

THE PINNOTHERID TYPE MATERIAL OF SEMPER (1880), NAUCK (1880) AND BÜRGER (1895) (CRUSTACEA: DECAPODA: BRACHYURA)

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ABSTRACT. – The major study of pinnotherid crabs by Otto Bürger (1895) is a landmark publication for students of the Pinnotheridae, not only for the many new species described, but also for its introduction of useful species characters. Bürger (1895) described and illustrated 28 new species, mainly from the Philippines, and reported additional species including those described by his colleagues, Semper and Nauck. Unfortunately, few subsequent workers have examined the ‘Bürger’ material—a significant problem because his species accounts are inadequate by modern taxonomic standards leading to questionable identifications. Therefore, all available ‘Bürger’ material has been re-examined herein. Of the 31 new species described by Bürger, Semper and Nauck, types of 21 species are still extant. Species for which original types are still extant are redescribed and refigured, with lectotypes usually selected. Species for which type material is lost are briefly diagnosed and illustrated by their original figures. Species for which neotypes have been assigned by previous studies are illustrated and diagnosed for completeness. Generic assignments of all species are reassessed and updated. Bürger’s specimens of *Pinnotheres parvulus* Stimpson, 1858, are syntypes of *P. alcocki* Rathbun, 1909, and transferred to *Arcotheres*. *Pinnotheres glaber* Bürger, 1895, is synonymised with *P. impressus* Bürger, 1895, and transferred to *Orthotheres*. *Pinnotheres rhombifer* Bürger, 1895, is synonymised with *P. latissimus* Bürger, 1895, and transferred to *Arcotheres*. *Pinnotheres rotundatus* Bürger, 1895, is also synonymised with *P. consors* Bürger, 1895, and transferred to *Arcotheres*. The type series of *Arcotheres palaensis* Bürger, 1895, comprised two species, one of which is referable to *A. guinotae* Campos, 2001; a lectotype is selected to retain validity of both species. The type series of *Xenophthalmus latifrons* Bürger, 1895 (here transferred to *Arcotheres*), contained two species, one of which is named *A. rayi*, new species. *Pinnotheres gracilis* Bürger, 1895, and *P. burgeri* Rathbun, 1909, are transferred to *Viridotheres*. Miscellaneous, unstudied material in the ‘Bürger’ collection included an undescribed *Viridotheres*, herein named *V. otto*, new species. *Pinnotheres placunae* Hornell & Southwell, 1909, is also referred to *Arcotheres*.

KEY WORDS. – Crustacea, Decapoda, Brachyura, Pinnotheridae, type material, new species, *Arcotheres rayi*, *Viridotheres otto*, taxonomy.

INTRODUCTION

The paper by Otto Bürger (1895) on Indo-West Pacific Pinnotheridae is a landmark publication in brachyuran studies. Bürger (1895) described and illustrated 28 new species, mainly from the Philippines, but more importantly, introduced a suite of useful taxonomic characters. As Manning (1993a: 126) commented “Almost a century ago, Bürger (1895) introduced a variety of characters that could be used to distinguish species and groups of *Pinnotheres*, e.g., the shape and relative lengths of the distal segments of the MXP3, the shape of the carapace, the relative dactylar and overall lengths

of the walking legs. Few workers have adopted the characters used by Bürger, yet his study laid the groundwork for a revision of the genus by providing a suite of very distinctive characters usable at the generic level.” Bürger (1895) had been extensively cited by almost all pinnotherid workers but few have examined or attempted to revise his material. This has been a serious problem because the descriptions and figures provided by Bürger are inadequate by modern taxonomic standards.

In their major synopsis of the Pinnotheridae, Schmitt et al. (1973) located many of Bürger’s specimens as well as those

studied by two of his associates at Germany's University of Göttingen, Semper and Nauck, who between them described several new species. Schmitt et al. (1973) commented that they could not find the types of several species, which may be lost.

In 1999, when the second author and the late Raymond Manning embarked on a study of pinnotherids associated with sea cucumbers (see Ng & Manning, 2003), attempts were made to trace Bürger's, Semper's and Nauck's material. It was discovered that the Smithsonian Institution held six lots of six species obtained by C. Semper, including material used for three important pinnotherid papers (Semper, 1880; Nauck, 1880; Bürger, 1895). Oddly, these species, *Pinnotheres flavus* Nauck, 1880, *P. holothuriae* Semper, 1880, *P. affinis* Bürger, 1895, *P. exiguus* Bürger, 1895, *P. glaber* Bürger, 1895, and *Xenophthalmus latifrons* Bürger, 1895, were not cited by Schmitt et al. (1973), although Mary J. Rathbun was aware of the type status of these specimens based on data from their labels. Michael Türkay and Andreas Allspach confirmed that the Senckenberg Museum in Frankfurt, Germany, was the eventual repository of the extant crustacean material from the Göttingen University, and still possessed types of two holothurian-dwelling pinnotherid species they were studying: *Pinnotheres flavus* Nauck, 1880, and *Holothuriophilus trapeziiformis* Nauck, 1880 (see Ng & Manning (2003) for a detailed account). It is important here to note that although Ng & Manning (2003) indicated that some of Bürger's (1895) types were present in the Zoological Museum in Berlin, we have since been informed by Oliver Coleman (pers. comm.) that there are actually none in the Berlin collections.

In 2001, Michael Türkay generously offered the second author the opportunity to study the "Göttingen" collection of pinnotherids but commented that there were many problems. Andreas Allspach prepared a list of the Göttingen material in the Senckenberg Museum, warning that sometime in the past (possibly several times), some of the bottles containing the "Göttingen" pinnotherids had dried out and were refilled much later. Consequently, the condition of some specimens was poor. Moreover, some bottles had been broken, the contents may have mixed, and not all specimens listed by Semper (1880), Nauck (1880) and Bürger (1895) could be accounted for. There was also material from Göttingen that had apparently never been published on by these authors. Nevertheless, the importance of this material for a clearer understanding of pinnotherid taxonomy, and the fact that there were still many extant types, compelled the complete study of the material. In this paper, the pinnotherid species described by Semper (1880), Nauck (1880) and Bürger (1895) are listed, and the status of the type material summarised.

Of the 31 species described by Semper, Nauck and Bürger, types of 21 species are still extant (see also Ng & Manning, 2003). Of the 10 species for which types are lost, Ng & Manning (2003) selected neotypes for two species.

For species whose types are still extant, lectotypes are in most cases selected and the taxon is redescribed and refigured. Where type material is lost, the original figures have been reproduced and in a brief diagnosis, the key characters are identified for the benefit of future workers. Generic assignments are also reassessed and taxonomy updated. Of these, five species [*Pinnotheres flavus* Nauck, 1880, *P. semperi* Bürger, 1895 (both now in *Holotheres* Ng & Manning, 2003), *P. holothuriae* Semper, 1880, *P. ortmanni* Bürger, 1895, *P. tenuipes* Bürger, 1895 (both now in *Buergeres* Ng & Manning, 2003)] were dealt with by Ng & Manning (2003) and one species (*Durckheimia caeca* Bürger, 1895) was redescribed by Ahyong & Ng (2005).

MATERIALS AND METHODS

Terminology used herein follows Manning (1993a). The following abbreviations are used: MXP3 = third maxilliped; the walking legs, pereopods 2–5, are referred to as P2–5, respectively; G1 = male first pleopod. Measurements are of the carapace width and length (cw. and cl., respectively), respectively in millimetres (mm). Specimens examined are deposited in the Senckenberg Museum, Frankfurt-am-Main (SMF); National Museum of Natural History, Smithsonian Institution, Washington D.C. (USNM); and Zoological Reference Collection of the Raffles Museum, National University of Singapore (ZRC). The Göttingen material in the SMF is catalogued separately from the main crustacean collections. The specimens carry original Göttingen Museum numbers (here indicated with the prefix Go) but are also separately catalogued in SMF under the abbreviation ZMG (for Zoologisch Museum Göttingen). Both sets of registration numbers are included in this study.

Since many of Bürger's species have not been adequately characterised until now, most published distribution records will require verification. Consequently, synonymies are restricted to the primary citation, and studies dealing directly with Bürger's material and/or types. A description and illustration of the type material is given for species not treated by Ng & Manning (2003) and Ahyong & Ng (2005). For completeness, species dealt with by Ng & Manning (2003) and Ahyong & Ng (2005) are illustrated and briefly diagnosed. Numerous currently used species characters such as walking leg asymmetry, segment proportions and dactylar setation are difficult or impossible to interpret from Bürger's account and figures, so it is not always possible to provide adequate diagnoses for species lacking type material. For species lacking types, the original figures and a brief list of diagnostic characters extracted from Bürger (1895) is given as a starting point for future studies. Table 2 lists species reported by Bürger (1895) in their original and current combinations, along with unpublished specimens from the 'Bürger collection', the number of specimens originally cited and material still extant.

TAXONOMY

PINNOTHERIDAE DE HAAN, 1833

Arcotheres alcocki (Rathbun, 1909), new combination
(Fig. 1)

Pinnotheres parvulus – Bürger, 1895: 375–376, Pl. 9: Fig. 18, Pl. 10: Fig. 17 [not *P. parvulus* Stimpson, 1858].

Pinnotheres alcocki Rathbun, 1909: 114 [type locality: Burias, the Philippines, by present lectotype designation].

Type material. – Lectotype: SMF-ZMG180 (Go655b), female (11.0 × 8.0 mm), Burias, the Philippines.

Description. – Female: Carapace subhexagonal, wider than long, anterior margin blunt; front slightly projecting, convex; posterior margin straight. Eyes small, partially visible in dorsal view. MXP3 with propodus about 3 times as long as high, apex blunt, rounded; dactylus not reaching propodal apex; ischiomerus about twice as long as wide, outer margin convex, inner margin with proximal 3/4 slightly concave, angular at distal quarter; exopod outer margin concave, inner margin relatively straight, flagellum two-segmented. Cheliped with dactylus longer than half palm length; palm about twice as long as high, mesioventral margin setose; dactylus occlusal margin with large proximal tooth; pollex occlusal margin with small proximal tooth, sparsely setose. Walking legs dorsally and ventrally unarmed; relative lengths of meri $P4 > P3 > P2 > P5$. $P2$ – $P5$ dactyli relative lengths $P5 > P4 > P3 > P2$. $P2$ and $P3$ dactyli less than half propodal length. $P4$ asymmetrical in length; sparsely setose; left and right dactyli subequal in length, shorter than propodus, setose ventrally. $P5$ dactylus

as long as propodus, slightly longer than $P4$ dactylus; ventrally setose, dorsally setose distally; ventral distal margin with 2 rows of 10–12 minute spinules. Abdomen extending to buccal region, covering bases of walking legs. Male: not known.

Remarks. – One of Bürger's (1895) three specimens that was reported as *P. parvulus* from Burias is still extant. Rathbun (1909) regarded records of *P. parvulus* by Bürger (1895) from the Philippines, de Man (1887: 105, 1888: 383) from the Mergui Archipelago and Indonesia, and Alcock (1900) from an unspecified locality, as misidentifications, and proposed a new name for the species, *P. alcocki*. The relative lengths of the walking leg dactyli in *P. alcocki*, in which the $P4$ and $P5$ dactyli are longer than those of $P2$ – $P3$ indicate that Rathbun's species is referable to *Arcotheres*. Rathbun (1909) did not designate type specimens for *A. alcocki*, so all of the material reported as *P. parvulus* by Bürger (1895), de Man (1887, 1888) and Alcock (1900) are syntypes. Significantly, the Mergui Archipelago syntype of de Man (1887) and reported by Gordon (1936), although said to be in poor condition, differs from the Philippine syntype, most notably in the setation and relative lengths of the $P4$ and $P5$ dactyli, with the $P4$ dactylus about 0.6 times rather than subequal to that of $P5$. Thus, the syntypes of *A. alcocki* are composite. To fix the identity of *A. alcocki*, Bürger's Philippine syntype (ZMG180) is herein designated as the lectotype. Fixation of the Philippine syntype as lectotype of *A. alcocki* raises the question of the identity of the Mergui Archipelago material. The Mergui Archipelago material almost certainly represents an undescribed species that is similar to, but probably distinct from Japanese material reported as *P. alcocki* by Takeda & Konishi (1988), also an undescribed species. In particular,

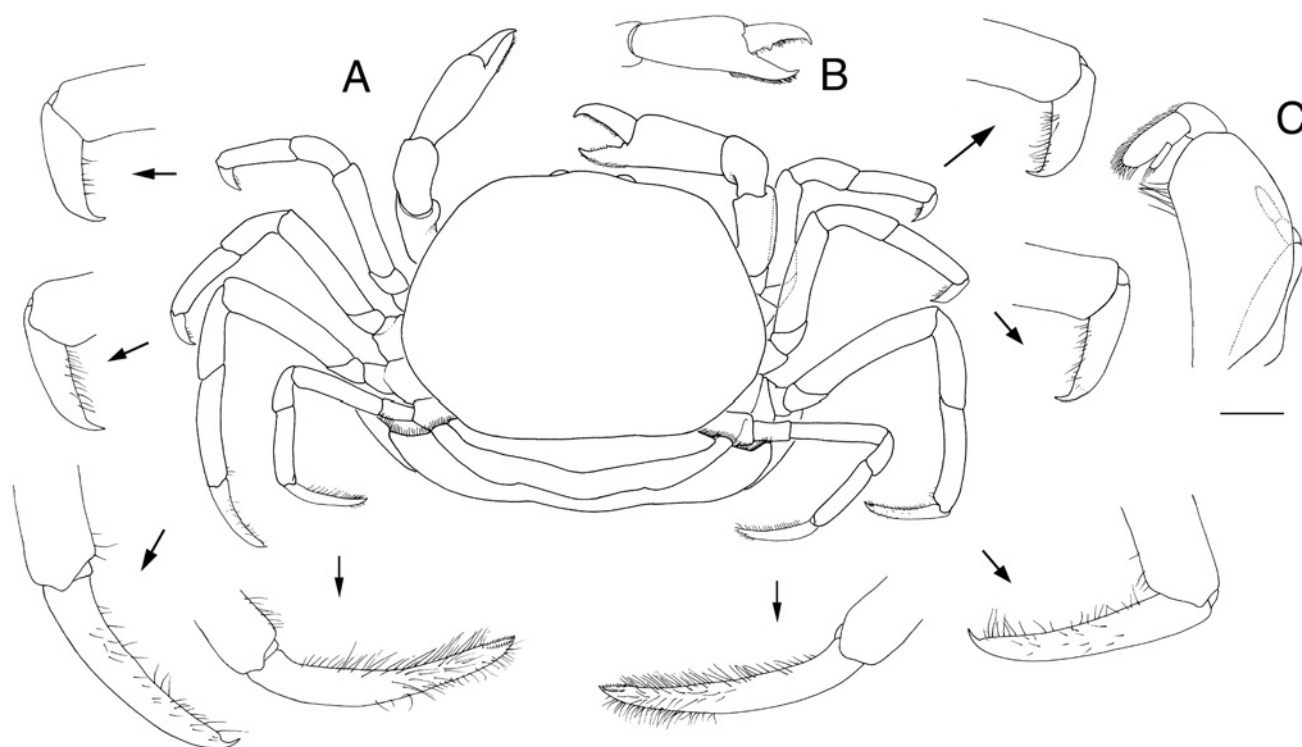


Fig. 1. *Arcotheres alcocki* (Rathbun, 1909), new combination, SMF-ZMG180, lectotype female (11.0 × 8.0 mm), Burias, the Philippines: A, dorsal habitus. B, right cheliped. C, right MXP3. Scale bars: A, B = 2.0 mm; C = 0.7 mm.

the propodus of MXP3 in the Japanese material tapers less strongly than that of the Mergui Archipelago specimen (if the figures are correct). Further action on the Mergui and Japanese species is deferred until specimens can be examined. The present status of material reported by Alcock (1900) is not known.

Takeda & Konishi (1988) compared and contrasted their Japanese "*P. alcocki*" with similar congeners including *P. sinensis* Shen, 1932. Ironically *Pinnotheres sinensis*, referable to *Arcotheres*, agrees well in almost all respects with *A. alcocki* sensu stricto, particularly in MXP3 morphology, walking leg segment proportions, and the ornamentation of the P5 dactyli including two ventral rows of minute spinules (based on Shen, 1932; Takeda & Konishi, 1988; Dai & Yang,

1991). Judging from the type description and figures, *A. sinensis* differs from *A. alcocki* in its slightly shorter P4 dactyli (0.8 vs. 0.9 P5 length) and possibly in carapace width: length ratio as well, 1.4 versus 1.2, based on Shen's (1932) figure 78b. *Arcotheres alcocki* and *A. sinensis* are possibly synonymous, but assessment of the status of the latter must await a redescription of type material.

Arcotheres arcophilus (Bürger, 1895)

(Fig. 2)

Pinnotheres arcophilus Bürger, 1895: 371, Pl. 9: Fig. 10, Pl. 10: Fig. 10 [type locality: Ubay, the Philippines, from *Arca*, by present lectotype designation].

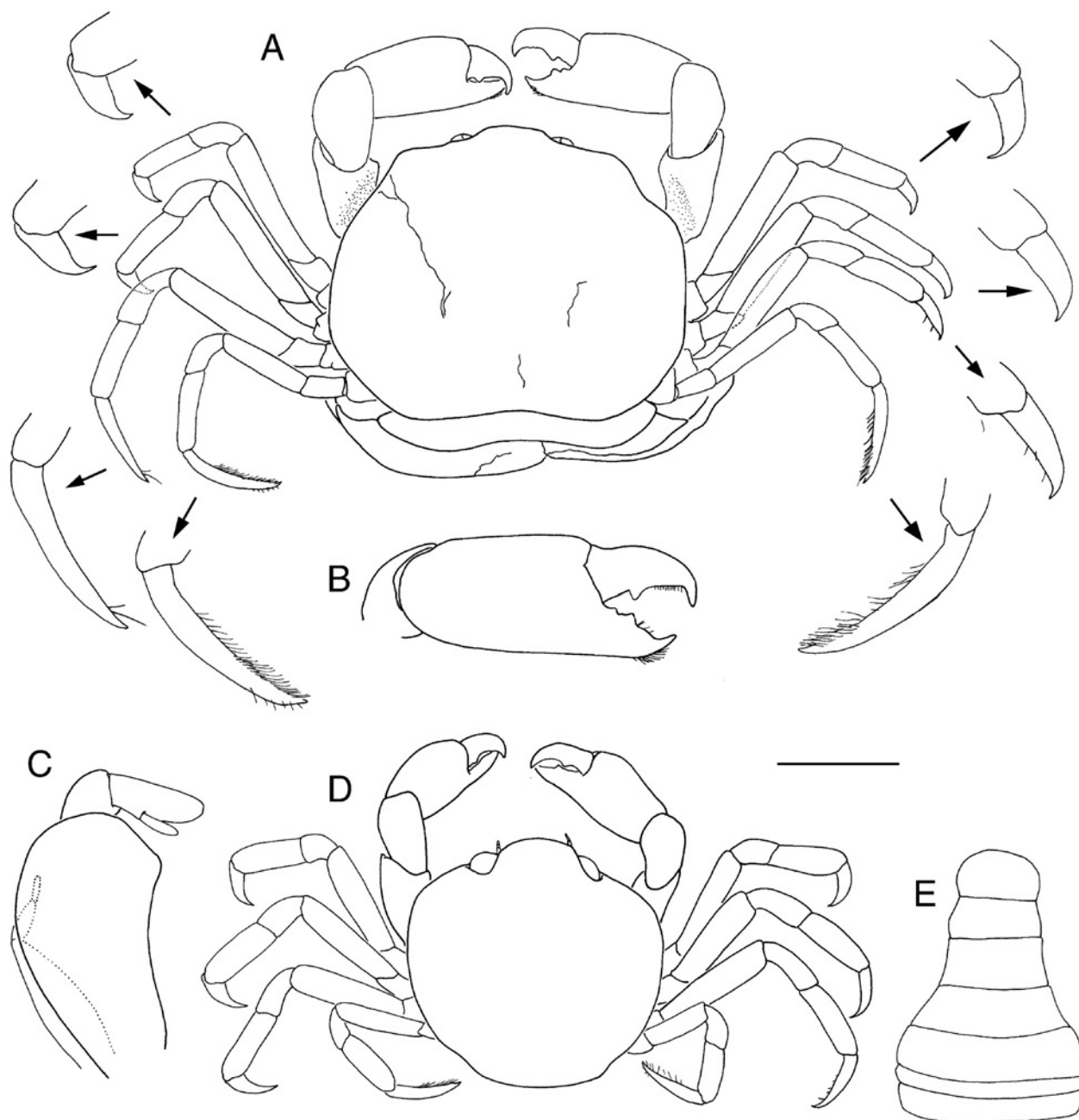


Fig. 2. *Arcotheres arcophilus* (Bürger, 1895), new combination, Ubay, the Philippines: A–C, SMF-ZMG172a, female lectotype (5.3 × 4.7 mm); D, E, SMF-ZMG172b, male paralectotype, (2.8 × 2.5 mm). A, D, dorsal habitus; B, right cheliped; C, right MXP3; E, abdomen. Scale bars: A = 2 mm; B, D = 1.4 mm; C, E = 0.5 mm.

Type material. – Lectotype: SMF-ZMG172a (Go954a), female (5.3 × 4.7 mm), Ubay, the Philippines, from *Arca*, C. Semper, 1863–1864. Paralectotypes: SMF-ZMG172b (Go954a), 1 male (2.8 × 2.5 mm), 1 shrivelled female (5.1 × 4.5 mm), type locality.

Description. – Female: Carapace subhexagonal, slightly wider than long, anterior margin sharp, front faintly projecting, slightly convex. Eyes small, partially visible in dorsal view. MXP3 with propodus about 3 times as long as high, apex rounded; dactylus not reaching propodal apex; ischiomerus about twice as long as wide, outer margin convex, inner margin with proximal 3/4 slightly concave, angular at distal quarter; exopod inner and outer margin convex, flagellum two-segmented. Cheliped with dactylus longer than half palm length; palm about 1.5 times as long as high, mesioventral margin setose; dactylus occlusal margin with large proximal tooth and short setae; pollex occlusal margin with 2 blunt proximal teeth, sparsely setose. Walking legs dorsally and ventrally unarmed; relative lengths of meri $P2 = P3 > P4 > P5$. $P2$ – $P5$ dactyli relative lengths $P5 > P4 > P3 > P2$. $P2$ and $P3$ dactyli about half propodal length. $P4$ asymmetrical, sparsely setose; longer dactylus longer than propodus, about twice length of shorter dactylus. $P5$ dactylus distinctly longer than propodus; ventrally setose, dorsally setose distally. Abdomen extending to buccal region, covering bases of walking legs. Male: Carapace subcircular, slightly wider than long, front projecting, margin convex. Eyes visible in dorsal view. MXP3 as in female. Cheliped as in female. Walking legs dorsally and ventrally unarmed; relative lengths of meri $P2 = P3 > P4 > P5$. $P2$ – $P5$ dactyli relative lengths $P5 > P4 > P3 = P2$. $P2$ and $P3$ dactyli about 2/3 propodal length. $P4$ asymmetrical; longer dactylus about 0.9 propodus length, about 1.5 times length of shorter dactylus. $P5$ dactylus slightly longer than propodus. Abdomen widest at somites 2 and 3, tapering distally to evenly rounded telson; telson wider than long.

Remarks. – Campos & Manning (2001) transferred *P. arcophilus* to *Arcotheres*. All three original syntypes of *A. arcophilus* are extant, of which the larger female syntype is here designated the lectotype.

***Arcotheres coarctatus* (Bürger, 1895), new combination**
(Fig. 3A)

Pinnotheres coarctatus Bürger, 1895: 369, Pl. 9: Fig. 7, Pl. 10: Fig. 7 [type locality: Zamboanga, the Philippines, from “Cahebe” (= *Polymesoda* spp.)].

Type material. – Lost.

Diagnosis. – Female: Carapace subquadrate, with shallow dorsal longitudinal groove extending from above each orbit to about midlength. Longer $P4$ dactylus shorter than half propodal length and about half-length of $P5$ dactylus. $P5$ dactylus shorter than propodus. MXP3 propodus with tapering apex; dactylus overreaching propodal apex; ischiomerus with obtuse but distinct inner distal angle. Male: not known. [after Bürger, 1895: 369, Pl. 9: Fig. 7, Pl. 10: Fig. 7]

Remarks. – In *Pinnotheres coarctatus*, the dactyli of $P4$ – $P5$ are longer than those of $P2$ – $P3$, and $P4$ is asymmetrical in length from left to right. Therefore, *P. coarctatus* is herein transferred to *Arcotheres*.

