

THE INDO-PACIFIC PILUMNIDAE IV.
ON *CRYPTOCOELOMA HASWELLI* RATHBUN, 1923
(DECAPODA, BRACHYURA)

BY

PETER K. L. NG

Department of Zoology, National University of Singapore, Kent Ridge Campus,
Singapore 0511, Republic of Singapore

RÉSUMÉ

Le rare crabe Pilumnidae, *Cryptocoeloma haswelli* Rathbun, 1923, n'est connu que par quelques spécimens de Java (Indonésie) et d'Australie, et sa position systématique n'est pas claire. Un lectotype est désigné et une description complète fournie, incluant des détails et des illustrations des pièces buccales, de l'abdomen et des premiers pléopodes du mâle. Sa position dans la famille des Pilumnidae sensu stricto est éclaircie et ses relations avec l'espèce très proche, *Heteropilumnus fimbriatus* (H. Milne Edwards, 1834) sont discutées.

INTRODUCTION

The rare pilumnid crab, *Cryptocoeloma haswelli* Rathbun, 1923, has had a confused taxonomic history. In this paper, the taxonomy of this species is clarified, and a full description is provided on the basis of specimens contained in the British Museum (Natural History) (BMNH) and the Zoological Reference Collection of the National University of Singapore (ZRC). A female originally examined by Miers (1884) is designated the lectotype of the species, and the male first and second pleopods are figured for the first time. The abbreviations G1 and G2 used in this paper are for the male first and second pleopods respectively. All measurements are of the carapace breadth and length respectively. This is the fourth paper in a series revising the Indo-Pacific Pilumnidae, the others being by Ng & Tan (1984) and by Ng (1987a, b).

Cryptocoeloma Miers, 1884

Cryptocoeloma Miers, 1884: 227. Gender: neuter.

Type species. — The only nominal species mentioned by Miers (1884) in the original publication of the new genus *Cryptocoeloma* is *Pilumnus fimbriatus* H. Milne Edwards, 1834, which therefore should be its type species by monotypy. However, Miers made clear that his specimens belonged to the same species as that which Haswell (1882) identified as *Pilumnus fimbriatus* H. Milne Edwards, but that he was not certain that Haswell's identification was correct.

Later, Rathbun (1923) confirmed Miers' suspicion and described Haswell's species as new under the name *Cryptocoeloma haswelli*. Miers' genus *Cryptocoeloma* thus is based on a misidentified type species, and according to Art. 70b of the International Code of Zoological Nomenclature, the matter has to be laid before the International Commission on Zoological Nomenclature for a decision. In an application the Commission (Ng & Holthuis, 1987) has now been requested to indicate *Cryptocoeloma haswelli* Rathbun, 1923, as the type species of the genus *Cryptocoeloma*. Pending the decision by the Commission the name *Cryptocoeloma* is used here in its current sense (Art. 80a of the Code).

Diagnosis. — Carapace quadrilateral, front deflexed; from dorsal view, front, anterolateral and supraorbital margins appear confluent, fringed with mixed long silk-like and short shaggy hairs, eyes not visible. Anterolateral margin with three low lobes, regions adjacent rugose. Carpus of cheliped with blunt spine on inner angle, dorsal surfaces rugose. Ambulatory legs unarmed. Male abdomen broad, first segment reaching to base of last pair of legs, male genital openings coxal. G1 almost straight, slender, distal region bent, tapered.

***Cryptocoeloma haswelli* Rathbun, 1923 (figs. 1-3)**

Pilumnus fimbriatus - Haswell, 1882: 66, pl. 1 fig. 4 (not *Pilumnus fimbriatus* H. Milne Edwards, 1834: 416).

Cryptocoeloma fimbriatum - Miers, 1884: 227, pl. 23 fig. A; Nobili, 1899: 260.

Cryptocoeloma - Miers, 1886: 223; Alcock, 1900: 292; Serène, 1965: 25.

Cryptocoeloma fimbriatus - Fulton & Grant, 1906: 8, pl. 4 fig. 5; Rathbun, 1923: 111.

Cryptocoeloma fimbriatus - Grant & McCulloch, 1906: 18.

