The genus *Paguristes* (Crustacea, Decapoda, Diogenidae) from Indonesia

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ABSTRACT

Seven species of *Paguristes* were collected in Indonesian waters during the expeditions of the *Siboga* (1899), the Danish Expedition to the Kei Island (1922), Th. Mortensen's Expeditions (1899-1930), CORINDON (1980), *Snellius* II (1984) and KARUBAR (1991). Three species: *P. arostratus, P. brachyrostris* and *P. antennarius* were new to science. Three of four described species were previously unrecorded from Indonesia: *P. palythophilus* Ortmann, 1892, known only from the northwestern Pacific, was found to be common in Indonesian waters; *P. aciculus* Grant, 1905, previously known from Australia, was represented by two males and one intact female specimens, therefore female morphological characters could be completed; and *P. pusillus* Henderson, 1896 was found in deeper waters than previously reported. The fourth species was *P. puniceus* Henderson, 1896.

RÉSUMÉ

Le genre Paguristes (Decapoda, Anomura, Diogenidae) en Indonésie

Sept espèces de *Paguristes* ont été récoltées des eaux indonésiennes par les expéditions de la Siboga (1899), la Danish Expédition aux Îles Kei (1922), les expéditions de Th. Mortensen (1899-1930), les campagnes CORINDON (1980), Snellius II (1984) et KARUBAR (1991). Trois espèces, *P. arostratus, P. brachyrostris* et *P. antennarius*, sont nouvelles pour la science. Trois des quatre espèces décrites n'étaient pas signalées d'Indonésie : *P. palythophilus* Ortmann, 1892, connue seulement du nord-ouest Pacifique, s'avère être commune en Indonésie ; *P. aciculus* Grant, 1905, connue auparavant d'Australie, est représentée par deux mâles et une femelle en bon état, ce qui permet de compléter les caractères morphologiques de la femelle ; et *P. pusillus* Henderson, 1896 a été trouvé plus profond que précédemment. La quatrième espèce est *P. puniceus* Henderson, 1896.

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INTRODUCTION

During the course of a study of the Indonesian *Paguristes* sensu lato, several species were transferred to the genera *Pseudopaguristes* McLaughlin, 2002 and *Stratiotes* Thomson, 1899 (Rahayu, 2005). Nevertheless, *Paguristes* sensu stricto still has the largest number of species among the genera in the family Diogenidae (Gordan 1956; Komai 2001). However, only two species have been reported from Indonesian waters: *Paguristes puniceus* var. *unispinosa* Balss, 1912, that was found to be synonymous with *Paguristes puniceus* Henderson, 1896 (cf. McLaughlin 2004), and *P. runyanae* Haig and Ball, 1988.

Morphologically, *Paguristes* is a very diverse genus. Nonetheless, intraspecific variations related to sex or animal size have been recognized by several authors (Forest 1954; Provenzano & Rice 1966; Forest & de Saint Laurent 1968; McLaughlin & Provenzano 1974, 1975). Based on *P. puniceus*, McLaughlin (2004) showed that virtually all characters that had been thought to be diagnostic were subject to intraspecific variation, thus a set of characters was required to separate species. Most of the species in this study are comprised of a large number of specimens; therefore intraspecific variation can be observed and discussed.

MATERIALS AND METHODS

The materials used in this study have come from the Dutch *Siboga* Expedition, 1899-1900, The Danish expedition to the Kei Islands and Th. Mortensen's Expeditions (1899-1930), the Dutch *Snellius* II, 1984, the French expeditions CORINDON, 1985 and the French-Indonesian expedition KARUBAR, 1991. Depositions of specimens as indicated in the Materials examined are: Muséum national d'Histoire naturelle, Paris, France (MNHN); Museum Zoologi Bogor, Lembaga Ilmu Pengetahuan Indonesia, Cibinong, Indonesia (MZB); Zoölogisch Museum, University of Amsterdam, Amsterdam, The Netherlands (ZMA); Zoologisk Museum, University of Copenhagen, Copenhagen, Denmark (ZMUC). Animal size is indicated by the shield length, measured from the tip of the rostrum or midpoint of the rostral lobe, to the midpoint of the posterior margin of the shield, and rounded to the nearest single decimal. The length of the ocular peduncles has been determined by measuring the left ultimate peduncular segment, including the cornea, along its lateral surface; corneal diameter represents the maximum width of the cornea measured on the dorsal surface. Terminology used in the descriptions generally follows that of Forest & McLaughlin (2000). The abbreviations DW, Stn, and ovig. refer to Warèn Dredge, station, and ovigerous female, respectively. Species are arranged according to their position in the key and do not suggest phylogenetic relationships.

SYSTEMATIC ACCOUNT

Family DIOGENIDAE Ortmann, 1892

Genus PAGURISTES Dana, 1851

Paguristes Dana, 1851: 269; 1852a: 122; 1852b: 437.
Paguristes – Alcock 1905: 30 (in part). — Forest 1954: 170 (in part). — A. Milne-Edwards & Bouvier 1893: 32. — Forest & de Saint Laurent 1968: 67 (in part). — Zariquiey Alvarez 1968: 235. — McLaughlin 1974: 17. — Miyake 1978: 25. — Forest & McLaughlin 2000: 58 (in part).
Pagurites Lörenthey & Beurlen, 1929: 71 (mispelling).

DIAGNOSIS. — Thirteen pairs of bi- or quadriserial gills; no pleurobranch on fifth or eighth thoracic somites. Shield well calcified, with rostrum well developed or reduced. Ocular acicles well developed or reduced, simple, bi- or

multidenticulate. Antennal peduncles with supernumerary segmentation; acicles elongate, spinose or spinulose. Mandible with unarmed mesial margin, palp often indistinctly 3-segmented. Maxillule with external lobe of endopod prominently recurved. Maxilla with elongate endopod. First maxilliped with well developed epipod. Second maxilliped without distinguishing characters. Third maxilliped with basal segments approximate or somewhat separated; crista dentata usually well developed; no accessory tooth; merus usually with 1 or more spines; carpus, propodus and dactyl usually unarmed.

Chelipeds equal, subequal or unequal, with left or occasionally right considerably larger; similar or dissimilar in armament; claws corneous, fingers opening in horizontal or oblique plane. Fourth pereopods subchelate or weakly semichelate, with or without preungual process developed at base of claw. Fifth pereopods chelate.

Males with paired gonopores; first and second pleonal somites each with pair of pleopods modified as gonopods; unpaired, unequally biramous left pleopods on pleomeres 3-4, pleopod 5 with well developed external ramus, internal ramus rudimentary. Females usually with paired gonopores, occasionally with only left; first pleonal somite with pair of modified pleopods; following 3 somites with unequally biramous left pleopods; fifth pleopod as in male; brood pouch usually well developed, occasionally entirely absent.

Uropods asymmetrical. Telson with lateral incisions; posterior portion divided by median cleft into 2 subequal to markedly unequal lobes.

REMARKS. — In her paper on the new genus *Pseudopaguristes*, McLaughlin (2002) suggested that the number of gills be examined in the species of the genus *Paguristes*. Following this suggestion, Rahayu (2005), in the study of the genus *Paguristes* from the Indonesian waters, transferred species that she found had eight pairs of gills to the genus *Pseudopaguristes* and reinstated the genus *Stratiotes* Thomson, 1899 for species having 12 pairs of gills, while the genus *Paguristes* Dana sensu stricto was retained for the species that had 13 pairs of gills. The *Paguristes* in this study include species that have bi or quadriserial gills, spinose or unarmed telson and paired gonopores in females. It has been observed that the species with unarmed telson usually have quadriserial gills while species with spinose telson generally have biserial gills.

KEY TO THE INDONESIAN SPECIES OF PAGURISTES

1. Telson unarmed 2
—Telson spinose 6

2. Rostrum weakly developed, never exceeding lateral projections, ocular peduncles subequal in length, diameter of cornea not more than 0.4 length of peduncles 3
— Rostrum weakly developed or well developed, always exceeding lateral projection, diameter of cornea more than 0.4 length of peduncles 4

3. Lateral face of dactyl and propodus of left third pereopod smooth ..... *P. brachyrostris*
— Lateral face of dactyl and propodus of left third pereopod with 4-5 irregular rows of pointed tubercles ..... *P. arostratus*

4. Mesial face of dactyl of cheliped with 1 row of tubercles 5
— Mesial face of dactyl of cheliped covered with corneous-tipped spines ..... *P. palythophilus*

5. Left cheliped larger than right, no hiatus between dactyl and fixed finger; antennular peduncles as long as ocular peduncles ..... *P. pusillus*
— Right cheliped slightly larger than left, narrow hiatus between dactyl and fixed finger, antennular peduncle half length of ocular peduncles ..... *P. runyanae*

6. Ocular peduncles half length of shield, left lobe of telson obviously longer than right lobe, propodi and carpi of second and third pereopods with row of large corneous-tipped spines on dorsal margin..... 7
— Ocular peduncles more than half length of shield, lobes of telson subtriangular, left lobe slightly longer than right lobe, propodi and carpi of second and third pereopods with row of moderately small to moderately large spines on dorsal margin ..... *P. puniceus*

7. Antennular peduncles exceeding ocular peduncles by half length of ultimate segment; antennal peduncles slender, as long as ocular peduncles; brood pouch large, subquadrate ..... *P. aciculus*
— Antennular peduncles exceeding ocular peduncles by entire length of ultimate segment; antennal peduncles stout, distinctly exceeding distal margin of corneas; brood pouch small, triangular ..... *P. antennarius*

Paguristes brachyrostris n. sp.

Figs 1A, 2, 3

TYPE MATERIAL. — Holotype and paratypes. CORINDON. Stn 267, 01°56,6'S, 119°16,7'E, 134-186m, 7.11.1980: holotype ♂ 4 mm (MNHN Pg 5929); paratypes 6 ♂ 2.6-5.8 mm, 8 ♀ 2.3-4.1 mm, 2 ♀ ovig. 3.9, 4.6 mm (MNHN Pg 5930), 2 ♂ 3.5, 4.6 mm, 2 ♀ 3, 3.6 mm (MZB); Stn 273, 01°56'S, 119°16'E, 180-220 m, 7.11.1980: 2 ♀ 3, 3.2 mm, 1 ♀ ovig. 3.9 mm (MNHN Pg 7414). — *Siboga*. Stn 312, 08°19'S, 117°41'E, 274 m, fine sand, mud, 14.2.1900: paratype 1 ♀ ovig. 4.8 mm (ZAM).

MATERIAL EXAMINED. — The type material (see above).

DESCRIPTION. — Quadriserial gills. Shield (Fig. 1A) slightly longer than broad; dorsal surface with several scattered spines or spinules laterally and with tufts of short setae. Rostrum very broadly rounded, nearly obsolete, not reaching level of lateral projections. Lateral projections obtusely triangular to subquadrate, sometimes simply broadly rounded, with or without terminal spine or spinule. Branchiostegites with 2-4 spinules on anterior margins. Posterior carapace with median plate moderately broad, well calcified.

Ocular peduncles subequal in length, left 0.8-0.9 length of shield, right cornea reaching base to half length of left cornea; dorsal surfaces each with row of long and dense setae; corneal diameter 0.3-0.4 of peduncular length. Ocular acicles triangular, each terminating acutely, with terminal spine; separated basally by 0.5 width of 1 acicle. Interocular lobe calcified, distal margin rounded.

Antennular peduncles when fully extended overreaching distal margins of corneas by 0.3-0.5 length of ultimate segment. Ultimate segment with row of very fine setae on dorsal surface; penultimate segment naked; basal segment with 1 spinule on lateral border.

Left antennal peduncle reaching from 0.6 length of ocular peduncles to overreaching base of cornea, right antennal peduncle always reaching base of cornea. Fifth segment with few scattered moderately long setae at dorsolateral distal margin; fourth segment with dorsodistal spinule; third segment with prominent ventrodistal spine; second segment with dorsolateral distal angle produced, terminating in bifid or simple spine, and tufts of long setae, dorsomesial distal angle unarmed or with 1 spine. Antennal acicle reaching 0.5-0.7 length of fifth peduncular segment, with bifid terminal spine; mesial margin with 5 spines, lateral margin with 2-3 smaller spines obscured by long setae. Antennal flagellum (Fig. 3K) 2-3 times longer than shield; each article with numerous setae, becoming longer and denser distally.

Chelipeds unequal, left (Fig. 2A, B, C) larger than right (Fig. 2D). Dactyl and fixed finger of left cheliped with narrow hiatus proximally. Dorsomesial margin of dactyl with row of acute spines, becoming smaller distally, accompanied by tufts of moderately long setae; dorsal surface with irregular longitudinal row of spines, few scattered tubercles and sparse tufts of setae, and with shallow longitudinal sulcus medially; mesial face (Fig. 2C) with longitudinal row of spines dorsal to midline, accompanied by tufts of long setae, second row of sparser and smaller spines adjacent to ventral margin, shallow sulcus on midline; cutting edge with row of calcareous teeth, 2 large teeth proximally, terminating in small corneous claw. Palm with row of moderate to small spines and tufts of setae on dorsomesial margin, second row of smaller spines adjacent to dorsomesial margin, dorsolateral margin not

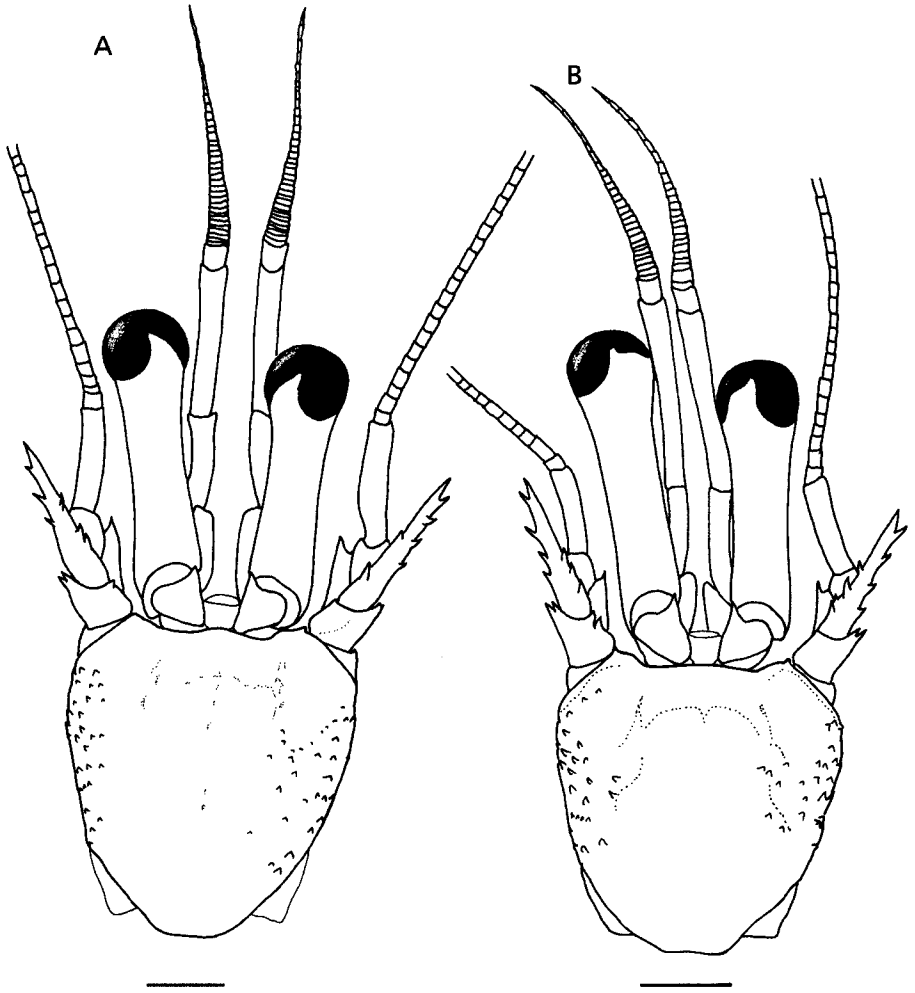

FIG. 1. Shield and cephalic appendages. A. *Paguristes brachyrostris* n. sp., holotype, male, 4.1 mm; B. *Paguristes arostratus* n. sp., holotype, male 3.5 mm. Setae omitted. Scale bars = 1 mm.

