



Establishment of a new genus for *Asthenognathus gallardoi* Serène & Soh, 1976 within Gaeticinae Davie & N.K. Ng, 2007 (Crustacea: Decapoda: Brachyura: Varunidae)

TOHRU NARUSE¹ & PAUL F. CLARK²

¹ Raffles Museum of Biodiversity Research, Department of Biological Sciences, National University of Singapore, Kent Ridge, Singapore 119260, Republic of Singapore.

(Present address: University of the Ryukyus, 1 Senbaru, Nishihara, Okinawa 903-0213, Japan, E-mail: naruse@lab.u-ryukyu.ac.jp)

² Department of Zoology, The Natural History Museum, Cromwell Road, London SW7 5BD, England. E-mail: p.clark@nhm.ac.uk

Abstract

Recently collected *Asthenognathus gallardoi* Serène & Soh, 1976 from Thailand and the Philippines are examined. *Asthenognathus gallardoi* possesses long setae of the palp of the third maxilliped and the fused male abdominal segments that are diagnostic characters of Gaeticinae Davie & N.K. Ng, 2007. Although the species lacks the longitudinal sulcus on the anterior segments of the sternum, which is another diagnostic character of Gaeticinae, the anterior part of the sternum is gently concave. The presences of these features indicate that *Asthenognathus gallardoi* belongs to Gaeticinae, not Asthenognathinae Stimpson, 1858. A new genus is established for *Asthenognathus gallardoi* to accommodate it in Gaeticinae.

Key words: *Asthenognathus gallardoi*, Varunidae, Gaeticinae, new genus, Thailand, Philippines

Introduction

The type species of *Asthenognathus* Stimpson, 1858 is *A. inaequipes* by monotypy, (Opinion 85, Direction 37); gender masculine. Stimpson (1858) assigned the genus to the Asthenognathidae. Three additional species have been described and assigned to this genus: *A. hexagonum* Rathbun, 1909, *A. atlanticus* Monod, 1933, and *A. gallardoi* Serène & Soh, 1976. Although the Asthenognathidae has traditionally been assigned to the Pinnotheroidea de Haan, 1833, P.K.L. Ng *et al.* (2008) established this taxon as a subfamily within the Varunidae H. Milne Edwards, 1853 (Grapsoidea MacLeay, 1838). Furthermore, P.K.L. Ng *et al.* (2008) considered *A. gallardoi* to be an unusual species in that it differed from other species assigned to *Asthenognathus* with respect to the form of its carapace and third maxilliped characters. However, *A. gallardoi* shares more significant characters with members of the subfamily Gaeticinae Davie & N.K. Ng, 2007 than with Asthenognathinae taxa. The purpose of this paper is to establish a new genus to accommodate *Asthenognathus gallardoi* within Gaeticinae.

The measurements provided, in millimetres, are carapace width (CW) and length (CL) respectively. Specimens examined are deposited in the Muséum national d'Histoire naturelle, Paris (MNHN); the Natural History Museum, London (NHM); the National Museum of the Philippines, Manila (NMCR); the Zoological Laboratory, Kyushu University, Fukuoka, Japan (ZLKU) (specimens that have been transferred to the Kitakyushu Museum of Natural History and Human History, Fukuoka, Japan); and the Zoological Reference Collection (ZRC) of the Raffles Museum of Biodiversity Research, National University of Singapore. Abbreviations used: ovigerous = ovig.; station = stn; coll. = collected by.

Family Varunidae H. Milne Edwards, 1853

Subfamily Gaeticinae Davie & N.K. Ng, 2007

Gopkittisak n. gen.

Asthenognathus — Serène & Soh, 1976: 27 (part); Jiang *et al.*, 2007: 77 (part).

Type species: *Asthenognathus gallardoi* Serène & Soh, 1976, by present designation.

