

A new species of vampire crab of the genus *Geosesarma* De Man, 1892 (Crustacea: Brachyura: Sesarmidae) from a montane forest in southwestern Sarawak, Malaysian Borneo

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Abstract. A new species of semiterrestrial crab, *Geosesarma penrissen*, new species, is described herein from Mount Penrissen in southwestern Sarawak, Malaysia. It represents the third species of *Geosesarma* known from the montane forests of Borneo, the other two being *G. larsi* Ng & Grinang, 2018 from Mount Ampungan in Serian, Sarawak, and *G. aurantium* Ng, 1995 from Mount Silam in Sabah. Diagnostic characters distinguishing *G. penrissen*, new species, from its congeners are provided, together with ecological notes on its highland habitat.

Key words. freshwater crab, semiterrestrial, taxonomy, lowland forest, comparative morphology

INTRODUCTION

Despite their marine ancestry, members of the genus *Geosesarma* De Man, 1892, commonly referred to as vampire crabs, are now well established in inland freshwater habitats, with several species recorded from montane forest areas. The genus currently contains 73 described species, the majority of which are in Indonesia (Ng et al., 2025). In Borneo (which is made up of the two Malaysian states of Sarawak and Sabah, as well as Brunei and Indonesian Kalimantan), 14 species have been documented (Grinang, 2022). The sesarmid fauna of Sarawak currently comprises six species: *Geosesarma bau* Ng & Grinang, 2004, *G. gracillimum* (De Man, 1902), *G. katibas* Ng, 1995, *G. larsi* Ng & Grinang, 2018, *G. sarawakense* (Serène, 1968), and *G. sodalis* Ng, 2021, all of which are endemic to the state (see Ng, 1995a, 2021; Ng & Grinang, 2004, 2018). The new species described herein, found at an elevation of approximately 1,040 m above sea level, represents the third species of *Geosesarma* known from montane habitats in Borneo, following *G. larsi* from Mount Ampungan in Serian Division, Sarawak (ca. 715 m above sea level) and *G. aurantium* from Mount Silam (ca. 620 m above sea level) in Lahad Datu, Sabah (Ng, 1995b; Ebin & Chung, 2012; Ng & Grinang, 2018). Other Bornean species of *Geosesarma* predominantly inhabit lowland forest habitats or limestone cave systems (Ng & Grinang, 2004; Ng, 2021).

MATERIAL AND METHODS

Material examined is deposited in the Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak (UNIMAS), Sarawak, Malaysia; and the Zoological Reference Collection of the Lee Kong Chian Natural History Museum (ZRC), National University of Singapore. Measurements provided, in millimetres (mm), are of the maximum carapace width and length, respectively. ‘Gunung’ is mountain in Bahasa Malaysia. The terminology used follows Ng (1988) and Davie et al. (2015). The abbreviations are as follows: coll. are for collectors’ information; and G1 and G2 used for the male first and second gonopods, respectively.

TAXONOMY

Family Sesarmidae Dana, 1851

Genus *Geosesarma* De Man, 1892

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

Geosesarma penrissen, new species

(Figs. 1–7)

Material examined. Holotype: male (10.6 × 10.2 mm) (ZRC 2024.0567), trail near ‘Kalimantan Lookout’, Gunung Penrissen, Sarawak, ca. 1°7’0”N 110°12’50”E, Malaysia, coll. P.Y.C. Ng, 6 July 2023. Paratypes: 2 males (7.3 × 7.0 mm, 10.7 × 10.5 mm), 2 young females (7.3 × 7.2 mm, 7.4 × 7.0 mm), 1 ovigerous female (10.7 × 10.0 mm) (ZRC 2024.0171), same data as holotype; 4 males (4.5 × 4.5 mm, 6.4 × 6.4 mm, 9.2 × 9.2 mm, 12.5 × 12.4 mm) (UNIMAS.C.00104), Batu Panggah Trail, Gunung Penrissen,

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Fig. 1. *Geosesarma penrissen*, new species, live colouration. A–C, holotype male (10.6 × 10.2 mm) (ZRC 2024.0567); D, paratype male (10.7 × 10.5 mm) (ZRC 2024.0171); E, adult male, on shrub, Batu Panggah trail, photographed 2311 hrs; 6 July 2023 (not collected); F, subadult, on shrub, Batu Panggah trail, photographed 2118 hrs, 6 July 2023 (not collected). All specimens from Sarawak. E, F, photographed by Chien Lee.

