

## On the Indian species of *Eurycarcinus* A. Milne-Edwards, 1867, *Heteropanope* Stimpson, 1858, and *Pilumnopeus* A. Milne-Edwards, 1867 (Decapoda: Brachyura: Pilumnidae)

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### ABSTRACT

Five species of pilumnid crabs assigned to *Eurycarcinus* A. Milne-Edwards, 1867, *Heteropanope* Stimpson, 1858, and *Pilumnopeus* A. Milne-Edwards, 1867, have been reported from India: *E. orientalis* A. Milne-Edwards, 1867, *E. bengalensis* Deb, 1999, *H. glabra* Stimpson, 1858, *H. neolaevis* Deb, 1995, and *P. convexus* (Maccagno, 1936). The identity of *E. bengalensis* is confused and the species had been provisionally transferred to *Heteropanope*. Examination of the types however, confirms the affinities of the species with *Eurycarcinus* and consequently extends the range of the genus to the eastern Indian

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Ocean. A re-examination of the types of *H. neolaevis* show that it is a junior subjective synonym of *Aniptumnus quadridentatus* (De Man, 1895), and is the first record of the genus from India. *Eurycarcinus integrifrons* De Man, 1879, is also formally recorded for the first time from India.

## KEYWORDS

*Aniptumnus*, *Eurycarcinus*, Gujarat, *Heteropanope*, India, new records, *Pilumnopeus*, synonymy, taxonomy, West Bengal

## INTRODUCTION

Davie (1989) revised the taxonomy of the Indo-West Pacific pilumnid genera *Heteropanope* Stimpson, 1858, and *Pilumnopeus* A. Milne-Edwards, 1867, and transferred several species to his new genus, *Benthopanope* Davie, 1989. The three genera were distinguished by carapace morphology, structure of the frontal margin, basal antennal article, male thoracic sternum, and male pleon (Davie, 1989). Until then, the taxonomy of these similar-looking genera was confused. Although Davie (1989: 130) noted that the Indian Ocean *Eurycarcinus* A. Milne-Edwards, 1867, was close to *Heteropanope*, but, as he did not have access to specimens, was unable to discuss the characters distinguishing these two genera.

In India, two species of *Eurycarcinus* have previously been recorded: *E. natalensis* (Krauss, 1843) Andhra Pradesh (Dev Roy and Nandi, 2007; Dev Roy, 2008); Tamil Nadu (Thomas, 1969; Dev Roy, 2008; Kathirvel and Gokul, 2010); West Bengal (Deb, 1995; Dev Roy and Nandi, 2012); Andaman and Nicobar Islands (Thomas, 1969; Bakus, 1994; Venkataraman et al., 2004), and *E. orientalis* A. Milne-Edwards, 1867 Gujarat (Chhapgar, 1957; Trivedi et al., 2012; Pandya and Vachhrajani, 2013); Maharashtra (Chhapga 1957; Pati et al., 2012); Goa (Dev Roy and Bhadra, 2008; Dev Roy, 2013); Karnataka (Chhapgar, 1957; Haragi et al., 2010); Kerala (Dev Roy, 2013); Andhra Pradesh (Dev Roy and Nandi, 2007; Dev Roy, 2008; Rath and Dev Roy, 2009); Orissa (Dev Roy and Rath, 2017); West Bengal (Dev Roy and Nandi, 2012); Andaman and Nicobar Islands (Dev Roy and Nandi, 2012). Two species in these genera were later described from specimens collected in the Bay of Bengal, India: *Heteropanope neolaevis* Deb, 1995, and

*Eurycarcinus bengalensis* Deb, 1999. Subsequently, Trivedi et al. (2015) and Gosavi et al. (2017) recorded *Heteropanope glabra* Stimpson, 1858, and *Pilumnopeus convexus* (Maccagno, 1936), respectively, from India.

Ng et al. (2018) revised *Eurycarcinus*, and distinguished it from *Heteropanope* by the following characters: thoracic sternite 8 remains clearly exposed when the male pleon is closed, male pleonal somite 3 is proportionately wider with the lateral margin distinctly projecting on lateral side, and male thoracic sternites 3 and 4 are transversely wider with the sterno-pleonal cavity close to the margin between sternites 3 and 4. On the basis of the published figures of Deb (1995, 1999), Ng et al. (2018) suggested that *E. bengalensis* can be assigned to *Heteropanope* on the basis of carapace shape but was uncertain about *H. neolaevis* because its gonopod structure was atypical for the genus. Trivedi et al. (2018: 59) noted that the records of *E. natalensis* from different parts of India were suspect and more likely belong to species of *Heteropanope* instead. *Eurycarcinus natalensis* is known for certain only from southern and eastern Africa (Ng et al., 2018). Trivedi et al. (2018: 59) also expressed doubts about the records of *E. orientalis* from eastern India, a species otherwise only known for certain from the western Indian Ocean (Ng et al., 2018).

The present paper examines and describes new material of the above genera including the types of *H. bengalensis* and *H. neolaevis*. *Eurycarcinus integrifrons* De Man, 1879 is formally recorded here for the first time from India. *Eurycarcinus bengalensis* is shown to be a valid taxon but the type material contains two species, with the paratype females belonging to *E. integrifrons* instead. In addition, *H. neolaevis* is shown to be a junior subjective synonym of *Aniptumnus quadridentatus* (De Man, 1895).

## MATERIAL AND METHODS

The specimens examined are deposited in the Zoological Reference Collection, Department of Life Sciences, Hemchandracharya North Gujarat University, Patan, Gujarat, India (LFSc.ZRC); Zoological Survey of India, Kolkata, India (ZSI); and the Zoological Reference Collection of the Lee Kong Chian Natural History Museum, National University of Singapore (ZRC). The terminology used in the description follows Davie *et al.* (2015) and Ng *et al.* (2018). The following abbreviations are used: CL = carapace length; CW = carapace width; G1 = male first gonopod; G2 = male second gonopod; coll. = collector. All the measurements are in millimeters (mm).

## TAXONOMY

### Family Pilumnidae Samouelle, 1819

#### Genus *Eurycarcinus* A. Milne-Edwards, 1867

##### *Eurycarcinus orientalis* A. Milne-Edwards, 1867 (Figs. 1, 9A–C)

*Eurycarcinus orientalis* A. Milne-Edwards, 1867: 277; Jones, 1986: 162, pl. 47; Vousden, 1987: 36, tabs. 4, 7; Apel and Türkay, 1992: 194, 204, 205; Ismail and Ahmed, 1993: 158; Apel 1994a: 43, 44; Apel, 2001: 97, 98; Al-Khayat and Jones, 1996: 806, fig. 5; Al-Khayat and Jones, 1999: 58, 61; Tirmizi and Ghani, 1996: 30–32, fig 10; Cooper, 1997: 168–170, figs. 4, 5, 15; Hornby, 1997: 16 (? part); Ng *et al.*, 2008: 140 (list); Naderloo and Türkay, 2012: 37; Al-Khafaji *et al.*, 2017: 363, fig. 3; Naderloo, 2017: 304, figs. 26.10c, 26.11, 26.13; Ng *et al.*, 2018: 484, figs. 1C, 3B, 4B, 5B, 6B, E, 7B, E, H, 8B, F, G; Trivedi *et al.*, 2018: 59 (list).

*Eurycarcinus grandidieri* — Alcock, 1898: 211, 212 [not *Eurycarcinus grandidierii* A. Milne-Edwards, 1867 = *E. natalensis* (Krauss, 1843)].

*Eurycarcinus* sp. — Basson *et al.*, 1977: 58, 228 (in list), fig. 38; Titgen, 1982: 131.

