

A new species of freshwater crab of the genus *Stoliczia* Bott, 1966 (Crustacea: Brachyura: Potamidae) from the summit of Bukit Larut, Perak, Peninsular Malaysia

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Abstract. A new highland species of potamid freshwater crab of the genus *Stoliczia* Bott, 1966, is described from Bukit Larut, Perak, Peninsular Malaysia. *Stoliczia larutensis*, new species, is diagnosed by its ovate carapace with smooth dorsal surface, slender ambulatory legs and a characteristic male first gonopod structure. With regards to the first male gonopod, it is perhaps closest to *S. leoi* (Ng & Yang, 1985) described from mountains southeast of Bukit Larut. *Stoliczia larutensis*, however, differs markedly in a number of carapace, ambulatory leg and male abdominal characters.

Key words. Crustacea, Brachyura, Potamidae, taxonomy, *Stoliczia*, new species, Bukit Larut, Malaysia

INTRODUCTION

The potamid genus *Stoliczia* Bott, 1966, is currently represented by 15 species, all from Peninsular Malaysia and southern Thailand (Ng, 1988, 2004; Ng et al., 2008). The constituent species can generally be divided into two groups on the basis of the structure of their male first gonopod. The members of one group (containing *S. bella* Ng & Ng, 1987, *S. ekavibhathai* Ng & Naiyanetr, in Ng, 1986a, *S. goal* Ng, 1993, *S. karenae* Ng, 1993, *S. kedahensis* Ng, 1992, *S. panhai* Ng & Naiyanetr, in Ng, 1986a, *S. perlensis* (Bott, 1966), *S. stoliczkana* (Wood-Mason, 1871), *S. tweediei* (Roux, 1934)) have a male first gonopod terminal segment which is elongated, conical, tapering to a pointed tip, without any trace of a dorsal flap (cf. Ng, 1988, 1992, 1993). Members of the second group (with *S. changmanae* Ng, 1988, *S. chaseni* (Roux, 1934), *S. cognata* (Roux, 1936), *S. leoi* (Ng & Yang, 1985), *S. pahangensis* (Roux, 1936), *S. rafflesi* (Roux, 1936)) have a male first gonopod terminal segment of varying shapes, from slender to stout, but generally relatively shorter than those in the first group, and always possessing a distinct dorsal flap (cf. Ng, 1988, 1991).

In 2006, specimens of a small species of freshwater crab of the family Potamidae were collected from near the summit of Bukit Larut, better known as Maxwell Hill in the state of Perak in Peninsular Malaysia. These specimens differ markedly from the only potamid known from the area,

Stoliczia tweediei, and from other species in the genus in having a male first gonopod that has a prominent dorsal flap on the terminal segment. The new material from Bukit Larut is therefore described here as a new species, *S. larutensis*.

Material examined is deposited in the Zoological Reference Collection (ZRC) of the Lee Kong Chian Natural History Museum (ex Raffles Museum of Biodiversity Research), National University of Singapore. Measurements (in millimetres) are of carapace width (cw) and carapace length (cl), respectively. The abbreviations G1 and G2 are used for the male first and second gonopods, respectively. The terminology used follows Ng (1988).

TAXONOMY

Family Potamidae Ortmann, 1896

Stoliczia Bott, 1966

Type species. *Telphusa stoliczkana* Wood-Mason, 1871, by original designation.

Stoliczia larutensis, new species (Figs. 1–4)

Material examined. Holotype: male (12.8 × 10.2 mm) (ZRC 2013.1816), Bukit Larut (= Maxwell Hill), Perak, ca. 1200 m above sea level (asl), Peninsular Malaysia, 4°47'N 100°45'E, coll. C. D. Schubart, P. Koller & S. Klaus, 13 March 2006. Paratypes – 2 subadult females (9.7 × 7.9 mm, 6.3 × 5.2 mm) (ZRC 2013.1817), same data as holotype.

Comparative material. *Stoliczia leoi* (Ng & Yang, 1985), holotype male (20.0 × 15.9 mm) (ZRC 1965.12.7.94), Gunong Kledang, Perak, ca. 700 m asl, Peninsular Malaysia, 4°36.5'N 101°02'E, coll. by R. Hanitsch, 1898.

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Diagnosis. Carapace subovate, mostly smooth, slightly inflated; epigastric cristae present as rugose swelling; postorbital cristae rounded, visible as raised area; external orbital tooth appears confluent with rest of convex anterolateral margin; exopod of third maxilliped without trace of flagellum or lobe; ambulatory legs (notably merus) slender; male broadly triangular, G1 with subterminal segment almost straight, inner distal corner with small hump; terminal segment gently curved outwards, with distinct dorsal fold on proximal half.