FIG. 1. *Bouclier et appendices céphaliques. A.* Paguristes brachyrostris *n. sp., holotype, mâle, 4,1 mm ; B.* Paguristes arostratus *n. sp. holotype, mâle 3,5 mm. Soies non représentées. Échelles = 1 mm.*

delimited; dorsal surface convex, with irregular rows of small spines or tubercles, denser and stronger tubercles extending onto fixed finger, each accompanied by tuft of short setae; lateral surface with scattered small tubercles; mesial face with few low tubercles and sparse tufts of setae, ventral surface with row of tubercles and tufts of setae extending almost entire length of fixed finger; fixed finger slightly curved, spoon-shaped, cutting edge with row of calcareous teeth, 1 large tooth medially, terminating in small corneous claw. Carpus with row of moderately large spines on dorsomesial margin, irregular rows of smaller spines on dorsal surface, shallow longitudinal sulcus on midline, scattered tubercles and spines lateral of midline, each accompanied by short tufts of setae; mesial face with row of tubercles and tufts of setae. Merus with few small to moderately large spines and moderately long setae on dorsodistal margin; dorsal surface with subdistal, transverse row of spines and setae, remaining dorsal surface with row of short spinulose ridges or spinulose protuberances accompanied by tufts of long setae; mesial and lateral faces weakly spinulose, ventromesial and ventrolateral margins each with row of spines distally, becoming smaller proximally and accompanied by long setae. Ischium unarmed.

Right cheliped slender (Fig. 2D). Dactyl and fixed finger with narrow hiatus proximally. Dorsomesial margin of dactyl with row of spines, becoming smaller distally, accompanied by tufts of dense and long setae; dorsal surface with irregular row of spines obscured by tufts of long and dense setae; mesial face with longitudinal row of spines, accompanied by long

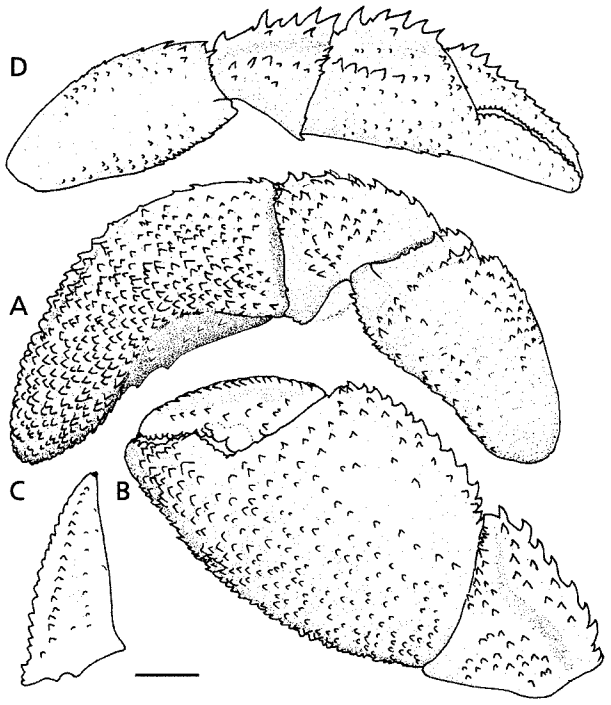

FIG. 2. *Paguristes brachyrostris* n. sp., holotype, male, 4.1 mm. Cheliped: A, entire left cheliped, dorsolateral view; B, same, chela and carpus, dorsal view; C, same, dactyl, mesial view; D, right cheliped, dorsolateral view. Setae omitted. Scale bar = 1 mm.

FIG. 2. Paguristes brachyrostris *n. sp., holotype, mâle, 4,1 mm. Chélipède : A, chélipède gauche entier, vue dorsolatérale ; B, le même, pince et carpus, vue dorsale ; C, le même, doigt en vue médiane ; D, chélipède droit, vue dorsolatérale. Soies omises. Échelle = 1 mm.*

setae; cutting edge with row of small calcareous teeth, terminating in small corneous claw. Palm with row of prominent spines and tufts of long setae on dorsomesial margin; dorsal surface convex with irregular rows of spines, stronger in midline, weaker and becoming less dense on fixed finger, each obscured by tufts of long dense setae; mesial face with few low tubercles and sparse tufts of setae, ventral surface with row of tubercles and tufts of setae extending almost entire length of fixed finger; fixed finger slightly curved, cutting edge with row of calcareous teeth, terminating in small corneous claw. Carpus with row of large spines on dorsomesial margin, irregular rows of smaller spines on dorsal surface, each accompanied by tufts of long setae, shallow longitudinal sulcus between dorsomesial margin and midline; mesial face with row of tubercles and tufts of setae. Merus with large spines and long setae on dorsodistal margin; dorsal margin with row of short spinulose ridges or spinulose protuberances accompanied by tufts of long setae; mesial and lateral faces weakly spinulose, ventromesial and ventrolateral margins each with row of spines distally, becoming smaller proximally, and long setae. Ischium unarmed.

Second (Fig. 3A) and third (Fig. 3B, C) pereopods with dactyls slightly curved, about 1.5 length of propodi; dorsal margins each with row of tufts of dense, long setae; lateral faces each with 1 longitudinal row of tufts of sparse, short setae; mesial faces each with 1 row of tufts of long, dense setae medially, second row of sparse setae adjacent to ventral margin; row of 28 (second) or 30 (third) small corneous spines on ventral margin, concealed by long, stiff setae; dactyl of third pereopods wider than those of second, with ratio of breadth to length of dactyls of second and third pereopods about 0.7 and about 0.9 respectively. Dorsal margins of propodi of second pereopods each with row of spines, visible only in mesial view on left pereopod, accompanied by tufts of long setae, stronger spines on right pereopod; dorsal surfaces of third with row of low protuberances and tufts of long setae; ventral margins of second and third pereopods each with row of spinulose tubercles and tufts of setae, spines better developed on second pereopods; lateral faces of second pereopods each with 2 longitudinal rows of dense setae, third row of sparse setae adjacent to ventral margin; on third pereopods rows of setae on lateral surface less dense. Carpi each with tufts of long setae and irregular row of moderately large spines on dorsal margin (second) or row of smaller spines (third); lateral faces each with 2 rows of tufts moderately long setae; ventral surfaces each with few tufts of moderately long setae. Meri each with dorsal row of low protuberances and tufts of long setae; ventral margins each with row of small spines distally and tufts of moderately long setae (second) or only low protuberances and long setae (third). Fourth pereopods (Fig. 3D) each with small preungual process at base of claw; propodi with moderately dense setation; carpi without dorsodistal spine.

Male first pleopod (Fig. 3F, G) with tuft of setae on outer margin of basal lobe; inferior lamella broadened distally, with 1 row of curved corneous spinules on distal margin, extending considerable distance along outer margin; internal lobe rounded, external lobe slightly shorter than inferior lamella. Second pleopod (Fig. 3H, I) with elongate basal segment, naked. Endopod twisted, with few of setae on inner margin and longer setae terminally; appendix masculina with long setae marginally. Female with paired first pleopods 2-segmented. Brood pouch (Fig. 3J) small, subtriangular with marginal

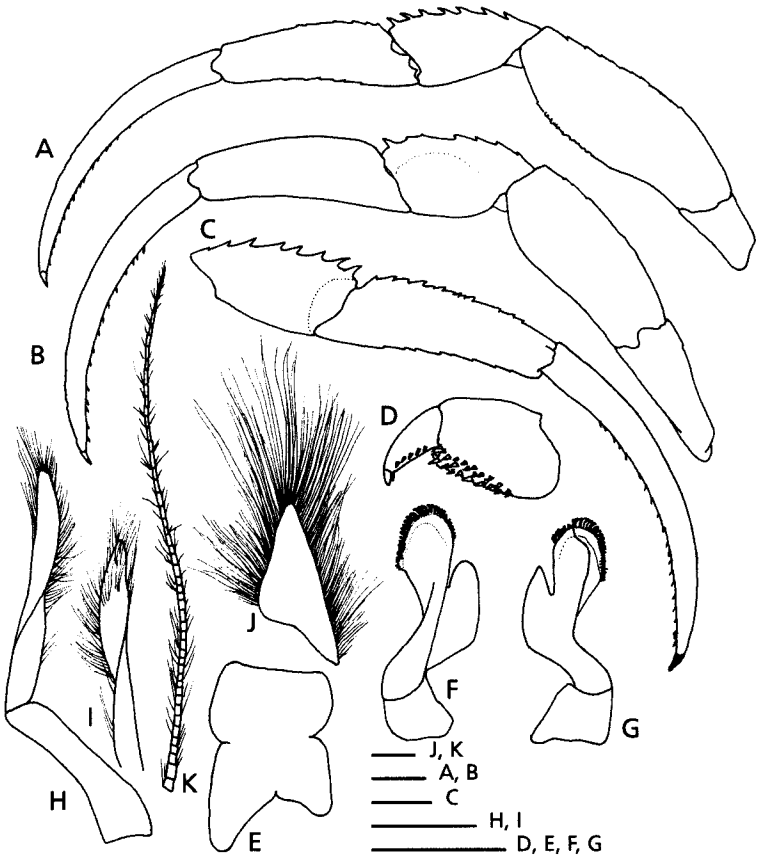

FIG. 3. *Paguristes brachyrostris* n. sp. A-J holotype, male, 4.1 mm; K, paratype, female 4.6 mm. Pereopods: A, second pereopod, lateral view, setae omitted; B, third pereopod, lateral view, setae omitted; C, same, mesial view, setae omitted; D, fourth pereopod, lateral view, setae omitted; E, telson, setae omitted; F, male first pleopod, external view, setae omitted; G, same, internal view, setae omitted; H, male second pleopod, external view; I, same, internal view; J, antennal flagella; K, brood pouch. Scale bars = 1 mm.

FIG. 3. Paguristes brachyrostris *n. sp. A-J holotype, mâle, 4,1 mm ; K, paratype, femelle 4,6 mm. Péréiopodes: A, second péréiopode, vue latérale, soies omises ; B, troisième péréiopode, vue latérale, soies omises ; C, le même, vue médiane ; D, quatrième péréiopode, vue latérale, soies omises ; E, telson, soies omises ; F, premier pléopode mâle, vue externe, soies omises ; G, le même, vue interne, soies omises ; H, deuxième pléopode mâle, vue externe ; I, le même, vue interne ; J, flagelle antennaire ; K, poche incubatrice. Échelles = 1 mm .*

long setae. Tergal thickenings above acetabula of pleopods 2-4 sometimes with fringe of long dense setae. Eggs attached to pleopods 2-4.

Telson (Fig. 3E) with moderately deep lateral indentations separating anterior and posterior portions; asymmetrical posterior lobes, unarmed, separated by V-shaped median cleft; left lobe longer than right, subtriangular with rounded apex, terminal margins of both lobes with row of long setae.

DISTRIBUTION. — Makassar Strait and North coast of Sumbawa Island, Indonesia, at 134-274 m depths.

REMARKS. — Twenty five specimens of *Paguristes brachyrostris* n. sp are present in the material studied. Individual variation related to the animal size has been observed in the armature of the left cheliped. The fixed finger of the left cheliped varies from straight to slightly or strongly curved, however, all are spoon shaped. The shallow longitudinal sulcus on the dorsal and mesial surfaces of the dactyl of the left cheliped is not always present in smaller individuals, where instead there are several low tubercles. The tuberculate spines on the dorsal surface of the palm and carpus are sparse and weak in the larger individuals, while in the smaller individuals they are stronger and often corneous-tipped. Morphological variations related to sex have not been detected.

This new species is most similar to *P. arostratus* n. sp., described below. Comparison between the two species is made under the account of *P. arostratus* n. sp.

ETYMOLOGY. — From the Latin *brachy*, short, and *rostris*, rostrum, referring to broadly rounded rostral lobe.

Paguristes arostratus n. sp.

Figs 1B, 4, 5

TYPE MATERIAL. — Holotype and paratypes. CORINDON. Stn. CP 295, 01°26.5'S, 117°02.1'E, 54-51 m, 11.11.1980: holotype ♂, 3.5 mm (MNHN Pg 5931), paratypes: 2 ♂, 2.5, 3.5 and 4.5 (MNHN Pg 5931). — *Siboga*. Stn. 260, 05°36.5'S, 132°55.2'E, 90 m, 16.12.1899: paratypes 2 ♂, 1.0 and 1.5 mm (ZMA).

MATERIAL EXAMINED. — The type material (see above).

DESCRIPTION. — Quadriserial gills. Shield (Fig. 1B) as long as broad; dorsal surface with several scattered spines or spinules on lateral part and with tufts of short setae. Rostrum obsolete, with few long simple setae. Lateral projections triangular with terminal spine or spinule. Branchiostegites with 1-5 small spines on anterior margins. Posterior carapace with median plate moderately broad, well calcified.

Ocular peduncles slightly unequal in length, left as long as or slightly longer than shield, right cornea reaching base of left cornea; dorsal surfaces each with row of long, sparse setae; corneal diameter 0.3 of peduncular length. Ocular acicles triangular, each terminating acutely; separated basally by 0.5 width of 1 acicle. Interocular lobe calcified, distal margin rounded.

Antennular peduncles when fully extended exceeding distal margins of corneas by 0.3 length of ultimate segment. Ultimate segment with row of very fine setae on dorsal surface; penultimate segment naked; basal segment with 1 spinule on lateral border.