Cryptocoeloma haswelli Rathbun, 1923: 111; Balss, 1933: 43; Balss, 1935: 145; Hale, 1927: 169; Serène, 1968: 86.

Diagnosis. — As for genus.

Material examined. 1 ♀ lectotype (9.3 by 6.7 mm) (BMNH 1847: 21), Billiton (Belitung) Island, Indonesia, ca. 3°S 108°E, H.M.S. "Samarang". 1 ♂ (9.1 by 6.1 mm) (ZRC Nr. 1965.9.9.59), Lindeman Island, Cumberland Group, Queensland, Australia, 20°15'36"S 149°01'48"E; reef, under rocks and corals, embedded in sand; May 1934.

Description of female lectotype. — Carapace quadrilateral, regions fairly well demarcated, mostly smooth, glabrous. Anterior outline (front, supraorbital and anterolateral margins) appear almost confluent in dorsal view. Real frontal margin strongly deflexed, divided into two trapezoidal lobes, separated by broad, V-shaped cleft which extends backwards as a broad, shallow, Y-shaped groove to gastric region. Anterior margins fringed with two rows of hairs; the lower row with dense, short, shaggy hair; in the upper row less dense, very long and silk-like. Anterolateral margin divided into three low lobes, each separated by a broad, shallow notch, the external orbital angle being inseparable from the supraorbital margin. Posterolateral margin slightly convex, converging. Posterior margin convex, smooth. Regions adjacent to anterior and posterolateral margins rugose and/or covered with low, flattened

granules. Pterygostomial and sub-branchial regions with several tufts of short, shaggy hair, suborbital and hepatic regions glabrous, almost smooth. Eyes completely filling orbit, not visible from above, appearing sunken into carapace, cornea pigmented. Basal segment of antenna broad, free, almost completely filling orbital hiatus, antennules folding slightly obliquely. Posterior margin of epistome slightly crenated, with median area triangular, sunken

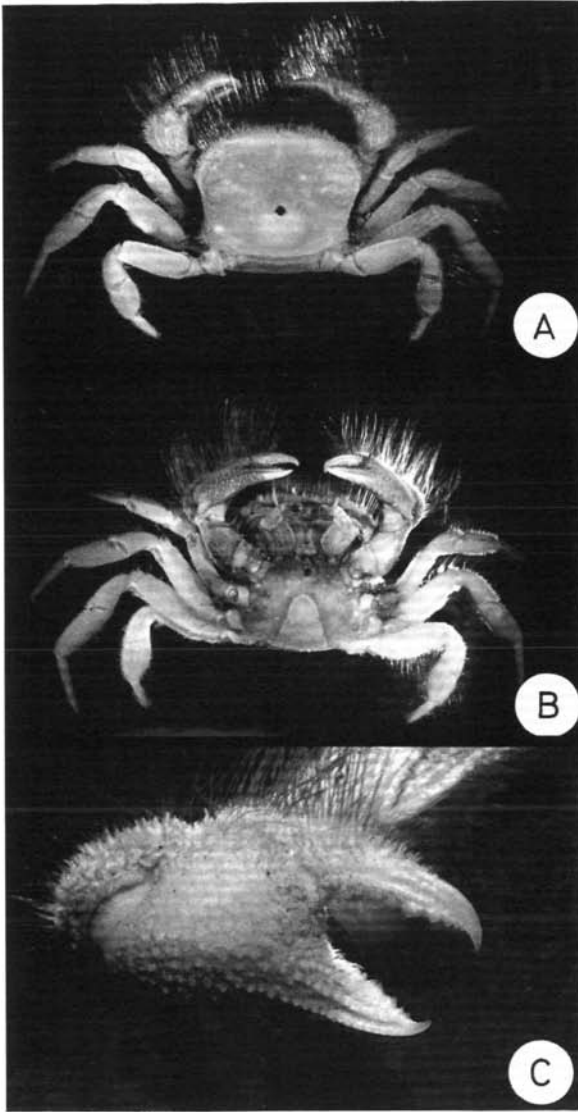


Fig. 1. *Cryptocoeloma haswelli* Rathbun, 1923. Lectotype female. A, dorsal view; B, ventral view; C, right cheliped.

into buccal region, the lateral margins gradually sloping inwards. Third maxillipeds completely covering buccal cavity when closed, surfaces smooth and almost glabrous (except for margins and distal areas), merus quadrate, with small median depression, anterolateral angle distinctly produced, ischium with distinct oblique median sulcus, exopod with blunt subdistal triangular tooth and long flagellum.

