

THE GECARCINUCID FRESHWATER CRABS OF SOUTHERN INDIA (CRUSTACEA: DECAPODA: BRACHYURA)

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ABSTRACT. – The freshwater crab fauna of the two southernmost Indian states of Kerala and Tamil Nadu are reviewed based on the findings of a recent field survey and re-examination of relevant type material. Nine genera and twenty-three species of gecarcinucid freshwater crabs are reported, including six new genera (*Baratha*, *Lamella*, *Pilarta*, *Snaha*, *Vanni* and *Vela*) and 10 new species (*Baratha pushta*, *Baratha peena*, *Pilarta anuka*, *Snaha aruna*, *Travancoriana kuleera*, *Travancoriana charu*, *Vanni ashini*, *Vanni deepta*, *Vanni giri* and *Vela virupa*). Four species previously regarded as junior subjective synonyms are recognised herein as valid species, namely, *Lamella lamellifrons* (Alcock), *Vela pulvinata* (Alcock), *Vanni travancorica* (Henderson) and *Travancoriana convexa* (Roux). Keys to the genera and species of southern Indian gecarcinucid freshwater crabs are provided.

KEY WORDS. – Freshwater crab, southern India, Crustacea, Decapoda, Brachyura, Gecarcinucidae, taxonomy, new genera, new species.

INTRODUCTION

Field surveys of the Sri Lankan freshwater crab fauna implemented through a collaboration between the Wildlife Heritage Trust of Sri Lanka and the National University of Singapore that began in 1993 have led to the discovery of a large number of new taxa, increasing the island's known fauna by almost an order of magnitude (see Ng, 1994, 1995a, b; Bahir, 1998, 1999; Ng & Tay, 2001; Bahir & Ng, 2005; Bahir et al., 2005; Bahir & Yeo, 2005). The remarkable diversity and endemism of Sri Lanka's freshwater crabs inspired questions about their evolution and biogeography, especially considering that Sri Lanka's biota is considered to have a close relationship with those of the Western Ghats (Dutta, 1997) (see later). This led us to initiate a study aimed at comparing the southern Indian freshwater crabs, especially from the southernmost states of Kerala and Tamil Nadu (Fig. 1), with the Sri Lankan freshwater crabs. The present work on gecarcinucid crabs is part of a broader study of the freshwater crabs of South Asia. The Parathelphusidae will be reported on in a separate paper (Yeo, in prep.).

There has been comparatively little research on the gecarcinucid freshwater crabs of southern India. A total of

11 species described in the period 1909–1969 have their type localities within the present-day states of Kerala and Tamil Nadu, and our study has included the re-examination of the type material of these species.

Nine genera (six of them new) and twenty-three species (10 new) of gecarcinucid freshwater crabs are reported in the present study. These are: *Barytelphusa* Alcock, 1909 [*B. cunicularis* (Westwood, 1836)]; *Cylindrotelphusa* Alcock, 1909 [*C. steniops* (Alcock, 1909)]; *Travancoriana* Bott, 1969 [*T. schirnerae* Bott, 1969, *T. pollicaris* (Alcock, 1909), *T. convexa* (Roux, 1931), *T. kuleera*, new species, *T. charu*, new species]; *Baratha*, new genus [*B. pushta*, new species, *B. peena*, new species]; *Lamella*, new genus [*L. lamellifrons* (Alcock, 1909)]; *Pilarta*, new genus [*P. anuka*, new species]; *Snaha*, new genus [*S. aruna*, new species, *S. escheri* (Roux, 1931)]; *Vanni*, new genus [*V. travancorica* (Henderson, 1913), *V. malabarica* (Henderson, 1912), *V. nilgiriensis* (Roux, 1931), *V. pusilla* (Roux, 1931), *V. ashini*, new species, *V. deepta*, new species, *V. giri*, new species); and *Vela*, new genus (*V. virupa*, new species, *V. carli* (Roux, 1931), *V. pulvinata* (Alcock, 1909)]. Keys to the genera and species of southern Indian gecarcinucid freshwater crabs are also provided.

Seven of the genera recognised here are currently known for certain only from southern Indian states of Kerala and Tamil Nadu (*Cylindrotelphusa*, *Travancoriana*, *Baratha*, *Lamella*, *Pilarta*, *Snaha* and *Vanni*), while two genera have species also occurring outside this region (*Barytelphusa* and *Vela*). *Travancoriana* may also occur in Karnataka (Srivastava, 2005), but this remains to be confirmed (see later). Henderson (1893: 383) cited two specimens of *Perbrinckia enodis* [as *Telphusa*] as follows: "... 'Madras,' a single specimen (Brit. Mus.)...specimen probably came from one of the south Indian hill ranges, and not from the neighbourhood of Madras." The genus *Perbrinckia*, however, is believed to be endemic to the island of Sri Lanka (Ng & Tay, 2001), and as we have yet to encounter the genus in our examination of Indian material, the present study corroborates this. This suggests that Henderson's (1893) specimens were misidentified and may instead represent a superficially similar species. Unfortunately, Henderson's specimens could not be located in the Natural History Museum, London (formerly British Museum of Natural History), so his identifications could not be verified.

In a recent study of freshwater crabs in the collection of the Southern Regional Station of the ZSI, Srivastava (2005) assigned more than 500 specimens collected from four southern Indian states (including Kerala and Tamil Nadu) to just five species (three Gecarcinucidae and two Parathelphusidae, but all five mistakenly placed in the family

"Potamonidae" (sic.)), the three gecarcinucid taxa being *Travancoriana schirnerae* (Bott), *Barytelphusa guerini* (H. Milne Edwards), and *Barytelphusa cunicularis* (Westwood). The identifications, however, appear to have been based solely on external characters because there was no mention of the taxonomically important male first pleopod characters (see Srivastava, 2005). Reliance on either set of characters alone could easily lead to misidentifications. Therefore, even though some of Srivastava's (2005) identifications are probably correct, they should be regarded as tentative, pending re-examination in the light of male first pleopod characters and the additional species recognised herein.

None of the taxa described in the present paper occur in Sri Lanka despite its relative proximity to southern India, which includes part of the Western Ghats. This matches previous studies that have failed to report any gecarcinucid crabs from the island despite numerous intensive field surveys conducted there in recent years (Ng & Tay, 2001; Bahir & Ng, 2005; Bahir et al., 2005), and further demonstrates the limited biotic exchange between Sri Lanka and the Indian mainland and the distinctiveness of their respective faunas (Bossuyt et al., 2004).

MATERIALS AND METHODS

The following abbreviations are used: G1 for male first pleopod, G2 for male second pleopod. Methods of measurements and anatomical terminology essentially follow Ng (1988) and Ng & Tay (2001). Ambulatory legs are measured from the proximal edge of the merus to the tip of the dactylus. All measurements are in millimetres. Coordinates and elevation above mean sea level of localities were obtained from published data, topographic maps and GPS. Scale bars = 1 mm.

The use of external characters such as carapace, male abdomen, and thoracic sternum features in addition to G1 and G2 characters is critical for the study of gecarcinucid crabs as they have relatively conservative G1 morphology. These characters have been extensively used by Ng & Tay (2001), to characterise new genera of Sri Lankan freshwater crabs. We have followed this in the present study, and use similar characters to diagnose the gecarcinucid genera from this region. All species are diagnosed, but full descriptions are given only for the type species of new genera.

Specimens examined in this study are deposited in the following institutions: Naturhistorisches Museum Basel, Basel, Switzerland (MBA); Natural History Museum, Geneva, Switzerland (MGE); Natural History Museum, London, UK (NHM); Forschungsinstitut Senckenberg, Frankfurt am Main, Germany (SMF); Wildlife Heritage Trust of Sri Lanka, Sri Lanka (WHT); Zoological Reference Collection (ZRC) of the Raffles Museum of Biodiversity Research, Department of Biological Sciences, National University of Singapore; and Zoological Survey of India, Kolkata, India (ZSI). Most of the recent specimens were hand-collected by local villagers and colleagues for the purpose of

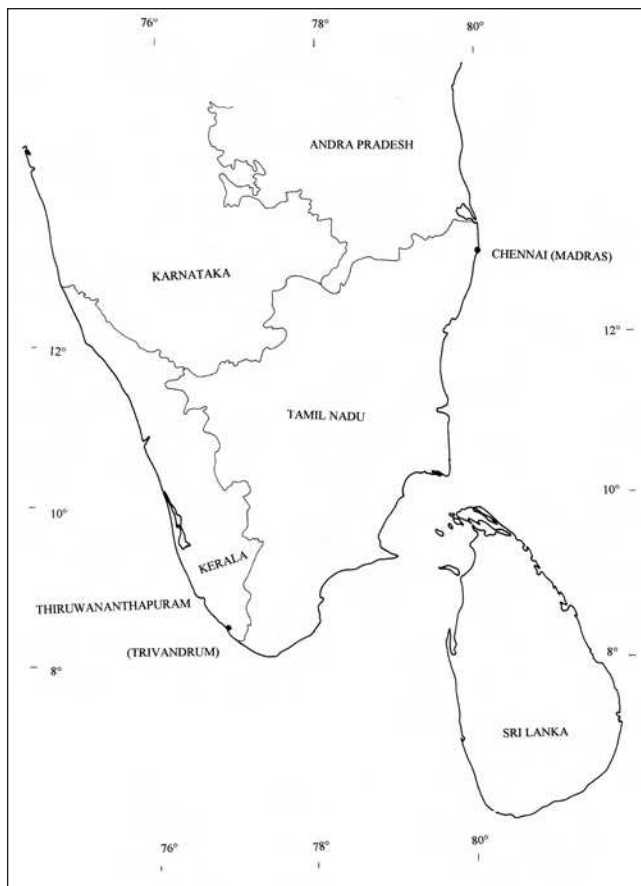


Fig. 1. Study area: the southernmost states of India, Kerala (southwestern India) and Tamil Nadu (southeastern India).

the present study. The new material referred to in this paper is deposited in ZRC and WHT.

TAXONOMY

GEARCINUCIDAE RATHBUN, 1904

Potamonidae Ortmann, 1896: 445 (part); Rathbun, 1904: 244 (part); Alcock, 1910b: 16 (part) (not Potamidae Ortmann, 1896).

Potamoninae – Rathbun, 1904: 245, 247 (part) (not Potaminae Ortmann, 1896).

Gecarcinucinae Rathbun, 1904: 245, 247; 1906: 66; Alcock, 1910b: 70 (part).

Gecarcinucidae – Bott, 1969: 359; 1970a: 335; 1970b: 22; Chuensri, 1974: 1; Ng, 1988: 84.

Type genus. – *Gecarcinucus* H. Milne Edwards, 1844, by original designation.

Remarks. – According to Bott (1969, 1970b), two gecarcinuroid families occur in India, namely the Gecarcinucidae Rathbun, 1904, and the Parathelphusidae Alcock, 1910a (which Bott mistakenly attributed to Colosi, 1920). Gecarcinucid crabs are distinguished from parathelphusid crabs by the frontal median triangle being incomplete, with a distinctly cristate upper margin only, the lateral margins being indistinct or absent altogether (vs. a well-developed frontal median triangle present, with distinctly cristate frontal and lateral margins) (e.g., Figs. 3B, 7B, 16B, 25I; vs. Ng & Tay, 2001: Figs. 11B, 29B, 35B, 82B, 114B, 116B, 119B; see also Ng, 1988).

Key to the southern Indian freshwater crab genera

1. Flagellum of exopod of third maxilliped absent or vestigial (Figs. 25B, 27A) 2
- Flagellum of exopod of third maxilliped long, well-developed (Figs. 7C, 16C) 3
2. Carapace deep; dorsal surface smooth (Figs. 28A, B, 30A, B). Sutures between thoracic sternites 2–3 and 3–4 distinctly marked as grooves (Figs. 28C, 29A, 30C). Ambulatory legs lacking dense setae (Figs. 28A, 30) *Snaha*, new genus
- Carapace slightly convex; dorsal surface with postorbital cristae, epigastric cristae and frontal region rugose (Figs. 25A, 26A, B). Sutures between thoracic sternites 2–3 and 3–4 indistinct (Figs. 25C, 26C). Ambulatory legs with dense, short setae (Figs. 25E, 26A) *Pilarta*, new genus
3. Distal segment of G2 short to vestigial (Figs. 2D, 4D, 22E) 4
- Distal segment of G2 relatively long, ca. 0.3–0.6 times length of basal segment (Figs. 6E, 18G, 25H, 27G, 31G, 47F) 6
4. Carapace very high, strongly convex; frontal and orbital regions very narrow; anterolateral margins with distinct granular serrations (Fig. 5). Male telson triangular (Fig. 5C). G1 terminal segment sickle-shaped (Fig. 4A–C) *Cylindrotelphusa*
- Carapace relatively low, gently convex anteriorly to flat posteriorly; frontal and orbital regions broad; anterolateral margins lacking serrations (Figs. 3A, B, 24A, B). Male telson tongue-shaped (Figs. 3C, 24C). G1 terminal segment upright (Figs. 2A–C, 22A, B) 5
5. Epigastric cristae slightly anterior to postorbital cristae, forming gentle concave ridge in dorsal view; external orbital angle

- triangular, outer margin long, ca. 2–3 times length of inner margin; epibranchial tooth broadly triangular, blunt (Fig. 3A). G1 narrow, long, curving slightly outwards, with a long, slender terminal segment, ca. 0.6 times length of subterminal segment (Fig. 2A, E, F) *Barytelphusa*
- Epigastric cristae in line with postorbital cristae, forming straight ridge in dorsal view; external orbital angle outer margin comparatively long, ca. 4–5 times length of inner margin; epibranchial tooth acutely triangular, sharp (Figs. 23A, 24A). G1 with inner margin characteristically curved or angled just below juncture between terminal and subterminal segments, with relatively shorter terminal segment, ca. 0.4 times length of subterminal segment (Fig. 22A–D) *Lamella*, new genus
 - 6. Carapace distinctly swollen in frontal and dorsal views (Figs. 19A, B, 21A, B, 46A, B, 48A, B). Suture between thoracic sternites 3–4 clearly demarcated by distinct, deep, complete groove running from abdominal cavity to edge of sternum (Figs. 18A, 19C, 21C, 45A, 46C, 48C). Male abdomen T-shaped, very narrow; sixth segment elongated (Figs. 18B, 19C, 21C, 45B, 46C) 7
 - Carapace slightly convex in frontal view (Figs. 8B, 32B). Suture between thoracic sternites 3–4 not demarcated by distinct groove from abdominal cavity to edge of sternum (Figs. 7E, 8C, 35A, 36C). Male abdomen T-shaped, distinctly broader; sixth segment relatively broader (Figs. 7D, 8C, 35B, 36C) 8
 - 7. Male abdomen relatively slender, with long, narrow telson, ca. 1.4 times longer than proximal width (Figs. 45B, 46C, 50C). G1 with long, cone-shaped terminal segment, ca. 0.4 times length of subterminal segment (Figs. 45C–E, 47B–E, 49A, B, F, G) *Vela*, new genus
 - Male abdomen relatively broad, with stout telson, ca. 1.1 times longer than proximal width (Figs. 18B, 19C). G1 with short, broadly cone-shaped terminal segment (Figs. 18C–F, 20A–D) *Baratha*, new genus
 - 8. Carapace relatively squarish; postorbital cristae usually less strongly developed; external orbital angle less broad, with outer margin ca. 1.5–2 times as long as inner margin (Figs. 32A, B, 34A, B). G1 terminal segment proportionately shorter, cone-shaped, ca. 0.2–0.3 times length of subterminal segment (Figs. 31C, D, 33A, B) *Vanni*, new genus
 - Carapace distinctly transverse; postorbital cristae usually strongly developed; external orbital angle distinctly broader, with outer margin ca. 3–5 times as long as inner margin (Figs. 7A, 8A, B, 10A, B). G1 terminal segment proportionately longer, ca. 0.3–0.6 times length of subterminal segment (Figs. 7F, G, 9A, B, 11A, B) *Travancoriana*

Barytelphusa Alcock, 1909

Paratelphusa (*Barytelphusa*) Alcock, 1909a: 250, 251; 1909b: 376; 1910b: 78; Balss, 1937: 144.

Barytelphusa – Bott, 1969: 360; 1970b: 30; Srivastava, 2005: 118.

Type species. – *Potamon* (*Potamonautes*) *jacquemontii* Rathbun, 1905, by original designation.

Diagnosis. – Carapace broader than long, dorsal surface slightly convex in frontal view, anterolateral margin and branchial region raised, flat posteriorly, smooth except at postorbital cristae, epigastric cristae and lateral margins; epistomal median lobe without median tooth; frontal median triangle incomplete, only dorsal margin developed, lateral margins indiscernible; postorbital and epigastric cristae prominent, fused, with latter slightly anterior to former,

forming gentle concave ridge in dorsal view; external orbital angle broadly triangular, with long outer margin, ca. 2–3 times length of inner margin; epibranchial tooth broad, blunt, separated from external orbital angle by clearly visible cleft (Fig. 3A, B; Rathbun, 1904: Pl. 16 fig. 5; Bott, 1970b: Pl. 3 fig. 21). Third maxilliped exopod with long flagellum. Suture between thoracic sternites 2–3 and 3–4 distinctly to slightly visible as grooves (Fig. 3C; Rathbun, 1904: Pl. 16 fig. 1; Bott, 1970b: Pl. 3 fig. 22). Male abdomen acutely triangular in large males (Fig. 3C; Rathbun, 1904: Pl. 16 fig. 1; Bott, 1970b: Pl. 2 fig. 20, Pl. 3 fig. 22). G1 narrow; with almost straight to slightly curved, long terminal segment, ca. 0.6 times length of subterminal segment (Fig. 2A–C, E, F; Bott, 1970b: Pl. 26 figs. 13, 14). G2 with short distal segment, ca. 0.2 times length of basal segment (Fig. 2D).

Remarks. – Alcock (1909a, 1910b) established *Barytelphusa* as a subgenus of *Parathelphusa* [mis-spelt as *Paratelphusa*] for 12 species (including four subspecies) of gecarcinucid crabs mostly from central to northern India. Bott (1970b) later recognised two subgenera and synonymised nine nominal species in the process: *Barytelphusa* (*Barytelphusa*) with two species; and *B. (Maydelliathelphusa)* with one species (including four subspecies). Our studies indicate that the genus requires revision. Several nominal taxa synonymised by Bott (1970b) are likely to be valid species, including the original type of the genus, *Potamon* (*Potamonantes*) *jacquemontii* Rathbun, 1904 (Yeo et al., in prep.).

Three nominal species of *Barytelphusa* have been reported from Kerala and Tamil Nadu, namely *B. cunicularis* (Westwood, 1836), *B. pollicaris* (Alcock, 1909) and *B. lamellifrons* (Alcock, 1909). However, only *B. cunicularis* is recognised as a species of *Barytelphusa* in the present study because the latter two species have been transferred to *Travancoriana* (see Bott, 1970a, b) and *Lamella*, new genus (present study), respectively. *Barytelphusa* is clearly distinguished from *Travancoriana* by G1 and G2 characters (see under genus Remarks for *Travancoriana*) and from *Lamella* by a combination of external and G1 characters (see under genus Remarks for *Lamella*). Srivastava (2005) recently reported *B. guerini* (H. Milne Edwards, 1853) from Tamil Nadu and Karnataka. However, this record of *B. guerini* is doubtful because the taxonomy of this species is very confused, with several species having been questionably synonymised with it (Bott, 1970b; Yeo, unpublished data).

Ecological notes. – See Species Account.

Distribution. – The genus occurs in a north-south direction along much of the Western Ghats, and is known from Maharashtra State, the general area around Mumbai (=Bombay) (Sykes & Westwood, 1836), including Pune (=Poona) and Manjira (=Manjira) River along the Balaghat Range in the north; through Karnataka State, Dharward and Dandeli; and south into Kerala State, Ponmudi, Chalakudy, Nilgiris, Annamalai (see also Rathbun, 1905; Bott, 1970b).

***Barytelphusa cunicularis* (Westwood, 1836)**

(Figs. 2, 3)

Thelphusa cunicularis Westwood, in Sykes & Westwood, 1836: 183; H. Milne Edwards, 1853: 209.

Telphusa cunicularis – Wood-Mason, 1871: 196.

Potamon cunicularis – De Man, 1898: 436.

Barytelphusa (*Barytelphusa*) *cunicularis* – Bott, 1970a: 335; 1970b: 31; ?Srivastava, 2005: 118, Pl. 1 Fig. 3.

Material examined. – 1 male (70.0 × 48.8 mm) (ZRC 2003.0250) (formerly WHT 10521), 1 male (62.2 × 44.3 mm) (WHT 10522), 1 male (45.1 × 32.7 mm) (WHT 10523), 1 male (32.1 × 24.7 mm) (WHT 10524), 1 juv. male (26.0 × 19.4 mm), Chathankodu near Ponmudi, Kerala, India, 08°39'45.1"N 77°09'03.5"E, alt. 100 m; 1 male (53.1 × 38.6 mm) (WHT 10526), 1 juv. male (20.8 × 15.7 mm) (WHT 10527), near Ponmudi, Kerala, India, 08°43'04.5"N 77°07'41.4"E, alt. 120 m; 1 male (41.0 × 28.9 mm) (WHT 10528), 1 male (51.6 × 36.7 mm) (WHT 10529), 1 female (46.4 × 33.9 mm) (WHT 10530), near Ponmudi, Kerala, India, 08°44'19.0"N 77°07'09.7"E, alt. 339 m; 1 female (49.0 × 45.1 mm) (WHT 10531), 1 juv. female (28.5 × 21.7 mm) (WHT 10532), Kalikavur on Manjeri-Trissur Road, Kerala, India, 11°10'0.6"N 76°19'51.7", alt. 52 m; 1 juv. male (29.7 × 2.0 mm) (WHT 10533), 1 juv. male (26.6 × 19.5 mm) (WHT 10534), 1 juv. male (22.2 × 16.7 mm) (WHT 10535), 1 juv. female (24.7 × 18.5 mm) (WHT 10536), Palaruvi waterfall, Kerala, India, 08°56'30.7"N 77°09'52.4"E, alt. 600 m; 2 males (larger 61.7 × 43.9 mm), 1 female (52.7 × 37.2 mm), Chalakudy, Kerala, India; 1 male (43.4 × 31.8 mm), 1 female (50.0 × 35.7 mm) (SMF 1765), Poona, southwestern India; 2 males (larger 65.8 × 47.7 mm) (SMF 2741), Balaghat, southwestern India; 2 males (larger 36.8 × 26.8 mm) (SMF 2745), “Indien, Dandheli, Kalu-Fluss, N-Kanara” [Karnataka, India]; 1 male (58.9 × 42.3 mm) (NHM 1895.11.8.9–13) (part), Bombay, southwestern India; 1 male (90.2 × 65.3 mm) (NHM 1980.125) (part), freshwater channels, in deep burrows in muddy places of Dharward District, Karnataka southwestern India.

Diagnosis. – Carapace broader than long, dorsal surface slightly convex anteriorly and flat posteriorly; anterolateral margin and branchial region raised in frontal view; postorbital and epigastric cristae strongly developed, confluent, with latter slightly anterior to former, forming gentle concave ridge in dorsal view; external orbital angle triangular, with long outer margin, ca. 2–3 times length of inner margin; epibranchial tooth broadly triangular, separated from external orbital angle by a distinct cleft; frontal median triangle visible, representing entire frontal margin, dorsal margin prominent (Fig. 3A, B). Male abdomen narrowly triangular; sixth segment broader than long, subequal in length to telson (Fig. 3C). G1 narrow, long, curving slightly outwards; with long terminal segment, ca. 0.6 times length of subterminal segment (Fig. 2A–C, E, F). G2 short; with short distal segment, ca. 0.2 times length of basal segment (Fig. 2D).

Remarks. – Westwood (in Sykes & Westwood, 1836) described *B. cunicularis* [as a *Telphusa*] based on specimens collected from “...along the Ghats from 17° to 19°23'N...extended very much further north and south in an oblique line running between the 73° and 75° meridian”. This is roughly equivalent to the region around Mumbai (=

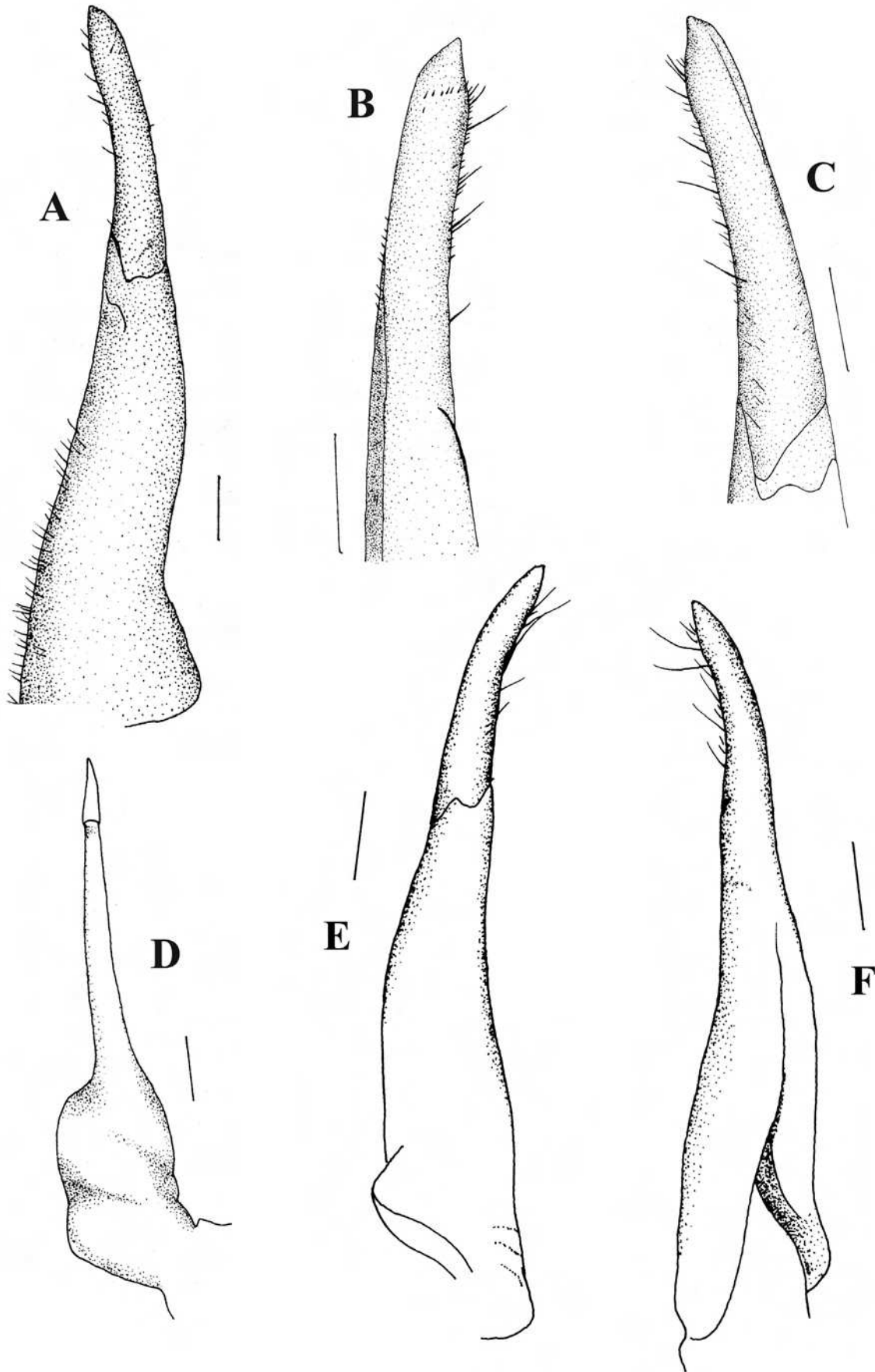


Fig. 2. *Barytelphusa cucicularis* (Westwood, 1836): A–D, male (70.0 × 48.8 mm) (ZRC 2003.0250) (formerly WHT 10521); E, F, male (43.4 × 31.8 mm) (SMF 1765). A, left G1 dorsal view; B, left G1 terminal segment ventral view; C, left G1 terminal segment dorsal view; D, left G2 dorsal view; E, right G1 dorsal view; F, right G1 ventral view. Scale bars = 1.0 mm.

