



ON THE VALIDITY OF *GEARCINUCUS* (*CYLINDROTHELPUSA*)
BUERGERI *LEBANGENSIS* BALSS, 1937 (CRUSTACEA: BRACHYURA:
GEARCINUCIDAE), WITH DESCRIPTION OF A NEW SPECIES OF
THELPUSULA BOTT, 1969 FROM CENTRAL SARAWAK, MALAYSIA

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ABSTRACT

Examination of recent material of the gecarcinucid freshwater crab genus *Thelphusula* Bott, 1969, a genus endemic to Borneo, showed that *Gecarcinucus* (*Cylindrothelphusa*) *buergeri lebangensis* Balss, 1937, described from the Kapuas drainage in West Kalimantan, Indonesia, is a valid species, and not a junior synonym of *T. buergeri* (De Man, 1899). Both taxa, *T. buergeri* and *T. lebangensis* are rediagnosed and figured. A new species from central Sarawak with a distinctive curved male first gonopod, *T. falciphallus*, is also described. It is morphologically closest to *T. granosa* Holthuis, 1979, *T. dicerophilus* Ng & Stuebing, 1990, and *T. sabana* Tan & Ng, 1998, but easily distinguished by its gonopod structure as well as other characters of the carapace and frontal margins.

Key words. — Borneo, comparative morphology, freshwater crab, Gecarcinucidae, new taxon, removal from synonymy

INTRODUCTION

The gecarcinucid genus *Thelphusula* Bott, 1969 currently contains 12 species, all from Borneo: *T. baramensis* (De Man, 1902), *T. buergeri* (De Man, 1899), *T. capillodigitus* Ng & Ng, 2018, *T. cristicervix* (Ng & Grinang, 2004), *T. dicerophilus* Ng & Stuebing, 1990, *T. granosa* Holthuis, 1979, *T. hulu* Tan & Ng, 1997, *T. luidana* (Chace, 1938), *T. pueh* Grinang & Ng, 2014, *T. sabana* Tan & Ng, 1998, *T. styx* Ng, 1989, and *T. tawauensis* Tan & Ng, 1998 (Ng, 1989a; Tan & Ng, 1998; Ng & Ng, 2018).

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Recently, we managed to study the type of *Gecarcinucus* (*Cylindrothelphusa*) *buergeri lebangensis* Balss, 1937, which was described from Sungai Leangan in the Kapuas; and subsequently synonymised under *T. buergeri* (De Man, 1899) by Bott (1970). This synonymy has not been challenged (see Tan & Ng, 1998) but the re-examination of the holotype shows that it is in fact a distinct species of *Thelphusula*.

In this paper, we rediagnose *T. lebangensis* (Balss, 1937) from the holotype and revise the diagnosis for *T. buergeri*. We also report on a distinct new species of *Thelphusula* collected from the Rajang River area in central Sarawak. The new species has a distinctive male first gonopod which is prominently medially curved.

MATERIAL AND METHODS

Measurements provided, in millimetres, are of the maximum carapace width and length, respectively. 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. Specimens studied are deposited in the Centre for Taxonomy and Morphology, Zoological Museum Hamburg, Hamburg, Germany (ZMH); Naturalis Biodiversity Centre (ex Rijksmuseum van Natuurlijke Histories, RMNH), Leiden, The Netherlands; and Zoological Reference Collection of the Lee Kong Chian Natural History Museum in the National University of Singapore (ZRC), Singapore. The Indonesian word “Sungai” is used in the text for river, stream or tributary. The old Dutch spelling “Koeboeng” is written as “Kubung” in Indonesian today.

TAXONOMY

GECARCINUCIDAE Rathbun, 1904

***Thelphusula* Bott, 1969**

Type species.— *Potamon* (*Geothelphusa*) *buergeri* De Man, 1899, by original designation and monotypy; gender feminine.

Remarks.— Bott (1969) designated *Potamon* (*Geothelphusa*) *bürgeri* De Man, 1899, as the type species of *Thelphusula* Bott, 1969, but in his treatment of the genus (Bott, 1970: 60), regarded it only as a subspecies of *T. melanippe* (De Man, 1899). This, however, does not change the nomenclature.

With the recognition of *T. lebangensis* (Balss, 1937) as a valid taxon and description of a new species from Sarawak, 14 species of *Thelphusula* Bott, 1969, are now known, all from Borneo.