Chelipeds symmetrical, fingers slightly longer than palm. Outer surfaces of palm covered with numerous small, blunt granules, the dorsal areas with numerous long stiff and shorter shaggy hairs. Dactylus with two longitudinal grooves, basal area granulated, hirsute, tip hooked, cutting edge with seven to eight teeth. Propodus with two longitudinal rows of low, blunt granules reaching to base of hooked tip, with five to six denticles on cutting edge. Outer surface of carpus rugose, covered with numerous mixed long silk-like and shaggy hairs, especially on margins, inner dorsal angle with a blunt tooth. Outer surface of merus covered with numerous low granules, dorsal margin with a low, blunt subdistal tooth.

Segments of ambulatory legs all unarmed, smooth, margins lined with long, stiff hairs. Third leg longest. Dactylus of first three pairs almost straight except for slightly hooked tip, slightly longer than propodus. Dactylus of last leg shorter than previous pairs, slightly shorter than the broad, flattened propodus.

Sternal and abdominal surfaces smooth. Abdomen seven-segmented, oval-shaped, not entirely covering sternum, all segments freely articulating; first segment reaching to base of last pair of legs; pleopods setose, well developed.

Comparison with male. — The male from Lindeman Island is identical to the lectotype female in almost all non-sexual aspects, except that surfaces adjacent to the anterolateral and posterolateral margins, and on the carpus of the chelipeds appear to be more strongly rugose. The specimen lacks the left cheliped. The male abdomen is triangular, broad, with seven freely articulating segments. First segment broad, reaching to base of last pair of ambulatory legs; second rectangular, narrower than first; third trapezoidal, as broad as first; fourth to sixth progressively narrower and more trapezoidal, lateral margins slightly convex; seventh segment triangular, tip rounded, lateral margins convex, as long as sixth. The genital openings are at the base of the coxa of the last pair of ambulatory legs. G1 is almost straight, except for the hooked distal portion, generally slender, simple, with the tips tapered, rounded and the margins lined with several simple hairs. G2 is short and sinuous.

Remarks. — Haswell (1882) identified a specimen (sex not stated) from coral reefs near Port Molle, Australia, as “*Pilumnus fimbriatus*”, believing it to be conspecific with H. Milne Edwards’ (1834) species, described from “New Holland” (= Australia). Haswell’s description of the species was almost a direct translation of Milne Edwards’ brief diagnosis of *P. fimbriatus*, except that