Bombay). Unfortunately, the types of this species are probably lost. Both Alcock (1910b) and Bott (1970b) made no mention of the types, and our attempts to locate them in two of the most likely depositories, the ZSI and NHM, were also unsuccessful.

However, although Bott (1970b) supposedly examined topotypic material (SMF 1765) from “Bombay” (= Mumbai), identified as *B. cunicularis*, a re-examination of the same specimens in the present study found that the label instead reads “Poona” (= Pune), a locality less than 200 km southeast of Mumbai. In any case, no attempt is made here to designate any of these specimens as a neotype, as they possess a relatively flat carapace that appears to differ from Westwood’s (in Sykes & Westwood, 1836) original description. Westwood (in Sykes & Westwood, 1836: 183) described the carapace as being “...much narrowed behind...” and with the “...front part depressed”, seeming to indicate that the animal has an inflated carapace instead, although we are unable to confirm this from Westwood’s (in Sykes & Westwood, 1836: Fig. 1) line drawing (or from re-examination of types). This suggests that there may be at least two distinct species in the Bombay region (one with a flat carapace and one with an inflated

carapace). In any case, since neither Bott (1970b) nor Alcock (1910b) examined any types of *B. cunicularis*, we cannot be sure at this point which form represents *B. cunicularis* sensu stricto. Fresh collections from the type locality will be needed to resolve this problem. For the time being, we will follow Bott’s (1970b) definition of *B. cunicularis*.

The present specimens from Kerala in southern India are referred to *B. cunicularis* sensu Bott, 1970b, as they are almost identical in external and G1 morphology (Fig. 2A–C) to the male specimen from Bombay (43.4 × 31.8 mm, SMF 1765) illustrated by Bott (1970b: Pl. 2 Figs. 19, 20), which we have also re-examined (Fig. 2E, F).

Barytelphusa cunicularis specimens reported by Rathbun (1905b), Alcock (1910b) and Roux (1931) from south India were determined by Bott (1969, 1970a, b) to be mis-identifications, who referred the specimens to *Travancoriana schirnerae* Bott, 1969 (see Remarks for *Travancoriana schirnerae*).

Bott (1970b) also synonymised *Potamon* (*Potamonautes*) *jacquemontii* Rathbun, 1905, and *Paratelphusa* (*Barytelphusa*) *pulvinata* Alcock, 1909, under *Barytelphusa cunicularis*, both of which are or are likely to be distinct species (unpublished data; see also Remarks for *Barytelphusa*, *Vela*, new genus, and *Vela pulvinata*).

A large number of specimens of *B. cunicularis* were also recently reported in the collection of the Southern Regional Station of the ZSI in Chennai (Srivastava, 2005). Some of this material would no doubt represent this widely distributed species; however, it would still be prudent to re-examine this material using G1 characters as well and taking into account the relevant findings from the present study (see earlier).

Ecological notes. – Specimens were collected from shallow to deep (0.01–1.5 m) streams. Large crabs were found under large boulders in streams 0.5–1.5 m deep.

Distribution. – *Barytelphusa cunicularis* sensu Bott, 1970b, is a widely distributed species in a north-south direction along much of the Western Ghats, and is known from Maharashtra State, the general area around Bombay, including Pune (= Poona) and Manjra (= Manjira) River along the Balaghat Range in the north; through Karnataka State, Dharward and Dandeli; Nilgiris, Annamalai (see also Bott, 1970b). We found this species from many localities in Kerala, southwestern India (see Material examined).

Cylindrotelphusa Alcock, 1909

Cylindrotelphusa Alcock, 1909b: 380; 1910a: 259; 1910b: 124; Colosi, 1920: 11; Chace, 1942: 226; Bott, 1969: 360; 1970b: 28.

Cylindrotelphusa – Balss, 1957: 1645.

Type species. – *Gecarcinucus* (*Cylindrotelphusa*) *steniops* Alcock, 1909, by original designation.

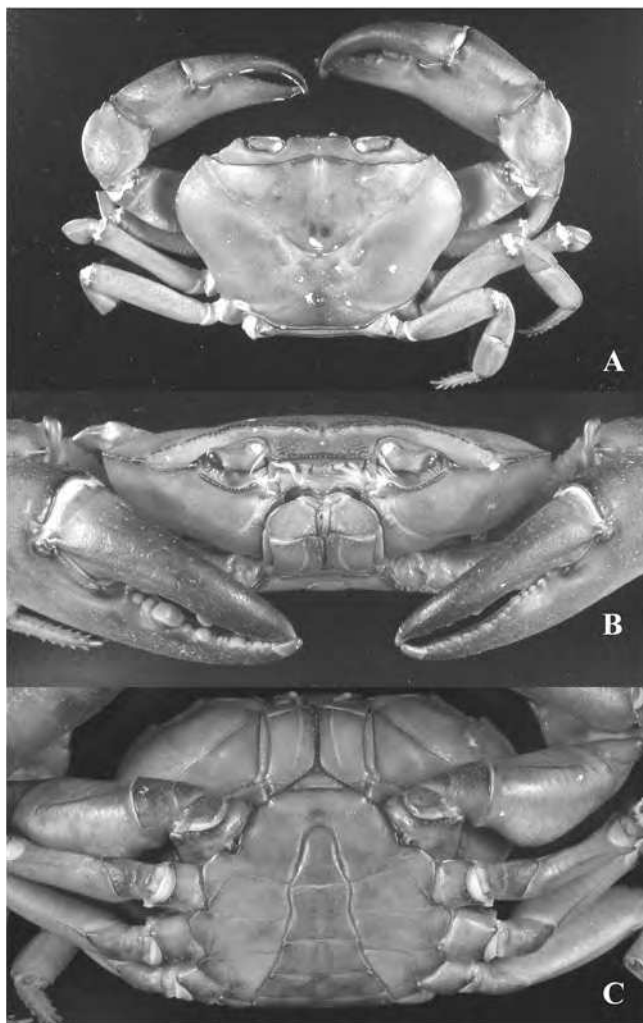


Fig. 3. *Barytelphusa cunicularis* (Westwood, 1836), male (70.0 × 48.8 mm) (ZRC 2003.0250) (formerly WHT 10521): A, dorsal view; B, frontal view; C, ventral view.

Diagnosis. – Carapace deep, dorsal surface highly convex; postorbital cristae well-developed, postorbital region distinctly concave; epibranchial tooth very small, blunt; frontal margin narrow; anterolateral margin of carapace distinctly serrated; external orbital angle small, acutely triangular, with concave outer margin, outer margin same length as inner margin; epistomal median lobe without acute median tooth (Fig. 5). Third maxilliped exopod not reaching proximal one-third of merus, flagellum long. Suture between male thoracic sternites 2–3 visible as shallow depression; anterior male thoracic sternites narrow; suture between sternites 3–4 only visible on sides. Male abdomen narrowly triangular, with broad, squarish sixth segment; telson narrowly triangular, with distinctly concave outer margins, tip acutely triangular (Fig. 5C). G1 narrow, long, with long sickle-shaped terminal segment, ca. 0.55 times length of subterminal segment (Fig. 4A–C). G2 short, with short distal segment, ca. 0.2 times length of basal segment (Fig. 4D).

Remarks. – *Cylindrotelphusa* has a suite of carapace and gonopod characters not found in other southern Indian freshwater crabs, viz., highly convex carapace, appearing swollen in frontal and dorsal views (Fig. 5A, B); triangular male telson with acute tip and distinctly concave outer

margins (Fig. 5C); and very narrow G1, with sickle-shaped, long terminal segment (Fig. 4A–C).

Ecological notes. – See Species Account.

Distribution. – *Cylindrotelphusa* is monotypic and only found in the southernmost states (Kerala and Tamil Nadu) of India.

Cylindrotelphusa steniops (Alcock, 1909)
(Figs. 4, 5)

Gecarcinicus (*Cylindrotelphusa*) *steniops* Alcock, 1909b: 380; 1910b: 125.

Cylindrotelphusa steniops – Bott, 1970b: 28, Pl. 2 figs. 12–14, Pl. 26 Figs. 10, 11.

Material examined. – Lectotype, male (27.7 × 21.6 mm) (ZSI 5741/10) Shathancotta near Quilon, coll. N. Annandale.

Paralectotypes – 4 males, 5 females (largest male 26.1 × 20.8 mm), same data as lectotype.

Others – 1 male (40.6 × 31.6 mm) (WHT 10564), 1 male (28.2 × 21.6 mm) (WHT 10565), 1 juv. female (15.1 × 11.5 mm) (WHT

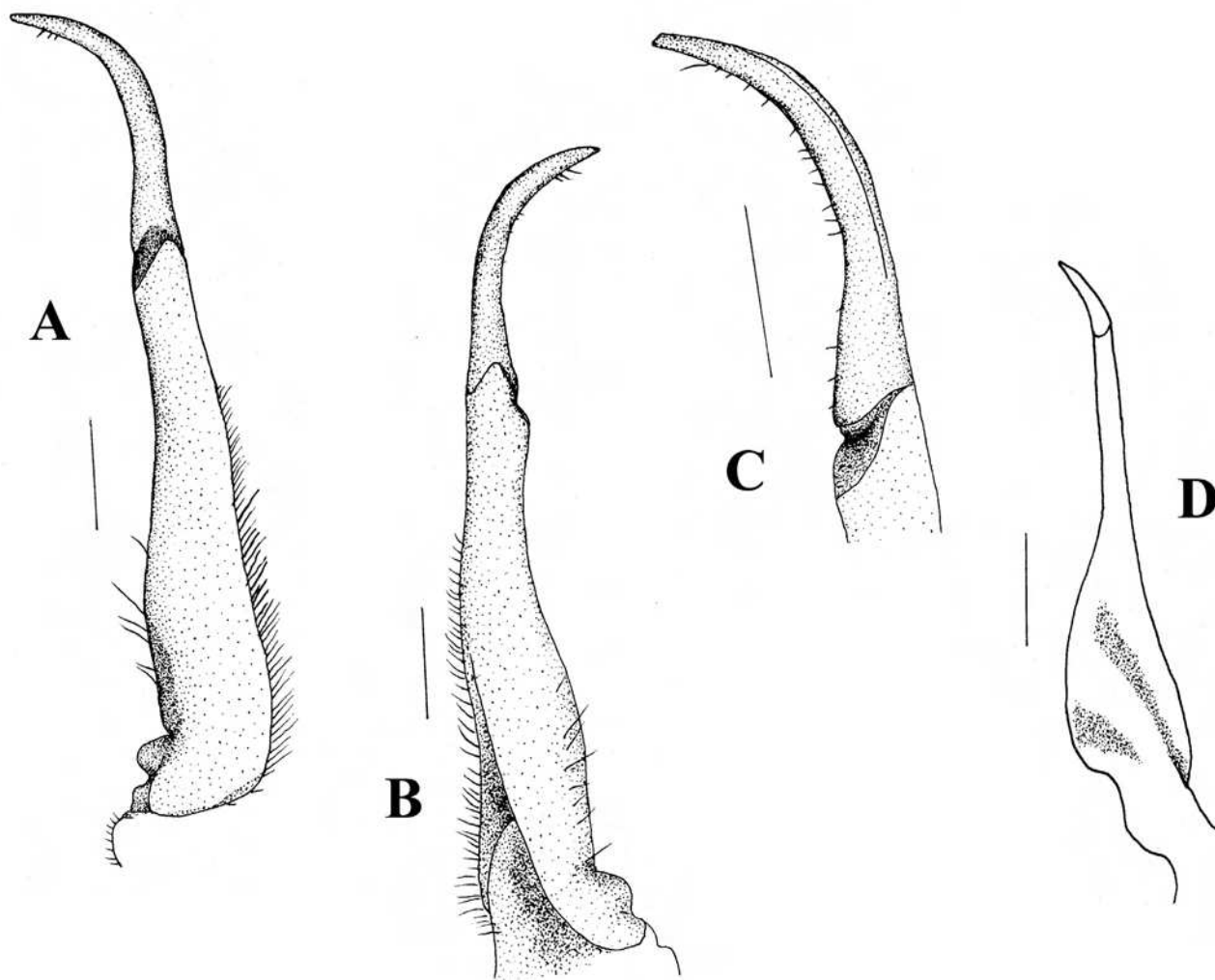


Fig. 4. *Cylindrotelphusa steniops* (Alcock, 1909), lectotype male (27.7 × 21.6 mm) (ZSI 5741/10): A, left G1 dorsal view; B, left G1 ventral view; C, left G1 terminal segment dorsal view; D, left G2 dorsal view. Scale bars = 1.0 mm.

10566), Chathankodu near Ponmudi, Kerala, India, 08°39'45.1"N 77°09'03.5"E, alt. 100 m; 1 juv. male (18.6 × 14.5 mm) (WHT 10570), 1 juv. female (15.0 × 11.9 mm) (WHT 10644), on the way to Ponmudi, Kerala, India, 08°39'45.1"N 77°09'03.5"E, alt. 100m. 1 juv. male (22.7 × 17.3 mm) (WHT 10569), Vettititta Village, Punalur, Kerala, India, 09°02'54.7"N 76°55'03.6"E, alt. 100 m; 1 juv. female (19.1 × 14.0 mm) (WHT 10571), 1 juv. female (16.1 × 11.9 mm) (WHT 10572), between Nedumandam-Devikulam, Kerala, India, 09°51'40.5"N 77°09'34.4"E, alt. 980 m; 1 juv. female (17.6 × 13.7 mm) (WHT 10721), Ponmudi, Kerala, India, 08°46'07.4"N 77°06'37.7"E, alt. 975 m; 1 juv. female (12.2 × 9.0 mm) (WHT 10600), between Gudalur-Manjeri, Tamil Nadu, India, 011°27'08.7"N 76°24'36.2"E, alt. 780 m; 1 female (37.7 × 28.0 mm) (WHT 10787), Chalakudy, Kerala, India.

Diagnosis. – As for genus.

Remarks. – The type series (ZSI 5741/10) was re-examined; and to stabilise the taxonomy of this species, the largest male specimen, measuring 27.7 × 21.6 mm, is hereby designated as the lectotype. *Cylindrotelphusa steniops* is unique among the southern Indian freshwater crabs in its carapace and gonopod morphology (see Remarks for the genus).

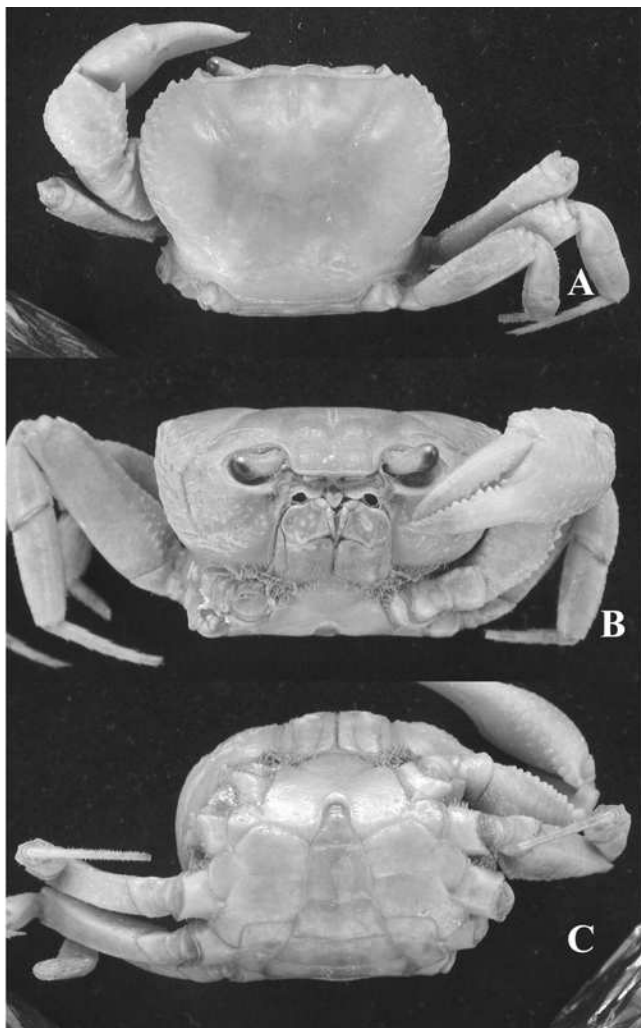


Fig. 5. *Cylindrotelphusa steniops* (Alcock, 1909), lectotype male (27.7 × 21.6 mm) (ZSI 5741/10): A, dorsal view; B, frontal view; C, ventral view.

Ecological notes. – The species is found in deep burrows next to streams (sometimes up to 5–6 m away from the stream margins) in shaded as well as in open areas. Juveniles were observed in burrows in wet muddy and sandy soil adjacent to streams in Kerala and Tamil Nadu, between 100–980 m in altitude.

Distribution. – As for genus.

Travancoriana Bott, 1969

Travancoriana Bott, 1969: 361; 1970b: 40; Srivastava, 2005: 117.

Type species. – *Travancoriana schirnerae* Bott, 1969, by original designation.

Diagnosis. – Carapace broader than long, dorsal surface slightly convex in frontal view, flat posteriorly, smooth except postorbital cristae, epigastric cristae and lateral margins; epistomal median lobe without median tooth; frontal median triangle incomplete, only dorsal margin developed, lateral margins indiscernible; postorbital cristae confluent with and epigastric cristae; external orbital angle broadly triangular, with long outer margin, ca. 3–5 times length of inner margin; epibranchial tooth small, blunt, cleft clearly visible (Figs. 7A, 8A, B, 16A, 17A, B). Third maxilliped exopod with long flagellum (Figs. 7C, 16C). Suture between male thoracic sternites 2–3 slightly visible as grooves, not prominent and deep, suture between male thoracic sternites 3–4 visible to indiscernible as grooves, not prominent and deep (Figs. 7E, 8C, 16E, 17C). Male abdomen T-shaped to narrowly triangular in large males (Figs. 7D, 8C, 16D, 17C). G1 straight, with long, cone-shaped terminal segment, ca. 0.3–0.6 times length of subterminal segment (Figs. 7F–H, 16F–I). G2 with long distal segment, ca. 0.4–0.6 times length of basal segment (Figs. 7I, 16J).

Remarks. – Bott (1969) established *Travancoriana* with *T. schirnerae* Bott, 1969 [southern India], as type-species. In his monograph, Bott (1970b) recognised three other species: *T. pollicaris* (Alcock, 1909b) [Western Ghats], *T. malabarica* (Henderson, 1912) [Malabar], and *T. carli* (Roux, 1931) [southern India]. In the present study, we re-assign *T. malabarica* and *T. carli* to two separate new genera, *Vanni* and *Vela*, respectively, based on key suites of differences in carapace and G1 morphology (see Remarks for *Vanni*, new genus). *Paratelphusa* (*Barytelphusa*) *pollicaris convexa* Roux, 1931 [south India], which Bott (1970b) regarded as a junior synonym of *T. pollicaris*, is also revalidated here after a re-examination of the types (present study). The genus *Travancoriana* sensu stricto now contains five species, including two new species, viz., *T. schirnerae*, *T. pollicaris*, *T. convexa*, *T. kuleera*, new species, and *T. charu*, new species.

Travancoriana is similar to some species of the parathelphusid genus *Ceylonthelphusa* sensu stricto [type species: *Telphusa rugosa* Kingsley, 1880]. *Ceylonthelphusa* appears to be a heterogeneous grouping, with the type species,

C. rugosa, and four other species, *C. soror* (Zehntner, 1894), *C. scansor* Ng, 1995, *C. kandambyi* Bahir, 1999, and *C. sentosa* Bahir, 1999, resembling *Travancoriana* species in the following features: low, flat carapace; sharp, well-developed postorbital cristae confluent with anterolateral margin; T-shaped abdomen; relatively long, subcylindrical G1 terminal segment; and relatively long G2 distal segment. However, *Travancoriana* species can be immediately separated from these and all other *Ceylonthelphusa* species by the absence of a complete frontal median triangle — *Travancoriana* only has a cristate frontal margin, with no clear lateral margins to form a frontal median triangle (Figs. 7B, 16B), whereas *Ceylonthelphusa* has a fully formed frontal median triangle, with distinctly cristate frontal as well as lateral margins (Ng & Tay, 2001: Figs. 35B, 41B).

In addition, *Travancoriana* can be generally separated from *C. rugosa* (type species of the genus) and other *Ceylonthelphusa* species by the following characters: i) carapace relatively more transverse (vs. carapace relatively more squarish); ii) epigastric cristae not sharp, rugose, always confluent with postorbital cristae (vs. epigastric cristae usually sharp, smooth, separate from postorbital cristae, with outer end of former overlapping inner end of latter); iii) postorbital cristae straight to gently sloping posteriorly outwards (vs. postorbital cristae gently to distinctly sloping anteriorly outwards); iv) external orbital angle relatively broad and weak (vs. external orbital angle relatively acute and strong); v) epibranchial tooth weak (vs. epibranchial tooth strong); vi) male abdomen relatively stouter, especially segments 5 and 6 (vs. male abdomen relatively slenderer, especially segments 5 and 6); and vii) G1 terminal segment generally proportionately shorter (vs. G1 terminal segment generally proportionately longer) (Figs. 7A, D, F, G, 8; vs. Ng & Tay, 2001: Figs. 35A, F, G, I, 37A, B, 39A, B).

Travancoriana is also superficially similar to *Barytelphusa* Alcock, 1909, but can be immediately distinguished by its relatively long, well-developed G2 distal segment (vs. G2 distal segment very short or vestigial) and proportionately stouter and shorter G1 terminal segment (vs. G1 terminal segment proportionately longer (Figs. 2A, D–F, 7F, G, I).

Ecological notes. – All mature specimens of *T. schirnerae*, *T. convexa*, *T. kuleera*, new species, and *T. charu*, new species, were obtained from shallow streams (< 1m), mostly from under stones or boulders. *Travancoriana pollicaris* is known only from museum specimens, and nothing is known about its ecology.

Distribution. – The genus is known from the southern Indian states of Kerala and Tamil Nadu (present study), and possibly from Karnataka (Srivastava, 2005; see earlier).

Key to the species of *Travancoriana*

- 1. Male abdomen narrower, appearing more distinctly T-shaped (Figs. 7D, 15C) 2
- Male abdomen broader, appearing more triangular (Figs. 10C, 13C, 16D)..... 3

- 2. Terminal segment of G1 comparatively straight (Figs. 6C, D, 7H)..... *Travancoriana schirnerae*
- Terminal segment of G1 with tip distinctly turned outwards (Fig. 14C, D)..... *Travancoriana kuleera*, new species
- 3. G1 distinctly stout, inner margin characteristically curved or angled just below juncture between terminal and subterminal segment; terminal segment long, stout, distinctly cone-shaped with straight tip (Figs. 11A–D, 12A–C) *Travancoriana convexa*
- G1 not stout, inner margin almost straight or slightly bent below juncture between terminal and subterminal segment; terminal segment long and cylindrical (Figs. 9A–D, 16F–I) 4
- 4. G1 tip distinctly curving outwards (Fig. 9C, D) *Travancoriana pollicaris*
- G1 tip almost straight (Fig. 16H, I) *Travancoriana charu*, new species

***Travancoriana schirnerae* Bott, 1969**
(Figs. 6–8)

Potamon (Potamonautes) cunicularis – Rathbun, 1905: 184, Pl. 15 Fig. 10 (not *Thelphusa cunicularis* Westwood, 1836).
Paratelphusa (Barytelphusa) cunicularis – Alcock, 1910b: 83: Pl. 12 Fig. 56; Roux, 1931: 46 (not *Thelphusa cunicularis* Westwood, 1836).
Travancoriana schirnerae Bott, 1969: 361; 1970a: 336; 1970b: 41, Pl. 4 Figs. 38–41, Pl. 26 Figs. 19, 20; ?Srivastava, 2005: 117, Pl. 1 Fig. 1.

Material examined. – Holotype, male (45.1 × 31.6 mm) (MGE), Coonoor and Hill-Grove, Nilgiris, coll. J. Carl.

Paratype – 1 female (55.3 × 36.8 mm) (MGE), same data as holotype.

Others – 1 male (42.3 × 30.0 mm) (WHT 10611), 1 female (38.7 × 27.7 mm) (WHT 10612), 1 female (39.2 × 27.8 mm) (WHT 10613), 1 juv. male (24.3 × 18.0 mm) (WHT 10614), 15 km from Mettupalayam on Ooty road, Tamil Nadu, India, alt. 500 m; 1 juv. male (24.9 × 18.0 mm) (WHT 10615), 1 juv. male (21.8 × 15.8 mm) (WHT 10616), 1 juv. male (17.2 × 12.9 mm) (WHT 10617), 1 juv. female (16.0 × 11.2 mm) (WHT 10618), Glendale Tea Estate, on Mettupalayam-Ooty road, Tamil Nadu, India, 11°19'49.7"N 76°47'18.3"E, alt. 1,560 m.

Diagnosis. – Carapace broader than long, dorsal surface slightly convex in frontal view, flat posteriorly, smooth except postorbital cristae, epigastric cristae and lateral margins; postorbital and epigastric cristae distinct, confluent; external orbital angle broadly triangular, with long outer margin, ca. 4 times length of inner margin; epibranchial tooth small, blunt, cleft clearly visible (Figs. 7A, 8A, B). Suture between thoracic sternites 2–3 visible as broad groove not reaching lateral margins; suture between sternites 3–4 visible as broad groove and reaching lateral margins (Figs. 7E, 8C). Male abdomen T-shaped in large males; sixth segment distinctly longer than broad, longer than telson (Figs. 6F, 7D, 8C). G1 straight, with long, cone-shaped terminal segment, ca. 0.3–0.4 times length of subterminal segment (Figs. 6A–D, 7F–H). G2 with long distal segment, ca. 0.5–0.6 times length of basal segment (Figs. 6E, 7I).

Remarks. – *Travancoriana schirnerae* was described by Bott (1969, 1970a, b) based on specimens from southern India

that were misidentified as *Potamon* (*Potamonautes*) *cunicularis* or *Paratelphusa* (*Barytelphusa*) *cunicularis* by previous workers (see Rathbun, 1905; Alcock, 1910b; Roux, 1931). The earlier mentioned generic characters that separate *Travancoriana* from *Barytelphusa* apply here between *T. schirnerae* from *B. cunicularis* (see Remarks for genus *Travancoriana*).