Kuching, Sarawak, Malaysia, coll. Y.M. Pui, 4 May 2016; 3 males (4.4 × 4.4 mm, 10.1 × 10.0 mm, 11.2 × 11.1 mm), 6 females (8.3 × 8.3 mm, 10.9 × 10.7 mm, 11.7 × 11.5 mm, 10.9 × 10.8 mm, 10.9 × 10.8 mm, 10.6 × 10.4 mm) (UNIMAS.C.00105), Batu Panggah Trail, Gunung Penrissen, Kuching, Sarawak, Malaysia, coll. Y.M. Pui & I. Das, 6 April 2016; 4 males (8.5 × 8.3 mm, 11.0 × 11.0 mm, 11.1 × 11.0 mm, 11.8 × 11.5 mm), 1 ovigerous female (9.1 × 8.8 mm) (UNIMAS.C.00106), Batu Panggah Trail, Gunung Penrissen, Kuching, Sarawak, Malaysia, coll. I. Das et al., 28 August 2021.

Diagnosis. Carapace almost square, width-to-length ratio 1.01–1.07, lateral margins gently sinuous, subparallel (Figs. 1A, D, 2A–D, 5A, C, F, 6A, D); dorsal surface with well-defined regions, anterior regions covered with small, rounded or flattened, squamate granules (Figs. 1A, C, E, F, 2A–D, 5A, C, E, 6A, D); front deflexed, with 2 broad subtruncate lobes, separated by shallow median concavity; postfrontal, protogastric lobe prominent, sharp-edged (Figs. 1A, C, D, 2A–D, 3A, 6C, F); external orbital tooth acutely triangular, outer margins curving anteriorly, tooth directed obliquely and laterally, clearly extending beyond lateral margin of carapace (Figs. 2A–D, 5A, C, E, 6A, D). Merus of third maxilliped