Left antennal peduncle reaching 0.6 length of ocular peduncles. Fifth segment with few scattered moderately long setae at dorsolateral distal margin; fourth segment with small dorsodistal spinule; third segment with prominent ventrodistal spine; second segment with dorsolateral distal angle produced, terminating in bifid spine and tufts of long setae, dorsomesial distal angle unarmed or with 1 spine, mesial margin with or without 1 spine. Antennal acicle reaching 0.7 of fifth peduncular segment to slightly overreaching distal segmental margin, with bifid terminal spine; lateral and mesial margins each with 3 spines obscured by long setae. Antennal flagellum (Fig. 4L) 2-3 times length of shield; each article with 1 or 2 long setae or with numerous setae, becoming longer and denser distally.

Chelipeds unequal, left (Fig. 4A-D) larger. Left cheliped without hiatus between dactyl and fixed finger. Dactyl with row of acute spines on dorsomesial margin, becoming smaller distally, accompanied by tufts of moderately long setae; dorsal surface with longitudinal row of spines and few scattered tubercles accompanied by tufts of sparse setae; mesial face (Fig. 4D) with longitudinal row of corneous-tipped spines accompanied by short stiff setae on midline; cutting edge with row of calcareous teeth, including 1 large tooth proximally, terminating in small corneous claw. Palm with row of large spines and tufts of short setae on dorsomesial margin; dorsolateral margin not delimited; dorsal surface convex, covered with scattered spinulose tubercles, denser and larger on fixed finger, each accompanied by tuft of short setae; lateral surface with row of small tubercles and tufts of setae; mesial face with few low tubercles and sparse tufts of setae, ventral surface with row of tubercles and tufts of setae extending onto near tip of fixed finger; fixed finger slightly curved, spoon-shaped, cutting edge with row of small calcareous teeth, 1 large tooth subdistally; terminating in small corneous claw. Carpus with row of large spines on dorsomesial margin, scattered smaller spines on dorsal surface, each accompanied by short tuft of setae; mesial face with row of tubercles and tufts of setae. Merus (Fig. 4C) with row of 3 larges spines and moderately long setae on dorsodistal margin; dorsal margin with subdistal, transverse row of moderately small spines and setae, remaining dorsal margin with row of short spinulose ridges or spinulose protuberances accompanied by tufts of long setae; mesial and lateral faces spinulose dorsally and ventrally, ventromesial and ventrolateral margins each with row of small spines and long setae. Ischium unarmed.

Right cheliped (Fig. 4E) smaller than left. Dactyl and fixed finger without hiatus. Dactyl with row of acute spines on dorsomesial margin, smaller distally, each accompanied by tuft of long setae; dorsal surface with longitudinal row of spines, few scattered tubercles and tufts of sparse setae; mesial face with longitudinal row of spines, accompanied by short stiff

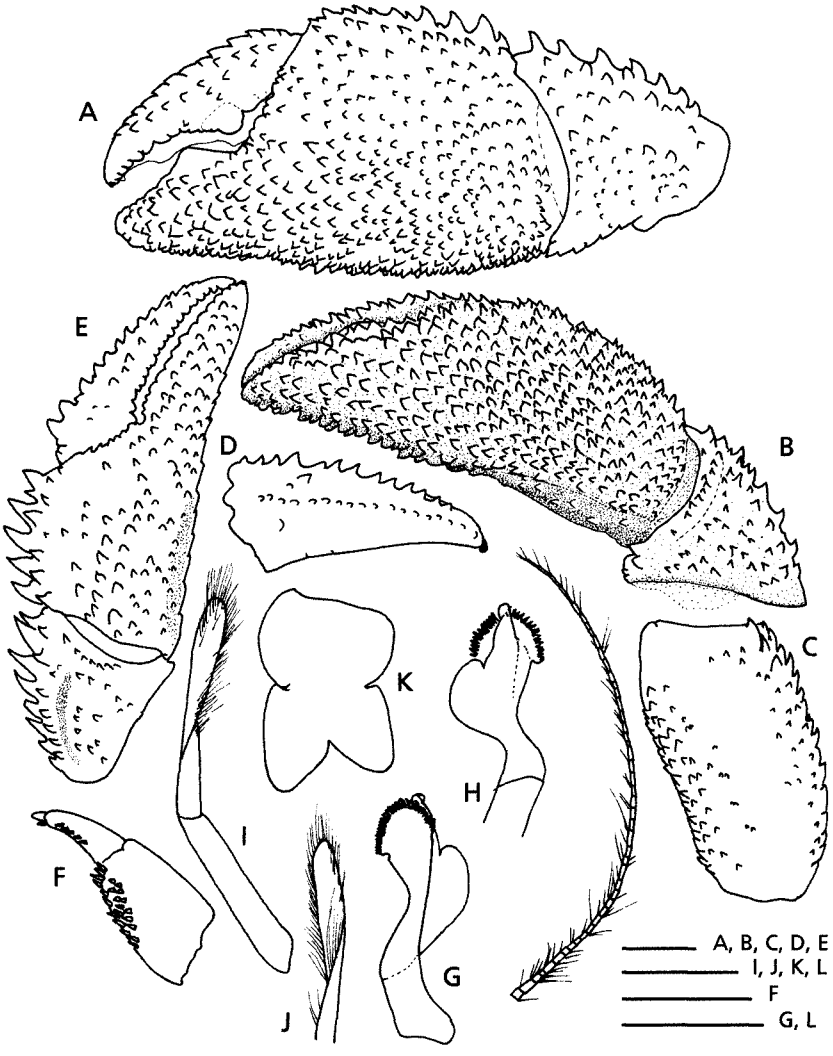

FIG. 4. *Pagurista arostratus* n. sp., holotype, male 3.5 mm. Left cheliped: A, left cheliped, chela and carpus, dorsal view, setae omitted; B, same, dorsolateral view, setae omitted; C, same, merus, lateral view, setae omitted; D, same, dactyl, mesial view, setae omitted; e right cheliped, dorsolateral view, setae omitted; F, fourth pereopod, setae omitted; G, male first pleopod, external view, setae omitted; H, same, internal view, setae omitted; I, male second pleopod, internal view; J, same, external view; K, telson, setae omitted; L, antennal flagella. Scale bars = 1 mm.

FIG. 4. Paguristes arostratus *n. sp., holotype, mâle 3,5 mm. Chélipède gauche : A, chélipède gauche, pince et carpe, vue dorsale, soies omises ; B, le même vue dorsolatérale, soies omises ; C, le même, mérus, vue latérale, soies omises ; D, le même, dactyle, vue médiane, soies omises ; E, chélipède droit, vue dorsolatérale, soies omises ; F, quatrième péréiopode, soies omises ; G, premier pléopode mâle, vue externe, soies omises ; H, le même, vue interne, soies omises ; I, second pléopode mâle, vue interne ; J, le même, vue externe ; K, telson, soies omises ; L, flagelle antennaire. Échelles = 1 mm.*

setae; cutting edge with row of calcareous teeth, terminating in small corneous claw. Palm with row of large spines and tufts of long setae on dorsomesial margin, irregular row of smaller spines adjacent to dorsomesial margin; dorsal surface convex, with scattered small spines, denser and larger on fixed finger, each accompanied by tuft of long setae; ventral surface with row of tubercles and tufts of setae extending nearly to tip of fixed finger; cutting edge of fixed finger with row of small calcareous teeth, terminating in small corneous claw. Carpus with row of large spines on dorsomesial margin, dorsal surface with row of small spines subdistally, irregular rows of smaller spines adjacent to dorsomesial margin, shallow longitudinal sulcus on midline, scattered tubercles and spines lateral of midline, each accompanied by short tufts of setae. Dorsal margin of merus with small spines and long setae distally, short spinulose ridges or spinulose protuberances accompanied by tufts of long setae proximally; mesial and lateral faces weakly spinulose, ventromesial and ventrolateral margins each with row of small spines and long setae. Ischium unarmed.

Second pereopods (Fig. 5B, D, F) each with dactyl about 1.7 length of propodus; dorsal margins of dactyls each with low protuberances and long setae; ventral margin with row of 17 small corneous spines; lateral faces each with row of long setae medially. Propodi with row of 9 (left) or 7 (right) small spines on dorsal margin, not extending to distal margin; carpi

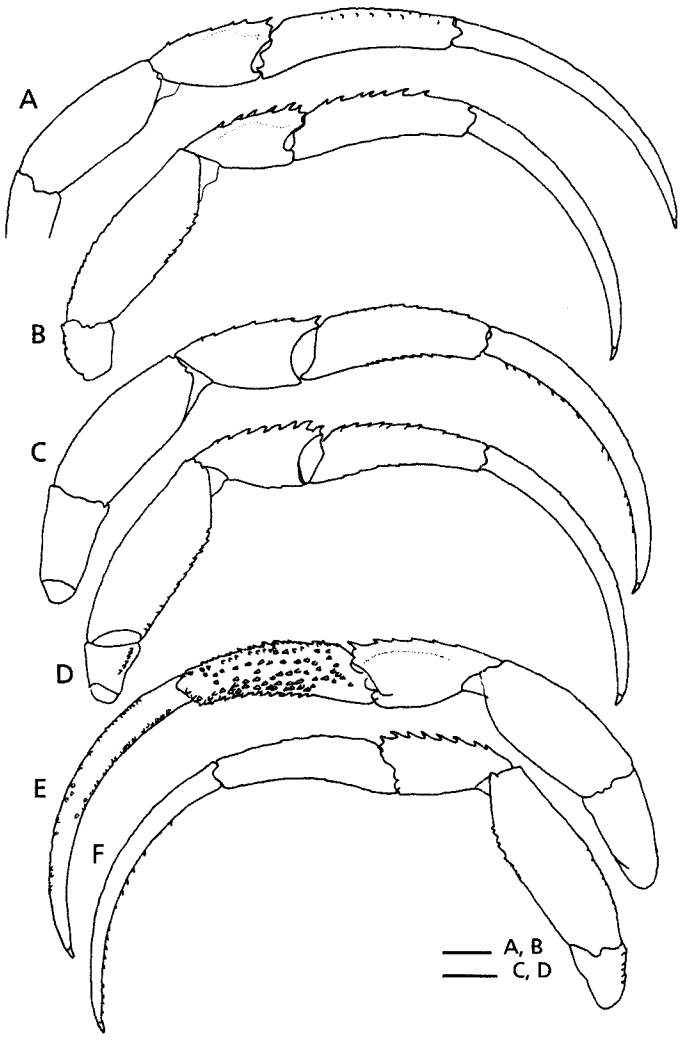

FIG. 5. *Paguristes arostratus* n. sp., holotype, male 3.5 mm. Pereopods: A, right third pereopod, lateral view; B, right second pereopod, lateral view; C, left third pereopod, mesial view; E, same, lateral view; D, left second pereopod, mesial view; F, same, lateral view. Setae omitted. Scale bars = 1 mm.

FIG. 5. Paguristes arostratus *n. sp., holotype, mâle 3,5 mm. Péréiopodes : A, troisième péréiopode droit, vue latérale ; B, second péréiopode droit, vue latérale ; C, troisième péréiopode gauche, vue médiane ; E, le même, vue latérale ; D, second péréiopode gauche, vue médiane ; F, le même, vue latérale. Soies omises. Échelles = 1 mm.*

with row of 8 (left) or 7 (right) moderately large spines, becoming smaller proximally. Meri and ischia each with row of spinulose tubercles on ventromesial margin.

Left third pereopod (Fig. 5C, E) with dactyl strongly curved, about 1.7 length of propodus, dorsal margin with long plumose setae; lateral face near dorsal margin with row of spinulose tubercles, extending from 0.2 to 0.8 of dactylar length; near ventral margin, row of tubercles extending from 0.1 to 0.6 of dactylar length, shallow sulcus between rows of tubercles; mesial face with row of tufts of long, dense setae medially, second row of sparse setae adjacent to ventral margin; row of 16 small corneous spines on ventral margin, concealed by long setae. Dorsal margin of propodus with row of small spines accompanied by tufts of long setae; lateral surface with 4 longitudinal irregular rows of spines obscured by plumose setae; ventral margin with row of spines, and tufts of setae. Carpus with irregular row of small spines on dorsal margin accompanied by tufts of moderately long setae; ventral surface with few tufts of moderately long setae. Merus and ischium unarmed, tufts of long setae on dorsal and ventral margins.

Right third pereopod (Fig. 5A) with dactyl about 1.6 length of propodus, dorsal margin with low protuberances and long setae, lateral and mesial faces each with row of long setae medially, ventral margin with row of 16 small corneous spines, concealed by long setae. Propodus with row of long setae on dorsal and ventral margins. Dorsal margin of carpus with irregular row of spines, smaller spines proximally. Merus and ischium unarmed, long setae on each dorsal margin.

Fourth pereopods (Fig. 4F) each with small preungual process at base of claw; propodi with moderately dense setation; carpi without dorsodistal spine.

Male first pleopod (Fig. 4G, H) with tuft of setae on outer margin of basal lobe; inferior lamella broad, with 1 row of curved corneous spines on distal margin; internal lobe rounded, external lobe extending slightly beyond distal margin of inferior lamella, tip curved. Second pleopod (Fig. 4I, J) with elongate basal segment, naked. Endopod slightly twisted, with few of setae on inner margin and longer setae terminally; appendix masculina with long setae marginally. Female unknown.

Telson (Fig. 4K) with moderately deep lateral indentation separating anterior and posterior portions; asymmetrical posterior lobes, unarmed, separated by V-shaped median cleft; left lobe longer than right, subtriangular with rounded apex, terminal margin of both lobes with row of long setae

DISTRIBUTION. — Kai Islands and Makassar Strait, 51 to 90 m depth.

REMARKS. — *Paguristes arostratus* is represented only by four males; there is no notable individual variation. *Paguristes arostratus* and *P. brachyrostris* n. sp., described earlier, have several characters in common, i.e. the rostrum is very poorly developed, almost obsolete; the shield is slightly longer or as long as broad; the ocular peduncles are slightly unequal with enlarged corneas, the left cheliped is much stronger than the right, and the telson is unarmed. The only difference between the two species is the armature of the left third pereopod. The lateral face of the dactyl and propodus of the left third pereopod of *P. arostratus* is armed with spinulose tubercles accompanied by plumose setae, while in *P. brachyrostris* they are unarmed and embellished by tufts of long, dense simple setae. With regard to the intraspecific variation generally found in species of the genus, the presence of spinulose tubercles on lateral face of dactyl and propodus of left third pereopod in *P. arostratus* perhaps could be just a variation. The presence of spinulose tubercles on lateral face of dactyl and propodus of left third pereopod, however, is consistent in all sized individual of *P. arostratus* (shield length 1.0-4.5 mm).