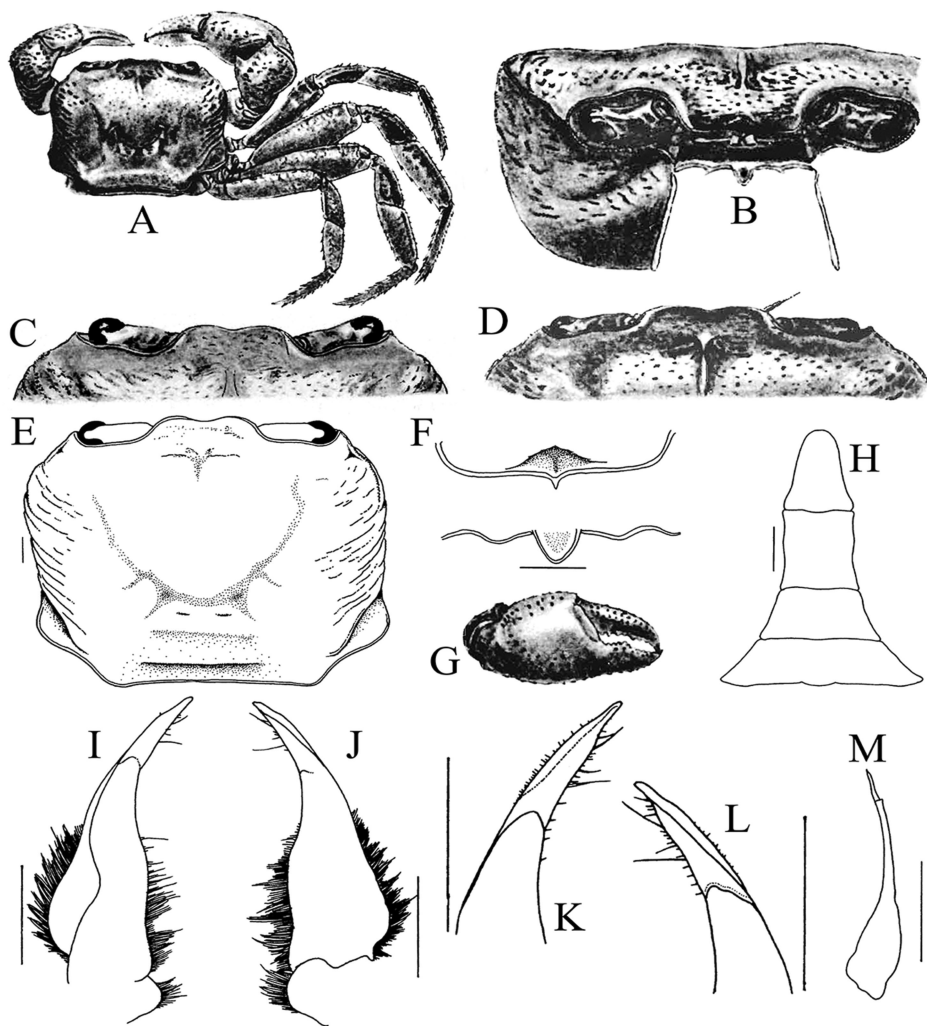


Fig. 1. *Thelphusula buergeri* (De Man, 1899). A-C, E-M, lectotype male (13.2 × 10.5 mm) (RMNH 155), Kalimantan; D, paralectotype female (15.3 × 11.5 mm) (RMNH 31960), Kalimantan. A, overall dorsal habitus; B, frontal view of cephalothorax; C, D, anterior part of carapace; E, dorsal view of carapace; F, frontal margin and epistome; G, outer view of right chela; H, male pleonal somites 4-6 and telson; I, left G1 (ventral view); J, left G1 (dorsal view); K, distal part of left G1 (ventral view); L, distal part of left G1 (dorsal view); M, left G2 (ventral view). A-D, G after De Man (1899: pl. 11 fig. 14, 14a, b, f, pl. 12 fig. 14g); E, F, H-M after Tan & Ng (1998: fig. 2). Scales = 1.0 mm.

***Thelphusula buergeri* (De Man, 1899)**

(Fig. 1)

Potamon (*Geothelphusa*) *bürgeri* De Man, 1899: 121, pls 11 figs. 14-14f, pl. 12 fig. 14g.

Potamon (*Geothelphusa*) *bürgeri* — Rathbun, 1905: 217.

Gecarcinucus (Cylindrothelphusa) bürgeri — Balss, 1937: 161.

Thelphusula buergeri — Bott, 1969: 362.

Thelphusula melanippe buergeri — Bott, 1970: 61 (part), pl. 9 fig. 7, 8; Tan & Ng, 1998: 810 (part); Fransen et al., 1997: 137; Ng et al., 2008: 73.

Material examined.— Lectotype: male (13.2×10.5 mm) (RMNH 155), Mount Liang Koeboeng, Kalimantan, Indonesia, coll. Borneo Expedition, 1899. Paralectotype: 1 female (15.3×11.5 mm) (RMNH 31960), Kalimantan (no precise location), Indonesia, coll. Borneo Expedition, 1899.

Diagnosis.— Carapace subquadrate, male width to length ratio 1.26; relatively high, branchial regions gently convex in frontal view, height to width ratio 0.48; anterolateral margin gently convex; low transverse carina present on cardiac region, edges nearly reaching posterolateral margins; epibranchial tooth low, barely visible; frontal margin clearly divided into 2 convex lobes, separated by deep concave cleft; frontal median triangle relatively narrow, not well defined, dorsal cristae low, uneven, not fused with lateral margins; median lobe of posterior margin of epistome triangular with gently convex lateral margins; epigastric cristae low but visible, postorbital cristae very low, barely visible; ambulatory meri relatively slender; G1 with proximal half of subterminal article relatively wide, terminal article proportionately shorter, 0.43 length of subterminal article, distal part of lateral margins of terminal article tapering more rapidly with area distinctly narrow.

Remarks.— *Potamon (Geothelphusa) bürgeri* De Man, 1899, was described from Mount Liang Kubung in western Kalimantan (Indonesian Borneo). De Man (1899: 121) stated that he only had one single male, but later in his account, he notes that he also had a female but without precise locality data which he also regards as conspecific (De Man, 1899: 126). In his measurements, he listed one male and one female, measuring 13.5×10.0 mm and 15.3×11.5 mm, respectively (De Man, 1899: 126). *Gecarcinucus (Cylindrothelphusa) bürgeri lebangensis* Balss, 1937, was described from one male, 20.2×15.2 mm, collected from Sungai Lebangan in the left tributary of the middle Mandai area off the Müller Mountains at Bukit Tilung.

In his treatment of *T. buergeri* (as a subspecies of *T. melanippe*), Bott (1970: 62) commented that “Die Unterarten *hendersonianum*, *melanippe*, *buergeri* unterscheiden sich im wesentlichen nur durch die Länge der P/2-5. Sie gehören in einen, in Borneo weit verbreiteten Formenkreis sehr kleiner Tiere, die höchstens unterartlich getrennt werden können, während *nobilii*, *bidiense* und *lebangense* eindeutig in die Synonymie der oben angeführten Arten gehören. Ob *kuchingense* auch hierher gehört, läßt sich vorerst wegen des allein bekannten ♀ nicht mit Sicherheit entscheiden”. [The subspecies *hendersonianum*, *melanippe*, and *buergeri* differ essentially only in the length of the 2-5 pereopods. They belong to a

group of very small animals widespread in Borneo, which can at most be separated into subspecies, while *nobilii*, *bidiense*, and *lebangense* clearly belong to the synonymy of the above-mentioned species. Whether *kuchingense* also belongs here cannot be determined with certainty at present because it is only known from a female.]. Bott (1970: 61) thus synonymised *Gecarcinucus* (*Cylindrothelphusa*) *buergeri lebangensis* Balss, 1937, under *Thelphusula melanippe buergeri*. The holotypes of *Potamon* (*Geothelphusa*) *buergeri* De Man, 1899 and *Gecarcinucus* (*Cylindrothelphusa*) *buergeri lebangensis* Balss, 1937, were figured by Bott (1970: pl. 9 figs 7-8) and Bott (1970: pl. 9 figs 4-6), respectively. Bott (1970: pl. 27 fig. 39) also figured the G1 of “*Thelphusula melanippe buergeri*” but he did not specify which type specimen it was from. Tan & Ng (1998), in revising the genus, examined the types of *Potamon* (*Geothelphusa*) *buergeri* and accepted the synonymy of the two taxa even though they did not see the type of *Gecarcinucus* (*Cylindrothelphusa*) *buergeri lebangensis*. Tan & Ng (1998: 813) did, however, note that “The headwaters of Sungei Lebang [sic, type locality of *G. lebangensis*] originate at Mt. Liang Koeboeng (present day Bukit Liyangcabung) [type locality of *P. buergeri*] and the two localities are about 170 km apart. The waters from Mt. Liang Koeboeng and Sungei Lebang ultimately lead to the lower Kapuas [sic] basin. It is probable that the same species are found in the same drainage”.

The name “Bukit Liyangcabung” is from the old Indonesian gazetteers, and the current Indonesian maps do not list it, and according to the local Dayaks, there is no present location called “Liang Koeboeng”. This site is probably what is today known as Kubung at the Keriau area at the Kapuas Hulu (headwaters) (D. Wowor, personal communication). Based on Büttikofer’s (1895) map, the distance between Mt. Tiloeng (=Bukit Tilung) and Mt. Liang Koeboeng is only about 100 km, but exactly where the two species were collected was not indicated.

We recently examined the type of *Gecarcinucus* (*Cylindrothelphusa*) *buergeri lebangensis* and it is in fact not conspecific with *Potamon* (*Geothelphusa*) *buergeri*. Tan & Ng (1998) redescribed and depicted the type male of *P. buergeri*, and their figure of the G1 (Tan & Ng, 1998: fig. 2D-G) is actually different from that figured by Bott (1970: pl. 27, fig. 39) for the species, with the subterminal article stouter and less sinuous, and the terminal article is distinctly shorter and more conical in form. Bott’s figure, with the subterminal article more slender and sinuous and the terminal article distinctly longer and tubular, actually matches exactly that for *G. buergeri lebangensis* examined here.