Travancoriana schirnerae is easily differentiated from its congeners except *T. kuleera* by having a narrow T-shaped male abdomen (vs. narrowly triangular abdomen); and anterior lateral half of the carapace being more convex in dorsal view (vs. gently convex) (Figs. 7D, 8A, C, 10A, C, 13A, C, 16D, 17A, C). It can be easily distinguished from *T. kuleera* by having a pointed, almost straight, cone-shaped G1 tip (vs. comparatively not pointed, and tip turned outwards like a hook); and the distal end of the subterminal segment being slightly broader than the base of the G1 terminal segment (vs. distal end of subterminal segment distinctly broader than base of G1 terminal segment) (Figs. 6A–D, 7F–H, 14A–D).

Srivastava (2005) recently reported this species from Karnataka and Tamil Nadu. While some of his specimens, especially among material collected from Tamil Nadu, are

likely to belong to *T. schirnerae*, as mentioned in the Introduction, the records require verification.

Ecological notes. – Recently collected mature specimens are from a small (< 1m wide), shallow (< 30 cm deep), steep, rocky stream in a shaded area at about 15 km from Mettupalayam on Ooty road (at 500 m altitude), Tamil Nadu, India. Juveniles were collected from Glendale Estate on Mettupalayam–Ooty, are from 5–10 cm deep wet soil on a large boulder, in an open area within the tea garden, Tamil Nadu, 11°19'49.7"N 76°47'18.3"E, at 1,560 m altitude.

Distribution. – The species is known from Coonoor and Hill-Grove, Nilgiris, and Glendale Tea Estate, Tamil Nadu, southern India (present study). Possible additional records from Karnataka as well (Srivastava, 2005).

***Travancoriana pollicaris* (Alcock, 1909)**
(Figs. 9, 10)

Paratelphusa (*Barytelphusa*) *pollicaris* Alcock, 1909b: 377; 1910b: 89, Pl. 6 Fig. 22; Roux, 1931: 48.

Travancoriana pollicaris Bott, 1970a: 336; 1970b: 41, Pl. 4 Figs. 42–44, Pl. 26 Fig. 21.

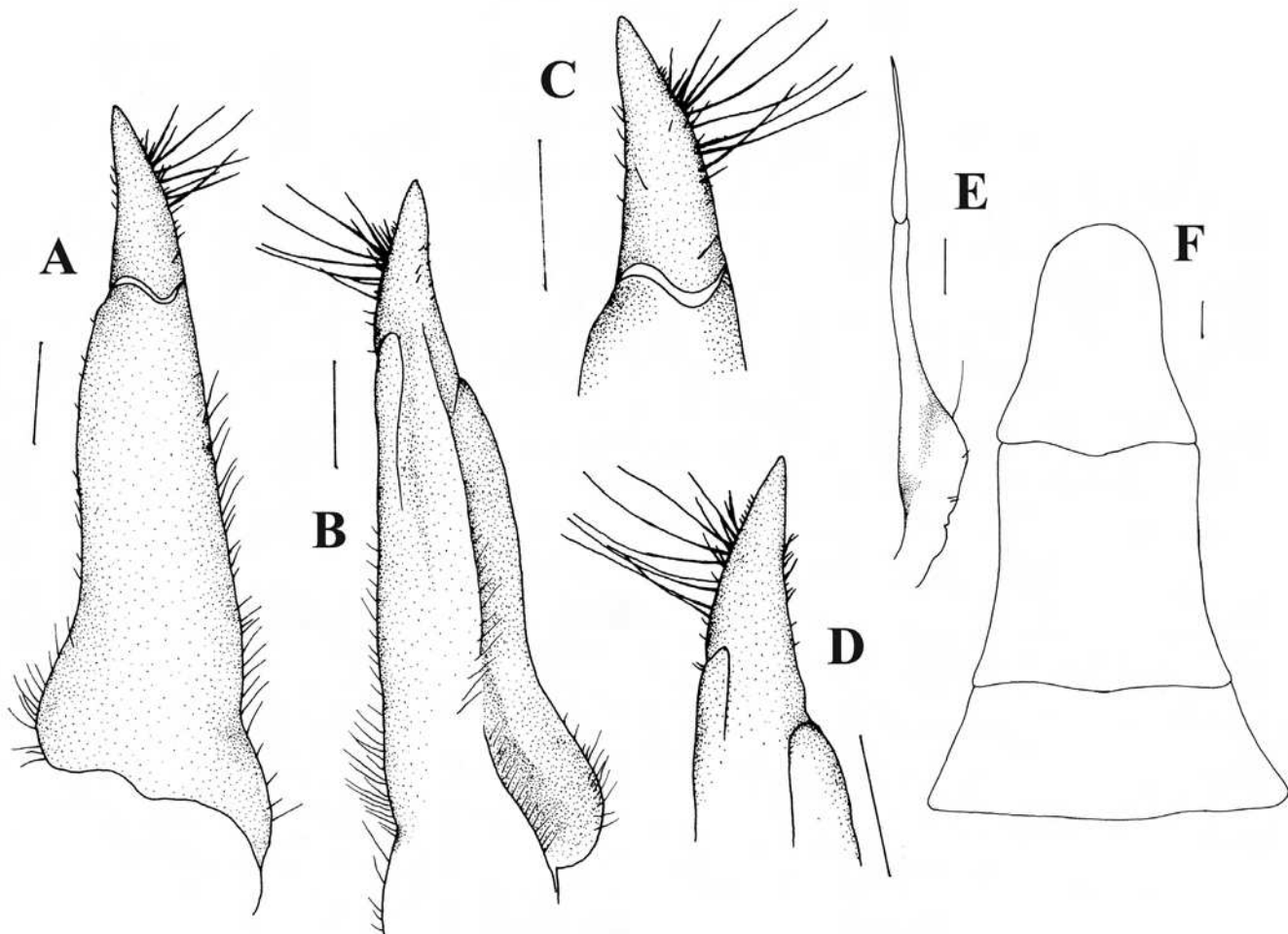


Fig. 6. *Travancoriana schirnerae* Bott, 1969, holotype male (45.1 × 31.6 mm) (MGE): A, right G1 dorsal view; B, right G1 ventral view; C, right G1 terminal segment dorsal view; D, right G1 terminal segment ventral view; E, right G2 dorsal view; F, distal segments of male abdomen. Scale bars = 1.0 mm.

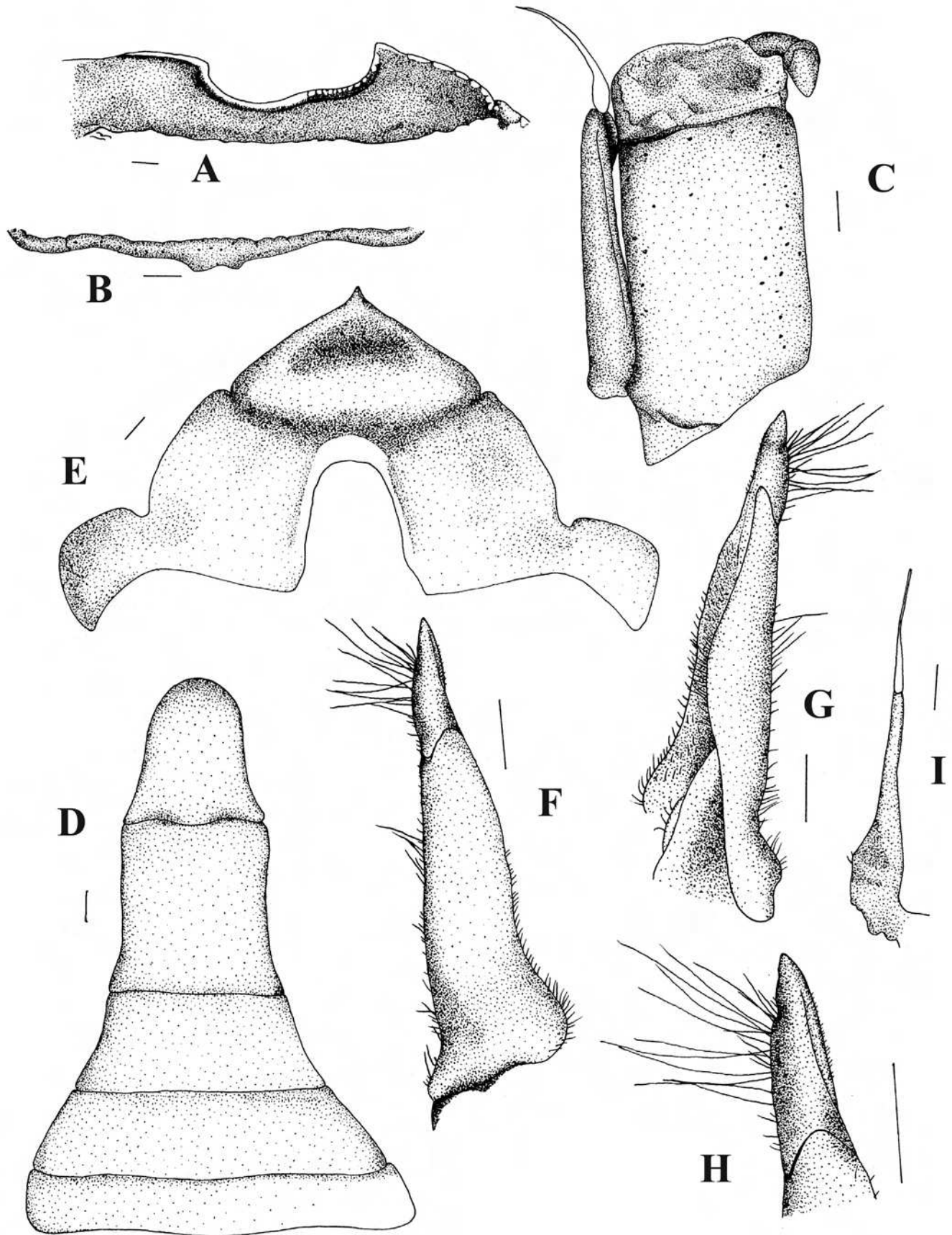


Fig. 7. *Travancoriana schirnerae* Bott, 1969, topotype male (42.3 × 30.0 mm) (WHT 10611): A, right side of anterior lateral carapace; B, frontal median triangle; C, right third maxilliped; D, male abdomen; E, anterior thoracic sternites; F, left G1 dorsal view; G, left G1 ventral view; H, left G1 terminal segment dorsal view; I, left G2 dorsal view. Scale bars = 1.0 mm.



Fig. 8. *Travancoriana schirnerae* Bott, 1969, holotype male (45.1 × 31.6 mm) (MGE): A, dorsal view; B, frontal view; C, ventral view.

Material examined. – Lectotype, male (52.1 × 38.1 mm) (ZSI 1779–87/10), south India, presented by Travancore Museum.

Paralectotype – 1 female (47.7 × 35.5 mm) (ZSI 1779–87/10), same data as lectotype.

Diagnosis. – Carapace slightly convex in frontal view, dorsal surface smooth except postorbital cristae, epigastric cristae and lateral margins; postorbital cristae well-developed, reaching rugose epigastric cristae; external orbital angle broadly triangular, with long outer margin, ca. 5 times length of inner margin; epigastric groove long, with bifurcate posterior end; cervical grooves broad, deep, reaching distinct H-shaped groove (Fig. 10A, B). Pollex of chelae flat in appearance, distinctly broader than dactylus (Fig. 10A). Suture between thoracic sternites 2–3 visible as broad groove not reaching lateral margins, suture between sternites 3–4 only visible only on sides (Fig. 10C). Male abdomen acutely triangular; sixth segment broader than long and same length as telson (Fig. 10C). G1 terminal segment relatively short, ca. 0.3 times length of subterminal segment and curving outwards, tip distinctly curving outwards (Fig. 9A–D). G2 with long distal segment, ca. 0.5 times length of basal segment (Fig. 9E).

Remarks. – Type material of this species in the ZSI was re-examined. To avoid future confusion, the male type specimen (52.1 × 38.1 mm) (ZSI 1779–87/10) is hereby designated as the lectotype of *Travancoriana pollicaris* (Fig. 10). *Travancoriana pollicaris* is most similar to *T. charu*, new species, in carapace and G1 morphology. The differences between the two species are discussed under Remarks for *T. charu*, new species.

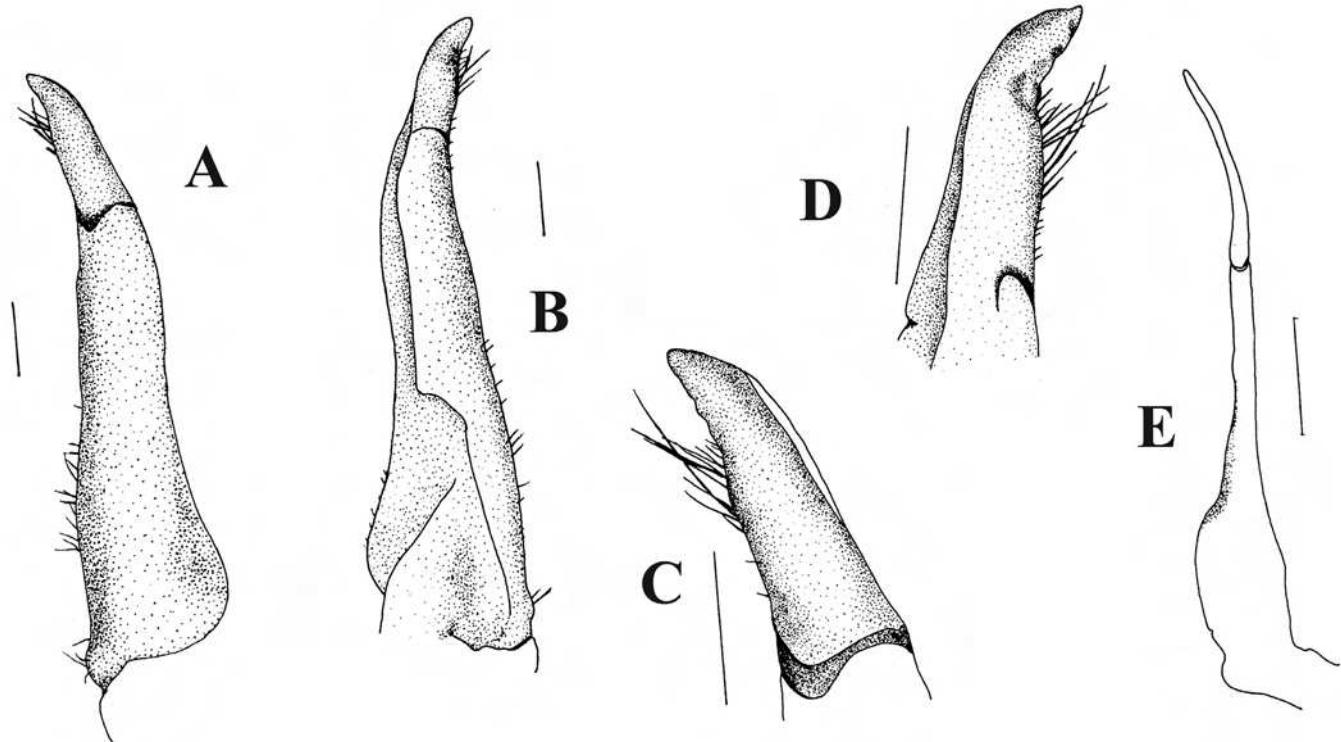


Fig. 9. *Travancoriana pollicaris* (Alcock, 1909), lectotype male (52.1 × 38.1 mm) (ZSI 1779–87/10): A, left G1 dorsal view; B, left G1 ventral view; C, left G1 terminal segment dorsal view; D, left G1 terminal segment ventral view; E, left G2 dorsal view. Scale bars = 1.0 mm.

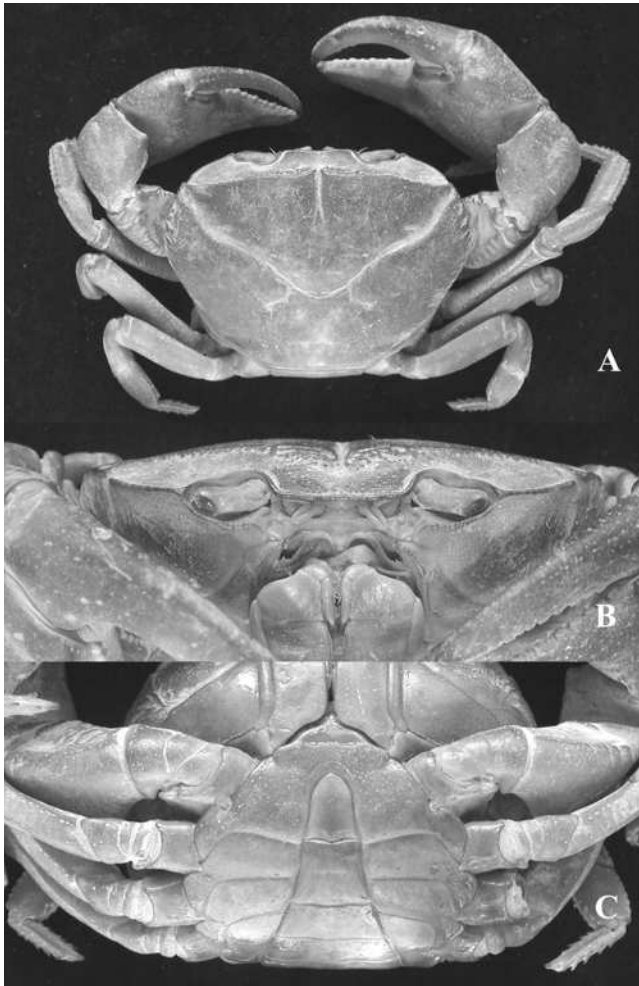


Fig. 10. *Travancoriana pollicaris* (Alcock, 1909), lectotype male (52.1 × 38.1 mm) (ZSI 1779–87/10): A, dorsal view; B, frontal view; C, ventral view.

Ecological notes. – Ecology not known.

Distribution. – The species is known only from the type specimens collected from south India.

***Travancoriana convexa* (Roux, 1931)**
(Figs. 11–13)

Paratelphusa (*Barytelphusa*) *pollicaris convexa* Roux, 1931: 49.
Travancoriana pollicaris Bott, 1970b: 41 (part) (not *Paratelphusa* (*Barytelphusa*) *pollicaris* Alcock, 1909).

Material examined. – Lectotype, male (51.2 × 37.8 mm) (MGE), Tandikudi, Palnis, coll. J. Carl.

Paralectotype – 1 female (broken carapace) (ca. 54.6 × 27.0 mm) (MGE), same data as lectotype.

Others – 1 male (40.7 × 30.5 mm) (ZRC 2003.0239) (formerly WHT 10578), 1 male (38.2 × 28.3 mm) (WHT 10579), 1 male (28.2 × 21.5 mm) (WHT 10580), 1 juv. female (25.0 × 19.4 mm) (WHT 10581), 1 juv. male (22.9 × 17.7 mm) (WHT 10582), 1 juv. female (22.6 × 17.1 mm) (WHT 10583), 1 juv. male (22.0 × 16.5 mm) (WHT 10584), 1 juv. male (17.7 × 13.9 mm) (WHT 10585), Perumedu on Perumedu-Kumerly Rd, Kerala India, 09°34'44.8"N 77°02'47.0"E, alt. 1,050 m; 1 male (36.0 × 27.2 mm) (WHT 10573), between Udumbuchchola and Devikulam, on Kumely-Munnar road, Kerala, India, 09°54'34.8"N 77°13'01.2"E, alt. 1,200 m; 1 male (38.8 × 29.3 mm) (WHT 10586), 1 juv. male (26.9 × 20.5 mm) (WHT 10587), 1 male (34.6 × 27.1 mm) (WHT 10588), 1 male (28.8 × 22.4 mm) (WHT 10589), 1 juv. male (18.7 × 14.8 mm) (WHT 10590), 1 juv. male 16.1 × 12.2 mm) (WHT 10591), 1 juv. male (11.9 × 9.3 mm) (WHT 10592), 1 female (49.1 × 37.2 mm) (WHT 10593), 1 female (43.3 × 32.9 mm) (WHT 10594), Kumerly-Munnar road, Kerala, India, 09°39'18.6"N 77°09'54.5"E, alt. 1,100 m.

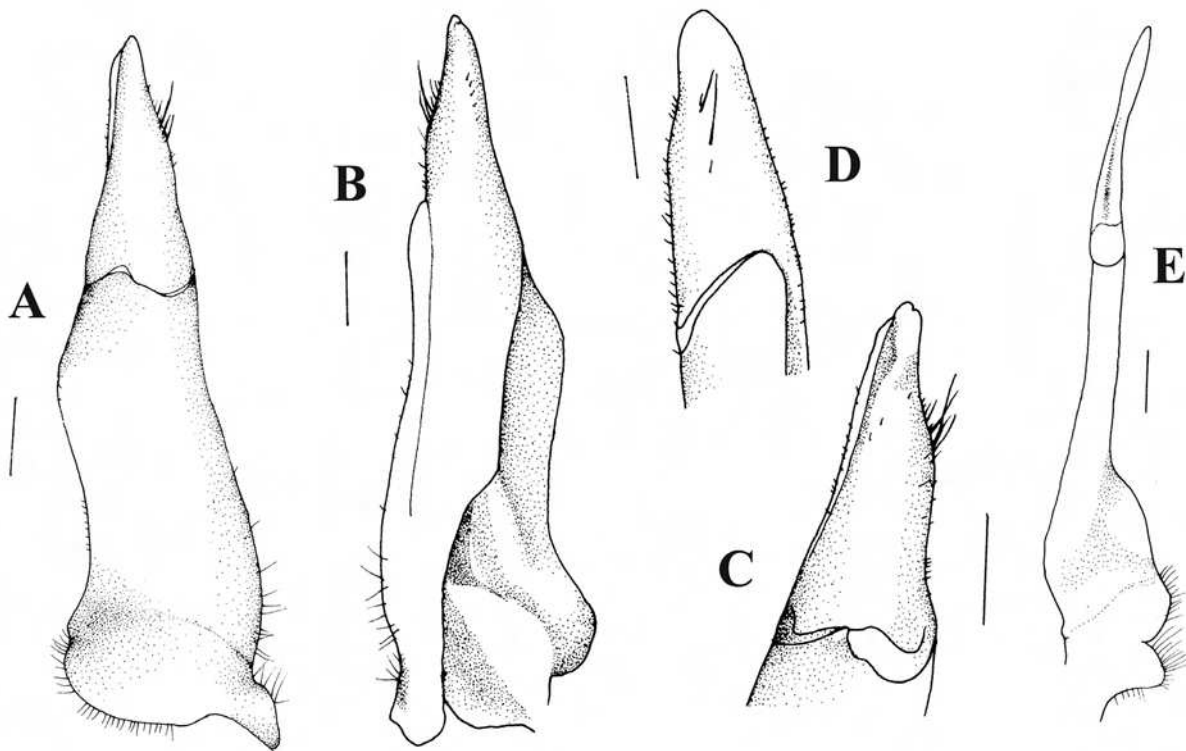


Fig. 11. *Travancoriana convexa* (Roux, 1931), lectotype male (51.2 × 37.8 mm) (MGE). A, right G1 dorsal view; B, right G1 ventral view; C, right G1 terminal segment dorsal view; D, right G1 terminal segment lateral view; E, right G2 dorsal view. Scale bars = 1.0 mm.

Diagnosis. – Carapace broader than long, dorsal surface slightly convex in frontal view, flat posteriorly, smooth except postorbital cristae, epigastric cristae and lateral margins; postorbital and epigastric cristae distinct, confluent, latter rugose; external orbital angle broadly triangular, with long outer margin, ca. 4 times length of inner margin; epibranchial tooth small, blunt, cleft clearly visible (Fig. 13A, B). Suture between thoracic sternites 2–3 distinct as a narrow groove reaching lateral margins; suture between sternites 3–4 distinct as a shallow groove reaching lateral margins (Fig. 13C). Male abdomen narrowly triangular in large males; sixth segment distinctly broader than long, slightly longer than telson (Fig. 13C). G1 stout, almost straight, with long, cone-shaped terminal segment, ca. 0.5–0.6 times length of subterminal segment, inner margin of terminal segment characteristically curved or angled slightly below juncture between terminal and subterminal segments (Figs. 11A–D, 12A–C). G2 with long distal segment, ca. 0.6 times length of basal segment (Figs. 11E, 12D).

Remarks. – Bott (1970b) synonymised *Paratelphusa* (*Barytelphusa*) *pollicaris convexa* Roux, 1931, under *Travancoriana pollicaris* (Alcock, 1909) after examining types of *P. (B.) pollicaris convexa* but not of *T. pollicaris*. In the present study, we re-examined types of both taxa and can confirm Roux’s (1931) supposition that they are distinct. *Paratelphusa (B.) pollicaris convexa* is thus here regarded as a distinct species of *Travancoriana*.

Travancoriana convexa can be easily differentiated from *T. pollicaris* by its squarish carapace (vs. transverse); anterolateral margin of carapace being slightly convex in

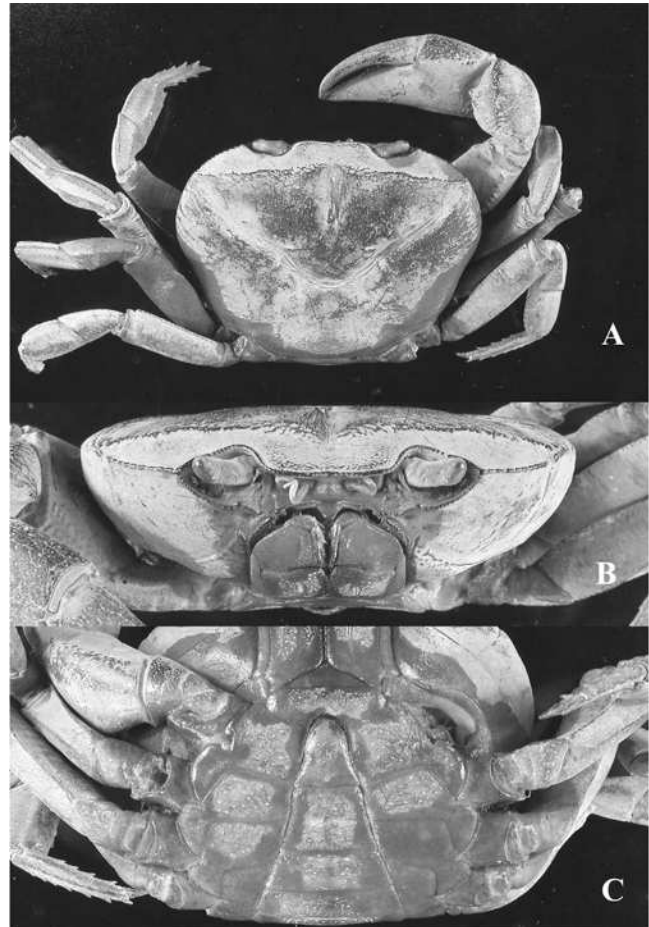


Fig. 13. *Travancoriana convexa* (Roux, 1931), lectotype male (51.2 × 37.8 mm) (MGE): A, dorsal view; B, frontal view; C, ventral view.

