The Indo-Pacific Pilumnidae XVII. On the identity of *Pilumnus elatus* A. Milne-Edwards, 1873 (Crustacea, Decapoda, Brachyura)

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Abstract: The systematic position of the enigmatic Pacific species, *Pilumnus elatus* A. Milne-Edwards, 1873, is clarified upon study of a male specimen. The species is neither a member of the genus *Pilumnus* or the family Pilumnidae, but is in fact much closer to *Planopilumnus*, and is here referred to the Planopilumninae in the Pseudoziidae. The species and new genus, here named *Haemocinus*, is diagnosed and figured in detail.

Key words: Taxonomy, Pseudoziidae, Pilumnidae, Philippines, new genus.

Introduction

The taxonomic position of the rare pilumnid crab, *Pilumnus elatus* A. Milne-Edwards, 1873, has been uncertain. Although it has long been placed in the genus *Pilumnus* Leach, 1815, its position there has been questioned. In 1995, the author had the opportunity to examine a wet-preserved male specimen of *P. elatus* in The Naturalis (ex-Rijksmuseum van Natuurlijke Historie, RMNH, Leiden, The Netherlands). The structures of the first and second male pleopods of the specimen show that the species is not a true pilumnid but actually belongs to the Pseudoziidae Alcock, 1898, instead.

Pilumnus elatus A. Milne-Edwards, 1873, is here referred to a new genus, *Haemocinus*. The description of this new genus forms the text of the present contribution. Specimens examined are deposited in the RMNH and Zoological Reference Collection of the Raffles Museum (ZRC), National University of Singapore. Measurements provided are of the carapace width and length reespectively. The abbreviations G1 and G2 are used for the male first and second pleopods respectively.

Taxonomy

Family Pseudoziidae Alcock, 1898
Subfamily Planopilumninae Serène, 1984
Haemocinus, new genus

Diagnosis: Carapace much broader than long; surface covered with short setae postorbital cristae low, granulated; epigastric cristae low, granulated; anterolateral margin convex, with 3 short spines; basal antennal segment not filling orbital hiatus; endostomial ridges present; ambulatory legs long, slender, first to third ambulatory meri with dorsal margins spinate; fourth ambulatory dactylus gently upcurved; thoracic sternum with sternites 2 and 3 separated by distinct suture; sternites 3 and 4 separated by suture laterally; abdominal cavity does not reach junction between sternites 3 and 4; male abdomen with all segments freely articulating; G1 gently curving outwards, margins lined with numerous spinules; G2 ca. half length of G1.

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Etymology: The genus name is an arbitrary combination of the Greek words "haema" for blood, and "karcinus" for crab; alluding to the bright red carapace and legs of the type species. The gender of the genus is masculine.

Type species: *Pilumnus elatus* A. Milne-Edwards, 1873, by present designation.

Remarks: *Pilumnus elatus* A. Milne-Edwards, 1873, was first described from Upolu, Samoa. But as the original description was very brief and there was no accompanying figure, its identity was uncertain until Balss (1933) provided a detailed redescription of the holotype (and only specimen), a male (20.5 by 15.0 mm), including photographs of the whole animal as well as a figure of its thoracic sternum and abdomen. Takeda & Miyake (1968) subsequently reported the species (on the basis of a female) from Japan (see also Sakai, 1976; Miyake, 1983).

Balss (1933) retained the species in *Pilumnus* with some reserve, noting that "Durch die breite Form des Sternums und des mannlichen Abdomens, sowie die Form des Carapax nimmt die Art eine aberrante Stellung in der Gattung *Pilumnus* ein, sodass es schwer ist, über ihre Verwandtschaft naheres auszusagen. Leider liegt mir von den primitiven Catometopen (*Pseudorhombilinae*) zu wenig Material vor, sodass isch nichts Bestimmtes über etwaige Beziehungen zu diesen bemerken kann" (Balss, 1933: 30-31). Unfortunately, Balss did not describe the male pleopods, probably because the only specimen available to him then was the dried holotype.

The present specimens agree with the original description and Balss' redescription and figures very well and we are confident of their conspecificity. In recent years, it has been shown that a reliance on external characters has often led to many incorrect familial assignments for xanthoid crabs and their kin. Convergent evolution is often rampant in these crabs and the form of the male abdomen and gonopods is a more reliable indication of their familial affinities than traditional carapace and pereiopod characters (see Guinot, 1978; Ng, 1998). The gonopods of the RMNH male (Fig. 7F-H) confirm that *P. elatus* is not a pilumnid as currently defined, i.e. with all male abdominal segments mobile, a G1 which is slender and sinuous, without large spines and/or long setae, and a G2 which is sigmoid, very short and less than a quarter the length of the G1 (see Ng & Clark, 2000a, b). The general form of the G1 of *P. elatus* resembles those of many carcinoplacines (Goneplacidae) but in these, the G2 is proportionately much longer, being subequal or longer than the G1 (e.g. see Guinot & Richer de Forges, 1981a, b). The structures of the G1 and G2 of *P. elatus*, on the other hand, agree very well with those of pseudoziids, as recently redefined by Ng & Wang (1994) and Ng & Liao (2002). As such, *P. elatus* must be referred there.

Within the Pseudoziidae (sensu Ng & Liao, 2002), *Pilumnus elatus* cannot be referred to any extant genus. The general facies of *P. elatus* (carapace sculpture, setose body, thoracic sternal and abdominal form) is perhaps most similar to members of the Indo-West Pacific *Planopilumnus* Balss, 1933, although there are still a number of differences. The genus *Planopilumnus* is heterogeneous, and of the many species that have been referred to it over the years, only two, *P. spongiosus* (Nobili, 1906) (type species) and *P. orientalis* Balss, 1933, actually belong there, the rest of the taxa been closer to the genus *Pilumnus* s. lato. (Pilumnidae) (see Ng & Clark, 2000a, b; Ng et al. 2001). In species of *Planopilumnus* s. str., the general carapace is relatively flatter, the anterolateral teeth are distinct, large and lobiform, the ambulatory meri are unarmed, and the ambulatory propodi are short and appear foliaceous (especially those of the last ambulatory legs). To this effect, I have examined the types and other specimens of *Planopilumnus spongiosus* (type in Paris Museum) and *P. orientalis* (type in Berlin Museum). The G1s do not differ much, with those of the two *Planopilumnus* species having the distal part less strongly curved than that of *P. elatus*. Their G2s are similar. *Pilumnus elatus* is also superficially similar to the east African *Platychelonion* Crosnier & Guinot, 1969 (referred to the Pseudoziidae by Ng & Liao, 2002) (which closely resembles *Planopilumnus*), especially with regard to the form of the chelae and ambulatory legs (cf. Crosnier & Guinot, 1969: Figs. 2-4, but differs in