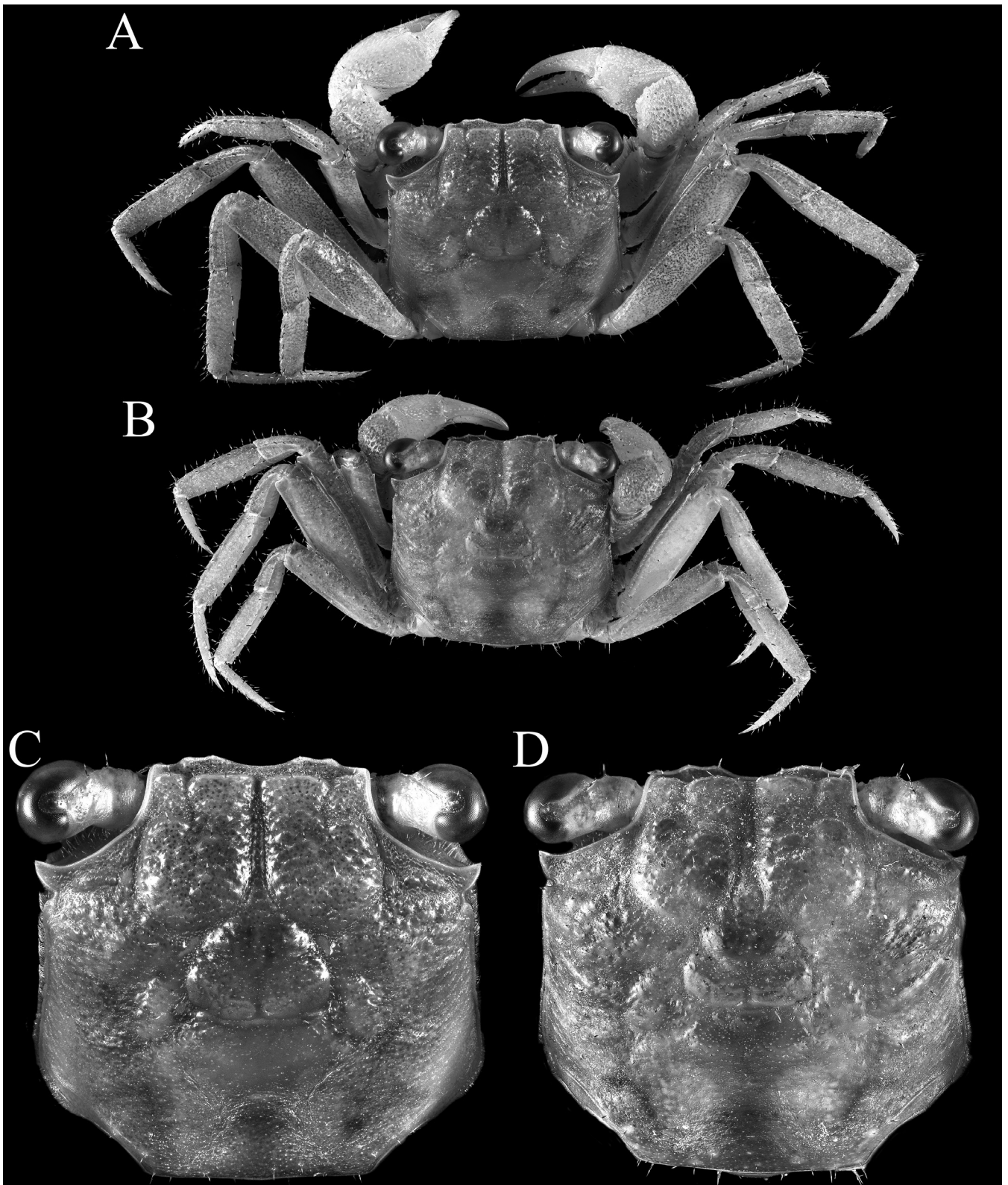


Fig. 2. *Geosesarma penrissen*, new species. A, C, holotype male (10.6 × 10.2 mm) (ZRC 2024.0567), Sarawak; B, D, paratype ovigerous female (10.7 × 10.0 mm) (ZRC 2024.0171), Sarawak. A, B, overall dorsal habitus; C, D, dorsal view of carapace.

subovate, subequal in length to ischium; exopod slender, without trace of flagellum (Fig. 7A). Outer surface of palm of adult male covered with small rounded granules; inner surface with low median ridge; dorsal surface of dactylus with 11 or 12 tubercles (distal one smallest) along inner margin, each with corneous tip (Fig. 3E–H). Ambulatory legs with relatively slender merus, with sharp subdistal spine on

dorsal margin, surfaces slightly rugose (Figs. 2A, B, 3D). Male pleon triangular; somites 3–6 very wide, somite 6 relatively broad and bearing gently convex lateral margins; telson short, arch-shaped, with convex lateral margins (Fig. 3B, C). G1 stout, subdistal part of outer margin (ventral view) with distinct sloping hump-like structure; corneous distal part elongate in lateral view, bent at angle of ca. 45°