The holotype of *A. coarctatus* from Zamboanga is lost. Three specimens from Singapore, however, are available (ZRC), obtained from within the mangrove clam *Polymesoda*, and correspond well to Bürger’s (1895) account and figures of *A. coarctatus*. At present, since *A. coarctatus* appears to be readily recognizable and cannot be confused with any other species, a neotype for the species is not necessary.

***Arcotheres exiguus* (Bürger, 1895)**
(Fig. 4)

Pinnotheres exiguus Bürger, 1895: 377, Pl. 9: Fig. 19, Pl. 10: Fig. 30 [type locality: Samar Island, the Philippines, by present lectotype designation].

Type material. – Lectotype: USNM 32432, female (5.6 × 4.6 mm), Samar Island, the Philippines, C. Semper, 1876.

Description. – Female: Carapace subhexagonal, wider than long, anterior margin well defined; front slightly projecting, transverse; posterior margin broadly convex. Eyes small, partially visible in dorsal view. MXP3 with propodus about 3 times as long as high, apex blunt, rounded; dactylus not reaching propodal apex; ischiomerus about twice as long as wide, outer margin convex, inner margin with proximal 3/4 concave, angular at distal quarter; exopod inner and outer margin convex, flagellum one-segmented. Cheliped with dactylus about 2/3 palm length; palm about twice as long as high, mesioventral margin setose; dactylus occlusal margin with large proximal tooth; pollex occlusal margin with 2 small proximal teeth, sparsely setose. Walking legs dorsally and ventrally unarmed; relative lengths of meri $P4 > P2 = P3 > P5$. $P2$ – $P5$ dactyli relative lengths $P5 > P4 > P3 > P2$. $P2$ and $P3$ dactyli less about half propodal length. $P4$ sparsely setose; left dactylus shorter than propodus; right dactylus not known. $P5$ dactylus slightly long as propodus; ventrally setose, dorsally setose distally. Abdomen extending to buccal region, covering bases of walking legs. Male: not known.

Remarks. – Campos & Manning (2001) transferred *P. exiguus* to *Arcotheres*. Of the four original syntypes, only one is extant, and is herein designated the lectotype. Unfortunately, the distal three segments of the right $P4$ are missing, structures that bear diagnostic value in *Arcotheres*. Judging by the relative length of the dactylus of the left $P4$, and the figure given in the type account, the missing dactylus is probably the longer.

***Arcotheres latifrons* (Bürger, 1895), new combination**
(Fig. 5)

Xenophthalmus latifrons Bürger, 1895: 387, Pl. 9: Fig. 32, Pl. 10: Fig. 32 [type locality: Bohol, the Philippines].

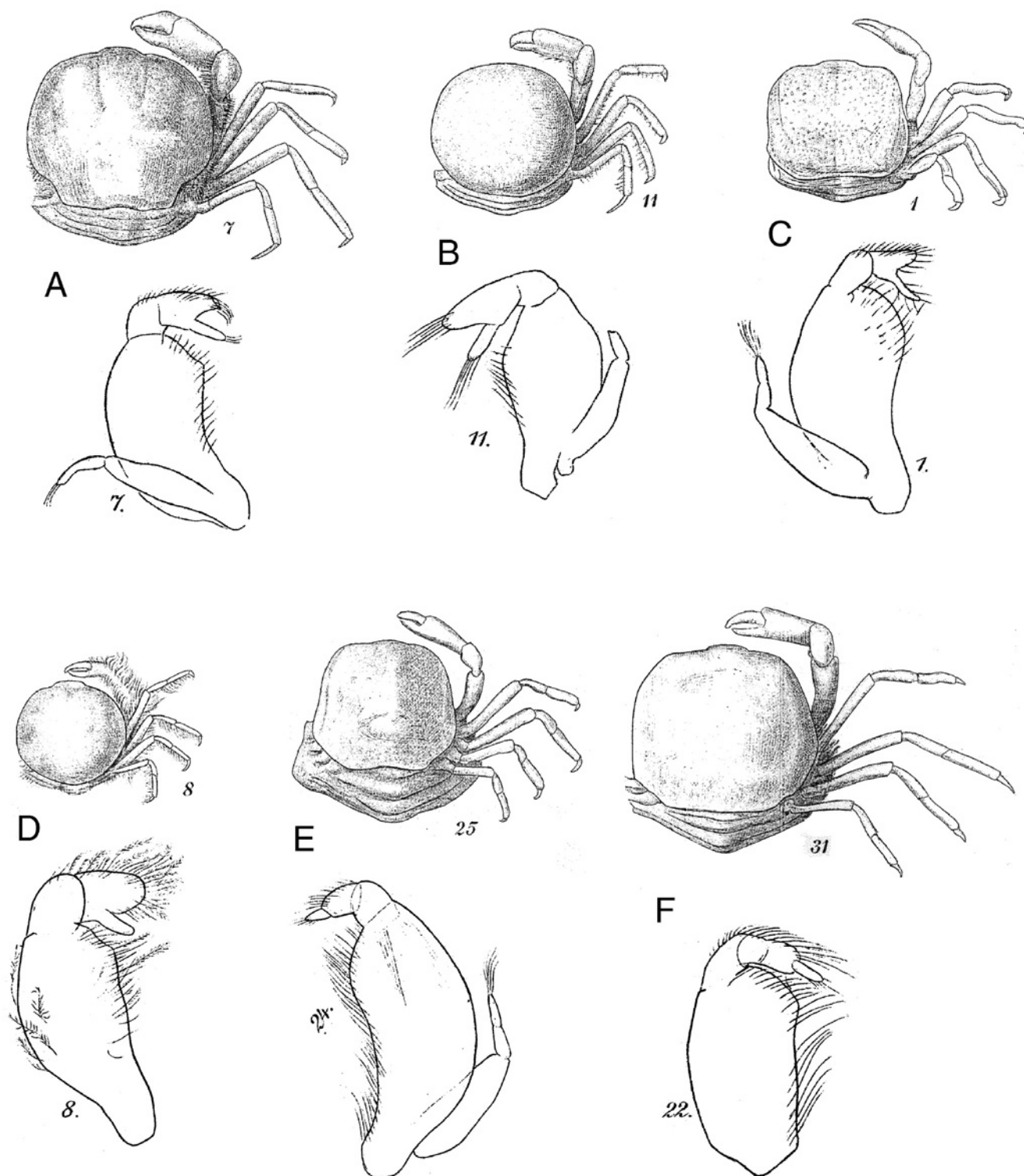


Fig. 3. Dorsal habitus and MXP3: A, *Arcotheres coarctatus* (Bürger, 1895), new combination, female holotype; B, *Buergeres tenuipes* (Bürger, 1895), female holotype, Ubay, the Philippines; C, *Nepinnotheres pectinicola* (Bürger, 1895), new combination, female holotype; D, *Nepinnotheres rathbunae* (Schmitt, McCain & Davidson, 1973), new combination, female holotype; E, *Orthotheres laevis* (Bürger, 1895), female holotype; F, *Orthotheres longipes* (Bürger, 1895), new combination, female holotype. (After Bürger, 1895, pl. 9: figs 1, 7, 8, 11, 22, 25, 31, pl. 10: figs 1, 7, 8, 11, 22, 24, 31).

Type material. – Lectotype: USNM 32436, female (9.5 × 8.1 mm), Mariveles or Bohol, the Philippines, coll. Semper. Paralectotype: SMF-ZMG952, female (11.3 × 8.7 mm), Mariveles or Bohol, Semper (not *Xenophthalmus latifrons* Bürger, 1895; holotype of *A. rayi*, new species, see later).

Description. – Female: Carapace subtrapezoid, wider than long, anterior margin well defined; front not projecting but demarcated by emargination lateral to frontal margin. Eyes absent. MXP3 with propodus greater than 3 times as long as high, apex blunt; dactylus not reaching propodal apex; ischiomerus length less than twice as long as wide, outer margin convex, inner margin with proximal 3/4 slightly concave, angular at distal quarter; exopod inner and outer margin convex, flagellum two-segmented. Cheliped with dactylus about half palm length; palm about 2.5 times as long

as high, mesioventral margin setose; dactylus occlusal margin with large proximal tooth; pollex occlusal margin with 2 small proximal teeth, sparsely setose. Walking legs dorsally and ventrally unarmed; relative lengths of meri P4 > P3 > P2 > P5. P2–P5 dactyli relative lengths P4 > P5 > P3 > P2. P2 and P3 dactyli about half propodal length. P4 asymmetrical in length; merus half carapace length; longer dactylus shorter than propodus, about twice length of shorter dactylus. P5 dactylus as long as propodus; ventrally setose. Abdomen extending to buccal region, covering bases of walking legs. Male: not known.

Remarks. – Tesch (1918) argued that the present species is not correctly placed in *Xenophthalmus*. The dactyli of P4–5 are longer than those of P2–3, so *X. latifrons* is transferred

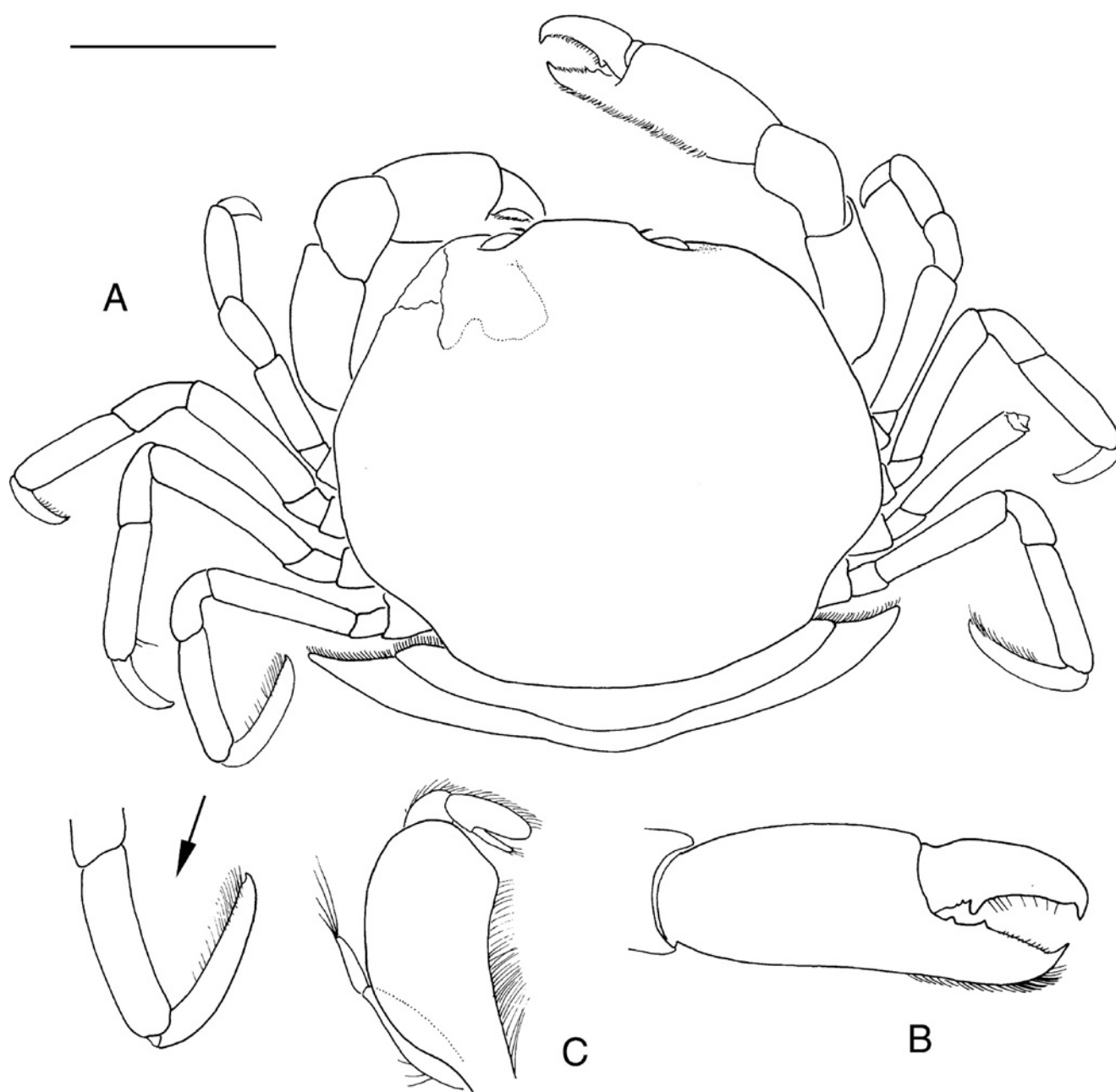


Fig. 4. *Arcotheres exiguus* (Bürger, 1895), USNM 32432, female (5.6 × 4.6 mm), Samar Island, the Philippines; A, dorsal habitus; B, right cheliped; C, right MXP3. Scale bars: A = 2.0 mm; B = 1.5 mm; C = 1.0 mm.

to *Arcotheres*. Two of the original six syntypes of *A. latifrons* are extant, both from Bohol, but each represent a separate species. One syntype (USNM 32436) represents the blind species figured by Bürger (1895) and is herein designated as the lectotype. Thus, *A. latifrons* is unique in the genus for lacking eyes. The paralectotype, which represents a separate species, is described below as new (see *Arcotheres rayi*, new species).

***Arcotheres latus* (Bürger, 1895), new combination**
(Fig. 6)

Pinnotheres latus Bürger, 1895: 374–375, Pl. 9: Fig. 16, Pl. 10: Fig. 15 [type locality: Ubay, Philippines, by present lectotype designation, from *Pinna* sp.].

Type material. – Lectotype: SMF-ZMG956a (Go310b), female (10.6 × 8.7 mm), Burias, from *Pinna* sp. Paralectotypes: SMF-ZMG956b (Go310b), 3 females (9.5 × 7.5 – 10.5 × 9.0 mm), Burias, from *Pinna* sp.; SMF-ZMG955 (Go310a), 2 females (7.2 × 6.3 – 8.7 × 7.3 mm), Palau, from *Pinna nigrina*, coll. Semper.

Description. – Female: Carapace subhexagonal, wider than long, anterior margin well defined; front slightly projecting, transverse; posterior margin faintly convex. Eyes small, partially visible in dorsal view. MXP3 with propodus about 3 times as long as high, apex blunt, subtruncate; dactylus not reaching propodal apex; ischiomerus about twice as long as wide, outer margin convex, inner margin with proximal 2/3 concave, angular at distal third; exopod outer margin relatively straight, inner margin slightly convex, flagellum two-segmented. Cheliped with dactylus about half palm length; palm about twice as long as high, mesioventral margin setose; dactylus occlusal margin with large proximal tooth; pollex occlusal margin irregular, sparsely setose. Walking legs dorsally and ventrally unarmed; relative lengths of meri $P4 > P2 > P3 > P5$. $P2$ – $P5$ dactyli relative lengths $P5 > P4 > P3 = P2$. $P2$ and $P3$ dactyli about half propodal length. $P4$ asymmetrical, sparsely setose; longer dactylus shorter than propodus, about twice length of shorter dactylus; dactyli finely dentate ventrally. $P5$ dactylus slightly longer than propodus; ventrally setose, dorsally setose distally; with 2 rows of subdistal spines, upper row with 7 or 8 spines, lower row

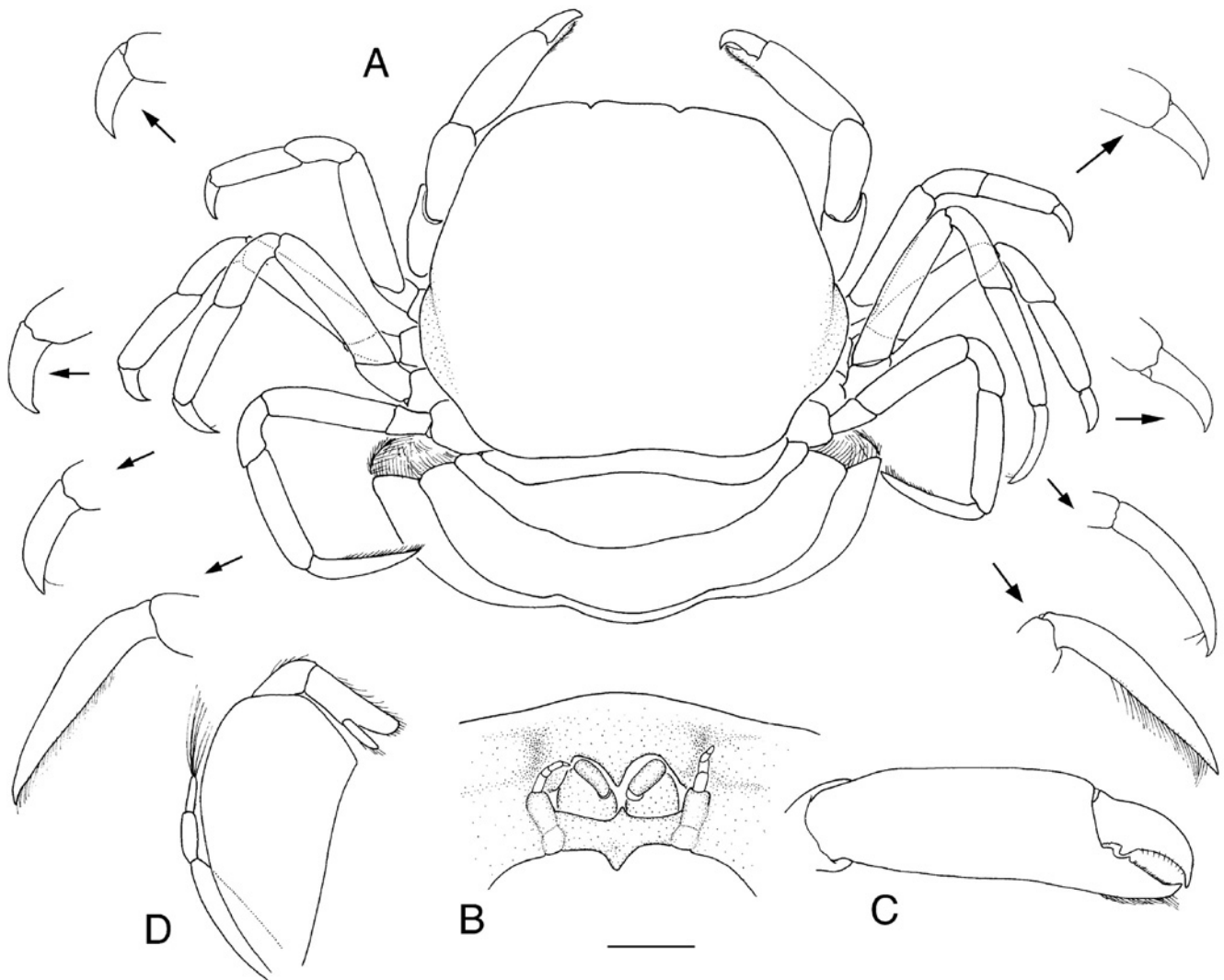


Fig. 5. *Arcotheres latifrons* (Bürger, 1895), new combination, USNM 32436, female lectotype (9.5 × 8.1 mm), Bohol, the Philippines: A, dorsal habitus; B, anterior carapace; C, right cheliped; D, right MXP3. Scale bars: A = 2.0 mm; B, C = 1.0 mm; D = 0.7 mm.

with 16–18 spines, decreasing in size proximally. Abdomen extending to buccal region, covering bases of walking legs. Male: not known.

Remarks. – Six of the original eight syntypes of *A. latus* are extant – four from Burias, the Philippines, and two from Palau. A female syntype (10.6 × 8.7 mm) from Burias, Philippines, is herein designated as the lectotype of *A. latus*.

***Arcotheres modiolicola* (Bürger, 1895)**
(Fig. 7)

Pinnotheres modiolicola Bürger, 1895: 370, Pl. 9: Fig. 9, Pl. 10: Fig. 9 [type locality: the Philippines, from *Modiola philippinarum*].

Type material. – Holotype: SMF-ZMG168 (Go951a), damaged ovigerous female (8.0 × 6.5 mm), Philippines, from *Modiola philippinarum*, C. Semper.

Description. – Female: Carapace subhexagonal (incomplete in holotype), slightly wider than long, anterior margin well blunt; front slightly projecting, transverse; posterior margin slightly concave. Eyes small, visible in dorsal view. MXP3 (based on type account) with propodus about twice as long

as high, apex blunt, subtruncate; dactylus not reaching propodal apex; ischiomerus less than twice as long as wide, outer margin convex, inner margin with proximal 2/3 concave, rounded at distal third; exopod inner and outer margin relatively straight, flagellum two-segmented. Cheliped with dactylus slightly longer than half palm length; palm about 1.5 times as long as high, mesioventral margin setose; dactylus occlusal margin with large proximal tooth; pollex occlusal margin with irregularly dentate proximally, sparsely setose. Walking legs dorsally and ventrally unarmed; relative lengths of meri P2–P4 subequal > P5. P2–P5 dactyli relative lengths P5 > P4 > P3 > P2. P2 and P3 dactyli about 2/3 propodal length. P4 asymmetrical, sparsely setose; longer dactylus as about 3/4 propodus length, about 1.1 times length of shorter dactylus. P5 dactylus longer than propodus; ventrally setose, dorsally setose distally; ventrodistal margin with 6 or 7 minute spines. Abdomen extending to buccal region, covering bases of walking legs. Male: not known.

Remarks. – Campos & Manning (2001) transferred *P. modiolicola* to *Arcotheres*. Unfortunately, the holotype is in poor condition, with carapace damaged and MXP3 missing. Therefore, in the above diagnosis, features of the MXP3 are based on the type description and figures.

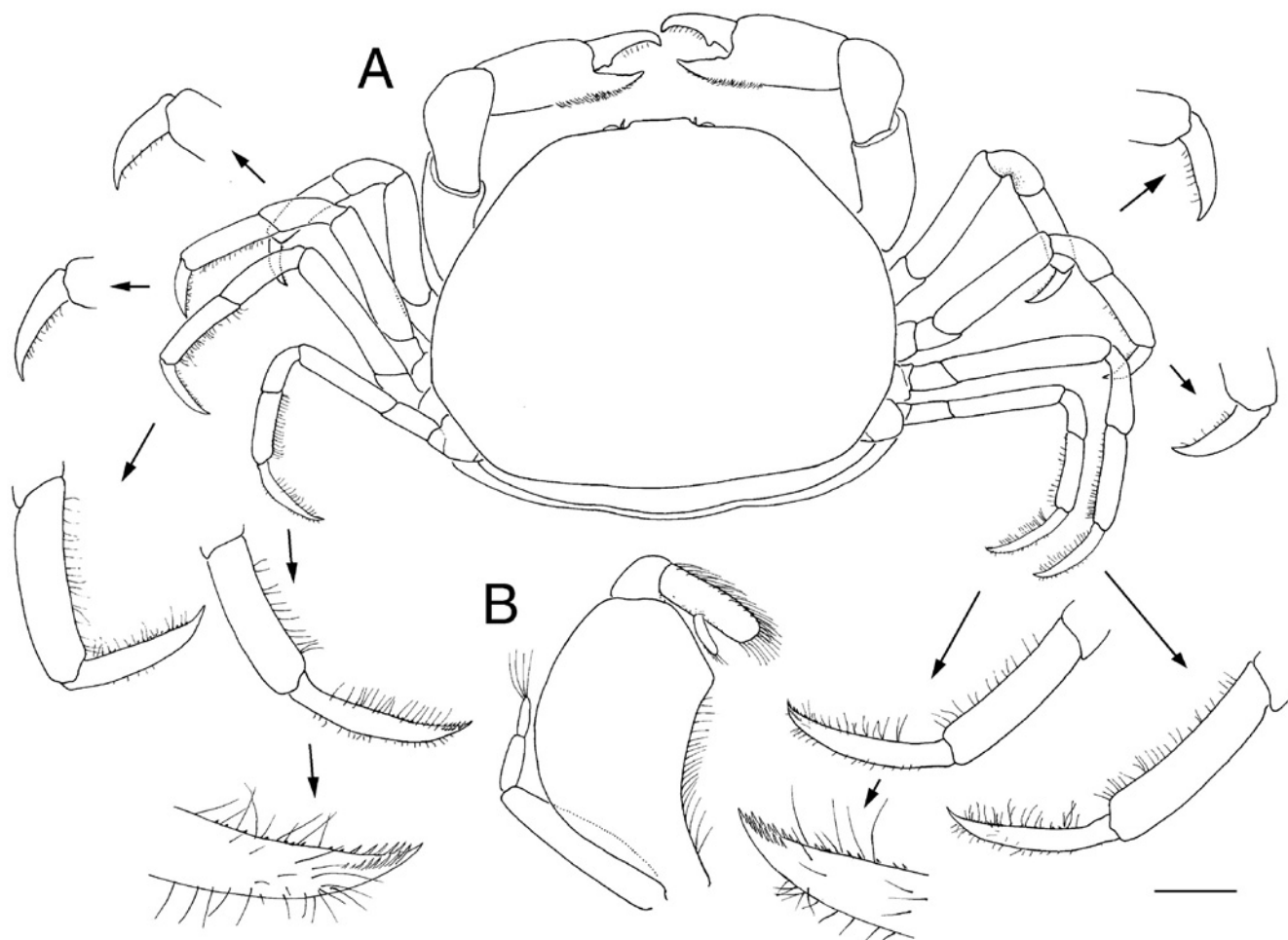


Fig. 6. *Arcotheres latus* (Bürger, 1895), new combination, SMF-ZMG956a, female lectotype (10.6 × 8.7 mm), Burias, the Philippines: A, dorsal habitus; B, right MXP3. Scale bars: A = 2.0 mm; B = 0.7 mm.