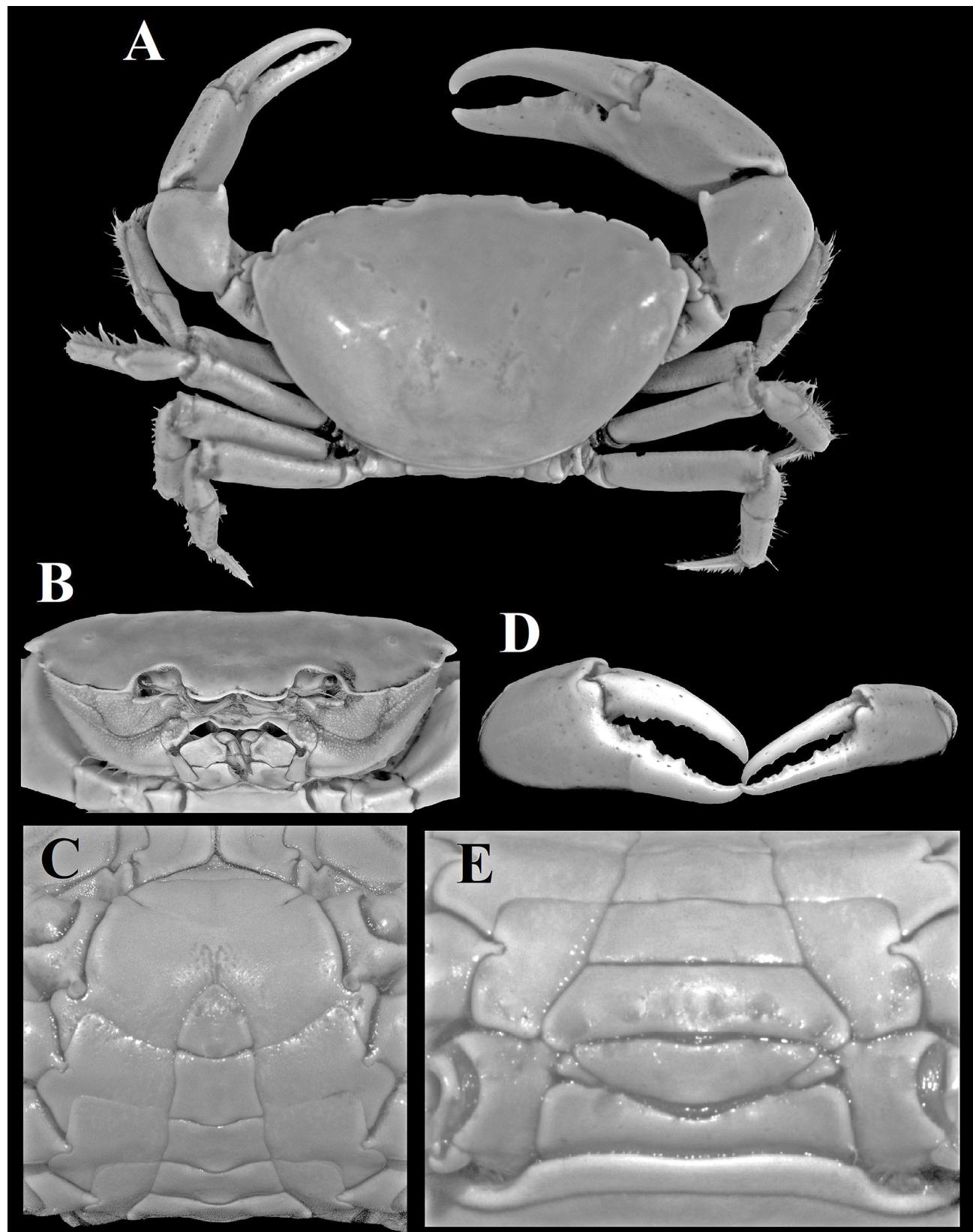
Type locality. Mumbai, India.

Material examined. 5 males (CW 27.6–41.5 mm, CL 17.5–26.9 mm), 4 females (CW 28.5–6.4 mm, CL 17.5–23.0 mm), LFSc.ZRC-64, Kamboi (22°12'59"N 72°36'59"E), Gujarat State, India, 11 April 2014, coll. J. Trivedi.

Remarks. The specimens examined in the present study agree with the description and figures of the species provided by Ng *et al.* (2018). *Eurycarcinus orientalis* resembles *E. natalensis* in carapace shape and dentition of the anterolateral border but can be separated from the latter in the following characters: the carapace is high (Fig. 1A) (not prominently raised in *E. natalensis*; cf. Ng *et al.*, 2018: figs. 1A; 6A, D); suborbital and pterygostomial regions are prominently granulated (Fig. 1B) (less granulated in *E. natalensis*; cf. Ng *et al.*, 2018: fig. 6D); G1 distal part gently recurved, tip gently curved (Fig. 9A, B) (distal part prominently recurved, tip hook shaped in *E. natalensis*; cf. Ng *et al.*, 2018: fig. 8A, D, E).

*Eurycarcinus orientalis* is so far reported from the Gulf of Aden, Persian Gulf, Gulf of Oman, Pakistan, India, and Thailand (Naderloo, 2017; Ng *et al.*, 2018). In India, the species is recorded from Gujarat, Maharashtra, Karnataka (Chhapgar, 1957) and Kerala (Dev Roy, 2013). Trivedi *et al.* (2018) commented that all the records of this species from the east coast including Andhra Pradesh (Dev Roy and Nandi, 2007), Orissa (Dev Roy and Rath, 2017), West Bengal (Dev Roy and Nandi, 2012), and Andaman and Nicobar Islands (Dev Roy and Nandi, 2012) require re-examination.

Trivedi *et al.* (2018) commented that the records of *E. natalensis* from India: Andhra Pradesh (Dev Roy and Nandi, 2007), Tamil Nadu (Thomas, 1969), West Bengal (Dev Roy and Nandi, 2012), and Andaman and Nicobar Islands (Thomas, 1969) are doubtful. Some of these may have been based on earlier incorrect identifications of Indian material by Alcock (1898) as *Eurycarcinus grandidieri*, the latter species being a junior synonym of *E. natalensis*. On the basis of the available specimens examined here, these records are probably a species of *Heteropanope* or *Eurycarcinus* and require re-examination, but, based on biogeography, they are likely to be *E. bengalensis* or *E. integrifrons* (see discussion for these species).



**Figure 1.** *Eurycarcinus orientalis* A. Milne-Edwards, 1867, male (CW 41.5 mm, CL 26.9 mm) (LFSc.ZRC-64), Kamboi, India. **A**, habitus, dorsal view; **B**, frontal view; **C**, anterior thoracic sternum (sternites 1–4) and pleon; **D**, chelae, outer view; **E**, posterior thoracic sternum and pleon.

**Eurycarcinus integrifrons De Man, 1879**  
**(Figs. 2, 9D–F)**

*Eurycarcinus integrifrons* De Man, 1879: 55, 56; Apel, 1994b: 415, 433, 434; Al-Ghais and Cooper, 1996: 425, 426; Apel, 2001: 97; Naderloo and Sari, 2007: 344, tab. 1; Özcan et al., 2010: 507, fig. 2; Naderloo and Türkay, 2012: 36; Naderloo et al., 2013: 449, 456, tab 2; Naderloo, 2017: 303, figs. 26.10b, 26.11, 26.12; Ng et al., 2018: 484, figs. 1C, 3B, 4B, 5B, 6B, E, 7B, F, G; Trivedi et al., 2018: 59 (list).

*Eurycarcinus orientalis* — Alcock, 1898: 210, 211 (part); Chhapgar, 1957: 436, 437, pl. 11d–f; Tirmizi et al., 1986: 8–10, fig. 3a–d; Tirmizi and Ghani, 1996: 30–32, fig. 10; Hornby, 1997: 16 (part) [not *Eurycarcinus orientalis* A. Milne-Edwards, 1867].

*Litocheira (amoyensis Gordon?)* — Stephensen, 1946: 169–171, fig. 46; Titgen, 1982: 252 (list) [not *Litocheira amoyensis* Gordon, 1931 = *Heteropilumnus amoyensis* (Gordon, 1931)].

*Eurycarcinus* sp. (? *integrifrons*) — Apel and Türkay, 1992: 194–195, 204–205.

*Eurycarcinus bengalensis* Deb, 1999: 376 (part).

*Type locality.* Unknown, probably India (cf. Naderloo 2017).

*Material examined.* 5 males (CW 13.2–28.2 mm, CL 9.66–9.9 mm), 5 females (CW 11.3–25.2 mm, CL 18.6–8.14 mm), LFSC.ZRC-63, Lakhpat (23°50'01"N 68°46'26"E), Gujarat State, India, 27 March, 2015, coll. J. Trivedi; 2 ovigerous females (CW 13.9 mm, CL 10.4 mm; CW 21.3 mm, CL 15.3 mm), ZSI-C3349/2 (part), Chamta Block, Sunderbans Tiger Reserve, West Bengal State, India (paratypes of *Eurycarcinus bengalensis* Deb, 1999).