Description of male holotype. Carapace subovate, mostly smooth, branchial and gastric regions gently convex, appears slightly inflated; lateral margins and surfaces with scattered short, stiff setae (Fig. 1A, B). Frontal region pitted, otherwise smooth granules; anterolateral regions with distinct low striae, posterolateral regions with low striae; rest of branchial regions slightly pitted, almost smooth; mesogastric, urogastric, cardiac and intestinal regions almost smooth; orbital regions pitted; suborbital region almost smooth; pterygostomial region with small granules, separated from suborbital region by row of small rounded granules (Fig. 1). Epigastric cristae visible as gently rugose swelling, separated by shallow Y-shaped furrow, more or less confluent with postorbital cristae; postorbital cristae not sharp,

rounded, visible as raised transverse area, not confluent with anterolateral margin (Fig. 1A, B). Cervical grooves shallow, not distinct; H-shaped median gastric groove distinct (Fig. 1A, B). Frontal margin divided into 2 broad, rounded lobes, separated by shallow concavity; margin of each lobe gently convex, separated from supraorbital margin by distinct angle, no lobe discernible (Fig. 1A, B). External orbital tooth not clearly demarcated from rest of anterolateral margin, almost confluent, lined with very small rounded granules, those on external orbital tooth lower; epibranchial tooth not discernible (Fig. 1). Anterolateral margins convex, subcristate, lined with small rounded granules (Fig. 2A, B). Posterolateral margin gently concave, converging towards gently convex posterior carapace margin (Fig. 1A, B). Orbits subovate; eye filling up most of orbital space; eye peduncle relatively short, stout; cornea large, pigmented (Fig. 1C). Supraorbital margin gently concave, entire, lined with small rounded granules (Fig. 1C). Suborbital margin concave, complete, lined with small rounded granules (Fig. 1C). Posterior margin of epistome gently sinuous; with distinct median triangle, lateral margins gently concave; lateral parts gently sinuous with small submedian fissure (Fig. 1C).

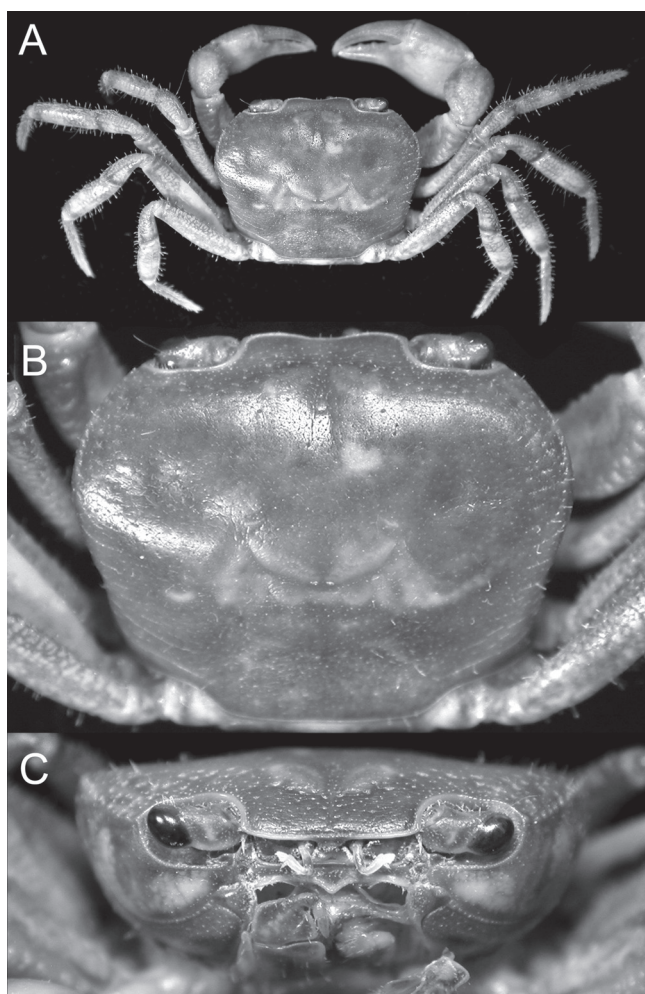


Fig. 1. *Stoliczia larutensis*, new species, holotype male (12.8 × 10.2 mm) (ZRC 2013.1816), Bukit Larut, Malaysia. A, whole animal dorsal view; B, carapace dorsal view; C, carapace frontal view.