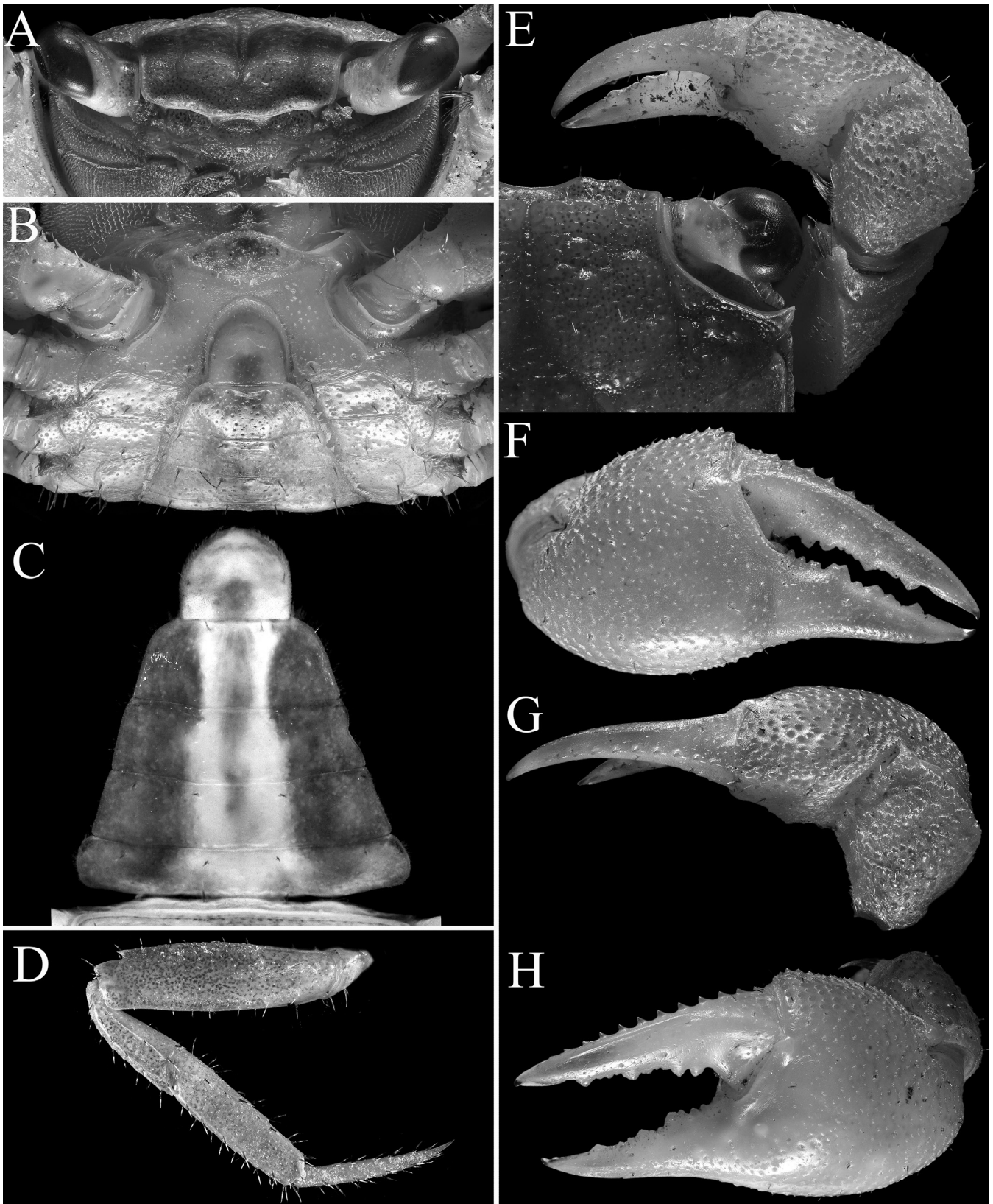


Fig. 3. *Geosesarma penrissen*, new species. A–G, holotype male (10.6 × 10.2 mm) (ZRC 2024.0567), Sarawak; H, paratype male (10.7 × 10.5 mm) (ZRC 2024.0171), Sarawak. A, frontal view of cephalothorax; B, anterior thoracic sternum, pleonal somites 4–6 and telson; C, pleon; D, left fifth pereopod; E, dorsal margin of right cheliped; F, outer surface of right chela; G, dorsal view of right chela; H, outer view of left chela.

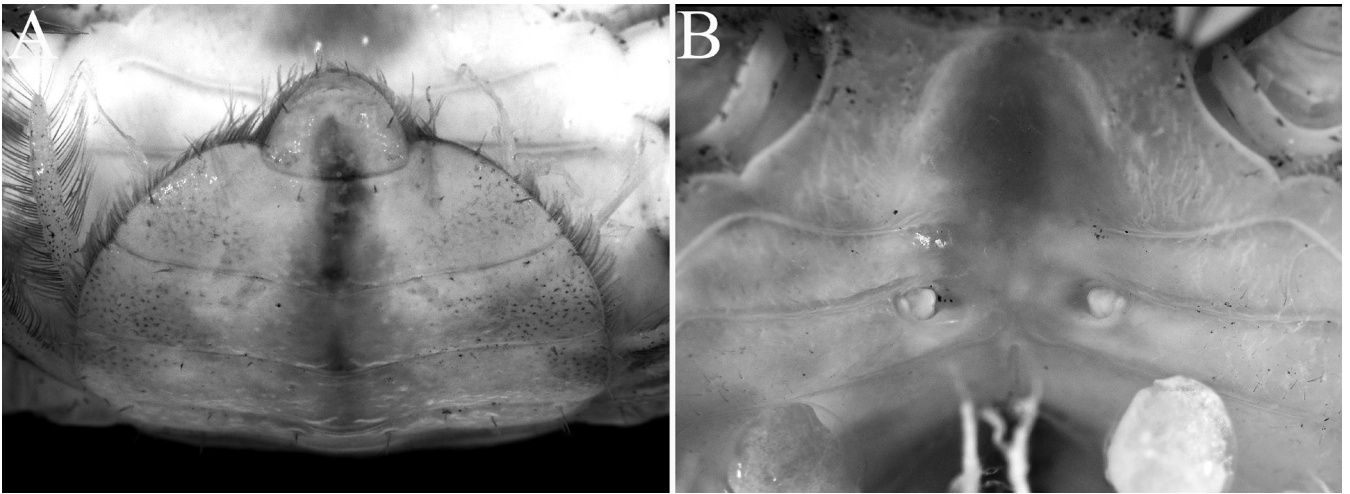


Fig. 4. *Geosesarma penrissen*, new species, paratype ovigerous female (10.7 × 10.0 mm) (ZRC 2024.0171), Sarawak. A, pleon; B, sternopleonal cavity showing vulvae.