***Arcotheres nudifrons* (Bürger, 1895)**
(Fig. 8)

Pinnotheres nudifrons Bürger, 1895: 378, Pl. 9: Fig. 22, Pl. 10: Fig. 20 [type locality: Lapinig, Philippines, by present lectotype designation].

Type material. – Lectotype: SMF-ZMG952 (Go535a), female (6.0 × 4.8 mm), Lapinig, the Philippines.

Description. – Female: Carapace subhexagonal, wider than long, anterior margin blunt, front slightly projecting, transverse; posterior margin transverse. Eyes not visible in dorsal view. MXP3 with propodus about 3 times as long as high, apex blunt, rounded; dactylus not reaching propodal apex; ischiomerus less than twice as long as wide, outer margin convex, inner margin with proximal 3/4 concave, bluntly angular at distal quarter; exopod inner and outer margin convex, flagellum 2-segmented. Cheliped with dactylus about 2/3 palm length; palm almost twice as long as high, mesioventral margin setose; dactylus occlusal margin with large proximal tooth; pollex occlusal margin with low proximal tooth, sparsely setose. Walking legs dorsally and ventrally unarmed; relative lengths of meri P4 > P3 > P2 > P5. P2–P5 dactyli relative lengths P5 > P4 > P3 > P2. P2

dactyli about half propodal length. P3 dactyli exceeding half propodal length. P4 sparsely setose; longer dactylus shorter than propodus and about 1.5 times as long as shorter dactylus; setose ventrally and dorsally. P5 dactylus as long propodus; ventrally and dorsally setose; with row of about 8 ventral subdistal spinules. Abdomen extending to buccal region, covering bases of walking legs. Male: not known.

Remarks. – Campos & Manning (2001) transferred *P. nudifrons* to *Arcotheres*. One of the original two syntypes of *A. nudifrons* is extant, and is herein designated as the lectotype.

***Arcotheres palaensis* (Bürger, 1895)**
(Fig. 9)

Pinnotheres palaensis Bürger, 1895: 372–373, Pl. 9: Fig. 12, Pl. 10: Fig. 12 [type locality: Palau, by present lectotype designation].

Type material. – Lectotype: SMF-ZMG948a (Go534d), female (10.2 × 8.4 mm), Palau, C. Semper. Paralectotypes: SMF-ZMG948b (Go534d), 3 females (10.3 × 8.3 – 10.8 × 8.9 mm) (1 with bopyrid), type locality; SMF-ZMG947 (Go534a), 1 female (10.0 × 7.0 mm)

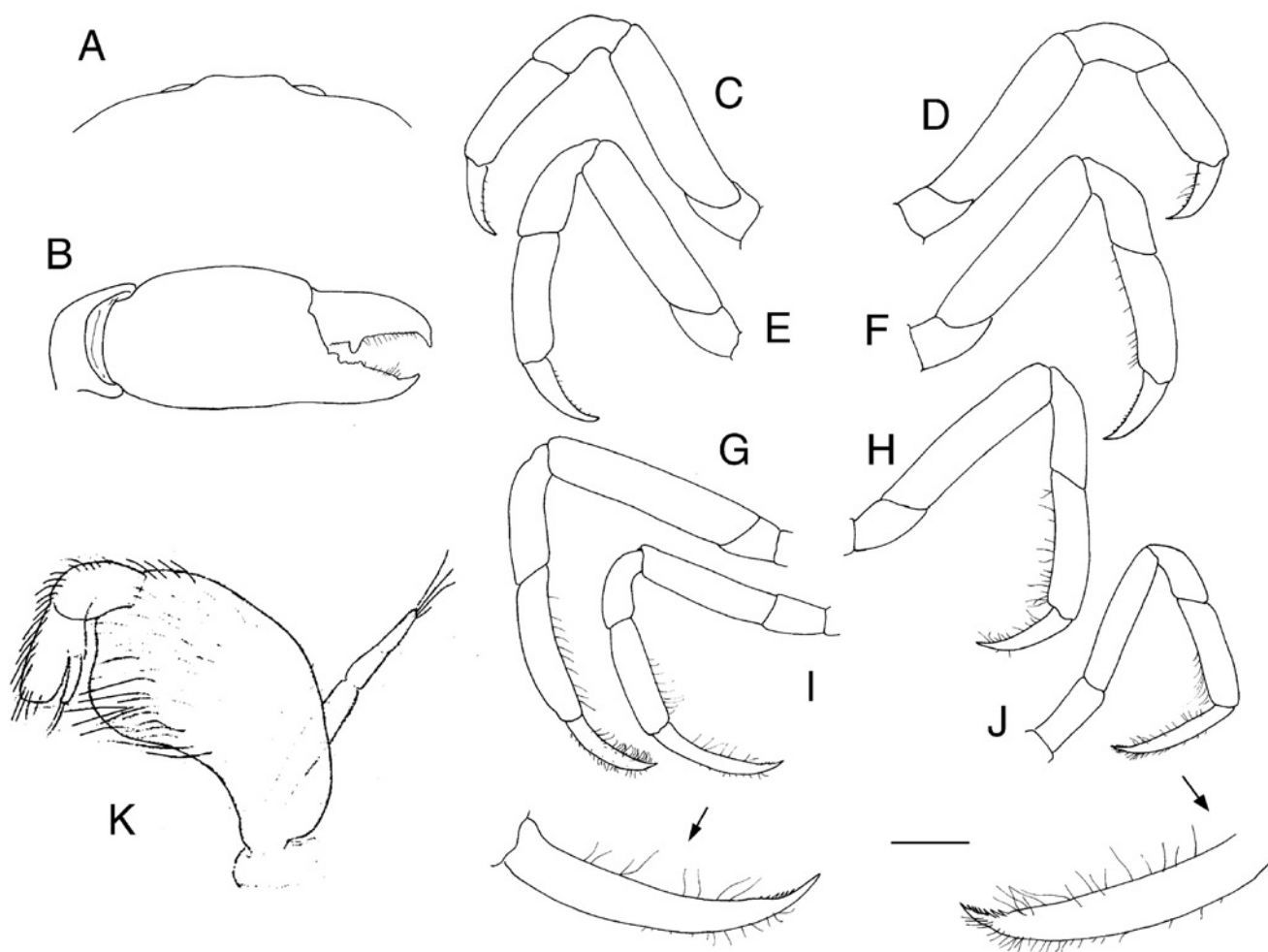


Fig. 7. *Arcotheres modiolicola* (Bürger, 1895), SMF-ZMG168, female lectotype (8.0 × 6.5 mm), the Philippines: A, anterior carapace; B, right cheliped; C, D, left and right P2; E, F, left and right P3; G, H, left and right P4; I, J, right and left P5; K, left MXP3 (after Bürger, 1895: pl. 10, fig 9). Scale bar: A–I = 1.0 mm.

(shrivelled), type locality; SMF-ZMG177 (Go534c), 4 females ($9.5 \times 7.4 - 11.8 \times 8.3$ mm) (shrivelled), Ubay, from *Placuna sella*, C. Semper (= *A. guinotae* Campos, 2001).

Description. – Female: Carapace subhexagonal, wider than long, anterior margin well defined, sharp; front faintly projecting, slightly convex; posterior margin slightly concave. Eyes small, not visible in dorsal view. MXP3 with propodus about 3 times as long as high, apex blunt, rounded; dactylus not reaching propodal apex; ischiomerus less than twice as long as wide, outer margin convex, inner margin with proximal 2/3 slightly concave, angular at distal third; exopod inner and outer margin relatively straight, flagellum two-segmented. Cheliped with dactylus about half palm length;

palm about 2.5 times as long as high, mesioventral margin setose; dactylus occlusal margin with large proximal tooth; pollex occlusal margin with 2 blunt proximal teeth, sparsely setose. Walking legs dorsally and ventrally unarmed; relative lengths of meri $P3 > P2 = P4 > P5$. P2–P5 dactyli relative lengths: $P5 > P4 > P3 > P2$. P2 and P3 dactyli less than half propodal length. P4 asymmetrical, sparsely setose; longer dactylus slightly shorter than propodus, about 1.1 times length of shorter dactylus. P5 dactylus slightly longer than propodus; ventrally setose; dorsally setose distally. Abdomen extending to buccal region, covering bases of walking legs.

Remarks. – All the syntypes of *A. palaensis* are extant except for the specimens from Burias, the Philippines (two males

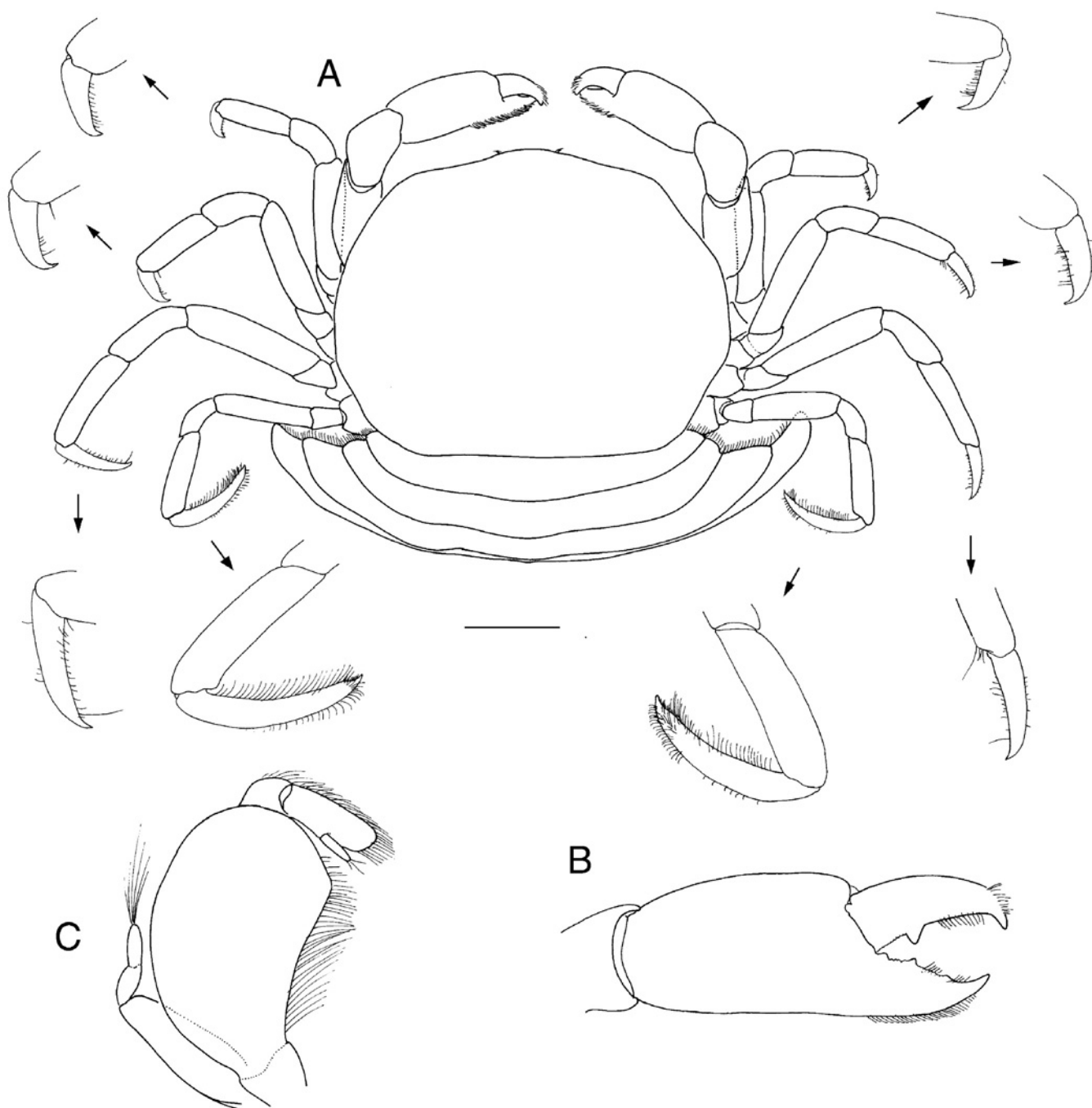


Fig. 8. *Arcotheres nudifrons* (Bürger, 1895), SMF-ZMG952, female lectotype (6.0×4.8 mm), Lapinig, the Philippines: A, dorsal habitus; B, right cheliped; C, right MXP3. Scale bars: A = 2.0 mm, B, C = 1.0 mm.

and two females). The remaining syntype series of *A. palaensis*, however, includes two species, one species from Palau and another from Ubay, the Philippines. Notably, those from Ubay are referable to *A. guinotae* Campos, 2001. Therefore, a syntype from Palau is designated as the lectotype of the species to fix the identity of *A. palaensis* in line with its specific epithet and to preserve the name *A. guinotae* as defined by Campos (2001). Campos & Manning (2001) attributed a geographic range to *A. palaensis* that spans Palau, the Philippines, Indonesia and Malaysia. With the present recognition of heterogeneity in the type series and fixation of a lectotype for *A. palaensis*, all records of the species outside Palau require verification.

***Arcotheres pernicola* (Bürger, 1895), new combination**
(Fig. 10)

Pinnotheres pernicola Bürger, 1895: 375–376, Pl. 9: Fig. 17, Pl. 10: Fig. 16 [type locality: Ubay, the Philippines, from *Perna*, by present lectotype designation].

Type material. – Lectotype: SMF-ZMG178 (Go947a), ovigerous female (6.0 × 5.0 mm), Ubay, from *Perna*, C. Semper, 1863–1864.

Diagnosis. – Female: Carapace broader than long; front not protruding anteriorly beyond dorsal outline. MXP3 propodus distally tapering; dactylus reaching propodal apex. Dactylus

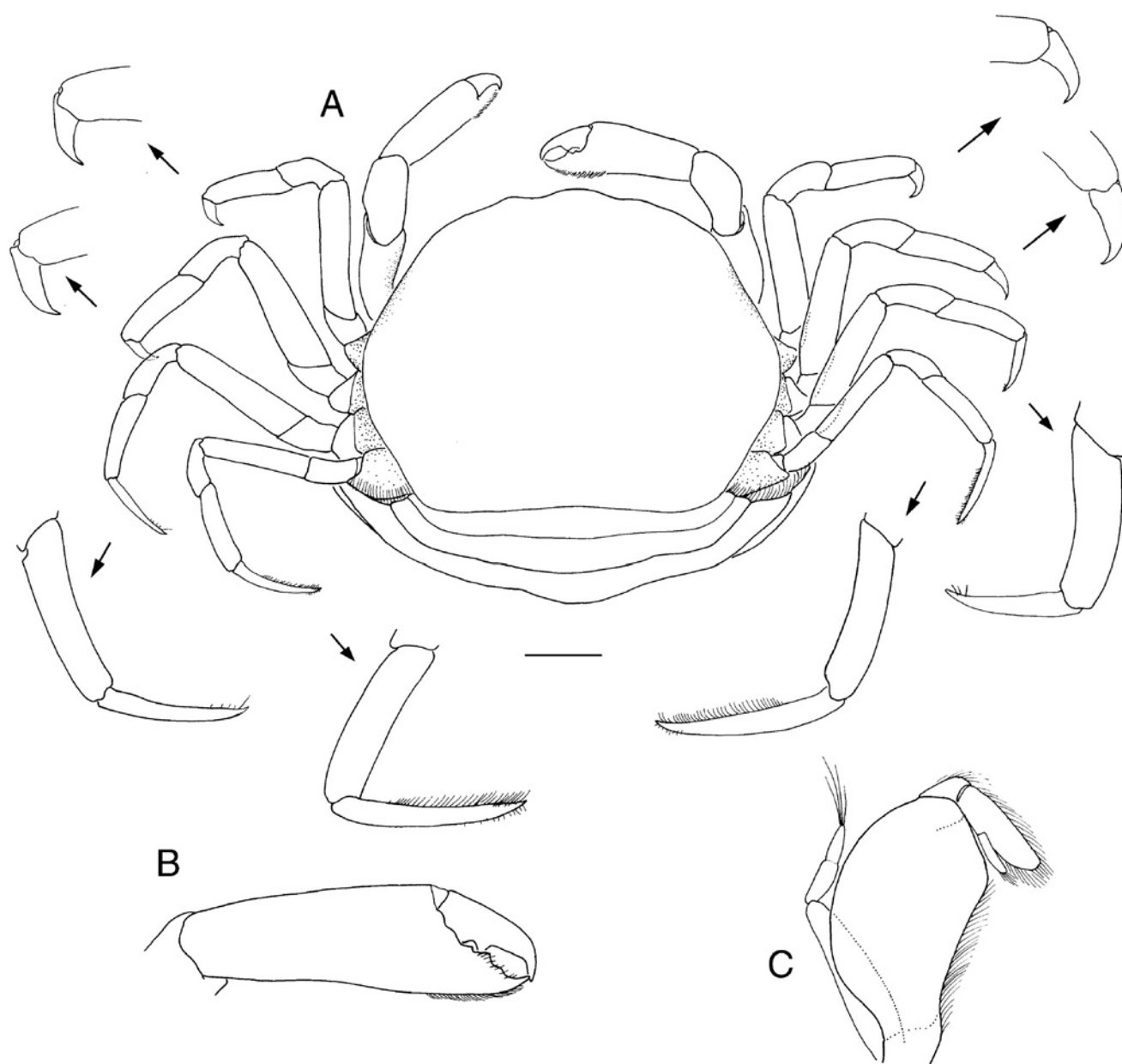


Fig. 9. *Arcotheres palaensis* (Bürger, 1895), SMF-ZMG948a, female lectotype (10.2 × 8.4 mm), Palau: A, dorsal habitus; B, right cheliped; C, right MXP3. Scale bars: A = 2.0 mm; B = 1.0 mm; C = 0.7 mm.

of cheliped about 2/3 as long as palm. P2–3 dactyli subequal in length, about half as long as respective propodi. P4 distinctly longer than other pereopods; dactylus about twice length of P5 dactylus. P5 dactylus more than twice as long as those of P2–3. Male: not known.

Remarks. – The single extant syntype of *A. pernicola* is in extremely poor condition: the carapace is shrivelled and collapsed, most pereopods are broken or lost, and the left and right MXP3 is missing. Thus, the syntype of *A. pernicola* is effectively useless, and it would be futile to make a lectotype designation. Should a specimen be found that bears the above diagnostic characters, a case should be made to the International Commission for Zoological Nomenclature to set aside the syntype to permit the selection of a neotype.

We tentatively assign *P. pernicola* to *Arcotheres* on the basis of the elongate dactyli of P4 and P5, which are longer than those of P2–3. The remnants of the syntype show that the P5 dactylus is more than twice as long as those of P2–3. Bürger's (1895) figure is inaccurate in showing the dactyli of P2–3 longer than half the length of the P5 dactylus.

***Arcotheres rayi*, new species**
(Fig. 11)

Xenophthalmus latifrons Bürger, 1895: 387 [part, not *X. latifrons* Bürger, 1895].

Type material. – Holotype: SMF-ZMG952, female (11.3 × 8.7 mm), Mariveles or Bohol, Semper (paralectotype of *X. latifrons* Bürger, 1895).

Description. – Female: Carapace subtrapezoid, wider than long, anterior margin well defined; front not projecting but demarcated by emargination above each orbit. Eyes not visible in dorsal view. MXP3 with propodus greater than twice as long as high, apex blunt; dactylus not reaching propodal apex; ischiomerus about twice as long as wide, outer margin convex, inner margin with proximal 3/4 slightly concave, angular at distal quarter; exopod inner and outer margin convex, flagellum two-segmented. Cheliped with dactylus about half palm length; palm about 3 times as long as high, mesioventral margin setose; dactylus occlusal margin with large proximal tooth; pollex occlusal margin with small proximal tooth, sparsely setose. Walking legs dorsally and

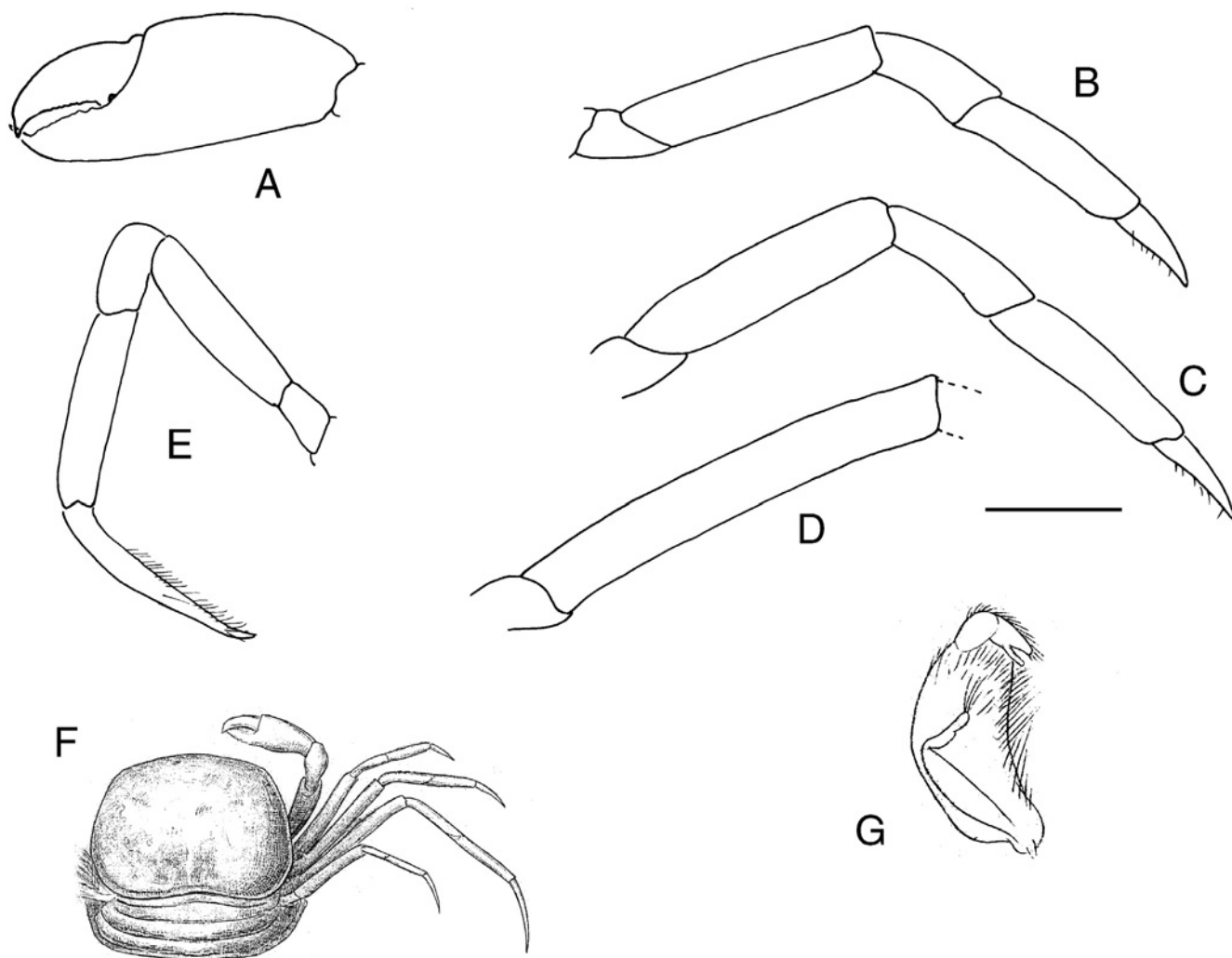


Fig. 10. *Arcotheres pernicola* (Bürger, 1895), new combination, SMF-ZMG178, female syntype (6.0 × 5.0 mm), Ubay, the Philippines: A, left cheliped; B, right P2; C, right P3; D, right P4 merus; E, left P5; F, dorsal habitus (after Bürger, 1895, Pl. 9: Fig. 17); G, left MXP3 (after Bürger, 1895, Pl. 10: Fig. 16). Scale bar = 1.0 mm.

ventrally unarmed; relative lengths of meri $P4 > P3 > P2 > P5$. $P2$ – $P5$ dactyli relative lengths $P4 > P5 > P3 = P2$. $P2$ and $P3$ dactyli about half propodal length. $P4$ asymmetrical in length; merus $2/3$ carapace length; longer dactylus shorter than propodus, about twice length of shorter dactylus. $P5$ dactylus shorter than propodus; ventrally setose. Abdomen seven-segmented, extending to buccal region, covering bases of walking legs. Male: not known.