*Remarks.* The specimens examined in the present study agree with the description and figures of the species in Ng et al. (2018). *Eurycarcinus integrifrons* differs from *E. natalensis* and *E. orientalis* in the following characters: carapace subquadrate (Fig. 2A) (transversely ovate in *E. natalensis* and *E. orientalis*; cf. Ng et al., 2018: figs. 1A, B, C; 6A, B); frontal margin weakly bilobed (Fig. 2B) (distinctly bilobed in *E.*

*natalensis* and *E. orientalis*; cf. Ng et al., 2018: figs. 1A–C; 6A, B).

The species is so far reliably reported from Gulf of Aden, Persian Gulf, Gulf of Oman, and Pakistan (Naderloo, 2017; Ng et al., 2018). The present study is actually the first confirmed record of the species from India, even though Naderloo (2017) suggested that the type may have originally been from there. The specimens from Gujarat (Kolak and Umarsadi) and Maharashtra (Mumbai) (recorded as *E. orientalis*) in Chhapgar (1957) should be referred to *E. integrifrons*; his figures leave no doubt. These records of Chhapgar (1957) thus extend the known range of *E. integrifrons* nearly 900 kilometers further south along the coast of western India. The two ovigerous female paratypes of *E. bengalensis* Deb, 1999, are here also re-identified as *E. integrifrons*, extending the range of this species to West Bengal state (see remarks for next species).

**Eurycarcinus bengalensis Deb, 1999**

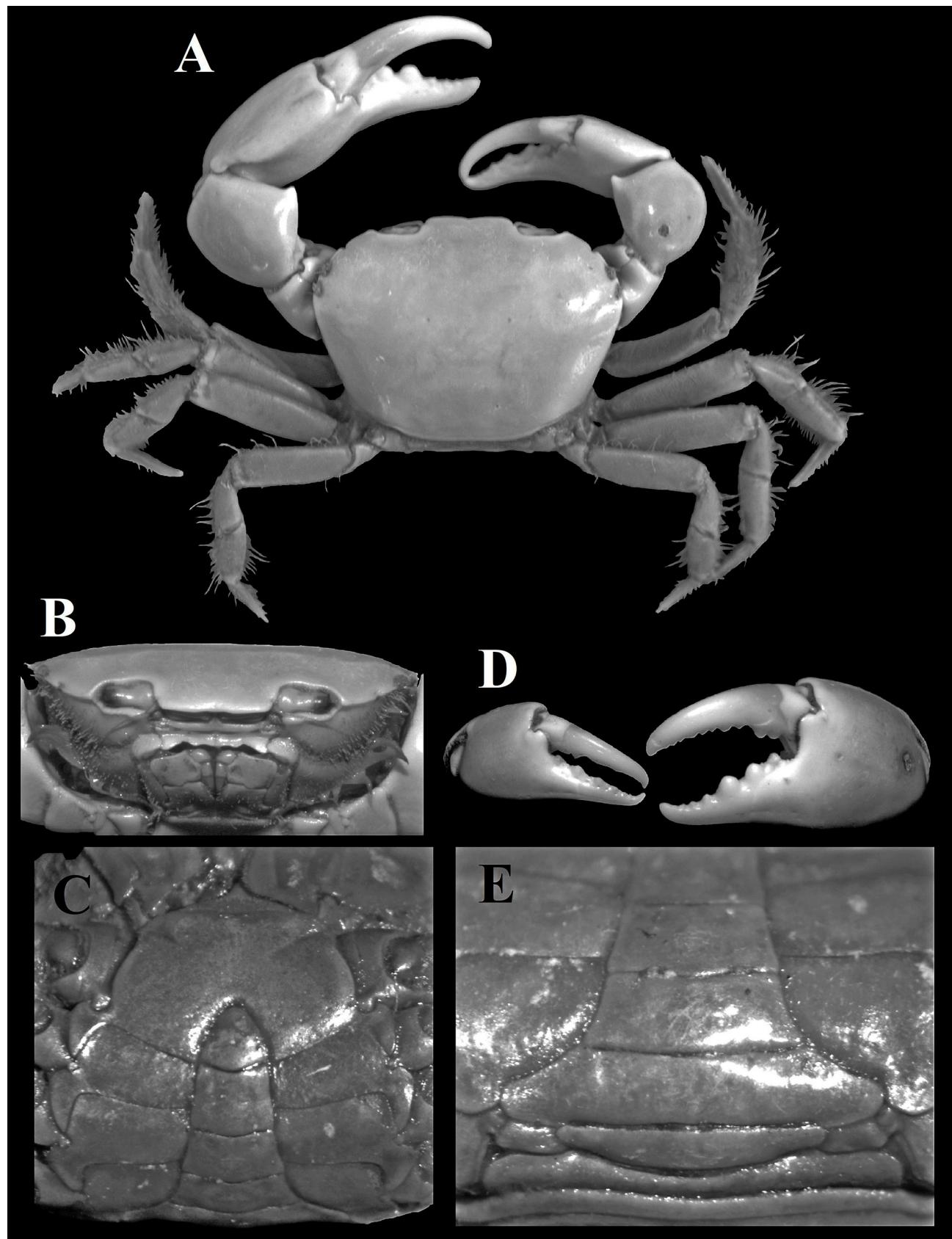
**(Figs. 3, 4, 9G–I)**

*Eurycarcinus bengalensis* Deb, 1999: 376 (part), fig. 2.

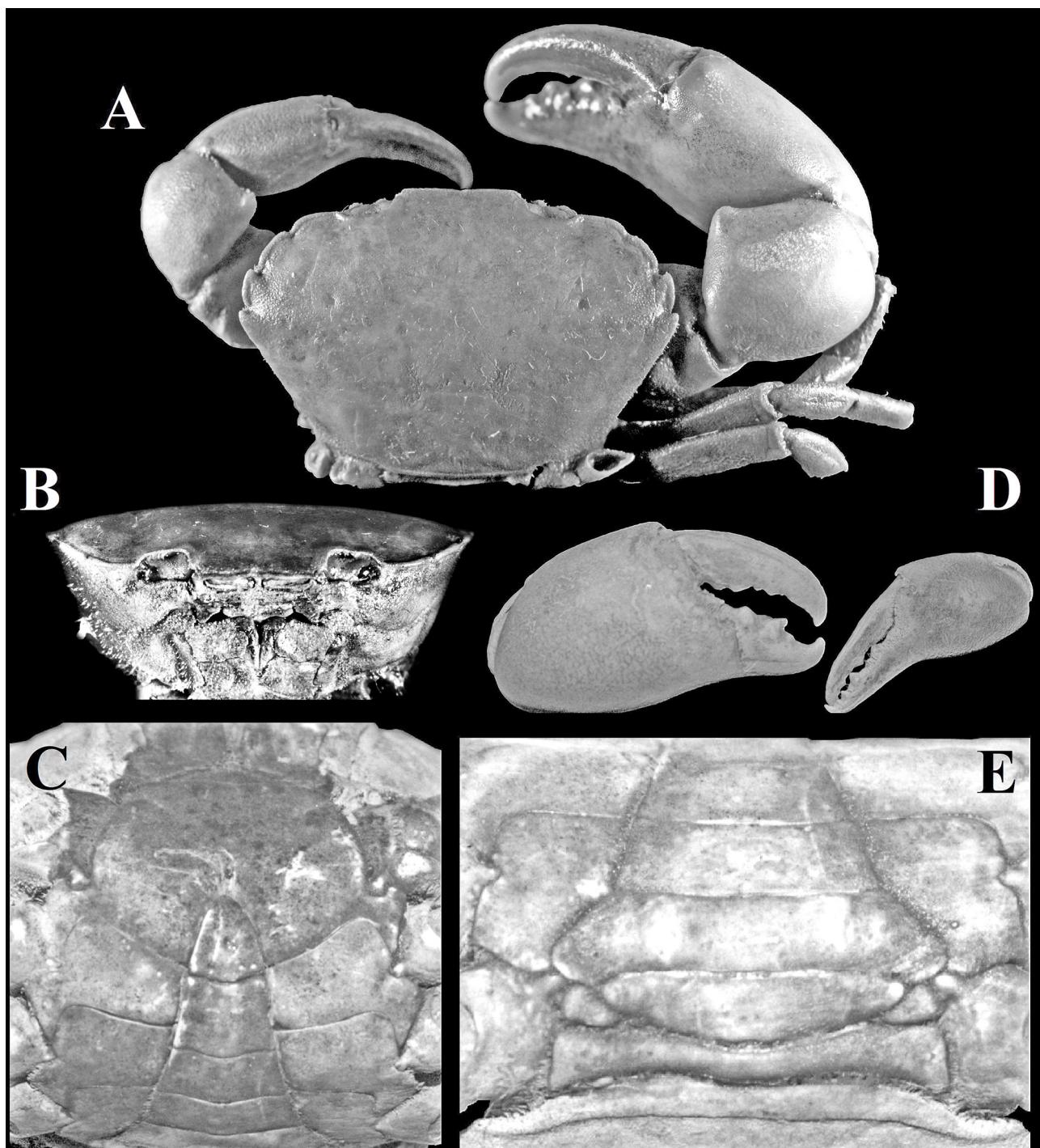
*Heteropanope bengalensis* — Ng et al., 2018: 474; Trivedi et al., 2018: 59.