having a carapace which has a more convex dorsal surface, presence of dense setae on the carapace and pereiopods and absence of distinct anterolateral teeth (cf. Crosnier & Guinot, 1969: 727, Fig. 1; Guinot & Richer de Forges, 1981a: Pl. 5 fig. 5). The G1 of *Platychelonion* is also relatively much stouter than that of *P. elatus*, although their G2s are similar (Crosnier & Guinot, 1969: Fig. 8a-c). Considering these differences, we hereby refer *Pilumnus elatus* A. Milne-Edwards, 1873, to a new genus, *Haemocinus*.

The position of *Haemocinus* within the Pseudoziidae is not clear. It is obvious from the form of its carapace surface (epigastric, protogastric and postfrontal cristae distinct and granulated), thoracic sternum (anterior part broad with the abdominal cavity not reaching far into sternite 4), form of the abdomen (relatively T-shaped) and structures of the G1 and G2 that *Haemocinus* is closely affiliated to *Planopilumnus* and *Platychelonion*, and should be classified together. Serène (1984) had established the Planopilumninae in the Pilumnidae but as Ng & Liao (2002) referred *Planopilumnus* to the Pseudoziidae, they also transferred this subfamily there. They tentatively accepted Planopilumninae as valid. All three genera should thus be placed in the Planopilumninae, at least for the time being.

Haemocinus elatus (A. Milne-Edwards, 1873) new combination

(Figs. 1-7)

Pilumnus elatus A. Milne-Edwards, 1873: 80; Balss, 1933: 30, Fig. 4, Pl. 5 figs. 22, 23; Takeda & Miyake, 1968: 11; Miyake, 1983: 137, Pl. 46 fig. 1 (not Sakai, 1976: 489, Pl. 175 fig. 3)

Material examined: 1 male (21.7 by 16.2 mm) (RMNH 32048), Wagu, Kii Islands, Mie Prefecture, Japan, coll. N. Yamashita, 1978/1979; 1 female (25.8 by 17.5 mm) (ZRC), Balicasag Island, Panglao, Bohol, Visayas, Philippines, intertidal reef, coll. A. Porpetcho & P. F. Clark, June 2002.

Description: Carapace transversely quadrate, much broader than long; dorsal surface of carapace gently convex, regions clearly demarcated; anterior half of surface with numerous small granules, posterior half relatively smother; entire surface covered with numerous short translucent setae that partially obscure surface and margins (Figs. 1A, 2, 3, 4A, B, 6A). Postorbital cristae low but distinct, not sharp, granulated; separated into 2 halves by cervical groove, not confluent with epigastric cristae or anterolateral margin (Figs. 1A, 2, 3, 4A, B, 6A). Epigastric cristae prominent, sharp, distinctly granulated; separated medially by Y-shaped groove; anterior of postorbital cristae, separated by distinct gap (Figs. 4B, 6A). Front short, frontal margin gently convex from dorsal view, deflexed, margin and adjacent surface granulated; with 2 broad median lobes, separated by shallow V-shaped notch; lateral lobes small, separated from median lobes by broad, shallow cleft, not clearly discernible from dorsal view (Figs. 4B, 6A). External orbital tooth low, narrow, tip not extending beyond frontal margin; anterolateral margin convex, with 3 discernible short spines, last smallest; rest of margin lined with denticles and spinules (Figs. 4B, 6A). Branchial regions with scattered low granules (Figs. 4B, 6A). Posterolateral margin gently converging posteriorly; gently convex along anterior half, posterior part gently concave (Figs. 1A, 2, 3, 4A, B, 6A). Posterior carapace margin sinuous, median part gently concave (Figs. 1A, 2, 3, 4A, B, 6A). Sub-hepatic, sub-orbital and sub-branchial regions with scattered granules, covered with dense short translucent setae that completely obscures surface (Figs. 4C, 6B). Supraorbital margin entire, finely granulated, with median fissure (Figs. 4B, 6A). Orbits ovate, eyes well developed, cornea completely pigmented, distal part of ocular peduncle lined with small granules on dorsal surface, with one just below cornea larger (Figs. 4B, C, 6A, B). Infraorbital margin granulated, without spines or prominent tooth (Figs. 4C, 6B). Basal antennal segment subquadrate, not filling space of orbital hiatus, mobile, segment 3 elongate, flagellum longer than width of orbit (Fig. 6B). Antennules folding slightly obliquely (Fig. 6B). Posterior margin of epistome sinuous, with

median triangular lobe which is divided medially by deep fissure; lateral margin with prominent subtruncate lobe, separated from rest of margin by deep cleft (Figs. 4C, 6B). Endostomial ridges strong, well developed along entire length (Fig. 6B). Third maxilliped with outer surfaces covered with dense short setae, relatively longer in ischium; merus squarish, anteroexternal angle rounded; ischium rectangular, with distinct median sulcus, inner margin serrulate; exopod relatively stout, straight, with distinct rounded subdistal tooth on inner margin, flagellum long (Fig. 6C).

