

## The Indo-Pacific Pilumnidae XVI.

### On the identity of *Pilumnus cristimanus* A. Milne Edwards, 1873, and the status of *Parapilumnus* Kossmann, 1877 (Crustacea: Decapoda: Brachyura), with description of a new species from rubble beds in Guam

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**Abstract**—The genus *Parapilumnus* Kossmann, 1877, is redefined on the basis of the type species, *Pilumnus cristimanus* A. Milne Edwards, 1873, and a new species, *Parapilumnus oryctos* from Guam. The present study completely changes the current understanding of the genus and necessitates the transfer of *Parapilumnus* s. str. out of the Pilumnidae and into the subfamily Chasmocarcininae in the family Goneplacidae. Most of the species now assigned to *Parapilumnus* are referred back to the genus *Pilumnus* s. lato, pending a revision of the genus. A replacement name, *Pilumnus debae*, is proposed for *Parapilumnus guinotae* Deb, 1987, which is here transferred to *Pilumnus* and becomes a junior homonym of *Pilumnus guinotae* Takeda & Miyake, 1968. A species previously referred to “*Parapilumnus*”, *P. quadridentatus* (De Man, 1895), possesses a suite of distinctive adult and larval characters, and is here referred to a new pilumnid genus, *Aniptumnus*.

## Introduction

Among the deep rubble crabs from Guam recently passed to me for study by Gustav Paulay was a very unusual specimen with a very distinctive body form, color pattern and chelipeds. While it bears a superficial resemblance to species of *Pilumnus* (Pilumnidae) or *Acidops* (Goneplacidae) it was nevertheless peculiar in many aspects. Its closest affinities are with *Pilumnus cristimanus* A. Milne Edwards, 1873, a poorly known species originally described from New Caledonia and Samoa, and never reported since. The Guam specimen, a male of a new species, allows the taxonomic position of “*Pilumnus*” *cristimanus* to be clarified, and the present study shows that they possess sufficient diagnostic characters to separate them into a genus of their own. *Pilumnus cristimanus*, however, was made the type species of an Indo-West Pacific genus of pilumnids, *Parapilumnus* Kossmann, 1877, by Rathbun (1930). With the present characterization of its type

species, *Pilumnus cristimanus*, the definition and understanding of *Parapilumnus* is changed very substantially.

The present paper discusses the above issues, redefines *Parapilumnus* on the basis of its type species, clarifies its systematic position and describes a new species from Guam. One species previously assigned to *Parapilumnus* is here referred to a new genus of Pilumnidae. Specimens examined are in the Museum national d'Histoire Naturelle (MNHN), Paris; Nationaal Natuurhistorisch Museum (ex Rijksmuseum van Natuurlijke Historie, RMNH), Leiden; and Zoological Reference Collection (ZRC), Raffles Museum, National University of Singapore. The abbreviations G1 and G2 are used for the male first and second pleopods respectively. Measurements provided (in millimeters) here are of the carapace width and length respectively.

### Taxonomy

Family Goneplacidae MacLeay, 1838

Subfamily Chasmocarcininae Serène, 1964

***Parapilumnus* Kossmann, 1877**

**Type Species.** *Pilumnus cristimanus* A. Milne Edwards, 1873, designation by Rathbun (1930). Gender of genus masculine.

**Diagnosis.** Carapace rounded to transversely ovate; anterolateral margin not marked with prominent teeth, lobes or spines; surface and margins of carapace lined with granules. Basal antennal segment large, filling orbital hiatus. Merus of third maxilliped with anteroexternal angle subauriculiform. Chelipeds symmetrical; outer surfaces of manus, carpus and merus distinctly granulated; dactylus with prominent submedian longitudinal ridge with 2 deep longitudinal grooves on either side of it; cutting edges of dactylus and pollex blade-like. Anterior thoracic sternum (sternites 1-5) relatively elongate; suture present between sternites 2 and 3; sternite 4 with deep longitudinal groove. Male abdomen with segments 3-5 completely fused. G1 straight, relatively stout; G2 long, subequal in length to G1.

**Remarks.** According to the published literature, *Parapilumnus* is a typical pilumnine crab (sensu Ng & Clark 2000a, b) and very close to *Pilumnus* Leach, 1815 s. str. (type species *Cancer hirtellus* Linnaeus, 1761, by monotypy), but differs in having a more granulose carapace, presence of tufts of setae and not having a uniform pubescence, and the frontal lateral lobes are usually absent (see Balss 1933, Takeda & Miyake 1969, Sakai 1976). Despite its general usage, *Parapilumnus* has never been properly defined. Monod (1956) commented on the problems associated with the species included by Kossmann (1877) in *Parapilumnus* when he first established it. Kossmann (1877) had established *Parapilumnus* as one of three subgenera of *Pilumnus*. He cited the main character as having the supraorbital margin entire and without any fissures, and listed the following species as belonging to *Parapilumnus*: *P. cristimanus* A. Milne

Edwards, 1873, *P. caerulescens* A. Milne Edwards, 1873, *P. cursor* A. Milne Edwards, 1873, *P. vermiculatus* A. Milne Edwards, 1873, and *P. globosus* Dana, 1852. Kossmann was unsure as to the generic status of two other species, *P. laevimanus* Dana, 1851, and *P. calculosus* Dana, 1851. Balss (1933) incorrectly attributed the authorship of *Parapilumnus* to De Man (1895) and incorrectly listed its type species as *P. quadridentatus*, an action which had been followed by almost all subsequent workers. Balss' (1933) type designation is not valid as *P. quadridentatus* was not among the seven species listed by Kossmann (1877) as belonging to *Parapilumnus* in the original paper.