*Material examined.* Holotype, male (CW 25.1 mm; CL 16.9 mm), ZSI-C3349/2, Chamta Block, Sunderbans Tiger Reserve, West Bengal State, India, coll. S. Bhuinya. Paratypes, 2 males (CW 11.5 mm; CL 7.8 mm, CW 11.7 mm; CL 8.6 mm), data as per holotype.

*Remarks.* Deb (1999) described *E. bengalensis* on the basis of a holotype and an unspecified number of specimens collected from Sundarbans Tiger Reserve, West Bengal state, India. Ng et al. (2018) provisionally transferred this species to *Heteropanope* on the basis of the figure and description of the type specimen given in Deb (1999). In the present study, the type specimens of the species were examined and identified as *Eurycarcinus* because the thoracic sternite 8 of the specimen remains exposed when the male pleon is closed (Fig. 3E) and pleonal somite 3 is relatively wider, with the lateral margin projecting (Fig. 3C), which are characteristics of *Eurycarcinus*.



**Figure 2.** *Eurycarcinus integrifrons* De Man, 1879, male (CW 28.2 mm, CL 19.9 mm) (LFSc.ZRC-63), Lakhpat, India. **A**, habitus, dorsal view; **B**, frontal view; **C**, anterior thoracic sternum (sternites 1–4) and pleon; **D**, chelae, outer view; **E**, posterior thoracic sternum and pleon.

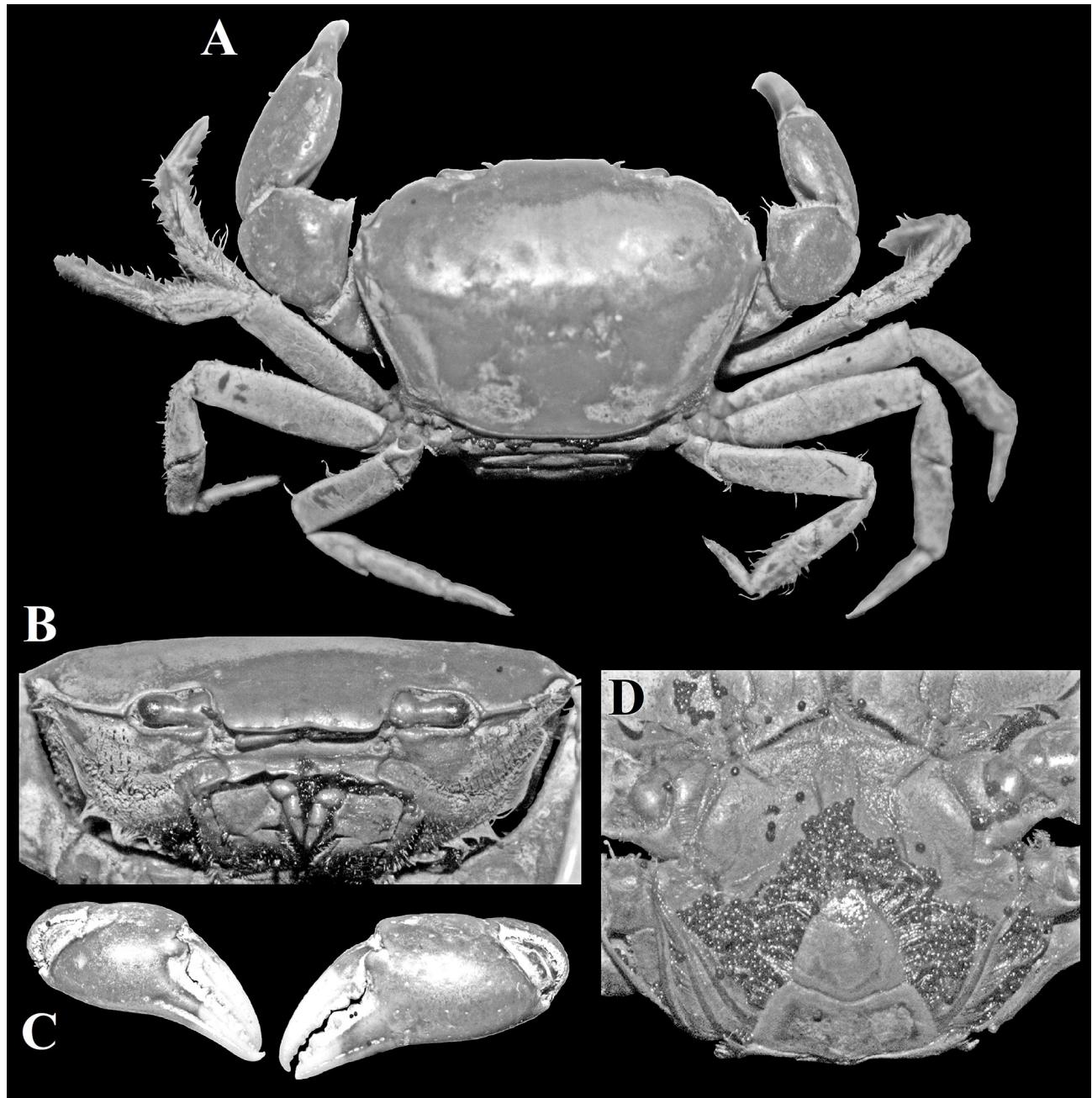


**Figure 3.** *Eurycarcinus bengalensis* Deb, 1999, holotype male (CW 25.1 mm, CL 16.9 mm) (ZSI-C3349/2), Chamta Block, India. **A**, habitus, dorsal view; **B**, frontal view; **C**, anterior thoracic sternum (sternites 1–4) and pleon; **D**, chelae, outer view; **E**, posterior thoracic sternum and pleon.

The type series of *E. bengalensis* is mixed. Of the five specimens, the two paratype males agree well with the holotype male in most aspects and are clearly conspecific. The two ovigerous females (CW 13.9 mm, CL 10.4 mm; CW 21.3 mm, CL 15.3 mm), however,

belong to *E. integrifrons* instead. The carapace shape and features (Fig. 4) are clearly of this species.

*Eurycarcinus bengalensis* s. str. is similar to *E. integrifrons* in the following characters: the carapace is not prominently swollen and high in frontal view



**Figure 4.** *Eurycarcinus integrifrons* De Man, 1879, paratype ovigerous female of *Eurycarcinus bengalensis* Deb, 1999 (CW 21.3 mm; CL 15.3 mm) (ZSI-C3349/2), Chamta Block, India. **A**, habitus, dorsal view; **B**, frontal view; **C**, chelae, outer view; **D**, anterior thoracic sternum (sternites 1–4) and pleon.

(Figs. 2A, 3A, 4A), the frontal margin is weakly bilobed (Figs. 2B, 3B, 4B), there are distinct clumps of short setae between the first to third anterolateral teeth (Figs. 2A, 3A, 4A), the supraorbital margin is smooth without granules, the sub-orbital and pterygostomial regions are smooth and glabrous with dense setae only along the sutures (Figs. 2B, 3B, 4B), and the posterior margin of the epistome has the median lobe truncate, protruding anteriorly and separated

from lateral margin by distinct rounded angle (Figs. 2B, 3B, 4B). *Eurycarcinus bengalensis*, however, differs from *E. integrifrons* in several characters that cannot be explained by variation: the carapace of *E. bengalensis* is proportionately wider (Figs. 3A, 4A) (more quadrate in *E. integrifrons*; Fig. 2A); the anterolateral teeth are lobiform and wide, separated from each other by a fissure (Figs. 3A, 4A) (more narrow dentiform anterolateral margin with the teeth

separated by a U-shaped hiatus in *E. integrifrons*; Fig. 2A); the male chela is proportionately shorter (Fig. 3D) (more elongate in *E. integrifrons*; Fig. 2D); male pleonal somite 6 is distinctly trapezoidal in shape (Fig. 3C) (less so in *E. integrifrons*; Fig. 2C); male pleonal somites 1–3 are proportionately less broad (Fig. 3E) (proportionately wider in *E. integrifrons*; Fig. 2E); and the distal part of the G1 is relatively shorter with the tip gently upcurved (Fig. 9G, H) (G1 distal part relatively longer with the tip almost straight or gently curved downwards in *E. integrifrons*; Fig. 9D, E).