Diagnosis. Carapace elliptical, dorsal surface with transverse ridges; posterior lateral facet present. Short infraorbital margin extended downwards from external orbital angle, ventral side of orbit demarcated by sub-orbital crista, continuous laterally as far as below lateral end of anterior lateral epibranchial crista of dorsal surface. Epistome short. Eyes well-developed. Antennule basal article large. Antennal basal article reaching lateral frontal angle, inner orbital tooth reaching middle to lateral frontal angle. Third maxillipeds less than two-thirds of buccal cavern when closed; ischium and merus subrectangular, these segments divided by oblique border; carpus attached to lateral half of distal margin of merus, propodus and dactylus attached to distal end of respective proximal segment; dactylus with long setae, reaching concavity of thoracic sternites 1–3. Male thoracic stenites 1/2 fused, stenite 3 demarcated from stenites 1/2 and 4, female thoracic stenites 1/2 and 3/4 fused respectively, both male and female thoracic stenites medially concave. Male third to sixth abdominal segments functionally fused.

Etymology. The genus is named in memory of Mrs Pharadee (Gop) Uchuphab and Mr Kittisak Raksasri who perished when the Tsunami swept through the Ranong Coastal Research Station, Ranong Province, Thailand on 26 December 2004. They are both missed, but still remembered. The name is an arbitrary combination of two first names and the gender is neuter.

Remarks. Peter K.L. Ng *et al.* (2008) stated that *Asthenognathus gallardoi* Serène & Soh, 1976 should not be assigned to *Asthenognathus*, as it is markedly different from the type species (*A. inaequipes*) in the transversely more elongated elliptical shape of the carapace and the presence of the transverse ridges on the carapace (Fig. 1a, b; Serène & Soh, 1976: Fig. 28B, Pl. VIII A; Ghani & Tirmizi, 1991: Fig. 1A, B; Jiang *et al.*, 2007: Fig. 1a). These morphological differences warrant that *A. gallardoi* should be placed in its own genus. *Gopkittisak*, new genus, is here established to accommodate *A. gallardoi*.

Systematic position of *G. gallardoi* is also problematic. Davie & N.K. Ng (2007) recently established the subfamily Gaeticinae for *Gaetice* Gistel, 1848 and *Sestrostoma* Davie & N.K. Ng, 2007. The diagnostic characters of this subfamily are: 1) long setae for suspension feeding on the palp of the third maxilliped, 2) a longitudinal sulcus on the anterior segments of the sternum for the long setae of the palp of third maxilliped, and 3) fused third to sixth male abdominal segments. Among these characters, *G. gallardoi* share the long setae of the palp of the third maxilliped and the fused male abdominal segments (Fig. 2a; Serène & Soh, 1976: Fig. 28A; Ghani & Tirmizi, 1991: Fig. 1C, F; Jiang *et al.*, 2007: Fig. 1d, e). Although *G. gallardoi* lacks the longitudinal sulcus on the anterior segments of the sternum, the anterior part of the sternum is gently concave so that the long setae can be accommodated. Furthermore, *Gaetice* and *Gopkittisak* share a markedly oblique border of the merus and ischium of the third maxilliped. The presence of these similar characters indicates that it is best to place *Gopkittisak* within Gaeticinae.

Paracleistostoma fossulum Barnard, 1955, also possesses the transverse ridges on the dorsal surface of the carapace (P.K.L. Ng *et al.*, 2008: 229). The systematic position of *P. fossulum* is uncertain, however. Barnard (1955) placed it under Ocypodidae, but Manning & Holthuis (1981: 209) stated that "[*P. fossulum* is] certainly no *Paracleistostoma* and possibly not even an ocypodid". Peter K.L. Ng *et al.* (2008) argued that the chela and the third maxilliped of *P. fossulum* is unlikely that of any Camptandriidae, and they transferred it to the Varunidae, although they treated it as "Subfamily incertae sedis". *Gopkittisak gallardoi* is similar to *P. fossulum* in

the presence of the dorsal ridges, but *G. gallardoi* can be differentiated from *P. fossulum* by the characters listed in Table 1.