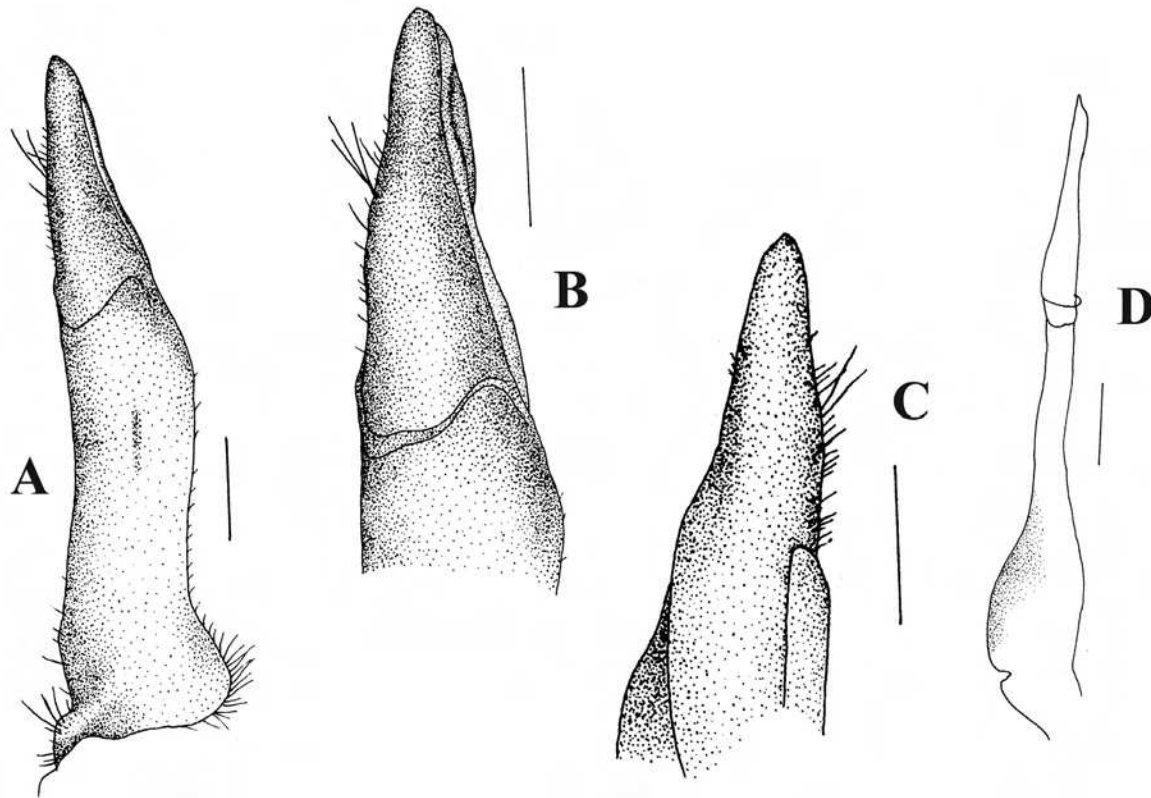


Fig. 12. *Travancoriana convexa* (Roux, 1931), male (40.7 × 30.9 mm) (ZRC 2003.0239) (formerly WHT 10578): A, left G1 dorsal view; B, left G1 terminal segment dorsal view; C, left G1 terminal segment ventral view; D, left G2 dorsal view. Scale bars = 1.0 mm.

dorsal view (vs. distinctly convex); cervical grooves being straight (vs. not straight); male abdomen being broader (vs. male abdomen narrower) (Figs. 10A, C, 13A, C). In addition to carapace characters, *T. convexa* is quite different from *T. pollicaris* in gonopod morphology with a distinctly stouter G1, with the long terminal segment, ca. 0.6 times length of subterminal segment (vs. G1 not stout, with short terminal segment, ca. 0.3 times length of subterminal segment); straight terminal segment (vs. terminal segment slightly bent outwards from juncture between terminal and subterminal segments); and tip of terminal segment being straight (vs. tip of terminal segment distinctly bent outwards) (Figs. 9A–D, 11A–D, 12A–C). The G1 morphology of *T. pollicaris* is similar to *T. charu*, new species; their differences are discussed under Remarks for *T. charu*.

Ecological notes. – Most of the recent specimens were collected from shallow, small streams, especially from under boulders. Specimens from beside a paddy field on Kumerly-Munnar road, Kerala, India, 09°39'18.6"N 77°09'54.5"E, alt. 1,100 m, are from a muddy canal in turbid water, collected by removing *Alocasia* plants.

Distribution. – The species is restricted to highlands of Tamil Nadu and Kerala, southern India. Type specimens were from Tandikudi, Palanis. In addition, we found *T. convexa* from

a wider range (three locations in Kerala, alt. 1,050–1,200 m) than its congeners.

***Travancoriana kuleera*, new species**
(Figs. 14, 15)

Material examined. – Holotype, male (28.0 × 19.7 mm) (ZRC 2003.0240) (formerly WHT 10621), between Gudalur and Manjery, Tamil Nadu, India, 11° 25'31.3"N 76°22'46.6"E, alt. 800 m.

Paratypes –1 male (21.7 × 15.8 mm) (WHT 10622), 1 male (19.9 × 14.5 mm) (WHT 10623), same data as holotype; 1 female (21.9 × 16.2 mm) (WHT 10619), 1 juv. female (19.4 × 14.7 mm) (WHT 10601), between Gudalur and Manjery, Tamil Nadu, India, 11° 27'08.7"N 76°24'36.2"E, alt. 780 m.

Diagnosis. – Carapace broader than long, dorsal surface slightly convex in frontal view, flat posteriorly, smooth except postorbital cristae, epigastric cristae and lateral margins; postorbital and epigastric cristae distinct, confluent, latter rugose; external orbital angle broadly triangular, with long outer margin, ca. 3 times length of inner margin; epibranchial tooth small, blunt, cleft clearly visible (Fig. 15A, B). Suture between thoracic sternites 2–3 distinct as a broad groove not reaching lateral margins, suture between sternites 3–4 visible, reaching lateral margins (Fig. 15C). Male abdomen broadly

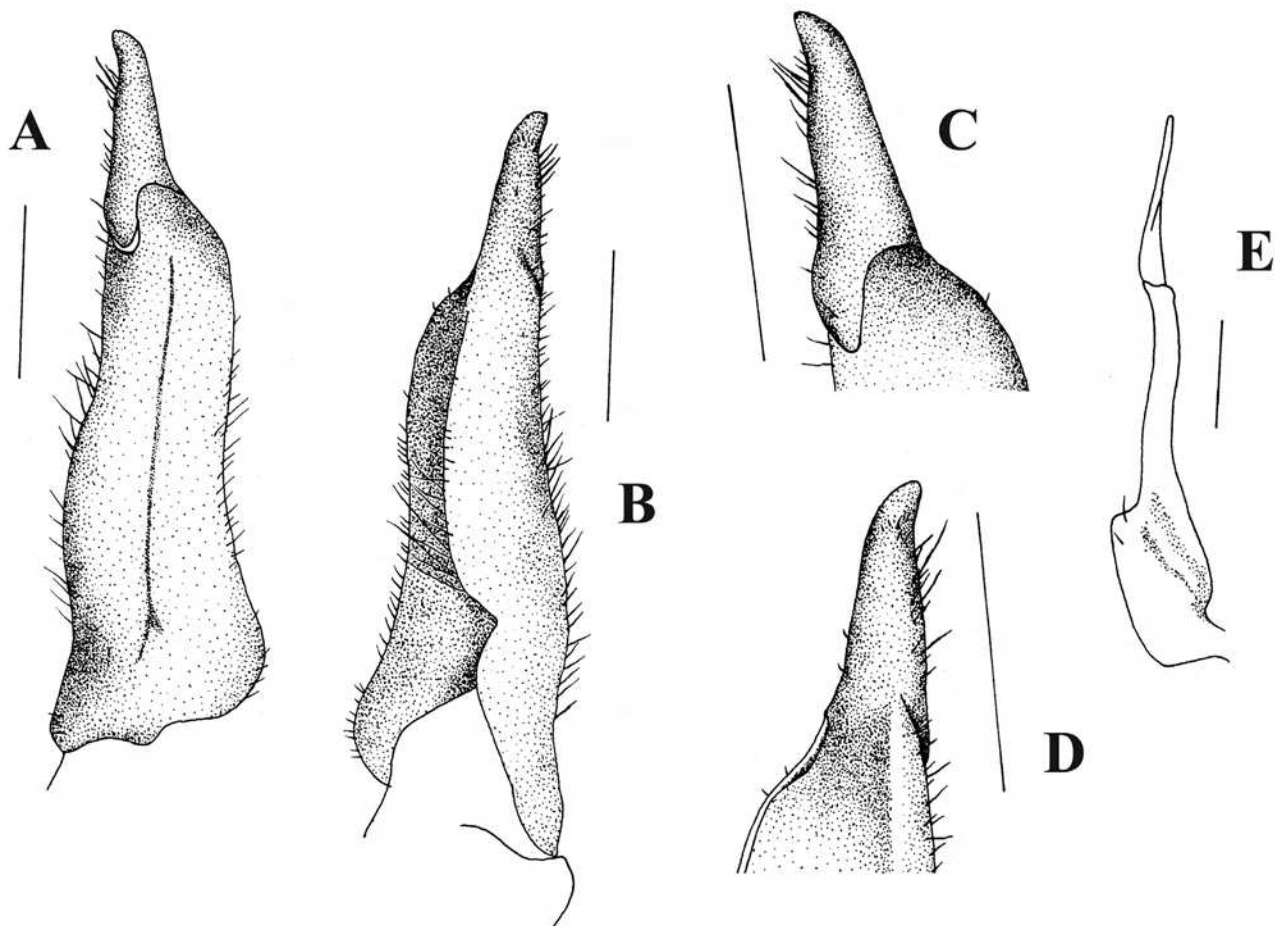


Fig. 14. *Travancoriana kuleera*, new species, holotype male (28.0 × 19.7 mm) (ZRC 2003.0240) (formerly WHT 10621): A, left G1 dorsal view; B, left G1 ventral view; C, left G1 terminal segment dorsal view; D, left G1 terminal segment ventral view; E, left G2 dorsal view. Scale bars = 1.0 mm.

T-shaped in large male; sixth segment distinctly longer than broad, longer than telson (Fig. 15C). G1 straight, with stout subterminal segment, almost straight (Fig. 14A, B); long, cone-shaped terminal segment narrow, ca. 0.4 times length of subterminal segment with characteristically bent tip, inner margin of terminal segment characteristically curved or angled slightly below juncture between terminal and subterminal segments (Fig. 14A–D). G2 with long distal segment, ca. 0.4 times length of basal segment (Fig. 14E).

Etymology. – The specific epithet, *kuleera*, means ‘crab’ in Sanskrit. Used as a noun in apposition.

Remarks. – *Travancoriana kuleera* can be easily differentiated from all its congeners except *T. pollicaris* by the bent tip of the G1. *Travancoriana kuleera* differs from *T. pollicaris* by the distinctly narrow G1 terminal segment relative to the subterminal segment (vs. base of terminal segment as broad as subterminal segment); and male abdomen being distinctly T-shaped (vs. narrowly triangular) (Figs. 9A–D, 10C, 14A–D, 15C).

Ecological notes. – Specimens were from a very shallow stream (< 1 m wide, < 10 cm deep), in a well-shaded area. The substrate of the stream was mostly gravel and small stones. All the crabs were found from under small stones.

Distribution. – The species is known only from two very



Fig. 15. *Travancoriana kuleera*, new species, holotype male (28.0 × 19.7 mm) (ZRC 2003.0240) (formerly WHT 10621): A, dorsal view; B, frontal view; C, ventral view.

close localities between Gudalur and Manjery, Tamil Nadu, southeastern India.

***Travancoriana charu*, new species**
(Figs. 16, 17)

Material examined. – Holotype, male (40.4 × 30.7 mm) (ZRC 2003.0241) (formerly WHT 10606), Ponmudy, Kerala, India, 08°44'19.0"N 77°07'9.7"E, alt. 339 m.

Paratypes – male (35.5 mm × 26.7 mm) (WHT 10607), 1 juv. female (34.4 × 26.3 mm) (WHT 10608), 1 juv. female (21.4 × 16.5 mm) (WHT 10609), same data as holotype.

Diagnosis. – Carapace slightly convex in frontal view, dorsal surface smooth except postorbital cristae, epigastric cristae and lateral margins; postorbital cristae well-developed, reaching rugose epigastric cristae; external orbital angle broadly triangular, with long outer margin, ca. 3–4 times length of inner margin; epigastric groove long, with bifurcate posterior end; cervical grooves distinct, anterior half broad, deep, reaching distinct H-shaped groove (Figs. 16A, 17A, B). Pollex of chelae distinctly broader than dactylus. Suture between male thoracic sternites 2–3 visible as narrow shallow groove not reaching lateral margins, suture between sternites 3–4 only visible on sides (Figs. 16E, 17C). Male abdomen acutely triangular; sixth segment longer than broad and longer than telson (Figs. 16D, 17C). G1 terminal segment cone-shaped, relatively short, ca. 0.3 times length of subterminal segment and curving slightly outwards, tip straight (Fig. 16F–I). G2 with long distal segment, ca. 0.4 times length of basal segment (Fig. 16J).

Etymology. – Charu is Sanskrit for ‘beauty’, alluding to the beautiful coloration of this crab in life. Used as a noun in apposition.

Remarks. – The G1 and carapace morphology of *T. charu* are superficially most similar to that of *T. pollicaris*, but *T. charu* can easily be differentiated from *T. pollicaris* by having a straight G1 tip (vs. distinctly curving outwards); male sixth abdominal segment being distinctly longer than the telson (vs. same length as telson); and telson being broader, slightly longer than broad (vs. narrower, distinctly longer than broad) (Figs. 9A–D, 10C, 16D, F–I, 17C).

Ecological notes. – Specimens obtained from under boulders in a streamlet (< 1 m wide and < 30 cm deep) in well shaded area, at Ponmudy, Kerala, southwestern India.

Distribution. – *Travancoriana charu* is known only from the type locality, Ponmudi, Kerala, southwestern India.

***Baratha*, new genus**

Type species. – *Baratha pushta*, new species, by present designation.

Diagnosis. – Carapace deep, dorsal surface distinctly convex; postorbital cristae distinct, external half sharp; epistomal

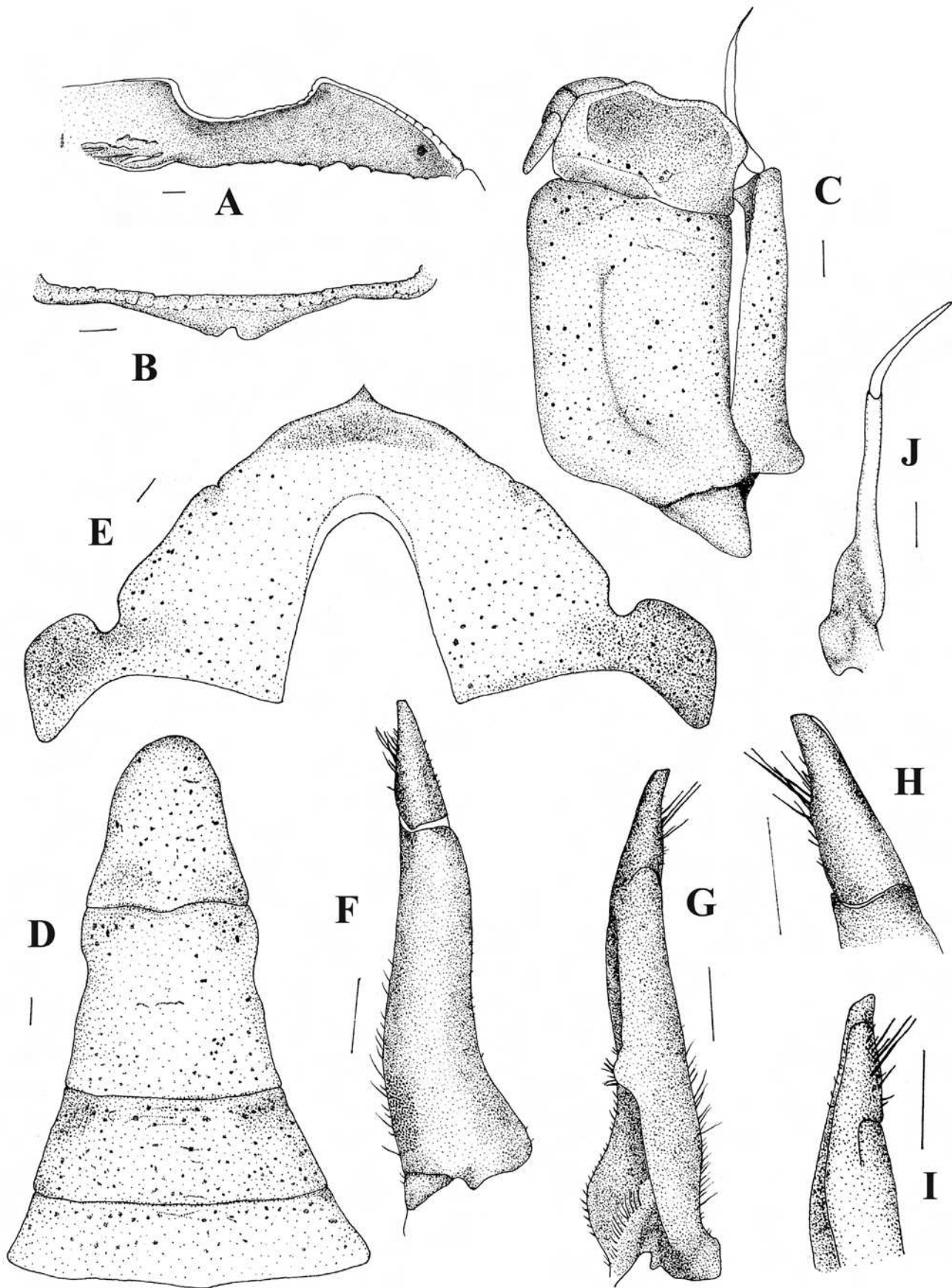


Fig. 16. *Travancoriana charu*, new species, holotype male (40.4 × 30.7 mm) (ZRC 2003.0241) (formerly WHT 10606): A, right side of anterior lateral carapace; B, frontal median triangle; C, left third maxilliped; D, male abdomen; E, anterior thoracic sternites; F, left G1 dorsal view; G, left G1 ventral view; H, left G1 terminal segment dorsal view; I, left G1 terminal segment ventral view; J, left G2 dorsal view. Scale bars = 1.0 mm.

median lobe without median tooth; frontal median triangle incomplete, only dorsal margin developed, lateral margins indiscernible; anterolateral margin distinctly convex; external orbital angle broadly triangular, with acute tip; epibranchial tooth broad, small, blunt, distinct, cleft visible; cervical grooves shallow, distinct; H-shaped groove distinct (Figs. 19A, B, 21A, B). G1 with short, stout, cone-shaped terminal segment, ca. 0.3–0.35 times length of subterminal segment (Figs. 18C–F, 20A–D). G2 with long distal segment, ca. 0.3 times length of basal segment (Figs. 18G, 20E).

Etymology. – The genus name is Sanskrit for ‘India’, here used in the feminine gender. Used as a noun in apposition.

Remarks. – *Baratha* species, viz., *B. pushta*, new species, and *B. peena*, new species, have a relatively convex dorsal carapace, superficially similar to that of *Vela*, new genus. *Baratha* species can, however, be separated from *Vela* species by a distinctive generic suite of characters that includes the less strongly developed postorbital cristae (vs. postorbital cristae very strongly developed); broader male abdomen, with stouter telson, ca. 1.1 times longer than proximal width (vs. male abdomen distinctly slenderer, with longer, narrower telson, ca. 1.40 times longer than proximal width); and proportionately shorter G1 terminal segment, ca. 0.3–0.35 times length of subterminal segment (vs. G1 terminal segment proportionately longer, ca. 0.45–0.5 of subterminal segment) (Figs. 18B–F, 19A, 20A–D, 21A, 45B–E, 46A, 47B–E, 48A, 49A, B, F, G, 50A, C).



Fig. 17. *Travancoriana charu*, new species, holotype male (40.4 × 30.7 mm) (ZRC 2003.0241) (formerly WHT 10606): A, dorsal view; B, frontal view, C, ventral view.

Baratha species are also similar to members of *Vanni*, new genus, but they are easily distinguished by the following differences in carapace and G1 morphology: carapace distinctly convex in frontal and dorsal view (vs. flat to slightly convex); carapace relatively more transverse, width ca. 1.4 times length (vs. carapace relatively more squarish, width 1.31–1.35 times length); suture between anterior male thoracic sternites 2–3 and 3–4 prominent, deep (vs. very shallow-indistinct); and G1 comparatively stouter (vs. comparatively not stout) (Figs. 18A, C–F, 19A–C, 20A–D, 21A–C, 31A, C–F, 32A–C, 34A, B, 35A, C–F, 36C, 37B).

Ecological notes. – Both species of *Baratha* have been found in muddy soil adjacent to small streams in shade.

Distribution. – The genus is known only from Kerala, southwestern India.

Key to the species of *Baratha*

1. Suture between male thoracic sternites 2–3 and 3–4 medially fused (Figs. 18A, 19C). Tip of G1 stouter; inner margin of terminal segment straight (Fig. 18C–F) *Baratha pushta*, new species
- Suture between male thoracic sternites 2–3 and 3–4 medially not fused (Fig. 21C). Tip of G1 stout; inner margin of terminal segment concave (Fig. 20A–D) *Baratha peena*, new species

***Baratha pushta*, new species**
(Figs. 18, 19)

Material examined. – Holotype, male (23.2 × 16.1 mm) (ZRC 2003.0234) (formerly WHT 10677), Vaguvurai Estate, on Munnar-Pollachchi, Kerala, India, 10°11'07.5"N 77°06'40.0"E, alt. 1,290 m.

Paratypes – 1 female (23.5 × 16.4 mm) (WHT 10678), 1 male (18.2 × 13.1 mm) (WHT 10680), 1 male (17.6 × 12.6 mm) (WHT 10681), 1 male (18.3 × 13.5 mm) (WHT 10679), 1 female (18.4 × 13.5 mm) (WHT 10682), same data as holotype.

Diagnosis. – Carapace deep, dorsal surface highly convex, smooth except postorbital, epigastric cristae and lateral margins; postorbital cristae distinct, external half sharp and strong, reaches rugose epigastric cristae; epibranchial tooth small, blunt, distinct, cleft visible; cervical grooves distinct, shallow; H-shaped groove distinct; external orbital angle outer margin ca. 3 times length of inner margin (Fig. 19A, B). Suture between thoracic sternites 2–3 deep, prominent, not reaching lateral margins, suture between sternites 3–4 prominent, deep and reaching lateral margins; suture between thoracic sternites 2–3 and 3–4 medially reaching each other (Figs. 18A, 19C). Male abdomen narrow, T-shaped; sixth segment stout, slightly longer than broad, slightly longer than telson (Figs. 18B, 19C). G1 almost straight, with short, stout, cone-shaped terminal segment, ca. 0.3 times length of subterminal segment with terminal segment outer margin straight (Fig. 18C–F). G2 with relatively long distal segment, ca. 0.3 times length of basal segment (Fig. 18G).

Description. – Carapace deep, broader than long, dorsal surface highly convex in dorsal and frontal views; dorsal surface of carapace smooth except postorbital cristae and lateral margins, striae on lateral margin poorly developed; postorbital and epigastric cristae well-developed and not fused; epigastric cristae smooth, raised; postorbital cristae sharp; epigastric groove narrow, bifurcate; external orbital angle broadly triangular, with straight, long outer margin, ca. 3 times length of inner margin; epibranchial tooth distinct, blunt, small, separated from external orbital angle by indistinct cleft; postorbital region distinctly concave; cervical grooves shallow, distinct; H-shaped groove distinct; branchial region with almost indistinct striae throughout adjacent to lateral margins (Fig. 19A, B). Frontal margin with cristate dorsal margin (Fig. 19B).

Third maxilliped ischium rectangular, with distinct sulcus; exopod not reaching mid length of merus, flagellum reaching about mid width of merus.

Chelae distinctly unequal in large males and females, narrowly gaping when fingers closed; major tooth of chelipedal carpus large, blunt with smooth outer margin.

Suture between thoracic sternites 2–3 visible, deep as a broad groove not touching lateral margins; suture between sternites 3–4 distinct, deep and reaching lateral margins, both grooves medially fused (Figs. 18A, 19C).

Male abdomen narrow, T-shaped in large males; sixth segment slightly longer than broad, longer than telson; telson longer than broad (Figs. 18B, 19C).

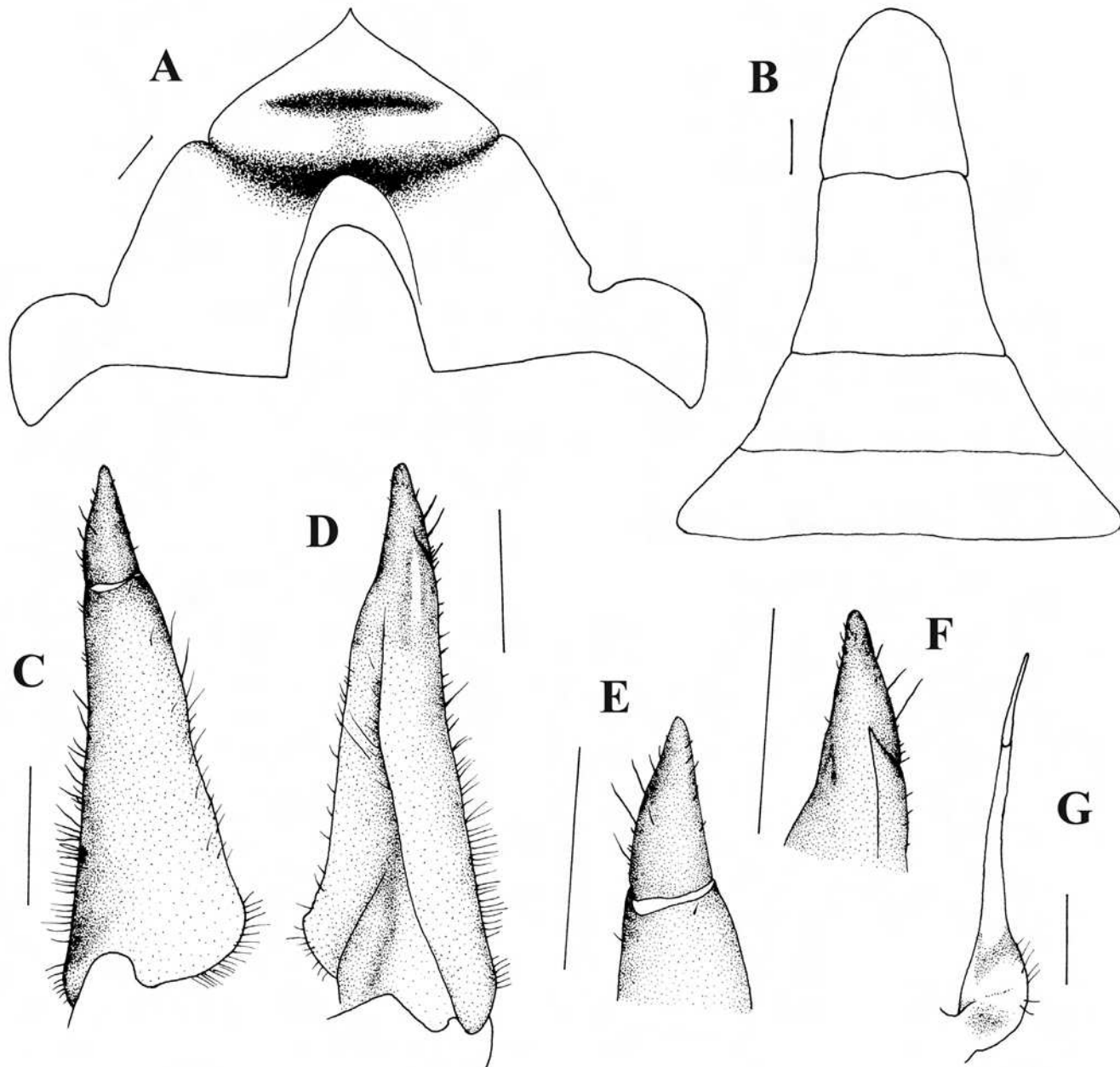


Fig. 18. *Baratha pushta*, new species, holotype male (23.2 × 16.1 mm) (ZRC 2003.0234) (formerly WHT 10677): A, anterior male thoracic sternites; B, male abdomen; C, left G1 dorsal view; D, left G1 ventral view; E, left G1 terminal segment dorsal view; F, left G1 terminal segment ventral view; G, right G2 dorsal view. Scale bars = 1.0 mm.