Monod (1956) noted that some of the species listed by Kossmann (1877) have already been referred to other genera. He suggested that one might have to consider the first species listed by Kossmann (1877), i.e., *P. cristimanus*, as the type, but he did not formally recommend such an action. He also suggested that one might try perhaps to make *P. quadridentatus* as the type species, although this would require a formal application to the International Commission of Zoological Nomenclature for action. Türkay & Schuhmacher (1985) subsequently briefly discussed the type species problem of *Parapilumnus*. They transferred some of the species in *Parapilumnus* to a new genus, *Latopilumnus*, but left the status of the other species unresolved. They also preferred not to designate a type species until the identities of the other species are better known. Unknown to all the above authors, Rathbun (1930), in her treatise of American crabs, had already considered this issue, and in the synonymy of *Pilumnus*, she had listed *Parapilumnus* as its synonym, and selected its type species as *P. cristimanus* A. Milne Edwards, 1873. This action, while brief, is perfectly valid. *Parapilumnus cristimanus* is known to be an unusual *Pilumnus*. Balss (1933) had suggested transferring *P. cristimanus* to *Globopilumnus* (Eriphiidae), but the species is clearly not a *Globopilumnus* (see Guinot-Dumortier 1969), as is confirmed here. In any case, the name *Globopilumnus* Balss, 1933, is also not a valid name, being actually a junior subjective synonym of *Eupilumnus* Kossmann, 1877 (see Ng et al. 2001). As it turns out here, with a re-examination of the types of *P. cristimanus* and the discovery of *P. oryctus*, new species, *Parapilumnus* is not even a pilumnid!

To try and keep the use of *Parapilumnus* as now used by carcinologists by applying to the zoological commission to change the type species is not advisable. There has never been consensus about what the genus really is, and as mentioned earlier, most authors have tended to follow Balss' (1933) incorrect definition using *P. quadridentatus* as the type species. The only other species of *Parapilumnus* recognized by Balss (1933) was *P. verrucosipes* Stimpson, 1858, a species which was also not included by Kossmann (1877) in the genus. As such, the author feels that it is best to just follow Rathbun's (1930) type species designation and restrict *Parapilumnus* for *P. cristimanus* and *P. oryctus*. With regards to the other species which have been referred to and are still in *Parapilumnus*, most should be referred back to *Pilumnus*, pending a complete reappraisal of the genus (see notes on this matter later on).

The exact affinities of *Parapilumnus* s. str. are not at all clear. While the setation pattern bears a superficial resemblance to many pilumnids or *Eupilumnus* (previously *Globopilumnus*) (Eriphiidae), the form of the carapace is quite unlike them. In the form of its chelipeds (granular manus with blade-like cutting edges of the fingers), it resembles xanthids like *Banareia* (see Odhner 1925, Guinot 1976, Serène 1984), but the relatively stout and straight G1 and elongate G2 clearly excludes it from the Xanthidae MacLeay, 1838, as current defined (see Guinot 1978, Serène 1984).

*Parapilumnus* s. str. in fact closely resembles *Acidops* Stimpson, 1971 (type species *Acidops fimbriatus* Stimpson, 1871), a genus with two species (*A. fimbriatus* and *A. cessaci* (A. Milne Edwards, 1878)) known only from the Atlantic thus far. *Acidops* nevertheless differs from *Parapilumnus* in many aspects, most obvious being the carapace having the regions well demarcated with deep grooves separating them, the anterolateral margin clearly separated into four prominent lobes, the fingers of the cheliped not ridged and grooved, and the carapace and legs far more densely setose, so much so that the margins and surface are almost obscured (cf. A. Milne Edwards & Bouvier 1900: 76, pl. 15 figs. 1-8, Monod 1956: 359, figs. 469, 470, De Melo 1996: 418). The G1 and G2 of *Acidops* and *Parapilumnus* s. str. are very similar in form and general shape (cf. Guinot & Ribeiro 1962: 64, figs. 27, 28). The systematic position of *Acidops* is unclear. Until recently, authors have placed it in the Rhizopinae Stimpson, 1858, but Ng (1987), who reappraised this subfamily, formally referred Rhizopinae to the Pilumnidae, excluded *Acidops* from it and transferred it tentatively to the Goneplacidae instead. Within the Goneplacidae, it fits best in the Chasmocarcininae Serène, 1964. On the same rationale, *Parapilumnus* s. str. should also be referred to the Chasmocarcininae as well.

**A note on species previously placed in *Parapilumnus*** — Twelve pilumnid species have previously been referred to the genus *Parapilumnus* sensu Balss (1933) in recent times, viz. *P. euryfrons* Garth & Kim, 1983, *P. guinotae* Deb, 1987, *P. hondai* Takeda & Miyake, 1969, *P. incertus* Takeda & Miyake, 1969, *P. indicus* Deb, 1987, *P. leopoldi* Gordon, 1934, *P. malardi* (De Man, 1914), *P. nefissurus* Garth & Kim, 1983, *P. quadridentatus* (De Man, 1895), *P. trispinosus* Sakai, 1965, *P. tuberculosus* Garth & Kim, 1983, and *P. verrucosipes* (Stimpson, 1858) (see Balss 1933, Monod 1956, Takeda & Miyake 1969, Garth & Kim 1983, Deb 1987). Of these, the following taxonomic changes have taken place: *P. hondai* Takeda & Miyake, 1969, has been transferred to *Nanopilumnus* Takeda, 1974; *P. leopoldi* Gordon, 1934, to *Serenepilumnus* Türkay & Schuhmacher, 1985; *P. tuberculosus* Garth & Kim, 1983, to *Latopilumnus* Türkay & Schuhmacher, 1985; *P. incertus* Takeda & Miyake, 1969, to *Viaderiana* Ward, 1942; and *P. verrucosipes* (Stimpson, 1858) is a junior subjective synonym of *Serenepilumnus pisifer* (MacLeay, 1838) (see Takeda 1974, Türkay & Schuhmacher 1985, Ng 1987).

Of the remaining taxa, *Parapilumnus euryfrons* Garth & Kim, 1983, is actually a junior subjective synonym of *Pilumnus neglectus* Balss, 1933. The author

has examined the types of both species in the Smithsonian Institution and Berlin Museum respectively, and they are clearly conspecific. *Parapilumnus guinotae* Deb, 1987, *P. indicus* Deb, 1987, *P. malardi* (De Man, 1914), *P. nefissurus* Garth & Kim, 1983, *P. trispinosus* Sakai, 1965, should be referred back to *Pilumnus* Leach, 1815, s. lato for the moment. The problem with this action is that *Pilumnus guinotae* (Deb, 1987) then becomes a junior homonym of *Pilumnus guinotae* Takeda & Miyake, 1968. Both species, however, are clearly different taxa, and a replacement name, *P. debae* nom. nov., is here proposed for *Parapilumnus guinotae* Deb, 1987, when it is used in the same generic combination as *Pilumnus guinotae* Takeda & Miyake, 1968.