Monod (1933) described *Asthenogathus atlanticus* from Atlantic side of Morocco. The holotype of *A. atlanticus* possesses *Gopkittisak*-type of the third maxilliped, with oblique border between merus and ischium and long setae from dactylus (Monod, 1933: Fig. 8A, B). He described the male abdomen as 7-segmented, but it is not certain whether it is functionally fused or completely segmented. Further study may prove that *A. atlanticus* is indeed a member of Gaeticinae. In that case, a new genus is needed to accommodate *A. atlanticus* as it is different from other gaeticine genera. The taxonomic statuses of the specimens subsequently recorded as “*A. atlanticus*” are also unclear. Monod (1956) reported 6 specimens of *A. atlanticus* from West Africa (2 ♂ and 2 ♀ from Mauritania; 1 ♂ from Senegal; 1 ♀ from the Gold Coast). Although at least the female specimen from the Gold Coast have a similar third maxilliped with the holotype of *A. atlanticus* (Monod, 1956: Fig. 543), the specimen from Senegal possesses a horizontal border between merus and ischium of third maxilliped (Monod, 1956: Fig. 544), which is same condition with *Asthenognathus sensu stricto*. The Senegal specimens are more similar to *A. inaequipes* than to *A. hexagonum* in its shape of the carapace, but the ischium of the third maxilliped is shorter than that of *A. inaequipes*, suggesting that it is most probably an undescribed species. Moreover, Bocquet (1963: Fig. 1) recorded *A. atlanticus* from France, but it appears to be a different new species as it has relatively wider carapace and ambulatory meri (Bocquet, 1963: 74, Fig. 7). *Asthenognathus atlanticus* has also been recorded from various authors (see Schmitt *et al.*, 1973; Franssen, 1991; d'Udekem d'Acoz, 1999). A taxonomic revision is necessary for the Atlantic *Asthenognathus*-like species.

TABLE 1. Characters distinguishing *Gopkittisak gallardoi* from *Paracleistostoma fossulum* Barnard, 1955.

CHARACTER	<i>Gopkittisak gallardoi</i>	<i>Paracleistostoma fossulum</i>
Anterolateral margin	Straight, merged with posterolateral margin	Undulate, forming angle with posterolateral margin
Carapace: dorsal surface: ridges on anterior half	Three short hepatic ridges	One long ridge
Carapace: dorsal surface: posterior ridge	Medial part placed behind of lateral parts	Straight
Ambulatory dactyli	Long, slender	Short, wide

Gopkittisak gallardoi (Serène & Soh, 1976) new combination

(Figs. 1–3)

Asthenognathus gallardoi — Serène & Soh, 1976: 1, Fig. 28A, B, Pl. VIII A, B; Ghani & Tirmizi, 1991: 100, Fig. 1;

Jiang *et al.*, 2007: 78, Fig. 1.

“*Asthenognathus*” *gallardoi* — P.K.L. Ng *et al.*, 2008: 226.

Material examined. Thailand: 1 ovig. ♀ (8.0 × 3.9 mm), NHM 2008.998, Tsunami Impacts in Laem Son Project, stn 120, 6 m, 9.46917°N 98.4039°E, off Laem Son National Park, Ranong Province, Andaman Sea, Thailand, coll. Paul Clark & Bob Foster Smith, by dredging, *Ocean One Ranong*, 29 November 2007; 1 ♂ (6.2 × 3.4 mm), 1 ovig. ♀ (6.7 × 3.7 mm), NHM 2008.4621–4622, 1 ♂ (7.4 × 4.0 mm), 1 ovig. ♀ (6.8 × 3.6 mm), ZRC 2008.1053, Rawai Beach, Phuket, Thailand, from under rocks on sandy to silty substratum, during extreme low tide, 0–0.5 m, coll. 7 March 2008. Philippines: 1 ♂ (9.9 × 5.4 mm), 2 ovig. ♀♀ (8.9 × 5.0 mm, 10.2 × 5.5 mm), ZRC 2008.1054, 2 ♀♀ (10.8 × 6.1 mm, 11.7 × 6.3 mm), 1 ovig. ♀ (9.5 × 5.3 mm), MNHN, Alona Beach, Panglao Island, Panglao Marine Biodiversity Project 2004, stn M1, 0–1 m, intertidal to shallow

subtidal, 9°32.9'N, 123°46.6'E, coll. Panglao Marine Biodiversity Project, 3 June 2004; 1 ♀ (9.2 × 5.2 mm), NMCR, Bohol Island, Panglao Marine Biodiversity Project 2004, stn T24, 35–57 m, 9°42.3'N, 123°50.3'E, coll. Panglao Marine Biodiversity Project, 23 June 2004.