Etymology. – The species is named after our good friend, the late Ray Manning, who helped and inspired us over many years, and who both of us “blame” for getting us started on this “most terrible nightmare” of pinnotherid systematics.

Remarks. – As had been discussed earlier, the type series of *Xenophthalmus latifrons* contained two species, of which the smaller syntype (9.5×8.1 mm, USNM 32436), was selected above as the lectotype. The paralectotype (11.3×8.7 mm, SMF-ZMG952) is here also made the holotype of a new species, *Arcotheres rayi*. *Arcotheres rayi* closely resembles *A. latifrons* in almost all respects, but is readily distinguished by the following features: the presence rather than absence of eyes, the longer $P4$ is proportionally longer than in *A. latifrons* whereby the merus is two-thirds instead of half the carapace length, the $P5$ dactylus is proportionally shorter than rather than longer than the $P4$ dactylus, and the dactylus of MXP3 does not reach to the end of the propodus.

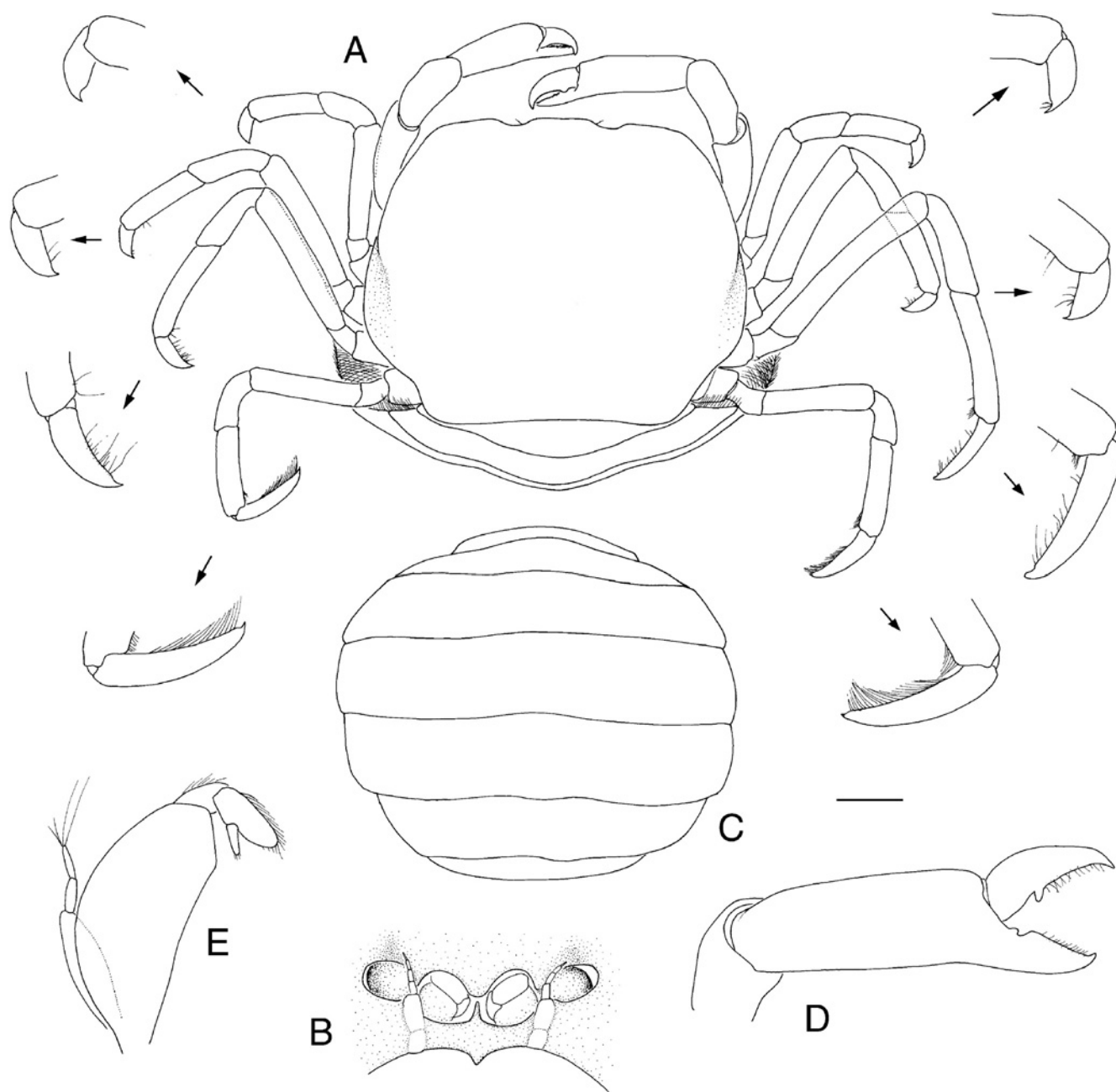


Fig. 11. *Arcotheres rayi*, new species, SMF-ZMG952, female holotype (11.3×8.7 mm), Bohol, the Philippines (paralectotype of *A. latifrons* (Bürger)): A, dorsal habitus; B, anterior carapace; C, abdomen; D, right cheliped; E, right MXP3. Scale bars: A, C = 2.0 mm; B = 1.0 mm; D, E = 0.7 mm.

A species that closely resembles *A. latifrons* and *A. rayi* is the Indian species, *Pinnotheres placunae* Hornell & Southwell, 1909, sharing similar carapace morphology, particularly in the flattened aspect and near straight anterior margin bearing small orbital notches. The type description of *P. placunae* is brief, and figures somewhat stylized, depicting the walking legs as symmetrical left to right, with subequal dactyli (contradicting the description in which the P4 and 5 dactyli are one and a half times the length of the P2 and 3 dactyli). A more detailed subsequent account of the species, however, indicates that the walking leg lengths are asymmetrical from left to right, particularly P4, and dactyl lengths are as described by Hornell & Southwell (1909). As such, *P. placunae* is referable to *Arcotheres* and is herein

transferred. *Arcotheres placunae*, new combination, like *A. rayi*, is immediately distinguished from *A. latifrons* by the presence of eyes. *Arcotheres rayi* and *A. placunae* are readily distinguished by the relative lengths of the P4–5 dactyli: slightly exceeding twice the length of the P2–3 dactyli in the former, and about one and a half times the length in the latter.

***Arcotheres rhombifer* (Bürger, 1895), new combination**
(Fig. 12)

Pinnotheres rhombifer Bürger, 1895: 374, Pl. 9: Fig. 15, Pl. 10: Fig. 14 [type locality: Ubay, the Philippines, by present lectotype designation, from *Pectunculus aurifluus*].

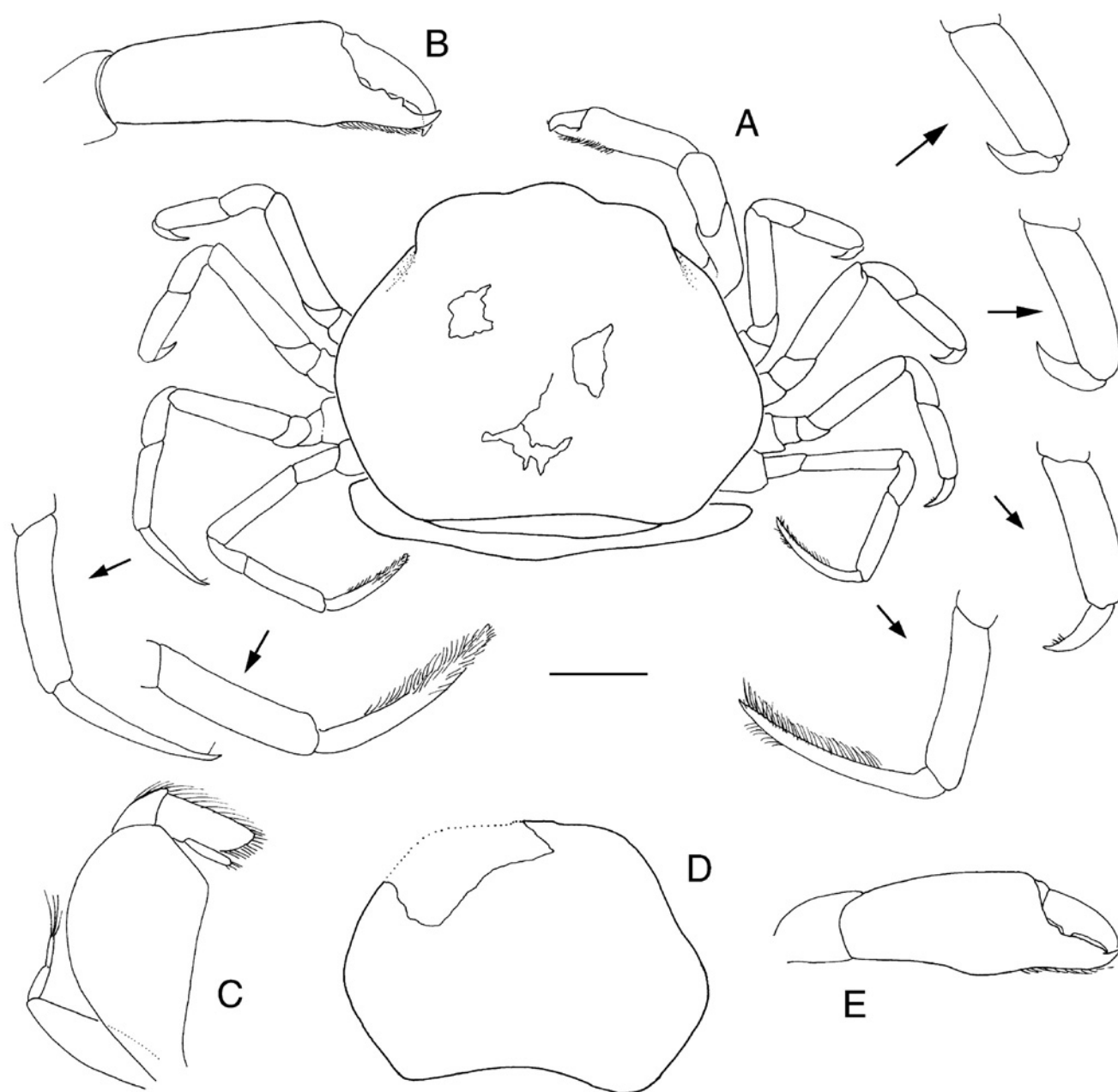


Fig. 12. *Arcotheres rhombifer* (Bürger, 1895), new combination, Ubay, the Philippines: A–C, ZMG179a, female lectotype (8.5 × 6.8 mm); D, E, ZMG179b, female paralectotype (7.4 × 5.7 mm); A, dorsal habitus; B, E, right cheliped; C, MXP3; D, carapace. Scale bars: A, D = 2.0 mm; B, E = 1.0 mm; C = 0.7 mm.

Pinnotheres latissimus Bürger, 1895: 373, Pl. 9: Fig. 13a, b, Pl. 10: Fig. 13 [type locality: Manila, the Philippines] [new synonymy].

Type material of *A. rhombifer*. – Lectotype: SMF-ZMG179a (Go949a), ovigerous female (8.5 × 6.8 mm), Ubay, Philippines, from *Pectunculus aurifluus*. Paralectotype: SMF-ZMG179b (Go949a), 1 ovigerous female (7.4 × 5.7 mm), type locality.

Description. – Female: Carapace subhexagonal, wider than long, anterior margin well defined; front faintly projecting, convex; posterior margin slightly concave. Eyes small, not visible in dorsal view. MXP3 with propodus about 3 times as long as high, tapering to blunt apex; dactylus not reaching propodal apex; ischiomerus about twice as long as wide, outer margin convex, inner margin with proximal 2/3 straight, angular at distal third; exopod inner margin relatively straight, outer margin convex, flagellum two-segmented. Cheliped with dactylus about half palm length; palm about 2.5 times as long as high, mesioventral margin setose, ventral margin with slight bulge near base of pollex; dactylus occlusal margin with large proximal tooth; pollex occlusal margin with 2 blunt proximal teeth, sparsely setose. Walking legs dorsally and ventrally unarmed; relative lengths of meri $P3 > P2 = P4 > P5$. $P2$ – $P5$ dactyli relative lengths $P5 > P4 > P3 = P2$. $P2$ and $P3$ dactyli less than half propodal length. $P4$ asymmetrical, sparsely setose; longer dactylus as long as propodus, about twice length of shorter dactylus. $P5$ dactylus longer than propodus; ventrally setose, dorsally setose distally. Abdomen extending to buccal region, covering bases of walking legs. Male: not known.

Remarks. – Campos & Manning (2001) transferred *P. rhombifer* to *Arcotheres*. Both syntypes of *A. rhombifer* are extant. The larger female syntype is herein designated as the lectotype.

The holotype of *A. latissimus* (type locality: Manila, the Philippines) is lost, but comparison of the original account and figures of the species with the types of *A. rhombifer* suggests that the two species are conspecific. As figured by Bürger (1895), the holotype of *A. latissimus* from Manila was incomplete, having damaged $P2$ and $P5$, at least on the right side. According to Bürger's (1895) account and figures, *A. rhombifer* is distinguished from *A. latissimus* by having a proportionally longer carapace, with the width/length ratio given as about 1.33 vs. 1.20, although based on Bürger's figures, the ratios are closer to 1.25 and 1.48 respectively. According to measurements of the types of *A. rhombifer*, the width/length ratios are 1.28–1.30. Consequently, the carapace ratios used by Bürger (1895) are neither reliable distinguishing criterion, nor are they particularly accurate in the case of *A. latissimus*. Both *A. rhombifer* and *A. latissimus* are otherwise indistinguishable, sharing similar MXP3 and relative lengths of the walking leg dactyli (where known). Both names are clearly synonymous and as they were published in the same paper, we select *A. rhombifer* as the senior synonym of *A. latissimus*. To stabilise the identity of the two species, the lectotype of *A. rhombifer* is also designated as the simultaneous neotype of *A. latissimus*. Thus, *A. latissimus* becomes an objective junior synonym of *A. rhombifer*.

Specimens from “Indo-Malayan Seas” first reported by Miers (1880) as “*?Pinnotheres obesus*” and subsequently identified by Gordon (1936) as *P. latissimus*, resemble *A. rhombifer*, notably in the slight bulge on the lower margin of the cheliped palm. Gordon's (1936) material, however, differs from *A. rhombifer* in the dactylus of $P5$ being shorter rather than longer than that of $P4$, and as such probably represents an undescribed species.

Arcotheres rotundatus (Bürger, 1895) (Fig. 13)

Pinnotheres rotundatus Bürger, 1895: 378, Pl. 9: Fig. 21, Pl. 10: Fig. 19 [type locality: Burias, the Philippines, by present lectotype designation, from *Circe*].

Pinnotheres consors Bürger, 1895: 377, Pl. 9: Fig. 20, Pl. 10: Fig. 18 [type locality: Palau, from *Circe*] [new synonymy].

Type material of *A. rotundatus*. – Holotype: SMF-ZMG169 (Go538a), ovigerous female (approx. 11.1 × 9.3 mm), carapace shrivelled, Burias, from *Circe*, 1859–1864, C. Semper.

Description. – Female: Carapace wider than long, anterior margin blunt, front projecting, relatively straight; posterior margin convex. Eyes partially visible in dorsal view. MXP3 with propodus about 2.5 times as long as high, apex blunt, rounded; dactylus reaching to or slightly beyond propodal apex; ischiomerus about 2.5 times as long as wide, outer margin convex, inner margin with proximal 3/4 concave, slightly angular at distal quarter; exopod outer margin concave, inner margin relatively straight, flagellum two-segmented. Cheliped with dactylus about half palm length; palm about twice as long as high, mesioventral margin setose; dactylus occlusal margin with large proximal tooth; pollex occlusal margin with 2 low proximal protrusions, sparsely setose. Walking legs dorsally and ventrally unarmed; relative lengths of meri $P3 > P2 = P4 > P5$. $P2$ – $P5$ dactyli relative lengths $P5 = P4 > P3 > P2$. $P2$ and $P3$ dactyli less than half propodal length. $P4$ sparsely setose; longer dactylus shorter than propodus and about twice as long as shorter dactylus, with single subdistal ventral seta; shorter dactylus with row of long setae on ventral margin. $P5$ dactylus slightly longer than propodus; ventrally and laterally setose. Abdomen extending to buccal region, covering bases of walking legs. Male: not known.

Remarks. – Campos & Manning (2001) transferred both *P. rotundatus* and *P. consors* to *Arcotheres*. The carapace of the holotype of *A. rotundatus* is partially crushed, but all diagnostic features of the MXP3 and walking legs are intact. Study of Bürger's account indicates that *A. rotundatus* differs from *A. consors* (types lost) only in the length of the MXP3 dactyli, reaching the propodal apex in the latter and slightly overreaching the apex in the former. As both species were published in the same paper, we select *Arcotheres rotundatus* as the senior synonym of *A. consors*. The holotype of *A. rotundatus* is designated as the neotype of *A. consors* to fix the identity of the latter as an objective junior synonym of the former.

Arcotheres similis (Bürger, 1895)

(Fig. 14)

Pinnotheres similis Bürger, 1895: 373–374, Pl. 9: Fig. 14 [type locality: Ubay, the Philippines].

Type material. – Holotype: ZMG956 (Go950a), female (8.3 × 6.4 mm), Ubay, the Philippines, C. Semper.

Description. – Female: Carapace subhexagonal, wider than long, anterior margin blunt; front faintly projecting, transverse; posterior margin slightly convex. Eyes small, visible in dorsal view. MXP3 with propodus about 3 times as long as high, apex blunt, rounded; dactylus not reaching propodal apex; ischiomerus about twice as long as wide, outer margin convex, inner margin with proximal 3/4 slightly concave, angular at distal quarter; exopod inner margin relatively straight, outer margin broadly convex, flagellum two-segmented. Cheliped with dactylus almost 3/4 palm length; palm about twice as long as high; dactylus occlusal margin with large proximal tooth; pollex occlusal margin with low blunt proximal teeth, sparsely setose. Walking legs dorsally and ventrally unarmed; relative lengths of meri P4 > P3 > P2 > P5. P2–P5 dactyli relative lengths P5 > P4 > P3 > P2. P2 and P3 dactyli longer than half propodal length. P4 asymmetrical; longer dactylus shorter than propodus, about 1.2 times length of shorter dactylus; ventral setae longer than

dorsal setae, apex spiniform. P5 dactylus longer than propodus and twice as long as P2 dactylus, 1.6 times as long as P3 dactylus; ventral setae longer than dorsal setae, apex spiniform; with 2 rows of subdistal spines, upper row with 5 spines, lower row with 8–11 spines, decreasing in size proximally. Abdomen extending to buccal region, covering bases of walking legs. Male: not known.

Remarks. – The holotype of *A. similis* is extant and in good condition. Gordon (1936) described and figured a specimen from Singapore identified as *A. similis*. Based on her account, however, the Singaporean specimen differs from the holotype in having a more tapering propodal apex on MXP3, in having a less pronounced anterointernal angle on the ischiomerus of MXP3, in having a relatively shorter dactylus of P3 (ratio of P3 : P5 dactylus 1 : 2 vs. 1 : 1.6) and in the presence of 8 short spinules rather than 5 or 6 slender spinules on the ventral subdistal margin of the P5 dactylus. Gordon (1936) mentioned only a single row of subdistal dactylar spines in her accounts of *A. spinidactylus* and *A. similis*, rather than two rows as observed in the holotype of the latter. The lower row of dactylar spines, however, can be obscured by setae and was probably overlooked by Gordon (1936). *Arcotheres similis* otherwise agrees with *A. spinidactylus* (Gordon, 1936) indicating that the two species are probably conspecific. Thus, Gordon's (1936) Singaporean specimen identified as *A.*

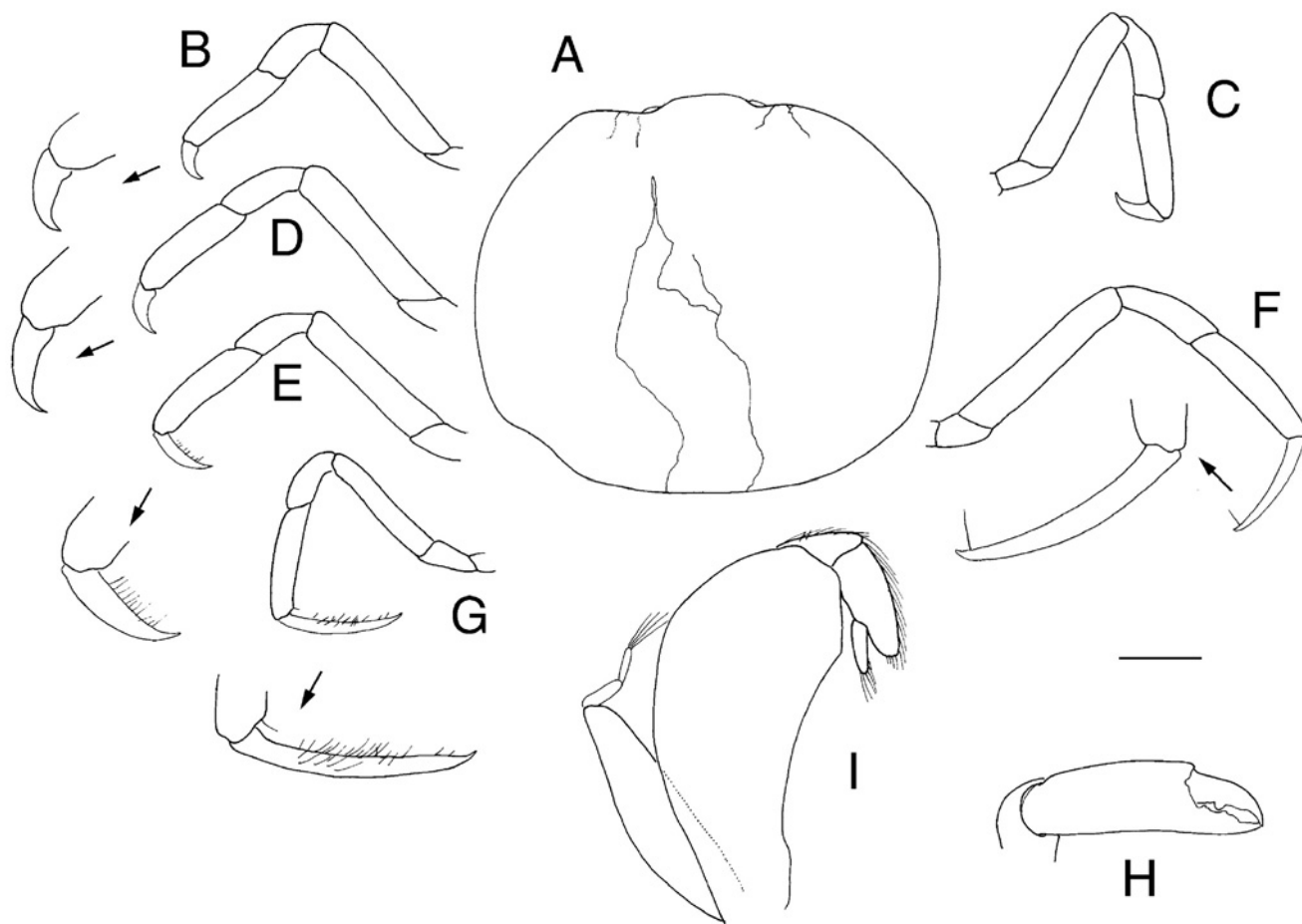


Fig. 13. *Arcotheres rotundatus* (Bürger, 1895), SMF-ZMG169, female holotype (approx. 11.1 × 9.3 mm), Burias, the Philippines: A, carapace; B, C, left and right P2; D, left P3; E, F, left and right P4; G, left P5; H, right cheliped; I, right MXP3. Scale bars: A–H = 2.0 mm; I = 0.7 mm.

similis should be restudied; it probably represents an undescribed species.

