BRILL

JOURNAL OF CRUSTACEAN BIOLOGY, 36(4), 538-552, 2016

Journal of Crustacean Biology

THE SPECIES OF *MATHILDELLA* GUINOT AND RICHER DE FORGES, 1981 AND *NEOPILUMNOPLAX* SERÈNE IN GUINOT, 1969 (DECAPODA: BRACHYURA: MATHILDELLIDAE)

Shane T. Ahyong [1,2,*] and Peter K. L. Ng [3]

[1] Australian Museum, 1 William St., Sydney, NSW 2010, Australia
[2] School of Biological, Earth and Environmental Sciences, University of New South Wales, Kensington, NSW 2052, Australia
[3] Lee Kong Chian Natural History Museum, Conservatory Drive, National University of Singapore, Singapore 119260, Republic of Singapore

ABSTRACT

The mathildellid crab genus *Neopilumnoplax* Serène in Guinot, 1969 was originally proposed for several deep-sea species previously placed in *Pilumnoplax* Stimpson, 1858, including *P. sinclairi* Alcock and Anderson, 1899 from the Bay of Bengal. Further revision led to creation of *Mathildella* Guinot and Richer de Forges, 1981, which differed chiefly from *Neopilumnoplax* in having one instead of two pairs of endostomial ridges, and in the width of the anterior abdominal somites. Most species of both genera are relatively well known, but *N. sinclairi*, until now, was known with certainty only from the type description and figure of the female holotype housed in the collections of the Zoological Survey of India. Examination of the holotype of *Pilumnoplax sinclairi*, facilitated by the late Michael Türkay, revealed *P. sinclairi* to belong to *Mathildella* instead of *Neopilumnoplax*. Moreover, comparison of *M. sinclairi* with *M. kyushupalauensis* Takeda and Watabe, 2004 from Komahashi Seamount off Japan revealed that the two nominal species may well be synonyms. We defer synonymising the two species, however, until male *M. sinclairi* can be studied. We also clarify selected historical records of "*Pilumnoplax*" species from Indonesia and mainland Japan, from which we confirm the occurrence of *Mathildella serrata* (Sakai, 1974) and *M. kyushupalauensis*, respectively. In addition, we recognise an additional character separating *Neopilumnoplax* from *Mathildella* in the respective presence or absence of epibranchial ridges on the carapace. *Neopilumnoplax michalis* sp. nov. from the Southwest Indian Ocean Ridge is described and compared with its nearest congener, *N. heterochir* (Studer, 1883) from off southern Africa. The identity of *Pseudorhombilia* (*Pilumnoplax*) *normani* Miers in Tizzard, Moseley, Buchanan and Murray, 1885 from Nightingale Island (Tristan da Cunha) and Agulhas Bank, off South Africa, is fixed by lectotype designation as a junior synonym of *N. heterochir*.

KEY WORDS: crabs, deep sea, new species Goneplacoidea, taxonomy

DOI: 10.1163/1937240X-00002446

INTRODUCTION

Serène in Guinot (1969) proposed *Neopilumnoplax* for several deepwater goneplacid crabs previously placed in *Pilumnoplax* Stimpson, 1858: *P. heterochir* Studer, 1883, *P. americana* Rathbun, 1898, and provisionally *P. sinclairi* Alcock and Anderson, 1899, to which was later added *Neopilumnoplax major* Sakai, 1978. In a partial revision of several goneplacoid genera, Guinot and Richer de Forges (1981a, b) transferred *Neopilumnoplax major* to a new genus, *Beuroisia*, and recognised a new genus, *Mathildella*, closely related to *Neopilumnoplax*, for a new species, *M. maxima* from New Caledonia and *Neopilumnoplax serrata* Sakai, 1974 from Japan. Since then, three species have been added to *Mathildella*: *M. rubra* Ng and Ho, 2003, *M. kyushupalauensis* Takeda and Watabe, 2004, and *M. mclayi* Ahyong, 2008; and four to *Neopilumnoplax*: *N. gervaini* Tavares and Guinot, 1996, *N. nieli* Ahyong, 2008, *N. lipkeholthuisi* Tavares and Melo, 2010, and *N. corallicola* Matos-Pita and Ramil, 2016. The strong similarities between *Neopilumnoplax* and *Mathildella* have been recognised, with the only consistent differences being the number of endostomial ridges (one in *Mathildella*, which reaches the anterior margin of the buccal frame; two in *Neopilumnoplax*, neither of which reach the anterior margin of the buccal frame) and the less expanded lateral margins of the male third abdominal somite in *Neopilumnoplax* (cf. Guinot, 1969; Tavares and Guinot, 1996; Ahyong, 2008). Species of *Mathildella* also always have a smooth dorsal carapace surface lacking ridges, whereas those of *Neopilumnoplax* have epibranchial and other ridges (except in *N. americana*, at least as reported for the holotype; Rathbun, 1898).

Most species of *Mathildella* and *Neopilumnoplax* are relatively well known, with their respective generic positions confirmed by the number of lateral endostomial ridges. The single exception is *Neopilumnoplax sinclairi* (Alcock and Anderson, 1899), known only from the female holotype collected by the RIMSS *Investigator* from the Bay of Bengal and a female from South Africa reported by Tavares and Melo (2010). According to Alcock's figures, *N. sinclairi*

* Corresponding author; e-mail: shane.ahyong@austmus.gov.au

DOI:10.1163/1937240X-00002446

has a smooth carapace surface without epibranchial ridges, as in *Mathildella*. Information about Alcock's holotype was until now limited to the type description and figure (Alcock, 1899: 75, pl. 3, fig. 1), and it has been retained in *Neopilumnoplax* in subsequent taxonomic treatments (e.g., Ng et al., 2008). Through the kind offices of the late Michael Türkay (Senckenberg Naturmuseum, Frankfurt, Germany), we were able to examine the holotype of *Pilumnoplax sinclairi*, on loan to him from the Zoological Survey of India, and determine its generic position. We herein present a redescription of Alcock's species and confirm it as a species of *Mathildella*, and report additional records of *Mathildella* from Indo-West Pacific and Atlantic localities. We also describe a new species of *Neopilumnoplax* recently collected from the southwestern Indian Ocean and provide a detailed comparison of this new species with *N. heterochir*.

Material and Methods

Measurements of specimens are in millimetres (mm). Carapace width (cw) is the maximum width including spines, carapace length (cl) is measured dorsally from the tip of the front to the posterior margin of the carapace. Pereopods 1-5 are abbreviated P1-5, respectively. Pereopod 4 length is measured from the basis to the tip of the dactylus. The terminology for the thoracic sternites follows Guinot and Quenette (2005). Specimens examined are deposited in the Australian Museum, Sydney (AM); Zoological Reference Collection of the Lee Kong Chian Natural History Museum, National University of Singapore (ZRC); Museo Milano, Milan (MM); National Science Museum, Tokyo (NSMT); South African Museum, Cape Town (SAM); National Museum of Natural History, Smithsonian Institution, Washington DC (USNM); Zoologische Museum, Berlin (ZMB); and Zoological Survey of India, Calcutta (ZSI).

Systematics

Family Mathildellidae Karasawa and Kato, 2003

Mathildella Guinot and Richer de Forges, 1981

Mathildella sinclairi (Alcock and Anderson, 1899) comb. nov.

Figs. 1, 2

Pilumnoplax Sinclairi Alcock and Anderson, 1899: 5, 11 (type locality: off Travancore coast, Bay of Bengal, India, 430 fathoms (787 m)). – Alcock, 1899: 74, pl. 3, fig. 1.

Neopilumnoplax sainclairi (sic) – Guinot and Richer de Forges, 1981b: 227.

Pilumnoplax sinclairi – Manning and Holthuis, 1981: 161. – Tavares and Guinot, 1996: 228.

Neopilumnoplax sinclairi – Sakai, 1976: 533. – Ng et al., 2008: 83. – Ahyong, 2008: 53. – Matos-Pita and Ramil, 2016: 257, 259, tab. 1. – Tavares and Melo, 2010: 686, 689.

Type Material.—ZSI 2363/10, female holotype (cl 13.3 mm, cw 16.5 mm), off Travancore coast, Bay of Bengal, India, 430 fathoms (787 m).

Comparative Specimens of *Mathildella kyushupalauensis* Takeda and Watabe, 2004.—NSMT Cr 6420, holotype male (cl 23.7 mm, cw 30.5 mm), Komahashi Seamount, Kyushu-Palau Submarine Ridge, Japan, 520 m, O. Tabeta coll.; MM no. 1657, 1 female (cl 17.3 mm, cw 22.3 mm), Sagami Bay, Japan, A. Owston coll., 1914.

Diagnosis.—Carapace (Fig. 1A) dorsal surface flat, microscopically rugose, appearing smooth; regions ill-defined, mesogastric region slightly swollen. Front subtruncate in dorsal view. First, second anterolateral teeth fused basally, demarcated by shallow concavity, forming broad lobe (Fig. 1A, C). Third anterolateral tooth larger than fourth tooth, both produced as anteriorly directed spines. Fourth tooth separated from adjacent tubercle by shallow notch. P4 ischiomerus (Fig. 2A) slightly longer than cl (1.05 cl); articles unarmed; margins, surfaces smooth. P5 dactylus slightly longer than propodus dorsal margin; 3/4 as long as P4 dactylus.

Description of Holotype.—Carapace subhexagonal (Fig. 1A), 1.24 times wider than long; dorsal surface flat, microscopically rugose, appearing smooth, without ridges; regions ill-defined, mesogastric region slightly swollen.

Front subtruncate (Fig. 1A) in dorsal view, bi-marginate, formed by distinct transverse anterior groove; margins gently convex, faintly granular, divided medially by distinct cleft. Supraorbital margin low, separated from front by shallow concavity; margin with fissure or V-shaped notch laterad to midlength (Fig. 1A). First and second anterolateral teeth fused basally, demarcated by very shallow concavity, forming broad lobe (Fig. 1A, C). First (outer orbital) anterolateral tooth anteriorly produced, blunt. Second anterolateral tooth blunt, apex rounded. Third anterolateral tooth larger than fourth tooth, both produced as anteriorly directed spines. Fourth tooth separated from adjacent tubercle by shallow notch. Suborbital margin granular; with blunt inner tooth, visible dorsally. Eyestalks with row of granules on inner distal margin (Fig. 1B, C). Suborbital, pterygostomial, sub-branchial regions finely granular. Posterolateral carapace margins almost straight; posterior margin sinuous.

