. Chelipeds and ambulatory legs light orange fading on dorsal surface of meri, and distal portions of carpi, propodi or palm, and dactyls.

HABITAT

Two of the known four specimens were found living in scaphopod tube shells, the other two specimens were found in gastropod shells.

REMARKS

Among the species of *Michelopagurus*, this new species is morphologically most similar to *M. chacei*, a species as previously mentioned, from Indonesia. The new species can be readily separated from *M. chacei* and all other congeners primarily by the shape of the rostrum (Fig. 1A), which is acutely triangular and terminates in a small spine in *M. tangaloo* n. sp., whereas the rostrum is broadly rounded and terminally unarmed in all others. This new species differs also from *M. chacei* in several other subtle characters. The corneas are reduced, not dilated or any wider than the distal width of the peduncle in *M. tangaloo* n. sp. (Fig. 1A), whereas the corneas are weakly dilated and wider than the distal width of the peduncle in *M. chacei*. On the right cheliped, the dorsal surface of the palm lacks spines, and the carpi has at most a weak dorsomesial distal row of small blunt spines in *M. tangaloo* n. sp. (Fig. 2A); whereas the dorsal surface of the palm has a row of distinct spines, and the carpus has dorsolateral and dorsomesial rows of distinct spines in *M. chacei*.

The degree of asymmetry of the uropods is variable even in the few known specimens of *Michelopagurus tangaloo* n. sp. The uropods are nearly symmetrical in two specimens (UF 23504, UF 23534) found living in scaphopod tubes, whereas they are strongly asymmetrical in the other two specimens found living in gastropod shells. It thus appears that the type of housing used by this new hermit crab species may influence the symmetry of the uropods.

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FIG. 4. — *Michelopagurus tangaloo* n. sp., 1 ♀ 3.1 mm, Moorea, French Polynesia (USNM 1253315 ex UF 23526), freshly collected specimen removed from housing, dorsal view.

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