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A New Species of Vampire Crab (Crustacea: Brachyura: Sesarmidae: *Geosesarma*) from a Freshwater Swamp Forest in Narathiwat Province, Southern Thailand, with a Note on *Geosesarma serenei* Ng, 1986

PETER K. L. NG[1], PUN YEESIN[2] AND RUEANGRIT PROMDAM[3*]

[1]Lee Kong Chian Natural History Museum, National University of Singapore, 14 Science Drive 4, Singapore 117543, REPUBLIC OF SINGAPORE
[2]Department of Technology and Industries, Faculty of Science and Technology, Prince of Songkla University, Pattani, THAILAND
[3]Princess Maha Chakri Sirindhorn Natural History Museum, Prince of Songkla University, Hat Yai, Songkhla 90110, THAILAND
[*]Corresponding author. Rueangrit Promdam (rueangrit.p@psu.ac.th)
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ABSTRACT. – A new species of vampire crab, *Geosesarma todaeng*, is described from a freshwater swamp forest in Narathiwat Province, Peninsular Thailand. This lowland species belongs to the *G. foxi* species group and can be distinguished from congeners by its carapace, male pleon and male first gonopod features. This brings to three the number of *Geosesarma* species now known from Thailand. The other member of *G. foxi* species group that previously record in Peninsular Thailand, *G. serenei* is discussed.

KEYWORDS: Decapoda, semi-terrestrial freshwater sesarmid, *Geosesarma todaeng*, lowland swamp forest, Peninsular Thailand

INTRODUCTION

Thailand has one of the richest diversities of primary freshwater crab species in the world, but few species of secondary freshwater crabs such as wholly freshwater sesarmids of the genus *Geosesarma* De Man, 1892 (Yeo and Ng, 1999; Yeo et al., 2008). While there are a large number of *Geosesarma* species reported from Malaysia, Indonesia and Brunei (e.g., Ng, 1988, 2015, 2017, 2021; Ng and Grinang, 2018; Ng and Ng, 2019; Ng and Wowor, 2019, 2022; Ng et al., 2015; Schubart and Ng, 2014), Thailand only has two reported species: *G. serenei* Ng, 1986 [referred to by Tweedie (1940) as "*Sesarma foxi*" from "Lacom", probably Nakhon Sri Thammarat, southern Thailand (see later; Ng, 2017)], and *G. krathing* Ng and Naiyanetr, 1992, from Chantaburi Province, eastern Thailand (Ng, 1986; Ng and Naiyanetr, 1992; Yeo and Ng, 1999; Ng, 2017). There are a number of sesarmid species of *Pseudosesarma* Serène and Soh, 1970, and *Manarma* Schubart and Ng, 2020, which live mainly in mangroves or coastal areas but often occur further inland in freshwater areas (see Ng and Schubart, 2017; Schubart and Ng, 2020), but unlike *Geosesarma* that have large eggs and whose life cycles are independent of the sea (Ng, 1988), these taxa have small eggs and need to return to the sea to release their free-swimming planktotrophic larvae.

In this note, we describe a new species of *Geosesarma* from a freshwater swamp forest in Narathiwat in southern Thailand.

MATERIALS AND METHODS

Material examined is deposited in the Princess Maha Chakri Sirindhorn Natural History Museum, Prince of Songkla University, Hat Yai, Thailand (PSUZC); and Zoological Reference Collection (ZRC) of the Lee Kong Chian Natural History Museum (formerly Raffles Museum of Biodiversity Research), National University of Singapore. The terminology used follows Ng (1988) and Davie et al. (2015). The following abbreviations are used: asl = above sea level; coll. = collected by; G1 = male first gonopod; G2 = male second gonopod. The measurements provided (in millimetres) are of the maximum carapace width and length, respectively.

RESULTS

TAXONOMY

Family Sesarmidae Dana, 1851
Genus *Geosesarma* De Man, 1892

Type species: *Sesarma* (*Geosesarma*) *nodulifera* De Man, 1892, subsequent designation by Serène and Soh (1970).