Thoracic sternum (Fig. 1D, E) microscopically granular, finely punctate. Sternites 2, 3 well demarcated. Sternites 3, 4 fused, sutures visible laterally. Anterior end of sternoabdominal cavity reaching sternite 4. Sutures 4/5, 5/6 medially interrupted. Suture 6/7, 7/8 complete. Sternites 7, 8 with median groove. Vulva (Fig. 1E) on sternite 5; orifice simple, without cover.

Female abdomen broad (Fig. 1D); 6 free somites plus telson; lateral margins convex; surface sparsely pitted. Somite 1 broad, slender, shortest medially, lateral margins not reaching base of P5 coxae. Somite 2 subrectangular, slightly narrower than somite 1; lateral margins obtusely rounded. Somite 3 transversely similar to somite 2 but lateral margins bluntly angular. Somites 1-3 not entirely covering space between P5 coxae, sternite 8 not visible when abdomen closed. Somites 4-6 progressively narrower, longer. Telson broader than long, rounded.

Maxilliped 3 (Fig. 1C) minutely, sparsely granular; merus subpentagonal, anteroexternal angle rounded; ischium subrectangular, with submedian sulcus; exopod stout, with small distal tooth, reaching to distal edge of merus. Lateral surface of endostome with single longitudinal carina on each side.

Chelipeds (P1) unequal (Fig. 2B, C). Merus short, trigonal; dorsal margin with convex ridge bearing small tubercle; inner distal margin with flat, rounded lobe at articulation with carpus; distoventral margin with blunt tooth or tubercle; surfaces otherwise smooth. Carpus with 2 stout, subequal spines on inner distal margin (Figs. 1A, 2A); surface microscopically rugose; with shallow transverse subdistal sulcus between articular condyles. Major palm (Fig. 2B) stout, unarmed, surfaces microscopically rugose but appear-

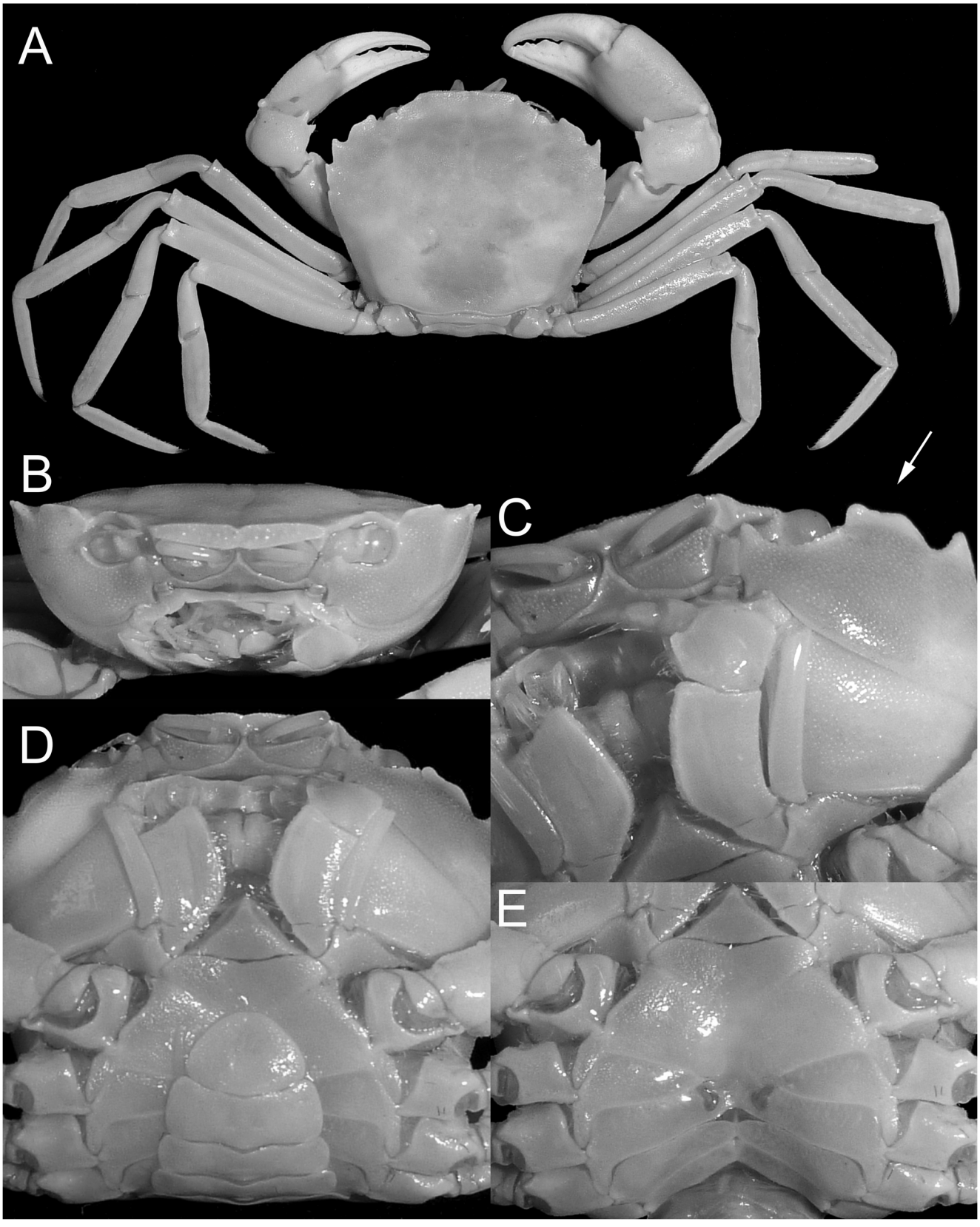

Fig. 1. *Mathildella sinclairi* (Alcock and Anderson, 1899), holotype female (cl 13.3 mm, cw 16.5 mm), Bay of Bengal, India (ZSI 2363/10). A, dorsal habitus; B, cephalothorax, anterior view; C, buccal area, left oblique anteroventral view, fused first and second anterolateral teeth indicated by arrow; D, ventral surface; E, thoracic sternum.

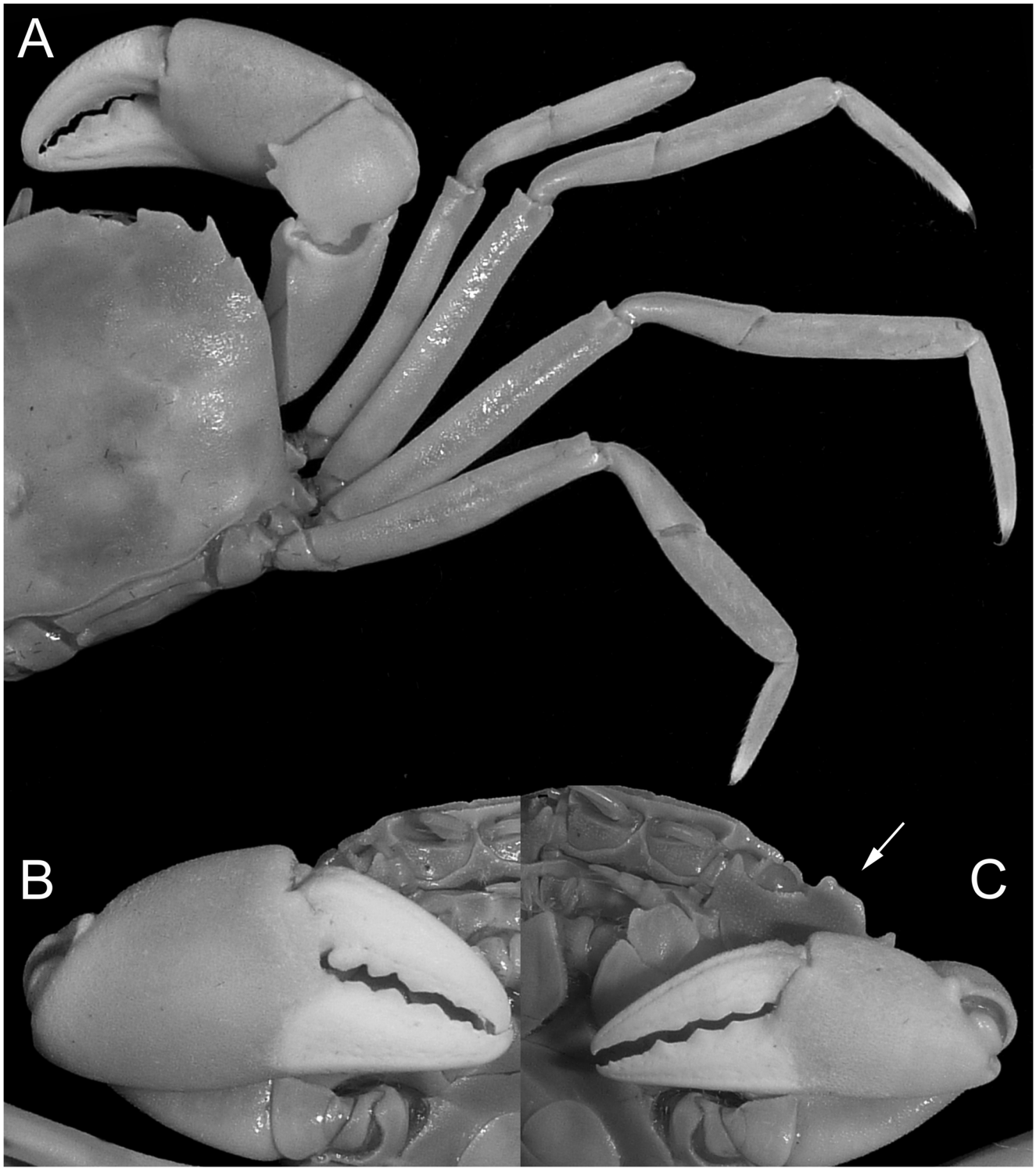

Fig. 2. *Mathildella sinclairi* (Alcock and Anderson, 1899), holotype female (cl 13.3 mm, cw 16.5 mm), Bay of Bengal, India (ZSI 2363/10). A, right side and pereopods; B, anterior cephalothorax and right cheliped; C, anterior cephalothorax and left cheliped, fused first and second anterolateral teeth indicated by arrow.

ing smooth; dorsal margin slightly shorter than fingers; fingers without gape; occlusal margins bluntly dentate, apices simple, crossing. Minor palm (Fig. 2C) microscopically rugose but appearing smooth; fingers about 1.5 times as long as dorsal margin of palm; occlusal margins bluntly dentate, apices simple, crossing; dactylus with low dorsal ridge; pollex with very shallow submarginal groove.