Thelphusula lebangensis can easily be distinguished from *T. buergeri* in that its carapace is proportionately wider (width to length ratio 1.36; Fig. 2A, B) (versus width to length ratio 1.33 in *T. buergeri*; Fig. 1A, E); the branchial regions are relatively more inflated in lateral and frontal views (Fig. 2B, C) (versus regions relatively lower in *T. buergeri*; Fig. 1B, E); the poorly developed frontal median

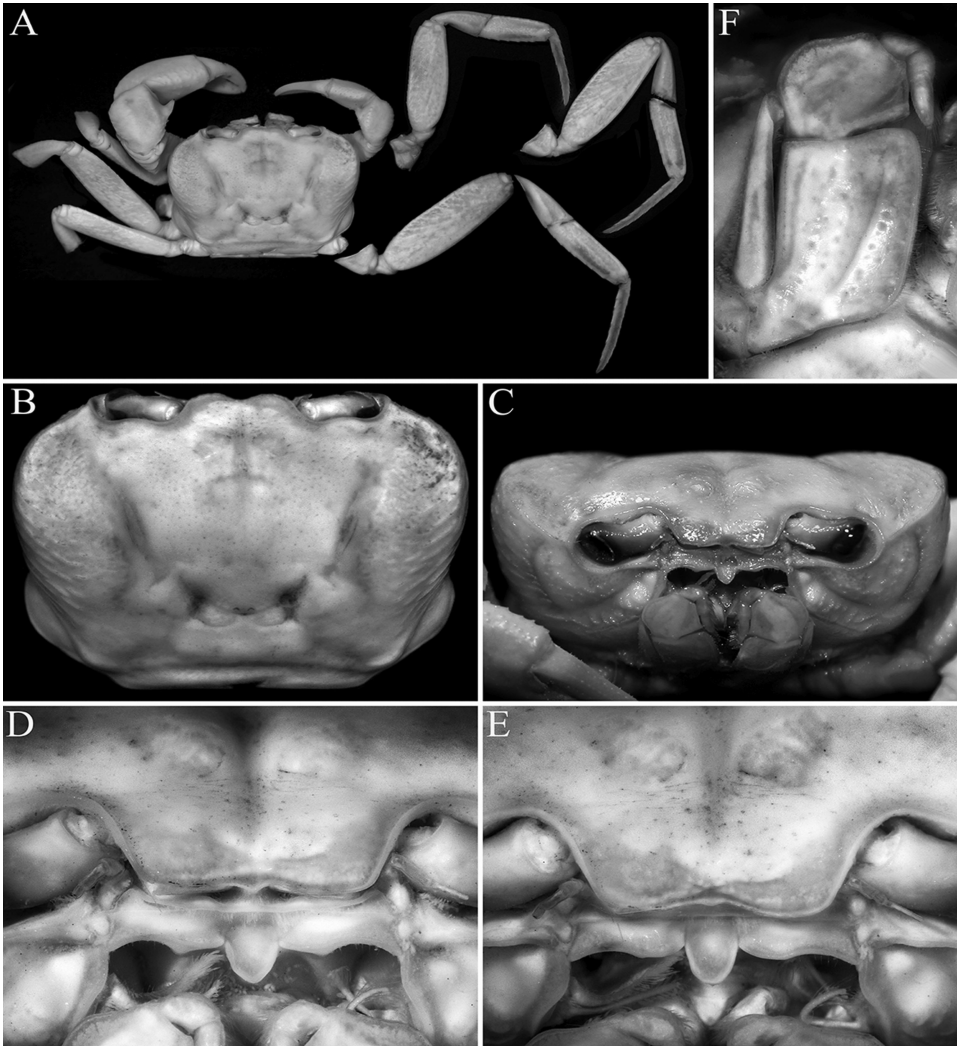


Fig. 2. *Thelphusula lebangensis* (Balss, 1937), holotype male (20.2 × 14.9 mm) (ZMH-K-008786), Kalimantan. A, overall dorsal habitus; B, dorsal view of carapace; C, frontal view of cephalothorax; D, E, frontal margin, antennules and epistome; F, right third maxilliped.

triangle is proportionately wider (Fig. 2D, E) (versus proportionately narrower in *T. buergeri*; Fig. 1F); the ambulatory meri are relatively wider and stouter (Figs 2A, 3D) (versus meri relatively more slender in *T. buergeri*; Fig. 1A); the proximal half of the subterminal article of the G1 is relatively more slender (Fig. 4B, C, 5A) (versus structure relatively wider in *T. buergeri*; Fig. 1I, J); the terminal article is proportionately more elongate, being 0.46 length of subterminal article (Figs 4B, C, 5A-C) (versus structure relatively shorter, being 0.43 length of subterminal article in *T. buergeri*; Fig. 1I-L); and the lateral margins of the terminal