Chelipeds prominently unequal (Figs. 3, 4A) in male, difference less marked in female (Fig. 4A). Basis-ischium surface finely granulated, inner margin with small spine. Surface of merus granulated, inner and dorsal margins with larger granules; inner margin with 2 spines; ventral margin with 1 or 2 distal granules relatively larger. Carpus covered with numerous small granules, those on margins relatively larger; inner distal angle with well developed sharp tooth; inner dorsal margin with numerous relatively longer stiff setae which partially obscure margin (Fig. 7C). Major chela with outer surface prominently granular, those on lower half generally larger, more distinct; inner dorsal margin with numerous longer translucent stiff setae; fingers shorter than palm; dactylus and pollex pigmented dark brown throughout except for basal parts; cutting edges with numerous prominent teeth, basal tooth on dactylus larger, submolariform in male; dactylus and pollex each with 2 developed longitudinal ridges (Figs. 5B, 7A). Minor chela relatively more slender than major chela; granulation on outer surface similar to major chela; inner dorsal margin with numerous longer translucent stiff setae; fingers shorter than palm; dactylus and pollex pigmented along distal three-quarters; cutting edges with relatively lower teeth; dactylus with 3 well developed longitudinal ridges with setae-lined grooves between them; pollex with 2 distinct longitudinal ridges (Figs. 5C, 7B).

Ambulatory legs relatively long, slender; third leg longest (Figs. 2, 3, 5A). Outer surfaces finely granular to smooth, margins lined with dense short setae that partially obscure margins (Figs. 1A, 4A, 5A). Dorsal margins of first to third ambulatory meri lined with small sharp granules along proximal half and 2 or 3 sharp spines along distal half; ventral margins with small sharp granules, 1 or 2 on distal part may be spiniform; last ambulatory merus with dorsal margin entire, ventral margin with small granules (Figs. 5A, 6E, 7D). Dorsal margin of carpus not serrated, surfaces finely granular, no ridges discernible (Figs. 5A, 7D). Dorsal and ventral margins of propodus elongate, entire, surfaces without ridges or spines; no dactylo-propodal lock discernible (Fig. 7D). Dactyli of first 3 ambulatory legs long, slender, styliform with corneous tip, third longest; dactylus of fourth leg relatively shorter, gently upcurved, spatuliform (Figs. 5A, 7D, E).

Thoracic sternum with granulated surface (Figs. 1B, 6D). Sternites 1 and 2 fused (Figs. 1B, 6D). Sternites 2 and 3 separated by distinct suture, median part interrupted, gently depressed (Fig. 6D). Sternites 3 and 4 separated by lateral suture, medially interrupted (Fig. 6D). Abdominal cavity does not reach junction between sternites 3 and 4 (Figs. 1B, 6D). Suture between sternites 4 and 5, and 5 and 6 medially interrupted (Fig. 6D). Press button lock for abdomen on median part of sternite 5 (Fig. 6D).

Male abdomen with all segments freely articulating. Telson semicircular, lateral margins gently convex (Figs. 1B, 6F); segment 6 retangular with slightly concave lateral margins; segments 3-5 progressively less trapezoidal (Figs. 1B, 6F); segment 2 as wide as segment 4, less broad than segment 3, lateral margins gently convex (Fig. 6F); segment 1 very broad, subtrapezoidal (Fig. 6F). Female abdomen almost round, almost completely covering thoracic sternum.

G1 gently curving outwards, distal part more strongly so; distal half of outer margin lined with numerous spinules and stiff setae; median part of inner margin lined with numerous spinules; tip open (Fig. 7F, G). G2 ca. half length of G1, basal segment ca. 3 times length of distal segment, junction with cup-like structure and short stiff setae (Fig. 7H).

Female vulvae ovate, with posterior edges rimmed

Colour: Deep red overall, with ventral surfaces yellowish-white (Fig. 2).

Remarks: Specimens from Japan that Sakai (1976) identified to *Pilumnus elatus* are probably not all of this species. His figure (Sakai, 1976: Pl. 175 fig. 3) differs from the type description, description and figure of Balss (1933), description by Takeda & Miyake (1968) and figure of Miyake (1983) in having the anterolateral margin distinctly dentate, the teeth been prominently triangular and relatively broad (vs. no clear teeth, only low spines), the dactylus and propodus of the ambulatory legs, especially the third leg, proportionately much shorter, and the last ambulatory dactylus is gently curved posteriorly (vs. gently upcurved). In addition, the male specimen figured by Sakai is homochelous (distinctly heterochelous in the 20.5 by 15.0 mm male figured by Miyake, 1983; and present RMNH male). In any case, in *H. elatus*, even the present female specimen from the Philippines is heterochelous. On the basis of his figure at least, Sakai's (1976) "*Pilumnus elatus*" is more likely to be a species of *Heteropilumnus*. It is certainly not *H. elatus* as presently defined. It is very possible, however, that Sakai's (1976) record may be based on mixed material. The present male specimen is clearly *H. elatus* s. str. but it had been identified by the late Tune Sakai and donated to the RMNH, although it was not listed in his 1976 book as it was obtained in 1978/1979. It is thus possible that of the four males and one female specimens Sakai (1976) reported from Kii Peninsula in Japan, at least one may be true *H. elatus*.

The specimens examined agree with the holotype figured by Balss (1933) in all significant respects and we are confident of their conspecificity. The male abdomen figured by Balss (1933: Fig. 4), however, differs from the present RMNH male in two aspects, viz. segment 3 and 4 and subequal in width (vs. segment 4 not as wide as segment 3, Fig. 3F) and the telson is distinctly triangular with almost straight lateral margins (vs. semicircular with convex lateral margins, Fig. 3F). Balss' figure, however, is rather schematic, and is not accurate. Angelika Brandt and Cornelia Warneke-Kremer of the Hamburg Museum were kind enough to examine and photograph the type specimen for me (Fig. 1), and the form of its male abdomen (Fig. 1B) agrees quite well with the present RMNH specimen (Fig. 6F).

The recent specimen from the Philippines was collected in somewhat unusual circumstances, washed up on the shore at night after two previous stormy days due to a passing typhoon. It was then kept alive in an aquarium for over a week. It moves very slowly, hiding under rocks during the day, becoming more active at night.

Haemocinus elatus is now known for certain from Samoa (type locality), Okinawa and Kii (Japan), and now, Philippines.