***Arcotheres* sp.**

Material. – ZMG 956, 10 females ($9.0 \times 6.8 - 9.7 \times 7.6$ mm), the Philippines, C. Semper 1859–1864.

Remarks. – These 10 *Arcotheres* specimens were not reported on by Nauck, Semper or Bürger. The specimens are in a poor state of preservation and not identifiable to species, with legs, mouthparts etc. missing or broken. Owing to the dimensions of the specimens, however, it is clear that they do not represent any of the missing types. Bürger may have excluded this material from his report because of their incomplete condition.

***Buergeres holothuriae* (Semper, 1880)
(Fig. 15)**

Pinnotheres holothuriae Semper, 1880: 105 [type locality: Zamboanga, the Philippines, by lectotype designation (Ng & Manning, 2003)]; Bürger, 1895: 381–382, Pl. 9: Fig. 27, Pl. 10: Figs. 26, 36.

Buergeres holothuriae – Ng & Manning, 2003: 912, Fig. 5.

Type material. – Lectotype: USNM 32433a, ovigerous female (10.1×9.3 mm), Zamboanga, Philippines, Semper, 1876. Paralectotype: USNM 032433b, 1 ovigerous female (8.0×6.5 mm), type locality.

Diagnosis. – Female: Carapace almost circular, slightly wider than long, width length ratio 1.1–1.2; dorsal surface smooth, gently convex. Lateral margins gently convex; sub-branchial surfaces gently setose. MXP3 with ischium and merus

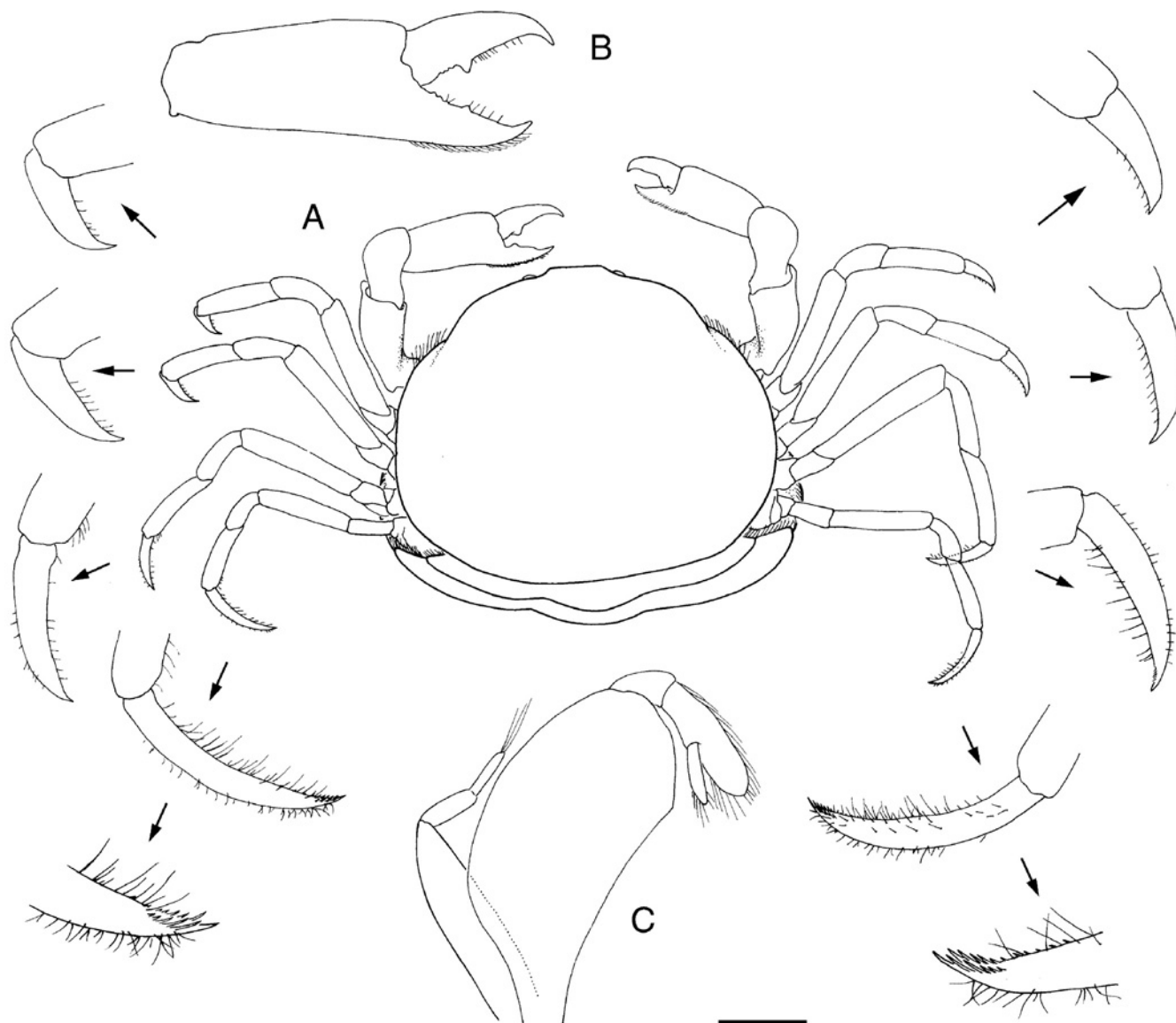


Fig. 14. *Arcotheres similis* (Bürger, 1895), ZMG956, female holotype (8.3×6.4 mm), Ubay, the Philippines: A, dorsal habitus; B, right cheliped; C, right MXP3. Scale bars: A = 2.0 mm; B = 1.0 mm; C = 0.5 mm.

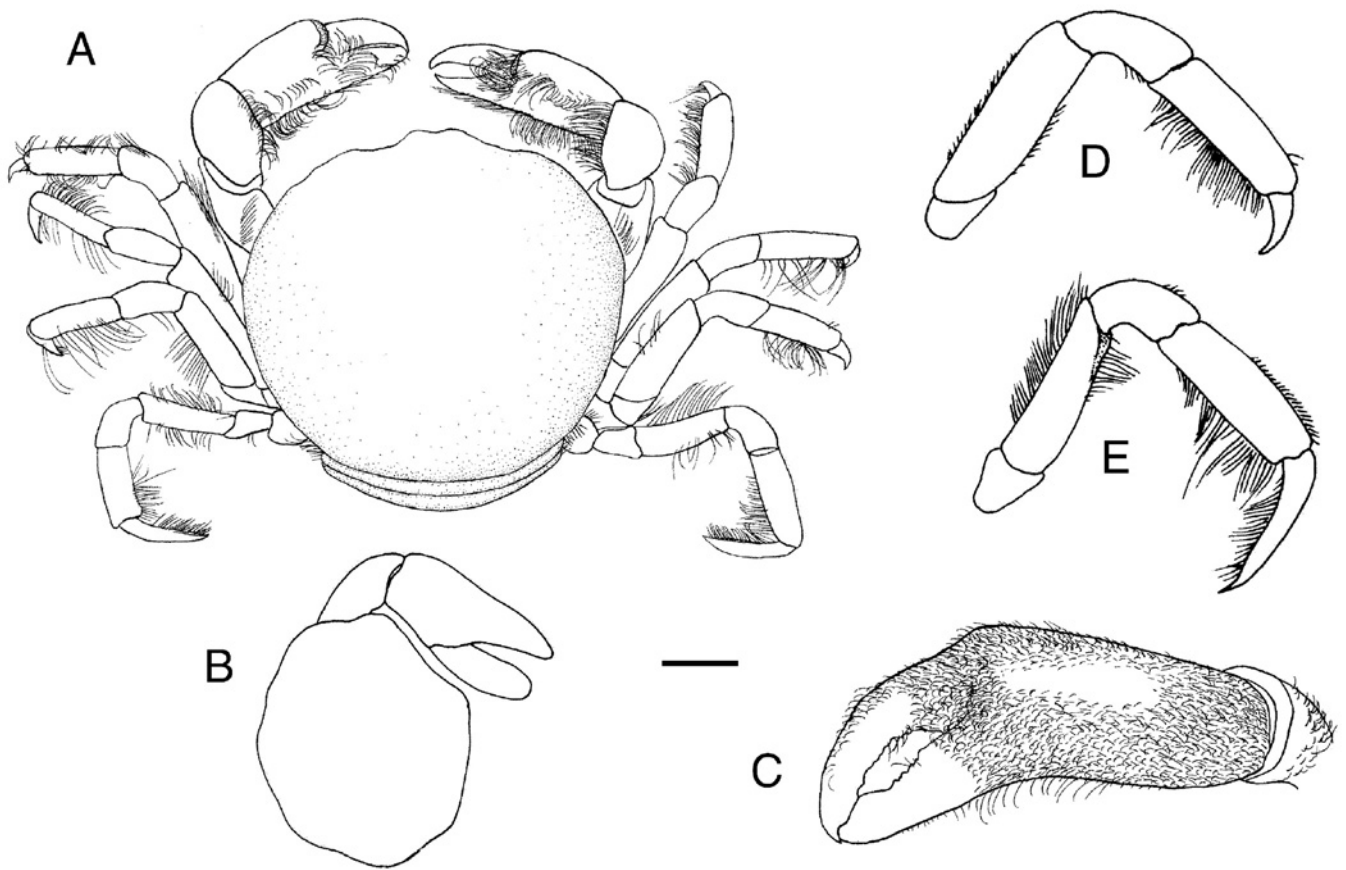


Fig. 15. *Buergeres holothuriae* (Semper, 1880), USNM 32433a, female lectotype (10.1 × 9.3 mm), Zamboanga, the Philippines: A, dorsal habitus; B, right MXP3 (setae omitted); C, left chela; D, right P4; E, right P5. Scale bars: A = 2.0 mm; B = 0.5 mm; C–E = 1.0 mm. (Modified after Ng & Manning, 2003).

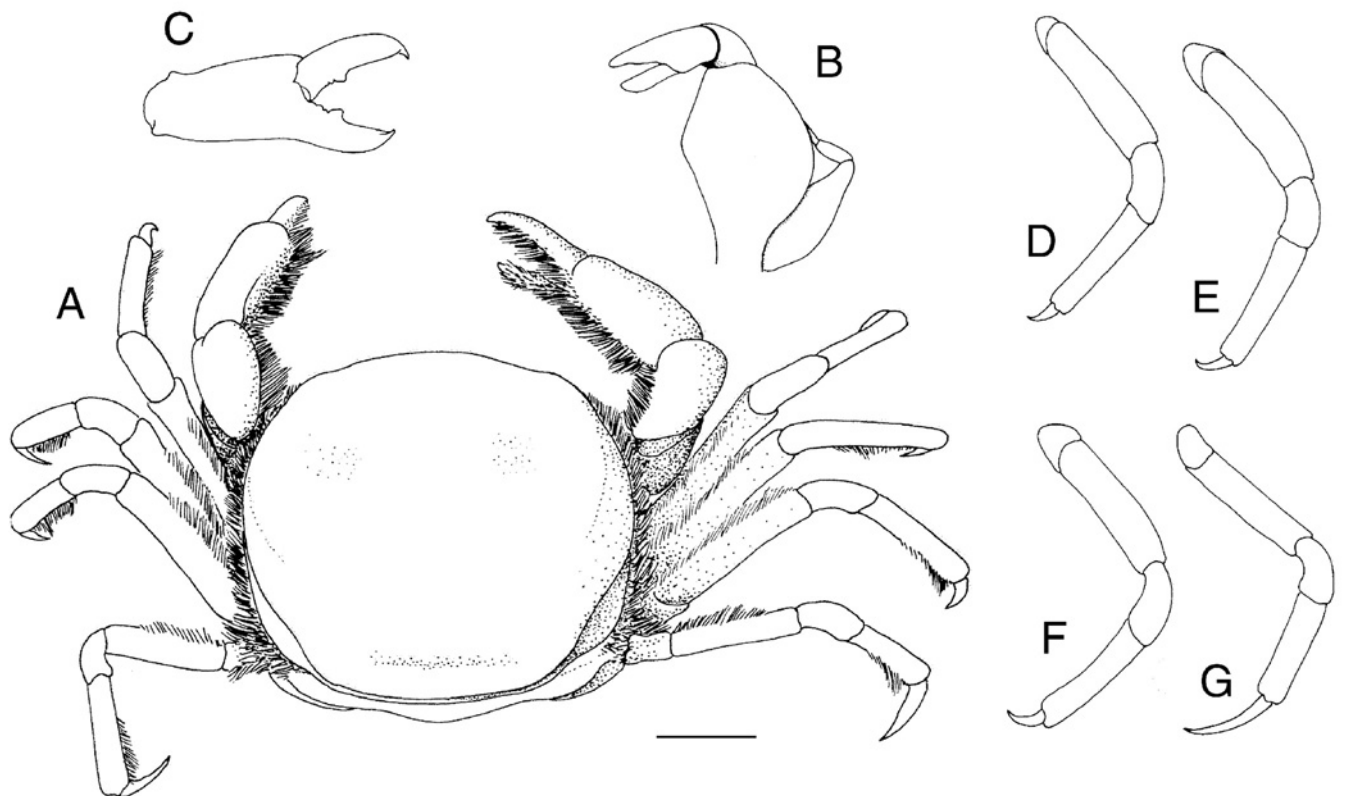


Fig. 16. *Buergeres ortmanni* (Bürger, 1895), ZRC 2003.59, female neotype (11.4 × 9.5 mm), Pulau Salu, northeastern Singapore: A, dorsal habitus; B, left MXP3 (setae omitted); C, right cheliped; D–G, right P2–P5. Scale bars: A, C–G = 2.5 mm; B = 1.0 mm (Modified after Ng & Manning, 2003).

completely fused, without trace of suture, subcircular, inner margin rounded; exopod relatively stout, outer margin gently convex, with well developed flagellar setae; palp three-segmented, propodus elongate, longer than dactylus; dactylus spatuliform, articulation point slightly anterior to base of propodus. Chelipeds subequal; inner surfaces of merus, carpus, palm and fingers covered with relatively long setae; outer surface of chela densely covered with short pubescence; palm relatively stout; fingers shorter than palm, basal third covered with dense pubescence; cutting edges of dactylus and propodus each with numerous denticles except for almost unarmed distal third. Walking legs relatively slender, $P3 > P2 > P4 > P5$ in length; dactyli of P2–4 relatively short, distinctly hooked; dactylus of P5 very long, about 5 times as long as those of other legs; dorsal and ventral margins of meri of all legs lined with setae of various lengths; ventral margins of propodus and dactylus of all legs lined with setae. Abdomen with all segments distinct, freely articulating, telson semicircular. Male: not known.

Remarks. – Ng & Manning (2003) redescribed this species and selected a lectotype.

***Buergeres ortmanni* (Bürger, 1895)**
(Fig. 16)

Pinnotheres ortmanni Bürger, 1895: 384–385, Pl. 9: Fig. 30, Pl. 10: Fig. 28 [type locality: Pulau Salu, Singapore, by neotype designation (Ng & Manning, 2003)].

Buergeres ortmanni – Ng & Manning, 2003: 911, Fig. 4.

Type material. – Neotype: ZRC 2003.59, female (11.4 × 9.5 mm), Pulau Salu, northeast Singapore, in holothurian in coral reef, exposed at edge of reef, R. U. Gooding, 28 Apr.1967.

Diagnosis. – Female: Carapace almost circular, slightly wider than long, width to length ratio 1.1–1.2; dorsal surface smooth, gently convex; intestinal region slightly depressed. Lateral margins gently convex; sub-branchial surfaces densely setose. MXP3 with ischium and merus completely fused, without trace of suture, subovate, inner margin subangular at distal third; exopod relatively stout, outer margin gently convex, with well developed flagellar setae; palp three-segmented, propodus elongate, longer than dactylus; dactylus spatuliform, articulation point near midlength of propodus. Chelipeds subequal; inner surfaces of merus, carpus, palm and fingers densely covered with relatively long setae; palm relatively stout; fingers shorter than palm; cutting edges of dactylus and propodus each with sub-basal large tooth and 1 or 2 denticles before it, rest of cutting edges smooth, almost blade-like; tips hooked. Walking legs relatively slender, $P3 > P2 > P4 > P5$ in length; dactyli of P2–4 relatively short, sharply tapering; dactylus of P5 very long, about 3 times as long as those of other legs; dorsal margins of meri of all legs relatively densely lined with setae of various lengths, becoming sparse or absent along distal one-quarter; ventral margins of propodus of all legs relatively densely lined with setae on distal half. Abdomen with all segments freely articulating, telson semicircular. Male: not known.

Remarks. – Ng & Manning (2003) redescribed this species on the basis of a neotype from Singapore.

***Buergeres tenuipes* (Bürger, 1895)**
(Fig. 3B)

Pinnotheres tenuipes Bürger, 1895: 371–372, Pl. 9: Fig. 11, Pl. 10: Fig. 11 [type locality: Ubay, Philippines, from holothurian].

Type material. – Lost.

Diagnosis. – Female: Carapace almost circular, slightly wider than long; dorsal surface smooth, glabrous. MXP3 with ischium and merus completely fused, inner margin obtusely angled at distal third; palp three-segmented; dactylus spatuliform, articulation point at midlength of propodus, apex not overreaching propodus. Chelipeds inner surfaces of merus, carpus, palm and fingers densely covered with relatively long setae; fingers shorter than palm; Walking legs relatively slender; relative lengths: $P3 > P2 > P4 > P5$; dactyli of P2–4 relatively short, sharply tapering; dactylus of P5 about 3 times as long as those of other legs; ventral margins of meri, propodi, and carpi of all legs setose. Male: not known. [after Bürger, 1895: 371–372, Pl. 9: Fig. 11, Pl. 10: Fig. 11]

Remarks. – *Pinnotheres tenuipes* was assigned, with a bit of doubt, to *Buergeres* by Ng & Manning (2003).

***Durckheimia caeca* Bürger, 1895**
(Fig. 17)

Durckheimia caeca Bürger, 1895: 385–386, Pl. 9: Fig. 33, Pl. 10: Fig. 31 [type locality: Palau, from *Lima squamosa* Lamarck]; – Ahyong & Ng, 2005: 119–121, Figs. 2, 3.

Type material. – Holotype: SMF-ZMG166, ovigerous female (10.2 × 9.0 mm), Palau, from *Lima squamosa* Lamarck, C. Semper.

Diagnosis. – Female: Carapace rounded in dorsal outline; anterior margin rounded, with deep, U-shaped, median notch. Median carina cristate with shallow concavity at about midlength; extending from posterior margin to anterior third of carapace after which it descends to base of median anterior notch. Endopod of MXP3 with ischiomerus about twice as long as wide, inner margin slightly convex, outer margin strongly convex; dactylus with apex slightly overreaching propodal apex. Chela without dorsal carina on merus. Pereopods 2–5 with merus cristate dorsally; carpus and propodus rounded dorsally. Male: not known.

Remarks. – The species was redescribed by Ahyong & Ng (2005).

***Holotheres flavus* (Nauck, 1880)**

(Fig. 18)

Pinnotheres flavus Nauck, 1880: 23, 66 [type locality: Bohol, Ubay, the Philippines, by lectotype designation (Ng & Manning, 2003)]; Bürger, 1895: 383–384, Pl. 9: Fig. 29, Pl. 10: Figs. 29, 35

Holotheres flavus – Ng & Manning, 2003: 907, Figs. 2, 3.

Type material. – Lectotype: SMF-ZMG 951a (Go297b), male (8.6 × 7.9 mm), Bohol, Ubay, the Philippines, C. Semper, 1863–1864. Paralectotypes: SMF-ZMG 951b, 2 males (7.9 × 7.6 mm, 8.0 × 7.6 mm), 2 females (10.3 × 10.0 mm, 8.9 × 8.0 mm), type locality; USNM 32434, 2 ovigerous females (10.0 × 9.5 mm, 8.4 × 7.8 mm), Zamboanga, the Philippines, C. Semper, 1876.

Diagnosis. – Carapace subcircular, width to length ratio ca. 1.1, margins setose, obscuring outline; anterolateral margin arcuate, lateral margins straight, subparallel, posterolateral margin gently convex. MXP3 with ischium and merus completely fused, without trace of suture, subovate, inner margin subangular submedially; exopod relatively stout, outer margin convex, with well developed flagellar setae; propodus elongate, subconical, subequal in length to dactylus; dactylus spatuliform, articulates at base of propodus. Chelipeds subequal; inner surfaces of distal 4 segments covered with setae; carpus dorsal surface entire, without dorsal groove; palm relatively stout; fingers shorter than palm; cutting edges of dactylus and propodus each with sub-basal large tooth and

several denticles before it. Walking legs relatively stout, P3 > P4 > P2 > P5 in length; dactyli of P2–5 relatively long, sharply tapering, all subequal in length; dorsal and ventral margins of meri, carpi and propodi of all legs lined with setae of various lengths, obscures margins. Male and female abdomens with all segments freely articulating.

Remarks. – Ng & Manning (2003) redescribed this species and selected a lectotype.

***Holotheres semperi* (Bürger, 1895)**

(Fig. 19)

Pinnotheres semperi Bürger, 1895: 382–383, Pl. 9: Fig. 28, Pl. 10: Fig. 27 [type locality: Singapore, by neotype designation (Ng & Manning, 2003)].

Holotheres semperi – Ng & Manning, 2003: 905, Fig. 1.

Type material. – Neotype: ZRC 1965.11.24.40, male (7.9 × 7.2 mm), in respiratory tree of *Holothuria scabra*, Singapore, S. H. Chuang, 1950s.