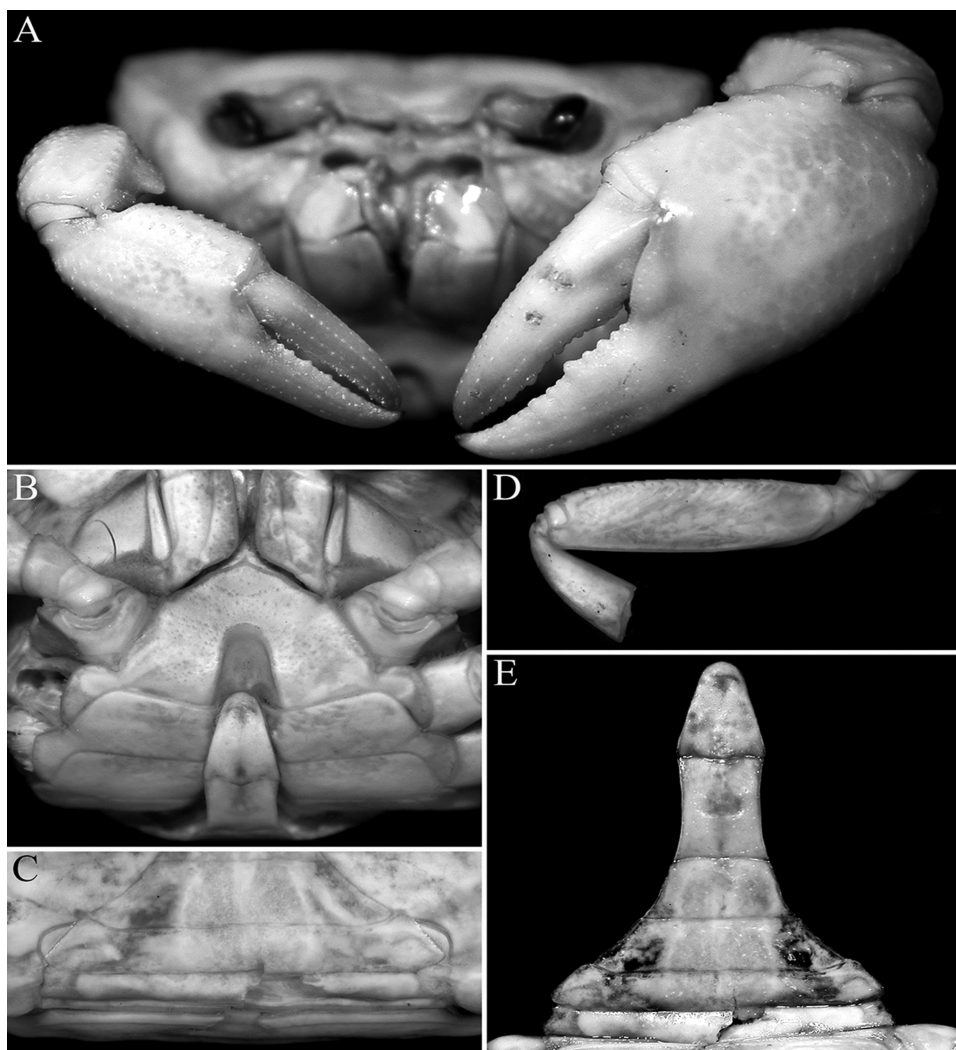


Fig. 3. *Thelphusula lebangensis* (Balss, 1937), holotype male (20.2 × 14.9 mm) (ZMH-K-008786), Kalimantan. A, outer view of chelae; B, male anterior thoracic sternum and pleon; C, male posterior thoracic sternum and pleon; D, left P5; E, pleon.

article gradually tapering to the tip (Figs 4B, C, 5A-C) (versus distal parts of lateral margins of terminal article tapering more rapidly making the area distinctly narrower in *T. buergeri*; Fig. 1I-L). The branchial regions of *T. lebangensis* are more convex than those of *T. buergeri* (Fig. 2C versus Fig. 1B), and the carapace height to width ratios for the two species is negligible. This is because the carapace of *T. lebangensis* is also distinctly wider and so the ratios are similar although they

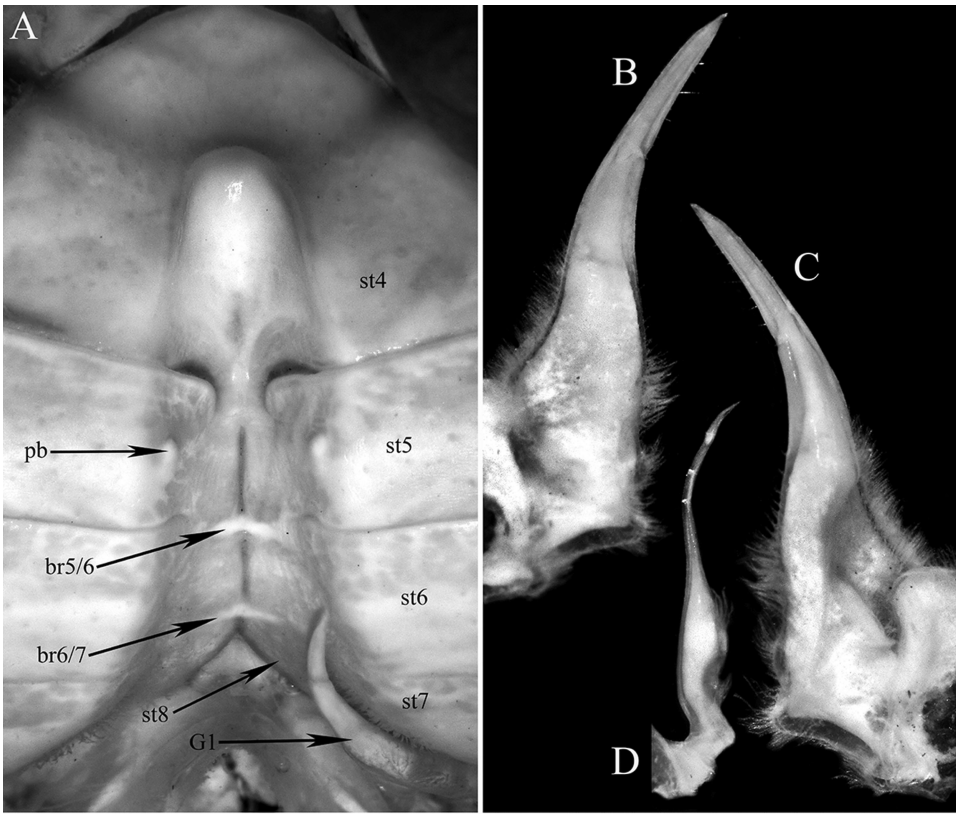


Fig. 4. *Thelphusula lebangensis* (Balss, 1937), holotype male (20.2 × 14.9 mm) (ZMH-K-008786), Kalimantan. A, male sternopleonal cavity; B, right G1 (dorsal view); C, right G1 (ventral view); D, left G2 (ventral view). B-D to same scale. Abbreviations: br5/6 = median bridge between junction of sternites 5 and 6; br6/7 = median bridge between junction of sternites 6 and 7; G1 = male first gonopod; pb = tubercle of press-button mechanism; st4-8 = sternites 4-8, respectively.

look very different. The differences discussed above are unlikely to be associated with size.

Lanchester (1900: 256) recorded “*Potamon (Geothelphusa) bürgeri*” on the basis of a female specimen from Kuching in Sarawak. This seems unlikely as this location is far from the type locality. It is likely to be *T. cristicervix* (Ng & Grinang, 2004) instead, described from nearby Bau, and is also known from forests inside Kuching (see Grinang & Ng, 2014). Tan & Ng (1998) argued that the records of “*Potamon (Geothelphusa) bürgeri*” by Nobili (1903: 16) and *Parathelphusa (Liothelphusa) bürgeri* by Colosi (1920: 26) from Samarinda in eastern Kalimantan are probably *Balssiathelphusa cursor* Ng, 1986, instead. The first author has examined the specimen in the Turin Museum and while it is a species of *Balssiathelphusa* Bott, 1969, it is not *B. cursor* but a new taxon; this

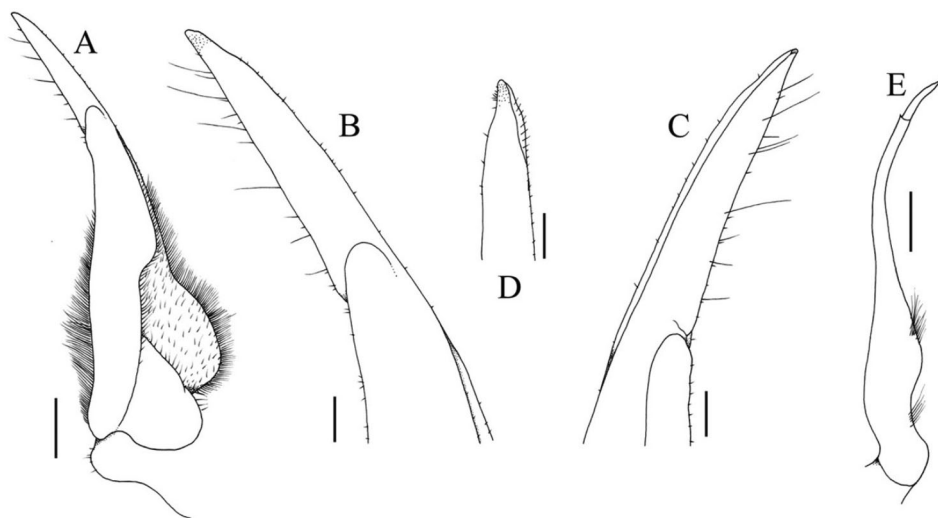


Fig. 5. *Thelphusula lebangensis* (Balss, 1937), holotype male (20.2 × 14.9 mm) (ZMH-K-008786), Kalimantan. A, right G1 (ventral view); B, distal part of right G1 (ventral view); C, distal part of right G1 (dorsal view); D, distal part of left G1 (dorso-mesial view); E, left G2 (ventral view). Scales: A, E = 0.5 mm; B-D = 0.2 mm.