Geosesarma todaeng n. sp.
(Figs 1–6)

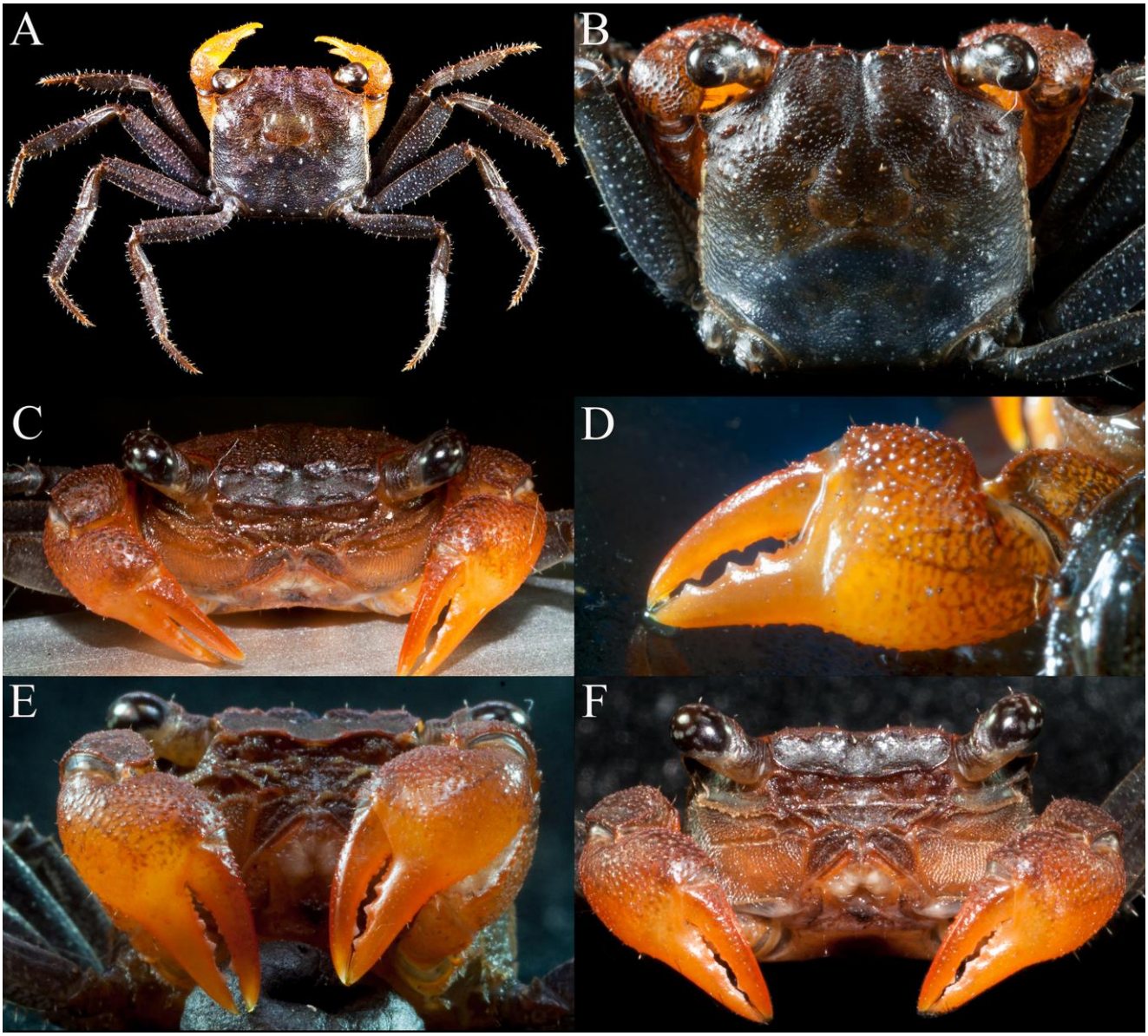

FIGURE 1. *Geosesarma todaeng* n. sp., specimens (not preserved) observed at the type locality, Narathiwat Province, Thailand, live colouration. A, overall dorsal view; B, dorsal view of carapace; C, F, frontal view of cephalothorax; D, E, chelae.