With regards to the last species which has been placed in *Parapilumnus*, *P. quadridentatus* (De Man, 1895), it is very different from typical *Pilumnus* species or any of the taxa considered thus far. The author has examined the types and recent specimens of *P. quadridentatus* from Singapore, and while its carapace is like many *Pilumnus* species and not especially unusual, it has a very distinctive ambulatory legs, as well as diagnostic G1 and larval antennal structures (Figs. 1, 2). On the fourth ambulatory merus, the ventral margins have distinct outwardly-directed granules along its proximal part and the distal margin of the basis-ischium has several prominent teeth (Fig. 1D), structures which are probably used to clamp onto the substrate (usually clumps of barnacles, bryozoan colonies or macroalgae). Its G1, although sinuous, has the distal part distinctly truncated (Fig. 1G), somewhat like that of *Rhizopa* (see Ng 1987), although their carapace and other external features are very different. The antennal exopod and spinous process of the first zoeae of *P. quadridentatus* (obtained from specimens from Singapore, ZRC) are extremely long (distinctly longer than the carapace) (Fig. 2A, D), longer than that known for any pilumnid thus far; the furcae of the abdominal telson are also prominently elongate (Fig. 2B) and the dorsal carapace spine is very long (Fig. 2A). In its other key larval characters, the first zoea of *P. quadridentatus* agrees with what is now defined for other pilumnids (see Ng & Clark 2001a, b). A full description of the larval morphology of this and other pilumnid species is currently being done by the author and P. F. Clark. In the light of the above adult and larval data, it is not possible to transfer this species to *Pilumnus*. As such it is here referred to a new genus, here named *Aniptumnus* (from the arbitrary combination of the Greek word “aniptos” for dirty, and the generic name *Pilumnus*; gender of genus masculine), alluding to the appearance of the crab in the wild. The type (and only species thus far) is *Pilumnus (Parapilumnus) quadridentatus* De Man, 1895. In the RMNH are two specimens, a male 7.2 by 5.0 mm, and a female 7.0 by 4.7 mm (RMNH 1483), labelled as syntypes of *Pilumnus (Parapilumnus) quadridentatus* De Man, 1895, collected from Pontianak in Borneo by Captain H. Storm, and donated by the Museum Lubeck (see Fransen et al. 1997: 118). The male is hereby selected as the lectotype of the species.

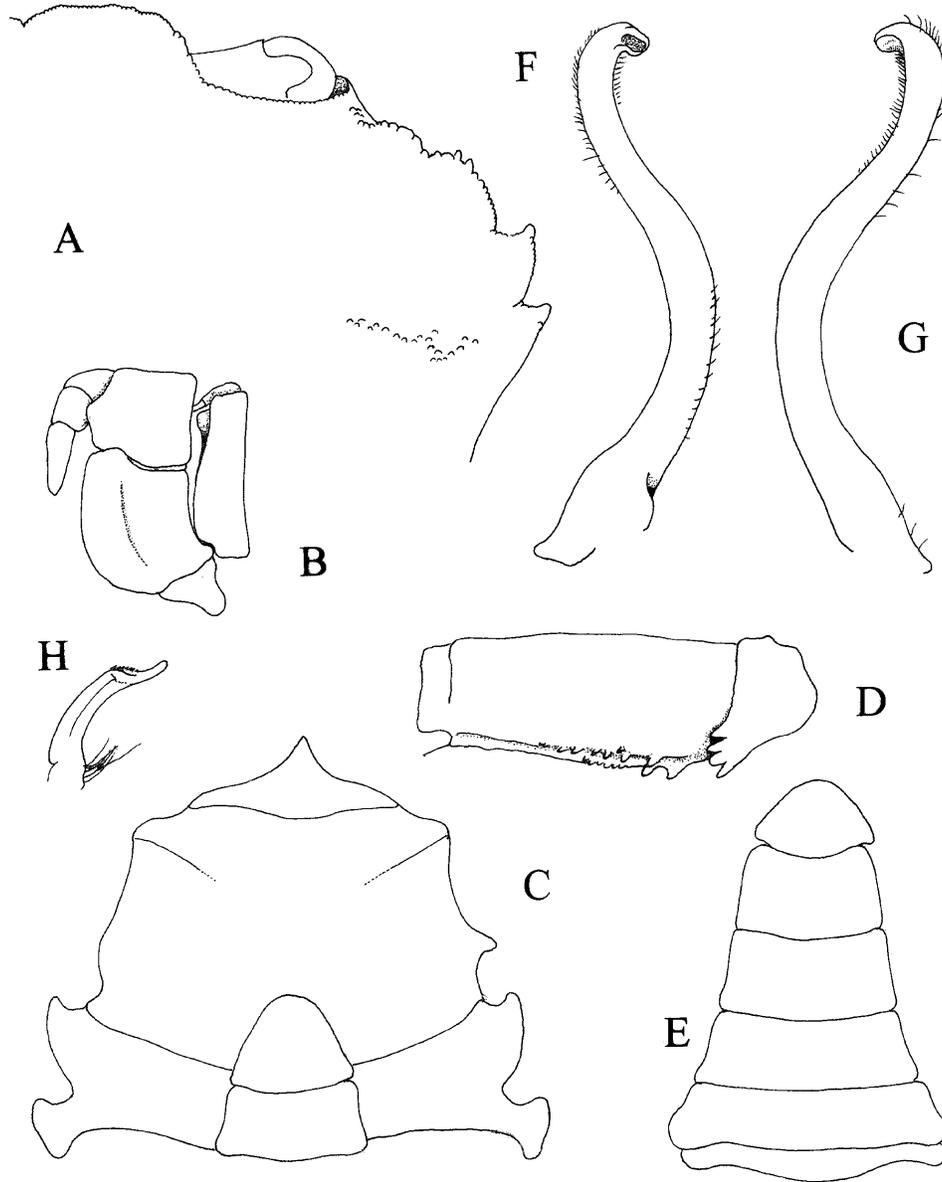


Figure 1. *Aniptumnus quadridentatus* (De Man, 1895). Lectotype male, 7.2 by 5.0 mm, Pontianak, Borneo (RMNH 1483). A, right side of carapace, schematic (setae denuded); B, left third maxilliped (setae not drawn); C, anterior male thoracic sternites; D, left fourth ambulatory merus and basis-ischium; E, abdomen; F, G, left G1; H, left G2.