will be described later as part of a revision of the genus. *Potamon* (*Geothelphusa*) *kuchingense* Nobili, 1901, was doubtfully placed in the synonymy of *P. buergeri* by Bott (1970: 61) as he noted it was only represented by a female. Ng (1989b) examined the type, referred the species to *Terrathelphusa* Ng, 1989, and in a subsequent revision of the genus, clarified its taxonomy (Grinang & Ng, 2015).

Bott (1970: 62) and Tan & Ng (1998: 810) regarded the male specimen of *Potamon buergeri* as the holotype and the female specimen as the paratype. Since De Man (1899) had two specimens and did not select a holotype, both of his specimens are technically syntypes. However, due to unavailable precise location data and male diagnostic characters, we are uncertain if the female specimen is actually conspecific with the male specimen. De Man (1899: 126) himself had some doubts, commenting that “In the male, described above, the upper orbital margin runs very slightly backwards, in the female however slightly forwards. The epigastric lobes are ill-defined. The ambulatory legs are a little more slender. . .”. In addition, the carapace of the female specimen is also relatively wider (width to length ratio 1.33 versus 1.26 for the male). As such, the male specimen is here formally designated the lectotype of *Potamon buergeri* De Man, 1899 for stability of the nominal species. The female specimen may well be another taxon and as such, we have not used it for our comparisons with *T. lebangensis*.

***Thelphusula lebangensis* (Balss, 1937)**

(Figs 2-5)

Gecarcinus (*Cylindrothelphusa*) *bürgeri lebangensis* Balss, 1937: 161.*Thelphusula buergeri* — Bott, 1970: 62 (part), pl. 9 figs 4-6, pl. 27 fig. 39; Tan & Ng, 1998: 810 (part) (not *Potamon* (*Geothelphusa*) *bürgeri* De Man, 1899)

Material examined.— Holotype: male (20.2 × 14.9 mm) (ZMH-K-008786), Sungai Lebangan, left tributary of the Middle Mandai (=Manday), starts at Bukit Tilung Mountain in Müller Mountains, Kalimantan, Indonesia, coll H. Winkler, 6 February 1925.

Diagnosis.— Carapace subrectangular, male width to length ratio 1.36; relatively high, branchial regions prominently convex in frontal view, height to width ratio 0.43; anterolateral margin strongly convex; low transverse carina present on cardiac region, edges reaching posterolateral margins; epibranchial tooth low, barely visible; frontal margin clearly divided into 2 convex lobes, separated by deep concave cleft; frontal median triangle relatively wide, not well defined, dorsal cristae low, uneven, not fused with lateral margins; median lobe of posterior margin of epistome triangular with gently convex lateral margins; epigastric cristae low but visible, postorbital cristae very low, barely visible; ambulatory meri relatively stout; G1 with subterminal article relatively more slender, terminal article proportionately more elongate, 0.46 length of subterminal article, distal part of lateral margins of terminal article gradually tapering to tip.

Remarks.— For morphological differences with *T. buergeri*, see remarks for latter species.

As noted above, the type locality of *T. lebangensis* (Sungai Lebangan) is probably about 100 km from that of *T. buergeri* (Mt. Liang Kubung). The headwaters of Sungai Lebangan are in Bukit Tilung which is west of Nanga Raun; while Mount Liang Kubung is nearby, just southwest of this village. While their headwaters are relatively close, and both eventually flow into the lower Kapuas River, they actually originate from different mountain systems (see also map in Büttikofer, 1895: pl. 1).

***Thelphusula falciphallus* n. sp.**

(Figs 6-9)

Material examined.— Holotype: male (11.8 × 10.8 mm) (ZRC 2024.0761), Pelagus Resort Forest, Kapit, Sarawak, Malaysia, coll. Y.M. Pui, 16 December 2014. Paratypes: 2 males (11.7 × 10.6 mm, 9.5 × 9.0 mm), 2 females (10.3 × 9.3 mm, 11.7 × 10.3 mm) (ZRC 2024.0762), same data as holotype; 1 male (10.4 × 9.5 mm) (ZRC 2024.0760), spring, Sungei Buya, Batang Rajang, Sarawak, Malaysia, coll. J. Grinang et al., 27 August 2014; 1 male (12.8 × 11.3 mm) (UNI-MAS.C.00068), intermittent stream, Pelagus Forest Reserve, Kapit Division, Sarawak, Malaysia, ca. 2.187°N 113.056°E, coll. Y.M. Pui et al., July 2014.

Comparative material.— *Thelphusula granosa* Holthuis, 1979: holotype male (26.0 × 23.0 mm) (RMNH 31970), alluvial lowland forest, Gunung Mulu National