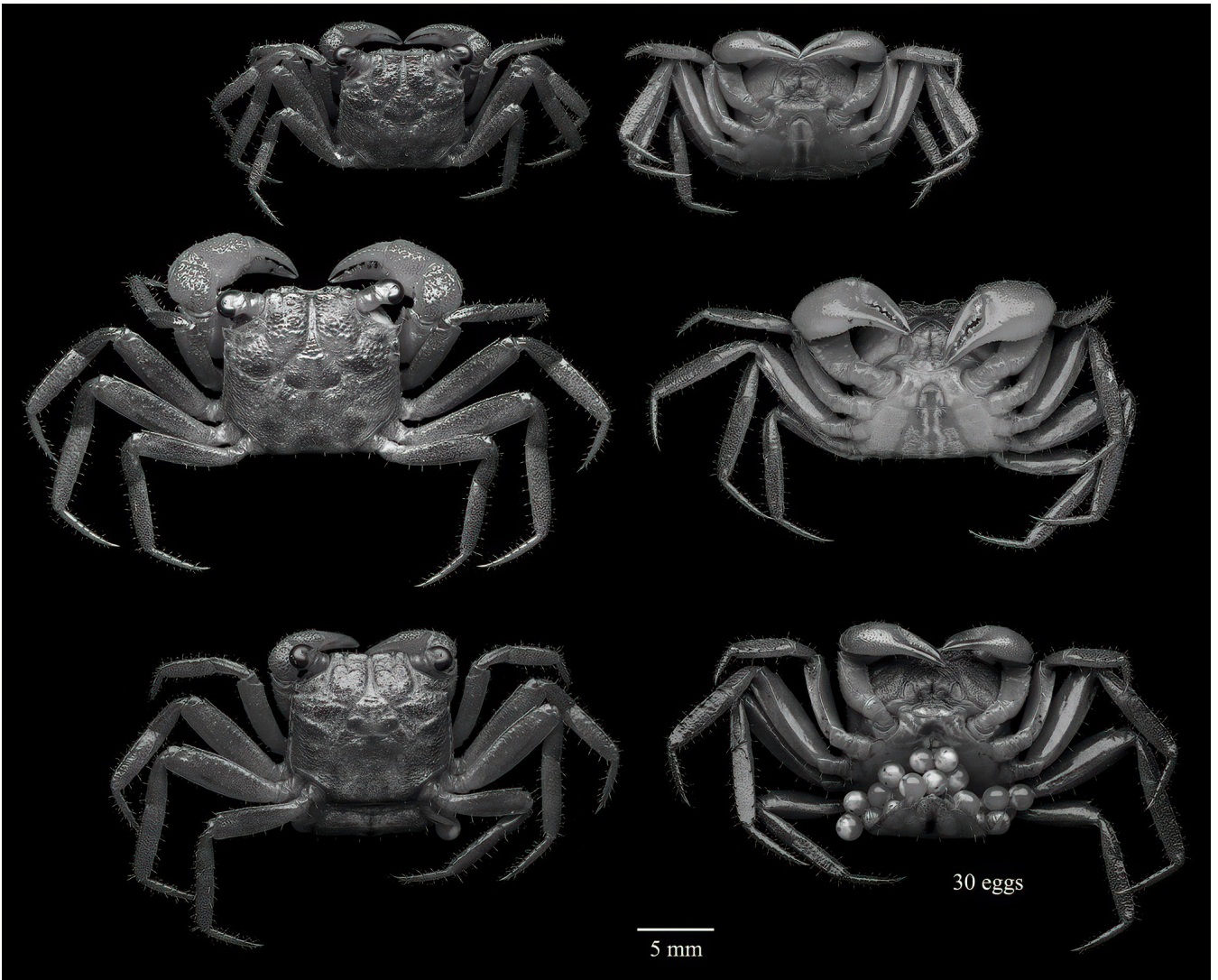


Fig. 5. *Geosesarma penrissen*, new species. A, B, male (8.5 × 8.3 mm) (UNIMAS.C.00106), Sarawak; C, D, male (11.1 × 11.0 mm) (UNIMAS.C.00106), Sarawak; E, F, ovigerous female (9.1 × 8.8 mm) (UNIMAS.C.00106), Sarawak. A, C, E, overall dorsal habitus; B, D, F, overall ventral habitus.