Comparison of the same sized individuals of both species showed that the lateral faces of dactyl and propodus of left third pereopod of *P. brachyrostris* are always unarmed.

The two new species are also superficially very close to *Paguristes brevirostris* Baker, 1905 from Australia. In the latter species, however, the gills are biserial, the ocular acicles are multifid, and the telson is armed with spinules on the terminal margins.

ETYMOLOGY. — From the Greek *a*, without, and *rostrum*, referring to the obsolete rostrum.

Paguristes palythophilus Ortmann, 1892

Restricted synonymy:
Paguristes palythophilus Ortmann, 1892: 277, pl. 12, figs 5, 5p, q.
Paguristes palythophilus – Komai 2001: 359, figs 3-6 (full synonymy).

TYPE MATERIAL. — Sagami Bay, 1881, 126-180 m, coll. L. Döderlein, ♂ 11.2 mm. Not seen.

MATERIAL EXAMINED. — *Siboga*. Stn. 12, 07°15'S, 115°15,6'E, 289 m, mud and shells fragments, 14.3.1899: 2 ♂, 8.9, 9.8 mm (ZMA). — The Danish Expedition to the Kei Islands *1922*. Stn. 15, 07°29'S, 114°49'E, 240 m 10.4.1929: 1 ♂, 8.3 mm (ZMUC); Stn. 44, 05°39'S, 132°23'E, 268 m, 30.4.1922: 3 ♀ 2.8, 3.6, 3.8 mm (ZMUC); Stn. 50, 05°34'S, 132°25'40"E, 233 m, 4.5.1922: 4 ♂, 3.4-6.6 mm (ZMUC); Stn 51, 05°46.30'S, 132°51'E, mud, 348 m, 7.v.1922: 1 ♂, 6.2 mm (ZMUC). — *Snellius II*. Stn.58, 0°52'S, 120°45'E, 190 m, 14.9.1984: 1 ♂, 4.3 mm, 1 ♀ ovig., 6.1 mm (MZB). — CORINDON. Stn. 267, 01°56,6'S, 119°16,7'E, 186-134 m, 7.11.1980: 1 ♀ ovig., 4.4 mm (MNHN Pg 7415); Stn 271, 01°57,8'S, 119°15'E, 215 m, 7.11.1980 2 ♂, 6.0 mm and 7.8 mm (MNHN Pg 7416). — KARUBAR. Stn. DW 03, 05°48'S, 132°E, 301-278 m, 22.10.1991: 1 ♂, 5.2 mm, (MNHN Pg. 5924); Stn. DW 14, 05°18'S, 132°38'E, 245-246 m, 24.10.1991: 1 ♂, 2.3 mm (MNHN Pg 7417); Stn. DW 15, 05°17'S, 132°41'E, 212-221 m, 24.10.1991: 1 ♂, 2 mm, 1 ♀, 2.5 mm (MNHN Pg 7418); Stn. DW 49, 08°00'S, 132°59'E, 210-206 m, 29.10.1991: 2 ♂, 1.7, 2.3 mm (MNHN Pg 7419); Stn. CP 27, 05°33'S, 132°41'E, 304-314 m, 26.10.1991: 1 ♂, 4.3 mm (MNHN Pg 7420); Stn. CP 36, 06°05'S, 132°44'E, 268-210m, 27.10.1991: 1 ♂, 3.0 mm (MNHN Pg 7421); Stn. CP 46, 08°01'S, 13°51'E, 271-273 m, 29.10.1991: 1 ♂, 5.9 mm (MNHN Pg 7422); Stn. CP 63, 08°00'S, 132°58'E, 215-214 m, 1.11.1991, 2 ♂, 4.7, 6.3 mm, 2 ♀ (1 ovig.), 5.6, 6.1 mm (MZB); Stn. CP 65, 09°14'S, 13°27'E, 184-186 m, 1.11.1991: 1 ♀ ovig., 3.8 mm, (MNHN Pg 7423); Stn. CP 67, 08°58'S, 132°06'E, 233-146 m, 1.11.1991: 6 ♂, 3.2–6.4 mm, 4 ♀ (3 ovig.), 4.0-4.8 mm (MNHN Pg 7424). Stn. CP 82, 09°32'S, 131°02'E, 219-215 m, 4.11.1991: 1 ♂, 4.3 mm (MNHN Pg 7425).

DIAGNOSIS. — Quadriserial gills. Shield longer than broad, rostrum long or short, always exceeding lateral projections. Ocular peduncles 0.5-0.8 length of shield, longer than antennal peduncles, shorter than antennular peduncles, slightly inflated proximally; corneas slightly dilated. Ocular acicles slender distally, simple, separated basally. Antennal flagella almost twice as long as shield, sparsely setose. Chelipeds subequal, setose; narrow hiatus between dactyl and fixed finger.

Mesial face of dactyl with scattered, small corneous-tipped spines; palm with irregular rows of small to moderately large spines accompanied by tuft of setae. Second and third pereopods longer than chelipeds by entire length of dactyls; dorsal margins of propodi and carpi of second pereopods each with 7-10 and 4-7 irregular spines, respectively; dorsal margins of propodi of third pereopods unarmed; dorsal margins of carpi of third pereopods each with 1 distal spine. Dense plumose setae on dorsal and ventral margin of pereopods. Inferior lamella of male first pleopod with 1-2 rows of hooked spines on distal margin. Female brood pouch varying from small and triangular to moderately large and subrectangular, marginally fringed with dense setae. Telson with posterior lobes asymmetrical, unarmed, left larger than right.

DISTRIBUTION. — *Paguristes palythophilus* has been recorded from Japan and Taiwan in the northwestern Pacific, at depths of 80-180 m (Komai 2001). The records from Indonesian waters extend its distribution southward to Makassar Strait and Maluku and down to 233m depth.

REMARKS. — The present specimens from Indonesia agree well with the redescription of *P. palythophilus* by Komai (2001). Twenty-nine males (1.7-9.8 mm) and 12 females (2.3-6.2mm) were examined in the present study. Morphological variation was observed, notably in relation to animal size. Chelipeds of the smaller animals have stronger spines and are more setose; in the larger animals the surfaces of palms are almost glabrous. Furthermore, the fixed fingers of the chelipeds in larger animals are curved downward, while in smaller sized animals they are almost straight. The cutting edges of fixed finger and dactyl vary from having small teeth to large, molariform teeth; the dactyl always terminates in a long corneous claw while the fixed finger terminates in a small corneous claw.

Additionally, the male first pleopod and the female brood pouch also vary in relation to animal size. In small specimens, the first male pleopod is in the form of a small protuberance; in specimens of slightly larger size, the distal margin of inferior lamella is without a row of hooked spines, while in still larger animals it has one or two rows of hooked spines. In the smallest female (shield length 2.3 mm) the brood pouch and the first pleopod are absent; pleopods 2-4 each has a rudimentary endopod. In larger females, the brood pouch varies from small and triangular, not covering the eggs, to broadly triangular, completely covering the eggs.

Variations in the rostrum and ocular peduncles are not related to the animal size or sex. The rostrum varies from long, narrow and acutely triangular to short, broad and subacutely triangular; however, it always exceeds the lateral projections. Ocular peduncles vary from enlarged on both extremities to dilated corneas and only slightly inflated bases.

COLOR. — Generally orange-red. Spines, tubercles protuberance on cheliped and ambulatory legs with white spots. Ocular peduncles with two white longitudinal stripes dorsolaterally and mesially, dorsal surface between two white stripes generally orange, becoming darker mesially, with longitudinal row of white spots; lateral and ventral faces deep red. Antennular peduncles orange, flagellum white. Antennal flagellum generally red, paler proximally (after Komai 2001).

Paguristes pusillus Henderson, 1896

Figs 6, 7, 8, 9

Paguristes pusillus Henderson, 1896: 526.
Paguristes pusillus – Alcock and Anderson 1897: pl. 31, figs 4, 4a. — Alcock 1905: 37, pl. 3, fig. 3. — Southwell 1906: 206.
?Paguristes pusillus – Balss 1913: 40. — Yokoya 1933: 43. — Thompson 1943: 414. — Miyake 1978: 37.
Paguristes pusillus var. – Nobili 1907: 88.
Paguristes p. pusillus – Wang and Tung 1982: 368.

TYPE MATERIAL. — East Coast of Ceylon (Sri Lanka), 50.4m. Not seen.

MATERIAL EXAMINED. — *Siboga*. Stn. 289, 09°0,3'S, 12°24,5'E, 112 m, mud and shell debris, 20.1.1900: 1 ♂, 3.1 mm (ZMA). — CORINDON. Stn. CP 208, 00°14,6'S, 117°52'E, 150 m, 31.10.1980: 2 ♂, 4.6, 6.9 mm, (MNHN Pg 5928); Stn. CP 216, 0°40,1'S, 117°51,4'E, 96 m, 1.11.1980: 1 ♂, 3.7 mm (MNHN Pg 7426).

DESCRIPTION. — Quadriserial gills. Shield (Fig. 6) about 1.2 times longer than broad; dorsal surface with several spines laterally. Rostrum narrowly triangular, exceeding lateral projections, overreaching mid-length of ocular acicles, with terminal spinule. Lateral projections triangular, each with terminal spine. Branchiostegites with 1-3 small spines on anterior margins. Posterior carapace with large, well calcified median plate.

Ocular peduncles subequal in length, left slightly longer than right, about 0.8 length of shield; dorsal surfaces each with row of long setae; corneal diameter about 0.2 of peduncular length. Ocular acicles triangular, each terminating acutely; separated basally by 0.5 basal width of 1 acicle.

Antennular peduncles when fully extended reaching middle of left cornea, overreaching distal margin of right cornea. Ultimate segment unarmed; penultimate segment with or without small spine on ventral surface at midlength; basal segment with 1 spinule on distomesial margin,

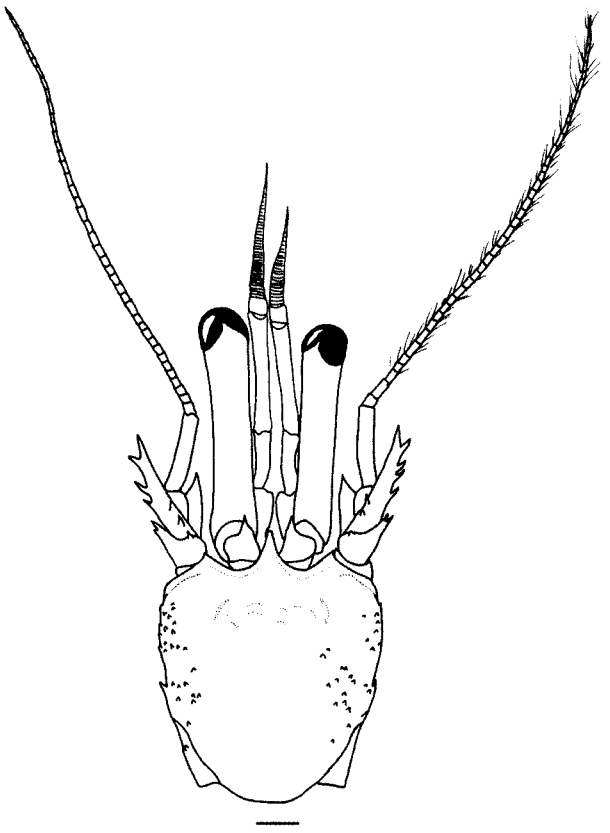

FIG. 6. *Paguristes pusillus* Henderson, 1896, male, 4.6 mm. Shield and cephalic appendages. Setae partially omitted. Scale bar = 1 mm.

FIG. 6. Paguristes pusillus *Henderson, 1896, mâle, 4,6 mm. Bouclier et appendices céphaliques. Soies partiellement omises. Échelle = 1 mm.*

Antennal peduncles when fully extended reaching 0.7-0.8 length of ocular peduncles. Fifth segment unarmed; fourth segment with small dorsodistal spine; third segment with ventromesial distal angle produced, terminating in prominent spine; second segment with dorsolateral distal angle produced, terminating in bifid spines, dorsomesial distal angle with 1 spine. Antennal acicle reaching 0.8 of fifth peduncular segment, with prominent terminal bifid spine; mesial margin with 1-3 spines, lateral margin with 2-3 spines, with sparse long setae. Antennal flagellum 1.6-1.7 times longer than shield, each article with short and long setae, denser and longer distally.

Chelipeds unequal, left larger (Fig. 7A-C). Dactyl and fixed finger without hiatus. Dorsomesial margin of dactyl of left cheliped with row of acute, corneous-tipped spines, accompanied by sparse, moderately long setae; dorsal surface with irregular longitudinal rows of acute spines accompanied by few long setae; mesial face (Fig. 7C) with longitudinal row of tubercles extending to tip and accompanied by long setae, few smaller tubercles scattered near ventral margin; cutting edge with row of small calcareous teeth in proximal half, corneous teeth distally; terminating in small corneous claw. Palm with row of large spines on dorsomesial margin, dorsolateral margin not delimited, weakly convex dorsal surface with irregular rows of strong spines, each spine accompanied by tuft of setae, stronger, denser spines extending onto fixed fingers; lateral surface with scattered tubercles; mesial face with few, low tubercles and sparse tufts of setae; ventral surface with row of tuberculate spines and sparse tufts of setae extending almost entire length of fixed finger; fixed finger straight, cutting edge with row of small calcareous teeth; terminating in small corneous claw. Carpus with 5 large spines on dorsomesial margin, decreasing in size proximally; distal margin with row of spines, dorsal surface covered with spines and spinulose tubercles, each accompanied by tuft of setae. Merus with row of small to moderately large spines and moderately long setae on

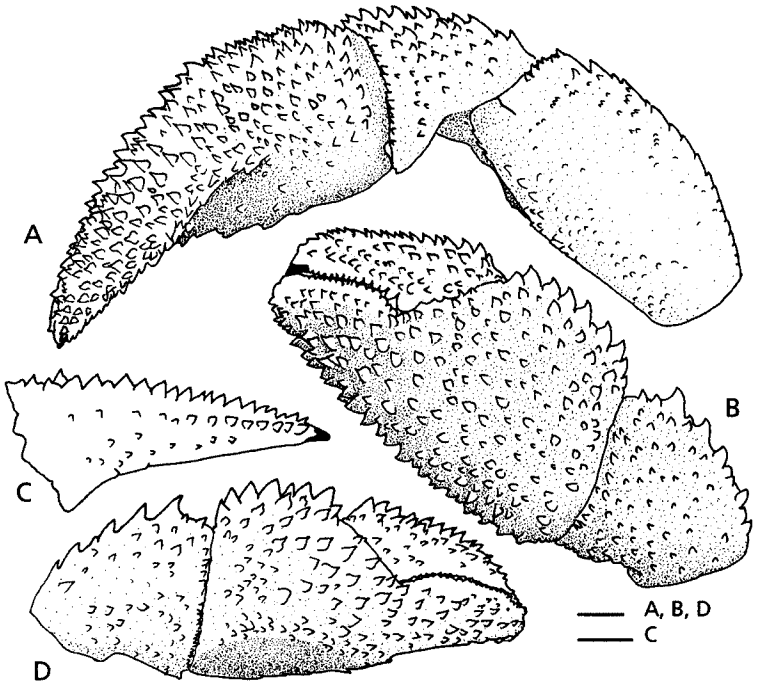

FIG. 7. *Paguristes pusillus* Henderson, 1896, male, 4.6 mm. Chelipeds: A, entire left cheliped, dorsolateral view; B, same, chela and carpus, dorsal view; C, same, dactyl, mesial view; d right cheliped, dorsolateral view. Setae omitted. Scale bars = 1 mm.