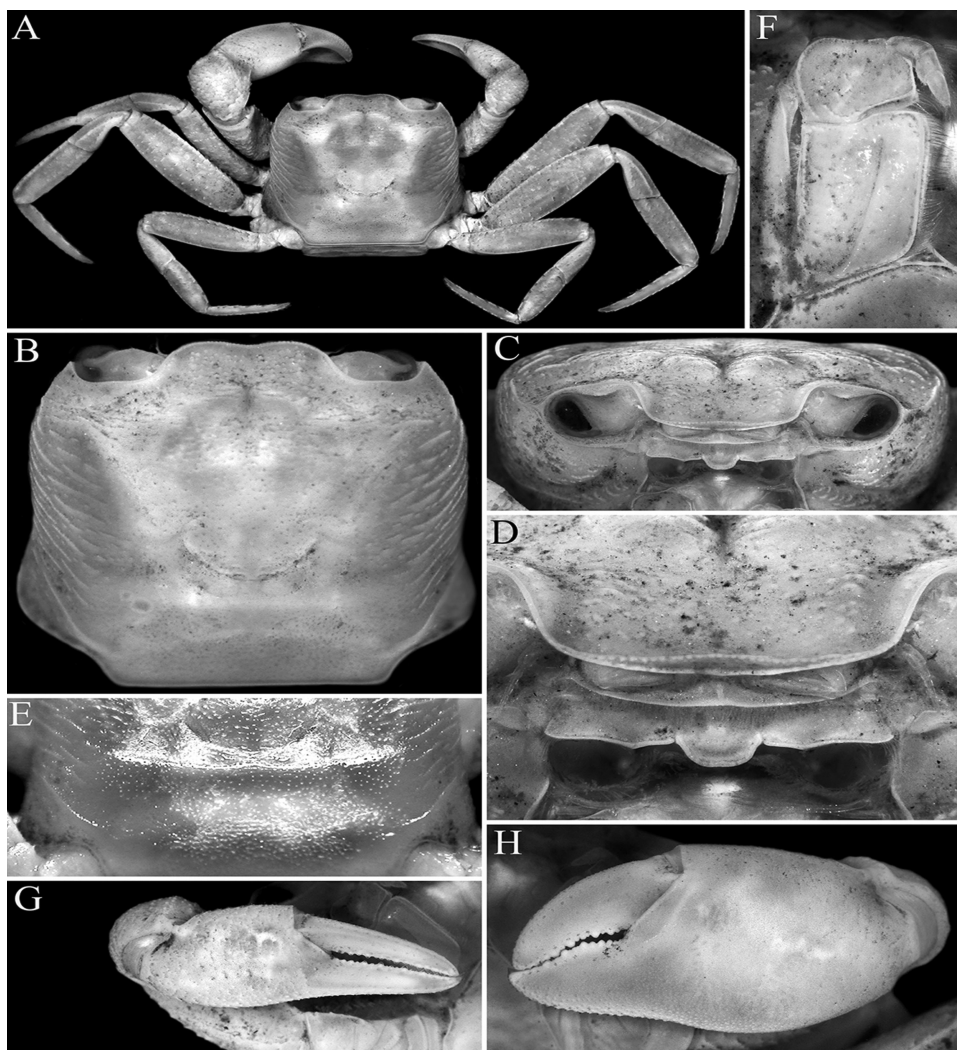


Fig. 6. *Thelphusula falciphallus* n. sp., holotype male (11.8 × 10.8 mm) (ZRC 2024.0761), Sarawak. A, overall dorsal habitus; B, dorsal view of carapace; C, frontal view of cephalothorax; D, frontal margin, antennules and epistome; E, subdorsal view of posterior surface of carapace; F, right third maxilliped; G, outer view of right chela; H, outer view of left chela. G, H to same scale.

Park, Sarawak, Borneo, Malaysia, 4°3'N 14°56'E, coll. N.M. Collins, 13 March 1978. *Thelphusula dicerophilus* Ng & Stuebing, 1990: holotype male (14.0 × 12.0 mm) (ZRC 1989.3588), in pitfall trap, adjacent to pool of rhinoceros mud wallow, Danum Valley, Sabah, Borneo, Malaysia, ca. 4°55'N 117°46'E, coll. R. Stuebing, 4 March 1988. *Thelphusula sabana* Tan & Ng, 1998: holotype male (14.7 × 12.0 mm) (ZRC 1997.0807), secondary forest near oil palm plantation, Juraco, Lahad Datu, Sabah, Borneo, Malaysia, coll. R. Goh, 27 March 1988.

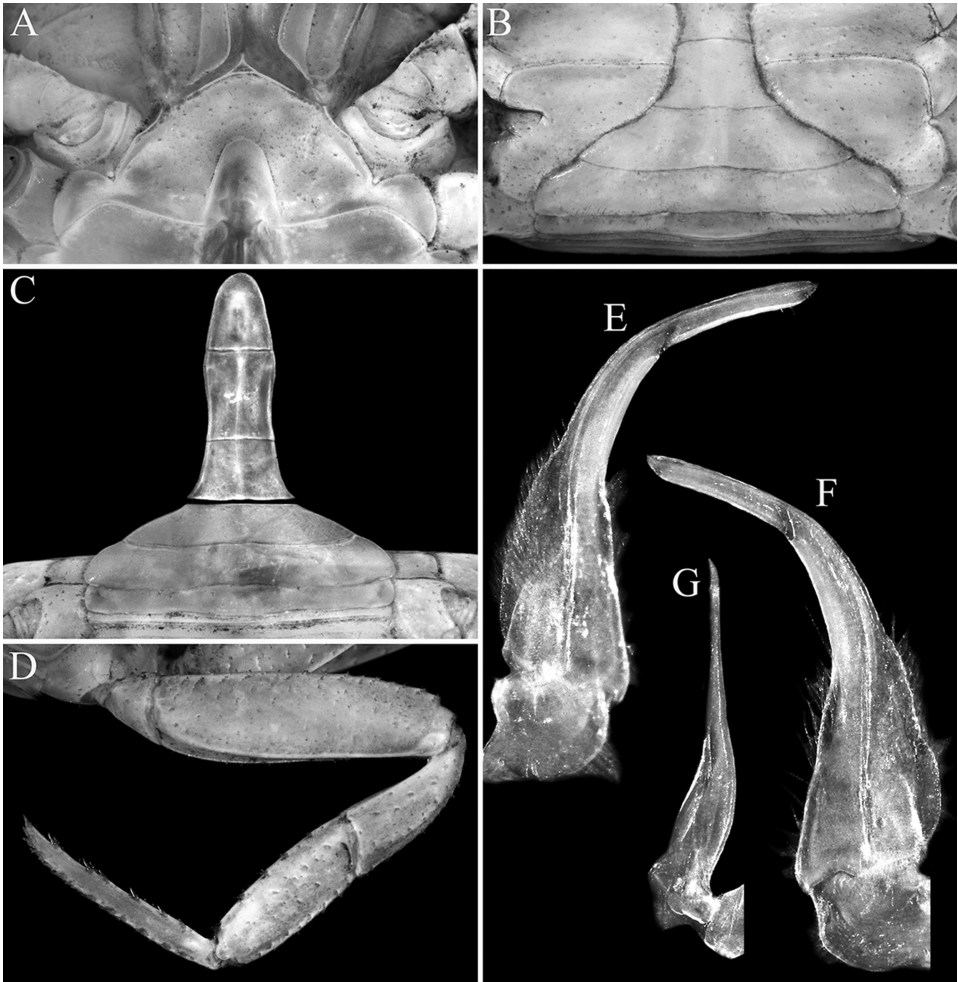


Fig. 7. *Thelphusula falciphallus* n. sp. A, C-G, holotype male (11.8 × 10.8 mm) (ZRC 2024.0761), Sarawak; B, paratype male (11.7 × 10.6 mm (ZRC 2024.0762), Sarawak. A, male anterior thoracic sternum and sternopleonal cavity; B, male posterior thoracic sternum and pleon; C, pleon; D, right P5; E, left G1 (ventral view); F, left G1 (ventral view); G, left G2 (dorsal view). E-G same scale.