G1 straight, with cone-shaped, stout, short terminal segment, ca. 0.3 times length of subterminal segment (Fig. 18C–F), inner margin straight. G2 with long distal segment, ca. 0.3 times length of basal segment (Fig. 18G).

Etymology. – Pushta, in Sanskrit, means ‘fat’, referring to the inflated carapace of the species. Used as a noun in apposition.

Remarks. – *Baratha pushta* is similar to *B. peena*, new species, in overall physiognomy and G1 structure, but they are easily distinguished by the following characters: frontal median carapace not distinctly raised when comparing to lateral regions in frontal view (vs. distinctly raised when comparing to lateral regions); lateral regions of carapace distinctly convex in frontal view (vs. comparatively not distinctly convex); cervical grooves comparatively narrow (vs. broad); lateral margins of telson almost straight (vs. distinctly concave); sutures between male thoracic sternites 2–3, 3–4 distinctly deeper and medially fused (vs. sutures between male thoracic sternites 2–3, 3–4 comparatively not deep and medially not fused); tip of G1 terminal segment broad (vs. tip of G1 terminal segment narrow); and inner margin of G1 distal segment straight (vs. inner margin of G1 distal segment concave) (Figs. 18A–F, 19A–C, 20A–D, 21A–C).

Ecological notes. – All the specimens were obtained from muddy edge of a rocky stream at Vaguvurai Estate.

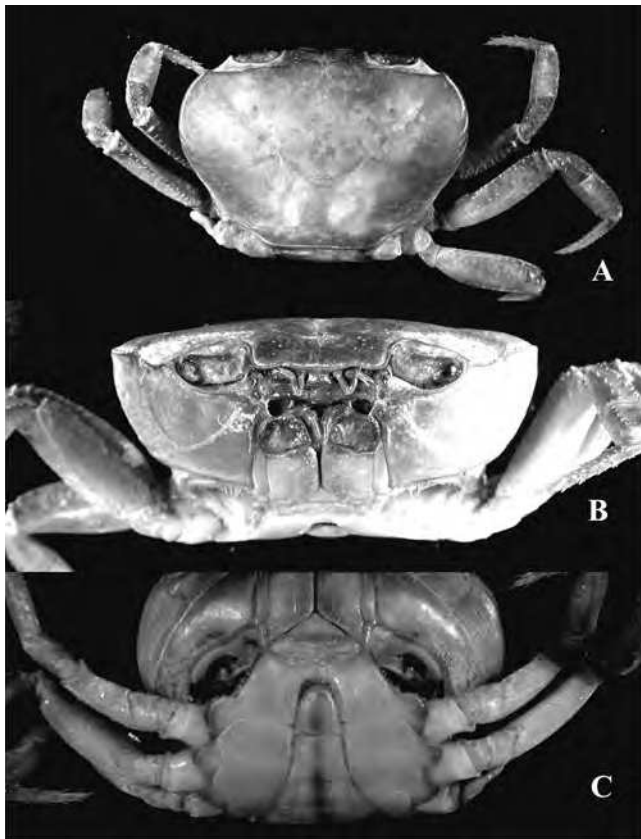


Fig. 19. *Baratha pushta*, new species, holotype male (23.2 × 16.1 mm) (ZRC 2003.0234) (formerly WHT 10677): A, dorsal view; B, frontal view; C, ventral view.

Distribution. – The species is known only from the type locality, Vaguvurai Estate, between Munnar-Pollachchi, Kerala, southwestern India.

***Baratha peena*, new species**
(Figs. 20, 21)

Material examined. – Holotype, male (18.4 × 13.2 mm) (ZRC 2003.0235) (formerly WHT 10676); Paniyar Estate, on Kumerly-Munar road, Kerala, India, 10°00'47.0"N 77°11'29.5"E, alt. 1,260 m.

Paratypes – 1 male (13.8 × 10.3 mm) (WHT 10666), 1 female (19.2 m × 13.8 mm) (WHT 10663), 1 female (15.0 × 11.0 mm) (WHT 10664), 1 female (14.1 × 10.3 mm) (WHT 10665), Kumerly-Munnar Road, near Devikulam, Kerala, India, 09°55'17.7"N 77°13'05.7"E, alt. 1,160 m.

Others – 1 juv. female (11.8 × 8.9 mm) (WHT 10670), 1 juv. female (10.5 × 8.0 mm) (WHT 10671), 1 damaged male (18.2 × 13.1 mm) (WHT 10675), 1 juv. male (10.8 × 8.1 mm) (WHT 10672), 1 juv. male (10.2 × 7.5 mm) (WHT 10674), 1 juv. male (10.6 × 7.8 mm) (WHT 10673), same data as holotype.

Diagnosis. – Carapace deep, dorsal surface convex, smooth except postorbital cristae and lateral margins; postorbital cristae distinct, external half sharp and strong, not reaches smooth epigastric cristae; epibranchial tooth small, blunt, distinct, cleft not prominent; cervical grooves distinct, shallow; H-shaped groove distinct; external orbital angle outer margin ca. 2.5 times length of inner margin (Fig. 21A, B). Suture between thoracic sternites 2–3 deep, prominent, not reaching lateral margins, suture between sternites 3–4 prominent, deep and reaching lateral margins (Fig. 21C). Male abdomen narrow, T-shaped; sixth segment squarish, as long as broad, longer than telson (Fig. 21C). G1 almost straight, with short, stout, cone-shaped terminal segment, tip narrow, ca. 0.35 times length of subterminal segment; inner margin of G1 characteristically curved or angled just below juncture between terminal and subterminal segments, terminal segment inner margin gently concave (Fig. 20A–D). G2 with relatively long distal segment, ca. 0.3 times length of basal segment (Fig. 20E).

Etymology. – The specific epithet, *peena*, is Sanskrit for ‘fat’, alluding to the convex carapace of the species. Used as a noun in apposition.

Remarks. – *Baratha peena* is similar to *B. pushta* in overall carapace and G1 physiognomy; their differences are discussed under Remarks of *B. pushta*.

Ecological notes. – Specimens have been obtained from muddy soil at a margin of a shady streamlet.

Distribution. – The species is known only from two close localities along Kumerly-Munar road, Kerala, southwestern India.

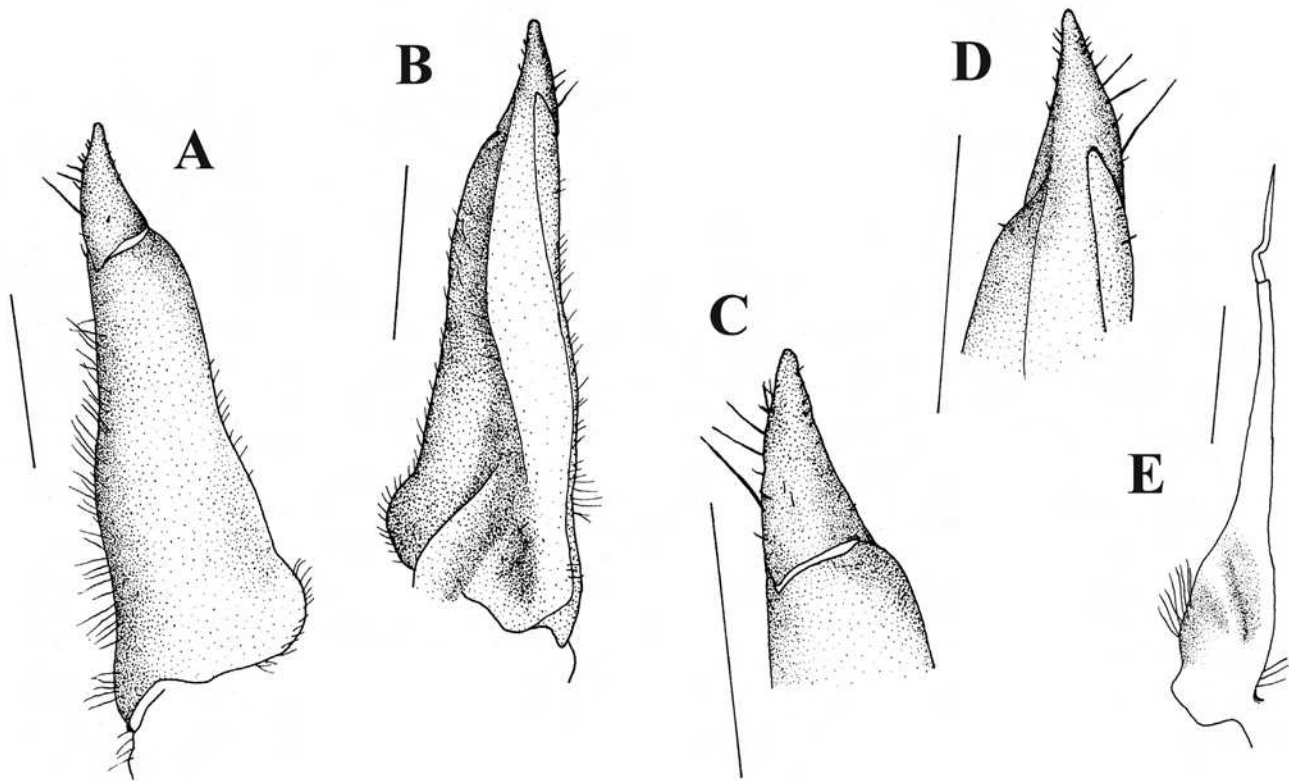


Fig. 20. *Baratha peena*, new species, holotype male (18.4 × 13.2 mm) (ZRC 2003.0235) (formerly WHT 10676): A, left G1 dorsal view; B, left G1 ventral view; C, left G1 terminal segment dorsal view; D, left G1 terminal segment ventral view; E, left G2 dorsal view. Scale bars = 1.0 mm.



Fig. 21. *Baratha peena*, new species, holotype male (18.4 × 13.2 mm) (ZRC 2003.0235) (formerly WHT 10676): A, dorsal view; B, frontal view; C, ventral view.

***Lamella*, new genus**

Type species. – *Paratelphusa (Barytelphusa) lamellifrons* Alcock, 1909, by present designation.

Diagnosis. – Carapace broader than long, dorsal surface slightly convex anteriorly and flat posteriorly, progastric and mesogastric regions slightly raised in frontal view; smooth except postorbital cristae, epigastric cristae and lateral borders; epistomal median lobe without median tooth; frontal median triangle incomplete, only dorsal margin developed, lateral margins indiscernible; postorbital and epigastric cristae strongly developed, confluent, forming sharp, straight crest; external orbital angle broadly triangular, with long outer margin, ca. 4–5 times length of inner margin; epibranchial tooth sharp, acutely triangular, separated from external orbital angle by a distinct cleft, even visible in ventral view; dorsal margin of frontal median triangle visible, represent the entire frontal margin (Figs. 23A, B, 24A, B). Third maxilliped exopod with long flagellum. Suture between anterior male thoracic sternites 2–3 distinct as a narrow groove, suture between sternites 3–4 indiscernible (Figs. 23C, 24C). Male abdomen T-shaped; sixth segment longer than broad and longer than telson (Fig. 24C). G1 narrow, with long terminal segment, ca. 0.4 times length of subterminal segment, inner margin characteristically curved or angled slightly below juncture between terminal and subterminal segments (Fig. 22A–D). G2 with short distal segment, ca. 0.2 times length of basal segment (Fig. 22E).

Etymology. – The genus name, *Lamella*, is derived from Latin for ‘flat’, alluding to the flat carapace dorsal surface of the type species. Gender feminine.

Remarks. – *Lamella*, new genus, is established here as a monotypic genus for *Paratelphusa* (*Barytelphusa*) *lamellifrons* Alcock, 1909, and is morphologically most similar to *Barytelphusa* Alcock, 1909, in overall physiognomy and G2 structure. However, *Lamella* is still clearly separated from *Barytelphusa* by the following carapace characters: carapace squarish in appearance and comparatively flat (vs. transverse in appearance and more convex in frontal view); postorbital and epigastric cristae in line, forming a straight ridge in dorsal view (vs. epigastric cristae slightly anterior to postorbital cristae, forming a gentle concave ridge in dorsal view); outer margin of external orbital angle comparatively long, ca. 4–5 times length of inner margin (vs. comparatively short, ca. 3–4 times); epibranchial tooth sharp (vs. obtusely pointed); and epibranchial tooth and the cleft distinctly visible in ventral view (vs. not very distinct) (Figs. 3A–C, 23A, B, 24A–C). From the present series, which includes recently collected topotypic male specimens, *L. lamellifrons* also differs from *B. cunicularis* in the G1 having a comparatively shorter terminal segment, ca. 0.4 times length of subterminal segment (vs. 0.6 times length of subterminal segment), with the inner margin being characteristically curved or angled from just below juncture between terminal and subterminal

segments (vs. almost straight) (Figs. 2A–C, E, F, 22A–D). The above combination of distinct differences in the G1 and external characters clearly are clearly generic in nature.

Ecological notes. – See Species Account.

Distribution. – Kerala, southwestern India.

***Lamella lamellifrons* (Alcock, 1909)**
(Figs. 22–24)

Paratelphusa (*Barytelphusa*) *lamellifrons* Alcock, 1909a: 251; 1909b: 376; 1910b: 82, Fig. 18.

Barytelphusa (*Barytelphusa*) *cunicularis* – Bott, 1970b: 31, 32 (part) (not *Thelphusa cunicularis* Westwood, 1836).

Material examined. – Holotype, female (59.5 × 46.2 mm) (ZSI 7724), Madatordy, Travancore Museum.

Others – 1 male (55.3 × 43.3 mm) (ZRC 2003.0248) (formerly WHT 10537), 1 male (45.8 × 35.8 mm) (WHT 10538), gravid female (49.8 × 38.7 mm) (WHT 10539), 1 male (39.0 × 30.7 mm) (WHT 10540), 1 male (33.3 × 26.9 mm) (WHT 10541), 1 female (40.8 × 31.9 mm) (WHT 10542), 1 juv. female (26.2 × 20.0 mm) (WHT 10543), 1 juv. female (23.5 × 19.0 mm) (WHT 10546), Chathankodu near Ponnudi, Kerala, India, 08°39'45.1"N 77°09'03.5"E, alt. 100 m; 1 male (54.0 × 41.8 mm) (ZRC 2003.0249) (formerly WHT 10547), 1 male (38.8 × 29.7 mm) (WHT 10548), Vettititta village, Punalur,

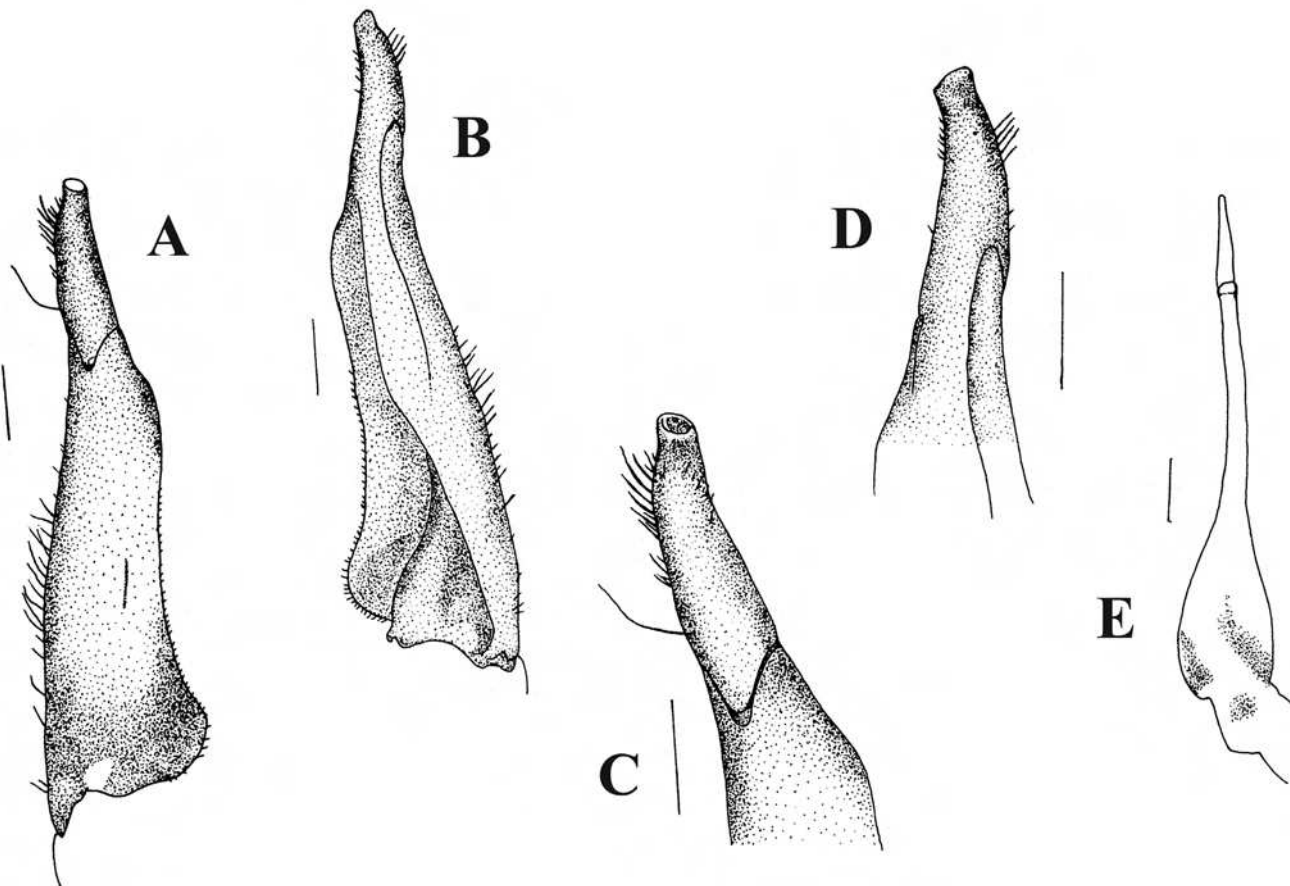


Fig. 22. *Lamella lamellifrons* (Alcock, 1909), male (55.3 × 43.3 mm) (ZRC 2003.0248) (formerly WHT 10537): A, left G1 dorsal view; B, left G1 ventral view; C, left G1 terminal segment dorsal view; D, left G1 terminal segment ventral view; E, left G2 dorsal view. Scale bars = 1.0 mm.

Kerala, India, 09°02'54.7"N 76°55'03.6"E, alt. 600 m; 1 female (27.5 × 21.6 mm) (WHT 10549), 1 male (25.2 × 20.1 mm) (WHT 10550), Palod near Kolaththupputha, Kerala, India, 08°44'30.0"N 77°00'43.9"E, alt. 600 m; 1 female (37.2 × 29.2 mm) (WHT 10551), 1 juv. male (19.7 × 16.1 mm) (WHT 10552), 1 juv. female (15.6 × 12.7 mm) (WHT 10553), Kolaththupputha, Kerala, India, 08°53'01.7"N 77°02'53.9"E, alt. 120m; 1 male (29.3 × 22.8 mm) (WHT 10554), 1 male (41.1 × 32.2 mm) (WHT 10556), between Ranni and Erumily, Kerala, India, 09°27'55.1"N 76°49'04.8"E, alt. 80 m; 1 male (50.3 × 38.0 mm) (WHT 10555), between Erumily and Mundakayam, Kerala, India, 09°30'05.3"N 76°52'54.8"E, alt. 100 m; 1 female (60.5 × 40.7 mm) (WHT554), 4 males (largest 47.6 × 38.1 mm), 1 female (49.5 × 38.6 mm) (WHT558), Chalakudy, Kerala, India; 1 male (39.5 × 31.0 mm) (WHT 10557), 1 juv. male (22.2 × 18.1 mm) (WHT 10558), 1 juv. female (21.9 × 17.4 mm) (WHT 10559), Pandalam, between Changanur-Adur, Kerala, India, 09°15'03.3"N 76°40'21.7"E, alt. 26 m; 1 male (31.4 × 25.3 mm) (WHT 10560), 1 juv. male (22.6 × 17.8 mm) (WHT 10561), 1 juv. female (19.6 × 15.9 mm) (WHT 10562), 1 juv. female (14.7 × 11.8 mm) (WHT 10563), Walagom Village, between Kottarakkar and Trivandrum, Kerala, India, 08°56'54.2"N 76°50'47.4"E, alt. 56 m.

Diagnosis. – As for genus.

Description. – Carapace not deep, broader than long, dorsal surface flat in dorsal and frontal views; dorsal surface of

carapace smooth except postorbital cristae and lateral margins, striae on lateral margin well-developed; postorbital and epigastric cristae prominent, sharp, confluent; epigastric groove narrow, weakly bifurcate; external orbital angle broadly triangular, with long outer margin, ca. 4–5 times length of inner margin; epibranchial tooth distinct, sharp, large separated from external orbital angle by indistinct cleft even visible from ventral view; postorbital region concave; cervical grooves prominent, broad and reaching prominent H-shaped groove; branchial region with striae throughout adjacent to lateral margins (Figs. 23A, B, 24A–C). Frontal margin with cristate dorsal margin (Figs. 23B, 24B).

Third maxilliped ischium rectangular, with distinct sulcus; exopod reaching mid length of merus with long flagellum.

Chelae distinctly unequal in large males and females, gaping when fingers closed; major tooth of chelipedal carpus large, sharp with smooth outer margin.

Suture between anterior male thoracic sternites 2–3 prominent as a deep broad groove not touching lateral margins, suture between sternites 3–4 indistinct (Fig. 24C).

Male abdomen narrow, T-shaped in large males; sixth segment distinctly longer than broad and longer than telson; telson longer than broad (Fig. 24C).

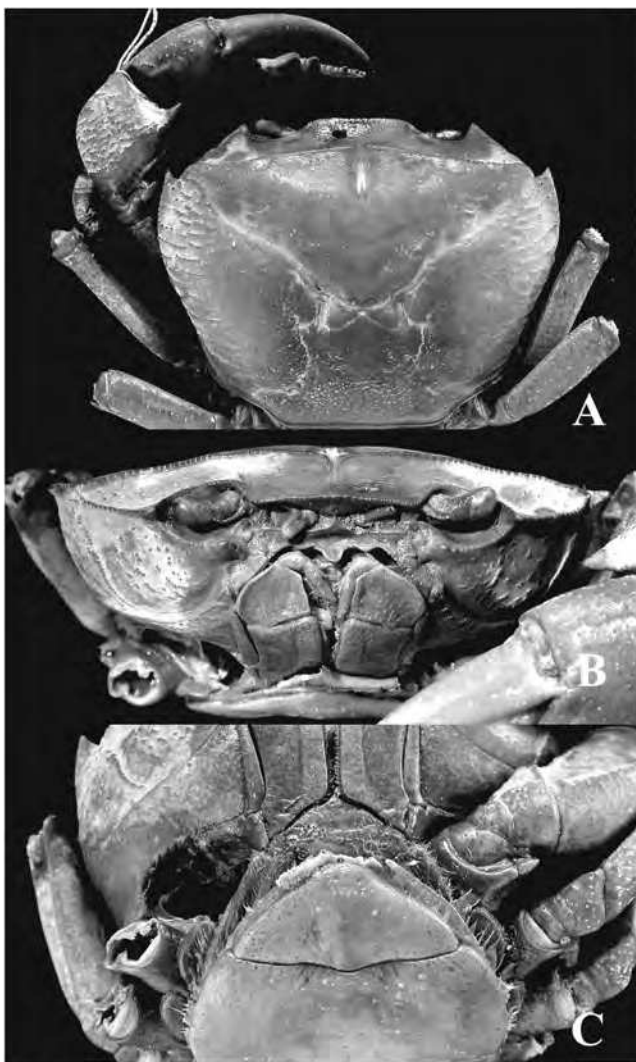


Fig. 23. *Lamella lamellifrons* (Alcock, 1909), holotype female (59.5 × 46.2 mm) (ZSI 7724): A, dorsal view; B, frontal view.

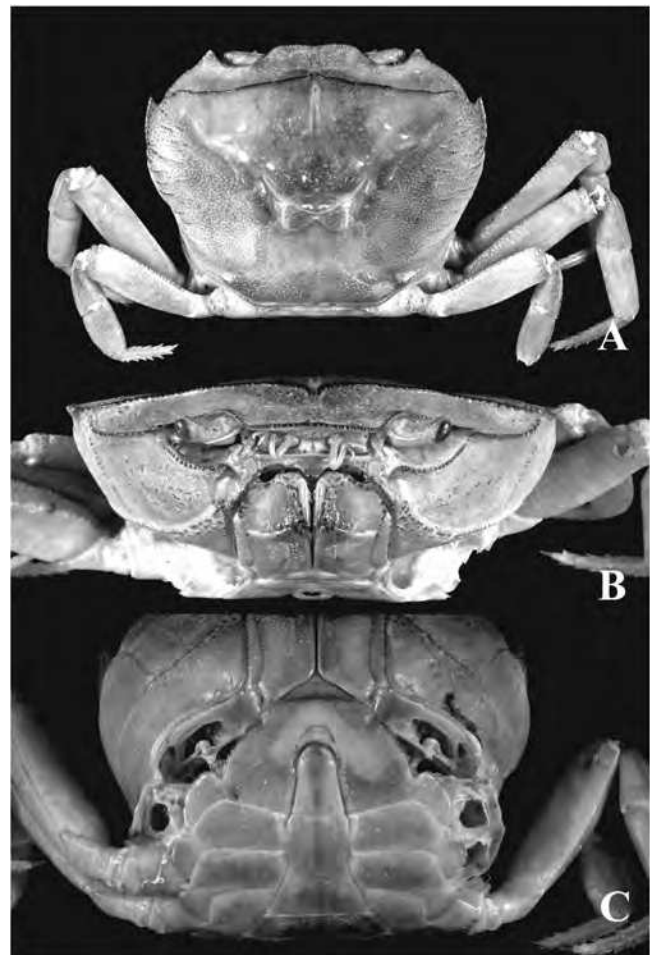


Fig. 24. *Lamella lamellifrons* (Alcock, 1909), male (55.3 × 43.3 mm) (ZRC 2003.0248) (formerly WHT 10537): A, dorsal view; B, frontal view; C, ventral view.