Holotype.– Male (11.6 × 11.4 mm) (ZRC 2021.0816), on fruits of palm *Eleiodoxa conferta* (Griff.) Burret, freshwater swamp forest, Narathiwat Province, Peninsular Thailand, coll. P. Yeesin, 30 December 2016.

Paratypes.– 1 female (11.6 × 11.1 mm) (ZRC 2021.0825), same data as holotype; 3 males (11.5 × 11.4 mm, 10.0 × 10.0 mm, 8.4 × 8.3 mm), 1 female (9.2 × 8.9 mm) (PSUZC), on fruits of palm *E. conferta*, freshwater swamp forest, Narathiwat Province, Peninsular Thailand, coll. P. Yeesin, 26 December 2021.

Etymology.– The name is derived from the type locality, Ban To Daeng. The name is used as a noun in apposition.

Diagnosis.– Carapace quadrate, slightly wider than long, adult width to length ratio 1.0–1.1, lateral margins parallel (Figs. 1A, B, 2); dorsal surface with regions just visible, anterior regions with small, low rounded granules on gastric regions (Fig. 2C, D); front distinctly deflexed, 2 frontal lobes broad with almost straight margins in dorsal view; postfrontal, postorbital cristae sharp, distinct (Fig. 2C, D); external orbital tooth (= first lateral tooth) triangular, directed obliquely laterally, outer margin gently convex, tip not