Diagnosis.— Carapace subquadrate, male width to length ratio 1.06-1.14; not distinctly raised, branchial regions gently convex in frontal view, height to width ratio 0.45; anterolateral margin gently convex; low transverse carina present on cardiac region, edges not reaching posterolateral margins; epibranchial tooth not visible; frontal margin weakly divided into 2 gently convex lobes, separated by shallow concave cleft; frontal median triangle wide, not well defined, dorsal cristae low, granulated, continuous, gradually merging with lateral margins; median lobe of posterior margin of epistome subtruncate; epigastric cristae low but visible, postorbital cristae low, just visible; ambulatory meri relatively slender;

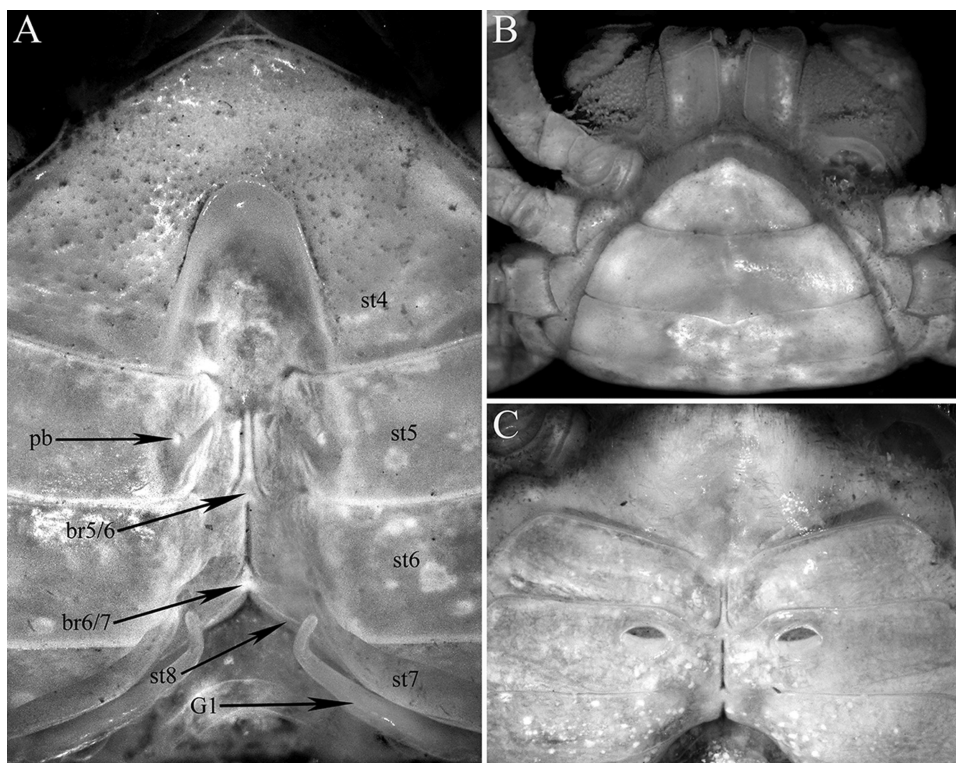


Fig. 8. *Thelphusula falciphallus* n. sp. A, holotype male (11.8 × 10.8 mm) (ZRC 2024.0761), Sarawak; B, C, paratype female (11.7 × 10.3 mm) (ZRC 2024.0762), Sarawak. A, male sternopleonal cavity; D, female pleon; C, female sternopleonal cavity and vulvae. Abbreviations: br5/6 = median bridge between junction of sternites 5 and 6; br6/7 = median bridge between junction of sternites 6 and 7; G1 = male first gonopod; pb = tubercle of press-button mechanism; s4-8 = sternites 4-8, respectively.

G1 relatively slender, distinctly curved outwards, subterminal and terminal articles separated by weakly cutinised suture, terminal article almost straight, elongate, cylindrical, 0.50 length of subterminal article.

Habitat.— *Thelphusula falciphallus* n. sp. inhabits intermittent streams and is restricted to steep riverbanks, where it occupies a distinctive microhabitat formed by spring water flowing through a dense root system that traps semi-decomposed plant material, fine sediment, and sand. Its presence is indicated by burrow openings within this organic-sandy root matrix.

Etymology.— The name is derived from the Latin word for sickle, “falx” in combination with “phallus”, alluding to the prominently curved G1 structure of the species. The name is used as a noun in apposition.

Remarks.— In the strongly rugose lateral regions, non-cristate epigastric and postorbital cristae on the carapace as well as the wide frontal median triangle with

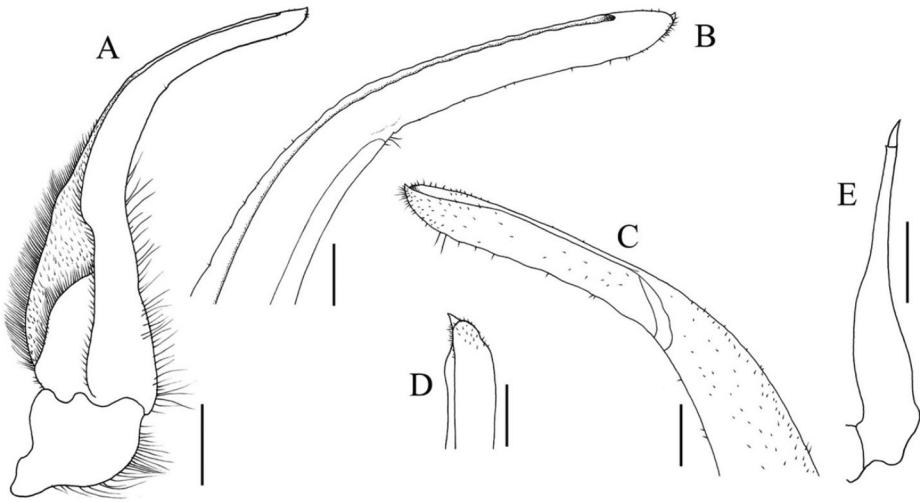


Fig. 9. *Thelphusula falciphallus* n. sp., holotype male (11.8 × 10.8 mm) (ZRC 2024.0761), Sarawak. A, left G1 (ventral view); B, distal part of left G1 (ventral view); C, distal part of left G1 (dorsal view); D, distal part of left G1 (dorso-mesial view); E, left G2 (ventral view). Scales: A, E = 0.5 mm; B-D = 0.2 mm.

the dorsal crista spanning the frontal margin, *Thelphusula falciphallus* n. sp. most closely resembles *T. granosa* Holthuis, 1979 (from Gunung Mulu National Park, Sarawak); *T. dicerophilus* Ng & Stuebing, 1990 (from Danum Valley, Sabah), and *T. sabana* Tan & Ng, 1998 (from Lahad Datu, Sabah).

Thelphusula falciphallus can be separated from *T. granosa* (Fig. 10) in that its carapace is distinctly lower with the gastric and branchial regions not raised (height to width ratio 0.45; Fig. 6C) (versus carapace high with gastric and branchial regions prominently raised in *T. granosa*, with height to width ratio 0.50; Fig. 10C); the branchial regions are covered with oblique striae (Fig. 6A, B) (versus regions with strong granules and striae in *T. granosa*; Fig. 10A, B); the transverse ridge behind the cardiac region is sharp and distinct (Fig. 6B, E) (versus with very low ridge behind cardiac region in *T. granosa*; Fig. 10B); the sternopleonal cavity reaches only to an imaginary line connecting the anterior edges of the cheliped coxae (Fig. 7A) (versus cavity reaching only to imaginary line connecting median points of cheliped coxae in *T. granosa*; Fig. 10E); the outer surface of the male major chela are relatively smooth (Fig. 6H) (versus covered with large granules and tubercles in *T. granosa*; Fig. 10D); and most significantly, the overall G1 is more slender, strongly curved with the distal article cylindrical and elongate (Figs 7E, F, 9A-C) (versus stouter, distinctly straighter with a subcylindrical terminal article that is distinctly tapering distally in *T. granosa*; cf. Holthuis, 1979: Fig. 6C; Tan & Ng, 1998: Fig. 6D).