G1 narrow, with long terminal segment, ca. 0.4 times length of subterminal segment, inner margin characteristically curved or angled slightly below juncture between terminal and subterminal segments (Fig. 22A–D). G2 with short distal segment, ca. 0.2 times length of basal segment (Fig. 22E).

Remarks. – Bott (1970b: 32) suggested that *Lamella lamellifrons* (Alcock, 1909) could be a junior synonym of *Barytelphusa cunicularis* (Westwood, 1836). They are, however, clearly separated by several carapace as well as G1 characters (see genus Remarks).

Ecological notes. – A primarily aquatic species, always found in water and in many locations. *Lamella lamellifrons* occurs sympatrically with *Barytelphusa cunicularis*. Specimens were collected from shallow to deep (0.01–1.5 m) streams. At Chathankodu, some of the crabs were found under leaf litter in a pool along a sandy, shaded stream (1 m deep). Crabs were always found in the water, and 56–600 m altitude.

Distribution. – As for genus.

Pilarta, new genus

Type species. – *Pilarta anuka*, new species, by present designation.

Diagnosis. – Carapace not very deep, broader than long, dorsal surface convex in frontal view; postorbital cristae and epigastric cristae visible, rugose but not well-developed; frontal region, postorbital region and lateral regions of carapace rugose; only dorsal margin of frontal median triangle visible; epistomal median lobe without an acute median tooth; tip of external orbital angle acutely triangular, with long outer margin, ca. 3 times length of inner margin; epibranchial tooth small, blunt, cleft visible (Fig. 25A); cervical grooves distinct, broad; H-shaped groove shallow (Fig. 26A, B). Third maxilliped exopod without long flagellum (Fig. 25B). Suture between thoracic sternites 2–3 and 3–4 indiscernible (Figs. 25C, 26C). Dactyli, propodi, carpi of ambulatory legs covered with dense setae (Fig. 25E). Male abdomen broadly T-shaped in large males; sixth segment squarish, broader than long, longer than telson (Fig. 25D). G1 with short terminal segment, ca. 0.3 times length of subterminal segment, tip narrow, mid portion of G1 subterminal segment broad, almost same as the widest base (Figs. 25F, G); G2 with long distal segment, ca. 0.4 times length of basal segment (Fig. 25H).

Etymology. – The genus name, derived from pilus (Latin for ‘hairy’ or ‘felt’) and arctus (Latin for ‘limb’), in arbitrary combination with the genus name, *Thelphusa*, alludes to the characteristic dense setae on the ambulatory legs of the type species. Gender is feminine.

Remarks. – *Pilarta*, new genus, is a monotypic genus that is similar to *Snaha*, new genus, but their carapace characters are quite different (see Remarks for *Snaha*, new genus).

Ecological notes. – See Species Account.

Distribution. – The genus is known only from Ponmudi, Kerala, southwestern India.

Pilarta anuka, new species (Figs. 25, 26)

Material examined. – Holotype, male (14.5 × 10.7 mm) (ZRC 2003.0238) (formerly WHT 10704); Ponmudi, Kerala, India, 08°46'07.4"N 77°06'37.7"E, alt. 975m.

Paratypes – 1 male (13.7 × 10.2 mm) (WHT 10702), 1 gravid female (13.5 × 10.3 mm) (WHT 10703), 1 male (11.5 × 8.5 mm) (WHT 10705), 1 gravid female (13.5 × 10.3 mm) (WHT 10706), 1 male (14.7 × 10.8 mm) (WHT 10708), 1 male (13.3 × 9.9 mm) (WHT 10710), 1 male (13.3 × 9.7 mm) (WHT 10711), 1 male (13.0 × 9.9 mm) (WHT 10709), 1 gravid female (15.7 × 11.8 mm) (WHT 10712), 1 gravid female (14.3 × 10.5 mm) (WHT 10715), 1 gravid female (13.5 × 10.1 mm) (WHT 10714), 1 gravid female (12.7 × 9.2 mm) (WHT 10713), 1 male (10.3 × 8.0 mm) (WHT 10716), 1 male (7.8 × 6.0 mm) (WHT 10717), 1 female (11.4 × 8.6 mm) (WHT 10718), 1 female (11.0 × 8.1 mm) (WHT 10719), 1 female (8.3 × 6.3 mm) (WHT 10720), same data as holotype.

Diagnosis. – As for genus.

Description. – Carapace broader than long, dorsal surface convex in frontal view, dorsal surface of carapace smooth except epigastric cristae, postorbital cristae, postorbital region, frontal region and lateral margins; postorbital and epigastric cristae rugose, not developed; epigastric groove broad, short; external orbital angle broadly triangular, anterior half of outer margin concave, outer margin ca. 3 times length of inner margin, tip acutely triangular. epibranchial tooth blunt, very small, separated from external orbital angle by distinct cleft; postorbital region gently concave; cervical grooves broad, distinct H-shaped groove distinct, not deep; branchial region with distinct striae throughout adjacent to lateral margins. Frontal median triangle small, dorsal margin cristate, lateral margins not developed (Figs. 25A, 26A, B).

Third maxilliped ischium rectangular, sulcus indistinct; exopod short, reaching proximal one-third of merus, lacking flagellum (Fig. 25B).

Chelae distinctly unequal in large males, fingers of large males gaping when fingers closed; major tooth of chelipedal carpus large, broad with smooth outer margin.

Male anterior thoracic sternites broad, suture between 2–3 and 3–4 indiscernible as grooves (Fig. 25C).

Male abdomen broadly T-shaped in large males; sixth segment squarish, slightly broader than long and distinctly longer than telson (Figs. 25D, 26C).

Ambulatory legs with distinct setae; external surfaces of dactyli, propodi and carpi with dense setae, setae on chelipedal carpus observed in some specimens (Fig. 26A).

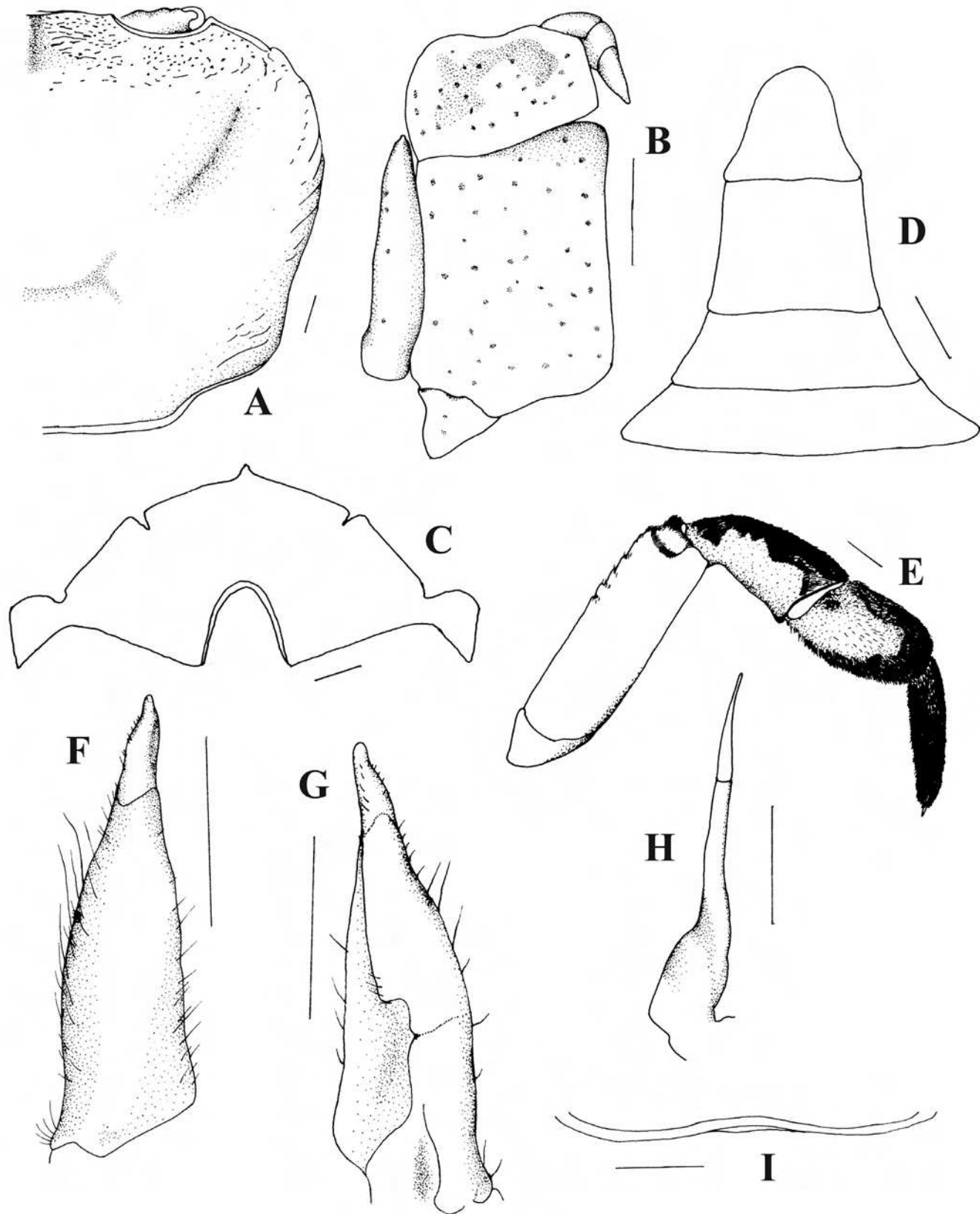


Fig. 25. *Pilarta anuka*, new species, holotype male (14.5 × 10.7 mm) (ZRC 2003.0238) (formerly WHT 10704): A, right dorsal view of carapace; B, right third maxilliped; C, anterior male thoracic sternites; D, male abdomen; E, fourth right ambulatory leg; F, left G1 dorsal view; G, left G1 ventral view; H, left G2 dorsal view; I, frontal median triangle. Scale bars = 1.0 mm.

G1 with short terminal segment, ca. 0.3 times length of subterminal segment, tip narrow; mid portion of G1 subterminal segment broad, almost same width as the widest base (Figs. 25F, G). G2 with long distal segment, ca. 0.4 times length of basal segment (Fig. 25H).

Etymology. – Anuka means ‘small’ or ‘minute’ in Sanskrit. Used as a noun in apposition.

Remarks. – *Pilarta anuka*, new species, is unique among the southern Indian freshwater crabs as the only species with dense setae on its ambulatory legs. It is similar to *Snaha* species, especially in lacking a flagellum on the exopod of the third maxilliped; but they are nevertheless distinctly different in many other ways (see Remarks for *Snaha*, new genus).

Ecological notes. – Specimens from the type locality were collected from a dry stream. All the crabs were collected from under stones in moist soil in shade. Sand accumulates on the dense setae of their ambulatory legs, and facilitating camouflage in the wet soil and leaf litter on the forest floor.

Distribution. – The species is known only from the type locality, Ponnudi, Kerala, southwestern India.

Snaha, new genus

Type species. – *Snaha aruna*, new species, by present designation.

Diagnosis. – Carapace deep, dorsal surface convex, smooth; postorbital and epigastric cristae indistinct; anterolateral margin of carapace convex; epibranchial tooth very small, hardly visible; cervical grooves very shallow; H-shaped groove shallow, visible; external orbital angle small, outer margin longer than inner margin; frontal margin short (Figs. 28A, B, 30A, B). Third maxilliped exopod lacking flagellum (Fig. 27A). Suture between thoracic sternites 2–3 deep, broad, not reaching lateral margins, suture between sternites 3–4 distinct, deep, reaching lateral margins (Figs. 28C, 29A, 30C). Male abdomen broadly T-shaped; sixth segment distinctly broader than long, slightly longer than telson (Figs. 27B, 29B, 30C). G1 almost straight, with cone-shaped, short terminal segment, ca. 0.3 times length of subterminal segment (Figs. 27C, D, 29C, D). G2 with long distal segment, ca. 0.4–0.5 times length of basal segment (Figs. 27G, 29E).

Etymology. – The genus name *Snaha*, mean ‘smooth’ in Sanskrit, alluding to the smooth dorsal surface of carapace of this species. Gender feminine. Used as a noun in apposition.

Remarks. – *Snaha*, new genus, is immediately differentiated from all other southern Indian gecarcinucid genera except *Pilarta*, new genus, by the flagellum of the exopod of the third maxilliped being absent or vestigial (vs. flagellum of exopod of third maxilliped long, well-developed) (Figs. 7C, 27A). Only two other genera from other parts of India lack or have a vestigial flagellum on the exopod of the third maxilliped: *Gubernatoriana* Bott, 1970 [west India], and *Globitelphusa* Alcock, 1909 [northeast India].

While the G1 structures of *Snaha*, new genus, and *Pilarta*, new genus, appear superficially similar, the two genera are nevertheless distinguished by the subterminal segment of the former being distinctly slenderer and possessing a sinuous inner margin (compared to distinctly stouter with convex inner margin in the latter). In addition, *Snaha* is easily differentiated from *Pilarta* by a generically significant suite of external morphological characters including the smooth, deep carapace (vs. rugose, flat carapace); sutures between thoracic sternites 2–3 and 3–4 prominent as deep grooves (vs. grooves indiscernible); ambulatory legs without dense setae (vs. dense setae); smooth outer surface of cheliped carpus (vs. outer surface of cheliped carpus rugose); and comparatively indistinct cervical grooves (vs. cervical grooves distinct) (Figs. 25A, C, E, 26A–C, 28A–C, 29A, 30A–C).

In addition to lacking a well-developed third maxilliped flagellum, *Snaha* also resembles *Gubernatoriana* [type species: *Paratelphusa (Globitelphusa) gubernatoris* Alcock, 1909] in its weak, indistinct postorbital cristae, external orbital angle and epibranchial tooth, and poorly developed subdistal spine on the inner margin of the cheliped carpus. Nevertheless, *Snaha* is easily separated from *Gubernatoriana* by the following characters: i) carapace relatively transverse (vs. carapace relatively squarish); ii) dorsal carapace more convex (vs. dorsal carapace relatively flatter); iii) frontal region relatively narrower (vs. frontal region very broad); iv) anterolateral margins convex (vs. anterolateral margins straight); v) male abdominal cavity not exceeding imaginary line joining midpoint of cheliped bases (vs. male abdominal cavity reaching or exceeding imaginary line joining anterior

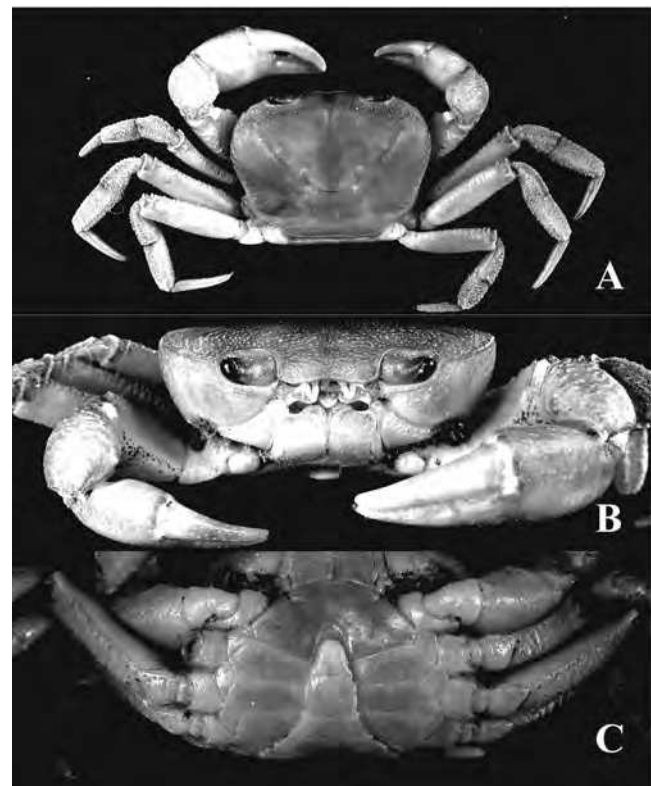


Fig. 26. *Pilarta anuka*, new species, holotype male (14.5 × 10.7 mm) (ZRC 2003.0238) (formerly WHT 10704): A, dorsal view; B, frontal view; C, ventral view.

part of cheliped bases) (Figs. 28, 30; Bott, 1970b: Pl. 6 Figs. 61, 62).

Snaha can generally be differentiated from *Globitelphusa* [type species: *Paratelphusa (Globitelphusa) bakeri* Alcock, 1909] by the following characters in addition to their highly disjunct distributions: i) cheliped carpus with very weak, broad subdistal spine on inner margin (vs. carpus with well-developed, sharp, obliquely directed subdistal spine on inner margin); ii) cervical grooves shallow but visible (vs. cervical grooves indistinct); iii) suture between thoracic sternites 3 and 4 demarcated by groove (vs. groove absent); iv) male abdomen distinctly more T-shaped, with narrower sixth segment (vs. male abdomen less T-shaped, with broader sixth segment); v) G1 terminal segment straight (vs. G1 terminal segment slightly bent outwards); vi) distal part of G1 subterminal segment narrow, with inner margin gently tapered, not produced as an angle (vs. distal part of G1 subterminal segment broad, with inner margin abruptly tapered, producing distinct broad angle) (Figs. 27B–F, 28, 29A–D, 30; Alcock, 1910b: Fig. 30; Bott, 1970b: Pl. 33 Figs. 13–16).

Two species are included in *Snaha*, new genus, viz., *Snaha escheri* (Roux, 1931), and *Snaha aruna*, new species.

Ecological notes. – See type Species Account.

Distribution. – The genus is known only from Tamil Nadu, southeastern India.

Key to the species of *Snaha*

- 1. Male abdomen with telson longer than broad. G1 with tip of terminal segment distinctly narrow (Fig. 27B–F) *Snaha aruna*, new species
- Male abdomen with telson as long as broad. G1 with terminal segment cone-shaped (Fig. 29B–D) *Snaha escheri*

***Snaha aruna*, new species**
(Figs. 27, 28)

Material examined. – Holotype, male (15.5 × 11.1 mm) (ZRC 2003.0237) (formerly WHT 10697), Nayamakad Tea Estate, on Munnar-Pollachchi road, Tamil Nadu, India, 10°09'09.3"N, 77°04'36.2"E, alt. 1,800 m.

Paratypes – 1 male (14.9 × 10.9 mm) (WHT 10698), 1 male (11.8 × 8.8 mm) (WHT 10699), 1 male (10.8mm × 8.3 mm) (WHT 10700), same data as holotype.

Diagnosis. – Carapace deep, broader than long, dorsal surface highly convex in frontal view, smooth; postorbital cristae and epigastric cristae indiscernible; tip of external orbital angle acutely triangular, with long outer margin, ca. 3 times length of inner margin; epibranchial tooth very small, blunt, cleft not prominent; cervical grooves shallow, broad; H-shaped groove shallow (Fig. 28A, B). Third maxilliped exopod short, not reaching one-third of merus length (Fig. 27A). Suture

between male thoracic sternites 2–3 distinct as a deep, broad groove not reaching lateral margins, suture between sternites 3–4 distinct and reaching lateral margins (Fig. 28C). Male abdomen broadly T-shaped in large males; sixth segment broader than long, shorter than telson length (Fig. 27B). G1 with short terminal segment, ca. 0.3 times length of subterminal segment, distal part of terminal segment (Fig. 27C–F). G2 with long distal segment, ca. 0.4 times length of basal segment (Fig. 27G).

Description. – Carapace broader than long, dorsal surface distinctly convex (Fig. 28A, B); dorsal surface of carapace smooth except lateral margins; postorbital and epigastric cristae not developed; epigastric groove short; external orbital angle broadly triangular, with convex long outer margin, ca. 3 times length of inner margin, tip acutely triangular; epibranchial tooth blunt, very small, separated from external orbital angle by almost indistinct cleft; postorbital region distinctly concave; cervical grooves broad, shallow, distinct; H-shaped groove distinct; branchial region with indistinct striae throughout adjacent to lateral margins; frontal median triangle small, dorsal margin cristate (Fig. 28A, B).

Third maxilliped ischium rectangular, with distinct sulcus; exopod short, not reaching proximal one-third of merus, lacking flagellum (Fig. 27A).

Chelae distinctly unequal in large males, fingers of large males gaping when fingers closed; major tooth of chelipedal carpus large, with smooth outer margin (Fig. 28A, B).

Suture between thoracic sternites 2–3 visible as broad, deep groove not reaching lateral margins; suture between sternites 3–4 distinct and reaching lateral margins (Fig. 28C).

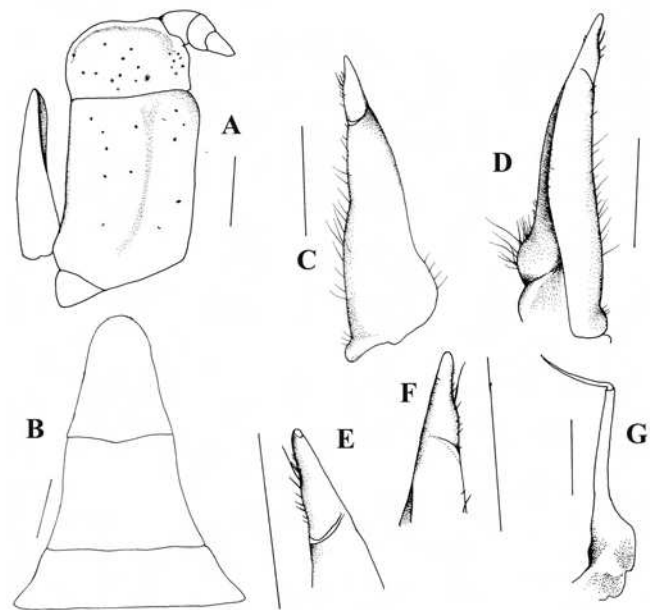


Fig. 27. *Snaha aruna*, new species, holotype male (15.5 × 11.1 mm) (ZRC 2003.0237) (formerly WHT 10697): A, right third maxilliped; B, male abdomen; C, left G1 dorsal view; D, left G1 ventral view; E, left G1 terminal segment dorsal view; F, left G1 terminal segment ventral view; G, right G2 dorsal view. Scale bars = 1.0 mm.

Male abdomen broadly T-shaped in large males; sixth segment distinctly broader than long and shorter than telson length, telson longer than broad (Figs. 27B, 28C).

G1 straight, with long terminal segment, ca. 0.3 times length of subterminal segment, distal part of terminal segment narrow (Fig. 27C–F). G2 with long distal segment, ca. 0.4 times length of basal segment (Fig. 27G).

Etymology. – The specific epithet, *aruna*, is derived from the Sanskrit word for ‘red’, a reference to the deep reddish brown live colouration of the species. Used as a noun in apposition.

Remarks. – *Snaha aruna* and *S. escheri* are similar in appearance, but differ clearly in male abdomen and G1 characters (see Key to the species of *Snaha*).

Ecological notes. – The type series was collected from a shallow (< 15 cm deep) streamlet (< 1 m wide), under stones in the Nayamakad Tea Estate, on Munnar-Pollachchi road, Tamil Nadu, India, at 1,800 m altitude.

Distribution. – The species is known only from the type locality, Nayamakad Tea Estate, on Munnar-Pollachchi road, Tamil Nadu, India.

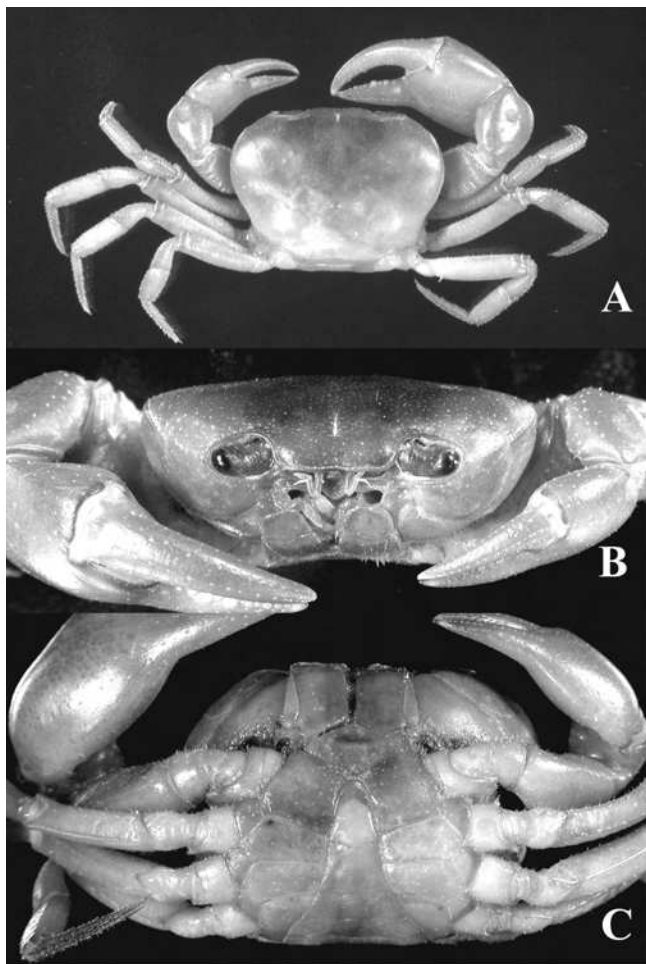


Fig. 28. *Snaha aruna* new species, holotype male (15.5 × 11.1 mm) (ZRC 2003.0237) (formerly WHT 10697): A, dorsal view; B, frontal view; C, ventral view.

***Snaha escheri* (Roux, 1931)**
(Figs. 29, 30)

Paratelphusa (*Globitelphusa*) *escheri* Roux, 1931: 60, Figs. 18, 19.
Gubernatoriana escheri Bott, 1970a: 336; 1970b: 45, Pl. 5 Figs. 54–56, Pl. 27 Fig. 25.

Material examined. – Lectotype, male (13.9 × 10.2 mm) (MGE), Kodaikanal, Palnis, coll. J. Carl.

Paralectotypes – 3 males (largest 10.8 × 7.9 mm), 1 female (13.1 × 9.5 mm), 4 juveniles (MGE), same data as lectotype.