FIG. 7. Paguristes pusillus *Henderson, 1896, mâle, 4,6 mm. Chélipèdes : A, chélipède gauche entier, vue dorsolatérale ; B, le même, pince et carpe, vue dorsale ; C, le même, dactyle, vue médiane ; D, chélipède droit, vue dorsolatérale. Soies omises. Échelles = 1 mm.*

dorsodistal margin; dorsal margin with subdistal, transverse row of small spines and setae, remaining dorsal margin with row of short spinulose ridges or spinulose protuberances accompanied by tufts of long setae; mesial and lateral faces weakly spinulose; ventromesial and ventrolateral margins each with row of small spines or spinules and long setae. Ischium with few spinules on ventromesial margin.

Right cheliped slender (Fig. 7D), dactyl and fixed finger without hiatus. Dorsomesial margin of dactyl with row of acute spines, slightly weaker spines distally, accompanied by sparse long setae; dorsal surface with scattered spinulose tubercles and tuft of setae. Palm with row of large spines on dorsomesial margin, dorsolateral margin not delimited, weakly convex dorsal surface with irregular rows of strong spines, each spine accompanied by tuft of setae, denser spines extending onto fixed finger; lateral surface slightly flattened, with scattered tubercles; mesial face with few low tubercles and sparse tufts of setae, ventral surface with row of tuberculate spines and sparse tufts of setae extending almost entire length of fixed finger; cutting edges of dactyl and fixed finger each with row of small calcareous teeth; terminating in small corneous claws.

Second pereopods (Fig. 8A, B, C) with dactyls about 1.8 length of propodi; dorsal margins of dactyls each with double row of tufts of moderately long setae, short row of small spines proximally; lateral faces each with 1 longitudinal row of sparse tufts of short setae; mesial faces each with 1 row of tufts of setae; row of 33-39 small corneous spines on each ventral margin; faint longitudinal sulcus on lateral and mesial faces proximally. Dorsal surfaces of propodi each with row of spines, second row of smaller spines in distal half; lateral faces each with rows of tubercles or protuberances accompanied by tufts of long setae near dorsal and ventral margins; ventral margins each with row of small spines. Carpi each with tufts of long setae and row of moderately large spines on dorsal margin, lateral faces each with shallow, wide longitudinal sulcus and 2 or 3 rows of tufts of short to moderately long setae; ventral surfaces each with few tufts of moderately long setae. Meri each with dorsal row of low protuberances and tufts of long setae; ventral margins each with row of small spines, visible only medially on ventrolateral margin, and tufts of moderately long setae. Mesial faces of carpi and meri flattened. Ischia each with row of small spinules on ventromesial margin.

Third pereopods (Fig. 8D, E, F) with dactyls about 1.9 length of propodi; dorsal margins of dactyls each with row of tufts of moderately long setae, lateral and mesial faces each with 2 longitudinal rows of sparse tufts of short setae; row of

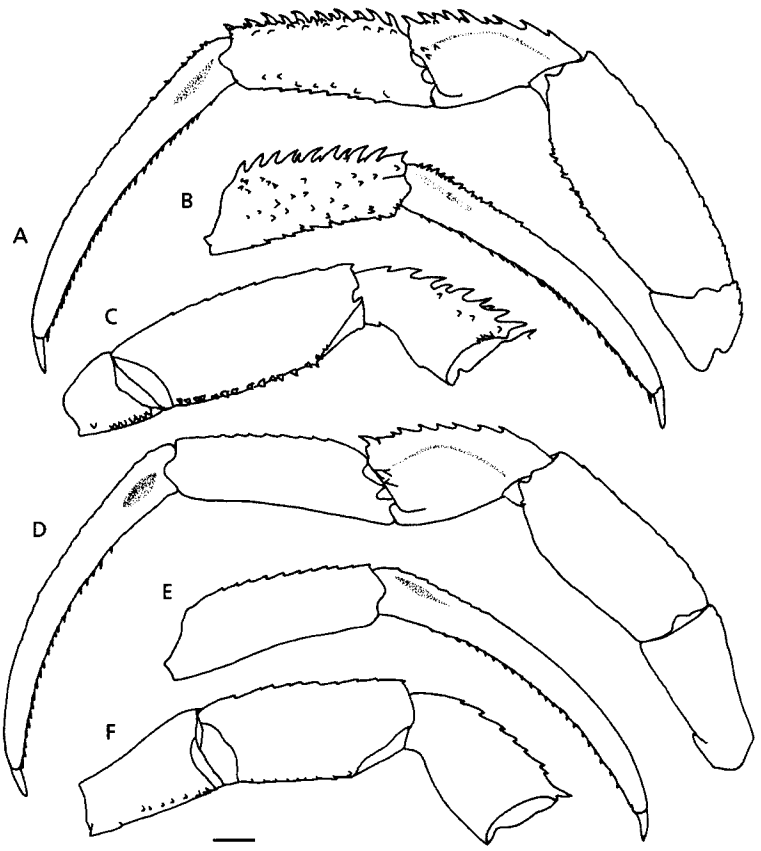

FIG. 8. *Paguristes pusillus* Henderson, 1896, male, 4.6 mm. Pereopods: A, left third pereopod, lateral view; B, same, dactyl and propodus, mesial view; C, same, carpus, merus and ischium, mesial view; D, left second pereopod, lateral view; E, same, dactyl and propodus, mesial view; F, same, carpus, merus and ischium, mesial view. Setae omitted. Scale bar = 1 mm.

FIG. 8. Paguristes pusillus *Henderson, 1896, mâle, 4,6 mm. Péréiopodes : A, troisième péréiopode gauche, vue latérale ; B, le même, dactyle et propode, vue médiane ; C, le même, carpus, mérus et ischium, vue médiane ; D, second péréiopode gauche, vue latérale ; E, le même, dactyle et propode, vue médiane ; F, le même, carpus, mérus et ischium, vue médiane. Soies omises. Échelle = 1 mm.*

32-33 small corneous spines on each ventral margin; lateral and mesial faces each with moderately faint longitudinal sulcus proximally. Dorsal surfaces of propodi each with low protuberances and tufts of long setae, ventral margins each with tufts of setae. Carpi each with irregular row of small spines and 1 large spine distally; lateral faces each with shallow, wide longitudinal sulcus and 2 or 3 rows of tufts of short to moderately long setae; ventral surfaces with few tufts of moderately long setae. Meri each with low protuberance and tufts of long setae on dorsal margin, ventral margins unarmed except for tiny subdistal spine. Mesial faces of carpi and meri slightly flattened.

Fourth pereopods (Fig. 9A) each with long, slender preungual process at base of claw; propodi with moderately dense setation; carpi without dorsodistal spine.

Male first pleopod (Fig. 9B, C) with tuft of setae on outer margin of basal lobe; inferior lamella with row of setae on outer margin, distal margin with 1 row of hooked spines; internal lobe moderately small, with row of long setae on inner margin; external lobe extending slightly beyond distal margin of inferior lamella. Left pleopods 3-5 with vestigial endopods. Second pleopod (Fig. 9D, E) with elongate basal segment, naked. Endopod with few of setae on inner margin and longer setae terminally; appendix masculina with long setae marginally. Female brood pouch large with marginal long setae.

Telson (Fig. 9F) with moderately deep lateral indentations separating anterior and posterior portions; asymmetrical posterior lobes, unarmed, separated by small V-shaped median cleft, terminal margins each with row of long setae extending onto lateral margin; left lobe usually appreciably elongate, subtriangular with rounded apex; right lobe short, subtriangular, terminal margin rounded.

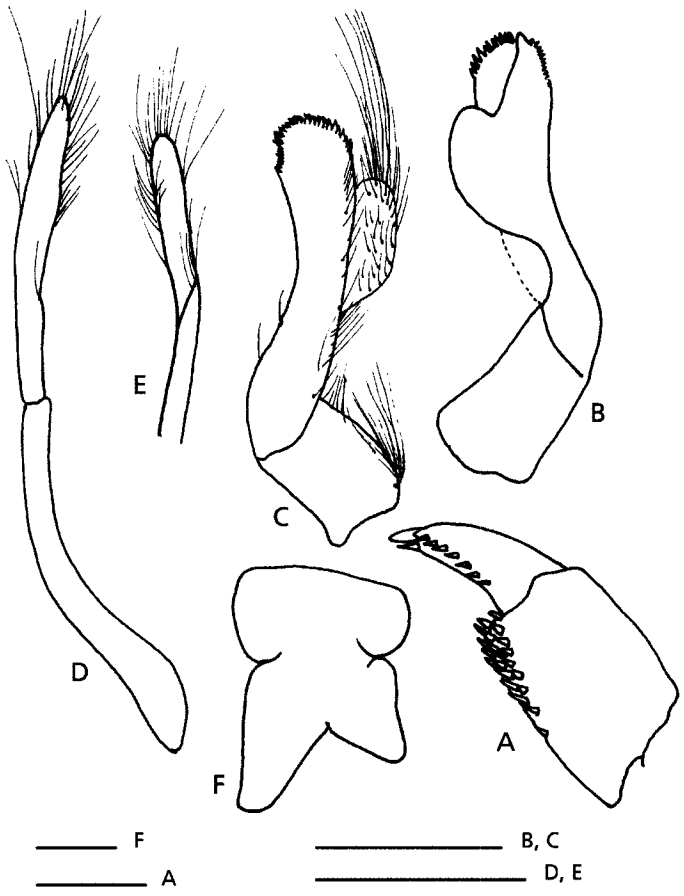

FIG. 9. *Paguristes pusillus* Henderson, 1896, male, 4.6 mm. A, fourth pereopod, lateral view, setae omitted; B, male first pleopod, internal view, setae omitted; C, male first pleopod, external view; D, male second pleopod, internal view; E, same, external view; F, telson, setae omitted. Scale bars = 1 mm.

FIG. 9. Paguristes pusillus *Henderson, 1896, mâle, 4,6 mm. A, quatrième péréiopode, vue latérale, soies omise ; B, premier pléopode male, vue interne, soies omises ; C, premier pléopode mâle, vue externe ; D, second pléopode mâle, vue interne ; E, le même, vue externe ; F, telson. Soies omises. Échelles = 1 mm.*

DISTRIBUTION. — Indian Ocean, Sagami Bay and now recorded from Indonesian waters, from 90-150 m.

REMARKS. — The description given above is based in part on the four males collected during *Siboga* and CORINDON expeditions, and in part on the description of a female specimen from Sri Lanka (Ceylon) that have been compared with the type of *P. pusillus* by Henderson, provided by McLaughlin (pers. comm). Several differences between the four male specimens from Indonesia and a female specimen from Sri Lanka have been observed. The length of the antennal flagellum of Indonesian specimens is longer than carapace (it is not quite as long as the carapace in Sri Lanka specimen); the dactyls of the second and third pereopods are almost twice as long as the propodi in Indonesian specimens, whereas in Sri Lanka specimen the dactyls of the second and third pereopods are only 1.4 length of the propodi. However, these differences appear to fall within expected range of variation of the species.

The sulcus on the lateral and mesial surfaces of the dactyls of the second and third pereopods and the first male pleopod of the four specimens examined in this study vary in accordance with animal size. In the small individual, the sulci on the dactyls of the second pereopods are absent. The inferior lamella of the first male pleopod in the largest specimen had one row of numerous hooked spines on distal margin, whereas, in the smaller specimens the row consists only of a few hooked spines and in the smallest animal the hooked spines were absent.

Paguristes runyanae Haig & Ball, 1988

Paguristes runyanae Haig & Ball, 1988: 173, figs 6, 7.

TYPE MATERIAL. — Banda, 04°32'S, 129°53.3'E, Indonesia, 0-8m. Not seen.

REMARKS. — *Paguristes runyanae* Haig & Ball, 1988 is known only from the holotype and paratypes collected in Banda Island, Indonesia.

Paguristes puniceus Henderson, 1896

Restricted synonymy:
Paguristes puniceus Henderson, 1896: 527.
Paguristes puniceus – McLaughlin 2004: 15, figs 1, 2 (full synonymy).

TYPE MATERIAL. — Bay of Bengal, India, 265-457 m, 30.I.1894: syntype. Not seen.

MATERIAL EXAMINED. — KARUBAR. Stn. CP 77, 08°57'S, 131°27'E, 352-346 m, 3.11.1991: 1 ♂ 3.5 mm (MNHN Pg 7427). — *Siboga*. Stn. 251, 05'28.4°S, 132°0.2'E, 204 m, sand, coral, 8.12.1899: 1 ♂, 3.1 mm (ZMA). — Stn. 74, 04°3.5'S, 119°0'E, 450 m, 8.6.1899 : 1 ♀ 6.0 mm (ZMA).

DISTRIBUTION. — Bay of Bengal, Sumatra, Queensland and now recorded from Makassar Strait and Tanimbar Island, from 193-450 m.

REMARKS. — McLaughlin (2004) discussed in detail the morphological variation of *P. puniceus*. The specimens used in this study agree with the redescription of the species by McLaughlin (2004). Several differences were still observed, such as long and very slightly curved dactyls of the right second and third pereopods, absence of the preungual process on the base of claw of the fourth pereopod, folded internal lobe of the male first pleopod that touches the lateral margin of the inferior lamella, and undeveloped first and second male pleopods in the small size animal, instead, which are represented by transparent protuberances. Those differences, however, still fall within the expected range of variation of *P. puniceus*.

Paguristes aciculus Grant, 1905

Figs 10, 11, 12

Paguristes aciculus Grant, 1905: 319, Pl. xi, figs 3, 3a.
Paguristes aciculus – McCulloch 1913: 345. — Gordan 1956: 321 (literature). — Davie 2002: 54.

TYPE MATERIAL. — Port Jackson Head, Australia. Not seen.