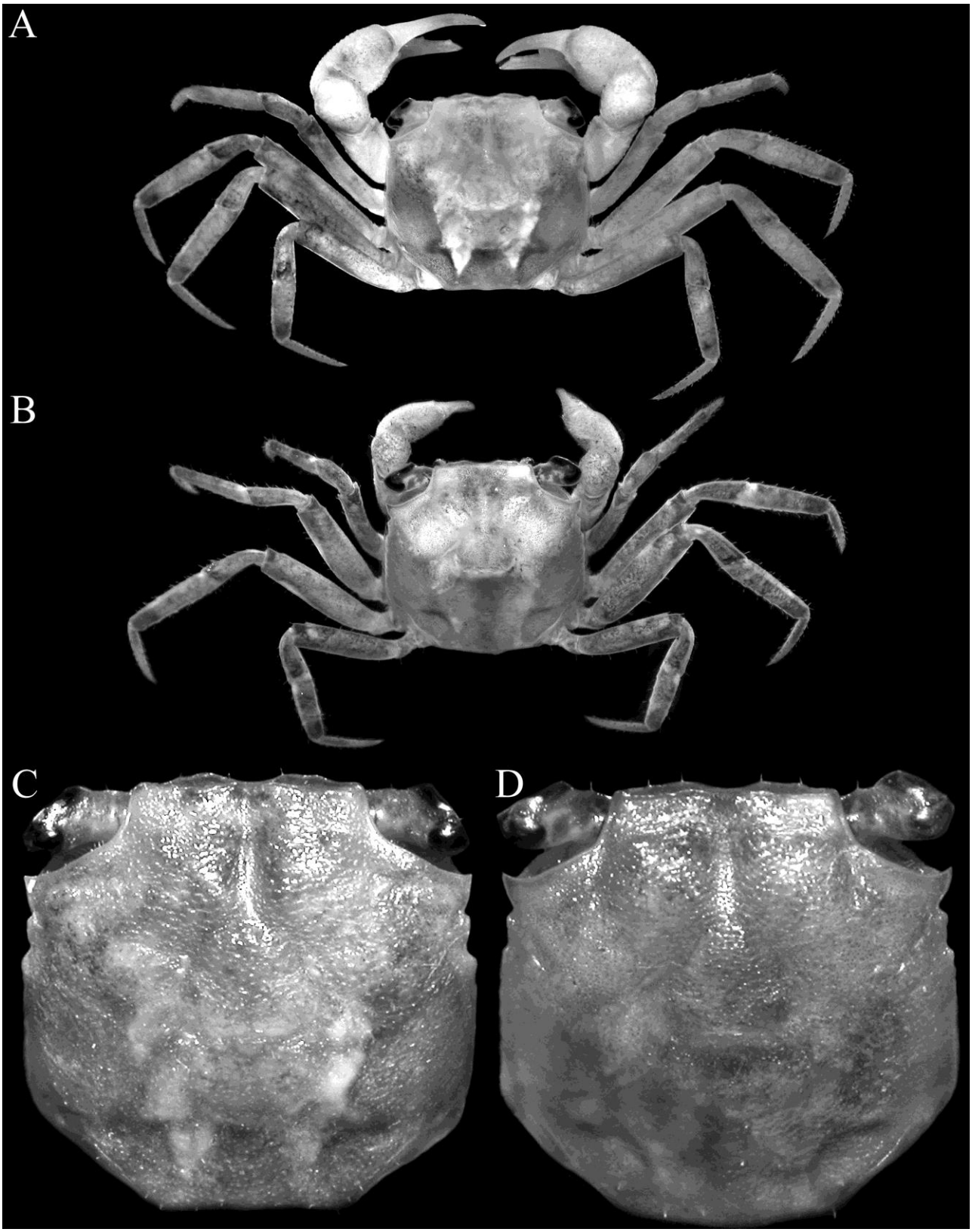

FIGURE 2. *Geosesarma todaeng* n. sp. A, C, holotype male (11.6 × 11.4 mm) (ZRC 2021.0816), Peninsular Thailand; B, D, paratype female (11.6 x 11.1 mm) (ZRC 2021.0825), Peninsular Thailand. A, B, overall dorsal view; C, D, dorsal view of carapace.

extending distinctly beyond lateral margin; second lateral tooth low, distinct, separated from rest of margin by wide cleft (Fig. 2C, D). Merus of third maxilliped subovate, shorter than ischium; exopod slender with no trace of flagellum (Fig. 4A). Outer surface of palm of adult male covered with small, low