Acknowledgements

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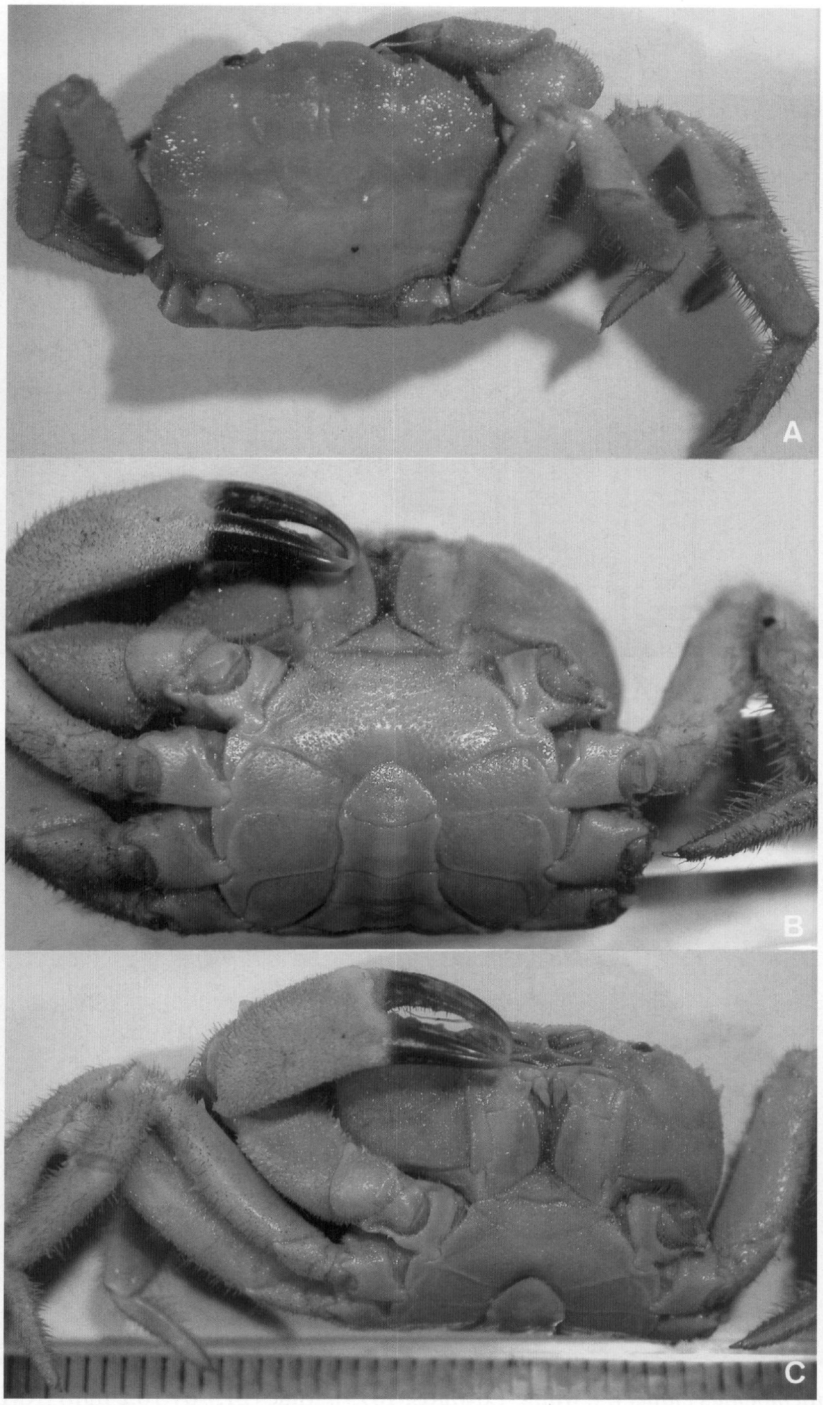


Fig. 1. *Haemocinus elatus* (A. Milne-Edwards, 1873). Holotype male (20.5 by 15.0 mm), (Hamburg Museum). A, overall view; B, ventral view of carapace; C frontal view and chela. (Photographs: Cornelia Warneke-Kremer)

Fig. 2. *Haemocinus elatus* (A. Milne-Edwards, 1873). Colour in life, female (25.8 by 17.5 mm) (ZRC).