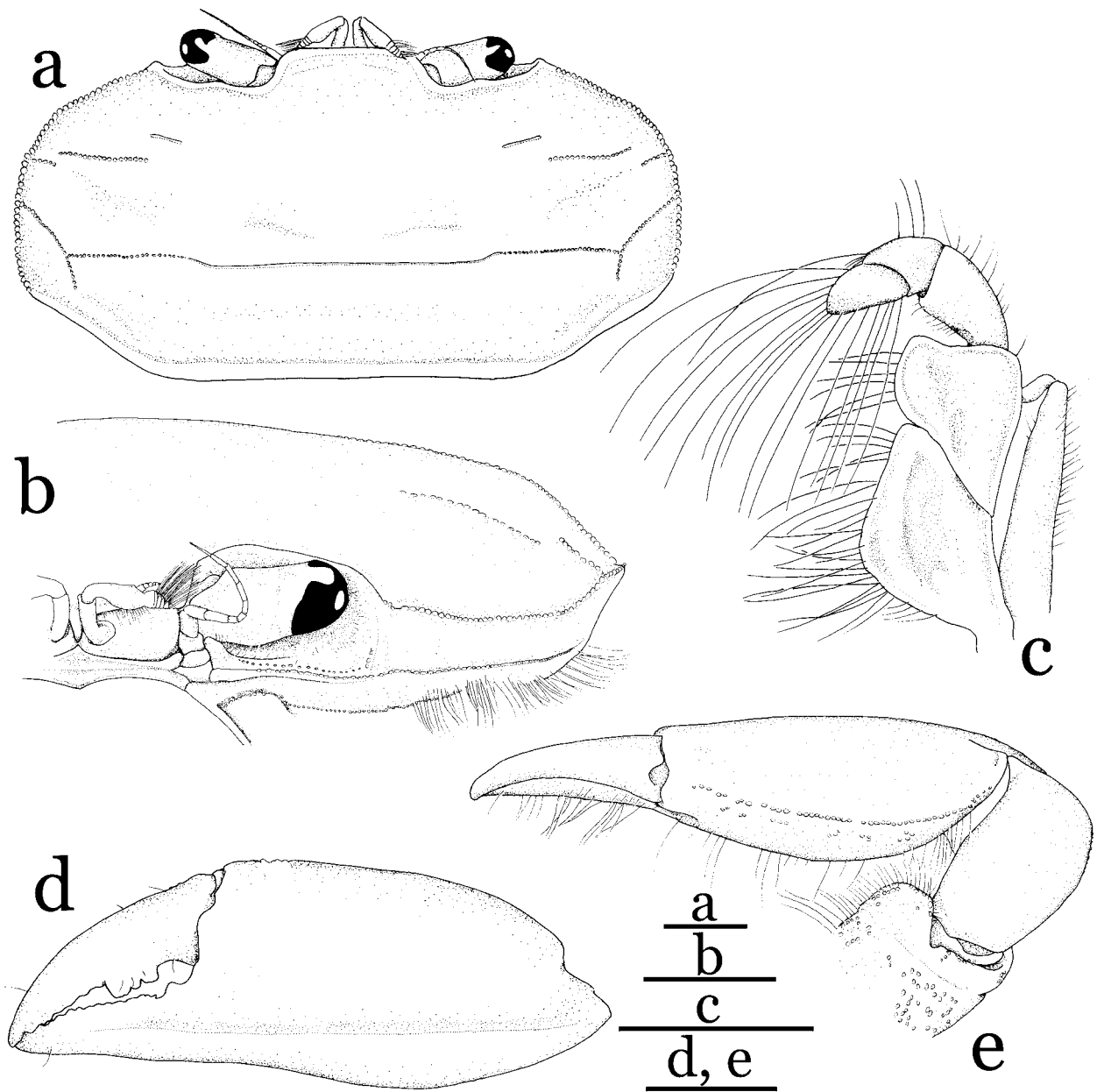


FIGURE 1. *Gopkittisak gallardoii* (Serène & Soh, 1976), ♀ (8.0 × 3.9 mm), NHM 2008.998: a, dorsal view of carapace; b, anterior view of cephalothorax; c, third maxilliped; d, left chela; e, dorsal view of right cheliped. Scale bars = 1 mm.

Comparative material. *Asthenognathus inaequipes* Stimpson, 1858: 1 ♀ (6.2 × 4.2 mm), ZLKU 8632, Ariake Sea, Kyushu, Japan, coll. 19 December 1957. *Asthenognathus hexagonum* Rathbun, 1909: 1 ♀ (7.8 × 5.5 mm), ZRC 1970.1.21.19, Manila Bay, Philippines, coll. 8 October 1964.