The relative width of the carapace and proportions of male pleonal somites 1–3 of *E. bengalensis* (Figs. 3A, 4A, 3E) are actually closer to the condition in *E. orientalis* (Figs. 1A, E) but the other characters (notably carapace shape, anterolateral armature, posterior margin of the epistome, male pleon shape and G1) do not match.

The characters possessed by *E. bengalensis* are interesting. While its carapace closely resembles species of *Heteropanope* as indicated by Ng et al. (2018), the male sternal and pleonal characters are those of *Eurycarcinus*. It is possible that some, if not all the records of “*Eurycarcinus natalensis*” and “*Eurycarcinus orientalis*” from the eastern Indian Ocean (e.g., Dev Roy, 2008; Rath and Dev Roy, 2009; see under *E. orientalis*) actually belong to *E. bengalensis* instead. The material will need to be examined.

### Genus *Pilumnopeus* A. Milne-Edwards, 1867

#### *Pilumnopeus convexus* (Maccagno, 1936) (Figs. 5, 10A–C)

*Heteropanope convexa* Maccagno, 1936: 176, 177.

*Pilumnopeus salomonensis* Ward, 1942: 96, pl. 6 fig. 11; Davie, 1989: 143; Ng et al., 2008: 141 (list).

*Pilumnopeus vauquelini* — Stephensen, 1946: 141, fig 35a, b; Guinot, 1967: 275; Basson et al., 1977: 228, 231; Titgen, 1982: 252 (list); Hornby, 1997: 15; Naderloo and Türkay, 2012: 37 [not *Pilumnus vauquelini* Audouin, 1826 = *Pilumnopeus vauquelini* (Audouin, 1826)].

*Pilumnopeus indica* — Barnard, 1955: 30, fig. 12 [not *Heteropanope indica* De Man, 1887 = *Benthopanope indica* (De Man, 1887)].

*Pilumnopeus convexa* — Davie, 1989: 142, 143, fig. 7A–C.

*Pilumnopeus convexus* — Cooper, 1997: 171–173, figs. 6, 16; Apel, 2001: 98; Ng et al., 2008: 141 (list); Naderloo and Türkay, 2012: 37; Ghory et al., 2013: 301–312, figs. 1–5; Naderloo et al., 2013: 449, tab. 1; Gosavi et al., 2017: 429–433, figs. 2–7; Naderloo, 2017: 311, figs. 26.21, 26.22a, 26.23.

*Type locality.* Ethiopia.

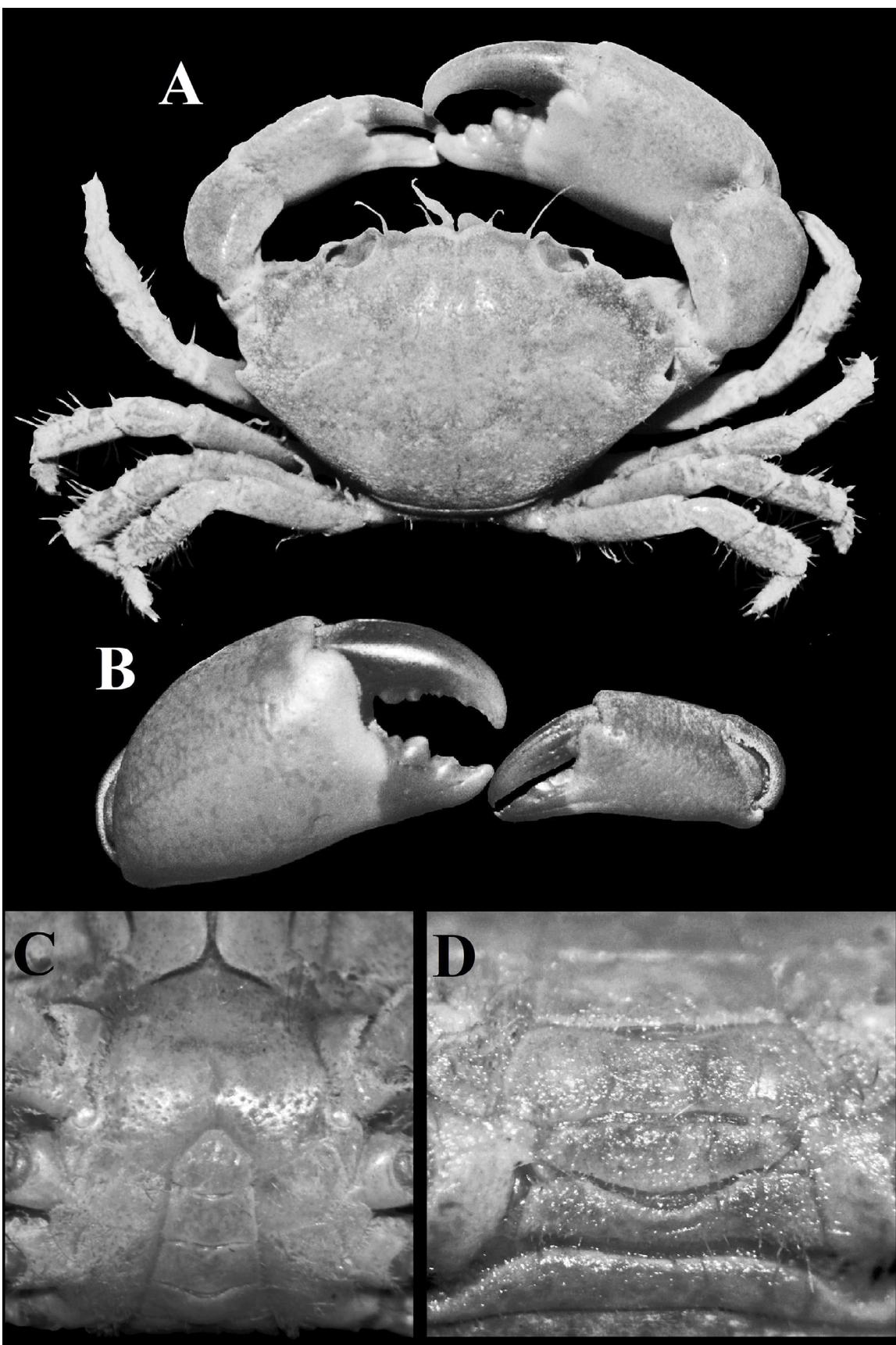
*Material examined.* 1 male (CW 15.3 mm; CL 11.3 mm), 2 females (CW 11.9 mm; CL 8.4 mm; CW 12.8 mm; CL 8.6 mm), LFSc.ZRC-70, Kuda (21°37'33"N 72°18'17"E), Gujarat State, India, 12 October, 2016, coll. J. Trivedi: 1 male (CW 9.6 mm; CL 6.4 mm), 1 female (CW 5.9 mm; CL 4.3 mm), ZRC 2012.0422, Somar Goth, Pakistan, 26 January 2009, coll. F. Ghory; 1 female (CW 8.7 mm; CL 5.9 mm) ZRC 2018.0067, Buleii, Pakistan, 4 March 1986, coll. Q. Kazmi; 1 female (CW 14.4 mm; CL 9.8 mm) (paralectotype of *Pilumnopeus salomonensis* Ward, 1942), ZRC 2012.0794, Salomón Islands, Chagos Archipelago, 1936, coll. R. Viader and G. Antelme; 2 males (CW 9.0 mm; CL 6.3 mm; CW 8.0 mm; CL 5.6 mm) ZRC 2018.1364, Persian Gulf, Iran, May 2010, coll. M. Safaei.