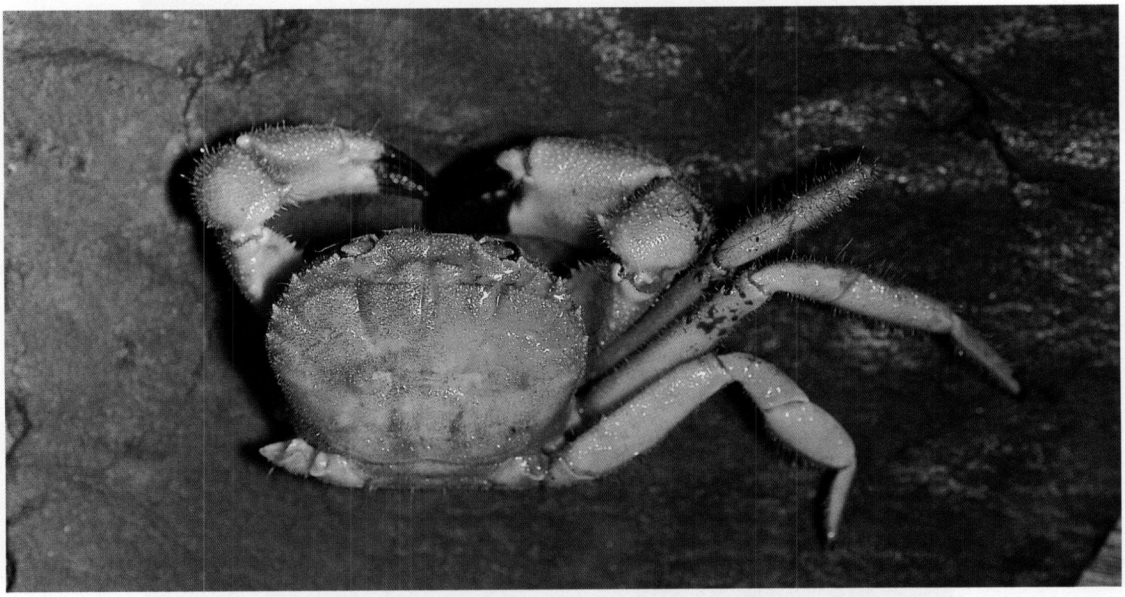
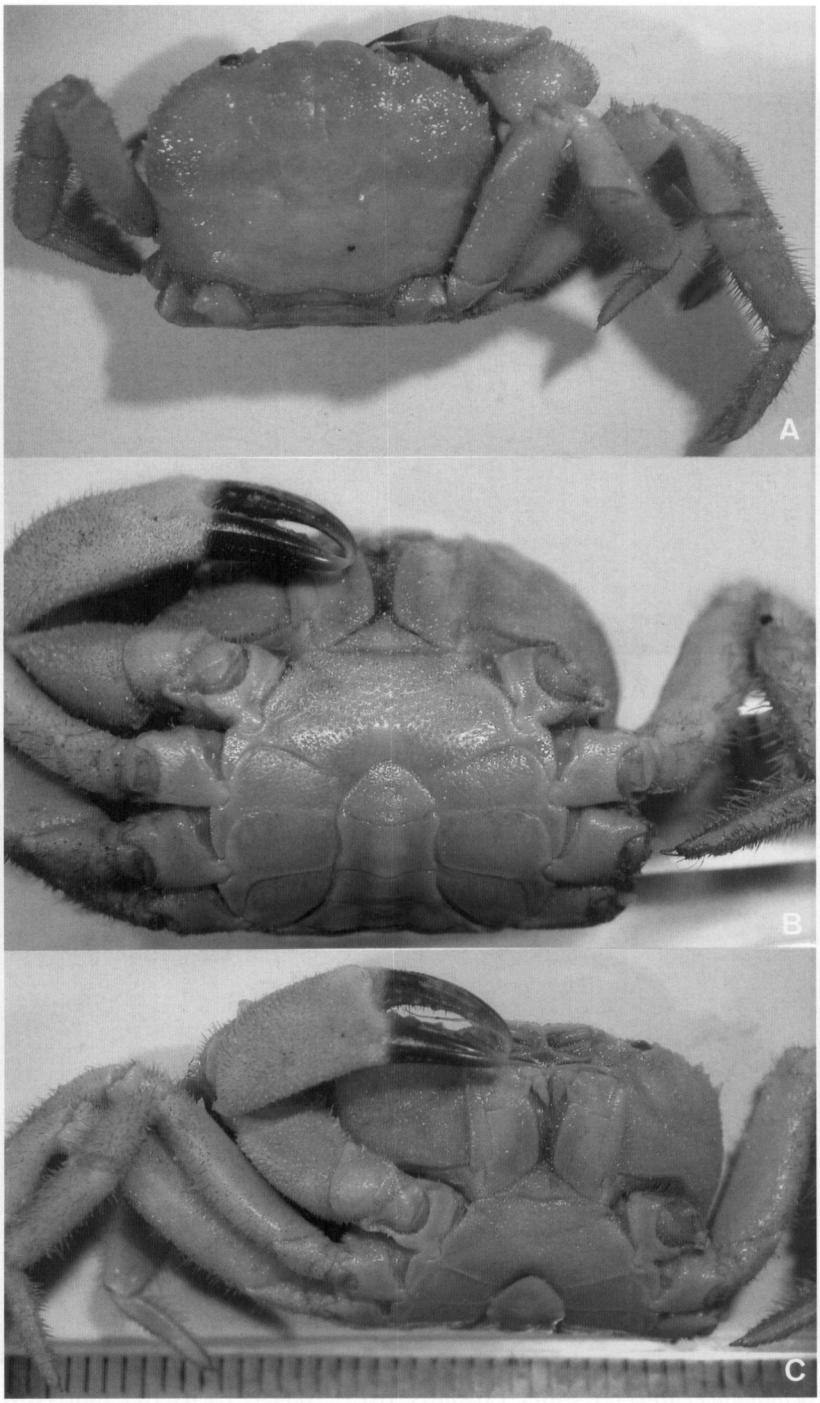


Fig. 3. *Haemocinus elatus* (A. Milne-Edwards, 1873). Male (21.7 by 16.2 mm) (RMNH 32048).



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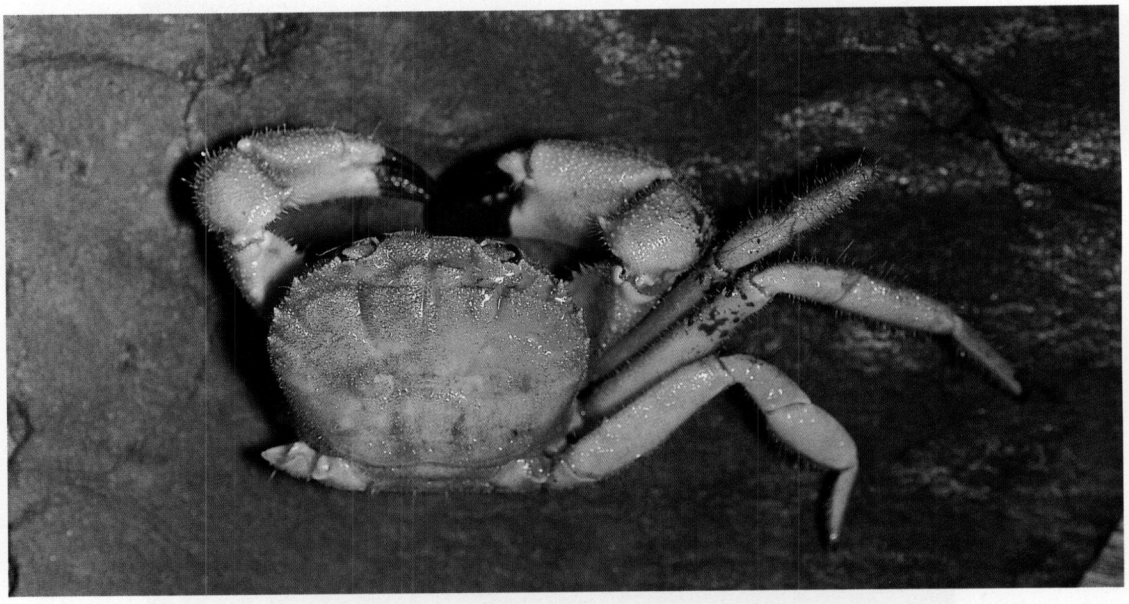

Fig. 3. *Haemocinus elatus* (A. Milne-Edwards, 1873). Male (21.7 by 16.2 mm) (RMNH 32048).