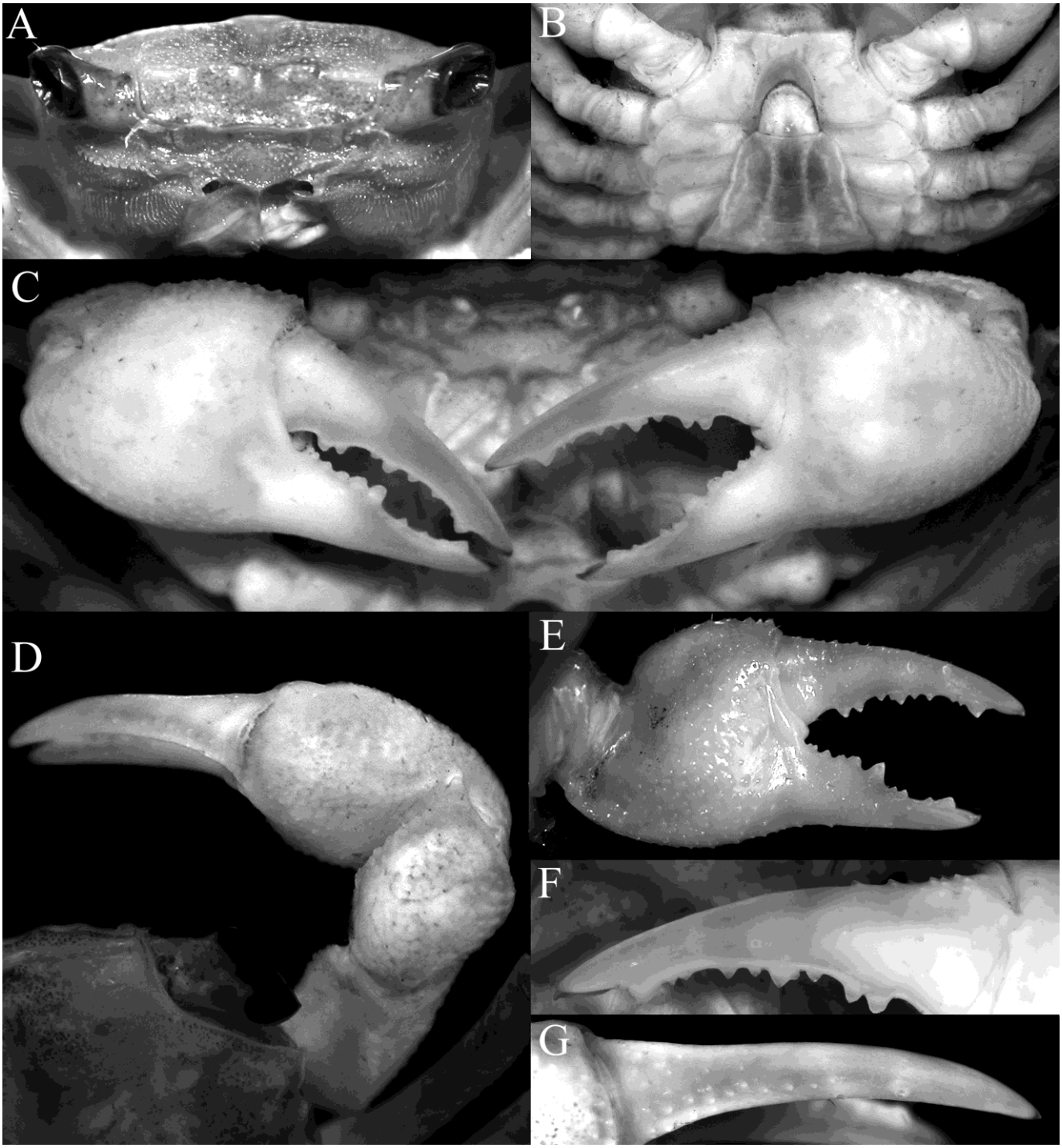

FIGURE 3. *Geosesarma todaeng* n. sp., holotype male (11.6 × 11.4 mm) (ZRC 2021.0816), Peninsular Thailand. A, frontal view of male cephalothorax; B, male anterior thoracic sternum and pleon; C, chelae; D, dorsal view of right cheliped; E, inner view of left chela; F, dactylus of left chela; G, dorsal view of dactylus of left chela.

rounded granules and striae; inner surface granulated but without transverse ridge; dorsal margin of dactylus with 7 or 8 low, non-chitinous tubercles on inner side of proximal third, proximal ones clustered together (Figs. 2A, B, 3C–G). Ambulatory legs with long, slender merus, with low subdistal spine on dorsal margin, surfaces gently rugose (Figs. 2A, B, 4C). Male pleon triangular; somite 6 wide with convex lateral margins; telson almost semicircular, not recessed into distal margin of somite 6 (Figs. 3B, 4B). G1 slender; outer margin of subdistal part of subterminal segment (in ventral view) with distinct shelf-like angle (Fig. 5A, B, D), distal chitinous part elongated, bent at angle of ca. 40º from longitudinal, distal part gently curved, tip