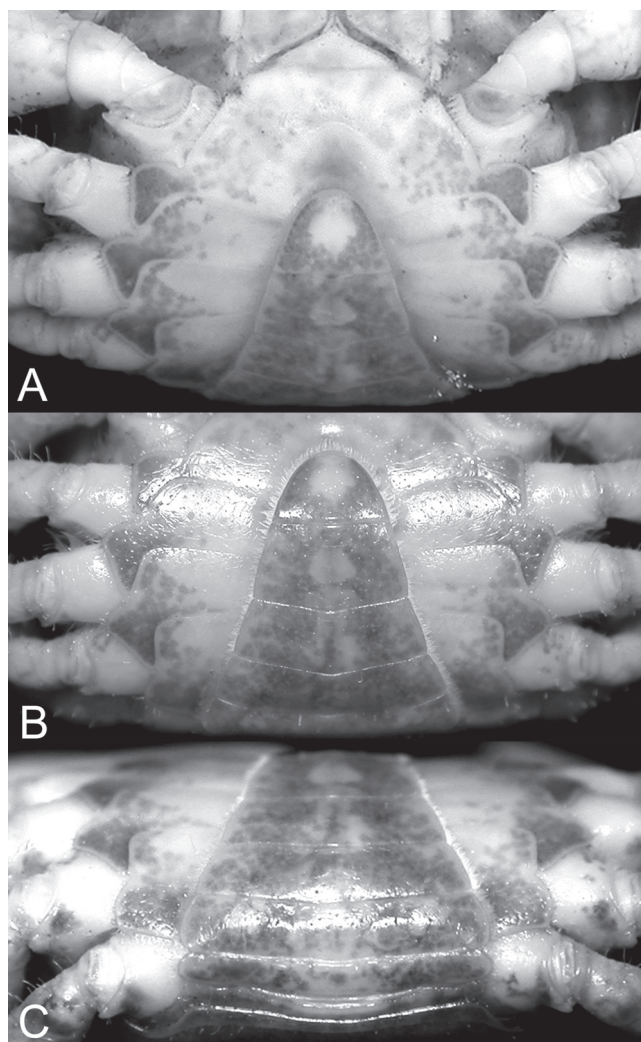


Fig. 2. *Stoliczia larutensis*, new species, holotype male (12.8 × 10.2 mm) (ZRC 2013.1816), Bukit Larut, Malaysia. A, anterior thoracic sternum, telson and abdominal somites 5 and 6; B, thoracic sternum, telson and abdominal somites 3-6; C, posterior thoracic sternum and abdominal somites 1-4.

Mandibular palp simple, with 3 articles; terminal article simple, not bilobed. Third maxillipeds covering most of buccal cavity when closed; ischium subrectangular, with shallow but distinct median oblique groove; merus subquadrate, wider than long, surface gently rugose, antero-external angle rounded; exopod relatively slender, reaching to lower third of merus, without trace of flagellum or lobe, inner distal edge with several short plumose setae (Fig. 4A).

Chelipeds slightly asymmetrical (Fig. 1A). Anterior margin of basis-ischium lined with small granules; margins of merus lined with small rounded granules; outer surface of carpus slightly rugose to smooth, inner margins distinctly granulated, distal angle with low rounded tubercle and smaller basal one (Fig. 1A). Chelae relatively stout; outer surfaces gently rugose to smooth; fingers gently curved, as long as palm; outer surface lined with rows of pits; propodal finger with longitudinal groove lined with pits; cutting edges of both fingers with variously sized teeth and denticles (Fig. 3A, B).

Ambulatory legs slender, second pair longest, last pair shortest, margins lined with numerous short, stiff setae that do not obscure margins (Fig. 1A). Outer surface of merus slightly rugose, dorsal margin entire; carpus smooth, outer surface with low submedian crista; outer surface of

propodus almost smooth with median part gently raised; dactylus relatively long, gently curved (almost straight on last ambulatory leg), quadrate in cross section, margins with short, sharp spines, tips corneous (Fig. 1A).

Thoracic sternum relatively narrow transversely, surface pitted to almost smooth (Fig. 2). Sternites 1, 2 completely fused (s1/s2 invisible) to form broadly triangular plate with slightly convex lateral margins; separated from sternite 3 by shallow but clear suture (s2/s3); sternites 3, 4 completely fused (s3/s4 invisible); sternoabdominal cavity reaching to imaginary line connecting median points of edges of cheliped coxae (Fig. 2A). Male abdominal locking tubercle low, rounded, positioned on submedian part of sternite 5.