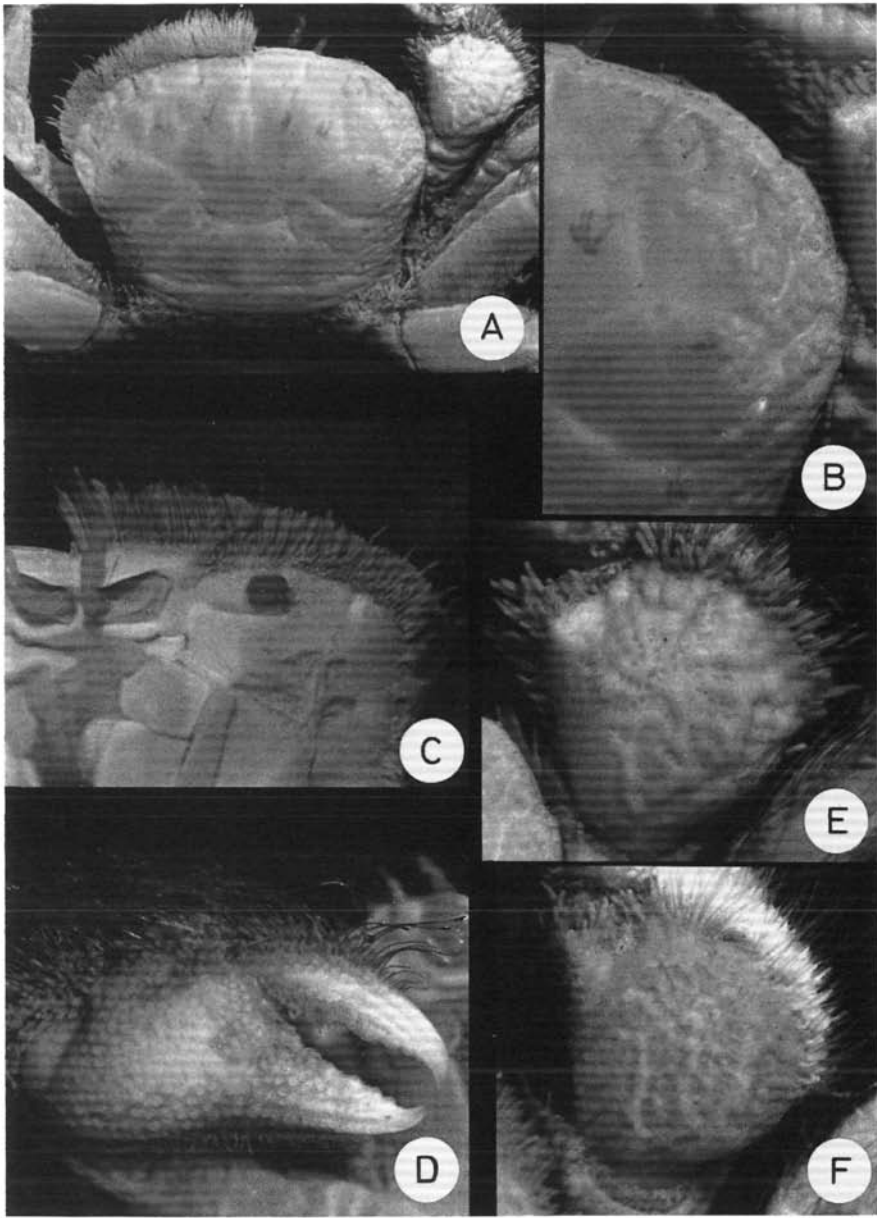


Fig. 2. *Cryptocoeloma haswelli* Rathbun, 1923. A-E, male, ZRC 1965.9.9.59; F, lectotype female. A, dorsal view; B, right anterolateral margin; C, frontal view of carapace; D, right cheliped; E, F, carpus of right cheliped (dorsal view).

he added that the anterolateral margins of the carapace and chelipeds are ornamented with numerous granulations. Miers (1884) provided a detailed description of the species on the basis of two females from Thursday Island, Australia ($10^{\circ}22'S$ $142^{\circ}06'E$) and from near Java [recte Billiton], Indonesia. He also established a new genus, *Cryptocoeloma* for the species.

De Man (1895), however, after examining a pair of syntypes of *Pilumnus fimbriatus* from the Paris Museum, disagreed with Haswell's and Miers' identifications of *P. fimbriatus*, and suggested that their specimens belong to a different species. He provided a long description of the types of *P. fimbriatus* but unfortunately, no figures. Nobili (1899) subsequently recorded two females from Somerset, Cape York, Australia ($10^{\circ}45'S$ $142^{\circ}30'E$), as *Cryptocoeloma*