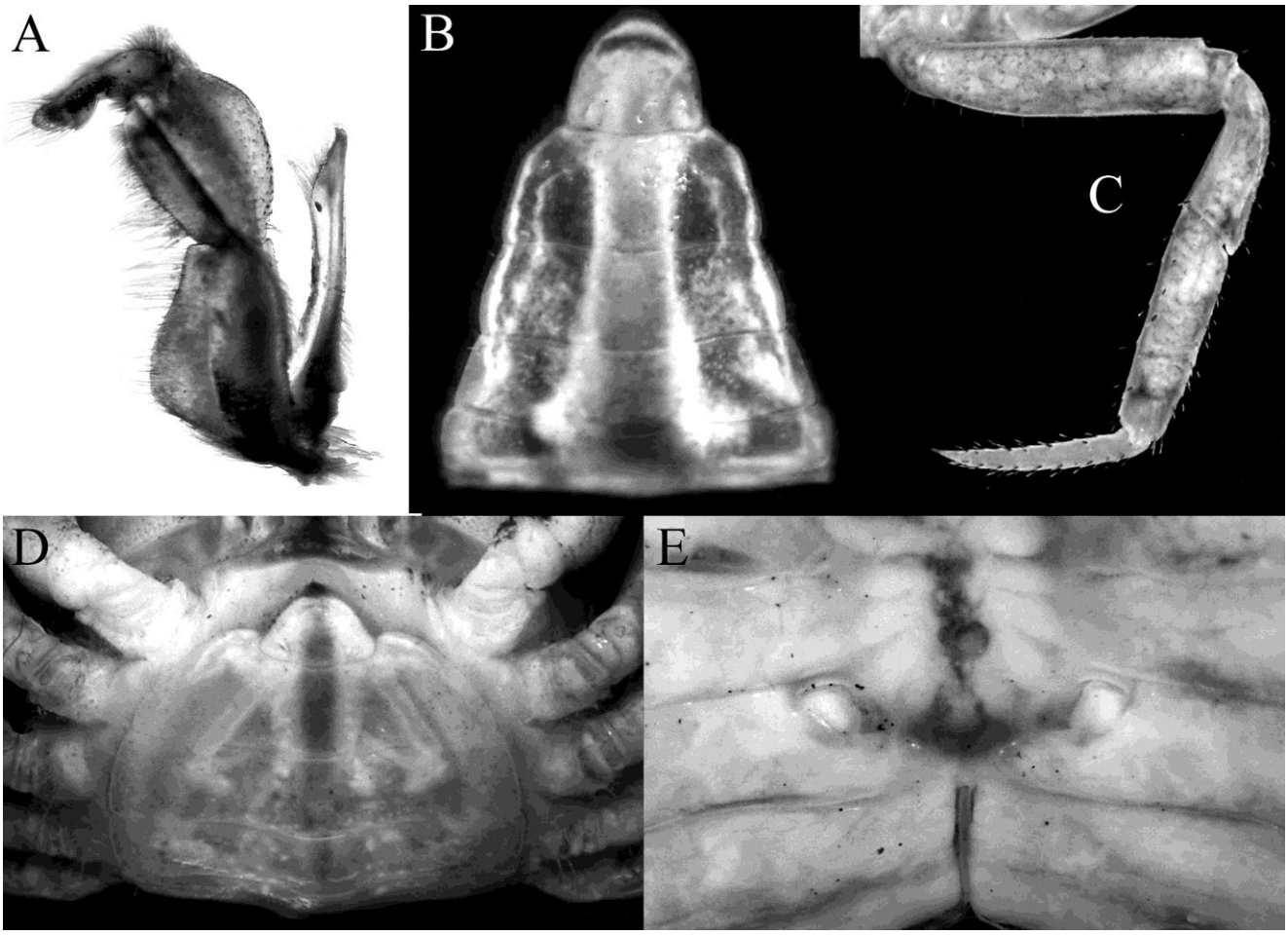

FIGURE 4. *Geosesarma todaeng* n. sp. A–C, holotype male (11.6 × 11.4 mm) (ZRC 2021.0816), Peninsular Thailand; D, E, paratype female (11.6 × 11.1 mm) (ZRC 2021.0825), Peninsular Thailand. A, male left third maxilliped; B, male pleon; C, male right fourth ambulatory leg; D, female pleon; E, female sternopleonal cavity and vulvae.

spatuliform (Fig. 5A–E). Vulvae on anterior half of sternite 6, raised, opens obliquely, with operculum and large truncate vulvar process which arches over the opening (Fig. 4E).

Colour.– Dorsal surface of carapace dark brown on posterior half, anterior half light brown to pale orange, with numerous small pale blue spots and flecks; chelae tallow to orange; ambulatory legs brown with numerous small blue spots (Fig. 1); ventral surfaces pale yellow.