Diagnosis. – Female: Carapace of female subcircular, width length ratio 1.1–1.2, anterolateral and lateral margin confluent, gently convex; male carapace subquadrate, width to length ratio ca. 1.1, anterolateral margin almost straight, lateral margin gently convex; sub-branchial surface densely setose dorsal surface gently convex, covered with dense layer

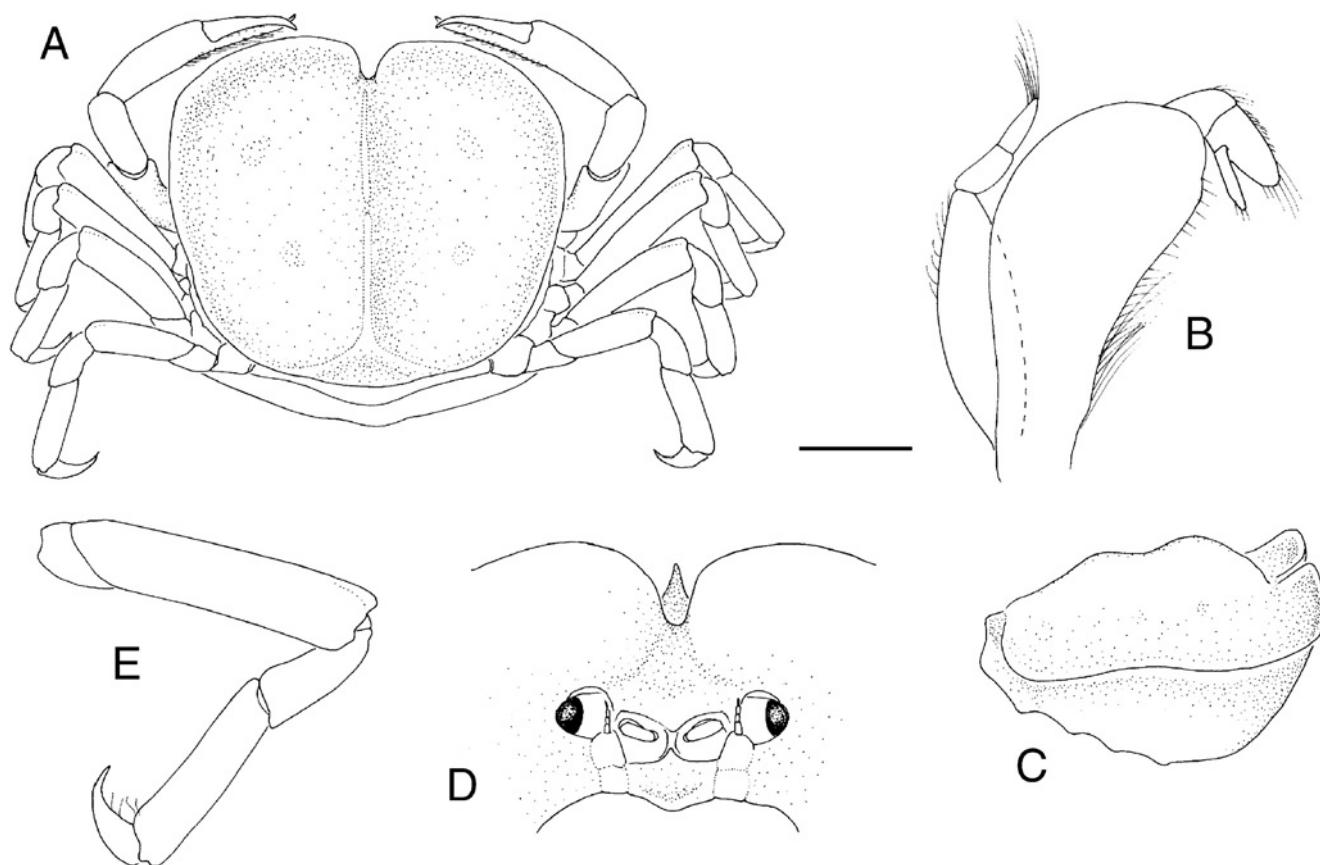


Fig. 17. *Durckheimia caeca* Bürger, 1895, SMF-ZMG166, holotype female (10.2 × 9.0 mm), Palau : A, dorsal habitus; B, right MXP3; C, carapace, right lateral view; D, carapace, anterior view; E, right P2. Scale bars: A, C = 3.0 mm; B = 0.7 mm; D, E = 1.5 mm. (Modified after Ahyong & Ng, 2005, fig. 2).

of short setae longer along lateral regions, completely obscuring outline and surface; intestinal region slightly depressed. MXP3 with ischium and merus completely fused, without trace of suture, subovate, inner margin obtusely angular submedially; exopod relatively stout, outer margin convex, with well developed setae on flagellum; propodus elongate, conical, subequal in length to dactylus; dactylus spatuliform, articulating at base of propodus. Chelipeds subequal; surfaces of distal 4 segments densely covered with setae, those on inner surfaces relatively longer; carpus dorsal surface entire, without dorsal groove; palm relatively stout; fingers shorter than palm; cutting edges of dactylus and

propodus each with sub-basal large tooth and numerous denticles before and after it; distal-most part of fingers excavated on inner surface. Walking legs relatively stout, $P3 > P4 > P2 > P5$ in length; dactyli of P2–5 relatively long, sharply tapering, all subequal in length; dorsal and ventral margins of meri, carpi and propodi of all legs densely lined with setae of various lengths, completely obscuring margins. Male and female abdomens with all segments freely articulating.

Remarks. – Ng & Manning (2003) recently redescribed this species on the basis of a neotype from Singapore.

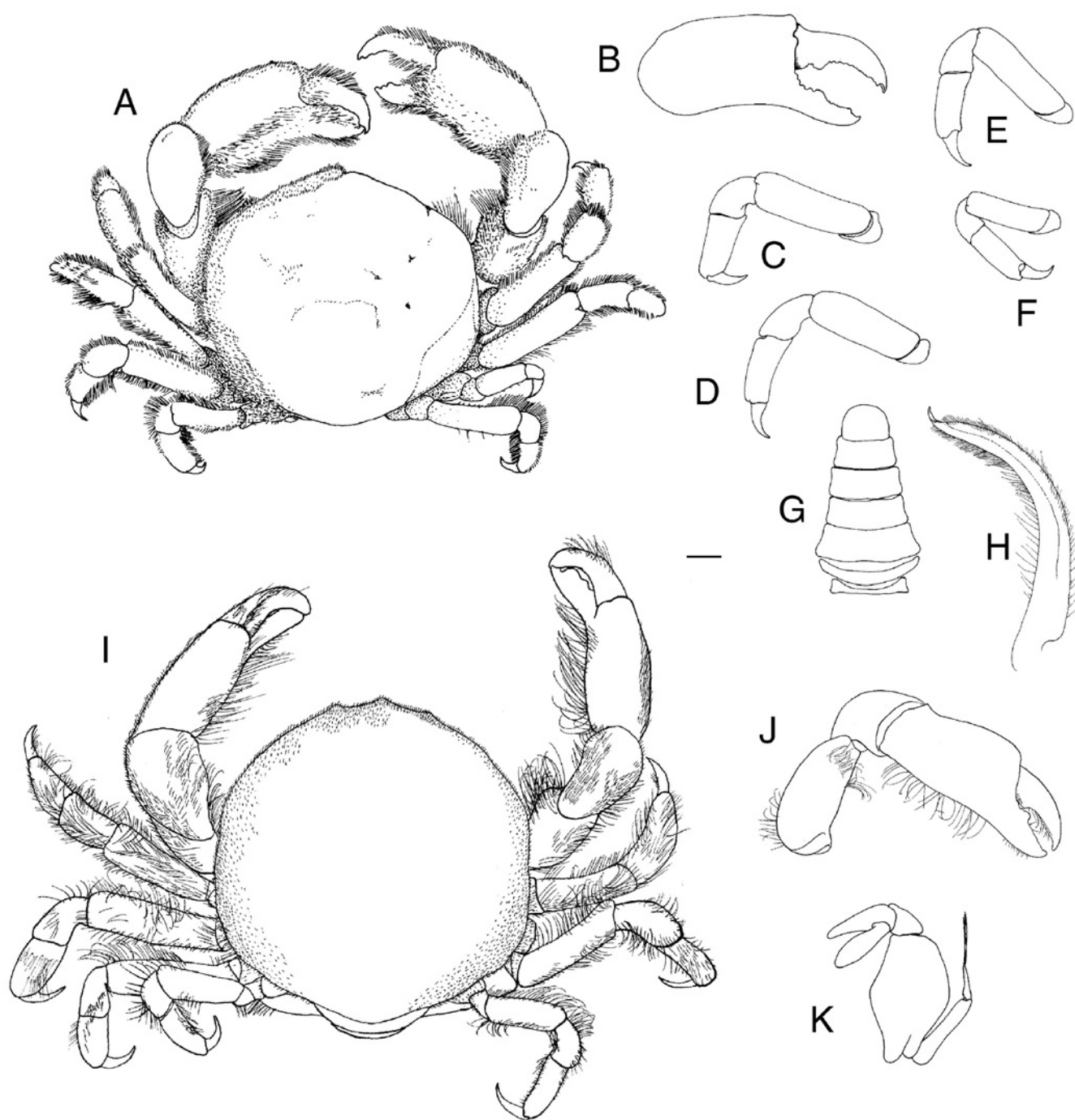


Fig. 18. *Holotheres flavus* (Nauck, 1880), Bohol, Ubay, the Philippines: A–H, SMF 951a, male lectotype (8.6 × 7.9 mm); I–K, USNM 32434, female paralectotype (10.0 × 9.5 mm); A, I, dorsal habitus; B, J, right cheliped; C–F, left P2–P5; G, abdomen; H, left G1; K, left MXP3. Scale bars: A–G, I, J = 1.0 mm; H = 0.3 mm; K = 2.0 mm. (Modified after Ng & Manning, 2003).

***Holothuriophilus trapeziformis* Nauck, 1880**
(Fig. 20)

Holothuriophilus trapeziformis Nauck, 1880: 24, 66 [type locality: Mazatlan, Sinaloa, Mexico, by lectotype designation (Ng & Manning, 2003)]; Ng & Manning, 2003: 903, 916–918, Fig. 7C–F.

Pinnotheres trapeziformis – Bürger, 1895: 380–381, Pl. 9: Fig. 26, Pl. 10: Fig. 25.

Type material. – Lectotype: SMF-ZMG 170 (Go565a), female (7.7 × 4.8 mm), Mazatlan, Sinaloa, Mexico, from the cloaca of a *Holothuria inornata* Semper.

Diagnosis. – Female: Carapace length about 0.6 times width, widest anterior to midlength. MXP3 palp three-segmented; propodus conical distally, dactylus spatulate, broadening distally, apex rounded, overreaching propodus, inserting near midlength of propodus. Cheliped merus and carpus densely setose; propodus setose on inner distal margin. Walking legs similar, shorter than carapace width, segments compressed; meri with setose dorsal and ventral margins; carpi and propodi dactyli subequal. Abdomen seven-segmented.

Remarks. – Manning (1993b) resurrected *Holothuriophilus* and Ng & Manning (1993) designated a lectotype for *H. trapeziformis*.

***Nepinnotheres affinis* (Bürger, 1895) new combination**
(Fig. 21)

Pinnotheres affinis Bürger, 1895: 365–366, Pl. 9: Fig. 2, Pl. 10: Fig. 2, 34 [type locality: Philippines, by present lectotype designation, from *Pinna*].

Type material. – Lectotype: SMF-ZMG171a, ovigerous female (7.0 × 6.1 mm), the Philippines, from *Pinna*. Paralectotypes: ZMG171b, 1 male (6.7 × 6.3 mm), type locality; SMF-ZMG944 (Go539b), 7 males (2.5 × 2.5 – 5.7 × 5.3 mm), 3 females (5.6 × 4.9 mm – 8.4 × 7.6 mm), Bohol, C. Semper; USNM 32435, 1 female (9.5 × 8.2 mm), Bohol, C. Semper. Probable paralectotypes: SMF-ZMG175 (Go542a), 1 male (7.2 × 7.15 mm), 1 female (8.1 × 7.3 mm), Ubay, C. Semper.

Description. – Female: Carapace subcircular, slightly wider than long, front projecting slightly. Eyes small, not visible in dorsal view. MXP3 with propodus about twice as long as high, tapering distally to blunt apex; dactylus outreaching propodal apex; ischiomerus outer margin convex, inner margin with proximal 2/3 slightly concave; exopod inner and outer margin convex, flagellum two-segmented.

Cheliped with dactylus slightly longer than half palm length; palm about twice as long as high, mesioventral margin setose; dactylus occlusal margin finely dentate and sparsely setose,

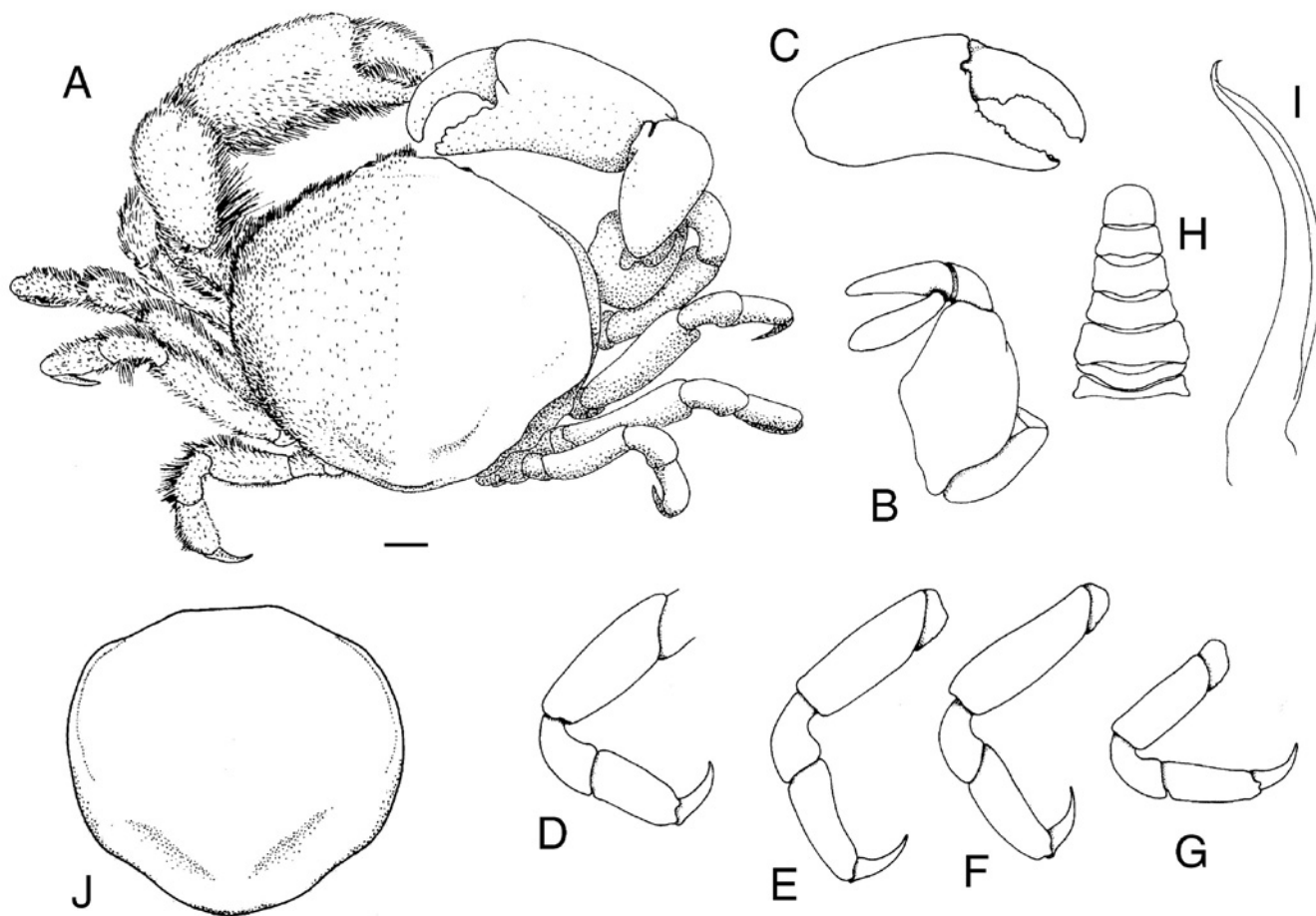


Fig. 19. *Holotheres semperi* (Bürger, 1895). A–I, ZRC 1965.11.24.40, male neotype (7.9 × 7.2 mm). J, ZRC 1954.11.24.41, female (10.7 × 10.2 mm), Singapore: A, dorsal habitus (right side of carapace denuded); B, left MXP3; C, right chela; D–G, left P2–P5; H, abdomen; I, left G1; J, carapace; B–I, setae omitted. Scale bars: A–H = 1.0 mm; B; I = 0.5 mm; J = 1.5 mm. (Modified after Ng & Manning, 2003).

with large proximal tooth; pollex with low protrusion proximally, margin sparsely setose; mesial margin of carpus and mesiodistal margin of merus setose. Walking legs dorsally and ventrally unarmed; relative lengths $P3 > P2 = P4 > P5$. P2–P5 dactyli falcate; relative lengths $P3 > P2 = P4 > P5$. P2–P5 propodus and carpus with ventral setae; P3–P5 merus with dorsal setae. Abdomen extending to buccal region, covering bases of walking legs. Male: Carapace subcircular, slightly wider than long, front not projecting. Eyes small, visible in dorsal view. MXP3 as in female. Cheliped with dactylus slightly longer than half palm length; palm length less than twice as long as high, mesioventral margin setose; dactylus occlusal margin finely dentate and sparsely setose, with large proximal tooth; pollex with low protrusion proximally, margin sparsely setose; mesial margin of carpus and mesiodistal margin of merus setose. Walking legs dorsally and ventrally unarmed; relative lengths $P3 > P2 = P4 > P5$. P2–P5 dactyli falcate; relative lengths $P3 > P2 = P4 > P5$. P3–P5 propodus and carpus with ventral setae, merus with dorsal and ventral setae; P2 merus with ventral setae. Abdomen widest at somite 3, tapering distally to evenly rounded telson.

Remarks. – *Pinnotheres affinis* agrees in all respects with Manning's (1993) concept of *Nepinnotheres* and is herein transferred. Most of the original syntypes of *N. affinis*, new combination, are extant. The two syntypes from ZMG171 are illustrated; the female is herein designated as the lectotype. One lot, ZMG175, containing one male and one female from Ubay, was accompanied by a recent label with the name *Pinnotheres gracilis*. These specimens, however, are clearly referable to *P. affinis* rather than *P. gracilis*. Bürger listed three specimens of *N. affinis* from Ubay, a male and two females, as part of the original type series, so it is likely that ZMG175 contains the remaining types of *N. affinis* from that locality. As such, we treat them as probable paralectotypes.

Although Ng & Manning (2003) indicated that some paralectotypes of *P. affinis* remained in the Berlin Museum, Oliver Coleman (pers. com. 2004) has informed us that none are actually present in the Berlin collections.

***Nepinnotheres cardii* (Bürger, 1895) new combination**
(Fig. 22)

Pinnotheres cardii Bürger, 1895: 367–368, Pl. 9: Fig. 4, Pl. 10: Fig. 4 [type locality: Burias, the Philippines, by present lectotype designation, from *Cardium unedo*].

Type material. – Lectotype: SMF-ZMG945 (Go955a), ovigerous female (8.6 × 8.3 mm), Burias, from *Cardium unedo*, C. Semper, 1859–1864. Paralectotype: SMF-ZMG957 (Go955a), 1 male (4.4 × 4.4 mm), type locality.

Description. – Female: Carapace subcircular, slightly wider than long, front faintly projecting, slightly concave. Eyes small, partially visible in dorsal view. MXP3 with propodus more than twice as long as high, tapering distally to blunt apex; dactylus not outreaching propodal apex; ischimerus about twice as long as wide, outer margin convex, inner margin with proximal 2/3 slightly concave, bluntly angular at distal third; exopod outer margin sinuous, inner margin relatively straight, flagellum two-segmented. Cheliped with dactylus slightly longer than half palm-length; palm slightly longer than twice as long as high, mesioventral margin setose; dactylus occlusal margin finely dentate and sparsely setose, with large proximal tooth; pollex with low proximal tooth, margin sparsely setose; mesial margin of carpus setose. Walking legs dorsally and ventrally unarmed; relative lengths $P3 > P2 > P4 > P5$. P2–P5 dactyli falcate, sparsely setose; relative lengths $P2 = P3 > P4 = P5$. P4 and P5 propodus with sparse ventral setae. Abdomen extending to buccal region, covering bases of walking legs. Male: Carapace subcircular,

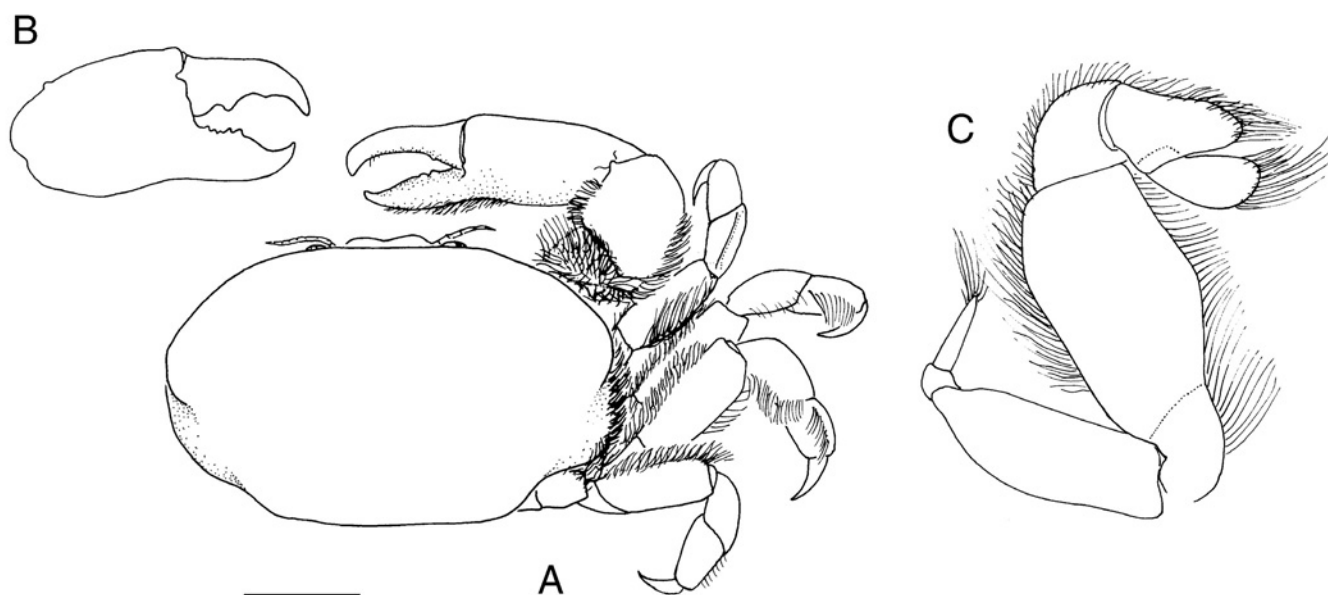


Fig. 20. *Holothuriophilus trapeziformis* Nauck, 1880, SMF-ZMG 170, female lectotype (7.7 × 4.8 mm), Mazatlan, Sinaloa, Mexico: A, dorsal habitus; B, right cheliped; C, right MXP3. Scale bars: A, B = 2.0 mm; C = 0.5 mm.

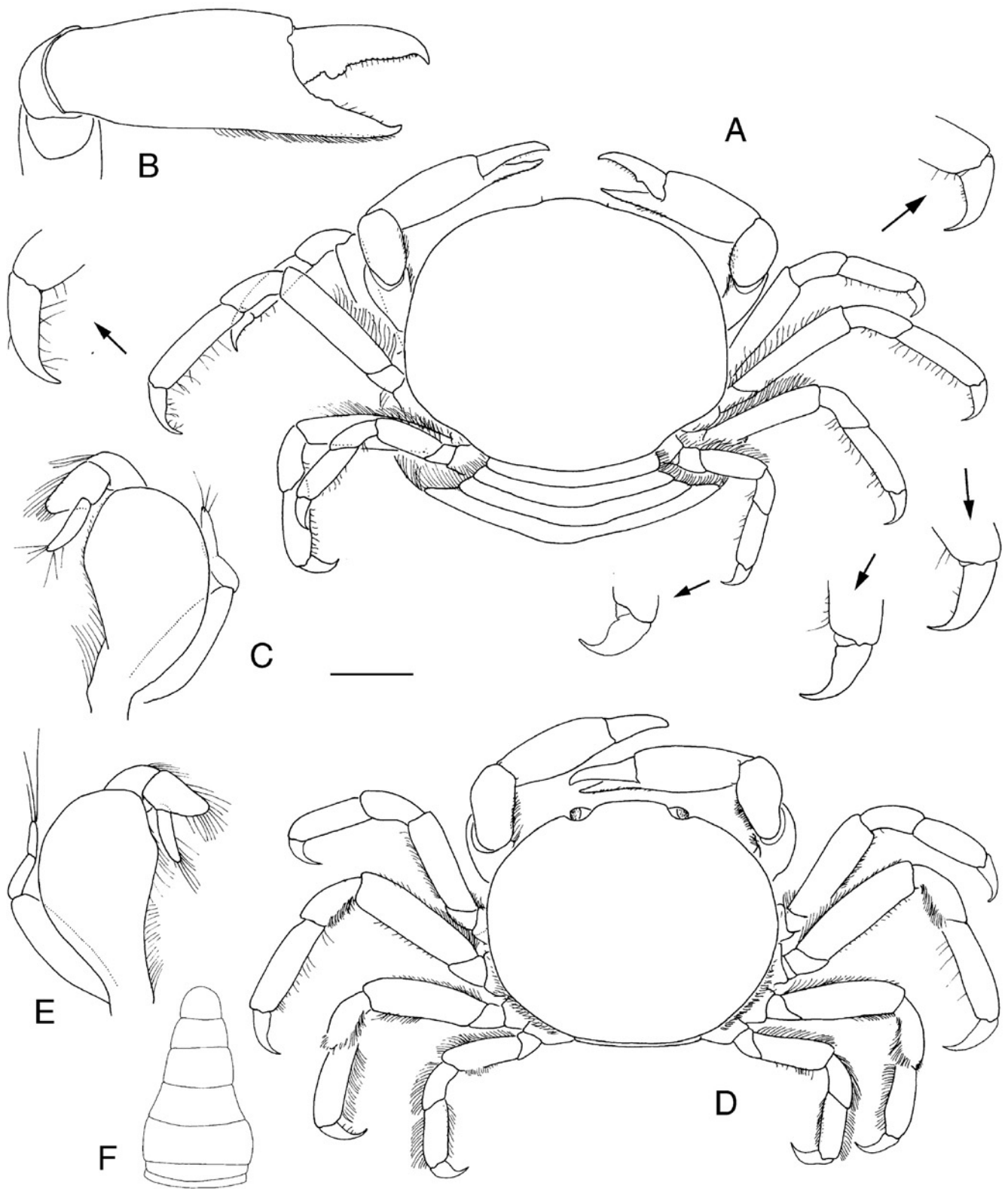


Fig. 21. *Nepinnotheres affinis* (Bürger, 1895), new combination, the Philippines: A–C, SMF-ZMG171a, female lectotype (7.0 × 6.1 mm); D–F, SMF-ZMG171b, paralectotype male (6.7 × 6.3 mm); A, D, dorsal habitus; B, right cheliped; C, left MXP3; E, right MXP3; F, abdomen. Scale bars: A, D, F = 2.0 mm; B = 1.0 mm; C, E = 0.7 mm.

as long as wide, front projecting, margin transverse. Eyes small, visible in dorsal view. MXP3 as in female except ischiomerus about 1.5 times as long as wide. Cheliped robust; dactylus half palm length; palm height about 3/4 length; dactylus occlusal margin with prominent, blunt proximal tooth and lower distal tooth, sparsely setose; pollex occlusal margin with irregular protrusions and few setae; mesial margin of carpus setose. Walking legs dorsally and ventrally unarmed;

relative lengths $P3 > P2 > P4 > P5$. P2–P5 dactyli falcate, sparsely setose; relative lengths $P3 > P2 > P4 > P5$. P3–P5 propodus and carpus with dorsal and ventral setae. P4 and P5 merus with dorsal and ventral setae. Abdomen widest at somite 3, tapering distally to evenly rounded telson.