Description. Carapace elliptical, CW 1.76–2.05 times CL (mean = 1.83, n = 12), dorsally convex both longitudinally and transversely, dorsal surface smooth, with four transverse ridges (Fig. 1a); longest ridge on posterior third of carapace, medial part of ridge slightly placed posteriorly, laterally divergent, anterior branch reaching lateral carapace margin, posterior margin short, longitudinal, anterior, posterior branches forming posterior lateral facet of carapace; three short ridges on hepatic and branchial regions. Front straight, as wide

as orbit, front to supraorbital margins rimmed, not granulated, fronto-orbital margin as wide as proximal margin; external orbital angle almost at right angle, directed anteriorly; short infraorbital margin extended downwards from external orbital angle, ventral side of orbit demarcated by suborbital crista, continuous laterally as far as below lateral end of anterior lateral epibranchial crista of dorsal surface (Fig. 1b), a row of setae just below crista. Epistome short, with middle triangular projection. Anterolateral margin lined with granules, anterior half convergent anteriorly.

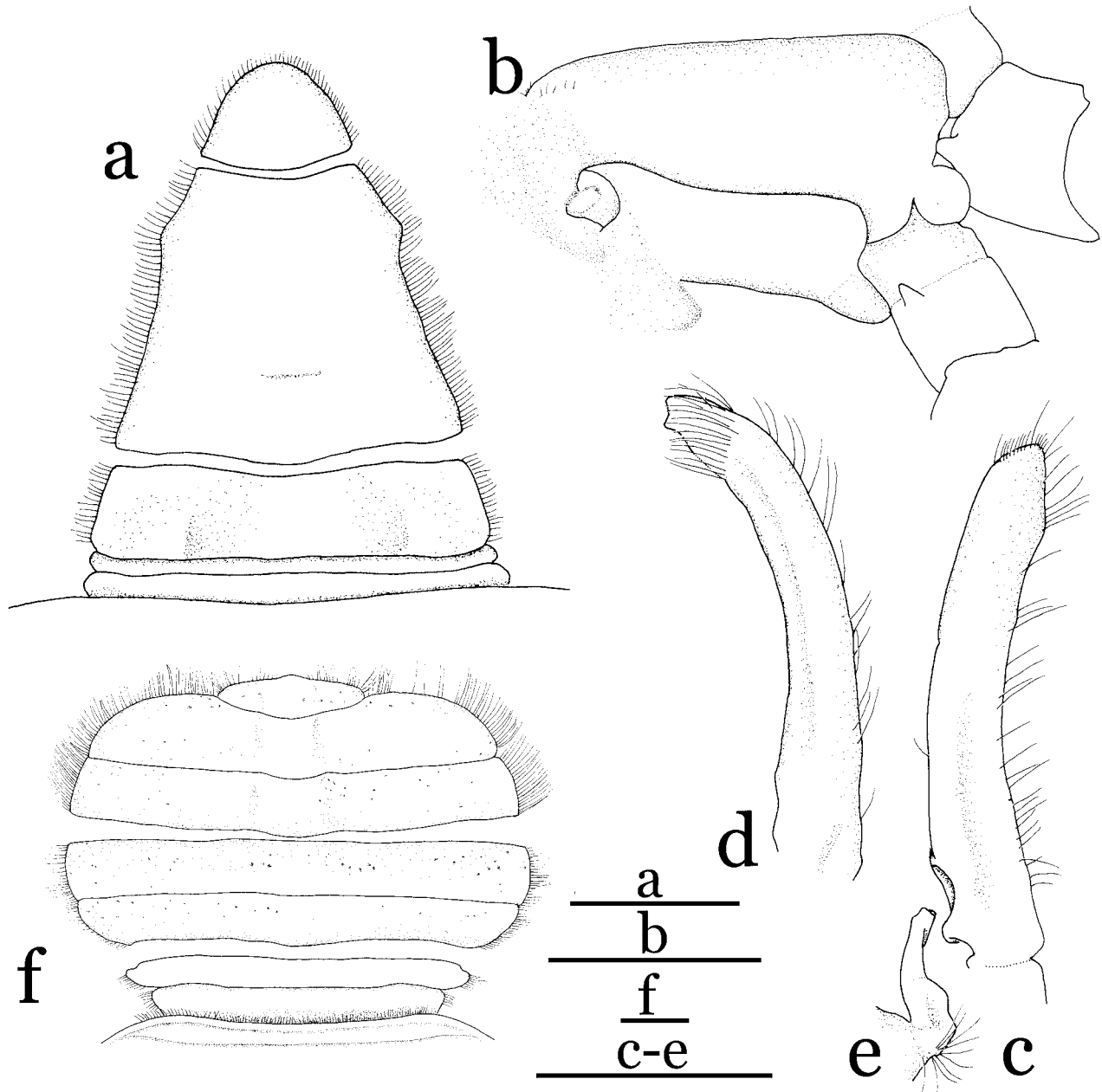


FIGURE 2. *Gopkittisak gallardoi* (Serène & Soh, 1976). a, ♂ abdomen and telson; b, ♂ thoracic sternites 7 & 8 (left); c, left G1, ventral view; d, left G1, inner view; e, left G2, ventral view; f, ♀ abdomen and telson. a, ♂ (6.2 × 3.4 mm), NHM 2008.4621–4622; b–e, ♂ (7.4 × 4.0 mm), ZRC 2008.1053; f, ♀ (8.0 × 3.9 mm), NHM 2008.998. Scale bars = 1 mm.

Eyes well-developed. Antennule basal article large. Antennal basal article reaching lateral frontal angle, inner orbital tooth reaching middle to lateral frontal angle. Third maxillipeds (Fig. 1c) filling less than two-thirds of buccal cavern when closed; ischium and merus subrectangular, these segments divided by oblique border, midlength of ischium slightly longer than that of merus; distal end of exopod not reaching to distal end

of merus, with long flagellum; carpus attached to lateral half of distal margin of merus, propodus and dactylus attached to distal end of respective proximal segment; carpus slightly longer than dactylus to propodus, propodus with row of long setae on extensor margin, dactylus lined with long setae on extensor, mesial margins. Buccal cavern wide, third maxillipeds only filling one-third of cavern.