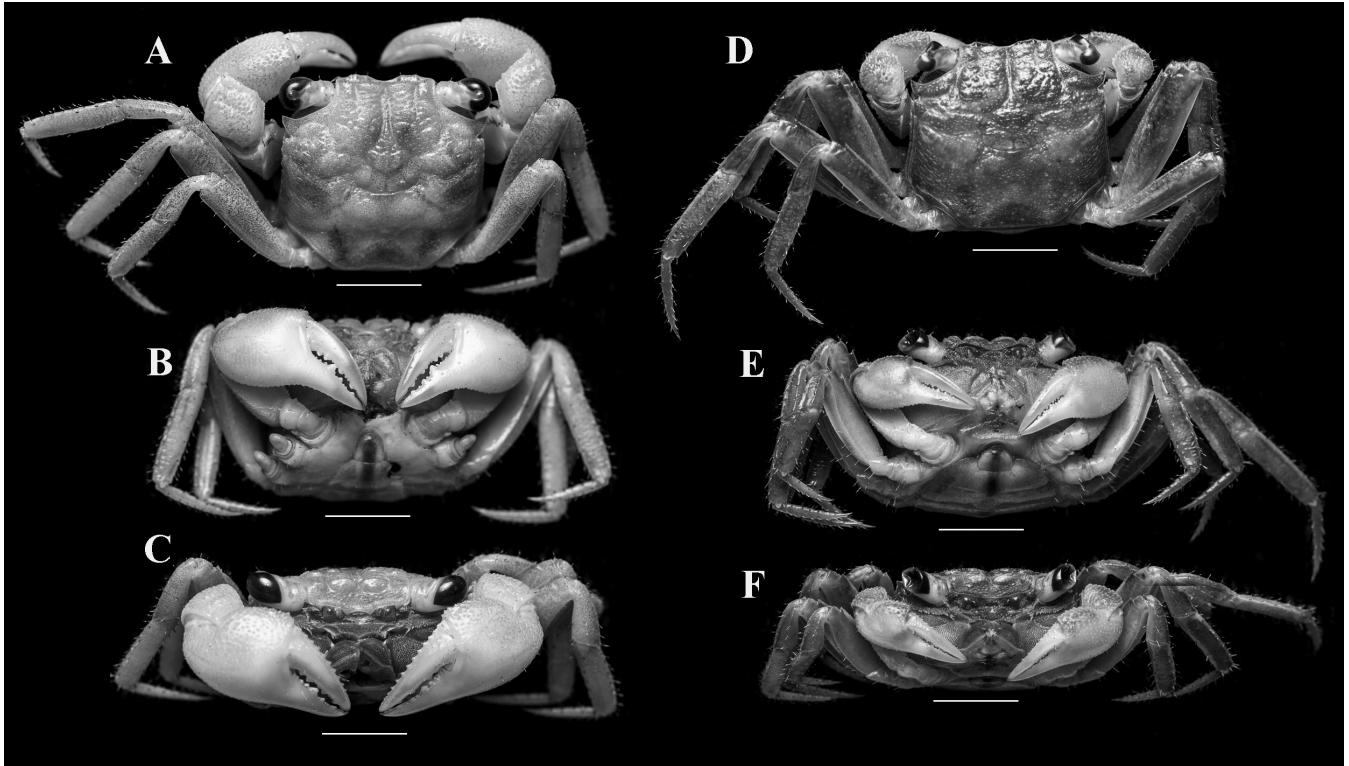


Fig. 6. *Geosesarma penrissen*, new species. A–C, male (12.5 × 12.4 mm) (UNIMAS.C.00104), Sarawak; D–F, female (10.9 × 10.8 mm) (UNIMAS.C.00105), Sarawak. A, D, overall dorsal habitus; B, E, overall ventral habitus; C, F, overall frontal habitus. Scales: 5.0 mm.