Diagnosis. – Carapace deep, dorsal surface convex, smooth; postorbital and epigastric cristae indistinct; epibranchial tooth very small, hardly visible; cervical grooves very shallow; H-shaped groove shallow, visible; external orbital angle small, outer margin longer than inner margin (Fig. 30A, B). Third maxilliped exopod reaching mid length of merus. Suture between thoracic sternites 2–3 deep, broad, not reaching lateral margins, suture between sternites 3–4 distinct, deep, reaching lateral margins (Figs. 29A, 30C). Male abdomen broadly T-shaped; sixth segment distinctly broader than long, slightly longer than telson, telson as long as broad (Figs. 29B, 30C). G1 almost straight, with cone-shaped, short terminal segment, ca. 0.3 times length of subterminal segment (Fig. 29C, D). G2 with long distal segment, ca. 0.5 times length of basal segment (Fig. 29E).

Remarks. – Bott (1970a, b) assigned this species to the genus *Gubernatoriana* Bott, 1970, on the basis of its weak epigastric and postorbital cristae, T-shaped male abdomen, and slender G1 with a cone-shaped terminal segment, with the base being as thick as the distal part of the subterminal segment. However, generic diagnostic characters of *Snaha escheri* clearly differentiate it from *G. gubernatoris* (Alcock, 1909), the type species of *Gubernatoriana*.

Ecological notes. – Ecology not known.

Distribution. – Known from south India; in addition to the type locality, Bott (1970) also recorded the species from “Palanis, Vandaruvu; shola bei Shembaganur; Bach bei Kukkal; Palanis Flub im Dschungel”.

Vanni, new genus

Type species. – *Paratelphusa* (*Liotelphusa*) *malabarica* var. *travancorica* Henderson, 1913, by present designation.

Diagnosis. – Carapace squarish, flat or slightly convex in frontal view; postorbital cristae distinct and epigastric cristae distinct; external orbital angle broad; epibranchial tooth broad, small, blunt, distinct, the cleft visible; dorsal margin of frontal median triangle distinct, without lateral walls; cervical grooves shallow, distinct; H-shaped groove distinct (Figs. 32A, B, 34A, B, 36A, B, 37A). Third maxilliped exopod with long flagellum. Suture between anterior male thoracic sternites 2–3 slightly visible or indistinct, suture between sternites 3–4 indistinct, only just visible on lateral margins,

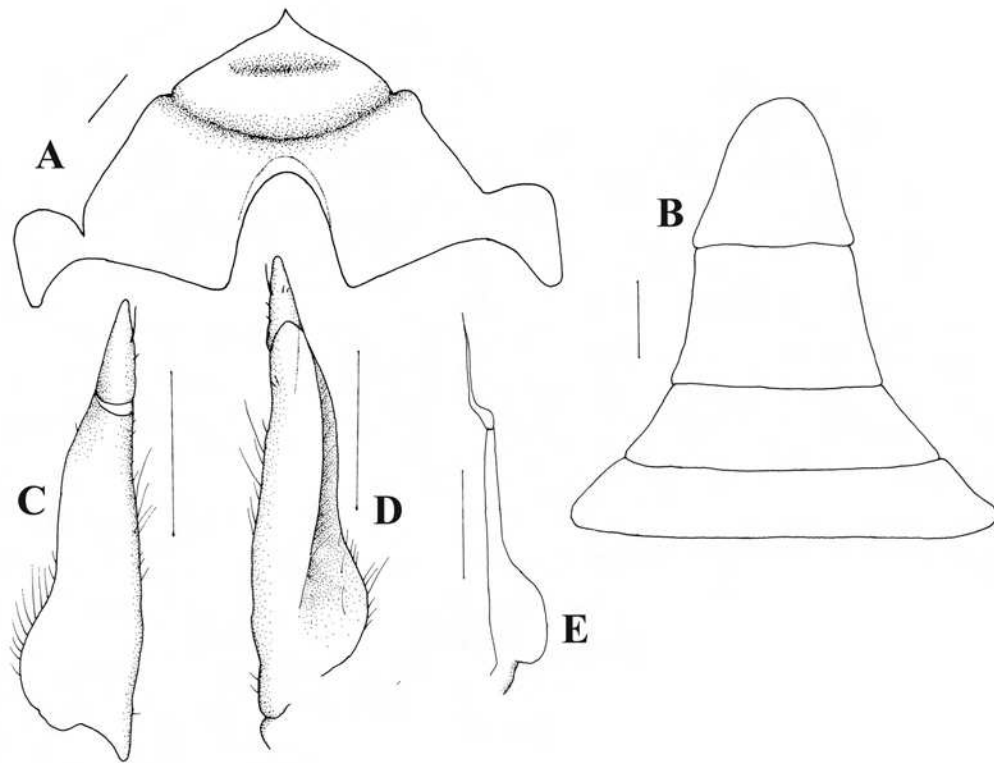


Fig. 29. *Snaha escheri* (Roux, 1931), lectotype male (13.9 × 10.2 mm) (MGE): A, anterior male thoracic sternites; B, male abdomen; C, right G1 dorsal view; D, right G1 ventral view; E, right G2 dorsal view. Scale bars = 1.0 mm.

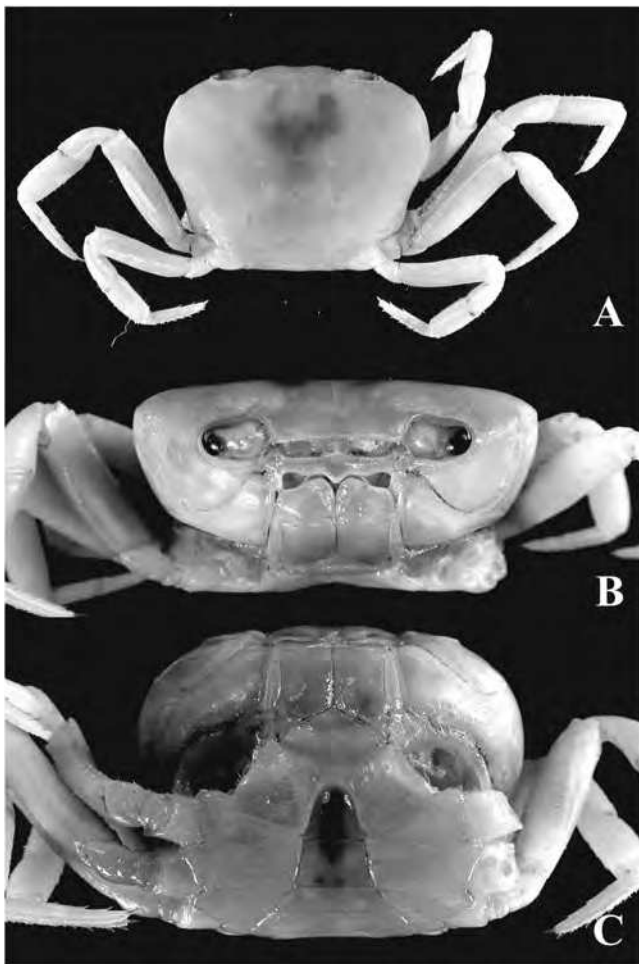


Fig. 30. *Snaha escheri* (Roux, 1931), lectotype male (13.9 × 10.2 mm) (MGE): A, dorsal view; B, frontal view; C, ventral view.

when present (Figs. 31A, 32A, 35A, 36A, 37A, 38A). Male abdomen narrow, T-shaped-acutely triangular; sixth segment squarish-slightly trapezoidal (Figs. 31B, 32C, 35B, 36C, 37C, 38C). G1 stout, almost straight, with short, stout, cone-shaped terminal segment, ca. 0.2–0.35 times length of subterminal segment; inner margin of G1 characteristically curved or angled just below juncture between terminal and subterminal segments (Figs. 31C–F, 33A, B, 35C–F, 37D, E). G2 with short-long distal segment, ca. 0.25–0.5 times length of basal segment (Figs. 31G, 34C, 35G, 37F).

Etymology. – The genus name, *Vanni*, means ‘forest’ in Sanskrit, a reference to the forested habitat in which the type species was discovered; here applied in the feminine gender. Used as a noun in apposition.

Remarks. – Bott (1970b) assigned *Vanni malabarica* (Henderson, 1912) to *Travancoriana* Bott, 1969 [type species: *Travancoriana schirnerae* Bott, 1969], mainly because of the relatively distinct postorbital cristae that are more or less confluent with the epigastric cristae. Furthermore, the G1 of *Vanni malabarica* is superficially similar in shape to that of *Baratha* and *Travancoriana*, especially in the relatively short and tapered G1 terminal segment. However, *Vanni malabarica* differs from both *Baratha* and *Travancoriana* in several generically significant external characters that warrant the establishment of a separate genus: postorbital cristae usually less strongly developed (vs. very strongly developed); external orbital angle relatively narrow, with outer margin 1.5–4 times as long as inner margin (vs. external orbital angle distinctly broader, with outer margin 3–5 times as long as inner margin); cervical grooves relatively weaker margin (vs.

cervical grooves much stronger); and G1 terminal segment proportionately shorter, ca. 0.2–0.3 times length of subterminal segment (vs. G1 terminal segment proportionately longer, ca. 0.3–0.6 times length of subterminal segment) (Figs. 7F, G, 8A, B, 18C, D, 19A, B, 33A, B, 34A, B).

Vanni also superficially resembles *Liotelphusa* Alcock, 1909 [type species: *Telphusa laevis* Wood-Mason, 1871], in overall carapace physiognomy and the relatively short G1 terminal segment—four of its species were originally described under *Paratelphusa* (*Liotelphusa*). However, the following morphological characters easily separate *Vanni* from *Liotelphusa*: (i) male abdomen broad but distinctly T-shaped (vs. male abdomen triangular, with concave lateral margins); (ii) male abdominal cavity reaching or slightly exceeding an imaginary line joining midpoint of cheliped bases (vs. male abdominal cavity not exceeding imaginary line joining posterior edge of cheliped bases); (iii) G1 terminal segment relatively shorter and stouter appearing more tapered and cone-shaped; and (iv) G1 terminal segment gradually tapered towards tip, not bottle-shaped, the distal part not distinctly narrower than the proximal part (vs. G1 terminal segment bottle-shaped, with distal part distinctly narrower than proximal part) (Figs. 31A–F, 32C, 33A, B, 35A–F; vs. Bott, 1970b: Pl. 6 figs. 63–65; Pl. 27 figs. 28, 29; Pl. 31 figs. 8–10; Pl. 33 figs. 13–24; Pl. 35 figs. 39–42). In addition, the southern Indian distribution of *Vanni* is considerably disjunct from the northeastern Indian distribution of *Liotelphusa*.

Vanni, new genus, consists of seven species, viz., *V. malabarica* (Henderson, 1912), *V. travancorica* (Henderson, 1913) [type species], *V. nilgiriensis* (Roux, 1931), *V. pusilla* (Roux, 1931), *V. ashini*, new species, *V. deepta*, new species, and *V. giri*, new species.

Ecological notes. – *Vanni malabarica*, *V. pusilla*, and *V. nilgiriensis* are known only from old museum specimens, and nothing is known of their ecology. Recently collected specimens of *Vanni travancorica*, *V. ashini*, *V. deepta* and *V. giri* were in or near small streams, depth < 5 cm. The crabs were usually found in wet soil, under stones and logs or amongst damp leaf litter on the forest floor; a few were collected from shallow burrows.

Distribution. – *Vanni*, new genus, is known only from Kerala, southwestern India.

Key to the species of *Vanni*

1. Ambulatory legs relatively longer, second and third pair more than twice carapace length (Fig. 40) *Vanni ashini*, new species
- Ambulatory legs relatively shorter, second and third pair less than twice carapace length 2
2. Male abdomen acutely triangular (Figs. 35B, 36C) *Vanni nilgiriensis*
- Male abdomen T-shaped 3
3. G1 with base of subterminal segment distinctly stouter (Fig. 31C, D); terminal segment narrower (Fig. 31C–F)

- *Vanni travancorica*
- G1 with base of subterminal segment comparatively less stout (Figs. 33A, B, 35A, B, 37D, E, 39A, B, 41A, B, 43A, B); terminal segment cone-shaped and stouter (Figs. 33A, B, 35E, F, 37D, E, 39C, D, 41C, D, 43C, D) 4
4. Carapace broader, ca. 1.4 times of carapace length; postorbital and epigastric cristae very weak (Figs. 37A, 38A, B) *Vanni pusilla*
- Carapace width less than 1.4 times of carapace length; postorbital and epigastric cristae stronger (Figs. 34A, B, 42A, B, 44A, B) 5
5. Mid dorsal surface of carapace raised in frontal view (Fig. 44B). Tip of G1 terminal segment narrow and directed outwards (Fig. 43A–D) *Vanni giri*, new species
- Mid dorsal surface of carapace not raised in frontal view (Figs. 34B, 42B). Tip of G1 terminal segment straight (Figs. 33A, B, 41A–D) 6
6. Frontal margin narrower, ca. 0.33 times of carapace width (Fig. 42B). G1 terminal segment acutely cone-shaped, long, ca. 0.3 times length of subterminal segment (Figs. 41A, B). G2 with long distal segment, ca. 0.4 times length of basal segment (Fig. 41E) *Vanni deepta*, new species
- Frontal margin broader, ca. 0.40 times of carapace width (Fig. 34B). G1 terminal segment cone-shaped, short, ca. 0.25 times length of subterminal segment (Fig. 33A, B). G2 with relatively shorter distal segment, ca. 0.25 times length of basal segment (Fig. 33C) *Vanni malabarica*

Vanni travancorica (Henderson, 1913)

(Figs. 31, 32)

Paratelphusa (*Liotelphusa*) *malabarica* var. *travancorica* Henderson 1913: 47, Fig. 2.

Paratelphusa (*Barytelphusa*) *travancorica* – Roux, 1931: 53.

Travancoriana travancorica – Bott, 1970a: 336.

Travancoriana malabarica – Bott, 1970b: 42 (part) (not *Paratelphusa* (*Liotelphusa*) *malabarica* Henderson, 1912).

Material examined. – 1 male (22.6 × 16.7 mm) (ZRC 2003.0231) (formerly WHT 10635), 1 male (19.7 × 15.1 mm) (WHT 10636), 1 male (16.6 × 12.8 mm) (WHT 10637), 1 male (17.0 × 13.2 mm) (WHT 10638), 1 female (19.7 × 15.1 mm) (WHT 10639), 1 male (17.5 × 13.3 mm) (WHT 10640), 1 male (15.8 × 12.2 mm) (WHT 10641), 1 female (17.7 × 13.3 mm) (WHT 10642), 1 female (17.2 × 13.2 mm) (WHT 10643), Ponmudy, Kerala, India, 08°44'19.0"N 77°07'9.7"E, alt. 339 m; 1 male (17.8 × 13.0 mm) (WHT 10624), 1 male (17.1 × 13.2 mm) (WHT 10625), 1 male (15.6 × 11.9 mm) (WHT 10626), 1 male (17.8 × 13.4 mm) (WHT 10627), 1 male (16.5 × 12.3 mm) (WHT 10628), 1 female (17.5 × 13.0 mm) (WHT 10629), 1 female (16.1 × 12.0 mm) (WHT 10630; female with 15 young, 15.7 × 11.7 mm) (WHT 10631), 1 female (17.1 × 13.1 mm) (WHT 10632), 1 juv. male (9.8 × 7.7 mm) (WHT 10633), 1 juv. female (9.0 × 7.0 mm) (WHT 10634), Chathankodu near Ponmudi, Kerala, India, 08°39'45.1"N 77°09'03.5"E, alt. 100 m.

Diagnosis. – Carapace not deep, dorsal surface slightly convex in frontal view, smooth except for postorbital, epigastric cristae and lateral margins; postorbital cristae distinct, reaches rugose epigastric cristae; epibranchial tooth distinct, cleft visible; cervical grooves shallow, broad; H-shaped groove distinct; external orbital angle outer margin ca. 2.5 times length of inner margin (Fig. 32A, B). Suture between thoracic sternites 2–3 very shallow, not reaching lateral margins, suture between sternites 3–4 indistinct (Figs.

31A, 32C). Male abdomen T-shaped; sixth segment squarish, longer than broad, longer than telson in large males (Figs. 31B, 32C). G1 almost straight, with narrow, cone-shaped, short terminal segment with inner margin characteristically curved or angled just below juncture between terminal and subterminal segments, base of G1 subterminal segment distinctly broader than the distal part (Fig. 31C–F). G2 with relatively short distal segment, ca. 0.35 times length of basal segment (Fig. 31G).

Description. – Carapace broader than long, dorsal surface slightly convex anteriorly and flat posteriorly; dorsal surface of carapace smooth except postorbital cristae, epigastric cristae and lateral margins; postorbital and epigastric cristae well-developed, confluent; epigastric cristae rugose; epigastric groove narrow, weakly bifurcate; external orbital angle broadly triangular, with convex long outer margin, ca. 2.5 times length of inner margin; epibranchial tooth distinct, blunt, small, separated from external orbital angle by distinct cleft; postorbital region distinctly concave; cervical grooves shallow, distinct; H-shaped groove distinct; branchial region with distinct striae throughout adjacent to lateral margins; frontal margin with cristate dorsal margin (Fig. 32A, B).

Third maxilliped ischium rectangular, with indistinct sulcus; exopod reaching about proximal one-third of merus, with long, well-developed flagellum.

Chelae distinctly unequal in both males and females, fingers of large males gaping when fingers closed; major tooth of chelipedal carpus large with smooth outer margin (Fig. 32A).

Suture between anterior male thoracic sternites 2–3 visible as very shallow groove not reaching lateral margins, suture between sternites 3–4 indistinct (Figs. 31A, 32C).

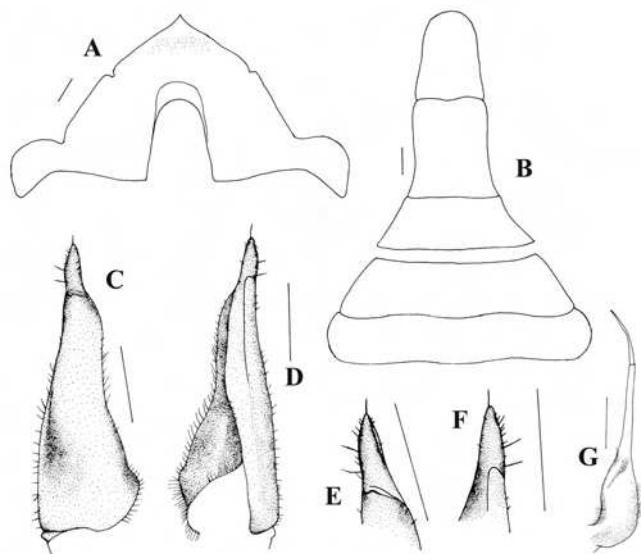


Fig. 31. *Vanni travancorica* (Henderson, 1913), topotype male (22.7 × 16.8 mm) (ZRC 2003.0231) (formerly WHT 10635): A, anterior male thoracic sternites; B, male abdomen; C, left G1 dorsal view; D, left G1 ventral view; E, left G1 terminal segment dorsal view; F, left G1 terminal segment ventral view; G, left G2 dorsal view. Scale bars = 1.0 mm.

Male abdomen T-shaped in large males; sixth segment distinctly longer than broad and longer than telson (Figs. 31B, 32C).

G1 almost straight, with narrow, cone-shaped, short terminal segment, ca. 0.2 times length of subterminal segment with characteristically curved or angled inner margin of G1 just below juncture between terminal and subterminal segments, base of G1 distinctly broad (Fig. 31C–F). G2 with relatively short distal segment, ca. 0.35 times length of basal segment (Fig. 31G).

Remarks. – Bott (1970b) regarded *Vanni travancorica* (Henderson, 1913) as a junior subjective synonym of *Travancoriana malabarica* (Henderson, 1912), noting that they differed only in the strength of the epigastric and postorbital cristae, and that both forms were collected from the same general area (Ponmudi and Cochin State Forest, southwestern India). In the present study, we examined a good series of topotypic specimens that closely match the description and illustrations of Henderson (1913) and are clearly referable to the present species. Our comparison of these specimens against the types of *Vanni malabarica* confirm that the differences noted by Henderson (1913) are consistent and that *Vanni travancorica* is a valid species.

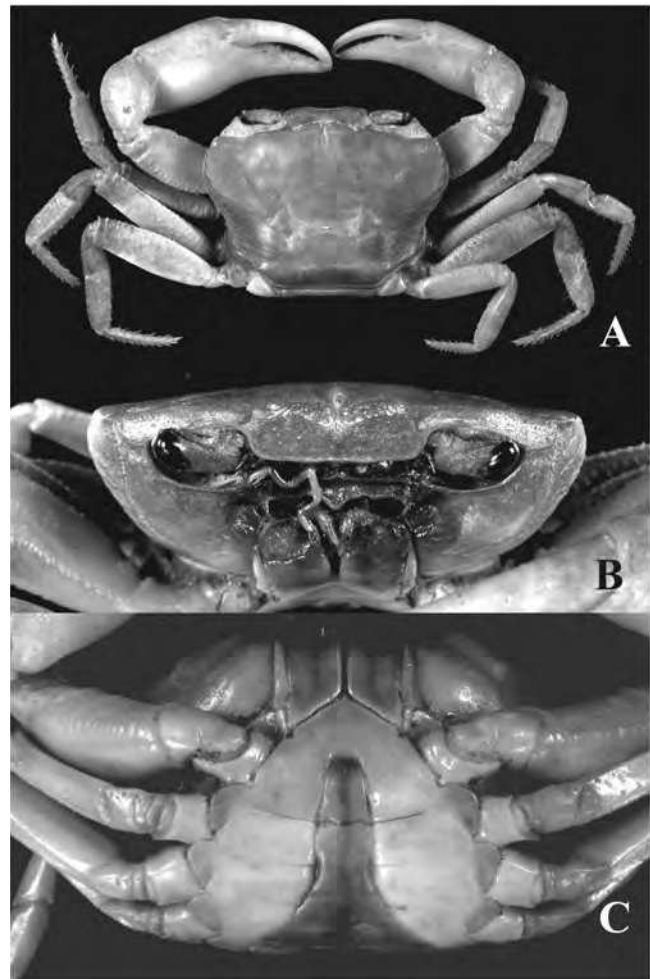


Fig. 32. *Vanni travancorica* (Henderson, 1913), topotype male (22.7 × 16.8 mm) (ZRC 2003.0231) (formerly WHT 10635): A, dorsal view; B, frontal view; C, ventral view.

In addition to having more strongly developed and distinct epigastric and postorbital cristae, *Vanni travancorica* also differs from *Vanni malabarica* in the following carapace, G1 and G2 characters: mid dorsal surface of carapace comparatively convex in frontal view, sides comparatively flat (vs. mid dorsal surface not convex, sides gently convex); frontal margin narrow, ca. 0.35 of carapace width (vs. broad, ca. 0.44 of carapace width); terminal segment of G1 distinctly narrower (vs. distinctly broader); base of G1 distinctly broader (vs. comparatively not broad); and G2 distal segment comparatively long, ca. 0.35 times length of basal segment (vs. comparatively shorter, ca. 0.25 times length of basal segment) (Figs. 31C, D, G, 32B, 33A–C, 34B).

The type localities of the two species also differ, *Vanni travancorica* was described from Ponnudi, Kerala, India, 08°44'N 77°07'E, whereas *V. malabarica* was described from Cochin State Forest, Kerala India, 09°50'N 76°30'E.

Ecological notes. – All recent material was collected from under stones and logs in wet soil, and from shallow burrows in wet soil, adjacent to small streams. The crabs were always found in the shade.

Distribution. – The species is known only from two localities, Chathankodu and Ponnudi (type locality), Kerala, southwestern India.

***Vanni malabarica* (Henderson, 1912)**
(Figs. 33, 34)

Paratelphusa (*Liotelphusa*) *malabarica* Henderson 1912: 111; 1913: 48, Fig. 1.
Travancoriana malabarica – Bott, 1970b: 42, Pl. 5 figs. 45–47, Pl. 26 Fig. 22.

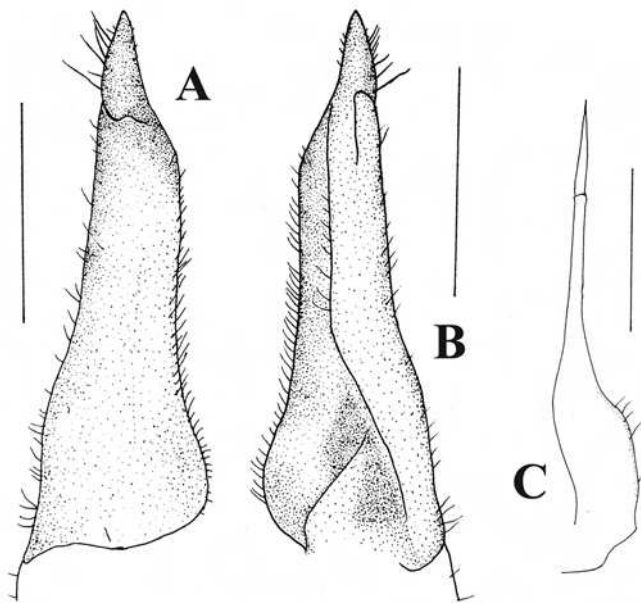


Fig. 33. *Vanni malabarica* (Henderson, 1912), lectotype male (13.6 × 10.1 mm) (NHM 1913.2.11.1–2): A, left G1 dorsal view; B, left G1 ventral view; C, left G2 dorsal view. Scale bars = 1.0 mm.

Material examined. – Lectotype, male (13.6 × 10.1 mm) (NHM 1913.2.11.1), Cochin State Forest, presented by J. R. Henderson.

Paralectotype – female (16.2 × 12.2 mm) (NHM 1913.2.11.2), same data as lectotype.

Diagnosis. – Carapace not deep, dorsal surface slightly convex in frontal view, smooth except postorbital, epigastric cristae and lateral margins; postorbital cristae distinct, barely reaches rugose epigastric cristae; epibranchial tooth distinct, cleft visible; cervical grooves very shallow; H-shaped groove distinct; external orbital angle outer margin ca. 2 times length of inner margin (Fig. 34A, B). Suture between thoracic sternites 2–3 and 3–4 indistinct (Fig. 34C). Male abdomen broadly T-shaped; sixth segment squarish, almost as long as broad, slightly longer than telson. G1 almost straight, with cone-shaped, short, stout terminal segment, ca. 0.25 times length of subterminal segment; inner margin of G1 characteristically curved or angled just below juncture between terminal and subterminal segment (Fig. 33A, B). G2 with relatively short distal segment, ca. 0.25 times length of basal segment (Fig. 33C).