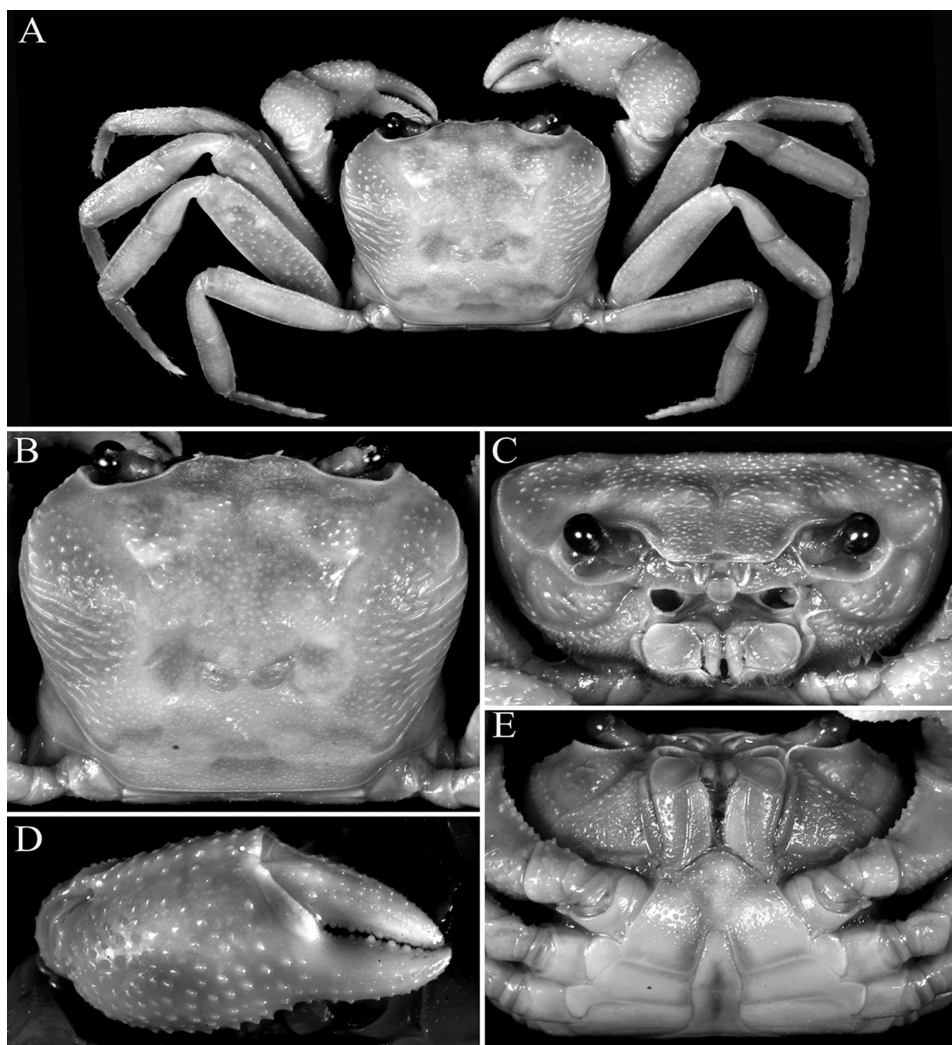


Fig. 10. *Thelphusula granosa* Holthuis, 1979, holotype male (26.0 × 23.0 mm) (RMNH 31970), Sarawak. A, overall dorsal habitus; B, dorsal view of carapace; C, frontal view of cephalothorax; D, outer view of right chela; E, male buccal cavity, anterior thoracic sternum and pleon.

Compared to *T. dicerophilus*, the carapace of *T. falciphallus* is distinctly lower with the height to width ratio 0.45 (Fig. 6C) (versus carapace higher and height to width ratio 0.51 in *T. dicerophilus*; cf. Ng & Stuebing, 1990: pl. 1B); the outer surface of male major chela, including the fingers, are smooth (Fig. 6H) (versus outer surface of chela with small granules and on fingers, granules are larger and sharper as well as more numerous in *T. dicerophilus*; cf. Ng & Stuebing, 1990: pl. 1C); and most significantly, the G1 is strongly curved with the terminal article cylindrical (Figs 7E, F, 9A-C) (versus G1 straighter with terminal article tapering

distally and the sharp tip is slightly upcurved in *T. dicerophilus*; cf. Ng & Stuebing, 1990: Fig. 1A-D).

The median lobe of the posterior margin of the epistome of *T. falciphallus* is low and subtruncate (Fig. 6C, D) like in *T. sabana* (cf. Tan & Ng, 1998: Fig. 3C); but *T. falciphallus* can easily be separated by the postorbital cristae being low and composed of rugae (Fig. 6B) (versus cristae well marked, high and made up of strong granules and rugae in *T. sabana*; cf. Tan & Ng, 1998: Fig. 3A); the lateral margins of male pleonal somite 6 are gently concave (Fig. 7C) (versus margins gently sinuous and subparallel in *T. sabana*; cf. Tan & Ng, 1998: Fig. 3B); and the G1 is strongly curved with the terminal article cylindrical (Figs 7E, F, 9A-C) (versus G1 straighter with the terminal article tapering distally and the tip is upcurved in *T. sabana*; cf. Tan & Ng, 1998: Fig. 3D-G).

The transverse ridge behind the cardiac region is sharp and pronounced in *T. falciphallus* (Fig. 6B, E), and in this character, it is like *T. baramensis* (De Man, 1902) (cf. Tan & Ng, 1998: Fig. 1A). In *T. falciphallus*, however, the frontal median triangle is incomplete (Fig. 6C, D) (versus complete in *T. baramensis*; cf. Tan & Ng, 1998: Fig. 1C), the epigastric and postorbital cristae are low, rugose and not sharp (Fig. 6B) (versus sharp and distinct in *T. baramensis*; Tan & Ng, 1998: Fig. 1A); the median lobe of the posterior margin of the epistome is subtruncate (Fig. 6D) (versus broadly triangular in *T. baramensis*; cf. Tan & Ng, 1998: Fig. 1C); and the G1 is strongly curved with the terminal article cylindrical (Figs 7E, F, 9A-C) (versus straighter with the terminal article tapering distally to a sharp tip that is gently upcurved in *T. baramensis*; cf. Tan & Ng, 1998: Fig. 1D-F).

Conservation notes.— *Thelphusula falciphallus* n. sp. appears to be micro-endemic to hill dipterocarp streamlets within Pelagus National Park which is located inside the Pelagus Forest Reserve. The surrounding landscapes are largely logged-over forests, and as such, the reserve provides partial protection for the ecosystem in the park but remains vulnerable to edge effects and future land-use pressures. This species is a small, semi-terrestrial stream-marginal crab that inhabits intermittent streams, particularly among leaf-packs, root mats, and bank seepages. Its activity peaks during nocturnal hours and in wet periods. The estimated area of occupancy is restricted to the national park which is only approximately 20 km² in area. Based on field observations, the species may be tentatively considered Least Concern under the IUCN Red List framework as the habitat is currently protected, although further surveys are needed to confirm its true distribution, population status, and threat levels.

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