*Remarks.* The specimens examined (Figs. 5, 10A–C) in the present study compared well with the description and figures in Ghory et al. (2013). *Pilumnopeus convexus* is close to *P. serratifrons* but varies from the latter in having a CW/CL ratio of 1.4 to 1.5 and a less projecting front with a shallow central notch (Davie, 1989). The specimens were collected (Figs. 6, 11D–F) from Ekkakula mangroves located in Odisha State.

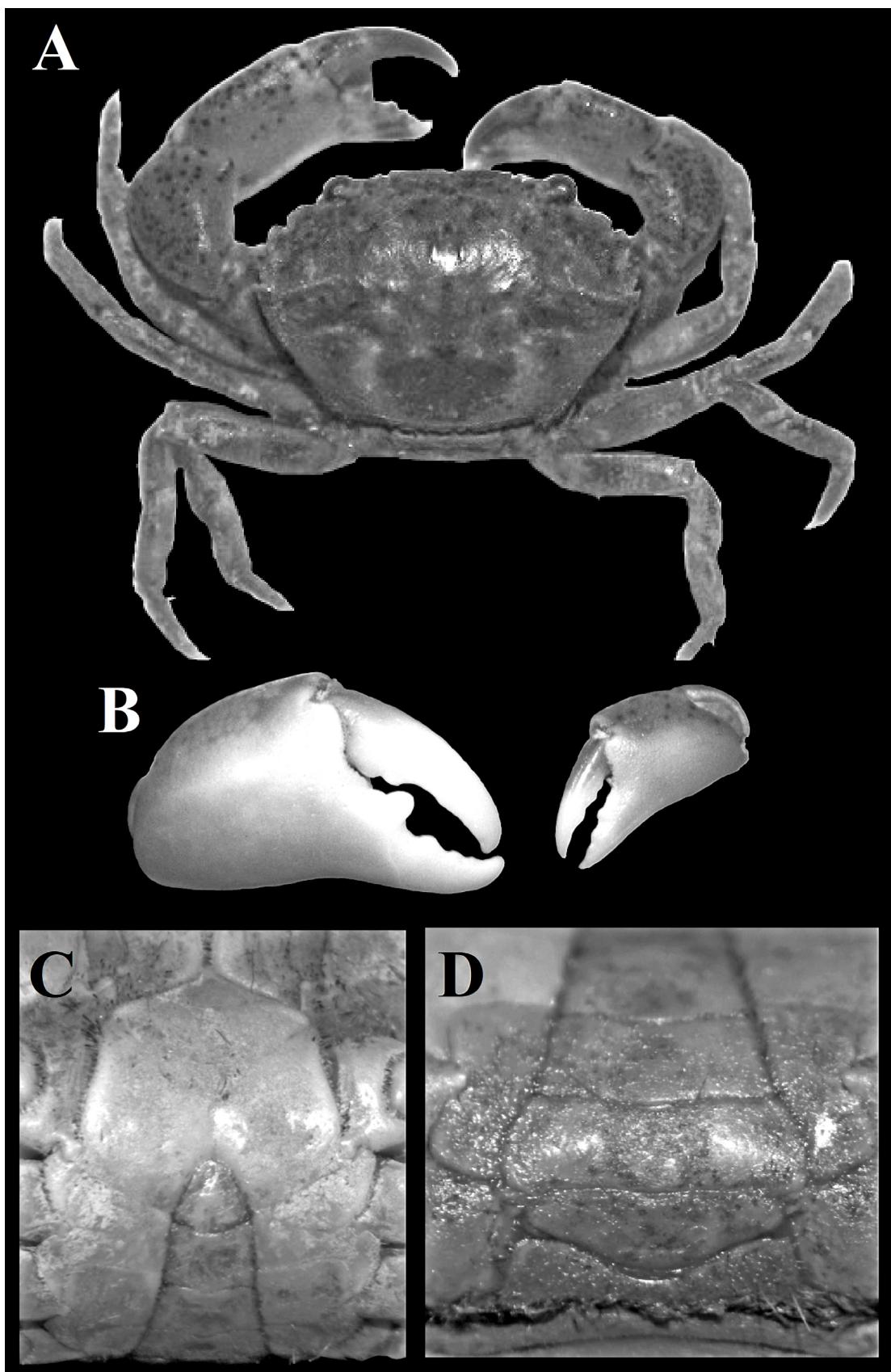
The species is so far reported from South Africa, Red Sea, Gulf of Aden, Persian Gulf, and Gulf of Oman (Naderloo, 2017). In India, the species was recorded from Gujarat (Gosavi et al., 2017) located on the west coast of India.

### Genus *Heteropanope* Stimpson, 1858

#### *Heteropanope glabra* Stimpson, 1858 (Figs. 6, 10D–F)



**Figure 5.** *Pilumnopeus convexus* (Maccagno, 1936), male (CW 15.3 mm, CL 11.3 mm) (LFSc.ZRC-70), Kuda, India. **A**, habitus, dorsal view; **B**, chelae, outer view; **C**, anterior thoracic sternum (sternites 1–4) and pleon; **D**, posterior thoracic sternum and pleon.



**Figure 6.** *Heteropanope glabra* Stimpson, 1858, male (CW 14.4 mm, CL 10.1 mm) (LFSc.ZRC-66), Ghogha mangroves, India. **A**, habitus, dorsal view; **B**, chelae, outer view; **C**, anterior thoracic sternum (sternites 1–4) and pleon; **D**, posterior thoracic sternum and pleon.

*Heteropanope glabra* Stimpson, 1858: 35.

*Eurycarcinus maculatus* Alcock, 1898: 212; Deb, 1999: 375.

*Heteropanope glabra* — Davie, 1989: 130–134, figs. 1a–j, 2; Tan and Ng, 1994: 84 (list); Ng et al., 2008: 140 (list); Naderloo and Türkay, 2012: 37; Naderloo et al., 2013: 449, tab. 1; Trivedi et al., 2015: 1–5, figs. 1, 2; Naderloo, 2017: 307, figs. 26.10d, 26.15, 26.16; Trivedi et al., 2018: 59 (list). [For complete synonymy see Davie, 1989: 130; Sakai, 1976: 503; Dai and Yang, 1991: 377].

*Type locality.* Hong Kong.

*Material examined.* 4 males (CW 14.4–6.0 mm; CL 10.1–4.0 mm), 6 females (CW 12.3–7.2 mm; CL 8.3–5.4 mm), LFSc.ZRC-66, Ghogha (21°40'41"N 72°17'06"E), Gujarat State, India, 14 April, 2014, coll. J. Trivedi.

*Remarks.* The specimens examined in the present study (Fig. 6) agree with the description and figures in Davie (1989). The G1 tip (Fig. 10D, E) is slightly longer compared to that figured in Davie (1989). This difference can easily be explained by the size of the present specimens.

This species is so far reported from East Africa, Persian Gulf, Gulf of Oman, Pakistan, India, Andaman Sea, Thailand, Hong Kong, Taiwan, Mergui Archipelago, Singapore, Australia, and New Caledonia (Sakai, 1976; Davie, 1989; Dai and Yang, 1991; Trivedi et al., 2015; Naderloo, 2017).

### Genus *Aniptumnus* Ng, 2002

#### *Aniptumnus quadridentatus* (De Man, 1895)

(Figs. 7, 8, 10G–I)

*Pilumnus seminudus* — De Man, 1887: 65 [not *Pilumnus seminudus* Miers, 1884 = *Glabropilumnus seminudus* (Miers, 1884)].

*Pilumnus quadridentatus* De Man, 1895: 537, fig. 6; Nobili, 1906: 278.

*Parapilumnus quadridentatus* Balss, 1933: 39 (list); Tan and Ng, 1994: 84 (list).

*Heteropanope neolaevis* Deb, 1995: 220; 1999: 374, figs. 3, 4; Ng et al., 2018: 475, 481–482; Trivedi et al., 2018: 59 (list).

*Aniptumnus quadridentatus* — Ng, 2002: 213, figs. 1, 2; Ng and Clark, 2008: figs. 13–18; Ng et al., 2008: 140 (list).

*Type locality.* Pontianak, West Kalimantan, Indonesia.

*Material examined.* Lectotype, male (CW 13.9 mm; CL 9.6 mm), ZSI-C1503/2, Matla River, Gangetic Delta, West Bengal State, India, December 1916, coll. S.W. Kemp. Paralectotypes, 4 males (CW 8.0–9.3 mm; CL 5.8–6.5 mm), same data as holotype.