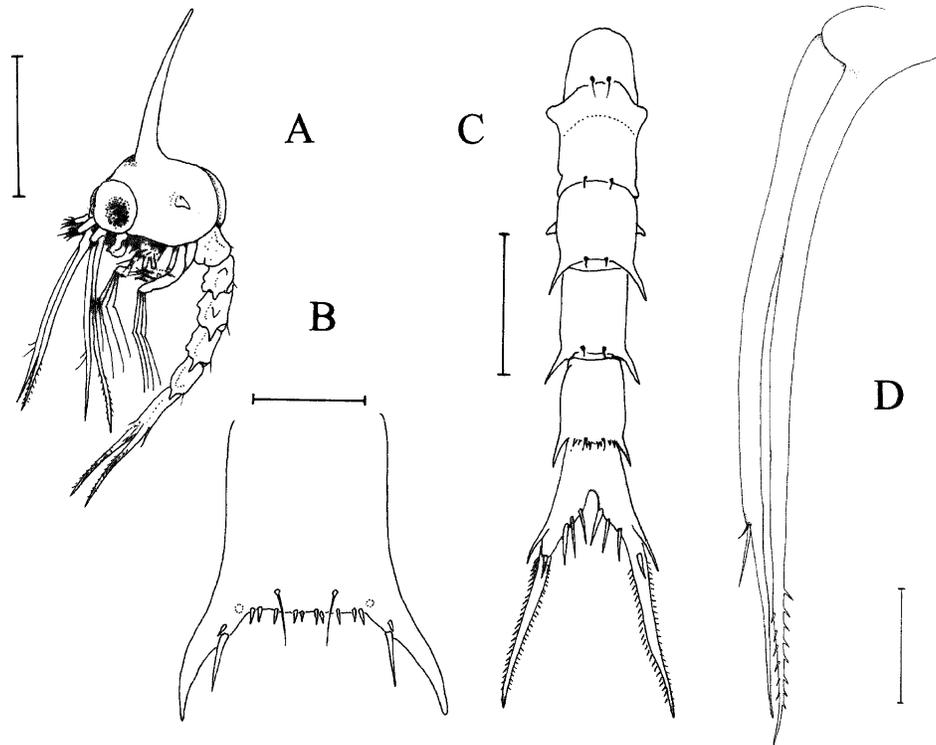


Figure 2. *Aniptumnus quadridentatus* (De Man, 1895). First zoea from Singapore specimen (ZRC). A, whole zoea; B, abdominal somite 5; C, abdomen; D, antennal exopod and spinous process. Scales: A = 0.50 mm; B = 0.25 mm; C = 0.07 mm; D = 0.14 mm.

*Parapilumnus cristimanus* (A. Milne Edwards, 1873)

(Figs. 3, 4)

*Pilumnus cristimanus* A. Milne Edwards, 1873: 251, pl. 9 fig. 5, 5a.

**Material examined.** Lectotype – female (16.5 by 13.0 mm) (MNHN-B12938), Upolu, Samoa, coll. M. Balansa. Paralectotype – 1 female (14.5 by 10.9 mm) (MNHN-B12939), New Caledonia, coll. M. Balansa.

**Diagnosis.** Carapace transversely ovate, broader than long; anterolateral margin lined with numerous rounded granules, with some anterior ones relatively sharper. Chelipeds symmetrical; surfaces of manus, carpus and merus covered with numerous rounded granules; dactylus with very prominent submedian longitudinal ridge which forms 2 deep grooves on either side, the dorsal one longer, extending to distal one-third of finger, the ventral one reaching only to proximal one-third; cutting edge of dactylus with 2 closely spaced proximal basal teeth, rest of edge entire, blade-like. Outer surfaces of ambulatory meri, carpi and propodi distinctly granulated, margins lined with prominent granules, appearing serrated.