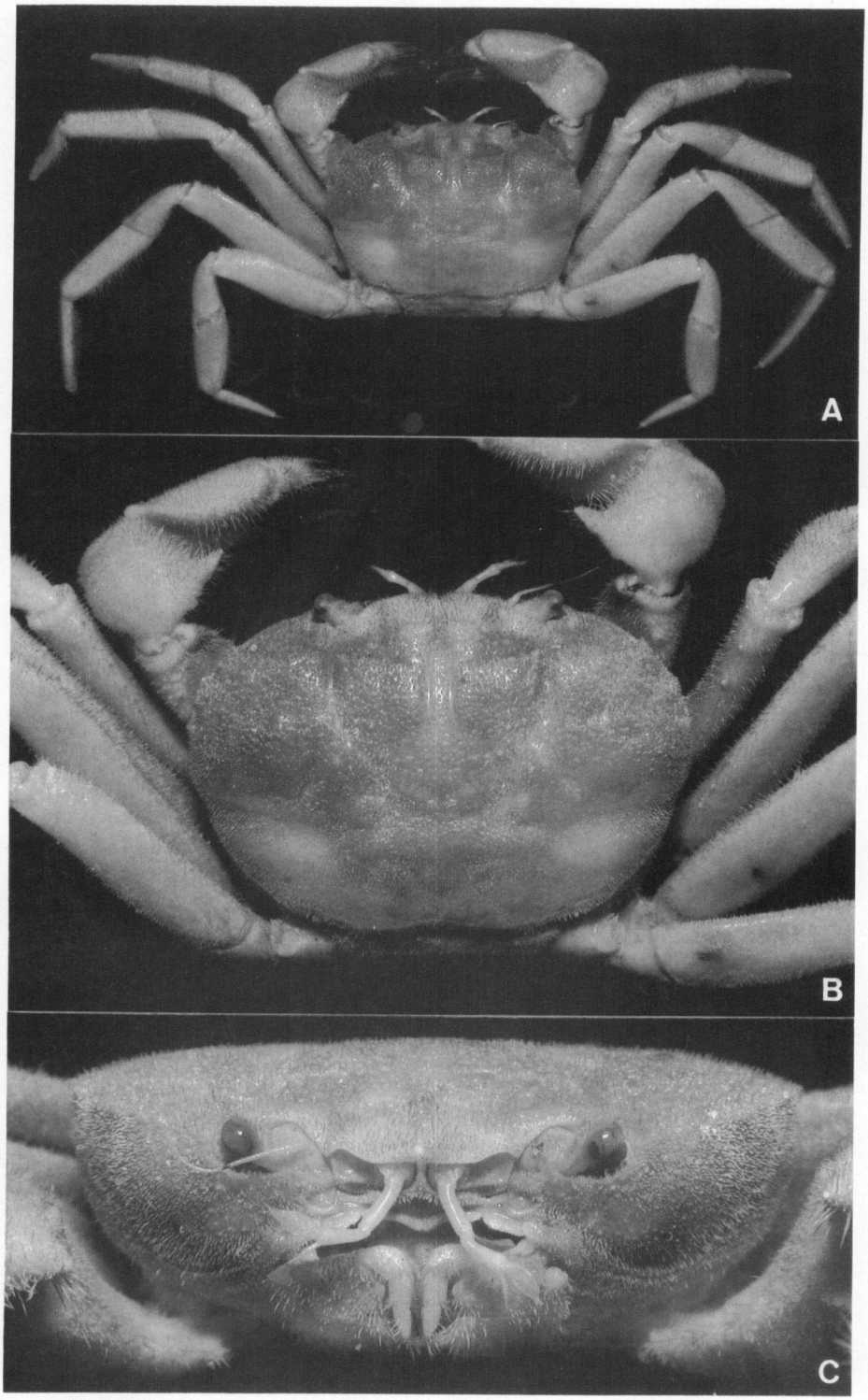

Fig. 4. *Haemocinus elatus* (A. Milne-Edwards, 1873). Female (25.8 by 17.5 mm) (ZRC). A, overall view; B, carapace; C, frontal view.