Remarks. – Characters of *P. cardii* correspond well to *Nepinnotheres*, to which the species is herein transferred. Both

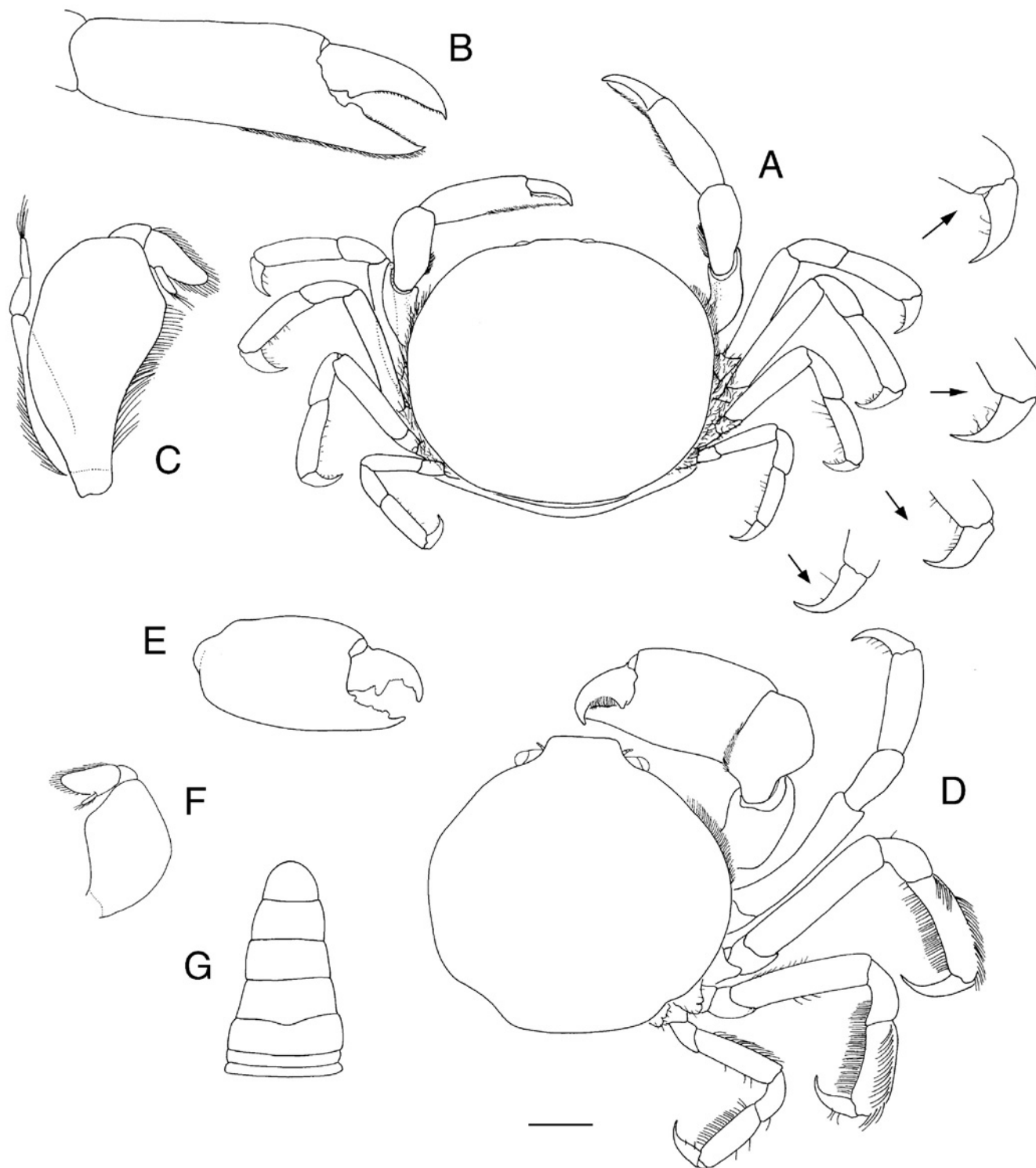


Fig. 22. *Nepinnotheres cardii* (Bürger, 1895), new combination, Burias, the Philippines: A–C, SMF-ZMG945, female lectotype (8.6 × 8.3 mm); D–G, SMF-ZMG957, paralectotype male (4.4 × 4.4 mm); A, D, dorsal habitus; B, E, right cheliped; C, right MXP3; F, left MXP3; G, abdomen. Scale bars: A = 2.0 mm; B, D, E, G = 1.0 mm; C = 0.7 mm; F = 0.5 mm.

syntypes of *N. cardii* are extant. The right MXP3 of *N. cardii* figured by Bürger (1895: pl. 10, fig 4) is from the male syntype. The female syntype of *N. cardii* is here designated the lectotype of the species.

***Nepinnotheres glaberrimus* (Bürger, 1895) new combination**
(Fig. 23)

Pinnotheres glaberrimus Bürger, 1895: 366–367, Pl. 9: Fig. 3, Pl. 10: Fig. 3 [type locality: Zamboanga, the Philippines, by present lectotype designation].

Type material. – Lectotype: SMF-ZMG174 (Go543a), male (5.3 × 5.2 mm), Zamboanga, the Philippines, brackish water, C. Semper, 1859–1864. Paralectotype: SMF-ZMG185, 1 male (2.2 × 2.1 mm), Palau, from *Arca* sp., C. Semper.

Description. – Female: not known. Male: Carapace subcircular, slightly wider than long, front projecting, margin transverse. Eyes small, visible in dorsal view. MXP3 with propodus more than twice as long as high, tapering distally to blunt apex; dactylus not reaching propodal apex; ischiomerus outer margin convex, inner margin with proximal 2/3 concave, margin at distal third produced to distinct angle; exopod inner and outer margin convex, flagellum two-segmented. Cheliped robust; dactylus about 3/4 palm length; palm length height about 2/3 length, mesioventral margin setose; dactylus occlusal margin sparsely setose, with large proximal tooth; pollex with 2 large proximal teeth, margin sparsely setose; mesiodistal margin of merus setose. Walking legs dorsally and ventrally unarmed; relative lengths $P4 > P3 > P2 > P5$. P2–P5 dactyli falcate, subequal. P2 carpus with distal setae. P3 and P4 propodus and carpus with dorsal setae. Abdomen widest at somites 2 and 3, tapering distally to evenly rounded telson.

Remarks. – Characters of *P. glaberrimus* correspond well to *Nepinnotheres*, to which the species is transferred. Two of three of Bürger's syntypes of *N. glaberrimus* are extant. The lost syntype, from Ubay, the Philippines, was hosted by *Lima divaricata*. The syntype from Zamboanga (SMF-ZMG 174) is herein designated the lectotype of the species.

***Nepinnotheres pectinicola* (Bürger, 1895) new combination**
(Fig. 3C)

Pinnotheres pectinicola Bürger, 1895: 362, 365, Pl. 9: Fig. 1, Pl. 10: Fig. 1 [type locality: Ubay, the Philippines, from *Pecten radula*].

Type material. – Lost.

Diagnosis. – Female: Carapace subquadrate; front projecting slightly beyond dorsal outline. Dactylus of MXP3 overreaching apex of propodus; propodus tapering to rounded apex; ischiomerus with rounded innerdistal margin. Walking legs with relative lengths $P3 > P2 > P4 > P5$; dactyli less than half propodus length. Male: not known. [after Bürger, 1895: 362, 365, Pl. 9: Fig. 1, Pl. 10: Fig. 1]

Remarks. – *Pinnotheres pectinicola* is tentatively assigned to *Nepinnotheres*. Although species placed in *Nepinnotheres* by Manning (1993a) have a subcircular instead subquadrate carapace, Bürger's species otherwise appears to conform to Manning's original generic concept. *Nepinnotheres pectinicola* might eventually have to be transferred to a new genus when the genus is revised.

The holotype of *N. pectinicola* is lost, and at present, we do not have material identifiable with the species. According to the type account, the combination of the subquadrate carapace

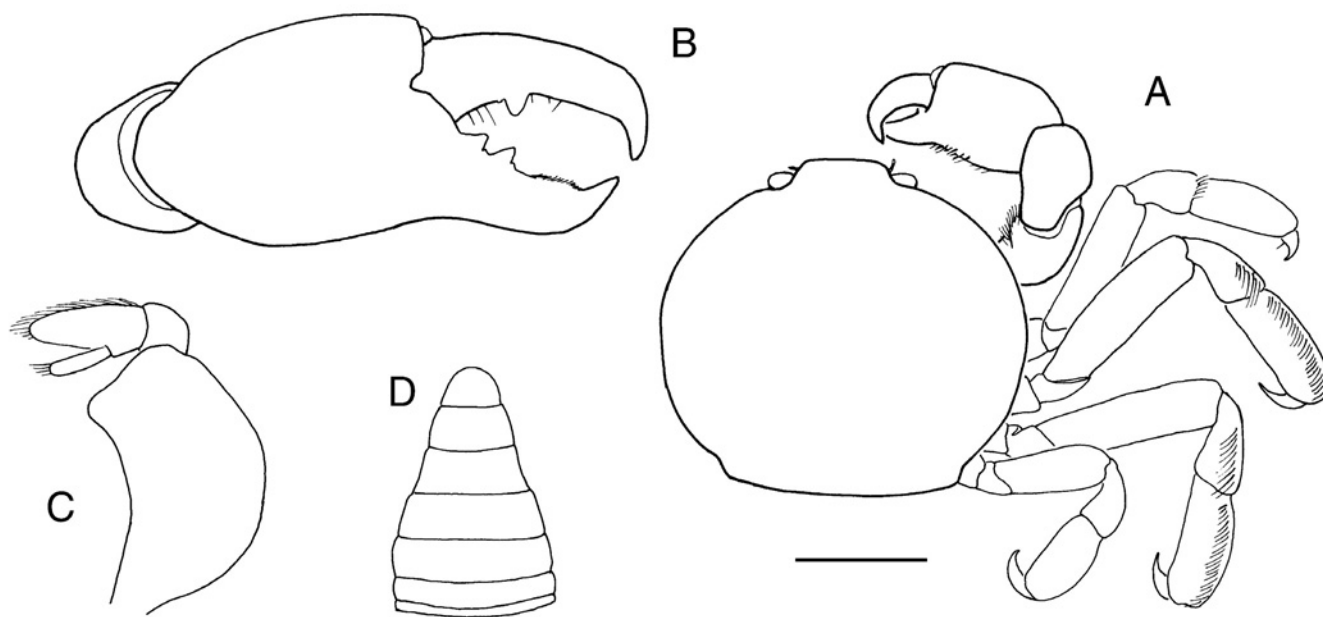


Fig. 23. *Nepinnotheres glaberrimus* (Bürger, 1895), new combination, SMF-ZMG174, male lectotype (5.3 × 5.2 mm), Zamboanga, the Philippines: A, dorsal habitus; B, right cheliped; C, left MXP3; D, abdomen. Scale bars: A, D = 2.0 mm; B = 0.7 mm; C = 0.5 mm.

and MXP3 dactylus over-reaching the propodal apex is diagnostic for *N. pectinicola*.

***Nepinnotheres rathbunae* (Schmitt, McCain & Davidson, 1973) new combination**
(Fig. 3D)

Pinnotheres barbatus Bürger, 1895: 369–370, Pl. 9: Fig. 8, Pl. 10: Fig. 8 [type locality: Aibukit, Palau, from *Donax* sp.].
Orthoheres rathbunae Schmitt, McCain & Davidson, 1973: 27 [replacement name for *Pinnotheres barbatus* Bürger, 1895, preoccupied by *Pinnotheres barbatus* Desbonne, 1867].

Type material. – Lost.

Diagnosis. – Carapace circular, front slightly projecting beyond margin, transverse. Dactylus of MXP3 articulating near proximal third of ventral propodal margin, not reaching apex of propodus; propodus height exceeding half length, apex broad, blunt; ischiomerus with obtuse innerdistal angle. Cheliped and lower margins of walking legs densely setose. [after Bürger, 1895: 369–370, Pl. 9: Fig. 8, Pl. 10: Fig. 8]

Remarks. – Schmitt et al. (1973) recognised that *Pinnotheres barbatus* Bürger, 1895, was preoccupied by *P. barbatus* Desbonne, 1867, and provided a replacement name, *rathbunae* for the former. Sakai (1969) placed *P. barbatus* in *Orthoheres* despite the fact that the dactylus of the MXP3 is not distally articulated. Rather, characters of the MXP3 and dactyls of the walking legs of *P. barbatus* according to Bürger (1895) correspond well with the genus *Nepinnotheres*, to which the species is transferred. The female holotype of *N. barbatus* is lost.

***Nepinnotheres villosulus* (Guérin-Méneville, 1831) new combination**

Pinnotheres villosulus Guérin-Méneville, 1831: 7, Pl. 4: Fig. 6 [type locality: Timor, Indonesia].
Pinnotheres villosus [sic] – Bürger, 1895: 366, Pl. 10: Fig. 5.

Material. – Lost.

Remarks. – Under the mis-spelt name “*Pinnotheres villosus*”, Bürger (1895) reported eight specimens from two Philippine localities: Ubay and Zamboanga. None appear to be extant. Characters of *P. villosulus*, particularly the subequal walking leg dactyli and articulation of the MXP3 dactylus near the midlength of the propodus indicate that the species belongs in *Nepinnotheres*. Hosts of *N. villosulus* reported by Bürger (1895) are *Pinna chemnitzii* and *Meleagrina margaritifera*.

***Orthoheres glaber* (Bürger, 1895) new combination**
(Fig. 24, Tab. 1)

Pinnotheres glaber Bürger, 1895: 379, Pl. 9: Fig. 23, Pl. 10: Fig. 21 [type locality: Palau, by present lectotype designation, from *Tapes turgida*].
Pinnotheres impressus Bürger, 1895: 380, Pl. 9: Fig. 24, Pl. 10: Fig. 23 [type locality: Aibukit, Palau] [new synonymy].

Type material of *P. glaber*. – Lectotype: USNM 32431, ovigerous female (7.8 × 6.5 mm), Palau, from *Tapes turgida*, C. Semper. Paralectotypes: SMF-ZMG 173 (Go304a), 6 males (3.4 × 3.1 – 4.8 × 4.3 mm), 4 females (3.5 × 3.5 – 8.3 × 7.4 mm), type locality; type locality.

Type material of *P. impressus*. – Syntypes: SMF-ZMG 176 (Go953a), 2 females (6.0 × 4.8 – 6.1 × 4.5 mm), Aibukit, Palau, C. Semper.

Description. – Female: Carapace subcircular, slightly wider than long, front faintly projecting, convex. Eyes small, not visible in dorsal view. MXP3 with propodus more than twice as long as high, apex rounded; dactylus inserting subdistally, outreaching propodal apex; ischiomerus exceeding twice length, outer margin convex, inner margin with proximal 3/4 concave, angular at distal quarter; exopod outer margin convex, inner margin relatively straight, flagellum two-segmented. Cheliped with dactylus about 2/3 palm length; palm 2.5 times as long as high, mesioventral margin setose; dactylus occlusal margin finely setose, with large proximal tooth; pollex occlusal margin sinuous, sparsely setose. Walking legs asymmetrical in length from right to left; propodi broadening distally; relative lengths P3 > P4 > P2 > P5. P2–P5 dactyli sparsely setose, shorter than half-length of respective propodi; relative lengths P3 > P4 > P2 > P5. P4 and P5 propodus with sparse ventral setae. Abdomen extending to buccal region and covering bases of walking legs. Male: Carapace subquadrate, wider than long, front projecting, medially emarginate. Eyes visible in dorsal view. MXP3 as in female, except with small distinct tooth at inner distal angle of ischiomerus. Cheliped robust; dactylus almost as long as palm; palm almost as high as long, outer surface with shallow, irregular pits; dactylus occlusal margin with prominent, blunt proximal tooth, distal margin crenulate, sparsely setose; pollex occlusal margin finely dentate, sparsely setose; mesial margin of carpus setose. Walking legs dorsally and ventrally unarmed, length asymmetrical from left to right; relative lengths P3 > P2 > P4 > P5. Dactyli shorter than half-length of respective propodi; P2–P4 dactyli subequal in length and slightly longer than P5 dactylus. P3 and P4 propodus with dorsal and ventral setae; carpus with diagonal setal row. Abdomen widest at somites 3 and 4, tapering distally to evenly rounded telson.

Remarks. – *Pinnotheres glaber* is transferred to *Orthoheres* on the basis of the subdistal insertion of the dactylus on the propodus of the MXP3. Ng & Manning (2003) indicated specimens of *O. glaber* are present in the Berlin Museum, but since all 11 specimens listed by Bürger (1895) are accounted for here, the Berlin specimens are not part of the type series. The ovigerous female specimen (USNM 32431) is herein selected as the lectotype. Bürger (1895) distinguished *O. glaber* from a very similar species, *O. impressus*, also described from Palau, by the relative lengths of the P2 and P5, with P2 subequal in length to P5 in the former, and P2 distinctly longer than P5 in the latter. Comparison of the intact female types of *O. glaber*, however, indicates that Bürger's (1895) diagnostic characters are inadequate. The walking legs in *O. glaber* are asymmetrical from left to right. In the lectotype, the ratio of P2 length to P5 length on the left and

right sides is 1.1 and 1.3 respectively. Similarly, the relative lengths of P2 and P5 varied from side to side in the four other female paralectotypes for which the requisite limbs are intact on both sides (Table 1). Thus, the specimens could be identified either as *O. glaber* or *O. impressus* depending on the side for which P2 and P5 are compared. Evidently, Bürger (1895) described *O. glaber* and *O. impressus* without considering the pereopodal asymmetry. Thus, *O. impressus* herein synonymised with *O. glaber*. As both names were published in the same paper, we here choose *Pinnotheres*

glaber Bürger, 1895, as having priority over *Pinnotheres impressus* Bürger, 1895, when the two names are considered to be synonymous.

Remains of both original syntypes of *O. impressus* are extant, but in extremely poor condition: all limbs are broken and incomplete, left and right MXP3 are missing, and carapace remains are soft and disintegrating. It seems pointless to select a lectotype from this series.

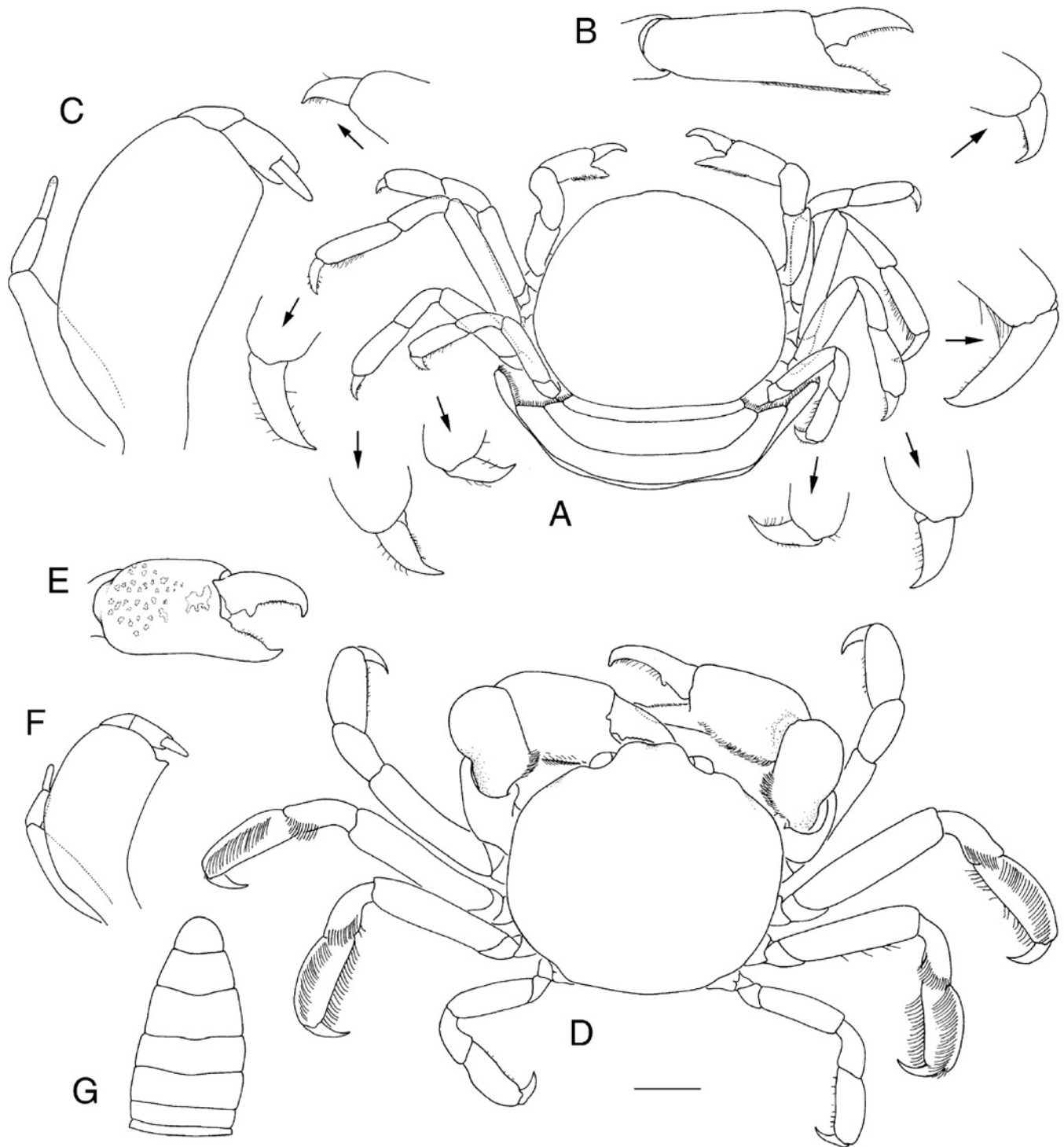


Fig. 24. *Orthoheres glaber* (Bürger, 1895), new combination, Palau: A–C, USNM 32431, female lectotype (7.8 × 6.5 mm); D–G, ZMG 173, male paralectotype (4.0 × 3.6 mm); A, D, dorsal habitus; B, E, right cheliped; C, F, right MXP3; G, abdomen. Scale bars: A = 2.0 mm; B, D, E, G = 1.0 mm; C = 0.4 mm; F = 0.2 mm.

Table 1. Relative lengths of P2 and P5 for left and right sides of female *Orthotheres glaber*.

Specimen	P2: P5 length (left)	P2: P5 length (right)
Paralectotype, female 3.5 × 3.5 mm	1.3	1.7
Paralectotype, female 5.2 × 4.5 mm	1.4	1.2
Paralectotype, female 7.5 × 6.3 mm	1.2	1.4
Lectotype, female 7.8 × 6.5 mm	1.1	1.3

***Orthotheres laevis* (Bürger, 1895)**
(Fig. 3E)

Pinnotheres laevis Bürger, 1895: 380, Pl. 9: Fig. 25, Pl. 10: Fig. 24
[type locality: Palau, from *Coralliophaga* sp.].