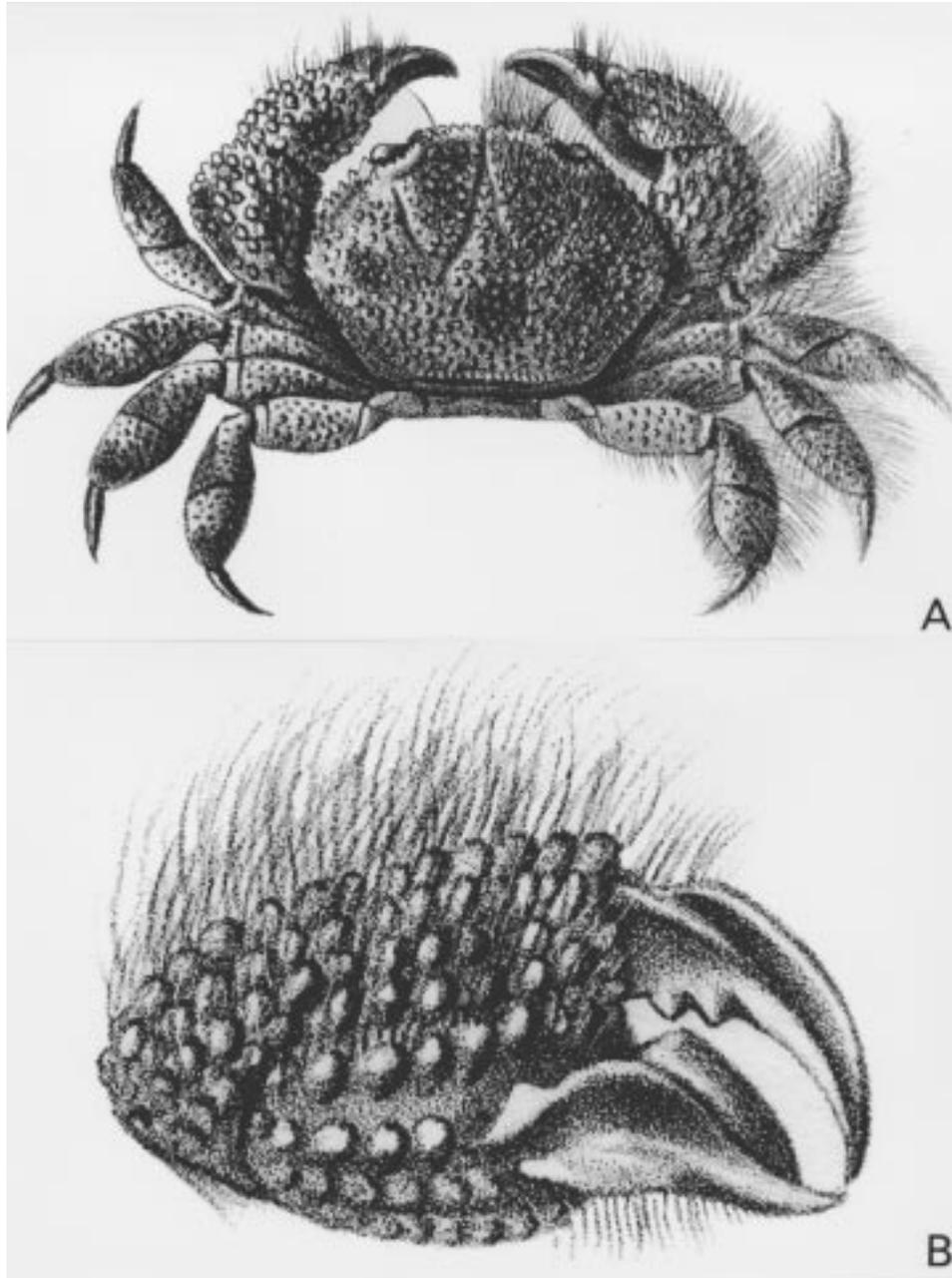


Figure 3. *Parapilumnus cristimanus* (A. Milne Edwards, 1873). A, overall view; B, right chela. (After A. Milne Edwards, 1873: pl. 9 fig. 5, 5a).

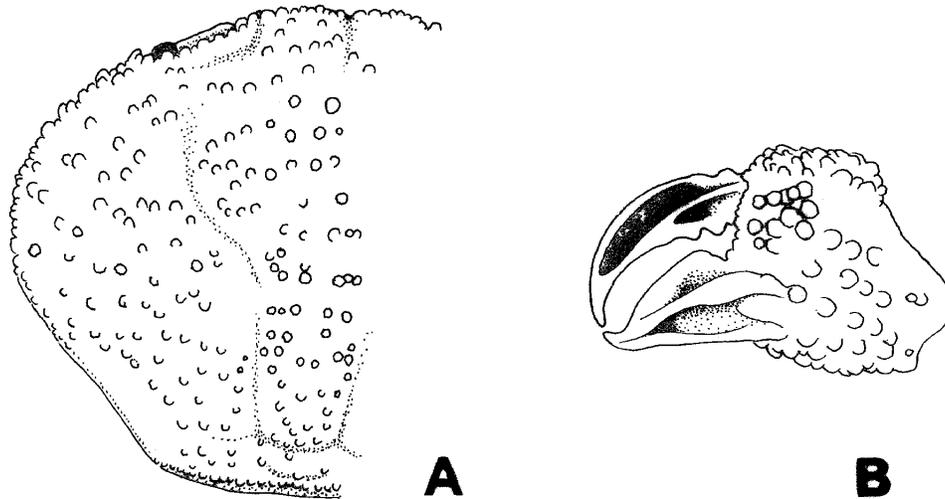


Figure 4. *Parapilumnus cristimanus* (A. Milne Edwards, 1873). Lectotype female (16.5 by 13.0 mm) (MNHN-B12938). A, left side of carapace; B, left chela. Both structures denuded.

**Remarks.** In describing this species, A. Milne Edwards (1873: 252) noted that “Il est très-rare à la Nouvelle-Caledonie et a aussi été trouvé à Upolu (archipel Samoa),” i.e., he had at least two specimens, one from each locality. He provided measurements for only one unsexed specimen 17 by 13 mm. In his figure, however, he noted that he had one male specimen. In the MNHN, there are only two specimens of *P. cristimanus*, both of which are listed as possible types. Both are females, and as such, it would appear that A. Milne Edwards had been mistaken about the sex of the specimen he figured. Both of the MNHN specimens are thus syntypes. The larger of the two specimens corresponds well to his measurements and figures, and is here designated the lectotype of the species. The descriptions, figure of the whole animal and chela of the species by A. Milne Edwards (1873: pl. 9 fig. 5, 5a) are quite accurate, although the specimens are now in rather poor condition. With regards to the color of the species, A. Milne Edwards (1873: 252) noted that “Le corps et les pattes sont d’une couleur jaun, tre avec de grandes taches rouges”. This color pattern actually agrees quite well with that here recorded for *P. oryctus* (Fig. 5).

### *Parapilumnus oryctus*, new species

(Figs. 5–8)

**Material examined.** Holotype – male (12.3 by 10.5 mm) (ZRC 2002.174), Luminao fore reef, 20–25m, in rubble, 20–25 m, coll. H. T. Conley, May 1998.