Abdomen broadly triangular, all somites and telson free; somites 3–6 trapezoidal, gradually decreasing in width; somite 6 wider than long, lateral margins gently convex; somites 1 and 2 subrectangular, very wide, reaching to bases of coxae of fourth ambulatory legs, sternite 8 not visible when abdomen closed (Fig. 2).

G1 with subterminal segment relatively stout, almost straight, inner distal corner with small hump; outer lateral margin articulates with terminal segment as short membranous part; terminal segment gently curved outwards, tapering to sharp tip, dorsal fold distinct on proximal half; outer lateral margin of distal part with small spines, mesial and submesial margin of distal part with several long plumose setae (Fig. 4B–D). G2 longer than G1, distal segment elongate, flagellum-like, about two-thirds length of basal segment (Fig. 4E).

Females. Both female specimens are distinctly smaller than the holotype male. The larger female paratype specimen (9.7 × 7.9 mm) is probably not adult because its abdomen is subovate and not broadened enough to completely cover the thoracic sternum (as does the typical abdomen of adult female potamids). The vulvae are relatively large, almost round, with a distinct sternal cover at the posterior edge of sternite 6, right at the suture with sternite 7 (Fig. 3C). The pubertal moult marking reproductive adults probably occurs between carapace widths of 10 and 12 mm.

Colour in life. Dorsal surface of carapace mostly reddish-brown; outer and dorsal surfaces of chela, merus and carpus reddish-brown with tips of fingers yellowish-white; ambulatory legs mottled reddish-brown and beige; ventral surfaces yellowish-white, abdomen dark yellow with uneven brown blotches.

Remarks. *Stoliczia larutensis*, new species, is quite different from its congeners. Its slender ambulatory meri ally it with smaller species *S. pahangensis*, *S. rafflesi*, and *S. changmanae*, but it is easily separated by differences in carapace characters (wider and more rugose in *S. changmanae*; proportionately wider in *S. rafflesi*, and epibranchial tooth distinct in *S. pahangensis*). In any case, their G1 structures are very different (see Ng, 1988: figs. 29D–F, 33D–F, 34D–F; Ng, 1991: fig. 1A–D, H–K). In the complete absence of even a small flap on the exopod of the third maxillipeds, *S.*

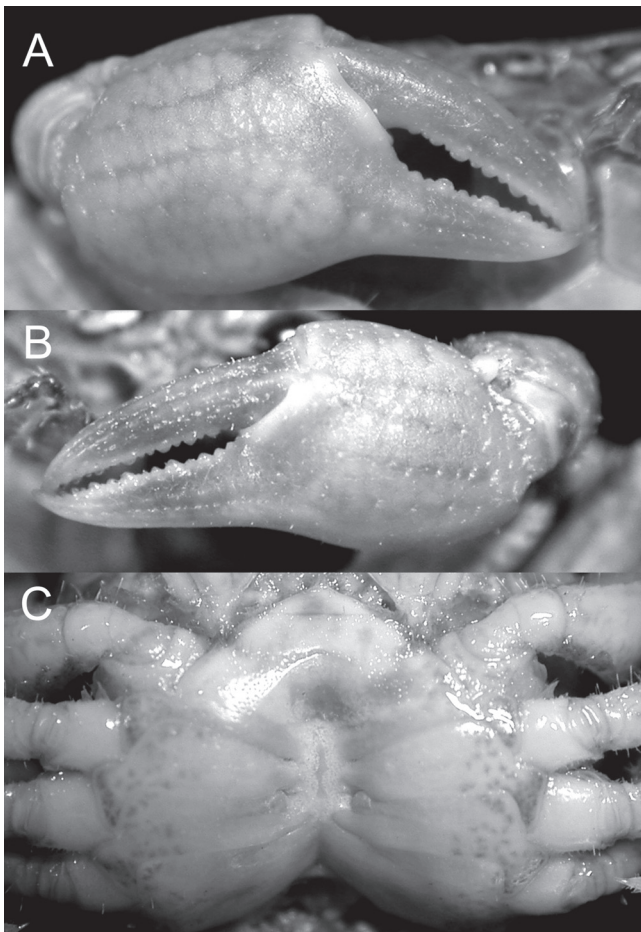


Fig. 3. *Stoliczia larutensis*, new species. A, B, holotype male (12.8 × 10.2 mm) (ZRC 2013.1816); C, paratype female (9.7 × 7.9 mm) (ZRC 2013.1817); both from Bukit Larut, Malaysia. A, right chela frontal view; B, left chela frontal view; C, female thoracic sternum and vulvae.