MATERIAL EXAMINED. — The Danish Expedition to the Kei Islands 1922. Stn. 50, 05°34'S, 32°25'40"E, 233m, 4.5.1922: 1 ♀ 9 mm (ZMUC). — Th. Mortensen's Expeditions 1899-1930. Stn. 7, 08°29'S, 114°40'E, 200m, 5.4.1929: 2 ♂, 6.2, 6.8 mm (ZMUC).

DESCRIPTION. — Biserial gills. Shield (Fig. 10A) as long as or slightly longer than broad; dorsal surface with several small spines laterally; tufts of long setae on lateral margin. Rostrum broadly triangular, slightly exceeding lateral projections, with terminal spinule and tufts of setae. Lateral projections broadly triangular, each with terminal spine. Branchiostegites with 1-3 small spines on anterior margins. Posterior carapace with large median plate well calcified.

Ocular peduncles about 0.5 length of shield; dorsal surfaces each with row of long setae on proximal half to entire length; cornea not dilated, corneal diameter about 0.2 of peduncular length. Ocular acicles triangular, each terminating acutely, with 1 terminal spine; separated basally by 0.5 basal width of 1 acicle.

Antennular peduncles, when fully extended, exceeding distal margins of corneas by 0.5 length of ultimate segments. Ultimate and penultimate segments unarmed; basal segment with 1-2 spinules on distolateral margin, ventrolateral distal margin produced into elongate spiniform process, lateral margin with 1 spine medially.

Antennal peduncles as long as ocular peduncles; segments obscured by long setae, especially first to third segments and antennal acicle. Fifth segment unarmed; fourth segment with dorsodistal spinule; third segment with ventromesial distal angle produced, terminating in acute spine; second segment with dorsolateral distal angle produced, terminating in bifid

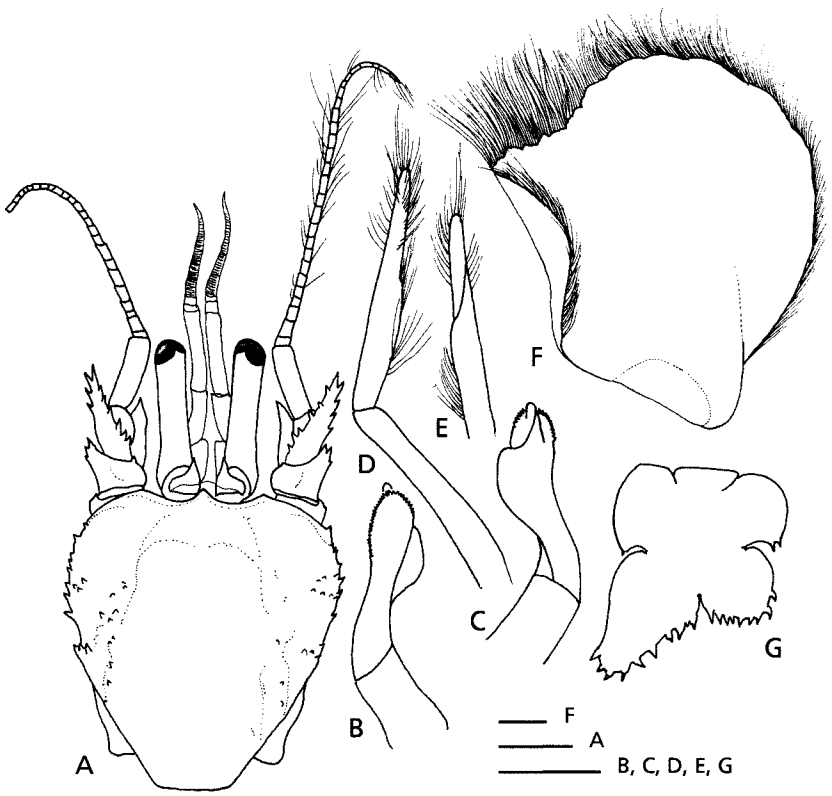

FIG. 10. *Paguristes aciculus* Grant, 1905. A, F, G, female, 9 mm; B, C, D, E, male, 6.2 mm. A, shield and cephalic appendages, setae partially omitted; B, male first pleopod, external view, setae omitted; C, same, internal view, setae omitted; D, male second pleopod, internal view; E, same, external view; F, brood pouch; G, telson, setae omitted. Scale bars = 1 mm.

FIG. 10. Paguristes aciculus *Grant, 1905. A, F, G, femelle, 9 mm ; B, C, D, E, mâle, 6,2 mm. A, bouclier et appendices céphaliques, soies partiellement omises ; B, premier pléopode mâle, vue externe, soies omises ; C, le même, vue interne, soies omises ; D, second pléopode mâle, vue interne ; E, le même, vue externe ; F, poche incubatrice ; G, telson, soies omises. Échelles = 1 mm.*

spines, 1 spine on lateral margin medially, dorsomesial distal angle with 1 spine. Antennal acicle reaching mid-length of fifth peduncular segment, terminating in prominent bifid spine; mesial margin with 4-6 spines, lateral margin with 1-3 spines. Antennal flagellum 1.2 to 1.5 length of shield, each article with sparse tuft of setae, becoming longer and denser distally.

Chelipeds (Fig. 11A, B, C, D) approximately equal or subequal, left slightly larger, armature generally similar, dactyl and fixed finger with narrow hiatus proximally. Dorsomesial margin of dactyl delimited by row of acute, corneous-tipped spines, accompanied by moderately long setae; dorsal surface with irregular rows of corneous-tipped spines and tufts of long setae; mesial face (Fig. 11D) with scattered of small corneous spines, and larger corneous-tipped spines near dorsal margin, accompanied by sparse long setae; ventral margin with row of tufts of long setae; cutting edge with row of small calcareous teeth in proximal half, corneous teeth in distal half; terminating in small corneous claw. Palm with row of 3 or 4 large, corneous-tipped spines and tuft of setae on dorsomesial margin, dorsolateral margin not delimited; weakly convex dorsal surface with irregular rows of large, corneous-tipped spines, extending onto fixed finger, each spine accompanied by tuft of stiff, long setae; lateral surface with several corneous-tipped spines and tufts of long setae; mesial face with row of corneous-tipped spines or tubercles near dorsal margin and some scattered spines, accompanied by tufts of setae; ventral surface with row of spines and sparse tufts of setae extending almost entire length of fixed finger; cutting edge of fixed finger with row of small calcareous teeth on proximal half, corneous teeth distally; terminating in small corneous claw. Carpus with 4 large spines on dorsomesial margin, each accompanied by long plumose setae; dorsal surface with irregular rows of large, corneous-tipped spines, each accompanied by tuft of setae, few tubercles present on lateral surface; mesial face with protuberances accompanied by tuft of long setae. Merus with row of moderately large corneous-tipped spines and long plumose setae on dorsodistal margin; dorsal surface with subdistal, transverse row of small to moderately large spines

and long setae, remaining dorsal surface with row of short spinulose ridge, accompanied by tufts of long setae; mesial and lateral faces spinulose; ventromesial and ventrolateral margins each with row of corneous-tipped spines and long setae. Ischium with few spinules on ventromesial margin.

Second (Fig. 12C, D) pereopods with dactyls about1.7 length of propodi; dorsal margins of dactyls each with row of strong, corneous-tipped spines proximally, becoming smaller and more widely-spaced distally, partially obscured by long, stiff setae; lateral faces each with longitudinal rows of tufts of long setae, and tiny corneous spines distally; mesial faces each with rows of tufts of setae, several small corneous spines proximally; row of 16-21 small corneous spines on each ventral margin, partially obscured by long, dense setae. Propodi each with row of strong, corneous-tipped spines accompanied by long plumose setae, and second row of smaller corneous-tipped spines and tuft of setae laterally on dorsal surface; lateral faces each with 2 rows of tuft of setae medially; near ventral margin row of conical tubercles accompanied by tufts of long setae; ventral margins each with row of corneous-tipped spines and tufts of plumose setae; mesial faces each with irregular rows of spines, concealed by tuft of long, stiff setae. Carpi each with row of large spines and tufts of long setae on dorsal margin; lateral faces each with tufts of long setae and longitudinal sulcus, few corneous-tipped spines and 2 or 3 large spines distally, concealed by tuft of long setae; ventral surfaces each with few tubercles distally and tufts of moderately long setae. Dorsal margins of meri each with row of small spines proximally, accompanied by tufts of long plumose setae; ventrolateral margins each with row of spines, stronger spines on ventromesial margins, and tufts of moderately long setae. Ischia each with row of small spinules on ventromesial margin.

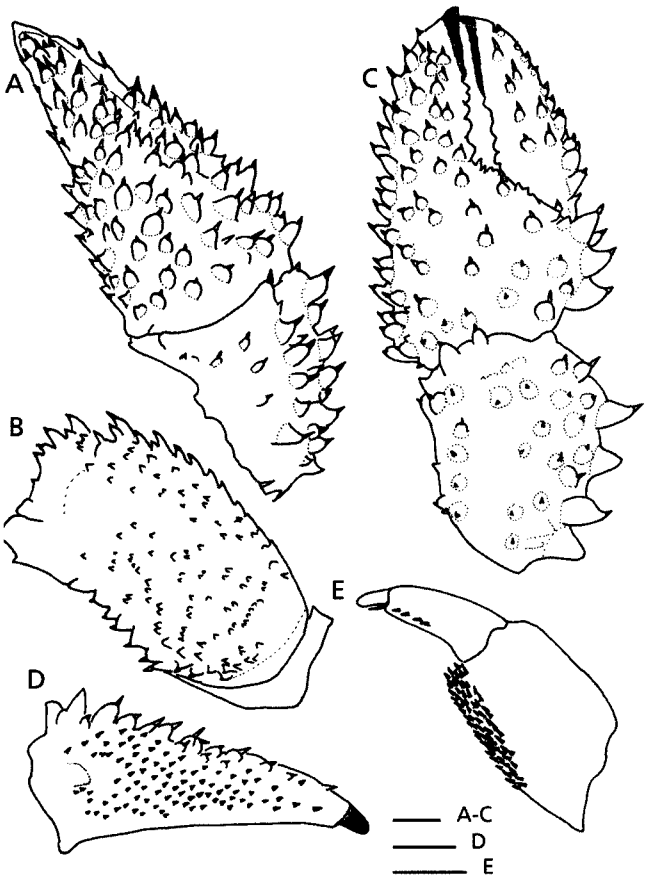

FIG. 11. *Paguristes aciculus* Grant, 1905. Female, 9 mm. Left cheliped: A, chela and carpus, lateral view; B, merus, lateral view; C, chela and carpus, dorsal view; D, dactyl, mesial view; E, left fourth pereopod, lateral view. Setae omitted. Scale bars = 1 mm.

FIG. 11. Paguristes aciculus *Grant, 1905. Femelle, 9 mm. Chélipède gauche : A, pince et carpus, vue latérale ; B, mérus, vue latérale ; C, pince et carpus, vue dorsale ; D, dactyle, vue médiane ; E, quatrième péréiopode gauche, vue latérale, soies omises. Échelles = 1 mm.*

Third pereopods (Fig. 12A, B) with dactyls 1.6-1.8 length of propodi; dorsal margins of dactyls each with row of small corneous-tipped spines proximally, and smaller and more widely-spaced spines distally, obscured by tufts of long plumose setae, mesial faces each with longitudinal rows of small corneous spines medially and rows of stiff, short or long setae, shallow sulcus proximally; row of 16-21 small corneous spines present on each ventral margin, partially obscured by long plumose setae. Dorsal margins of propodi each with row of small corneous-tipped spines accompanied by long, stiff setae; lateral faces each with protuberances accompanied by tufts of long and stiff setae near dorsal margin, sometimes with row of small corneous-tipped spines accompanied by tuft of stiff setae near ventral margin, and with longitudinal row of setae medially; ventral margins each with row of corneous-tipped spines, partially obscured by long setae, mesial faces each with irregular rows of spinulose tubercles and long, stiff setae. Carpi each with small dorsodistal and dorsoproximal spines, sometimes with irregular row of small spines on entire dorsal margin; lateral faces each with longitudinal sulcus and 2 or

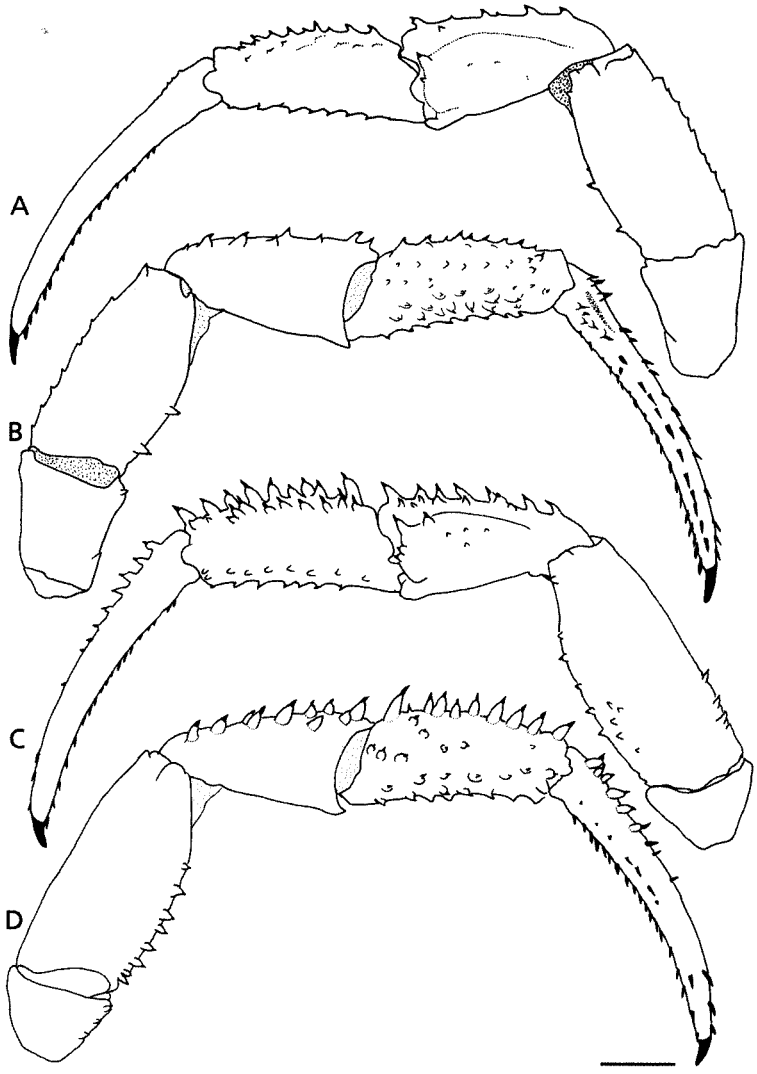

FIG. 12. *Paguristes aciculus* Grant, 1905. Female, 9 mm. Pereopods: A, left third pereopod, lateral view; B, same, mesial view; C, left second pereopod, lateral view; D, same, mesial view. Setae omitted. Scale bar = 1 mm.