**Diagnosis.** Carapace relatively rounded; anterolateral margin lined with prominent conical granules, some sharp. Basal antennal segment large, subquadrate, filling orbital hiatus. Merus of third maxilliped with anteroexternal

angle subauriculiform. Chelipeds symmetrical; outer surfaces of manus, carpus and merus covered with numerous large sharp to rounded granules; dactylus with very prominent submedian longitudinal ridge which forms 2 deep grooves on either side, the dorsal one longer, extending to distal one-third of finger, the ventral one reaching only to proximal half; cutting edge of dactylus with 2 well spaced proximal basal teeth, rest of edge blade-like, lined with about 12 denticles. Outer surfaces of ambulatory meri, carpi and propodi weakly granulated, margins lined with prominent granules, appearing serrated. Anterior thoracic sternum relatively elongate; sternites 2 and 3 completely fused, prominent suture present between sternites 2 and 3; sternite 4 with deep longitudinal groove which starts from abdominal cavity. Male abdomen with segments 3-5 completely fused. G1 straight, relatively stout, distal part tapering to sharp tip; G2 long, subequal in length to G1, distal segment about half length of G2 basal segment.

**Description.** Carapace relatively rounded; dorsal surface with regions poorly indicated, weakly convex, covered with numerous well spaced rounded and conical granules, the base of which usually has several long, stiff setae. Front not produced, bilobed, each lobe truncatiform, lined with numerous conical granules; lobes separated by shallow V-shaped cleft; margin lined with numerous long, stiff setae which almost obscures margin. Supraorbital margin gently concave, granulated, without distinct clefts, inner supraorbital angle demarcated by 1-2 granules, separated from frontal margin by small, narrow cleft; outer angle represented by large granule, not clearly separated from anterolateral margin. Infraorbital margin distinctly granulated, without distinct larger tooth or tubercle. Orbits relatively large, sloping posteriorly from dorsal view. Anterolateral margin convex, lined with conical granules, appearing serrated; margin not clearly separated from posterolateral margin; margin faintly divided into three very low subequal lobes (including external orbital lobe), each lobe marked by slightly deeper cleft between granules. Posterolateral margin sinuous, with posterior part weakly concave; anterior part lined with small rounded granules. Posterior carapace margin almost straight, with transverse ridge of small rounded granules just anterior to it. Pterygostomial and sub-orbital regions separated by row of large granules, surfaces otherwise almost smooth, covered with dense soft setae. Basal antennal segment large, subquadrate, distal margin concave, filling orbital hiatus; flagellum prominent, reaching to outer edge of orbit. Antennules folding somewhat obliquely. Posterior margin of epistome with broad median triangular lobe; lateral margins concave, each with median cleft. Endostome with low but discernible oblique ridges. Third maxilliped relatively short, ischium fused with basis, suture only clear laterally; ischium with discernible sulcus, inner margin weakly serrated; merus subrectangular, median part faintly depressed, margins finely granulated; anteroexternal angle subauriculiform; exopod stout, distal part reaching almost to edge of merus, flagellum well developed.

Chelipeds symmetrical; outer surfaces of manus, carpus and merus covered with numerous large sharp to rounded granules, with numerous short and long stiff setae which do not obscure surface or margins. Merus fused with basis-ischi-

um but suture still discernible. Carpus short, inner distal angle with low projection. Chela short; surface covered with strong granules, those closer to fingers and margins especially larger and more coniform; fingers shorter than palm, not pigmented, tips corneous. Dactylus curved, proximal dorsal margin with several granules; outer surface with very prominent submedian longitudinal ridge which extends to two-third's length of finger, forming 2 deep grooves on either side, the dorsal one longer, extending to distal one-third of finger, the ventral shallower one reaching only to proximal half; cutting edge with 2 well spaced proximal basal teeth, rest of edge blade-like, lined with numerous denticles. Subventral margin of pollex with longitudinal groove and low ridge; very broad basally proximal part with broad tooth, rest of cutting edge blade-like with some denticles distally, tip strongly recurved.

Ambulatory legs relatively short, second and third leg longest; outer surface almost smooth, not granular or rugose; setose all over, setae denser and longer on margins, but never obscuring surface. Dorsal margin of merus distinctly granular; ventral margin with 2 subparallel rows of granules. Carpus with dorsal margin granulated, separated from subdorsal row of granules by shallow groove. Propodus short, ovate, dorsal margin and subdorsal surface granular. Dactylus unarmed, completely covered with short, dense setae except for distal corneous part.

Anterior thoracic sternum relatively elongate, surfaces finely granular. Sternites 1 and 2 fused, with suture demarcating them not easily discernible; suture between sternites 2 and 3 deep, complete; sternites 3 and 4 completely fused, sternite 4 with deep median longitudinal groove which continues to abdominal cavity. Sternite 5 medially interrupted by solid plate; sternites 6-8 with longitudinal groove. Abdominal cavity deep, just reaching to imaginary transverse line connecting proximal bases of chelipeds. Abdominal lock present as low rounded granules on posterior margin of sternite 5. Penis relatively long, arising directly from base of coxa of fourth ambulatory leg.

Abdomen with segments 3-5 completely fused, lateral margin gently concave, with small lateral cleft demarcating segments 3 and 4. Telson triangular, with lateral margins prominently convex, tip rounded. Segment 6 transversely rectangular, lateral margins concave. Segments 1 and 2 trapezoidal; subproximal margin of segment 1 with transverse row of granules.

G1 straight, relatively stout, distal part tapering to sharp tip, opening slit-like; G2 relatively long, subequal in length to G1, distal segment about half length of G2 basal segment.

**Color.** The color in life of this species is stunning, with striking bilaterally symmetrical red blotches on the greyish-white carapace and pereopods (Fig. 3). The long setae on the margins are golden yellow.

**Etymology.** The species name is derived from the Greek "oryktos" for digs, alluding to its possible burrowing behavior.