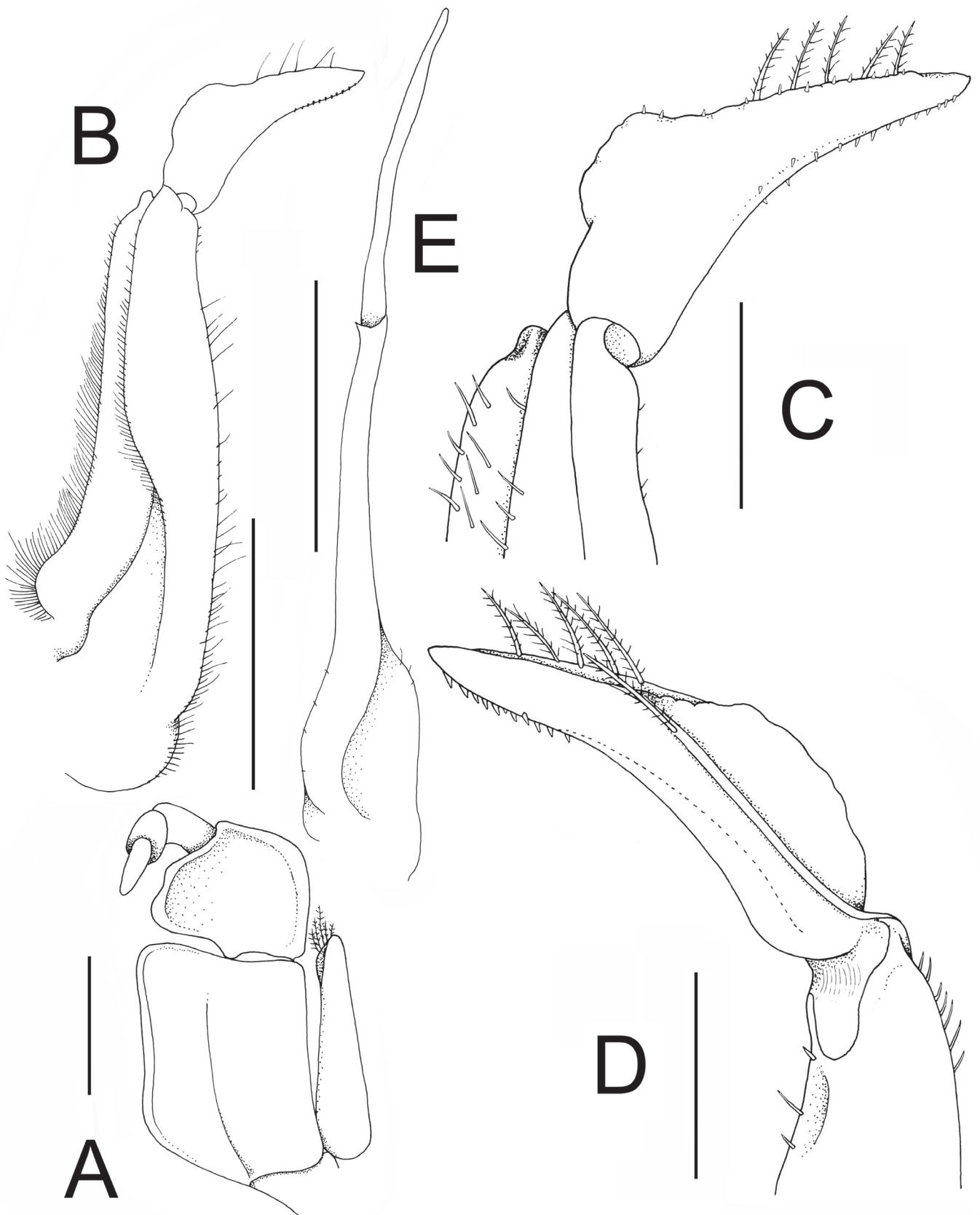


Fig. 4. *Stoliczia larutensis*, new species, holotype male (12.8 × 10.2 mm) (ZRC 2013.1816), Bukit Larut, Malaysia. A, left third maxilliped (setae not drawn except for exopod); B, left G1 (ventral view); C, terminal segment of left G1 (ventral view); D, terminal segment of left G1 (dorsal view); E, left G2. Scale bars: A = 0.5 mm; B, E, 1.0 mm; C, D = 0.25 mm.

larutensis resembles *S. perlensis*, *S. chaseni*, *S. pahangensis*, *S. changmanae*, and *S. karenae*, but these species have very different carapaces, ambulatory legs and G1s (see Ng, 1988, 1992, 1993).