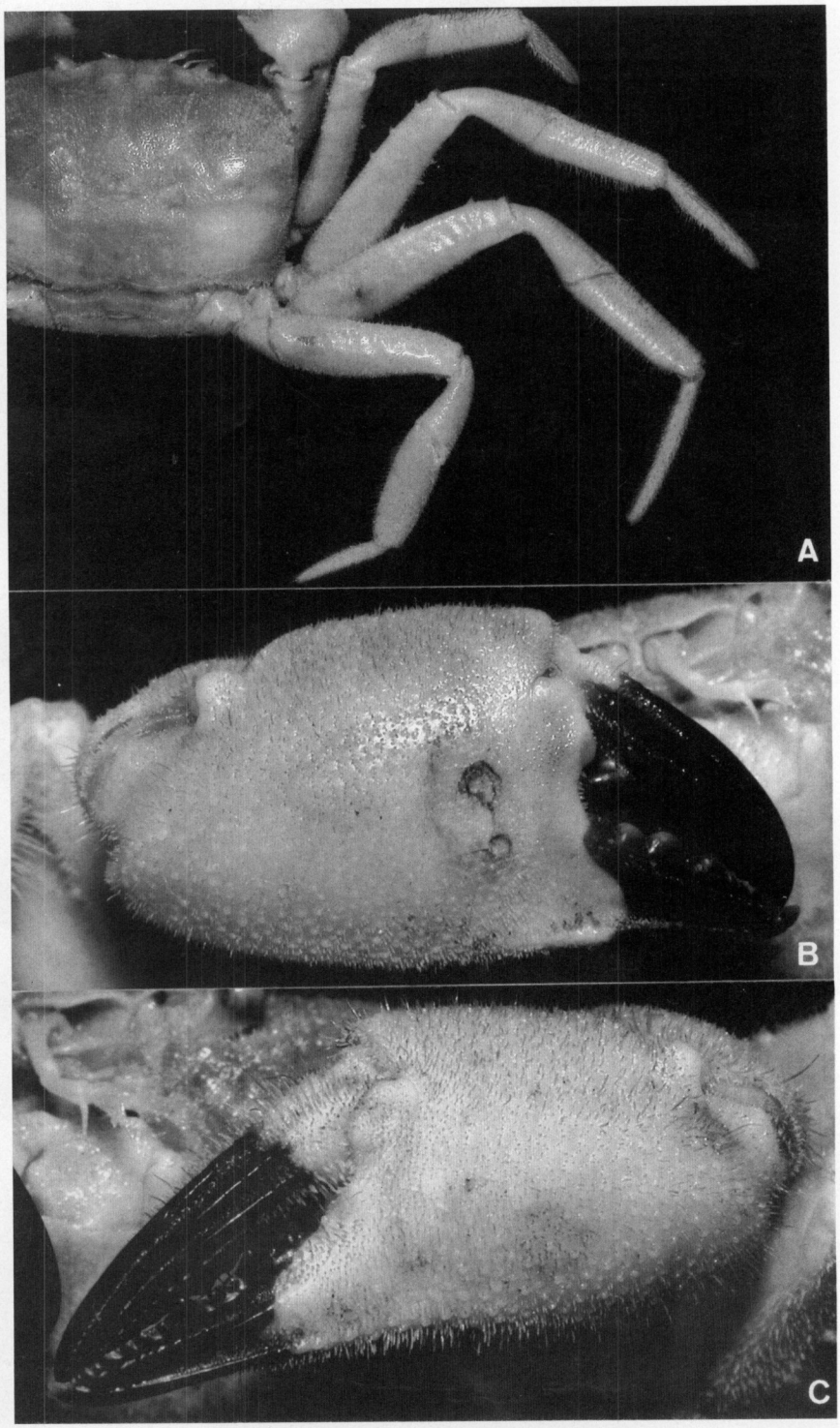

Fig. 5. *Haemocinus elatus* (A. Milne-Edwards, 1873). Female (25.8 by 17.5 mm) (ZRC). A, right ambulatory legs; B, right chela; C, left chela.

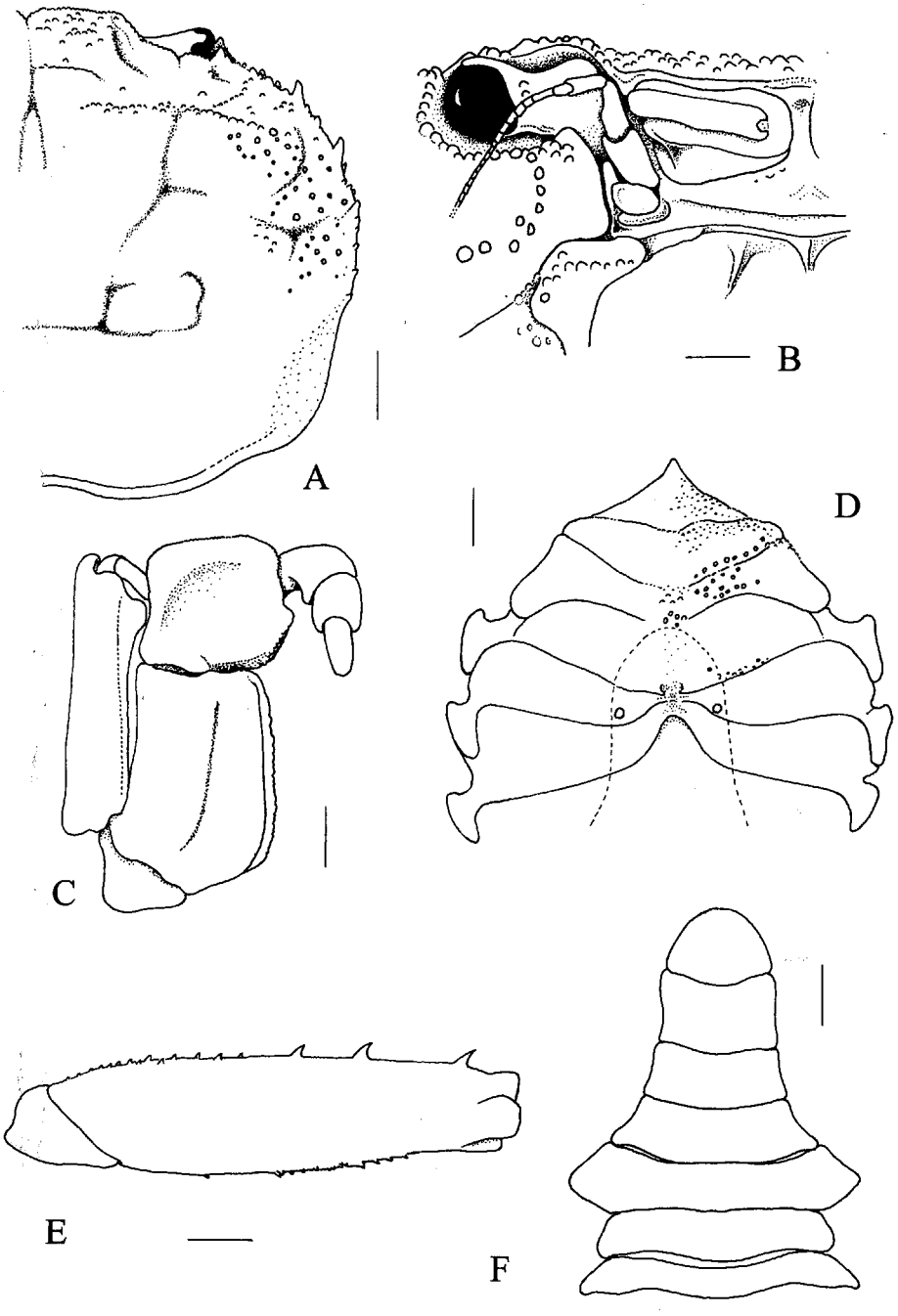

Fig. 6. *Haemocinus elatus* (A. Milne-Edwards, 1873). Male (21.7 by 16.2 mm) (RMNH 32048). A, right side of carapace (denuded); B, right side of front (denuded); C, right third maxilliped; D, anterior thoracic sternum (right side not denuded, covered with very short pubescence); E, left merus of second ambulatory leg; F, abdomen. Scales: A, D-F = 2.0 mm, B, C = 1.0 mm.