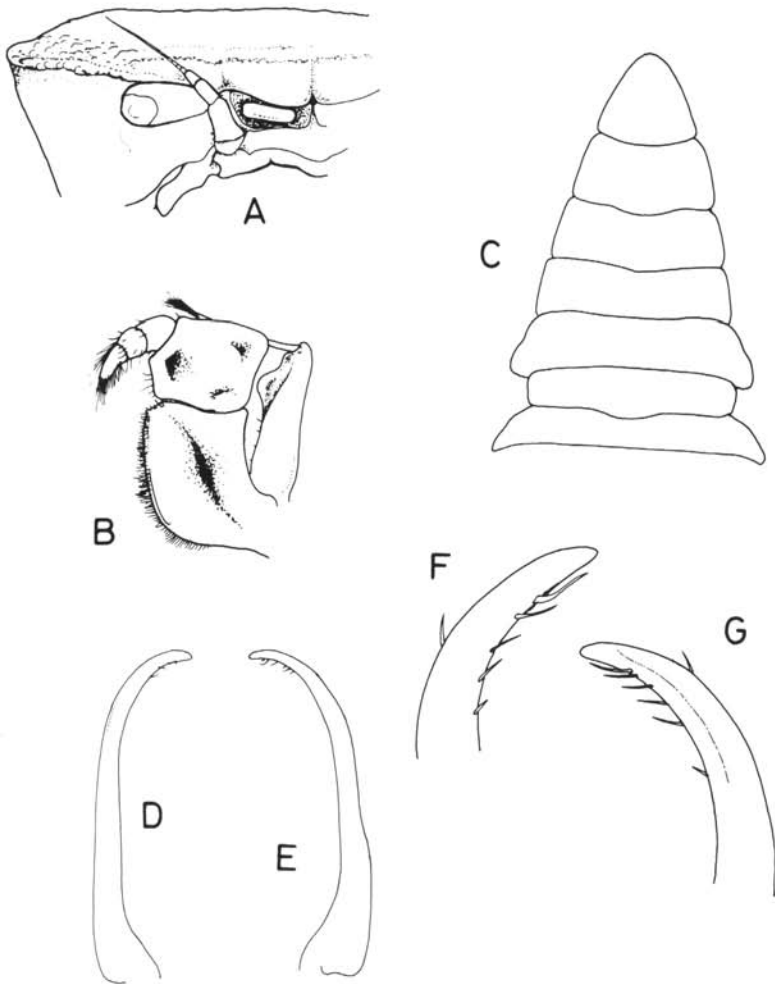


Fig. 3. *Cryptocoeloma haswelli* Rathbun, 1923, male, ZRC 1965.9.9.59. A, front view of carapace (hairs removed); B, left third maxilliped; C, abdomen; D, E, G1; F, G, tip of G1.

fimbriatum, apparently unaware of De Man's paper. Fulton & Grant (1906) in describing a new species, *Pilumnus pilosus*, from Port Phillip and Western Port (South Australia), compared their species with specimens from northeastern Queensland, which conforms to Haswell's (1882) "*P. fimbriatus*". They noted that as for Haswell's "*P. fimbriatus*", "... on comparison with the South coast habitant (*P. pilosus*) there seems a possibility that it is not Milne-Edwards' species, and that the South coast species is more likely to be *P. fimbriatus* Milne-Edwards, whose description is so meagre" (p. 9). Grant & McCulloch (1906) reported a female specimen from Port Curtis, Australia (23°57'S 151°30'E), as *C. fimbriata*.

Miers (1884), despite his excellent description of the genus and species (identified by him as *C. fimbriatum*), had in fact suspected that his (and Haswell's 1882) identification might be incorrect. He remarked that, "... there is, I think, no doubt of the specific identity of our example with the specimen figured in the 'Catalogue of the Australian Crustacea' [by Haswell], though whether this be identical with the *P. fimbriatus* of M.-Edwards remains somewhat uncertain, on account of the brevity of the diagnosis of the latter author" (p. 228).

Rathbun (1923) agreed with De Man that Haswell's and Miers' specimens represent a different species, and was the first to apply a new name, *Cryptocoeloma haswelli*, for their specimens, as well as to a male specimen in her possession from Port Denison, Queensland, Australia. She retained the genus with the pilumnids. Haswell's specimens from Port Molle, Miers' two females from Thursday and Billiton Islands, and Rathbun's male from Port Denison thus constitute the type series of *Cryptocoeloma haswelli*, with all of them having syntype status (L. B. Holthuis, in litt., 1 July 1985).

Miers' female from Billiton Island, which was sent to the author through the kindness of Mr Paul Clark (BMNH), is here designated the lectotype. A male deposited in the ZRC from Queensland is also clearly conspecific with the lectotype female and its G1 is figured.

Balss (1933) seemed to agree with Fulton & Grant's (1906) implication that their *P. pilosus* might be conspecific with *P. fimbriatus* and synonymised the two species. He (1933) also transferred *P. fimbriatus* to the genus *Heteropilumnus* De Man, 1895, and recorded a female of *Cryptocoeloma haswelli* from Shark Bay in Western Australia (ca. 25°17'S 113°36'E) (Balss, 1933, 1935). Griffin & Yaldwyn (1971) reaffirmed Balss' action after examining a syntype of *P. pilosus* in the Australian Museum and more specimens of *H. fimbriatus* from Port Phillip. Chilton's (1911) record of *Pilumnus fimbriatus* from the Kermadec Islands cannot be confidently referred to either H. Milne Edwards' or Rathbun's species. Balss (1933) had included Chilton's record in the synonymy of *Cryptocoeloma haswelli* with doubt. Considering the southern location of these islands however, Chilton's record is more likely to be *H. fimbriatus* instead, and is excluded from the present synonymy of *C. haswelli*.