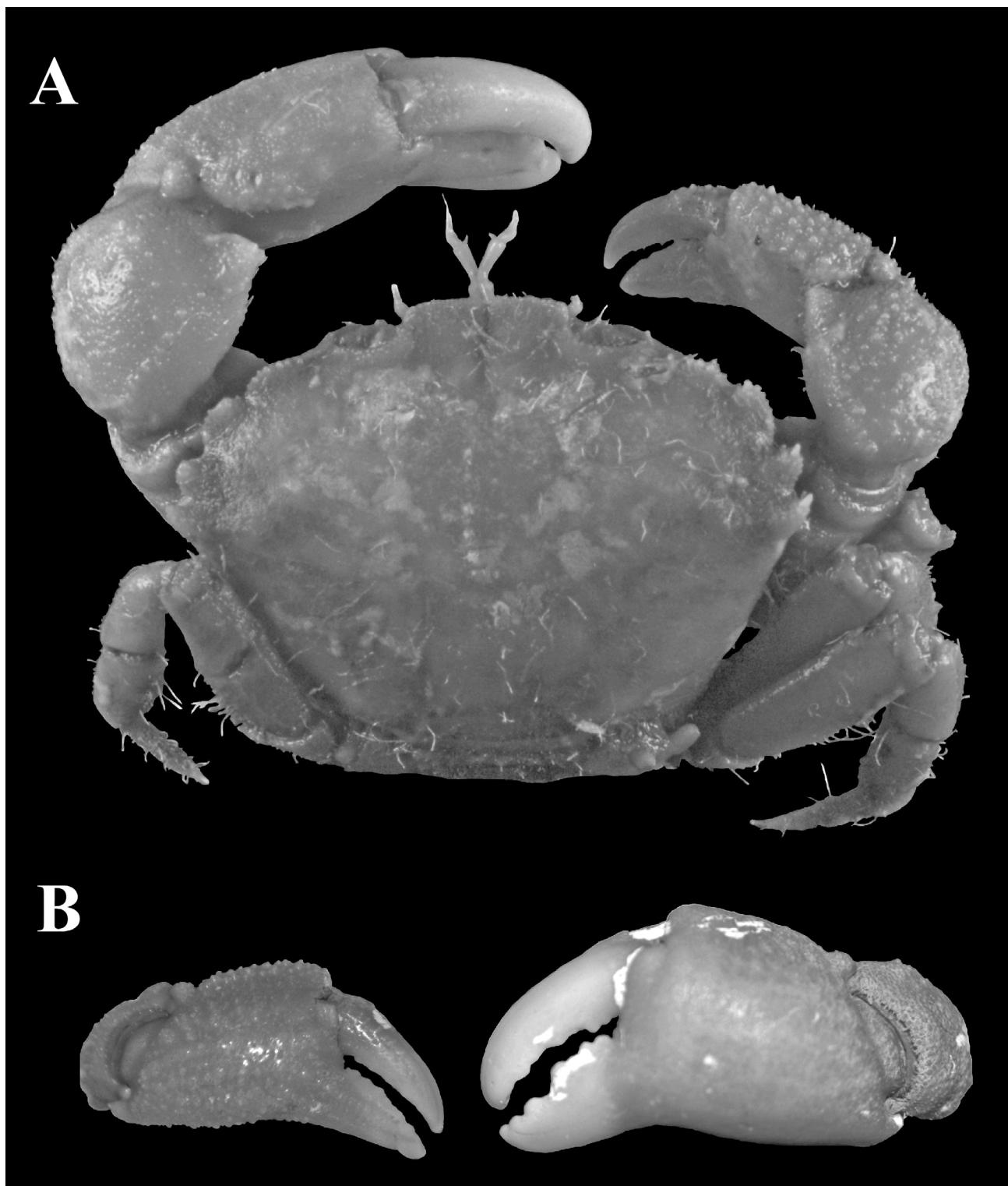
*Remarks.* Ng et al. (2018: 481–482) clarified the date of publication for *Heteropanope neolaevis*, noting that the correct spelling of the name and citation should be *Heteropanope neolaevis* Deb, 1995

Deb (1995: 220) listed “50 examples” of this species (as *H. neolaevis*) from an estuarine area in the Matla River, Gangetic Delta, West Bengal State, India, and no types were designated. Deb (1999: 374) noted that she had “Several (about 50) specimens including holotype and paratypes from Gangetic delta, collected by S. W. Kemp, Z.S.I. Regd. No. C1503/2”. She did not specify the sex or size of the holotype. In the ZSI, there is one male specimen labeled as holotype which has the same data as indicated by Deb (1999) and is here recognized as the lectotype since no holotype was noted in the original paper (Deb, 1995).

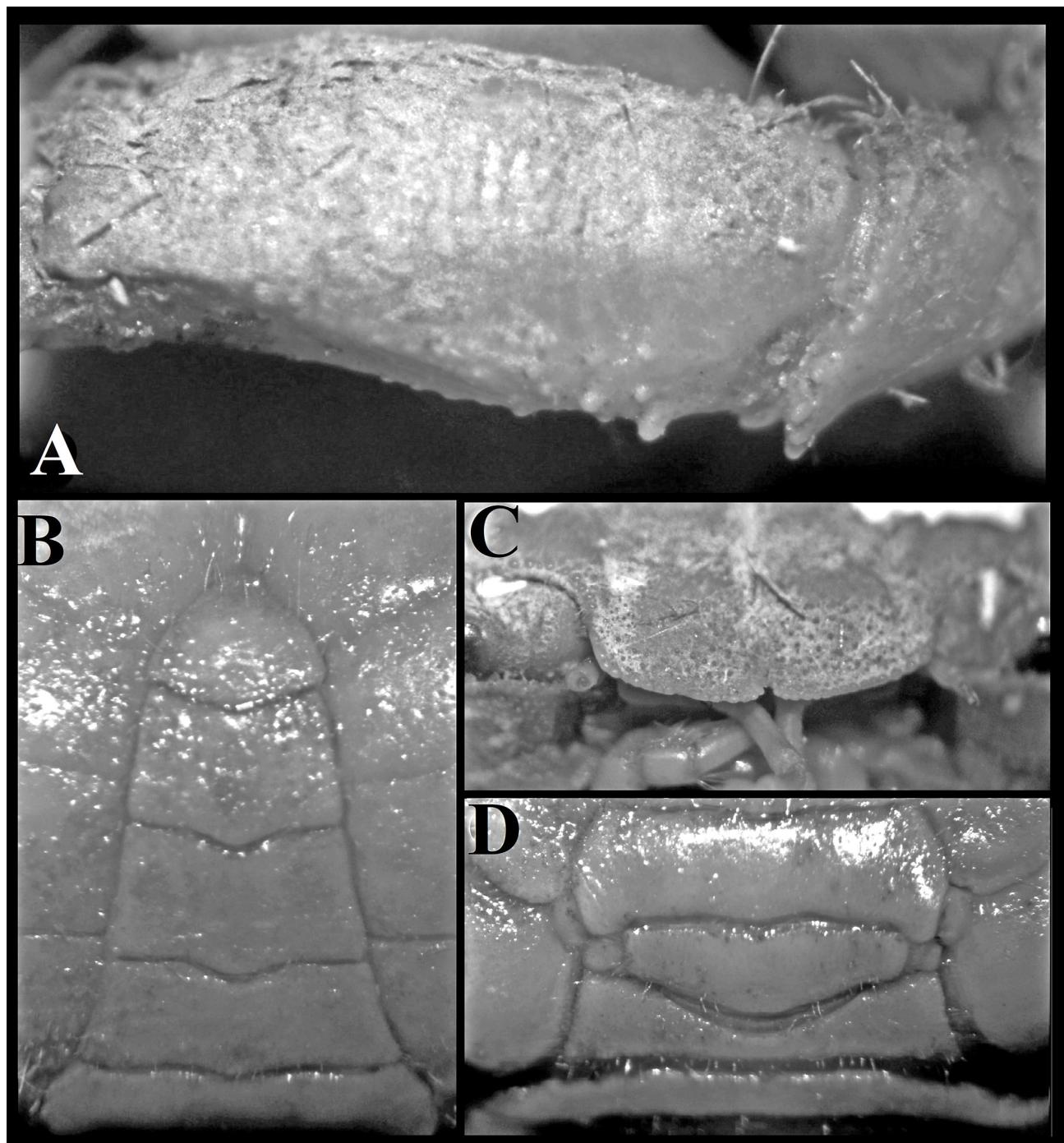
Ng et al. (2018: 475) commented that the species is neither *Heteropanope* nor *Pilumnopoeus* or *Benthopanope*, and the G1 figured (Deb, 1999: fig. 4) was unusual, being short and stout with the tip rounded. The lectotype and paralectotypes of *H. neolaevis* were examined and the *Heteropanope neolaevis* of Deb is here identified as *Aniptumnus quadridentatus* (De Man 1895). De Man (1895) described *Pilumnus quadridentatus* from a good series of specimens from the port of Pontianak, West Borneo, Indonesia. He also referred a specimen earlier obtained from Mergui (De Man, 1887) to this species. Nobili (1906) reported the species from Djibouti in the Red Sea, but his specimen should be re-examined in order to confirm its identification. Balss (1933)

first referred it to *Parapilumnus* De Man, 1895, but Ng (2002) reviewed the status of *Parapilumnus* and showed that this genus was actually not a pilumnid but an acidopsid. Ng (2002) selected a lectotype for *P.*