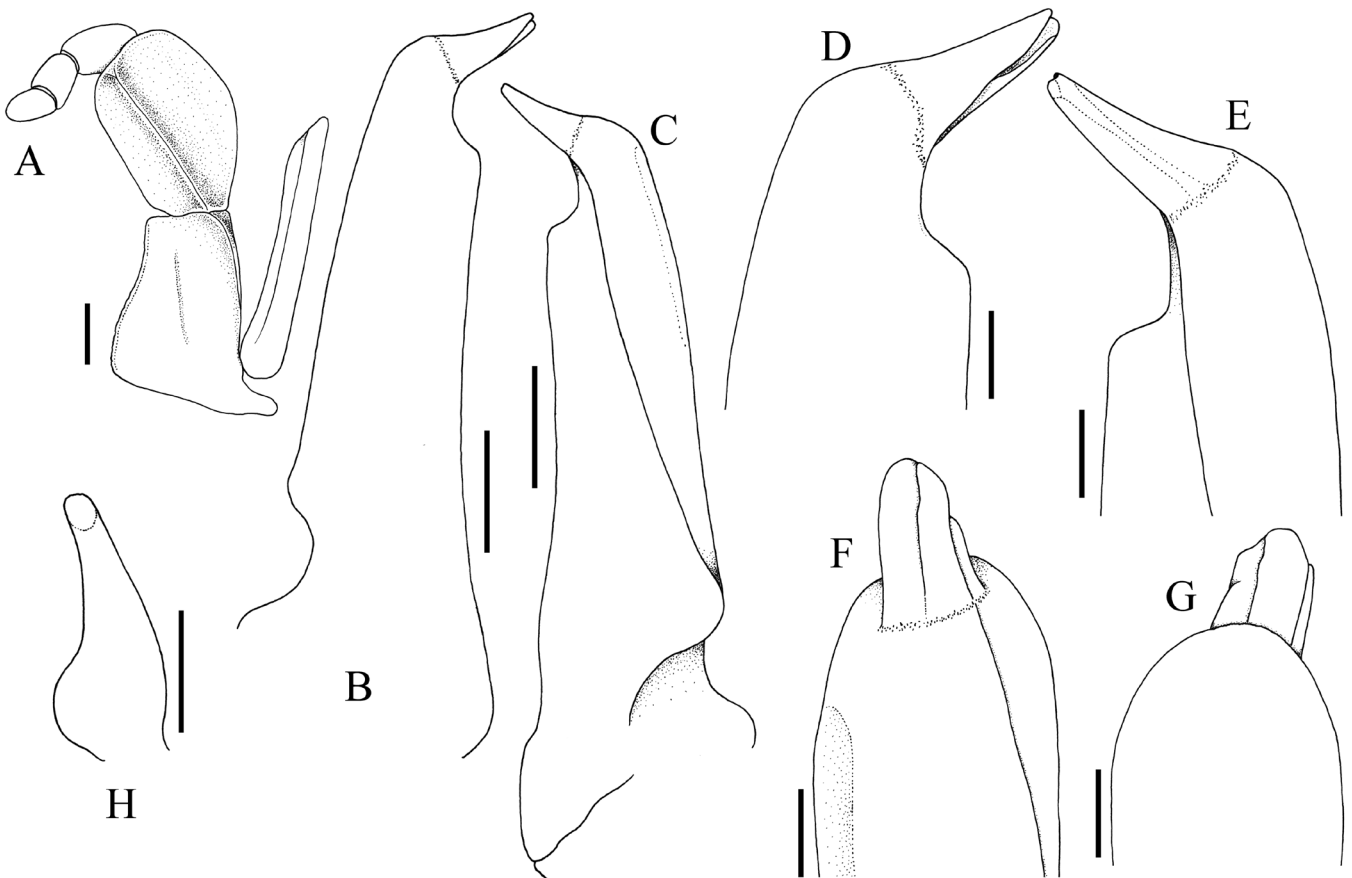


Fig. 7. *Geosesarma penrissen*, new species, holotype male (10.6 × 10.2 mm) (ZRC 2024.0567), Sarawak. A, left third maxilliped; B, left G1 (ventral view); C, left G1 (dorsal view); D, distal part of left G1 (ventral view); E, distal part of left G1 (dorsal view); F, distal part of left G1 (ventro-mesial view); G, distal part of left G1 (dorso-mesial view); H, left G2. Structures denuded. Scales: A, B, C, H = 0.5 mm; D–G = 0.2 mm.

from longitudinal axis, spatuliform from marginal view, with small median cleft (Fig. 7B–G).

Female morphology. Females agree with the males in all carapace features although their chelipeds are more slender. The female pleon is wide, subovate, and covers almost the entire thoracic sternum, with the telson semicircular and prominently inserted into the distal margin of somite 6 (Fig. 4A). The vulvae are widely separated, with a prominent cylinder-like vulvar cover and with the opening directed obliquely and laterally inwards (Fig. 4B). One ovigerous female was obtained, and it had 30 spherical eggs, each measuring 0.5 mm in maximum length (preserved) (Fig. 5F).