Ambulatory legs (P2-5) relatively long, slender, relative lengths P4 > P3 > P2 > P5; P4 longest (2.6 cl) (Fig. 2A); P4 ischiomerus slightly longer than cl (1.05 cl); segments,

sparsely setose, margins, surfaces smooth, unarmed. Dactyli sparsely setose, elongated, flattened, almost straight; relative lengths P4 > P3 > P2 > P5; P5 dactylus slightly longer than propodus dorsal margin; 3/4 as long as P4 dactylus ventral margins with corneous robust setae, dorsal margin with few small corneous setae, apex corneous; elongate, flattened, almost straight.

Remarks.—*Pilumnoplax sinclairi* has remained poorly known owing to the brief original description (Alcock and Anderson, 1899) and inaccessibility of the holotype in the Zoological Survey of India. As such, the taxonomy of the species has had a mixed history. Soon after its description, Alcock (1899) synonymised his *P. sinclairi* with *P. americana* Rathbun, 1898, described from the tropical western Atlantic. Serène in Guinot (1969) resurrected *P. sinclairi* and provisionally placed it in *Neopilumnoplax* along with a group of other species formerly placed in *Pilumnoplax*. In a revision of deep-water goneplacids, Guinot and Richer de Forges (1981a, b), separated out *Neopilumnoplax* sensu stricto and transferred several species into two new genera, *Mathildella* and *Beuroisia*. Being known only from its type description, *N. sinclairi* was retained in *Neopilumnoplax* where it has remained until now.

The possession of a single endostomial ridge clearly places *Pilumnoplax sinclairi* in *Mathildella*. Moreover, confirmation of *Pilumnoplax sinclairi* as a species of *Mathildella*, rather than *Neopilumnoplax*, identifies the absence of epibranchial ridges on the carapace as a feature of the former genus. In contrast, the epibranchial ridge on the carapace is present in adults of all remaining species of *Neopilumnoplax*, except for *N. americana*, which was described based on juveniles. To date, the carapace ornamentation of adults of *N. americana* has not be reported. Unpublished observations (Marcos Tavares, pers. com.), however, confirm that the epibranchial ridge on the carapace is developed in adult *N. americana*, like all other species of the genus. Thus, the presence (*Neopilumnoplax*) or absence (*Mathildella*) of the epibranchial ridge of the carapace is an additional diagnostic character distinguishing the two genera.

Confirmation of the generic position of *M. sinclairi* warrants comparison with other species of *Mathildella*. *Mathildella sinclairi* can be distinguished from *M. maxima*, *M. mclayi* and *M. serrata*, by having the first and second anterolateral teeth of the carapace fused into a single broad lobe, separated by at most a shallow concavity (Fig. 1C). In *M. maxima*, *M. mclayi*, and *M. serrata* the first and second anterolateral teeth may be fused, but are nevertheless demarcated by a distinct notch or U-shaped sinus. Comparison of *M. sinclairi* with the holotype of *M. kyushupalauensis* from Komahashi Seamount (Fig. 3) and a specimen from Sagami Bay (Fig. 4), however, shows the two species to be very close. Unfortunately, males of *M. sinclairi* are not presently known so the male abdomen and gonopods cannot be compared. *Mathildella sinclairi* and *M. kyushupalauensis* could well prove conspecific, but considering their known distributions, we prefer to recognise both nominal species until further material of *M. sinclairi* becomes available. Should *M. sinclairi* and *M. kyushupalauensis* prove identical, the distribution of species would range from Japan to the eastern Indian Ocean, similar to that of *M. serrata*.

Distribution.—Presently known only from off the Travancore coast, Bay of Bengal, India; 787 m.

Mathildella serrata (Sakai, 1974)

Pilumnoplax americana – Doflein, 1904: 120, pl. 35, figs. 3, 4.

Neopilumnoplax heterochir – Serène and Lohavinjaya, 1973: 69, figs. 176, 177, pl. 16D.

Neopilumnoplax serratus Sakai, 1974: 93 (type locality: Oda Peninsula, Akita Prefecture, Japan); 1976: 533, pl. 188, fig. 4; 1978: 8, 31, figs. 14, 15.

Mathildella serrata – Guinot and Richer de Forges, 1981b: 232, figs. 7D, 8C, C1, D, pl. 3, figs. 3, 3a, b. – Ikeda, 1998: 140, pl. 60. – Ng and Chan, 2000: 150, figs. 1, 2. – Ng and Ho, 2003: 341, 342, figs. 4H-J, 5. – Takeda and Watabe, 2004: 187, fig. 4C. – Ng et al., 2008: 83. – Poore et al., 2008: 48 (part, excluding colour figure).

Not *Pilumnoplax americana* – Parisi, 1918: 91. – Sakai, 1939: 560 (= *Mathildella kyushupalauensis* Takeda and Watabe, 2004).

Material Examined.—ZMB 13677, 1 juvenile female (cl 11.8 mm, cw 15.2 mm), west coast of Sumatra, 12 nautical miles (22 km) south of Bangkam, north channel of Nias, Indonesia, 1°48.1′N, 97°06′E, 141 m, Tiefsee stn 202, 4 Feb 1899; ZRC 2009.1044, 1 male (cl 14.7 mm, cw 20.1 mm), 1 juvenile male (cl 5.5 mm, cw 6.8 mm), 1 female (cl 17.3 mm, cw 23.6 mm), Bohol Sea, PANGLAO 2005, stn CP2343; USNM 46182, 2 males (cl 8.3 mm, cw 10.5 mm; cl 11.7 mm, cw 15.1 mm), Mindanao, Philippines, 169 fm (309 m), *Albatross*, stn 5517, 9 Aug 1909; USNM 46183, 1 male juvenile (cl 5.2 mm, cw 6.6 mm), Mindanao, Philippines, 182 fm (335 m), Albatross, stn 5519, 9 Aug 1909.

Remarks.—The present juvenile female was reported by Doflein (1904) as *Pilumnoplax americana* and is here reidentified as *M. serrata*. We also refer Serène and Lohavinjaya's (1973) record of *N. heterochir* from the South China Sea (NAGA S4 stn 60-212, 15°40.0′N, 109°22.9′E) to *N. serrata*. The photograph in Serène and Lohavinjaya (1973: pl. 16D) clearly depicts the smooth carapace and anterolateral armature corresponding to that of *M. serrata*. Although *M. serrata* is normally considered a deepwater species, Sakai (1976) reported the species from depths apparently as shallow as 15-60 m.

Sakai (1939, 1976) assumed Parisi's (1918) record of *Pilumnoplax americana* from Sagami Bay, Japan to be referable to *M. serrata* (as *Neopilumnoplax*). As discussed above, however, Parisi's specimen is actually *M. kyushupalauensis*, and the first confirmed record of the species from mainland Japan. It is perhaps surprising that *M. kyushupalauensis* has not been recognised from Sagami Bay (and other mainland Japanese localities) until now; we suspect it may have been confused under *M. serrata*. Yokoya's (1933) records of "*P. americana*" from Muroto-zaki and Kii Tanabe, also referred to *M. serrata* by Sakai (1976), require confirmation.

Ng and Ho (2003) provided detailed figures of *M. serrata*.

Distribution.—Western Pacific to eastern Indian Ocean, from Japan and Taiwan to the Philippines, the South China Sea, southwestern Indonesia and northwestern Australia.

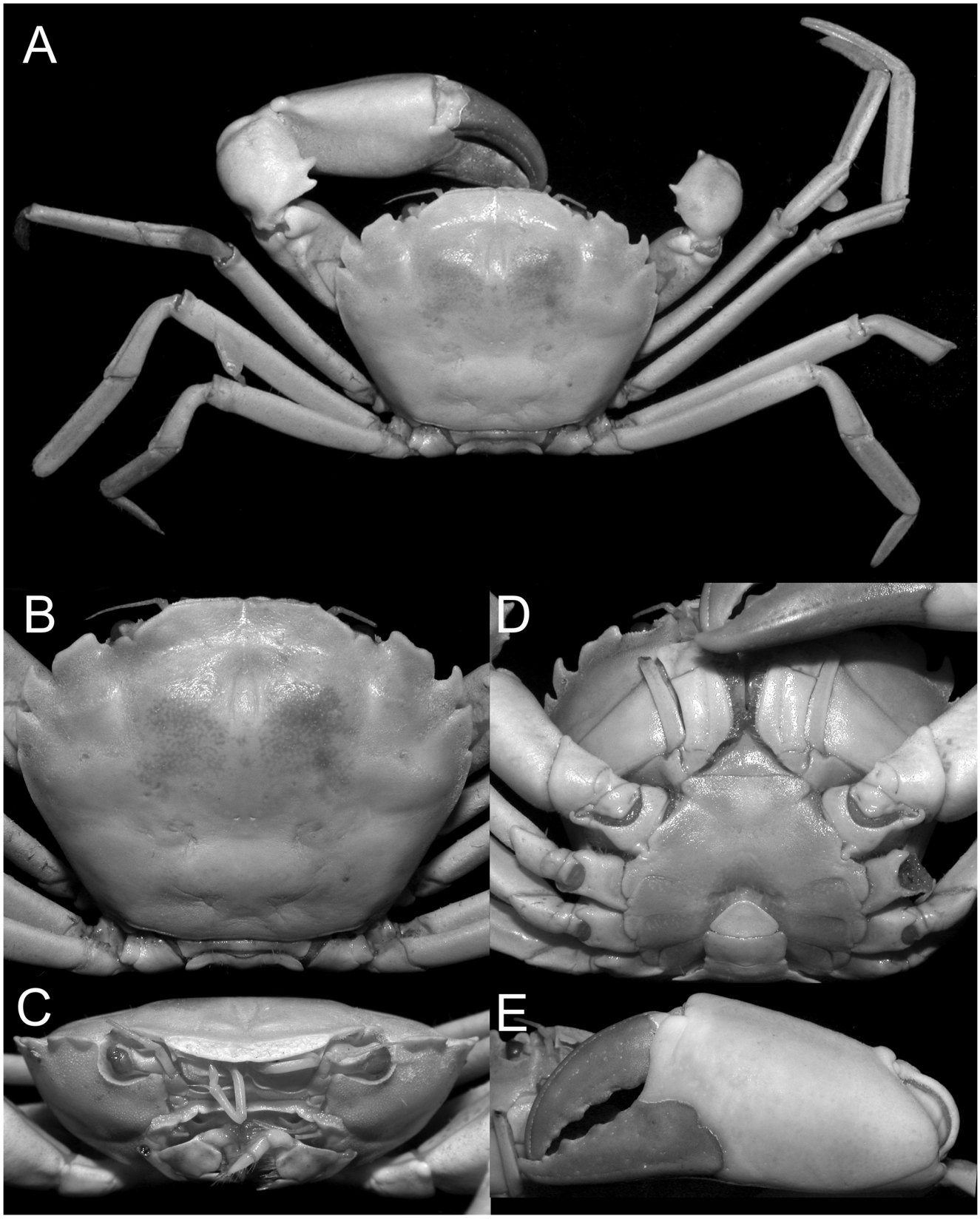

Fig. 3. *Mathildella kyushupalauensis* Takeda and Watabe, 2004, holotype male (cl 23.7 mm, cw 30.5 mm), Komahashi Seamount, Kyushu-Palau Submarine Ridge, Japan (NSMT Cr 6420). A, dorsal habitus; B, carapace, dorsal view; C, carapace, anterior view; D, ventral surface; E, left cheliped.