**Remarks.** The present new species is very close to *P. cristimanus*, but there are several characters which can distinguish them. The most distinct is

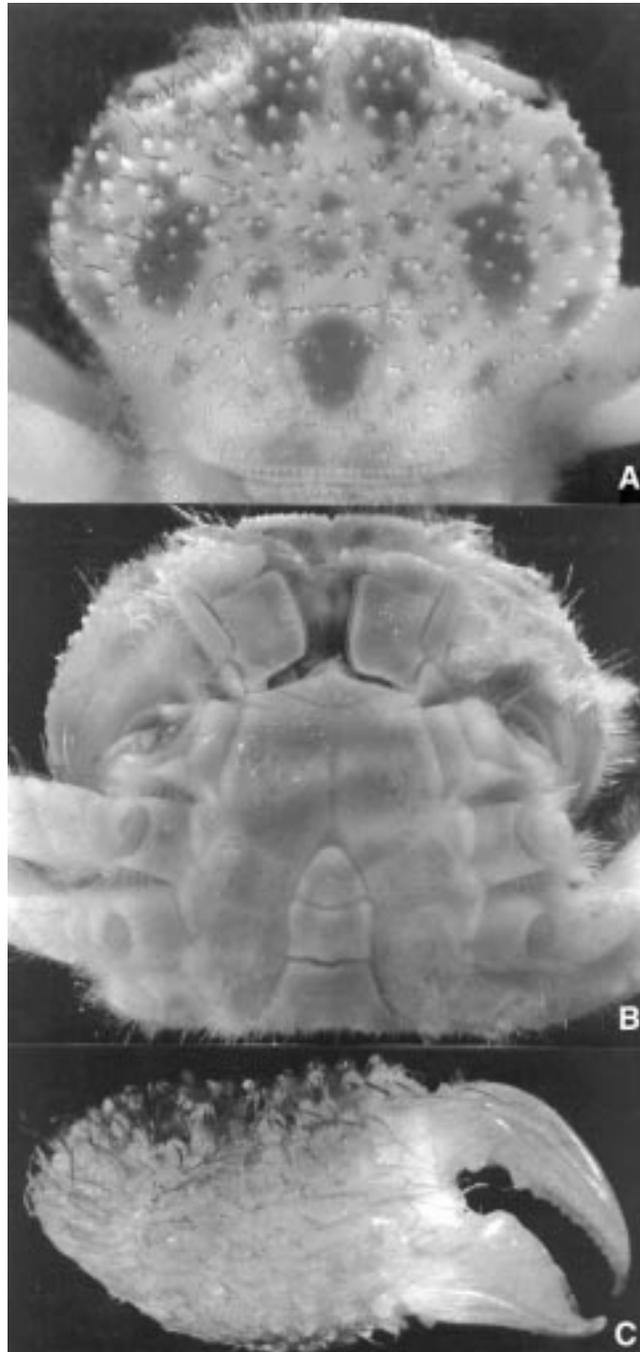


Figure 6. *Parapilumnus oryctus*, new species. Holotype male (12.3 by 10.5 mm) (ZRC 2002.174). A, carapace; B, anterior thoracic sternum; C, right chela.

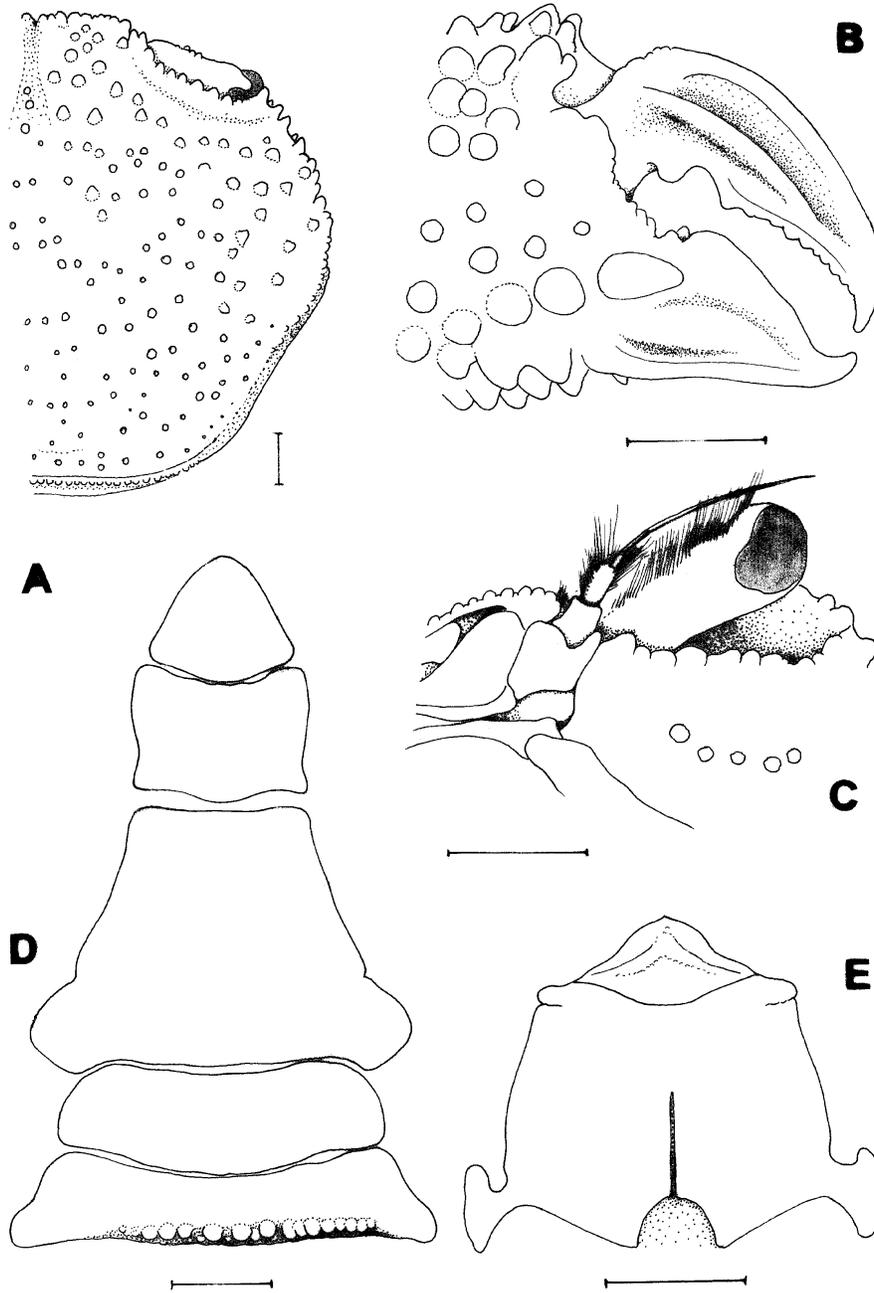


Figure 7. *Parapilumnus oryctus*, new species. Holotype male (12.3 by 10.5 mm) (ZRC 2002.174). A, right side of carapace (denuded); B, right chela (denuded); C, left frontal view of carapace (denuded); D, male abdomen (denuded); E, Anterior thoracic sternum. Scales: A, D = 1.0 mm; B, C, E = 2.0 mm.