Remarks.– In the quadrate carapace, exopod of the third maxilliped lacking a flagellum, relatively long and slender ambulatory legs, and a relatively slender G1 with the chitinous distal part elongate and spatulate, *G. todaeng* n. sp. belongs to the *G. foxi* (Kemp, 1918) species group (sensu Ng, 2017), which currently includes three known species: *G. foxi* s. str., *G. serenei* and *G. faustum* Ng, 2017.

Compared to the other members of the *G. foxi* species group, *G. todaeng* n. sp. has a more swollen gastric region, appearing distinctly convex in frontal view (Fig. 3A) (versus clearly flatter and less convex in others, e.g., Ng, 2017: figs. 3D, 9D). The male pleon of *G. todaeng* n. sp. (Fig. 4B) is most similar to *G. faustum* in somite 6 being more trapezoidal in form (cf. Ng, 2017: fig. 11B, C). In *G. foxi* and *G. serenei*, however, the lateral margins of male pleonal somite 6 are distinctly more convex (Ng, 2017: figs. 5B, C, 6C). The chitinous distal part of the G1 of *G. todaeng* n. sp. is prominently elongate with the tip gently curved downwards and is again most like that of *G. faustum* (cf. Ng, 2017: fig. 12B–G). In *G. todaeng* n. sp., however, the chitinous part is bent at an angle of about 40º (Fig. 5A, B, D) while in *G. faustum*, it is at angle of about 55º (Ng, 2017: fig. 12B–E). In addition, the subdistal shelf-like angle on the outer margin of the G1 is distinctly more angular in *G. todaeng* n. sp. (Fig. 5A, B, D) but more rounded in *G. faustum* (Ng, 2017: fig.