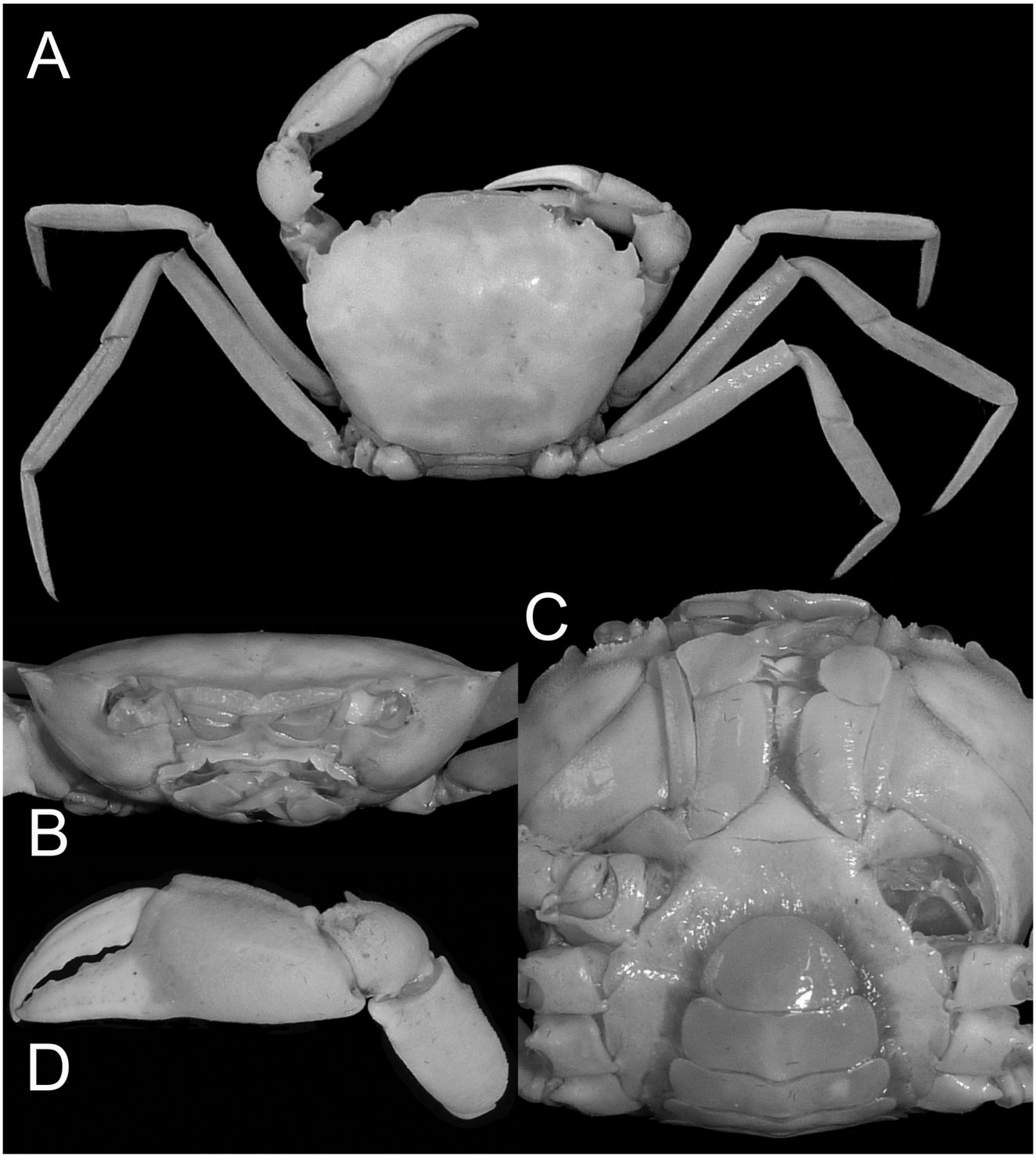

Fig. 4. *Mathildella kyushupalauensis* Takeda and Watabe, 2004, female (cl 17.3 mm, cw 22.3 mm), Sagami Bay, Japan (MM no. 1657). A, dorsal habitus; B, carapace, anterior view; C, ventral surface; D, left cheliped.

Neopilumnoplax Serène in Guinot, 1969
Neopilumnoplax heterochir (Studer, 1883)
Figs. 5, 6, 9B

Pilumnus heterochir Studer, 1883: 11, pl. 1, fig. 3a-d (type locality: S of the Cape of Good Hope, 34°13.6′S, 15°00.7′E, 117 fathoms (214 m)).

Pseudorhombilia (*Pilumnoplax*) *normani* Miers in Tizzard, Moseley, Buchanan, and Murray, 1885: 587 (type locality: Nightingale Island, Tristan da Cunha Group, South Atlantic, fixed by present lectotype designation).

Pilumnoplax heterochir – Miers, 1886: 227, pl. 19: fig. 1. – Doflein, 1904: 119. – Stebbing, 1910: 314; 1914: 265. – Tesch, 1918: 156. – Barnard,

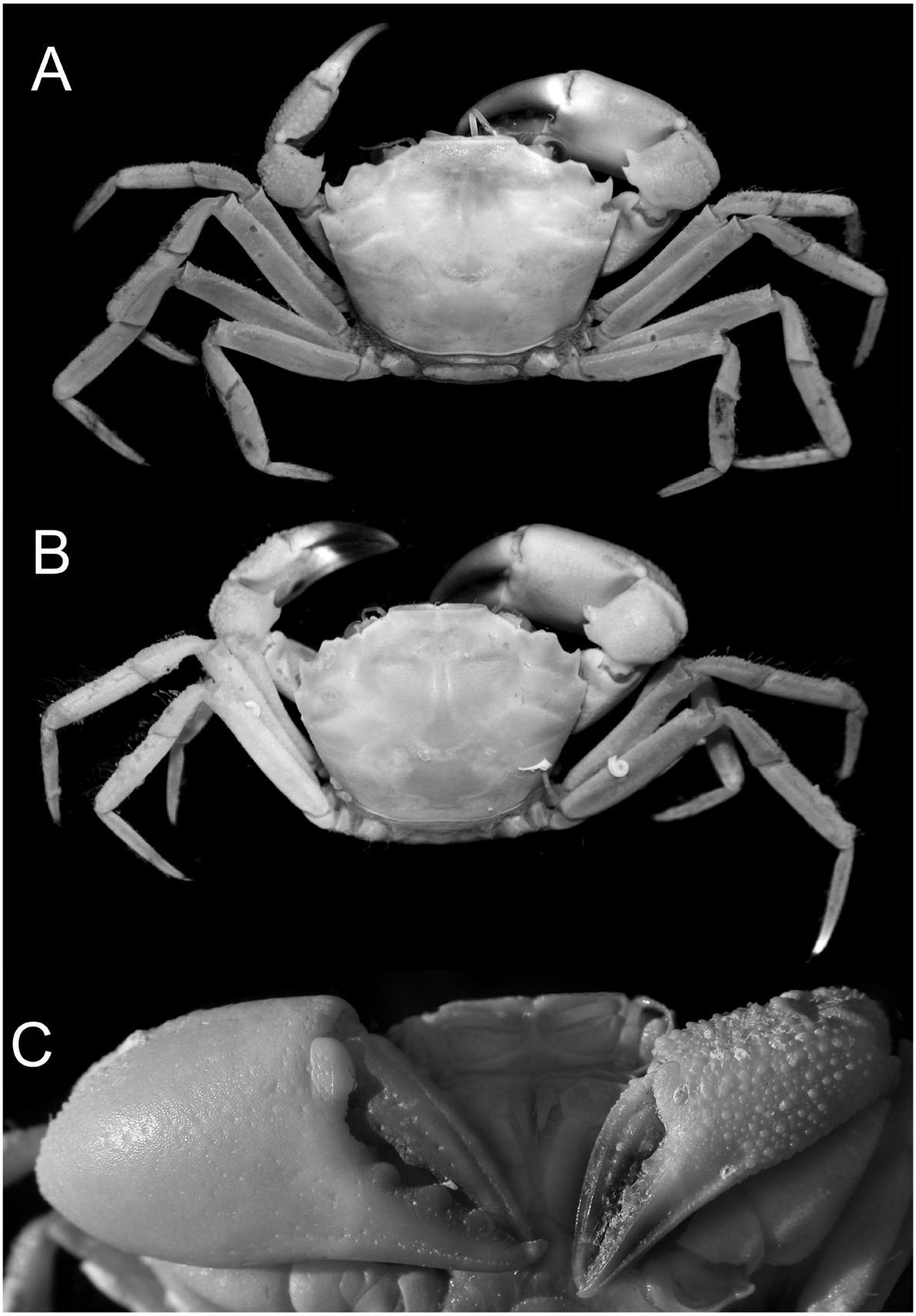

Fig. 5. *Neopilumnoplax heterochir* (Studer, 1883). A, B, dorsal habitus; C, chelipeds, anterior view. A, female (cl 10.4 mm, cw 14.1 mm), off Chalumna River, South Africa (SAM A45378). B, C, female (cl 10.1 mm, cw 13.4 mm), South Africa (SAM A39555).