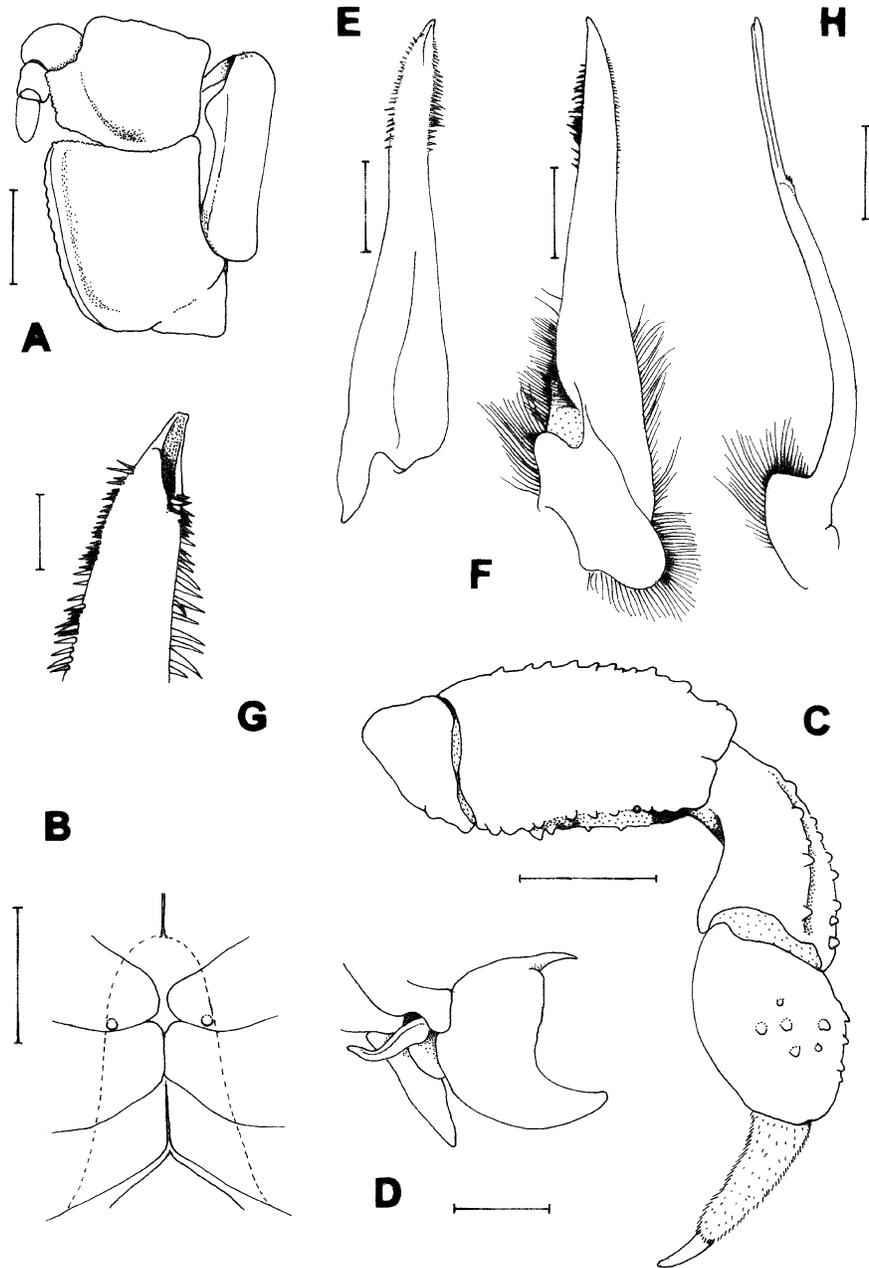


Figure 8. *Parapilumnus oryctus*, new species. Holotype male (12.3 by 10.5 mm) (ZRC 2002.174). A, left third maxilliped (denuded); B, abdominal cavity of thoracic sternum, showing abdominal locking buttons on sternite 5; C, right fourth ambulatory leg (denuded except for dactylus); left penis arising from coxa of fourth ambulatory leg (denuded); E-G, left G1; H, left G2. Scales: A, D = 1.0 mm; B, C = 2.0 mm; E, F, H = 0.5 mm; J = 0.05 mm.

that the carapace of *P. cristimanus* is broader than long with the length to width ratios of the two specimens 1.27 and 1.33 (vs. more rounded in *P. oryctus*, length to width ratio 1.17), the granules on the anterolateral margin are relatively more prominent and sharper, the outer surface of the ambulatory legs (especially the meri) are covered by numerous distinct granules (vs. almost smooth in *P. oryctus*), and the dactylus of the cheliped has the two basal teeth relatively closely spaced with the rest of the cutting edge entire and blade-like (vs. basal teeth prominently more widely spaced, with the rest of the cutting edge lined with small denticles in *P. oryctus*). These differences are unlikely to be associated with sex, although admittedly, *P. cristimanus* is only known from females and *P. oryctus* is represented by only one male. It is of course possible that with a larger series of either species, these differences will be shown to be variable, but until then, the author prefers to recognize the Guam taxon as a separate species.

*Parapilumnus oryctus* has no morphological characters which might suggest it is an obligate deep rubble dweller. Deep rubble beds are very much like caves and inhabitants of this habitat are typically poorly or not pigmented, have reduced eyes and occasionally long pereopods. The bright colors of *P. oryctus* suggests it normally lives on the surface, as with most other brightly colored xanthoid crabs. What these crabs eat is not known.

### Acknowledgements

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