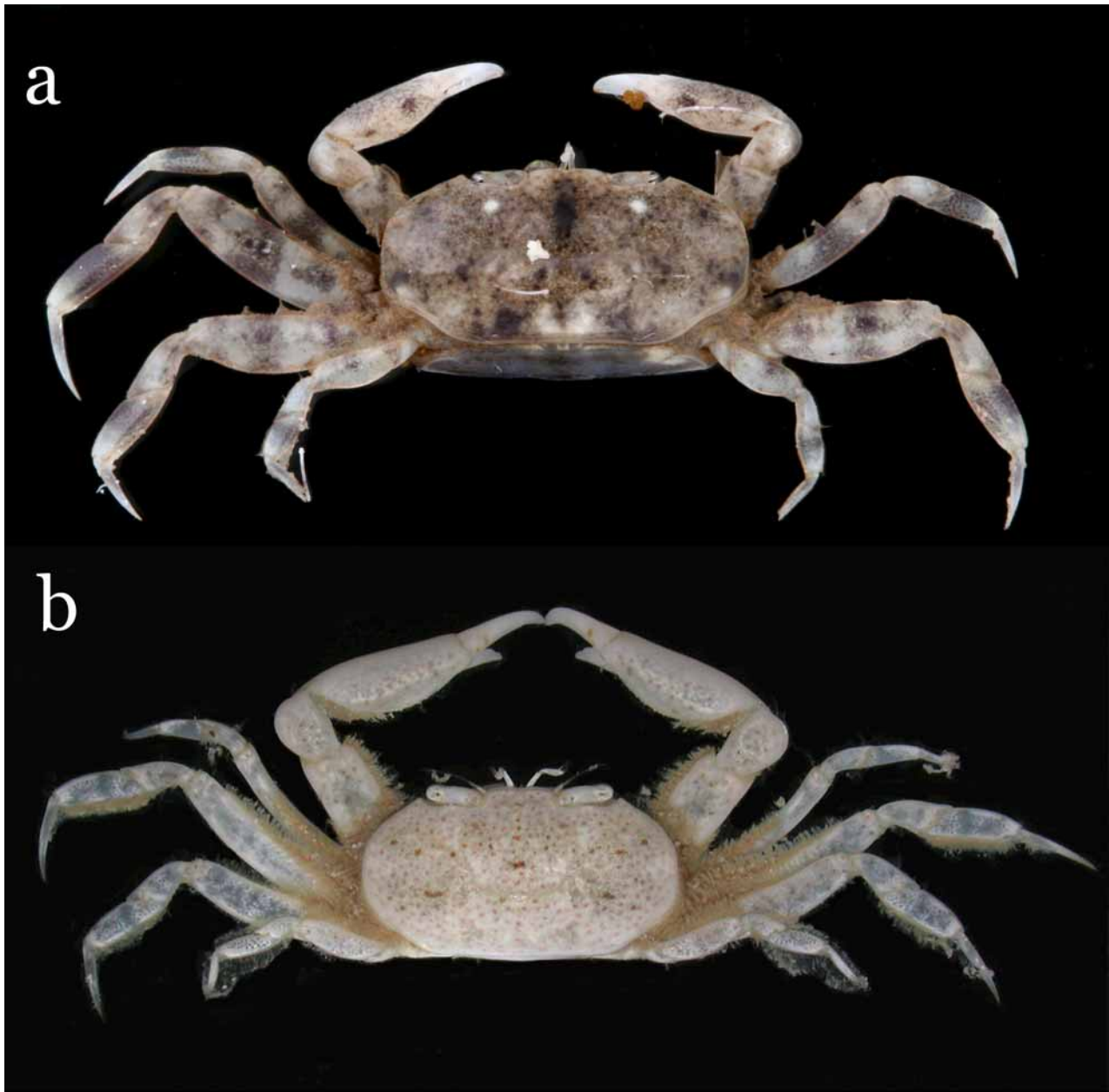


FIGURE 3. Fresh colouration of *Gopkittisak gallardoi* (Serène & Soh, 1976). a, ♀ from Ranong, Thailand, NHM 2008.998 (photo taken by Jube, Tsunami Impacts in Laem Son Project); b, ♂ from Panglao Island, the Philippines, ZRC 2008.1054.

Male thoracic sternites 1 and 2 fused, sternite 3 short, demarcated from sternites 1/2 and 4 by transverse rim, sternites 1–3 medially concave; sternal condyle on distal end of thoracic sternite 5. Penis sternal, appearing from distal end of thoracic sternite 8 (Fig. 2b). Female thoracic sternites 1/2 and 3/4 fused respectively, these sternites concave medially. Vulva on anterior half of thoracic sternite 5.

Chelipeds (Figs. 1e, 3) equal, smooth, longer in male; merus with subproximal part of dorsal margin, ventral inner margin with soft setae; carpus without inner angle; chela smooth, with one longitudinal crista from base of palm to immovable finger; dactylus with rectangular tooth, occlusal margin of tooth incised, distal

margin of tooth on middle of cutting edge; cutting edge of immovable finger regularly lined with low, rounded teeth. Ambulatory legs (Fig. 3) somewhat compressed dorso-ventrally, anterior part of proximal half of meri to ischia setose, meri with anterior, posterior margins granular; second leg longest, merus of second leg longer than carapace; fourth leg shortest, both outer, inner margins of propodus, inner margin of dactylus lined with plumose setae.

Male abdomen (Fig. 2a) relatively narrow; first and second segments short, third segment widest, first segment slightly narrower than third segment; third to sixth segments fused, fourth to sixth lacking suture from outer surfaces; proximal lateral angle of sixth segment convex laterally, with socket for sternal condyle on inner side (Fig. 2c, d). G1 stout, subtriangular in cross section, distally slightly curved outwards. Female abdomen (Fig. 2f) wide, fourth segment widest, almost reaching pereopodal coxae laterally; telson small, short, almost embraced by sixth segment.

Coloration. The specimens from Thailand are mottled brown with two anterior white spots on the carapace (Fig. 3a), while the Philippines specimens are beige in background and brown dots (Fig. 3b).

Distribution. *Gopkittisak gallardoi* was originally described from Andaman Sea, Thailand (Serène & Soh, 1976). They also recoded it from Nhatrang Bay, Vietnam. Subsequently the species has been recorded from Pakistan (Ghani & Tirmizi, 1991) and Weizhou Island, Gungxi, China (Jiang *et al.* 2007). The present study newly records this species from central Philippines.

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