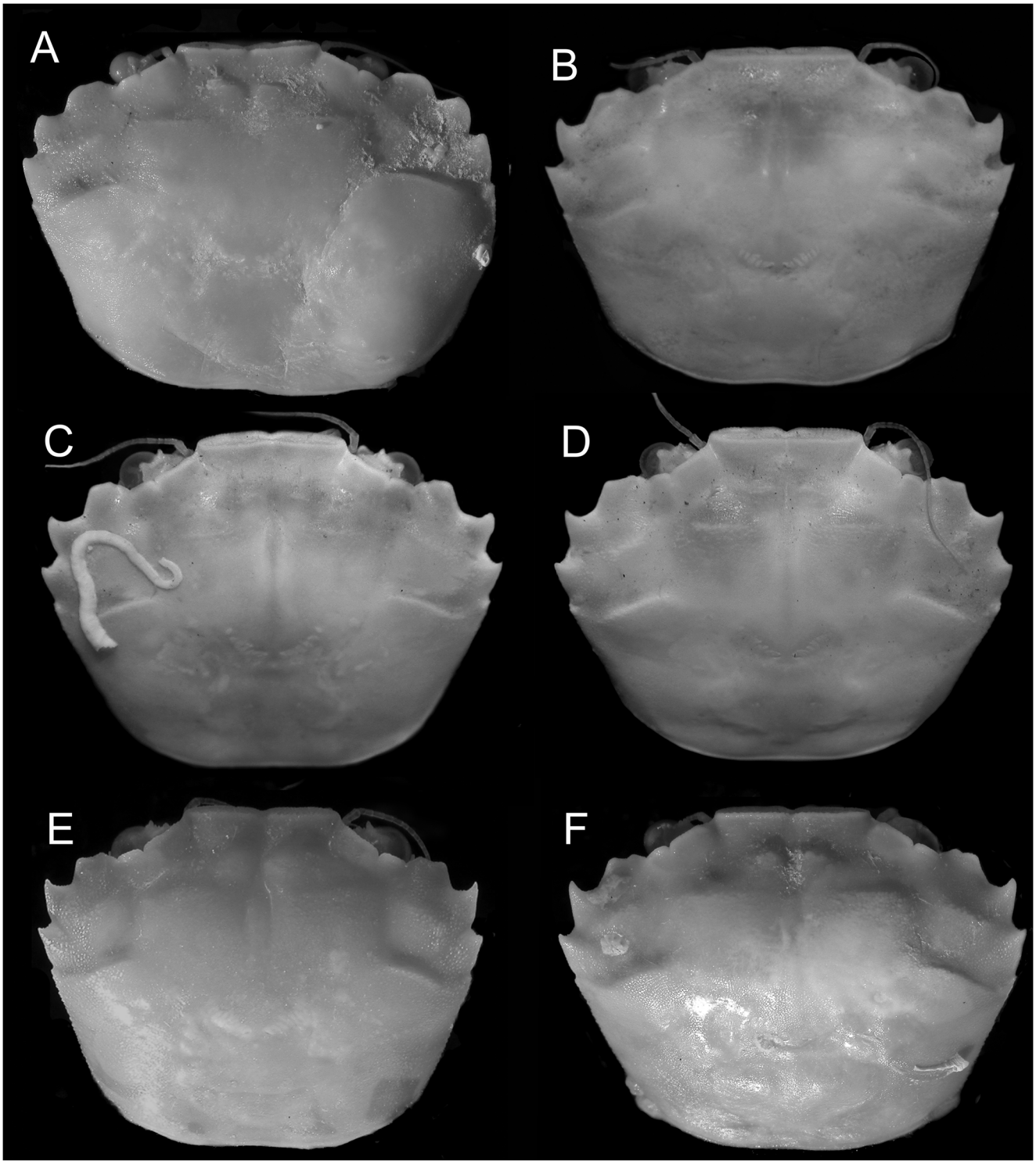

Fig. 6. *Neopilumnoplax heterochir* (Studer, 1883), dorsal view of carapace. A, female, with epicaridean parasite, South Africa (cl 13.4 mm, cw 17.6 mm) (SAM A39555); B, female (cl 10.4 mm, cw 14.1 mm), South Africa (SAM A45378); C, male (cl 9.5 mm, cw 12.2 mm), South Africa (SAM A417-428, A838); D, male (cl 11.8 mm, cw 15.2 mm), South Africa (SAM A417-428, A838); E, juvenile female (cl 7.4 mm, cw 9.2 mm), South Africa (SAM A39555); F, female (cl 10.4 mm, cl 13.1 mm), South Africa (SAM A39555).

1950: 289, fig. 54a-c. – Kensley, 1981a: 62; 1981b: 46. – Manning and Holthuis, 1981: 161. – Tavares and Guinot, 1996: 228.

Neopilumnoplax heterochir – Guinot, 1969: 689, figs. 85-89. – Sakai, 1976: 533. – Guinot and Richer de Forges, 1981a: pl. 3, figs. 1, 1a, 1b; 1981b: 227, 231, figs. 4A, 5D, 7A. – Ng et al., 2008: 83. – Ahyong, 2008: 53, 54. – Tavares and Melo, 2010: 686, 689-690, fig. 2C. – Matos-Pita and Ramil, 2016: 259, tab. 1.

Neopilumnoplax sinclairi – Tavares and Melo, 2010: 686.

Material Examined.—AM G1636 (lectotype of *Pseudorhombilia* (*Pilumnoplax*) *normani* Miers, in Tizzard, Moseley, Buchanan, and Murray, 1885), 1 ovigerous female (cl 5.4 mm, cw 6.6 mm), off Nightingale Island, Tristan da Cunha Group, 37°24′S, 12°28′W, 183 m, HMS *Challenger*, 1873-1876; SAM A39555, 3 females (cl 7.4 mm, cw 9.2 mm; cl 10.1 mm, cw 13.4 mm; cl 13.4 mm, cw 17.6 mm, with epicaridean), 31-32°S, 16°36-55′E, 272-347 m, UCT Ecological Survey stn AFR 691P + 707D + 728G, 1947; SAM A417-428, A838, 2 males (cl 11.8 mm, cw 15.2 mm; cl 9.5 mm, cw 12.3 mm), South Africa, no other data; SAM A45378, 1 female (cl 10.4 mm, cw 14.1 mm), continental slope off Chalumna River, South Africa, 225 m, Jago Expedition Dive 114, P. Coetzee coll., 23 May 1991.

Diagnosis.—Carapace (Figs. 5A, B, 6) protogastric, mesogastric, epibranchial ridges well-defined; front straight, median emargination indistinct; first (outerorbital) anterolateral tooth low, blunt, angular; first, second anterolateral teeth fused basally, apices each obtuse, blunt, demarcated by shallow concavity; third anterolateral tooth larger than fourth tooth, both produced as an anteriorly curved spine; third tooth blunt in specimens above about 13 mm cl; fifth anterolateral tooth indicated by shallow notch at base of fourth anterolateral tooth. Outer surface of major cheliped palm smooth, without granules (Fig. 5C); upper surface smooth to weakly granular on proximal upper surface at articulation with carpus. Entire outer, upper surfaces of minor cheliped coarsely granular (Fig. 5C). Carpus of both chelipeds entirely granular; 2 stout, triangular inner spines (Fig. 5A, B).

Remarks.—The series of specimens of *N. heterochir* examined shows the consistency of diagnostic characters across a wide size range. The outer palm surface of the major cheliped is always smooth and that of the minor cheliped always coarsely granular (Fig. 5C) at all sizes. Some granulation may be present on the dorsal proximal surface of the major cheliped palm in small specimens, but this disappears with increasing size. The form of the anterolateral spines is consistent at all sizes except in the largest specimen (SAM A39555, cl 13.4 mm, cw 17.6 mm) in which the third anterolateral tooth has a blunt apex (Fig. 6A). The epibranchial ridges are always distinct but the protogastric and mesobranchial ridges are evident more as swellings in the two smallest specimens (AM G1636, cl 5.4 mm, cw 6.6 mm; SAM A39555, cl 7.4 mm, cw 9.2 mm; Fig. 6E).

Neopilumnoplax heterochir apparently matures at a relatively small size. The smallest specimen examined is ovigerous and the eggs are comparatively large (AM G1636, cl 5.4 mm, cw 6.6 mm, egg diameter 0.40 mm), possibly indicating some degree of abbreviated development. Barnard (1950) recorded ovigerous females from cl 6.5 mm, cw 8.5 mm. The largest specimen examined is infected with an epicaridean isopod parasite on the right side, and several specimens have serpulid or spirorbid polychaete tubes on the carapace or pereopods. The coloration of the present specimens is faded, but Studer (1883) described the life colour as orange-red with black cheliped fingers.

In his narrative of the *Challenger* expedition, Miers in Tizzard et al. (1885) mentions a new species, *Pseudorhombilia* (*Pilumnoplax*) *normani*, from Nightingale Island (Tristan da Cunha Group) and Agulhas Bank. Miers (1886), however, later referred these specimens to *Pilumnoplax heterochir*. Miers apparently intended to name the Nightingale Island and Agulhas specimens as a new species in his report on the *Challenger* Brachyura, but was pre-empted by Studer's (1883) published description of *P. heterochir*. Although Miers (1886) corrected the identification of the Nightingale Island and Agulhas Bank specimens, it was possibly too late to correct the narrative text (Miers, in Tizzard et al., 1885), which was almost certainly in production several years prior to publication. *Pseudorhombilia* (*Pilumnoplax*) *normani* is an available name because Miers (in Tizzard et al., 1885) provided sufficient descriptive information for the Nightingale Island specimens. Therefore, Miers' (in Tizzard et al., 1885) specimens from Nightingale Island and Agulhas Bank that he later referred to as *P. heterochir* are syntypes of *Pseudorhombilia* (*Pilumnoplax*) *normani*. We herein designate the ovigerous female from Nightingale Island (AM G1636, cl 5.4 mm, cw 6.6 mm) as the lectotype of *Pseudorhombilia* (*Pilumnoplax*) *normani* and place the species in the synonymy of *Neopilumnoplax heterochir*. Doflein (1904), Rathbun (1923) and Barnard (1950) regarded *Neopilumnoplax heterochir* as widespread, ranging from the South Atlantic (Tristan da Cuhna) to southern South Africa, St Paul and New Amsterdam islands, and southern Australia. Doflein's (1904) series of juvenile specimens from the southwestern Indian Ocean (St Paul and New Amsterdam islands; 496-672 m), reported as *Pilumnoplax heterochir*, are probably referrable to *Beuroisia duhameli* Guinot and Richer de Forges, 1981, which was described from these localities. Ahyong (2008) showed that records from Australia and new records from New Zealand were referable to a new species, *N. nieli*. The female specimen (MNHN-B12562, cl 15.5 mm, cw 18.5 mm) from South Africa listed as *N. sinclairi* by Tavares and Melo (2010) was kindly re-examined for us by Marcos Tavares; it proved referrable to *N. heterochir* sensu stricto. Thus, *Neopilumnoplax heterochir* sensu stricto appears to be restricted to the southern Atlantic and off the southeast and southwest coast of South Africa.