Stoliczia larutensis is perhaps closest to *S. leoi*, described from Gunung Kledang in Perak, especially with regard to the general form of the G1. However, the two species have very different external features. Compared to *S. larutensis*, the carapace is proportionately broader in *S. leoi*, with the dorsal surface relatively flatter, almost glabrous, the epigastric and postorbital cristae sharper, the epibranchial tooth distinct and separated from the external orbital tooth by a distinct fissure (cf. Ng & Yang, 1985: fig. 5A, B; Ng, 1988: fig. 35A, B) (versus carapace more ovate, the dorsal surface having scattered setae, the epigastric and postorbital cristae being lower, and the external orbital angle being confluent with the anterolateral margin without an epibranchial tooth visible, Fig. 1A, B). The ambulatory legs (notably the merus) of *S. leoi* are relatively stouter, shorter and less setose (cf. Ng & Yang, 1985: fig. 5A, B; Ng, 1988: fig. 35A, B) (versus longer, more slender and prominently setose in *S. larutensis*, Fig. 1A). The male telson of *S. leoi* is more triangular in shape (cf. Ng & Yang, 1985: fig. 5B) compared to *S. larutensis* that is distinctly more rounded with the lateral margins distinctly convex (Fig. 2A, B). The ischium of the third maxilliped of *S. larutensis* is also proportionately shorter compared to *S. leoi* (Fig. 4A versus Ng, 1988: fig. 35C). While the G1 structure is of a similar shape, with the subterminal segment straight, the terminal segment of *S. larutensis* is more distinctly bent outwards with the distal part relatively longer (Fig. 4B–D) (versus the terminal segment being less distinctly bent, with distal part shorter in *S. leoi*, Ng & Yang, 1985: fig. 6D–G; Ng, 1988: fig. 35D–F). The G1 of *S. larutensis* is clearly that of an adult male, despite is relatively small size, with the structure already strongly chitinised and distinctly setose.

Geographically, Bukit Larut, the type locality of *S. larutensis*, is over 50 km northwest of Gunung Kledang (= Keledang) in Perak where *S. leoi* occurs; and both hill systems are distinct and not connected by other highlands. Five other species of freshwater crabs are known from Bukit Larut: one potamid, *Stoliczia tweediei* (Roux, 1934); two gecarcinucids, *Phricotelphusa hockpingi* Ng, 1986b, and *Parathelphusa maculata* De Man, 1879; and two sesarmids: *Geosesarma cataracta* Ng, 1986a, and *Geosesarma serenei* Ng, 1986a (see Ng, 1988). As discussed, the G1 structure of *S. tweediei* is very different from *S. larutensis* (Fig. 4B–D), being straighter and the terminal segment tapering and lacking a dorsal flap (see Ng, 1988: fig. 30D–G; Ng, 1993: fig. 1B–F).

Biology. The specimens of *S. larutensis* were collected by hand in March 2006, shortly after the wet season. They were found under a rotting log next to the trail near the summit of the mountain (highest altitude 1250 m). During this time of the year, there was water seeping from under very dark and soft humus-rich soil. It appears to be a semiterrestrial species as there were no permanent areas with flowing water nearby (nor dried river beds) and only few close to the summit of the mountain. The other potamid found on Bukit

Larut, *S. tweediei*, lives in the main streams and waterfall, hiding under rocks, is a fully aquatic species and has been recorded from up to 900 m asl (see Ng, 1988, 1993). The gecarcinucid *Phricotelphusa hockpingi* lives at the sides of small fast flowing streams from altitudes of 80 to 850 m, usually hiding among submerged vegetation, although it can be found in shallow pools under small rocks near these habitats (Ng, 1986b, 1988). The other gecarcinucid on the mountain, *Parathelphusa maculata*, only occurs in the lowlands below 100 m asl. The sesarmids *Geosesarma serenei* and *G. cataracta* are semiterrestrial, inhabiting moist areas, with the former occurring in relatively higher altitudes (1150 m asl) and the latter near waterfalls at about 350 m asl (see Ng, 1988).

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