Cryptocoeloma haswelli is certainly close to *H. fimbriatus*. The anterolateral margin of *H. fimbriatus* is, however, much more distinctly lobated, the fringe of hairs on the anterolateral and frontal margin is less prominent, the dorsal aspects of the carapace are more pubescent, the surfaces of the carpus of the chelipeds less rugose, the palm much smoother, and the area adjacent to the anterolateral margin smooth. All current records indicate that *C. haswelli* is a tropical species, ranging from Billiton, to mid-western and northern Australia, whereas *H. fimbriatus* is exclusively Australian in distribution, being reliably recorded only from southern Australia: Victoria, Tasmania and South Australia (Griffin & Yaldwyn, 1971). The type of *H. fimbriatus* was obtained from Australia (= "New Holland") without any indication of the exact locality.

Through the kindness of Dr Danièle Guinot, I was able to examine the specimens from Djibouti, Red Sea, identified by Nobili (1906: 274) as "*Pilumnus fimbriatus*". They certainly do not belong to that species as defined at present, but probably to an undescribed taxon. In the Djibouti specimens, the carapace is more ovoid in shape, and the hairs on the anterior margins are short and rough.

Interestingly, Griffin & Yaldwyn (1971) record a syntype of *Pilumnus pilosus* Fulton & Grant, 1906, in the Australian Museum bearing the original label "*Cryptocoeloma pilosus*", suggesting that the two original authors had suspicions that their species might in fact be a *Cryptocoeloma*, although they never stated this in print.

It is difficult to access the validity of the genus *Cryptocoeloma* in view of the confusing state of pilumnid taxonomy. The two main characters, according to Miers (1884), are the deflexed front which meets the basal antennal joint and partly fills the inner orbital hiatus; and the anterior (frontal, supraorbital and anterolateral) margins which form an unbroken line, hiding the eyes from dorsal view. The first character is not very reliable, and several other *Heteropilumnus* species also have a similar structure. The structure of the carapace, especially the anterior margins, remains, as far as is known, unique. Some *Heteropilumnus* have a front so heavily fringed with hairs that the eyes are not dorsally visible, but after denuding the hairs, the eyes can be seen (fide Fulton & Grant, 1906: pl. 4 fig. 5; Hale, 1927: fig. 170; present figures). In *Cryptocoeloma*, however, the eyes are actually below the margin, concealed by the borders of the anterior margins. The orbits, according to Miers (1884), are entirely inferior, the supraorbital margin being impossible to separate from the anterolateral and frontal margins. In this respect, *H. fimbriatus* cannot be referred to *Cryptocoeloma* since after cleaning, the eyes are distinctly visible from above (fide Fulton & Grant, 1906: pl. 4 fig. 3).

With regards to the other species in the genus *Heteropilumnus*, *Cryptocoeloma* differs in the form of the front, anterolateral margin, arrangement of hair on the carapace and structure of the chelipeds. Of the 17 *Heteropilumnus* species

recognised by Ng & Tan (in press) and Ng (1987a), many tend to have the hairs lining the frontal and anterolateral margins longer and denser than at other parts, but no known species has it to the extent and manner observed in *C. haswelli*. Moreover, in most *Heteropilumnus*, the rest of the carapace is also pubescent whereas in *C. haswelli*, these areas are almost glabrous.

The first gonopod of *C. haswelli* is also unusual. Unlike those of typical pilumnids, including *Heteropilumnus*, the G1 is straighter, not as distinctly sinuous, and the tip is less strongly tapered. It must be noted, however, that the basic structure of the G1 is still pilumnid, and very different from those of the other xanthoid families (fide Guinot, 1979; Ng, 1983). The male specimen appears to be fully mature, and approaches the size of the type female, which is definitely mature, with the abdomen relatively broad, and pleopods well developed. The unusual structure of the G1 is thus unlikely to be associated with age or immaturity.