Distribution.—South Atlantic Ocean (Tristan Da Cunha) to South Africa including localities off the Cape of Good Hope, Agulhas Bank, Chalumna River, and East London; 137–710 m (Doflein, 1904; Stebbing, 1914; Kensley, 1981a, b).

Neopilumnoplax michalis sp. nov.
Figs. 7, 8, 9A

Type Material.—ZRC 2015.300, holotype female (cl 8.8 mm, cw 12.0 mm), Atlantis Bank, Southwest Indian Ridge, 32°42.225′S, 57°18.020′E, 1053 m, JC066-4269, No. 8-22, 13 December 2011.

Diagnosis.—Carapace (Fig. 7) protogastric, mesogastric, epibranchial ridges weakly-defined; front straight, median emargination indistinct; first, second anterolateral teeth blunt, fused, forming broad lobe, demarcated by shallow concavity; third anterolateral tooth larger than fourth tooth, both produced as triangular spine, apex slightly inclined anteriorly; fifth anterolateral tooth indicated by shallow notch at base of fourth anterolateral tooth. Outer surface of palm, carpus of both chelipeds entirely granular; 2 conical inner carpal spines (Figs. 7B; 8D, E).

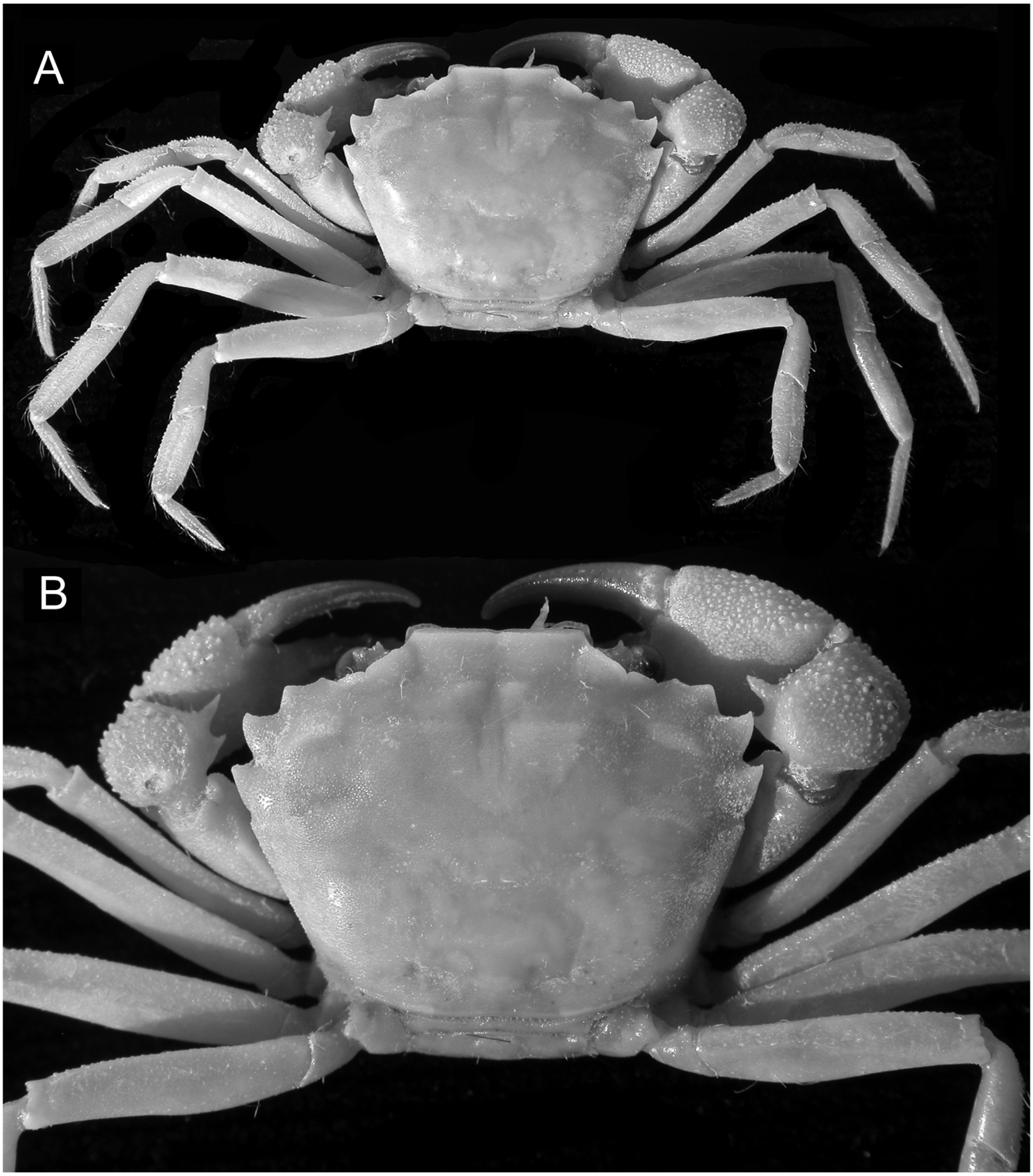

Fig. 7. *Neopilumnoplax michalis* sp. nov., holotype female (cl 8.8 mm, cw 12.0 mm), Atlantis Bank, western Indian Ocean (ZRC 2015.300). A, dorsal habitus; B, carapace and chelipeds, dorsal view.

Description.—Carapace (Fig. 7) subhexagonal, 1.36 times wider than long; dorsal surface microscopically rugose but appearing smooth; regions ill-defined; protogastric, mesogastric regions, slightly swollen, with indistinct ridges; cardiac region flat; epibranchial ridge weakly-defined. Front truncate in dorsal view, bimarginate, formed by distinct transverse anterior groove; margins straight, faintly granular, conspicuously shallow median emargination. Supraorbital margin low, separated from front by shallow concavity; margin short, V-shaped notch laterad to midlength. First

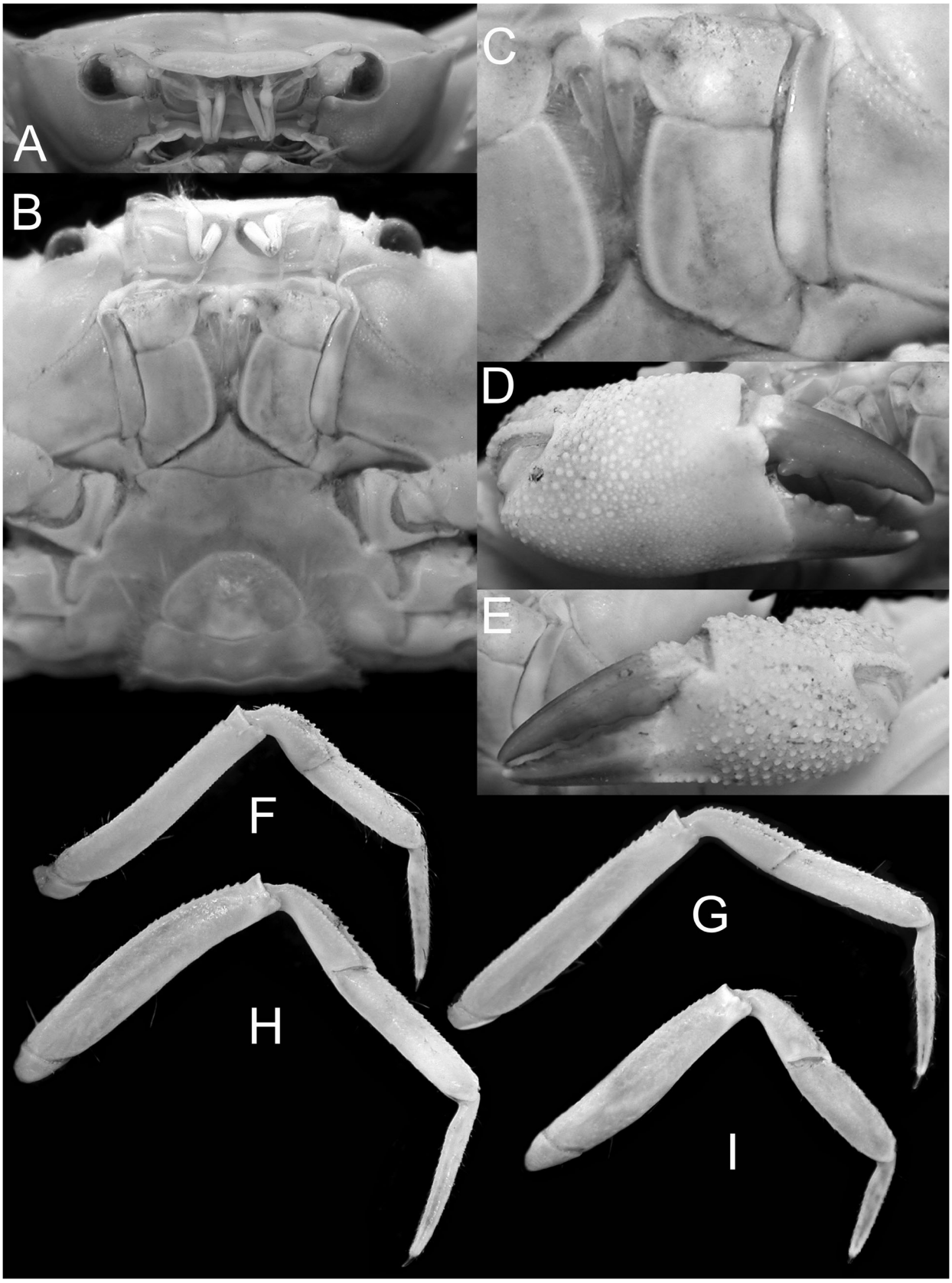

Fig. 8. *Neopilumnoplax michalis* sp. nov., holotype female (cl 8.8 mm, cw 12.0 mm), Atlantis Bank, western Indian Ocean (ZRC 2015.300). A, carapace, anterior view; B, ventral surface; C, maxilliped 3; D, right cheliped; E, left cheliped; F-I, pereopods 2-5.