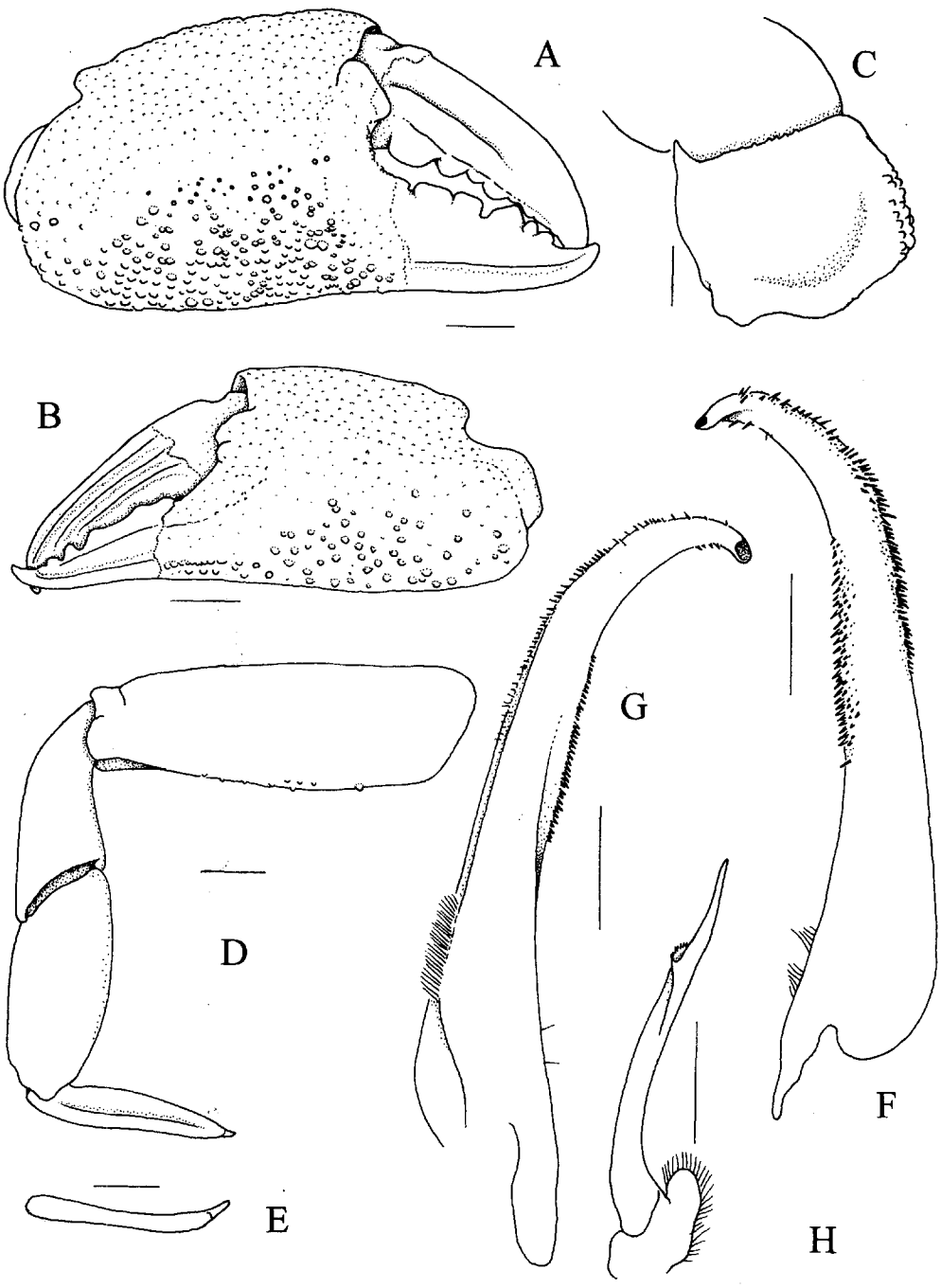

Fig. 7. *Haemocinus elatus* (A. Milne-Edwards, 1873). Male (21.7 by 16.2 mm) (RMNH 32048). A, right chela (denuded); B, left chela (denuded); C, right carpus of cheliped; D, left fourth ambulatory leg (denuded); E, dactylus of left fourth ambulatory leg (marginal view); F, dorsal view of left G1; G, ventral view of left G1; H, left G2. Scales: A-E = 2.0 mm, F-H = 1.0 mm.

印度太平洋區的毛刺蟹科 XVII－高身毛刺蟹的正名（甲殼綱，十足目，短尾類）

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摘要

產於太平洋，總是被稱爲高身毛刺蟹(*Pilumnus elatus*)的分類地位一直成謎，本文釐清了此問題。本種既不屬於毛刺蟹屬(*Pilumnus*)，也不是毛刺蟹科(Pilumnidae)的成員，事實上更接近扁平毛刺蟹屬(*Planopilumnus*)，而隸屬於扁平毛刺蟹亞科(Planopilumninae)，假團扇蟹科(Pseudoziidae)。本文將其另命名爲新屬，稱爲血紅蟹屬(*Haemocinus*)。文中提供詳細特徵描述及圖。

關鍵詞：分類學，假團扇蟹科，Pseudoziidae，毛刺蟹科，Pilumnidae，菲律賓，新屬。