Live colour. This species displays a combination of colouration patterns, ranging from dark reddish-brown in mature individuals to a dark brown hue with a slight metallic sheen in subadults (Fig. 1). Females exhibit a more uniform, darker colouration and lack the striking colour contrast seen in males. The eyes are always pigmented black (Fig. 1), and not the more often seen iridescent yellow in many *Geosesarma* species.

Etymology. The species is named after its type locality, Gunung Penrissen, near the southwestern border between Sarawak (Malaysia) and Kalimantan (Indonesia). The name is used as a noun in apposition.

Remarks. The absence of a flagellum on the third maxilliped exopod has been noted in several species of *Geosesarma* (Ng, 2015, 2017, 2021, 2026; Ng et al., 2025), however, its phylogenetic or phylogeographic significance remains unclear (see Ng et al., 2004; Schubart & Ng, 2014; Ng, 2017). Within the genus, this character appears to be homoplastic, and its taxonomic significance remains unsubstantiated due to limited molecular data and comprehensive comparative morphological analyses, especially for Bornean taxa. At present, there is insufficient evidence to interpret this feature as a reliable indicator of evolutionary relationships or regional lineage differentiation among Bornean *Geosesarma* species.

Although *G. penrissen*, new species, is a Sarawakian species, it is morphologically closest to *G. ambawang* Ng, 2015, and *G. pontianak* Ng, 2015, both from lowland habitats of western Kalimantan in Indonesia, in quadratic carapace, well-defined dorsal surface, and stout G1 (Ng, 2015: figs. 8A, B, 9D, E, 11A, B, 13D, E, J, L; Fig. 2). *Geosesarma penrissen*, new species, can be readily distinguished from these two species by its live colouration, whereby there are numerous small blue or white spots on its carapace and appendages (more prominent in young specimens) (Fig. 1) (versus evenly orange to red without trace of spots in both *G. ambawang* (viz. Ng, 2015: fig. 10), and *G. pontianak*; viz. Ng, 2015: 51); the dorsal carapace surface is smoother, with the anterior parts covered with squamate granules (Fig. 2A–D) (versus surface with raised, rounded granules, being especially dense on anterior parts in *G. ambawang* (Ng, 2015: fig. 8A, B) and in *G. pontianak*; viz. Ng, 2015: fig. 11A, B); the length-to-widest-width ratio of the male pleonal somites 3–6 is 0.80, and the length-to-width ratio of telson is 0.83

(Fig. 3C) (versus proportion from those of *G. ambawang* are 0.76 and 1.06, respectively (Ng, 2015: fig. 8D), and *G. pontianak* are 0.72 and 1.06, respectively; Ng, 2015: fig. 11D); the external orbital tooth is acutely triangular, and directed obliquely outwards (Fig. 2B, C) (versus external orbital tooth strong, directly anteriorly in *G. pontianak*; Ng, 2015: fig. 11A, B); and the G1 outer subdistal part has a prominent, sharply angled shelf (Fig. 7B–E) (versus shelf gently sloping in *G. ambawang* (Ng, 2015: fig. 9D–G), and shelf almost right-angles in *G. pontianak*; viz. Ng, 2015: fig. 13D–G, J–L).

ECOLOGICAL AND CONSERVATION NOTES

Geosesarma penrissen, new species, inhabits the montane forests of Gunung (= Mount) Penrissen, the highest peak along the Indonesia–Malaysia border in southwestern Sarawak. This rugged terrain, accessible via the Borneo Highlands Resort, features steep jungle-clad slopes, mossy ridges, and cool, shaded microhabitats between 850–1,200 m above sea level. The crabs were found among leaf litter or above ground vegetation at night, near intermittent streams and rocky outcrops along forest trails (i.e., Batu Panggah and Kalimantan Trails), often in areas with high humidity and dense undergrowth. The presence of forest leeches, pitcher plants, and natural stone formations suggests a pristine ecosystem, where this sesarmid thrives in moist, secluded microhabitats along the transboundary summit ridge. Several studies on the Penrissen crab fauna have been done over the years (see Grinang et al., 2014; Grinang & Ng, 2015a, b) and our field observations suggest the species is confined to higher elevations, with no records from lower altitudes, implying a strong association with montane conditions. Although public access is restricted through resort management, the area lacks formal protection under Sarawak’s conservation laws, offering no legal safeguards for the long-term survival of this endemic sesarmid.

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