FIG. 12. Paguristes aciculus *Grant, 1905. Femelle, 9 mm. Péréiopodes : A, troisième péréiopode gauche, vue latérale ; B, le même, vue médiane ; C, second péréiopode gauche, vue latérale ; D, le même, vue médiane. Soies omises. Échelle = 1 mm.*

3 rows of long setae; ventral surfaces with few tufts of moderately long setae. Meri each with low protuberance and tuft of long setae on each dorsal margin, ventromesial margins each with 2 spines.

Fourth pereopods (Fig. 11E) each with long, slender preungual process at base of claw; propodi with moderately dense setation; carpi with dorsodistal corneous-tipped spine.

Male first pleopod (Fig. 10B, C) with tuft of setae on outer margin of basal lobe; inferior lamella with row of setae on outer margin, distal margin with 1 row of spines; internal lobe moderately small, with row of long setae on inner margin; external lobe extending beyond distal margin of inferior lamella. Second pleopod (10D, E) with elongate basal segment, naked. Endopod with several setae on inner margin and longer setae terminally; appendix masculina with long setae marginally. Left pleopods 3-5 with vestigial endopods. Female brood pouch (Fig. 10F) largely subquadrate, margin with long setae.

Telson (Fig. 10G) with deep lateral indentations separating anterior and posterior portions; posterior lobes asymmetrical, separated by V-shaped median cleft, terminal margins each with row of strong corneous-tipped spines and long setae extending onto lateral margin on right lobe; left lobe usually appreciably elongate; right lobe short, subquadrate.

DISTRIBUTION. — *Paguristes aciculus* has been reported from Port Jackson Head, Australia, from 250-300 fathoms. The record from Indonesian waters extends its geographical distribution northward, and its bathymetric range to 233 m.

REMARKS. — The present specimens from Indonesia agree well with the original description of *Paguristes aciculus* by Grant (1905). Although his description was fairly detailed, he failed to mention that the telson bears several strong spines on the terminal margins. The intact female specimen provides the opportunity to add the description of the brood pouch.

The spines on the dorsal margins of propodi and carpi of the third pereopods of the two male specimens are less developed than those of the female. It might be size-related variation because of the smaller size of the male specimens compared to the female specimen.

Paguristes antennarius n. sp.

Figs 13, 14, 15

TYPE MATERIAL. — Holotype and paratypes. KARUBAR. Stn. 75, 08°46'S, 131°36'E, 452-451 m, 03.11.1991: holotype, ♂, 5.1 mm (MNHN Pg 7428); paratypes: Stn. DW 28, 05°31'S, 132°54'E, 448-467 m, 26.10.1991: 1 ♀, 3.2 mm (MNHN Pg 7429); Stn. CC 58, 08°19'S, 132°02'E, 457-461 m, 31.10.1991: 1 ♀, 7.2 mm (MNHN Pg 7430); Stn. CP 75, 08°46'S, 131°36'E, 452-451 m, 03.11.1991: 1 ♀, 3.4 mm (MZB). — Paratypes. Th. Mortensen's Expeditions 1899-1930. Stn. 7, 08°29'S, 114°40'E, 200m, 5.4.1929: 2 ♂, 4.6, 6.2 mm, 3 ♀ 2.9, 4.4, 5.6 mm (ZMUC); Stn.11, 08°30'S, 114°38'E, 450 m, 7.4.1929: 1 ♂, 5.6 mm (ZMUC)

MATERIAL EXAMINED. — The type material (see above).

DESCRIPTION. — Biserial gills. Shield (Fig. 13A) as long as broad; dorsal surface with some small spines laterally. Rostrum broadly triangular, falling short of lateral projections. Lateral projections broadly triangular with terminal spinule. Branchiostegites with 1-3 spinules on anterior margins. Posterior carapace with median plate large, well calcified.

Ocular peduncles about 0.5 length of shield; dorsal surfaces each with row of long setae; corneal diameter about 0.2 of peduncular length. Ocular acicles small, triangular, each terminating acutely; separated basally by 0.5 basal width of 1 acicle. Interocular lobe broadly triangular, obtuse, not calcified.

Antennular peduncles, when fully extended, exceeding corneas by entire length of ultimate segment. Ultimate and penultimate segments unarmed; basal segment with 1-2 spinules on distolateral margin, ventrolateral distal margin produced into elongate spiniform process, lateral margin with 1 spine medially.

Antennal peduncles exceeding corneas. Fifth segment unarmed; fourth segment with dorsodistal spinule; third segment with ventrodistal angle produced, terminating in prominent bifid spine; second segment with dorsolateral distal angle produced, terminating in bifid spines, 1 spine on lateral margin medially and tuft of long setae, dorsomesial distal angle with 1 spine. Antennal acicle reaching 0.8 length of fifth peduncular segment, with prominent terminal bifid spine; mesial margin with 4 corneous-tipped spines, lateral margin with 1 spine and long setae. Antennal flagellum about 1.6 length of shield, each article with tuft of setae, longer and denser distally.

Chelipeds (Fig. 13B, C, D) subequal, left slightly larger, armature similar, dactyl and fixed finger without hiatus. Dactyl about 1.7 times longer than palm, dorsomesial margin with row of corneous-tipped spines accompanied by long setae, and irregular second row of smaller spines on dorsal surface; dorsal surface with few long setae; mesial face (Fig. 13D) with irregular, oblique or longitudinal rows of small corneous spines, larger corneous spines near dorsal margin, long setae on ventral margin; cutting edge with row of calcareous teeth in proximal half, and corneous teeth in distal half; terminating in small corneous claw. Palm about 0.7 length of carpus, dorsomesial margin with 4 large, corneous-tipped spines, dorsolateral margin not delimited; weakly convex dorsal surface with irregular rows of large, corneous-tipped spines, each accompanied by tuft of long stiff setae, smaller spines extending onto fixed fingers; lateral face with some corneous-tipped spines; mesial face with longitudinal row of tubercles accompanied by long setae; ventral surfaces with row of corneous-tipped spines and sparse tufts of setae extending almost entire length of fixed fingers; cutting edges of fixed finger with row of small calcareous teeth; terminating in long corneous claw. Carpus about 0.6 length of merus, dorsomesial margin with 4 large, corneous-tipped spines, each accompanied by long plumose setae, irregular double rows of moderately large spines adjacent to dorsal margin, accompanied by tuft of setae; dorsal surface with row of corneous-tipped spines medially, each accompanied by tuft of setae, few tubercles present on lateral face. Merus with row of moderately large corneous-tipped spines and long, plumose setae on dorsodistal margin; dorsal surface with subdistal, transverse row of moderately large spines and long setae, remaining dorsal surface with row of short spinulose ridges accompanied by tufts of long setae; mesial and lateral faces weakly spinulose; ventromesial and ventrolateral margins each with row of small spines and long setae. Ischia with few spinules on ventromesial margin.

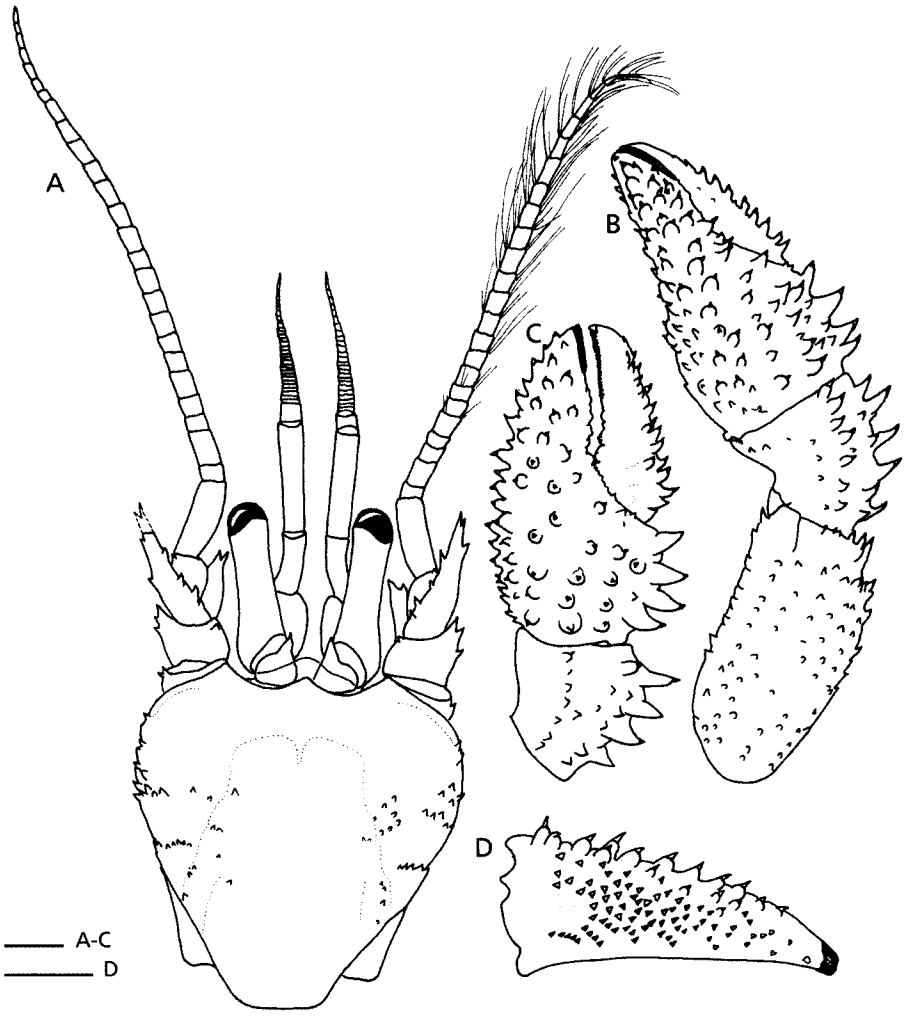

FIG. 13. *Paguristes antennarius* n. sp. Holotype, male, 5.1 mm. A, shield and cephalic appendages, setae partially omitted; B, left cheliped, entire, lateral view, setae omitted; C, same, chela and carpus, dorsal view, setae omitted; D, same, dactyl, mesial view, setae omitted. Scale bars = 1 mm.

FIG. 13. *Paguristes antennarius n. sp. Holotype, mâle, 5,1 mm. A, bouclier et appendices céphaliques, soies partiellement omises ; B, chélipède gauche entier, vue latérale, soies omises ; C, le même, pince et carpe, vue dorsale, soies omises ; D, le même, dactyle, vue médiane, soies omises. Échelles = 1 mm.*

Second (Fig. 14A, B) pereopods with dactyls about 1.7 length of propodi; dorsal margins each with row of tufts of long, plumose setae, and row of strong, corneous-tipped spines proximally, smaller and more widely-spaced spines distally; lateral faces each with longitudinal row of tufts of short setae; mesial faces each with row of tufts of setae, small corneous spines proximally; row of 16-17 small corneous spines on each ventral margin, partially concealed by long plumose setae. Dorsal surfaces of propodi each with row of 8-9 large corneous-tipped spines accompanied by long plumose setae; lateral faces each with row of small corneous-tipped spines accompanied by tufts of plumose setae near dorsal margin and row of conical tubercles and tuft of setae near ventral margin; 2 rows of tuft of short setae present medially; ventral margins each with row of small corneous-tipped spines and tufts of plumose setae; mesial faces each with irregular rows of spines accompanied by tufts of long setae. Carpi each with tufts of long setae and row of strong spines on dorsal margin; lateral faces each with longitudinal sulcus and 2 or 3 strong spines distally, concealed by tufts of long setae; ventral surfaces each with few tubercles distally and tufts of moderately long setae. Dorsal margins of meri each with row of small spines, accompanied by tufts of long plumose setae; ventral margins each with row of spines, and tufts of moderately long plumose setae. Ischia each with row of small spinules on ventromesial margin.

Third pereopods (Fig. 14C, D) with dactyls about 1.6 length of propodi; dorsal margins each with row of tufts of long plumose setae; mesial faces each with longitudinal row of small corneous spines medially and tufts of short setae; row of

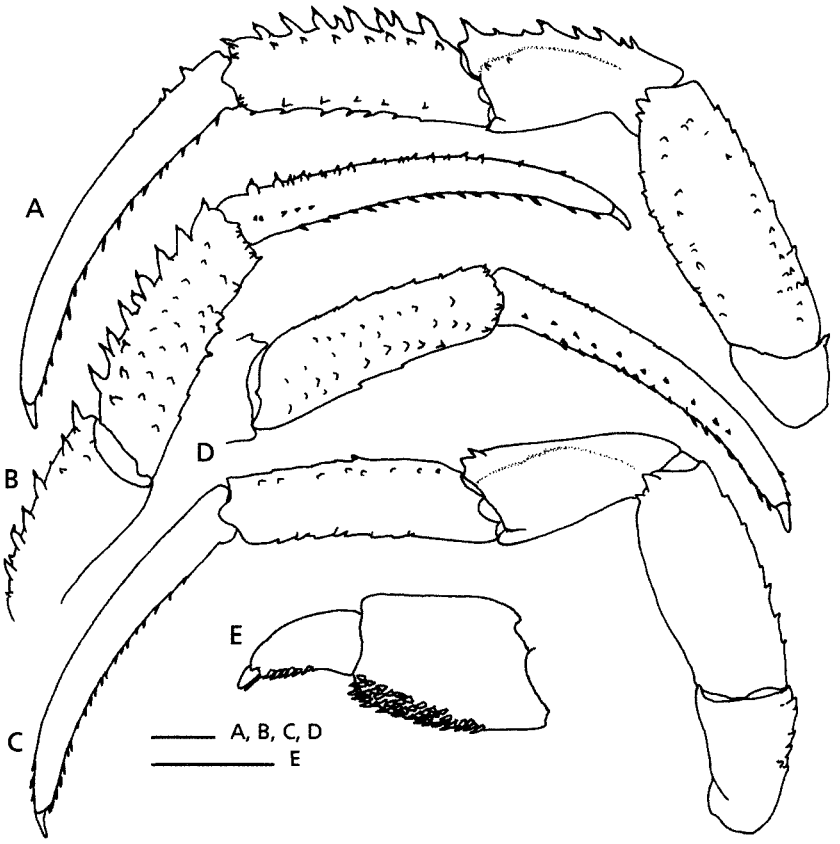

FIG. 14. *Paguristes antennarius* n. sp. Holotype, male, 5.1 mm. Pereopods: A, left second pereopod, entire, lateral view; B, same, dactyl, propodus and carpus, mesial view; C, left third pereopod, entire, lateral view; D, same, dactyl and propodus, mesial view; E, left fourth pereopod, lateral view. Setae omitted. Scale bars = 1 mm.