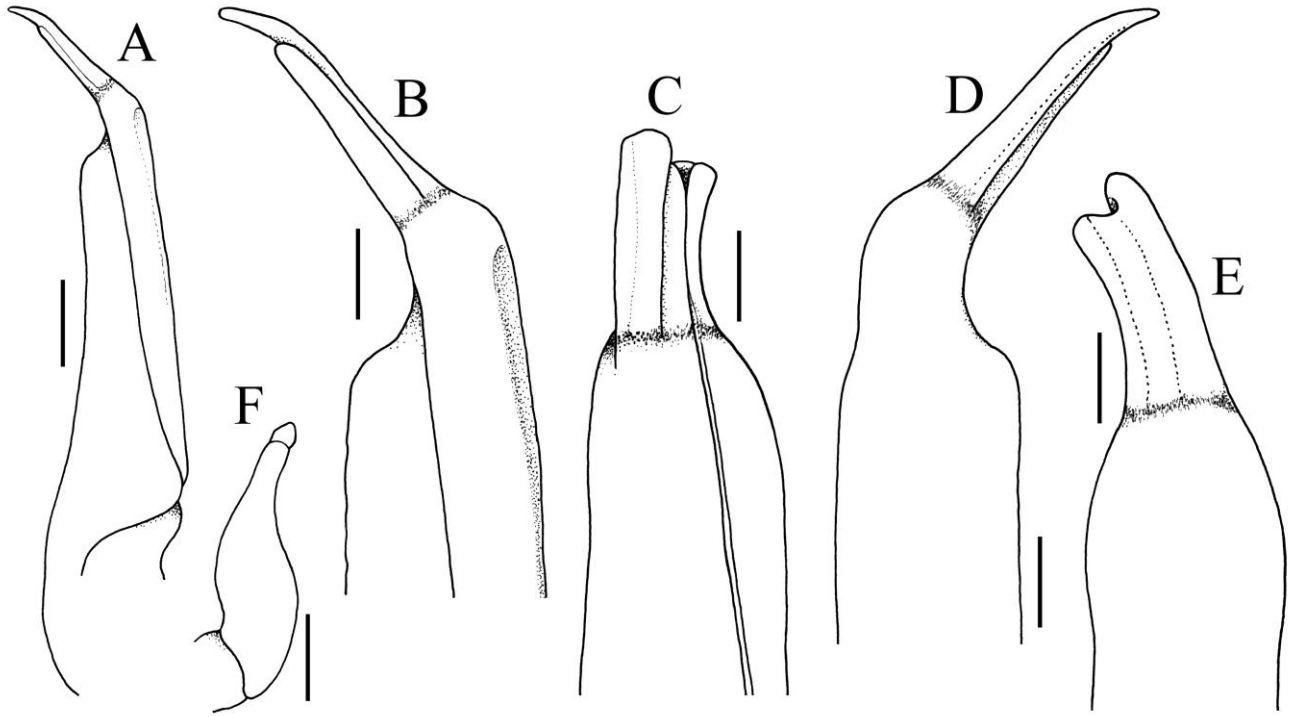

FIGURE 5. *Geosesarma todaeng* n. sp., holotype male (11.6 × 11.4 mm) (ZRC 2021.0816), Peninsular Thailand. A, left G1 (dorsal view); B, distal part of left G1 (dorsal view); C, distal part of left G1 (dorso-mesial view); D, distal part of left G1 (ventro-mesial view); F, left G2. Scales: A, F = 0.5 mm; B–E = 0.2 mm.

12B, D). The vulvae of *G. todaeng* n. sp. are also similar to those of *G. faustum*, with the openings directed obliquely inwards (Fig. 4E; Ng, 2017: fig. 11H). In *G. foxi* and *G. serenei*, the vulvae open laterally inwards (Ng, 2017: figs. 5F, 6H).

The number of tubercles on the dorsal margin of the dactylus of the male chela in *G. todaeng* n. sp. is not a differentiating character. The species has 7 or 8 tubercles (smaller ones not counted) (Fig. 3E–G) and this agrees with the 7–9 reported for *G. foxi* and *G. faustum* (Ng, 2017: figs. 5D, 11D).

Noteworthy is that the habitat of *G. todaeng* n. sp. is a lowland swamp forest near Nakhon Si Thammarat in southern Thailand. All the other members of the *G. foxi* species group have been found in pristine rainforests at much higher altitudes (above 700 m asl).

The record of *G. serenei* in southern Thailand requires discussion. Lanchester (1902: 550–551) first reported the species as "*Sesarma* (*Geosesarma*) *maculata* de Man" from "Lacom" in southern Thailand but without any habitat or altitude data. Lacom is probably what is today Nakhon or Nakhon Si Thammarat (see Ng et al., 2022: 552). Tweedie (1940: 108) referred Lanchester's record to "*Sesarma foxi*", noting that they probably were collected at altitudes above 1500 m. Ng (1986: 36) subsequently placed this material in *G. serenei*, the type locality of the species being Larut Hills in Perak. It is possible that Lanchester (1902) collected his specimens from lowland habitats and not montane forests, and as such, his material may be *G. todaeng* n. sp.; that being said, Narathiwat is quite far from Nakon Si Thammarat so their conspecificity seems unlikely. In any case, his specimens will need to be found and re-examined to ascertain their identity.

Notes on habitat.– This nocturnal species is found in the freshwater swamp forest (about 5 m asl) (Fig. 6A, B) ;with water depth 0.5–0.8 meters, temperature is about 23˚C, DO is about 4.04 mg/l, pH and conductivity is about 4.02 and 88 µmhos/cm respectively. They were seen climbing on the tree roots, and on the leaves, leaf stalks and stem of palms *E. conferta* (Fig. 6B) and *Licuala* spp. (Fig. 6C, D), especially on the fruits of *E. conferta*, about 0.5–1.0 meters above the water surface. When disturbed, the crabs immediately drop into the water.

FIGURE 6. Habitats of *Geosesarma todaeng* n. sp. A, B, freshwater swamp forest at the type locality, Narathiwat Province, Thailand; C, D, crab observed on the dry leaves of palm *Licuala* sp. (not collected).

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