Type material. – Lost.

Diagnosis. – Carapace subhexagonal. MXP3 with dactylus inserting subdistally, outreaching propodal apex; propodus slightly longer than high; ischiomerus inner margin sinuous, length almost 3 times width. Walking legs with propodi subcylindrical, not inflated; P3 dactylus longer than P2, P4 and P5 dactyli. [after Bürger, 1895: 380, Pl. 9: Fig. 25, Pl. 10: Fig. 24]

Remarks. – The type account and figures indicate that the dactylus of the MXP3 in *P. laevis* inserts subdistally on the propodus, and is thus placed in *Orthotheres*. The holotype of *O. laevis* is no longer extant.

***Orthotheres longipes* (Bürger, 1895) new combination**
(Fig. 3F)

Pinnotheres longipes Bürger, 1895: 379–380, Pl. 9: Fig. 31, Pl. 10: Fig. 22 [type locality: Aibukit, Palau].

Type material. – Lost.

Diagnosis. – Female: Carapace subhexagonal. MXP3 with dactylus inserting subdistally, outreaching propodal apex; propodus length about twice height; ischiomerus with obtuse inner distal angle, length about twice width. Walking legs with propodi subcylindrical, not inflated; P3 dactylus longer than P2, P4 and P5 dactyli. Male: not known. [after Bürger, 1895: 379–380, Pl. 9: Fig. 31, Pl. 10: Fig. 22]

Remarks. – The dactylus of the MXP3 in *P. longipes* inserts subdistally on the propodus; the species is thus transferred to *Orthotheres*. The female holotype of *O. longipes* is no longer extant.

***Viridotherees gracilis* (Bürger, 1895) new combination**
(Fig. 25)

Pinnotheres gracilis Bürger, 1895: 368–369, Pl. 9: Fig. 6, Pl. 10: Fig. 6 [type locality: Ubay, the Philippines, by present lectotype designation, from *Solen*].

Type material. – Lectotype: SMF-ZMG946a (Go542a), female (6.3 × 5.7 mm), Ubay, from *Solen*, C. Semper, 1862–1863.

Paralectotypes: SMF-ZMG946b (Go542a), 2 females (5.6 × 4.7–6.3 × 5.7 mm), type locality.

Description. – Female: Carapace subcircular, slightly wider than long, front faintly projecting, slightly concave. Eyes small, partially visible in dorsal view. MXP3 propodus about 3 times as long as high, margins subparallel, apex blunt; dactylus not reaching propodal apex; ischiomerus about twice as long as wide, outer margin convex, inner margin with proximal 3/4 slightly concave, distinctly angular at distal quarter; exopod inner and outer margin convex, flagellum two-segmented. Cheliped with dactylus slightly longer than half palm length; palm slightly shorter than twice as long as high, mesioventral margin setose; dactylus occlusal margin finely dentate, with large proximal tooth; pollex with occlusal margin irregularly crenulate, sparsely setose; mesial margin of carpus setose. Walking legs dorsally and ventrally unarmed; all segments with dorsal and ventral setae; relative lengths P3 > P2 > P4 > P5. P2–P5 dactyli weakly falcate; relative lengths P3 > P2 > P4 > P5. P2 dactylus 0.4–0.5 propodus length. P3 dactylus 0.4 propodus length. P4 dactylus about 0.4 propodus length. P5 dactylus about 0.5 propodus length. Abdomen extending to buccal region, covering bases of walking legs. Males: not known.

Remarks. – *Pinnotheres gracilis* is herein transferred to *Viridotherees*: it conforms well to Manning's (1996) diagnosis of the genus, notably in the subcircular carapace, in P3 having the longest dactylus, and being the longest of the walking legs, and in having the dactylus of the MXP3 inserting near the midlength on the ventral propodus margin. All three original syntypes of *V. gracilis* are extant. The largest syntype of *V. gracilis* is herein designated as the lectotype of the species.

***Viridotherees otto*, new species**
(Fig. 26)

Type material. – Holotype: ZMG 953a, ovigerous female (4.8 × 3.7 mm), Philippines, C. Semper 1859–1864. Paratype: ZMG 953b, 1 immature female (2.8 × 2.3 mm), type locality.

Diagnosis. – Carapace front projecting slightly, transverse. MXP3 propodus tapering distally to blunt apex. Cheliped pollex with proximal tooth. Walking leg dactyli elongate, apices falcate; relative lengths P3 > P2 > P4 > P5. P2 dactylus about 0.5 times propodus length. P3 dactylus 0.5–0.6 times propodus length. P4 dactylus about 0.6 times propodus length.

Description. – Female: Carapace subcircular, slightly wider than long, front projecting slightly, transverse. Eyes small,

visible in dorsal view. MXP3 with propodus about twice as long as high, tapering distally to blunt apex; dactylus not reaching beyond propodal apex; ischiomerus outer margin convex, inner margin with proximal 3/4 slightly concave; inner distal angle blunt, obtuse; exopod inner margin straight, outer margin convex, flagellum two-segmented. Cheliped with dactylus about 2/3 palm length; palm less than twice as long as high, mesioventral margin setose; dactylus occlusal margin sparsely setose, with large proximal tooth; pollex with proximal tooth, margin sparsely setose; carpus and merus glabrous. Walking legs dorsally and ventrally unarmed; glabrous; relative lengths $P3 > P2 = P4 > P5$. P2–P5 dactyli elongate, apices falcate; relative lengths $P3 > P2 > P4 > P5$. P2 dactylus about 0.5 propodus length. P3 dactylus 0.5–0.6 propodus length. P4 dactylus about 0.6 propodus length. P5 dactylus about 0.6 propodus length. Abdomen seven-segmented, extending to buccal region, covering bases of walking legs. Male: not known.

Etymology. – Named in honour of Otto Bürger, in recognition of his major contributions to the study of the Pinnotheridae. The name is used as a noun in apposition.

Remarks. – Although part of the Semper collection, these specimens were not reported on by Bürger (1895). The assignment of our new species to *Viridothere* is tentative.

Viridothere was originally characterised by having P3 longer than other walking legs, with the P3 dactylus distinctly longer than those of other walking legs (Manning, 1993b). In *V. otto*, new species, the dactylus of P3 is only slightly longer than that of P2. Although the new species perhaps belongs in a separate genus, it is here referred to *Viridothere*. The adult female holotype differs from the juvenile female paratype in carapace shape, being subcircular with a straight frontal margin instead of being subtrapezoid with a concave frontal margin. In other respects, the two specimens of *V. otto* agree well. The new species most closely resembles *Pinnothere burgeri* Rathbun, 1909, and *V. gracilis* Bürger, 1895, in the P3 being longer than the remaining pereopods, and in the dactyli of P2–3 being longer than those of P4–5, with the P3 dactylus longer than the P2 dactylus. On the basis of the relative length of P3 and its dactylus in comparison to the remaining walking legs, *Pinnothere burgeri* also belongs in *Viridothere*.

Viridothere otto is distinguished from *V. gracilis* in having glabrous instead of setose walking legs, in the tapering rather than rounded propodal apex on MXP3, in the more strongly curved dactylar apices of P2–4 dactyli, and in the longer P3–4 dactyli (0.5–0.6 versus 0.4 propodus length). *Viridothere otto* differs from *V. burgeri* in the shorter dactyli on the walking legs with the P2–5 dactyli about dactyli not exceeding

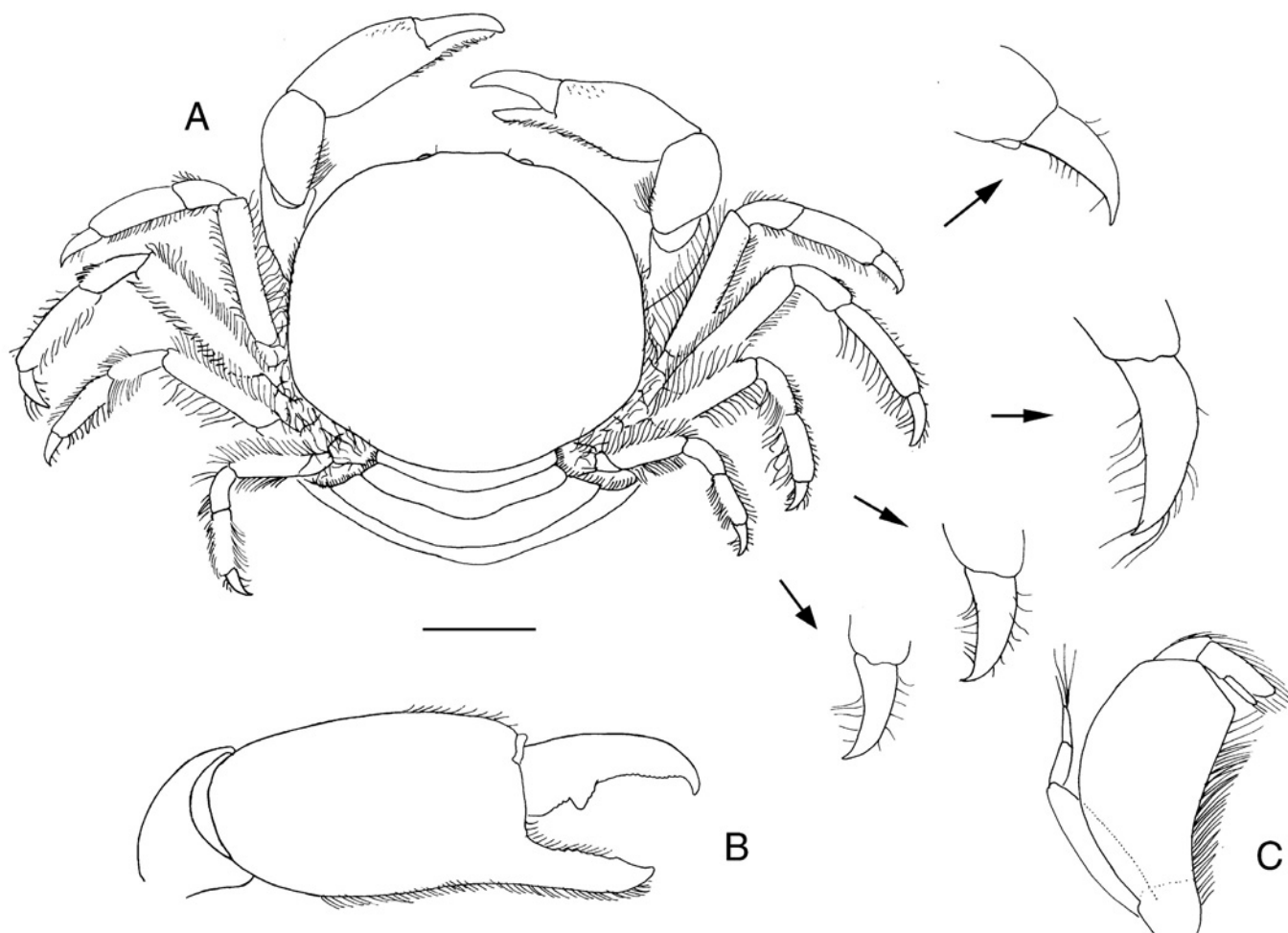


Fig. 25. *Viridothere gracilis* (Bürger, 1895), new combination, SMF-ZMG946a, female lectotype (6.3 × 5.7 mm), Ubay, the Philippines: A, dorsal habitus; B, right cheliped; C, right MXP3. Scale bars: A = 2.0 mm; B = 1.0 mm; C = 0.7 mm.

0.6 their respective propodal lengths instead of about 3/4 propodal length; in the shorter MXP3 dactylus, which falls short of instead of reaching the propodal apex; and in the narrower, more tapering MXP3 propodus. In addition, the dactylus of P3 in *V. otto* is only slightly longer than, instead of distinctly longer than the P2 dactylus as in *V. burgeri*. Unfortunately, the holotype of *V. burgeri* is a juvenile, so the adult carapace shape is not known. The carapace shape of the holotype of *V. burgeri*, however, is similar to that of the juvenile paratype of *V. otto*, so both species possibly share a similar adult carapace form.

***Xanthasia murigera* White, 1846**

Xanthasia murigera White, 1846: 177, Pl. 2, Fig. 3a [type locality: Philippines]; Bürger, 1895: 386–387; Ahyong & Ng, 2005: 126–127, Fig. 7.

Material. – ZMG167, 2 males (cw. 10.4–6.0 m, cl. 9.4–5.3 mm), 1 female (cw. 13.6 mm, cl. 11.9 mm), Bohol, coll. Semper.

Remarks. – The three specimens reported by Bürger (1895) were reported by Ahyong & Ng (2005).

***Xanthoidea* sp.**

Material. – ZMG 954, 13 juvenile males, the Philippines, C. Semper 1859–1864.

Remarks. – The specimens, collected by Semper from the Philippines, and apparently unpublished, are very juvenile xanthoids.

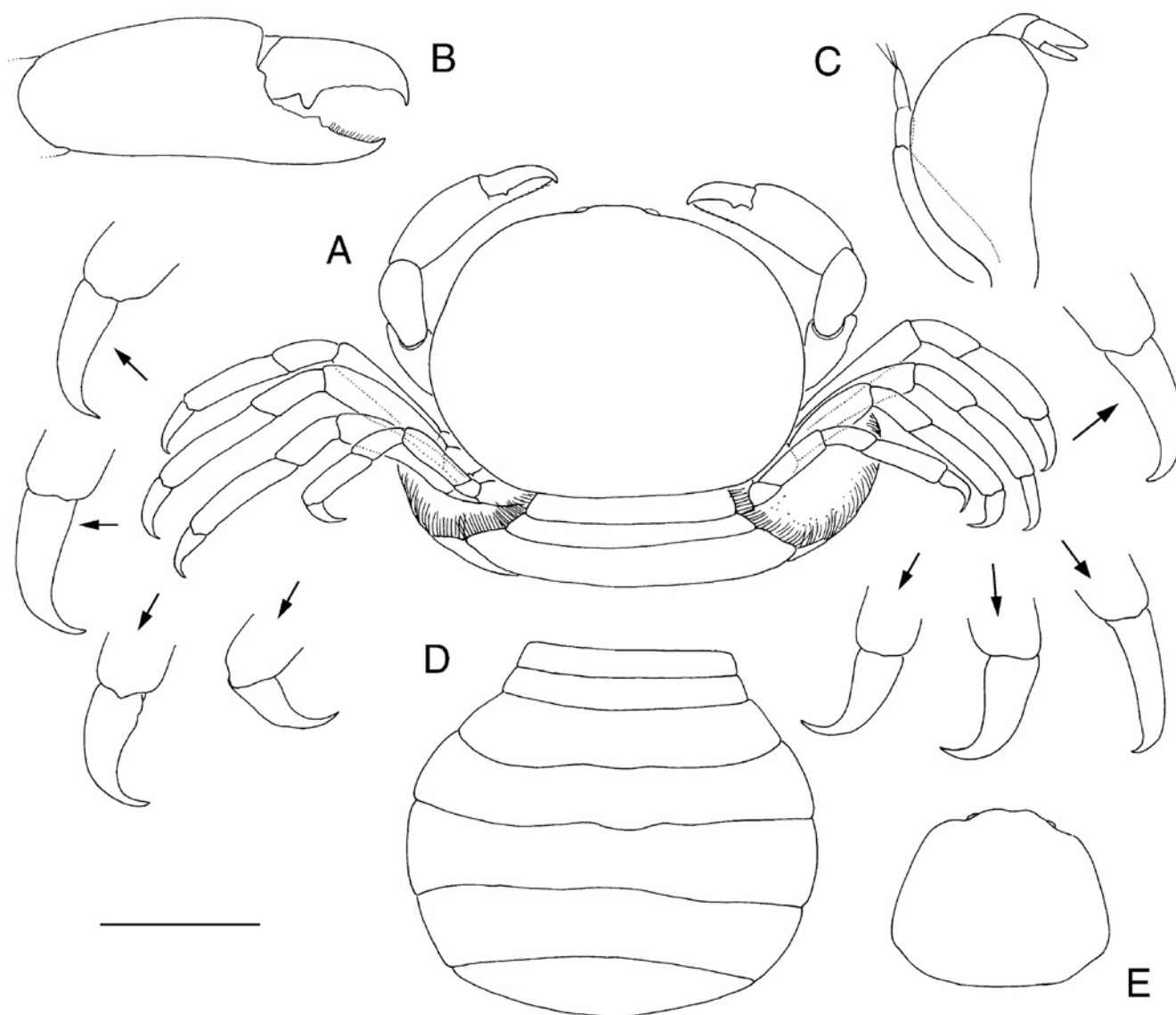


Fig. 26. *Viridotherees otto*, new species, the Philippines: A–D, SMF-ZMG 953a, female holotype (4.8 × 3.7 mm); E, ZMG 953b, immature female paratype (2.8 × 2.3 mm), carapace; A, dorsal habitus; B, right cheliped; C, right MXP3; D, abdomen; E, carapace. Scale bars: A, D, E = 2.0 mm; B = 1.0 mm; C = 0.8 mm.

Table 2. Species reported by Bürger (1895) and unpublished specimens from the 'Bürger collection'. Species listed in order of appearance in Bürger (1895). F = female; M = male

Original name*	Material originally listed	Current status	Current name
<i>Pinnotheres pectinicola</i> Bürger, 1895	1 F, Ubay	Lost	<i>Nepinnotheres pectinicola</i> (Bürger, 1895)
<i>Pinnotheres affinis</i> Bürger, 1895	1 M, 2 F, Ubay 1 M, 1 F, the Philippines 4 F, 7 M, Bohol	1M, 1F extant Extant, F lectotype designated Extant	<i>Nepinnotheres affinis</i> (Bürger, 1895)
<i>Pinnotheres glaberrimus</i> Bürger, 1895	1 M, Zamboanga 1 M, Palau 1 M, Ubay	Extant, lectotype designated Extant Lost	<i>Nepinnotheres glaberrimus</i> (Bürger, 1895)
<i>Pinnotheres cardii</i> Bürger, 1895	1 M, 1 F Burias	Both extant; F lectotype designated	<i>Nepinnotheres cardii</i> (Bürger, 1895)
<i>Pinnotheres gracilis</i> Bürger, 1895	3 F, Ubay	All extant; lectotype designated	<i>Viridoheres gracilis</i> (Bürger, 1895)
<i>Pinnotheres coarctatus</i> Bürger, 1895	1 F, Zamboanga	Lost	<i>Arcotheres coarctatus</i> (Bürger, 1895)
<i>Pinnotheres barbatus</i> Bürger, 1895	1 F, Aibukit	Lost	<i>Nepinnotheres rathbuni</i> Schmitt, McCain & Davidson, 1973
<i>Pinnotheres modiolicola</i> Bürger, 1895	1 F, the Philippines	Extant	<i>Arcotheres modiolicola</i> (Bürger, 1895)
<i>Pinnotheres arcophilus</i> Bürger, 1895	2 F, 1M, Ubay	All extant; F lectotype selected	<i>Arcotheres arcophilus</i> (Bürger, 1895)
<i>Pinnotheres tenuipes</i> Bürger, 1895	1 F, Ubay	Lost	<i>Buergeres tenuipes</i> (Bürger, 1895)
<i>Pinnotheres palaensis</i> Bürger, 1895	1 F, Palau 4 F, Palau 4 F, Ubay	F, designated as lectotype Extant Extant	<i>Arcotheres palaensis</i> (Bürger, 1895)
	2 M, 2F, Burias	Lost	<i>A. palaensis</i> (Bürger, 1895)
<i>Pinnotheres latissimus</i> Bürger, 1895	1 F, Manila	Lost	<i>A. guinotae</i> Campos, 2001
<i>Pinnotheres similis</i> Bürger, 1895	1 F, Ubay	Extant	<i>Arcotheres rhombifer</i> (Bürger, 1895)
<i>Pinnotheres rhombifer</i> Bürger, 1895	2 F, Ubay	Both extant; lectotype selected	<i>Arcotheres similis</i> (Bürger, 1895)
<i>Pinnotheres latus</i> Bürger, 1895	4 F, Burias 4 F, Palau	All extant; lectotype designated 2F extant	<i>Arcotheres rhombifer</i> (Bürger, 1895)
	1 F, Ubay, from <i>Perna</i>	Extant	<i>Arcotheres latus</i> (Bürger, 1895)
<i>Pinnotheres pernicola</i> Bürger, 1895	1 F, Ubay	Lost	<i>Arcotheres pernicola</i> (Bürger, 1895)
<i>Pinnotheres exiguus</i> Bürger, 1895	4 F, Samar Island	1 F extant; lectotype designated	<i>Arcotheres exiguus</i> (Bürger, 1895)
<i>Pinnotheres consors</i> Bürger, 1895	1 F, Palau	Lost; neotype designated	<i>Arcotheres rotundatus</i> (Bürger, 1895)
<i>Pinnotheres rotundatus</i> Bürger, 1895	1 F, Burias	Extant	<i>Arcotheres rotundatus</i> (Bürger, 1895)
<i>Pinnotheres nudifrons</i> Bürger, 1895	2 F, Laping	1 F extant; lectotype designated	<i>Arcotheres nudifrons</i> (Bürger, 1895)
<i>Pinnotheres glaber</i> Bürger, 1895	5 F, 6 M, Palau	All extant; F lectotype designated	<i>Orthoheres glaber</i> (Bürger, 1895)
<i>Pinnotheres longipes</i> Bürger, 1895	1 F, Aibukit	Lost	<i>Orthoheres longipes</i> (Bürger, 1895)

Table 2. Cont'd

<i>Pinnotheres impressus</i> Bürger, 1895	2 F, Aibukit	Extant	<i>Orthoheres glaber</i> (Bürger, 1895)
<i>Pinnotheres laevis</i> Bürger, 1895	1 F, Palao	Lost	<i>Orthoheres laevis</i> (Bürger, 1895)
<i>Holothuriophilus trapeziiformis</i> Nauck, 1880	1 F, no data 1 F, Mazatlan	Lost Lectotype female designated by Ng & Manning (2003)	<i>Holothuriophilus trapeziiformis</i> Nauck, 1880
<i>Pinnotheres holothuriae</i> Semper, 1880	8 F, 3 M, Zamboanga	2 F extant; lectotype designated by Ng & Manning (2003)	<i>Buergeres holothuriae</i> (Semper, 1880)
<i>Pinnotheres semperi</i> Bürger, 1895	1 M, 1 F, Java	Lost. M neotype designated by Ng & Manning (2003)	<i>Holotheres semperi</i> (Bürger, 1895)
<i>Pinnotheres flavus</i> Nauck, 1880	6 M, 6 F, Zamboanga 3 M, 2 F, Ubay	2 F extant All extant; M lectotype designated by Ng & Manning (2003)	<i>Holotheres flavus</i> (Nauck, 1880)
<i>Pinnotheres ortmanni</i> Bürger, 1895	1 F, Abukit	Lost. F neotype designated by Ng & Manning (2003)	<i>Buergeres ortmanni</i> (Bürger, 1895)
<i>Durckheimia caeca</i> Bürger, 1895	1 F, Palau	Extant	<i>Durckheimia caeca</i> Bürger, 1895
<i>Xenophthalmus latifrons</i> Bürger, 1895	1 F, Mariveles or Bohol 1 F, Mariveles or Bohol	F lectotype designated. Holotype of <i>A. rayi</i> new species	<i>Arcoheres latifrons</i> (Bürger, 1895) <i>Arcoheres rayi</i> new species
<i>Pinnotheres villosulus</i> Guérin-Méneville, 1831 (as <i>P. villosus</i>)	2 F, Zamboanga 3 F, Ubay 1 F, Ubay, from Pinna 1 F, Ubay 1 F, Ubay, from Meleagrina 1 F, Burias	Lost Lost Lost Lost Lost Extant	<i>Nepinnotheres villosulus</i> (Guérin-Méneville, 1831) <i>Arcoheres alcocki</i> (Rathbun, 1909)
<i>Xanthasia murigera</i> White, 1847	2 F, Burias, from Mytilus 2 M, 1 F, Bohol	Lost All extant	<i>Xanthasia murigera</i> White, 1847
<i>Pinnotheres</i> sp.	Not listed, Philippines	2F, types of <i>V. otto</i> new species	<i>Viridoheres otto</i> new species
<i>Pinnotheres</i> sp.	Not listed, Philippines	10 F	<i>Arcoheres</i> sp.
<i>Pinnotheres</i> sp.	Not listed, Philippines	13 M	<i>Xanthoidea</i> sp.

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