Miers (1884: 228) had expressed doubts about the validity of retaining *C. haswelli* with the pilumnids, noting that it "... certainly cannot be retained in *Pilumnus* as present restricted; and I am inclined to think that it should be removed from the Cancroidea to the Grapsoidea". Miers (1886), following up on his suspicion that *Cryptocoeloma* might be a "Grapsoid", tentatively transferred the genus to his "Section Rhizopinae", subfamily Carcinoplacinae, family Ocypodidae. Alcock (1900) included, with some doubt, *Cryptocoeloma* in his new subfamily Pseudorhombilinae, family Goneplacidae Dana, 1851, but provided no reasons for his transfer. Later authors (Balss, 1957; Scrène, 1965, 1968), however, accepted the placement of *Cryptocoeloma* with the pilumnids. Guinot (1978) made no reference to *Cryptocoeloma* in her definition of the Pilumnidae Samouelle, 1819 s. str., but Ng (1983) accepted it as a true pilumnid in his partial review of the family. The structure of the male abdomen (all seven segments freely articulating), pilumnid-type G1, short and sigmoid-shaped G2 of *C. haswelli* however, is clear evidence that despite its unusual appearance, *C. haswelli* is a pilumnid. Recently, Ng (1987a) placed the genus in the subfamily Rhizopinae Stimpson, 1858, family Pilumnidae. The larva of the species is unknown.

Cryptocoeloma haswelli appears to be a rather rare, tropical littoral coral reef species, ranging from Billiton to western and northern Australia. Miers' (1884) specimens from Thursday Island were obtained from 4 to 5 fathoms of water (substrate unknown). The specimen from Lindeman Island (ZRC Nr. 1965.9.9.59) was collected from under rocks and corals on a sandy substrate.

ACKNOWLEDGEMENTS

The author is most grateful to Mrs C. M. Yang, Mr. Paul Clark and Dr. Danièle Guinot for permitting him to study the specimens in their collections. Advice by Professor Dr L. B. Holthuis on nomenclatural aspects is also greatly

appreciated. This study has been partially supported by research grant RTF 006/84 to the author from the Singapore Institute of Biology.