*quadridentatus* and made it the type for a new genus, *Aniptumnus*, characterized by its subtruncate G1 tip, presence of sharp granules on the ventral margin of the basis-ischium and merus of the fourth ambulatory leg.



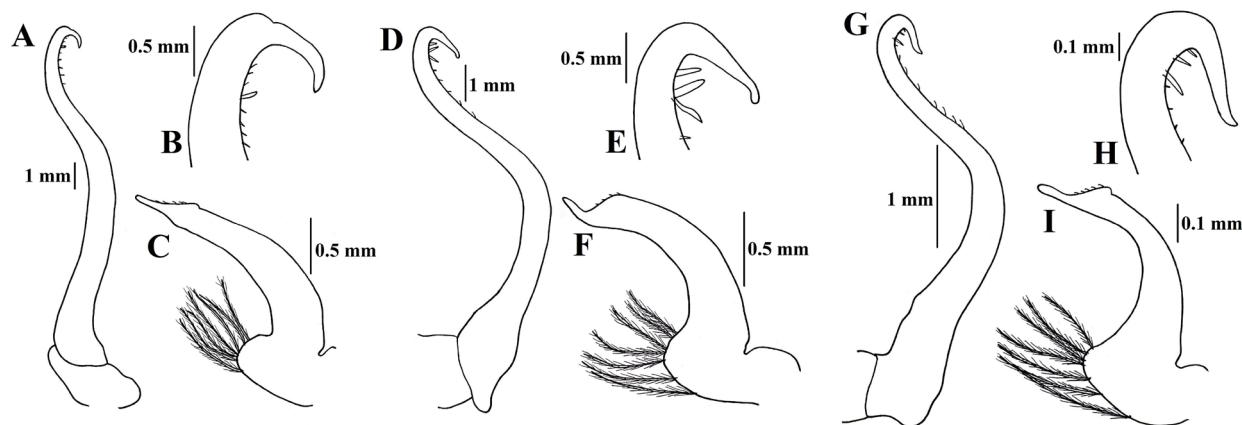
**Figure 7.** *Aniptumnus quadridentatus* (De Man, 1895), male (CW 13.9 mm; CL 9.6 mm) (ZSI-C1503/2) Matla River, India (lectotype of *Heteropanope neolaevis* Deb, 1995); **A**, habitus, dorsal view; **B**, chelae, outer view.



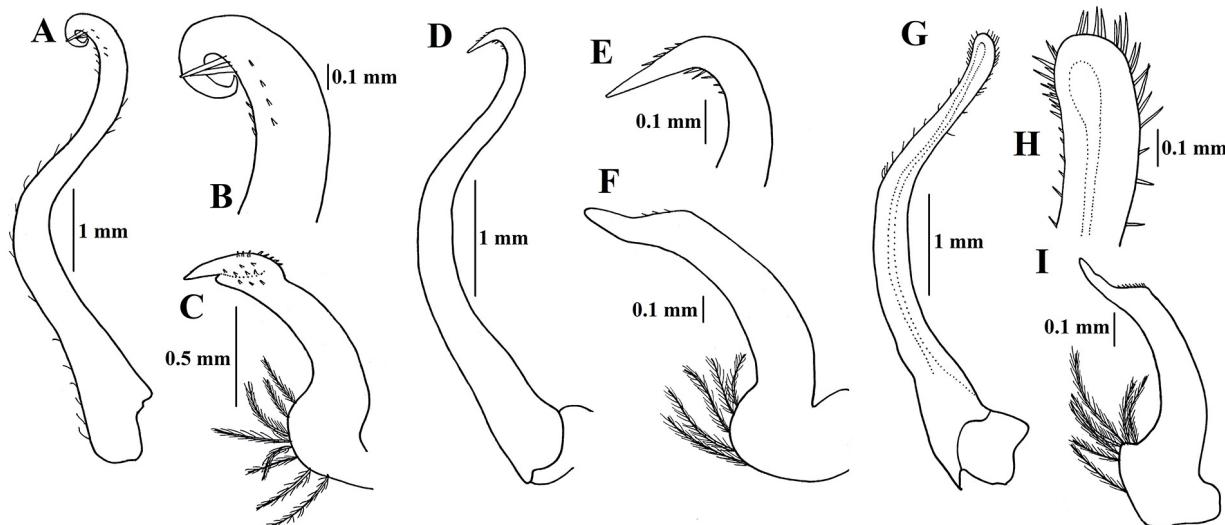
**Figure 8.** *Aniptumnus quadridentatus* (De Man, 1895), male (CW 13.9 mm; CL 9.6 mm) (ZSI-C1503/2) Matla River, India (lectotype of *Heteropanope neolaevis* Deb, 1995); **A**, fourth ambulatory leg merus and basis-ischium lateral view; **B**, pleon; **C**, frontal margin; **D**, posterior thoracic sternum and pleon.

The types of *H. neolaevis* agree with the descriptions and figures of *A. quadridentatus* by De Man (1895), Ng (2002), and Ng and Clark (2008) and are considered conspecific. The carapace, cheliped and ambulatory leg characters all agree (Figs. 7A, b, 8A). The G1 of *H. neolaevis* figured by Deb (1999: Fig. 4) is inaccurate, being much shorter and stouter in her illustration. The

actual G1 closely resembles that of *A. quadridentatus*, except that the tip is more rounded and less produced (Fig. 10G, H), but this can easily be explained by variation. In addition, the male sternite 8 of the types of *H. neolaevis* are exposed when the male pleon is closed (Fig. 8D; see also Ng and Clark, 2008; Hsueh et al., 2009).



**Figure 9.** **A–C**, *Eurycarcinus orientalis* A. Milne-Edwards, 1867, male (CW 41.5 mm, CL 26.9 mm) (LFSc.ZRC-64), Kamboi, India; **D–F**, *Eurycarcinus integrifrons* De Man, 1879, male (CW 28.2 mm, CL 19.9 mm) (LFSc.ZRC-63), Lakhpat, India; **G–I**, *Eurycarcinus bengalensis* Deb, 1999, holotype male (CW 25.1 mm, CL 16.9 mm) (ZSI-C3349/2), Chamta Block, India. **A, D, G**, ventral view of left G1; **B, E, H**, ventral view of distal part of left G1; **C, F, I**, left G2.



**Figure 10.** **A–C**, *Pilumnopoeus convexus* (Maccagno, 1936), male (CW 15.3 mm, CL 11.3 mm) (LFSc.ZRC-70), Kuda, India; **D–F**, *Heteropanope glabra* Stimpson, 1858, male (CW 14.4 mm, CL 10.1 mm) (LFSc.ZRC-66), Ghogha mangroves, India; **G–I**, *Aniptumnus quadridentatus* (De Man, 1895), male (CW 13.9 mm; CL 9.6 mm) (ZSI-C1503/2) Matla River, India (lectotype of *Heteropanope neolaevis* Deb, 1995). **A, D, G**, ventral view of left G1; **B, E, H**, ventral view of distal part of left G1; **C, F, I**, left G2.

*Aniptumnus quadridentatus* is a mangrove species, occurring in brackish waters. The type locality, Pontianak, is a port at the opening of the Kapuas River in Borneo and is surrounded by mangroves. In Malaysia and Singapore, the species is often found among fouling communities in mangrove and estuarine habitats. When present, it often occurs in large numbers.

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