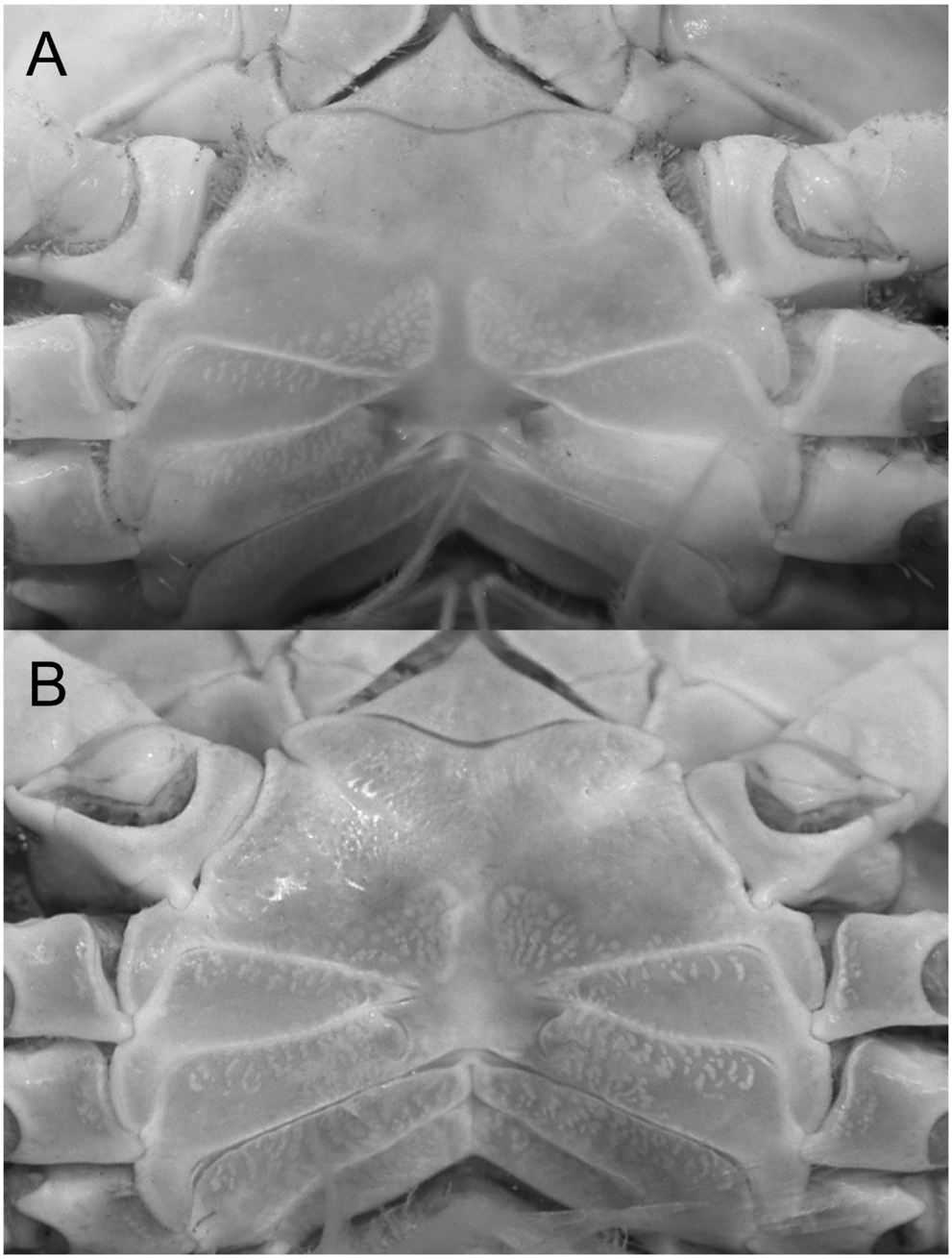

Fig. 9. Female thoracic sternum showing vulva. A, *Neopilumnoplax michalis* sp. nov., holotype female (cl 8.8 mm, cw 12.0 mm), Atlantis Bank, western Indian Ocean (ZRC 2015.300); B, *Neopilumnoplax heterochir* (Studer, 1883), female (cl 10.4 mm, cw 14.1 mm), South Africa (SAM A45378).

(outerorbital) anterolateral tooth low, blunt, angular. First, second anterolateral teeth fused basally, demarcated by shallow concavity. Second anterolateral tooth obtusely angular, anterior margin approximately transverse. Third anterolateral tooth larger than fourth tooth, both produced as triangular spine, apex slightly inclined anteriorly. Small tubercle behind fourth anterolateral tooth. Suborbital margin granular (Fig. 8A, B); with blunt inner tooth, visible dorsally. Eyestalks with row of rounded granules on inner distal margin. Suborbital, pterygostomial, sub-branchial regions finely granular. Posterolateral, posterior carapace margins almost straight.

Thoracic sternum (Figs. 8B, 9A) microscopically granular, finely punctate. Sternites 2, 3 well demarcated. Sternites 3, 4 fused, sutures visible laterally. Anterior end of sternoabdominal cavity reaching anterior end of sternite 4. Sutures 4/5, 5/6 medially interrupted. Suture 6/7, 7/8 complete. Sternites 7, 8 with median groove. Vulva (Fig. 9A) on sternite 5; orifice simple, without cover.

Female abdomen broad (Fig. 8B); 6 free somites, telson; lateral margins convex; surface sparsely pitted. Somite 1 broad, slender, shortest medially, lateral margins reaching base of P5 coxae. Somite 2 subrectangular, slightly narrower than somite 1; lateral margins obtusely rounded. Somite 3

transversely similar to somite 2 but lateral margins bluntly rounded. Somites 1-3 entirely covering space between P5 coxae, sternite 8 not visible. Somites 4-6 becoming progressively narrower, longer. Telson broader than long, rounded.

Maxilliped 3 (Fig. 8B, C) minutely, sparsely granular; merus subpentagonal, anteroexternal angle rounded; ischium subrectangular, with submedian sulcus; exopod stout, with small distal tooth, reaching to distal edge of merus. Lateral surfaces of endostome each with pair of longitudinal carinae.

Chelipeds (P1) unequal (Figs. 7A; 8D, E). Merus short, trigonal; dorsal margin with convex granular ridge bearing small subdistal spine or tubercle; inner distal margin with flat, rounded lobe at articulation with carpus; surfaces otherwise appearing smooth but microscopically granular. Carpus with 2 distinct, conical spines on inner distal margin, distal spine longer; surface coarsely granular; with shallow transverse subdistal sulcus between articular condyles. Major palm (Fig. 8D) stout, unarmed, entire outer, upper surfaces coarsely granular, gradually decreasing in size from upper to lower margin; dorsal margin slightly shorter than fingers; fingers with slight gape, occlusal margins bluntly dentate, apices simple, crossing, fingers pigmented darkly throughout length; pigmentation on pollex not extending onto manus; dactylus with 3 weak, shallow longitudinal grooves; pollex with low subventral ridge extending slightly onto palm. Minor palm (Fig. 8E) coarsely rugose on entire outer surface, inner surface finely granular; fingers about 1.5 times as long as dorsal margin of palm; occlusal margins bluntly dentate, apices simple, crossing; fingers pigmented black throughout length; pigmentation on pollex not extending onto manus; dactylus outer margin with 3 slender ridges; pollex outer margin with slender ridge, shallow submarginal ridge.

Ambulatory legs (P2-5) relatively long (Fig. 8F-I), slender, relative lengths P4 > P3 > P2 > P5; P4 longest (2.37 cl); P4 ischiomerus subequal to cl (0.95 cl); articles sparsely setose; distal portion of merus granular, more pronounced on distal portion; carpus upper, outer margin with row of coarse granules; propodus coarsely granular on extensor margin, weakly granular on outer surface; dactylus longer than extensor margin of propodus sparsely setose, elongate, flattened, almost straight; relative lengths P4 > P3 > P2 > P5, ventral margin with corneous robust setae, dorsal margin with few small corneous setae, apex corneous. P5 dactylus faintly deflected dorsally; about two-thirds as long as P4 dactylus.

Etymology.—The species is named after our good friend, the late Michael Türkay, senior carcinologist at the Senckenberg Museum. The name is derived from the Greek for Michael ($Μιχάλης$) and is used as a noun in apposition.

Remarks.—*Neopilumnoplax michalis* is most closely related to *N. heterochir* (Studer, 1883) from South Africa and Tristan da Cunha, and *N. lipkeholthuisi* Tavares and Melo, 2010, from southern Brazil and the northern coast of Argentina in sharing similar dorsal and marginal carapace ornamentation, and coarse granulation on the minor cheliped palm. *Neopilumnoplax michalis* differs chiefly from *N. heterochir* in the prominent granulation of the major cheliped palm, which, in *N. michalis* covers the entire dorsal (extensor) and outer surface (Fig. 8D, E). In *N. heterochir*, the major palm has a smooth outer surface with granules (if present) restricted to the proximal dorsal surface (Fig. 5A-C). Although *N. michalis* is only known from the single holotype female, these differences in palm granulation are consistent across the full size range of both sexes of *N. heterochir* examined. Subtle differences are also evident in the shape of the third anterolateral tooth of the carapace. In *N. heterochir*, the third anterolateral tooth forms a relatively narrow, anteriorly directed spine (Figs. 5, 6B-F) in all but the largest specimen (SAM A39555, cl 13.4 mm, cw 17.6 mm; Fig. 6A) in which the apices are blunt as also figured by Guinot and Richer de Forges (1981a: pl. 3, figs. 1, 1a) (male, cl. 13.0 mm, cw 17.2 mm) for a similarly sized specimen. In *N. michalis*, the third anterolateral tooth is triangular and proportionally broader, with the apices weakly inclined anteriorly (Fig. 7). Other subtle differences between *N. michalis* and *N. heterochir* are in the more weakly defined gastric and epibranchial ridges and narrower inner carpal spines on the cheliped of the new species (Figs. 5A, B; 6, 7B). *Neopilumnonoplax michalis* also has proportionally longer legs than *N. heterochir*; the P4 measures 2.4 cl in the female holotype of *N. michalis* compared to 2.2-2.3 cl in *N. heterochir*.

Neopilumnoplax michalis is readily distinguished from *N. lipkeholthuisi* by the form of the third and fourth anterolateral teeth of the carapace, which in the latter are strongly produced anteriorly, and in the much stronger granulation of the major cheliped carpus and palm (Tavares and Melo, 2010).

Little is known of the ecology of *N. michalis*. Other decapods recently described from Atlantis Bank and also collected by ROV *Kiel 6000* include the squat lobsters *Munidopsis mandelai* Macpherson, Amon and Clark, 2014, and *Munidopsis atlantis* Ahyong, 2014.

Distribution.—Presently known only from Atlantis Bank, Southwest Indian Ocean Ridge; 1053 m.