REFERENCES

- ALCOCK, A., 1900. Materials for a carcinological fauna of India. No. 6. The Brachyura Catametopa, or Grapsoidea. Journ. Asiatic Soc. Bengal, **69** (3): 279-456.
- BALSS, H., 1933. Beiträge zur Kenntnis der Gattung *Pilumnus* (Crustacea Decapoda) und verwandter Gattungen. *Capita Zool.*, **4** (3): 1-47, pls. 1-7.
- , 1935. Brachyura of the Hamburg Museum Expedition to South-Western Australia, 1905. Journ. Roy. Soc. Western Australia, **21**: 113-151, pl. 13.
- , 1957. Decapoda. In: H. G. BRONN, *Klassen und Ordnungen des Tierreichs*, (ed. 2) **5** (1) (7) (12): 1505-1672.
- FULTON, S. W. & F. E. GRANT, 1906. Some little known Victorian Decapod Crustacea, with descriptions of new species. No. III. Proc. Roy. Soc. Victoria, (n. ser.) **19** (1): 5-15, pls. 3-5.
- GRANT, F. E. & A. R. McCULLOCH, 1906. On a collection of Crustacea from the Port Curtis District, Queensland. Proc. Linnean Soc. New South Wales, **1**: 2-53, pls. 1-4.
- GRIFFIN, D. J. G. & J. C. YALDWYN, 1971. Port Phillip Survey 1957-1963. Part 2. 5. Brachyura (Crustacea, Decapoda). Mem. Nat. Mus. Victoria, **32**: 43-64, 2 charts.
- GUINOT, D., 1978. Principes d'une classification évolutive des Crustacés Décapodes Brachyours. Bull. biol. France Belgique, (n. ser.) **112** (3): 211-292, tabl. 1.
- , 1979. Données nouvelles sur la morphologie, la phylogénèse et la taxonomie des Crustacés Décapodes Brachyours. Mém. Mus. natn. Hist. Nat., Paris, (A) (Zool.) **112**: 1-354, pls. 1-27.
- HASWELL, W. A., 1882. Catalogue of the Australian stalk- and sessile-eyed Crustacea: i-xxiv, 1-324, pls 1-4. (The Australian Museum, Sydney).
- MAN, J. G., DE, 1895. Bericht über die von Herrn Schiffscapitän Storm zu Atjeh, an den westlichen Küsten von Malakka, Borneo und Celebes sowie in der Java-See gesammelten Decapoden und Stomatopoden. Zool. Jarhb., Syst., **8**: 485-609, pls. 12-14.
- MIERS, E. J., 1884. Crustacea. Report on the zoological collections in the Indo-Pacific Ocean during the voyage of H.M.S. "Alert" 1881-1882: 178-322, 513-575, pls. 18-34. (London).
- , 1886. Report on the Brachyura collected by H.M.S. 'Challenger' during the years 1873-1876. Report on the scientific results of the exploring voyage of H.M.S. 'Challenger', Zoology, **17** (49): 1-362, pls. 1-29.
- MILNE EDWARDS, H., 1834-1837. Histoire naturelle des Crustacés, **1** (1834): i-xxxv, 1-468; **2** (1837): 1-532; atlas, 1834-1840: 1-32, pls. 1-42.
- NG, P. K. L., unpublished. Aspects of the systematics of the family Pilumnidae Samouelle, 1819 (Crustacea, Decapoda, Brachyura) and a study on evolutionary trends in the superfamily Xanthoidea (sensu Guinot, 1978). B. Sc. Hons. Thesis, 1983, Dept. Zool., National University of Singapore, pp. i-viii, 1-251, 12 pls.
- , 1987a. The Indo-Pacific Pilumnidae II. A revision of the genus *Rhizopa* Stimpson, 1858 and the status of the *Rhizopinae* Stimpson, 1858 (Crustacea, Decapoda, Brachyura). Indo-Malay. Zool., **4** (1): 69-111.
- , 1987b. The Indo-Pacific Pilumnidae III. A new record of the luteophilous crab, *Rhizopa gracilipes* Stimpson, 1858 (Crustacea Decapoda, Brachyura) from Singapore. Journ. Singapore natn. Acad. Sci., **16**.
- NG, P. K. L. & L. B. HOLTHUIS, 1987. *Crypocoeloma* Miers, 1884 (Crustacea, Decapoda): proposed designation of *Crypocoeloma haswelli* Rathbun, 1923, as type species. Bull. zool. Nomencl., **44** (4): 240, 241.
- NG, P. K. L. & L. W. H. TAN, 1984. The Indo-Pacific Pilumnidae I. Description of four new species of the genus *Pilumnus* Leach, 1815 and definition of a new genus, *Bathypilumnus*. Journ. Singapore natn. Acad. Sci., **13**: 13-19.
- , in press. The identities of *Heteropilumnus* subinteger (Lanchester, 1900) and *Heteropilumnus hirsutior* (Lanchester, 1900) stat. nov., with description of a new species *Heteropilumnus holthuisi* sp. nov. (Crustacea, Decapoda, Brachyura, Pilumnidae). Crustaceana,

- NOBILI, G., 1899. Contribuzioni alla conoscenza della fauna carcinologica della Papuasìa, delle Molucche e dell' Australia. *Ann. Mus. Civ. Stor. Nat. Genova*, (2) 20 (40): 230-282.
- RATHBUN, M. J., 1923. Report of the crabs obtained by F.I.S. "Endeavour" on the coasts of Queensland, New South Wales, Victoria, South Australia and Tasmania 3. Report on the Brachyrhyncha, Oxystomata and Dromiacea. *Biol. Res. "Endeavour"*, 5: 95-156, pls. 16-42.
- SERÈNE, R., 1965. Guide for curators of brachyuran collections in Southeast Asia: 1-65 (Applied Sci. res. Corpn., Bangkok, Thailand).
- , 1968. The Brachyura of the Indo-West Pacific Region. In: *Prodromus for a Check List of the non-planctonic marine fauna of South East Asia*. UNESCO, Singapore natn. Acad. Sci., Spec. Publ. 1 (Fauna III Cc3): 33-112.