FIG. 14. Paguristes antennarius *n. sp. Holotype, mâle, 5,1 mm. Péréiopodes : A, second péréiopode gauche entier, vue latérale ; B, le même, dactyle, propodus et carpus, vue médiane ; C, troisième péréiopode gauche entier, vue latérale ; D, le même, dactyle et propodus, vue médiane ; E, quatrième péréiopode gauche, vue latérale. Soies omises. Échelles = 1 mm.*

16-19 small corneous spines on each ventral margin, partially concealed by long plumose setae. Dorsal and ventral margins of propodi each with row of small spines accompanied by dense, long plumose setae; lateral faces each with row of setae medially; mesial faces each with 3 irregular rows of tubercles accompanied by long setae. Dorsal margins of carpi each with tufts of long setae and 1 spine distally; lateral faces each with longitudinal sulcus and tufts of long setae; ventral surfaces each with few tufts of moderately long setae. Meri with low protuberance and tuft of long setae on each dorsal margin, ventral margins each with distal spine. Ischia each with row of spines on dorsal margin.

Fourth pereopods (Fig. 14E) each with long, slender preungual process at base of claw; propodi with moderately dense setation; carpi each with dorsodistal spine.

Male first pleopod (Fig. 15A, B) with tuft of setae on outer margin of basal lobe; inferior lamella with row of curved spines on distal margin; internal lobe rounded, external lobe longer than inferior lamella. Second pleopod (Fig. 15B, C) with elongate basal segment, naked. Endopod twisted, with few of setae on inner margin and longer setae terminally; appendix masculina with long setae marginally. Female paired first pleopods 2-segmented. Brood pouch (Fig. 15E) subtriangular, margin weakly scalloped and with marginal long setae. Tergal thickenings above acetabula of pleopods 2-4 sometimes with fringe of long dense setae.

Telson (Fig. 15F) with deep lateral indentations separating anterior and posterior portions; asymmetrical posterior lobes, separated by V-shaped median cleft; left lobe elongate, rounded, terminal margin with small corneous spines; right lobe much shorter, rounded, terminal margin with small spines; margins both with long setae obscuring spination.

DISTRIBUTION. — Kai and Tanimbar Islands in Maluku and south of Java Island, from 200-452 m depth.

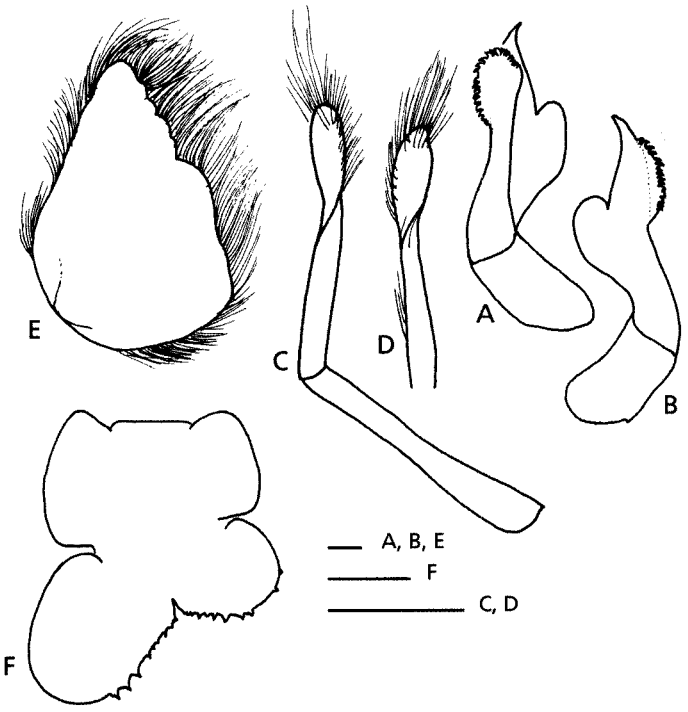

FIG. 15. *Paguristes antennarius* n. sp. A-D, F, Holotype, male, 5.1 mm; E, paratype, female, 7.2 mm. A, male first pleopod, external view, setae omitted; B, same, internal view, setae omitted; C, male second pleopod, internal view; D, same, external view; E, brood pouch; F, telson, setae omitted. Scale bars = 1 mm.

FIG. 15. Paguristes antennarius *n. sp. A-D, F, Holotype, mâle, 5,1 mm ; E, paratype, femelle, 7,2 mm. A, premier pléopode mâle, vue externe, soies omises ; B, le même, vue interne, soies omises ; C, second pléopode mâle, vue interne ; D, le même, vue externe ; E, poche incubatrice ; F, telson, soies omises. Échelles = 1 mm.*

REMARKS. — This species resembles *P. aciculus* in having short ocular peduncles, small corneas, densely hirsute and spinose chelipeds and pereopods. It differs in several details, notably in the development of the spines and the setae of the chelipeds and the pereopods that are weaker in *P. antennarius*. Additionally, comparison of the individuals of same size and sex, showed that in *P. antennarius* the ocular peduncles were relatively shorter and the antennal peduncles were stouter than in *P. aciculus*. However, those characters might fall within the expected ranges of intraspecific variations. The most reliable character to distinguish the two species is the shape and armament of the telson. In *P. antennarius* the lobes of the telson are rounded with small marginal spines while in *P. aciculus* the lobes are subtriangular, and the rounded apices are armed with strong, corneous-tipped spines.

Although the antennal flagella is variable in length and setation in *P. puniceus* (see McLaughlin 2004), in *P. antennarius* this characters is quite stable. Over the full size range of specimens in this study the antennal flagella are always longer than shield and considerably stouter and more hirsute than those of *P. aciculus*.

ETYMOLOGY. — From the Latin, *antenna*, alluding to the stout antennal peduncles.

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REFERENCES

ALCOCK A. 1905. — *Catalogue of the Indian Decapod Crustacea in the collections of the Indian Museum*. Part II: *Anomura*. Fasc. I: *Pagurides*. Indian Museum, Calcutta, xi + 197 p.

ALCOCK A. & ANDERSON R. S. 1897. — Crustacea. Part 5, *in Illustrations of the Zoology of the Royal Indian Marine Surveying Steamer Investigator under the command of Commander C. F. Oldham, R. N.*, Calcutta: pls 28-32.

BAKER W. H. 1905. — Notes on South Australian Decapod Crustacea. Part III. *Transactions of the Royal Society of South Australia* 29: 252-269.

BALSS H. 1912. — Paguriden, *in* CHUN C. (ed.), *Wissenschaftliche Ergebnisse der deutschen Tiefsee-Expedition* Valdivia *1898-1899* 20 (2): 85-124.

BALSS H. 1913. — Ostasiatische Dekapoden I. Die Galatheiden und Paguriden, *in* DOLFEIN F. (ed.), Beiträge zur Naturgeschichte Osasiens. *Abhandlungen der Mathematisch-Physikalischen Classe der Königlich Bayerischen Akademie der Wissenschaften,* suppl. 2 (9): 1-85.

DANA J. D. 1851. — Conspectus crustaceorum quae in orbis terrarum circumnavigatione, Carolo Wilkes e classe reipublicae foederatae duce, lexit et descripsit. (Preprint from) *Proceedings of the Academy of Natural Sciences,* Philadelphia 5: 267-272.

DANA J. D. 1852a. — Conspectus crustaceorum, etc., Conspectus of the Crustacea of the Exploring Expedition under Capt. Wilkes, U. S. N., including the Paguridea, continued, the Megalopidea, and the Macroura. Paguridea, continued, and subtribe Megalopidea. (Preprint from) *Proceedings of the Academy of Natural Sciences,* Philadelphia (1854) 6: 6-28.

DANA J. D. 1852b. — Crustacea. Part I. *United States Exploring Expedition, during the years 1838, 1839, 1840, 1841, 1842, under the command of Charles Wilkes, U. S. N.* Vol. 13, C. Sherman, Philadelphia (Reprinted Antiquariaat Junk, Lochem, Netherlands, 1972), 685 p.

DAVIE P. J. F. 2002. — Crustacea: Malacostraca Eucarida (Part 2). Decapoda, Anomura, Brachyura, *in* WELLS A. & HOUSTON W. W. K. (eds.), *Zoological Catalogue of Australia. 19.3B.* CSIRO Publishing, Melbourne, xiv + 641 p.

FOREST J. 1954. — Les *Paguristes* des côtes occidentales et méridionales d'Afrique. *Annals of the South African Museum* 41: 159-213.

FOREST J. & MCLAUGHLIN P. A. 2000. — Superfamily Coenobitoidea, Families Pylochelidae and Diogenidae, *in* FOREST J., SAINT LAURENT M. DE, MCLAUGHLIN P. A. & LEMAITRE R. (eds), The marine fauna of New Zealand: Paguridea (Decapoda: Anomura) exclusive of the Lithodidae. *NIWA Biodiversity Memoir* 114: 31-103.

FOREST J. & SAINT LAURENT M. de 1968. — Résultats scientifiques des campagnes de la "Calypso". Part VII. Campagne de la Calypso au large des côtes Atlantiques de l'Amérique du Sud (1961-1962). 6. Crustacés Décapodes: Pagurides. *Annales de l'Institut Océanographique de Monaco,* n. s. 45 (2): 45-172.

GORDAN J. 1956. — A bibliography of pagurid crabs, exclusive of Alcock, 1905. *Bulletin of the American Museum of Natural History* 108: 253-352.

GRANT F. E. 1905. — Crustacea dredged off Port Jackson in deep water. *Proceedings of the Linnean Society of New South Wales* 2: 312-324.

HAIG J. & BALL. E. E 1988. — Hermit crabs from northern Australian and eastern Indonesian waters (Crustacea Decapoda: Anomura; Paguroidea) collected during 1975 Alpha Helix Expedition. *Records of the Australian Museum* 40: 151-196.

HENDERSON J. R. 1896. — Natural history notes from H. M. Investigator Commander C. F. Oldham, R. N., commanding. 2 (24). Report on the Paguridae collected during the season 1893-1894. *Journal of the Asiatic Society of Bengal* 65 (2): 516-536.

KOMAI T. 2001. — A review of the north-western Pacific species of the genus *Paguristes* (Decapoda: Anomura: Diogenidae). I. Five species initially reported by Ortmann (1892) from Japan. *Journal of Natural History* 35: 357-428.

LÖRENTHEY E. & BEURLEN K. 1929. — Die fossilen Dekapoden der Länder de ungarischen Krone. *Mathematische und Naturwissenschaftliche Berichte aus Ungarn* 25 (3): 1-420.

MCCULLOCH A. R. 1913. — Studies in Australian Crustacea. *Records of the Australian Museum* 9: 321-353.

MCLAUGHLIN P. A. 1974. — The hermit crabs (Crustacea Decapoda, Paguridea) of northwestern North America. *Zoologische Verhandelingen* 130: 1-396.

MCLAUGHLIN P. A. 2002. — *Pseudopaguristes* a new and aberrant genus of hermit crabs (Anomura: Paguridea: Diogenidae). *Micronesica* 34: 185-199.

MCLAUGHLIN P. A. 2004. — *Paguristes puniceus* Henderson, 1896 (Decapoda: Anomura: Paguroidea: Diogenidae): A study in intraspecific variability. *Zootaxa* 742: 1-28.

MCLAUGHLIN P. A. & PROVENZANO A. J. Jr. 1974. — Hermit crabs of the genus *Paguristes* (Crustacea: Decapoda: Diogenidae) from the western Atlantic. Part I. The *Paguristes tortugae* complex, with notes on variation. *Bulletin of Marine Science* 24: 165-234.

MCLAUGHLIN P. A. & PROVENZANO A. J. Jr. 1975. — Hermit crabs of the genus *Paguristes* (Crustacea: Decapoda: Diogenidae) from the western Atlantic. Part II. Descriptions of six new species. *Bulletin of Marine Science* 24 (1974), 885-938.

MILNE-EDWARDS A. & BOUVIER E.-L. 1893. — Reports on the results of dredging, under the supervision of Alexander Agassiz, in the Gulf of Mexico, and in the Caribbean sea, 1877, 1878, 1879, by the United States Coast Survey Steamer "Blake", Lieut.-Commander C. D Sigsbee, U. S. N., and Commander J.R. Bartlett, U. S. N., commanding. XXXIII. Description des Crustacés de la famille des paguriens recueillis pendant l'expédition. *Memoirs of the Museum of Comparative Zoology, Harvard College* 14 (3): 5-172.

MIYAKE S. 1978. — *The crustacean Anomura of Sagami Bay*. Biological Laboratory, Imperial Household, Tokyo: 1-200 [in English]; 1-161 [in Japanese].

NOBILI G. 1907. — Ricerche sui crostacei della Polinesia. Decapodi, stomatopodi, anisopodi e isopodi. *Memorie della Reale Accademia delle Scienze di Torino* 2 (57): 351-430.

ORTMANN A. 1892. — Die Decapoden-Krebse des Strassburger Museum. IV. Die Abtheilungen Galatheidea und Paguridea. *Zoologisher Jahrbucher-Syatematik* 6: 241-326.

PROVENZANO A. J. Jr. & RICE A. L.1966. — Juvenile morphology and the development of taxonomic characters in *Paguristes sericeus* Milne-Edwards (Decapoda, Diogenidae). *Crustaceana* 10: 53-69.

RAHAYU D. L. 2005. — Addition to the Indonesian fauna of the hermit crab genus *Pseudopaguristes* McLaughlin and a further division of the genus

Paguristes Dana (Crustacea: Decaoda: Paguroidea: Diogenidae). *Zootaxa* 831: 1-42.

SOUTHWELL T. 1906. — Report on the Anomura collected by Professor Herdman at Ceylon in 1902, *in* HERDMAN W. A. (ed.), *Report to the government of Ceylon on the pearl oyster fisheries of the Gulf of Manaar, with supplementary report upon the marine biology of Ceylon, by other naturalists. Part V.* Royal Society, London: 211-224.

THOMPSON E. F. 1943. — Paguridae and Coenobitidae. *The John Murray Expedition 1933-1934, Scientific Reports* 7 (5): 411-426.

THOMSON G. M. 1899. — A revision of the Crustacea Anomura of New Zealand. *Transactions and Proceedings of the New Zealand Institute, Zoology* 31: 169-197.

WANG F.-Z. & TUNG Y.-M. 1982. — New subspecies and new records of hermit crabs (Crustacea, Anomura) from China. *Acta Zootaxonomica Sinica* 7 (4): 368-371

YOKOYA Y. 1933. — On the distribution of decapod Crustacea inhibiting the continental shelf around Japan, chiefly based upon the material collected by S. S. "Soyo Maru" during the years 1923-1930. *Journal of the College of Agriculture Tokyo Imperial University* 12 (1): 1-236.

ZARIQUIEY ALVAREZ R. 1968. — Crustáceos Decápodos Ibéricos. *Investigación Pesquera* 32: vi + 510 p.