ACKNOWLEDGEMENTS

We are grateful to Sammy De Grave (Oxford University) for passing us the material from Atlantis Bank, Charles Oliver Coleman (ZMB) for the loan of Indonesian material from the Deutsch Tiefsee expedition, as well as Rafael Lemaitre and Karen Reed (USNM), and Masatsune Takeda (NSMT) for access to their material. Candice Untiedt and Elizabeth Hoensen (SAM) kindly facilitated the loan of material from SAM and Lee Bee Yan (National University of Singapore) is thanked for her help during her visit to the South African Museum. We thank Martyn Low (National University of Singapore) for bringing Miers' (1885) name, *Pseudorhombilia* (*Pilumnoplax*) *normani*, to our attention. The late Michael Türkay is gratefully acknowledged for his kind hospitality in Frankfurt, 2014, and sharing material with us; and we are grateful to two anonymous reviewers for their improvements to the manuscript, and Peter Castro for his editorial efficiency. We are also grateful to Marcos Tavares for checking the South African record of *N. sinclairi*, and for sharing his unpublished observations on *N. americana*. This study was partially supported by a Research Fellowship from the Lee Kong Chian Natural History Museum to STA. This is a contribution from the Australian Museum Research Institute.

REFERENCES

Ahyong, S. T. 2008. Deepwater crabs from seamounts and chemosynthetic habitats off eastern New Zealand (Crustacea: Decapoda: Brachyura). Zootaxa 1708: 1-72.

———. 2014. Deep-sea squat lobsters of the *Munidopsis serricornis* complex from the Indo-West Pacific, with descriptions of six new

species (Crustacea: Decapoda: Munidopsidae). Records of the Australian Museum 66: 197-216.

Alcock, A. 1899. An Account of the Deep-Sea Brachyura Collected by the Royal Indian Marine Survey Ship Investigator. Trustees of the Indian Museum, Calcutta.

———, and A. R. S. Anderson. 1899. Natural history notes from H.M. Royal Indian Marine Survey Ship 'Investigator,' Commander T. H. Heming, R.N., commanding. – Series III., No. 2. An account of the deep-sea Crustacea dredged during the surveying-season of 1897-98. Annals and Magazine of Natural History (Series 7) 3: 1-27.

Barnard, K. H. 1950. Descriptive catalogue of South African decapod Crustacea (crabs and shrimps). Annals of the South African Museum 38: 1-837.

Doflein, F. 1904. Brachyura. Wissenschaftleche Ergebmisse der Deutschen Tiefsee-Expedition auf dem Dampfer "Valdivia" 1898-1899 6: 1-314.

Guinot, D. 1969. Les Goneplacidae (suite et fin) Recherches préliminaires sur les groupements naturels chez les Crustacés Décapodes Brachyoures. VII. Bulletin du Muséum national d'Histoire naturelle (Paris) (Sèrie 2) 41(3): 688-724.

———, and B. Richer de Forges. 1981a. Crabs de profondeur, nouveaux ou rares, de l'Indo-Pacifique (Crustacea, Decapoda, Brachyura) (Première partie). Bulletin du Muséum national d'Histoire naturelle (Paris) (Sèrie 4, Section A) 2: 1113-1153.

———, and ———. 1981b. Crabs de profondeur, nouveaux ou rares, de l'Indo-Pacifique (Crustacea, Decapoda, Brachyura) (Deuxième partie). Bulletin du Muséum national d'Histoire naturelle (Paris) (Sèrie 4, Section A) 3: 227-260.

———, and G. Quenette. 2005. The spermatheca in podotreme crabs (Crustacea, Decapoda, Brachyura, Podotremata) and its phylogenetic implications. Zoosystema 27: 267-342.

Ikeda, H. 1998. The Deep-Sea Crabs of Sagami Bay. Hayama Shiosai Museum, Kanagawa, Japan.

Kensley, B. 1981a. The South African museum's Meiring Naude cruises. Part 12. Crustacea Decapoda of the 1977, 1978, 1979 cruises. Annals of the South African Museum 83: 49-77.

———. 1981b. On the zoogeography of southern African decapod Crustacea, with a distributional checklist of the species. Smithsonian Contributions to Zoology 338: 1-64.

Macpherson, E., D. Amon, and P. F. Clark. 2014. A new species of *Munidopsis* from a seamount of the Southwest Indian Ocean ridge (Decapoda: Munidopsidae). Zootaxa 3753: 291-296.

Manning, R. B., and L. B. Holthuis. 1981. West African brachyuran crabs. Smithsonian Contributions to Zoology 306: i-xi, 1-379.

Matos-Pita, S. S., and F. Ramil. 2016. New species of *Neopilumnoplax* Serène in Guinot, 1969 (Decapoda, Brachyura, Mathildellidae) from Northwest Africa with a key to the genus. Marine Biodiversity 46: 253-260.

Miers, E. J. 1886. Report on the Brachyura collected by H. M. S. Challenger during the years 1873-1876. Report on the scientific results of the voyage of HMS Challenger during the years 1873-76 under the command of Captain George S. Nares and the late Captain Frank Tourle Thomson, R.N. Zoology 17: i-l, 1-362, pls. I1-29.

Ng, P. K. L., and T.-Y. Chan. 2000. Note on *Mathildella serrata* (Sakai, 1974) (Crustacea: Decapoda: Brachyura: Goneplacidae) from deep waters in Taiwan. National Taiwan Museum Special Publications Series 10: 149-153.

———, and P. H. Ho. 2003. *Mathildella rubra*, a new species of deep-water carcinoplacine crab (Decapoda, Brachyura) from the Philippines. Crustaceana 76: 333-342.

———, D. Guinot, and P. J. F. Davie. 2008. Systema Brachyurorum: part I. An annotated checklist of extant brachyuran crabs of the world. Raffles Bulletin of Zoology Supplement 17: 1-286.

Parisi, B. 1918. I Decapodi giapponesi del Museo di Milano. VI. Catametopa e Paguridea. Atti della Società Italiana di Scienze Naturali e del Museo Civico di Storia Naturale in Milano 58: 90-115.

Poore, G. C. B., A. W. McCallum, and J. Taylor. 2008. Decapod Crustacea of the continental margin of southwestern and central western Australia: preliminary identifications of 524 species from FRV Southern Surveyor voyage SS10-2005. Museum Victoria Science Report 11: 1-106.

Rathbun, M. J. 1898. The Brachyura of the biological expedition to the Florida Keys and the Bahamas in 1893. Bulletin from the Laboratories of Natural History of the State University of Iowa 4: 250-294, pls. 1-9.

———. 1923. Report on the crabs obtained by the F.I.S. "Endeavour" on the coasts of Queensland, New South Wales, Victoria, South Australia and Tasmania. Biological results of the fishing experiments carried on by the F.I.S. Endeavour 1909-1914 5: 95-156.

Sakai, T. 1939. Brachygnatha, Brachyrhyncha. Studies on the crabs of Japan IV: 365-741, pls. 42-111. Yokendo, Tokyo.

———. 1974. Notes on the carcinological fauna of Japan (V). Researches on Crustacea 6: 86-102, frontispiece.

———. 1976. Crabs of Japan and the Adjacent Seas. Parts 1-3, 1-773, 1-461, 1-16, maps 3, pls. 1-251. Kodansha, Tokyo.

———. 1978. Decapoda Crustacea from the Emperor Seamount chain. Researches on Crustacea Supplement 8: 1-39, pls. 1-4.

Serène, R., and P. Lohavanijaya. 1973. The Brachyura (Crustacea: Decapoda) collected by the Naga expedition, including a review of the Homolidae. Naga Report 4: 1-187.

Stebbing, T. R. R. 1910. General catalogue of the South African Crustacea (part 5). Annals of the South African Museum 6: 281-293.

———. 1914. Stalk-eyed Crustacea Malacostraca of the Scottish National Antarctic expedition. Transactions of the Royal Society of Edinburgh 50: 253-307, pls. 23-32b.

Stimpson, W. 1858. Prodromus descriptionis animalium evertebratorum, quae in Expeditione ad Oceanum Pacificum Septentrionalem a Republica Federata missa, Cadwaladaro Ringgold et Johanne Rodgers Ducibus, observavit et descripsit. Pars V. Crustacea Ocypodoidea. Proceedings of the Academy of Natural Sciences of Philadelphia 10: 93-110 (39-56 on separate).

Studer, T. 1883. Verzeichniss der wahrend der Reise S.M.S. Gazelle an der weskuste von Afrika, Ascension und dem Cap der Guten Hoffnung Gesammelten Crustaceen. Abhandlungen der Klasse Preussischen Akademie der Wissenschaften Berlin 1882: 1-32.

Takeda, M., and H. Watabe. 2004. Deepwater carcinoplacinae crabs of the genus *Mathildella* (Crustacea, Decapoda, Brachyura), with a description of a new species from the Kyushu-Palau submarine ridge, southwestern Japan. Bulletin of the National Science Museum (Tokyo) (Series A) 30: 181-189.

Tavares, M., and G. A. S. de Melo. 2010. A new species of *Neopilumnoplax* Serène in Guinot, 1969 (Decapoda, Brachyura, Mathildellidae) from the southwestern Atlantic, pp. 685-691. In, C. H. J. M. Fransen, S. De Grave, and P. K. L. Ng (eds.), Studies on Malacostraca: Lipke Bijdeley Holthuis Memorial Volume. Crustaceana Monographs. Vol. 14. Brill, Leiden.

———, and D. Guinot. 1996. Description de *Neopilumnoplax gervaini* sp. nov. des Caraïbes (Crustacea, Decapoda, Brachyura, Goneplacidae). Bulletin du Muséum national d'Histoire naturelle (Paris) (Séries 4, Section A, Zoologie) 18: 225-232.

Tesch, J. J. 1918. The Decapoda Brachyura of the Siboga expedition. Part II. Goneplacidae and Pinnotheridae. Siboga-Expeditie Monograph 39c: 1-149.

Tizzard, T. H., H. N. Moseley, J. Y. Buchanan, and J. Murray. 1885. Narrative of the cruise of H.M.S. Challenger with a general account of the scientific results of the expedition. Report on the Scientific Results of the Voyage of HMS Challenger during the years 1873-76 1: i-liv, 1-1106.

Yokoya, Y. 1933. On the distribution of Decapod Crustaceans inhabiting the continental shelf around Japan, chiefly based upon the materials collected by the S.S. Sôyô-Maru, during the year 1923-1930. Journal of the College of Agriculture, Imperial University of Tokyo 12: 1-226, figs. 1-71, tabs. I-IV.

RECEIVED: 29 March 2016.
ACCEPTED: 15 May 2016.
AVAILABLE ONLINE: 3 June 2016.