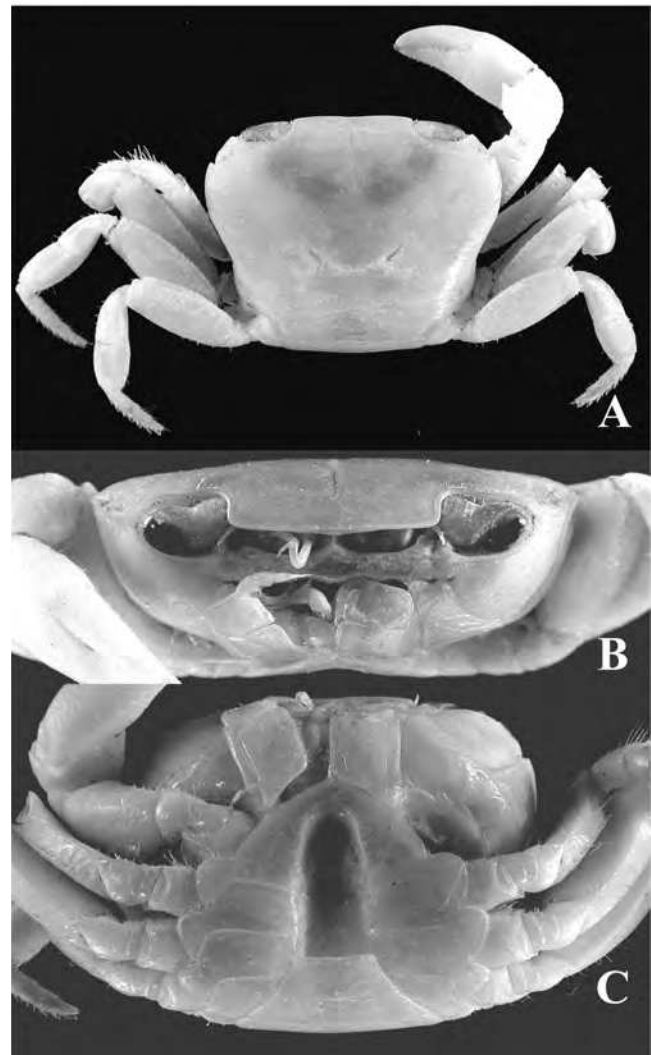


Fig. 34. *Vanni malabarica* (Henderson, 1912), lectotype male (13.6 × 10.1 mm) (NHM 1913.2.11.1–2): A, dorsal view; B, frontal view; C, ventral view.

Remarks. – Henderson (1812) described *Vanni malabarica* [as a *Paratelphusa* (*Liotelphusa*)] based on specimens from the Cochin State Forests in Kerala. The male syntype in the NHM (NHM 1913.2.11.1), which was also examined and illustrated by Bott (1970b, Pl. 5 figs. 45–47, Pl. 26 fig. 22), is hereby designated as the lectotype for the species.

Paratelphusa (*Liotelphusa*) *travancorica* (Henderson, 1913) was synonymised under *Travancoriana malabarica* (Henderson, 1912) by Bott (1970b), but both are recognised here as distinct species of *Vanni*. The features separating these morphologically similar species are discussed in the Remarks for *Vanni travancorica*.

Ecological notes. – Ecology not known.

Distribution. – The species is known only from the types from Cochin State Forest, Kerala, southwestern India.

***Vanni nilgiriensis* (Roux, 1931)**
(Figs. 35, 36)

Paratelphusa (*Liotelphusa*) *nilgiriensis* Roux, 1931: 56, Figs. 14, 15.

Gubernatoriana nilgiriensis – Bott, 1970a: 336; 1970b: 45, Pl. 5 Figs. 51–53, Pl. 27 Fig. 24.

Material examined. – Lectotype, male (24.7 × 18.5 mm) (MGE), Avalanche, Nilgiris, coll. J. Carl.

Paralectotype – 1 male (21.0 × 15.1 mm) (MGE), same data as lectotype.

Diagnosis. – Carapace not deep, dorsal surface slightly convex in frontal view, smooth except postorbital cristae, epigastric cristae and lateral margins; postorbital cristae distinct, rugose, barely reaches rugose epigastric cristae;

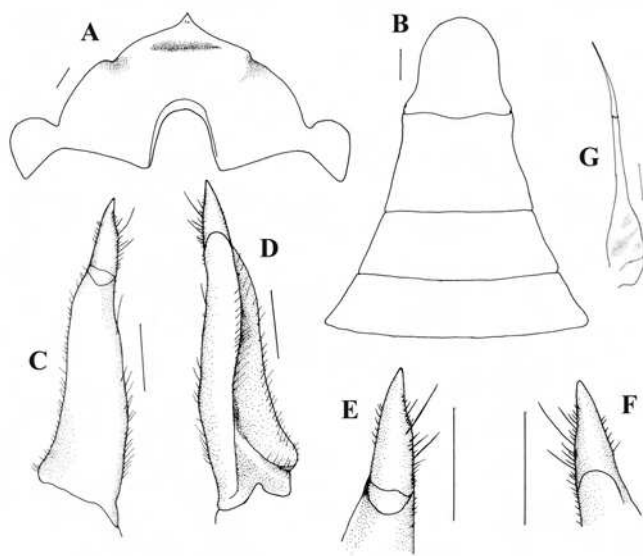


Fig. 35. *Vanni nilgiriensis* (Roux, 1931), lectotype male (24.7 × 18.5 mm) (MGE): A, anterior male thoracic sternites; B, male abdomen; C, right G1 dorsal view; D, right G1 ventral view; E, right G1 terminal segment dorsal view; F, right G1 terminal segment ventral view; G, right G2 dorsal view. Scale bars = 1.0 mm.

epibranchial tooth small, distinct, cleft visible; cervical grooves very shallow; H-shaped groove distinct; external orbital angle outer margin ca. 4 times length of inner margin (Fig. 36A, B). Suture between male thoracic sternites 2–3 narrow, not reaching lateral margins, suture between sternites 3–4 only visible on sides (Figs. 35A, 36C). Male abdomen acutely triangular; sixth segment trapezoid, distinctly broader than long, almost same length as telson (Figs. 35B, 36C). G1 almost straight, with cone-shaped, relatively long terminal segment with narrow tip, ca. 0.3 times length of subterminal segment, basal two-thirds of terminal segment distinctly broader than the distal part; inner margin of G1 characteristically curved or angled just below juncture between terminal and subterminal segments (Fig. 35C–F). G2 with relatively long distal segment, ca. 0.5 times length of basal segment (Fig. 35G).

Remarks. – The overall carapace physiognomy and G1 structure of *Vanni nilgiriensis* is typical of *Vanni*, new genus. Bott (1970b) assigned *V. nilgiriensis* (Roux, 1931) and *V. pusilla* (Roux, 1931) to *Gubernatoriana* Bott, 1969 [type species: *Paratelphusa* (*Globitelphusa*) *gubernatoris* Alcock,

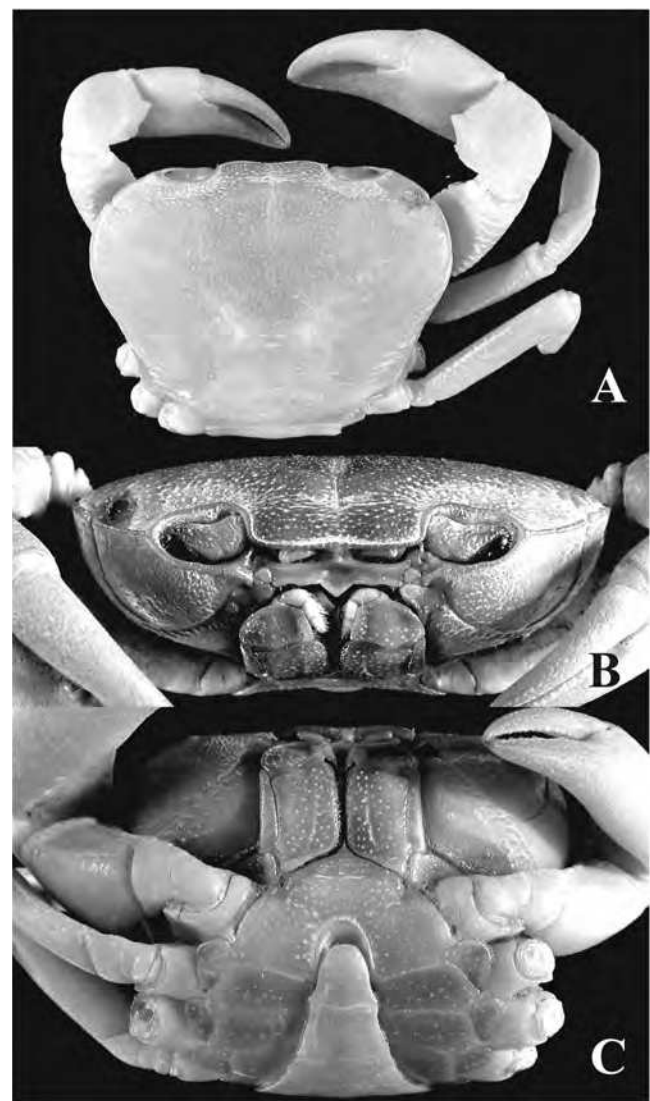


Fig. 36. *Vanni nilgiriensis* (Roux, 1931), lectotype male (24.7 × 18.5 mm) (MGE): A, dorsal view; B, frontal view; C, ventral view.

1909] based on the presence of weak epigastric and postorbital cristae, a T-shaped male abdomen, and a slender G1 with a cone-shaped terminal segment, the proximal part being as thick as the distal part of the subterminal segment. However, we have examined the type series of *Gubernatoriana gubernatoris* in the ZSI 4046/4, and found that the two species are clearly distinct from *Gubernatoriana* sensu stricto, differing in various significant characters including the presence of a long, well-developed flagellum on the third maxilliped exopod (vs. flagellum absent or vestigial); the distal segment of the G2 being relatively long (vs. vestigial); and male abdominal cavity not exceeding the imaginary line joining the midpoint of the cheliped bases (vs. male abdominal cavity reaching imaginary line joining the anterior edge of the cheliped bases) (unpublished data).

Ecological notes. – Ecology not known.

Distribution. – The species is known from Avalanche, Nilgiris, southwestern India.

***Vanni pusilla* (Roux, 1931)**
(Figs. 37, 38)

Paratelphusa (*Liotelphusa*) *pusilla* Roux, 1931: 58, Figs. 16, 17.
Gubernatoriana pusilla – Bott, 1970b: 46, Pl. 6 figs. 57–59, Pl. 27 Fig. 26.

Material examined. – Paralectotypes, 1 male (12.0 × 8.4 mm), 1 female (12.9 × 9.2 mm) (MBA 801a), Avalanche, Nilgiris, southwestern India.

Diagnosis. – Carapace not deep, dorsal surface slightly convex in frontal view, smooth except postorbital cristae, epigastric cristae and lateral margins; postorbital cristae broken, rugose, barely reaches rugose epigastric cristae; epibranchial tooth small, distinct, cleft visible; cervical grooves very shallow, broad; H-shaped groove distinct; external orbital angle outer margin ca. 4 times length of inner margin (Figs. 37A, 38A, B). Suture between male thoracic sternites 2–3 and 3–4 indiscernible (Figs. 37B, 38C). Male abdomen broadly T-shaped; sixth segment trapezoid, distinctly broader than long, almost same length as telson (Figs. 37C, 38C). G1 almost straight, with long, cone-shaped terminal segment with narrow and straight distal part; terminal segment ca. 0.3 times length of subterminal segment; inner margin of G1 characteristically curved or angled just below juncture between terminal and subterminal segments (Figs. 37D, E; Bott, 1970b: Pl. 27 fig. 26).

Remarks. – Roux (1931) described *Vanni pusilla* [as a *Paratelphusa* (*Liotelphusa*)] based on two male and four female specimens. Bott (1970b) subsequently re-described and illustrated the species, assigning it to *Gubernatoriana* Bott, 1969; and designated a lectotype male specimen in the MGE.

The present diagnosis of *V. pusilla*, however, is based on the male paralectotype specimen from MBA as the lectotype in MGE is currently not available for re-examination. In any case, there is some confusion as to the identity and whereabouts of the lectotype specimen. In the text of his revision, Bott (1970b: 46) designated the male type specimen

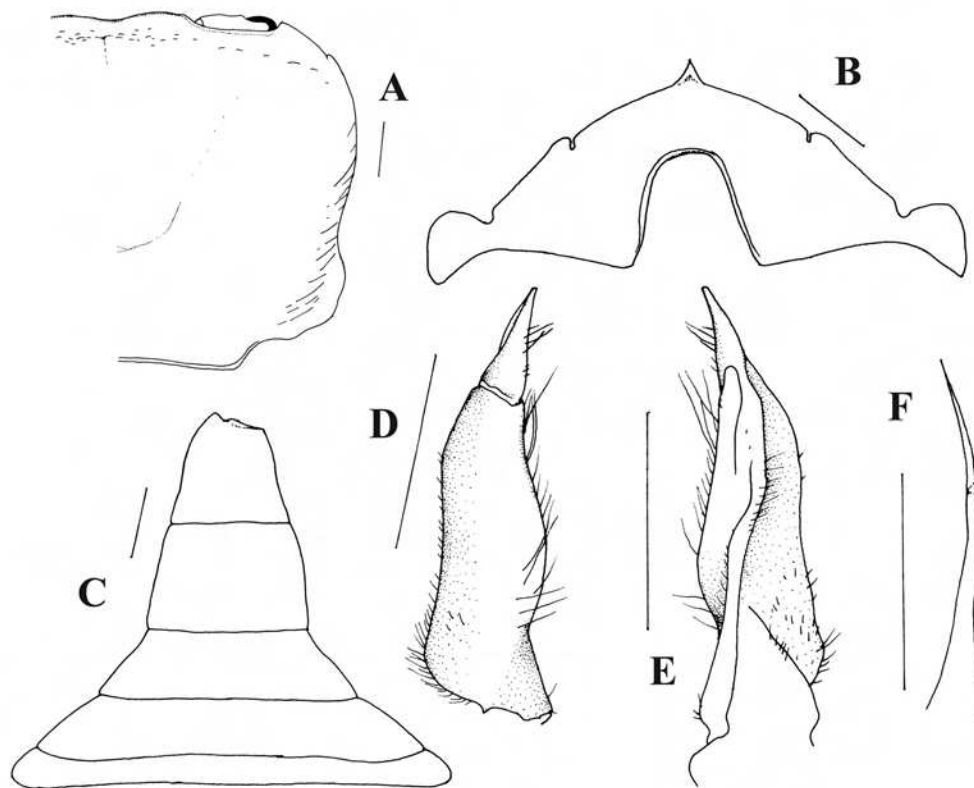


Fig. 37. *Vanni pusilla* (Roux, 1931); paralectotype male (12.0 × 8.4 mm) (MBA 801a): A, right dorsal view of carapace; B, anterior male thoracic sternites; C, male abdomen; D, right G1 dorsal view; E, right G1 ventral view; F, right G2 dorsal view. Scale bars = 1.0 mm.

from MGE as the lectotype, citing its measurements as 13 by 10 mm. However, the caption for the photograph of the lectotype in Bott (1970b: Pl. 6 Figs. 57–59) cites the specimen from MBA instead (catalogue number 801a) (measured in the present study as 12.0×8.4 mm). It is possible that Bott actually meant to designate the MBA 801a male specimen as the lectotype, but due to a typographical error in the text, the MGE specimen was named the lectotype instead. The specimen illustrated by Bott (1970b: Pl. 6 Figs. 57–59) does resemble the MBA male specimen in having a damaged telson tip (Fig. 37C), although the damage is on the wrong side of the telson (possibly due to the image being laterally inverted); and the measurements in the caption are incongruent with the measurements of the MBA male specimen in the present study. Until the purported male lectotype from MGE is re-examined, however, the present MBA 801a male type specimen should continue to be regarded as a paralectotype.

Like the previous species, *V. pusilla* can also be easily differentiated from *Gubernatoriana* by several significant external characters (see earlier Remarks for *Vanni nilgiriensis*).

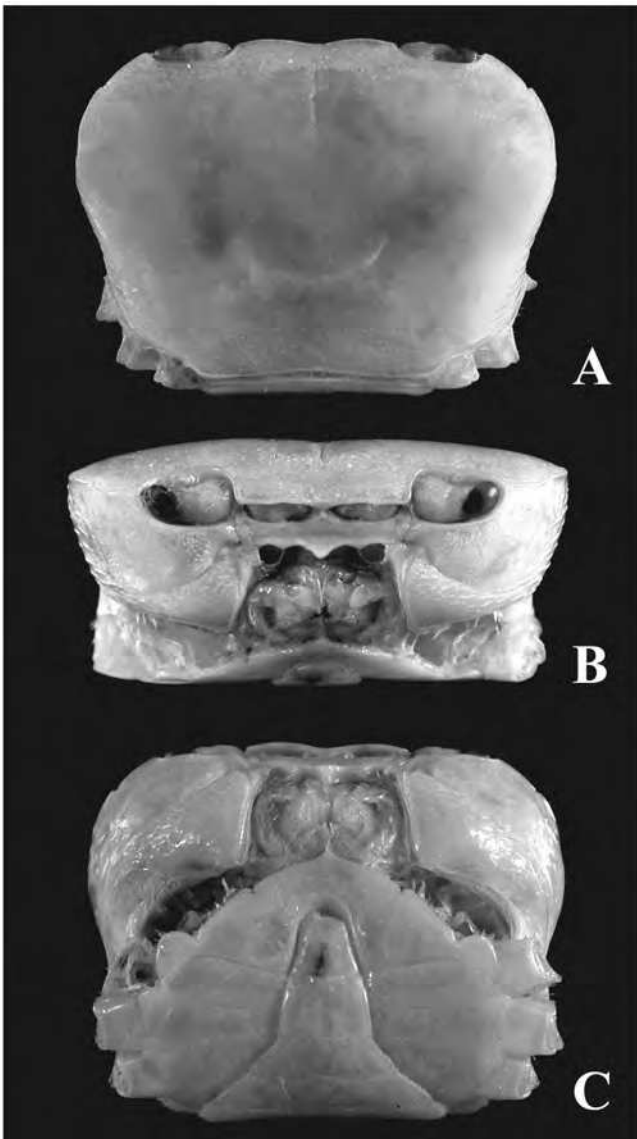


Fig. 38. *Vanni pusilla* (Roux, 1931); paralectotype male (12.0×8.4 mm) (MBA 801a): A, dorsal view; B, frontal view; C, ventral view.

Vanni pusilla most closely resembles *V. nilgiriensis* in carapace and G1 morphology. They can, however, be distinguished by the following characters: carapace broader, ca. 1.4 times of carapace length (vs. comparatively squarish, ca. 1.3 times of carapace length); male abdomen T-shaped (vs. acutely triangular); suture between male thoracic sternites 2–3 indiscernible (vs. suture between male thoracic sternites 2–3 visible as a narrow groove); and distal G1 distinctly bent just below the groove between terminal and subterminal segments (vs. not bent) (Figs. 35A–D, 36A, C, 37B–E, 38A, C).

Ecological notes. – Ecology not known.

Distribution. – The species is known from Avalanche, Nilgiris, southwestern India.

Vanni ashini, new species

(Figs. 39, 40)

Material examined. – Holotype, male (24.1×18.5 mm) (ZRC 2003.0232) (formerly WHT 10655), Ponnudi, Kerala, India, $08^{\circ}46'07.4''N$ $77^{\circ}06'37.7''E$, alt. 975 m.

Paratype – 1 male (15.8×12.0 mm) (WHT 10656), same data as holotype.

Diagnosis. – Carapace not deep, dorsal surface slightly convex in frontal view, smooth except postorbital, epigastric cristae and lateral margins; postorbital cristae distinct, sharp fused with rugose epigastric cristae; epibranchial tooth distinct, cleft visible; cervical grooves distinct; H-shaped groove distinct; external orbital angle outer margin ca. 1.5 times length of inner margin (Fig. 40A, B). Ambulatory legs long, second and third pairs the longest which is more than 2 times length of carapace length (Fig. 40A). Suture between thoracic sternites 2–3 narrow, not reaching lateral margins, suture between sternites 3–4 indistinct (Fig. 40C). Male abdomen distinctly T-shaped; sixth segment squarish, longer than broad, longer than telson (Fig. 40C). G1 almost straight, relatively stout, with cone-shaped, short terminal segment, ca. 0.2 times length of subterminal segment; inner margin of G1 characteristically curved or angled just below juncture between terminal and subterminal segments (Fig. 39A–D). G2 with relatively short distal segment, ca. 0.35 times length of basal segment (Fig. 39E).

Etymology. – The specific epithet, *ashini*, is the feminized form of the Sanskrit word for ‘discoverer’. Used as a noun in apposition.

Remarks. – *Vanni ashini* differs distinctly from all its congeners by the ambulatory legs being very long, with the second and third pairs the longest, more than twice the carapace length (vs. shorter than twice the carapace length). The G1 of *V. ashini*, while similar to that *V. giri*, new species, is quite different from its other congeners, with the G1 distal segment being distinctly stouter (vs. not very stout). *Vanni ashini* is also superficially similar to *V. travancorica* in carapace physiognomy although they do differ in the

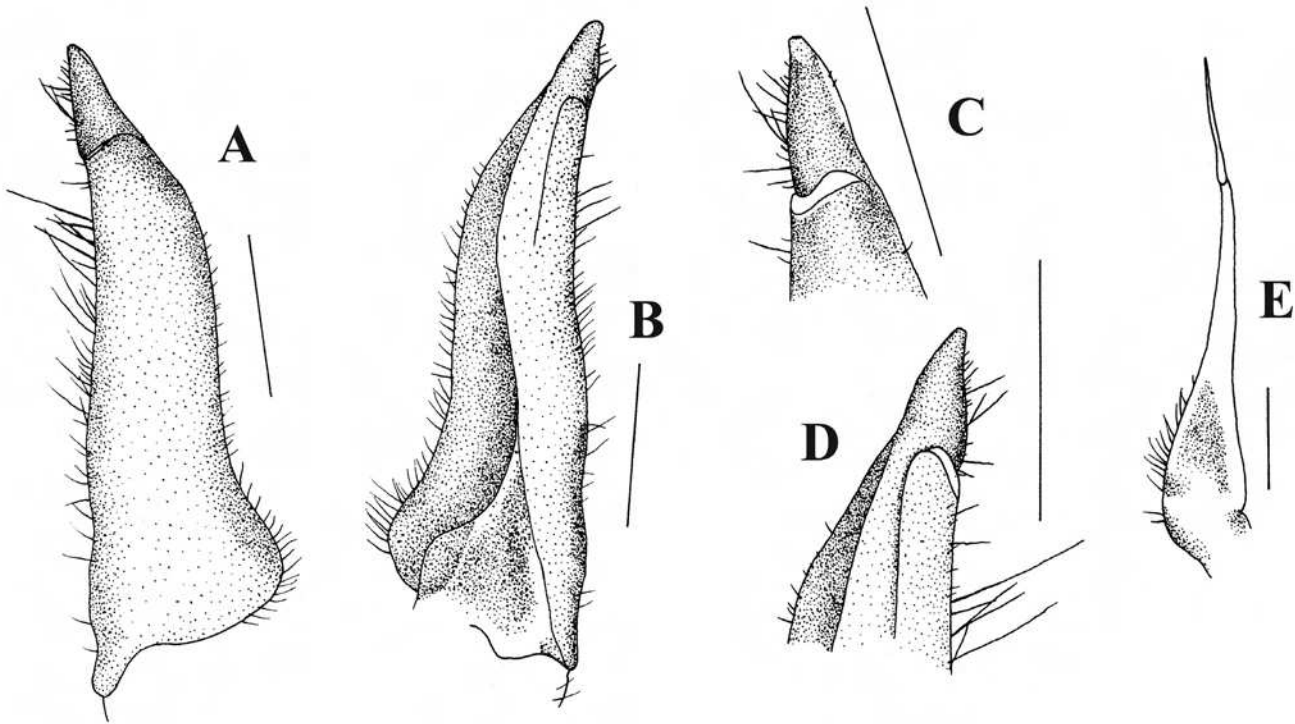


Fig. 39. *Vanni ashini*, new species, holotype male (24.1 × 17.7 mm) (ZRC 2003.0232) (formerly WHT 10655): A, left G1 dorsal view; B, left G1 ventral view; C, left G1 terminal segment dorsal view; D, left G1 terminal segment ventral view; E, left G2 ventral view. Scale bars = 1.0 mm.

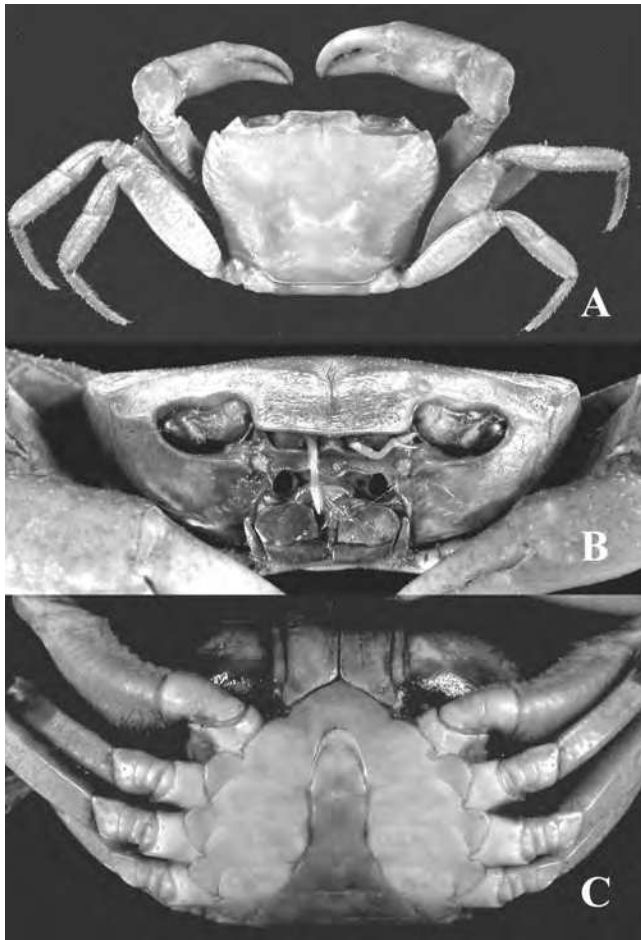


Fig. 40. *Vanni ashini*, new species, holotype male (24.1 × 17.7 mm) (ZRC 2003.0232) (formerly WHT 10655): A, dorsal view; B, frontal view; C, ventral view.

following: anterolateral margin of carapace not distinctly convex (vs. distinctly convex); posterolateral margin comparatively not concave (vs. distinctly concave); frontal margin comparatively short, ca. 0.30 times of carapace width (vs. comparatively broad, ca. 0.34 of carapace width); and epibranchial tooth comparatively sharp, with the cleft separating the tooth being very distinct in dorsal view (vs. blunt and cleft slightly distinct in dorsal view) (Figs. 31C, D, 32A, B, 33A, B, 35C, D, 37D, E, 39A, B, 40A, B, 41A, B).

Despite the G1 morphology of *V. ashini* being similar to that of *V. giri*, it remains easily distinguishable by its slightly turned G1 terminal segment (vs. straight terminal segment); comparatively short and stouter terminal segment (vs. long and narrower); and straight tip of the G1 terminal segment (vs. very short tip of G1 distinctly bent outwards) (Figs. 39A–D, 43A–D).

Ecological notes. – Specimens were collected from under stones in moist soil in a dry stream margin, in a shady area, where *Pilarta anuka*, new species, is syntopic.

Distribution. – The species is known only from the type locality, Ponmudi, Kerala, southwestern India.

***Vanni deepta* new species**
(Figs. 41, 42)

Material examined. – Holotype, male (17.8 × 12.8 mm) (ZRC 2003.0233) (formerly WHT 10648), Kaduwappara, on Mundakayam-Kumerly, Kerala, India, 09°33'26"N 76°57'40"E, alt. 685 m.

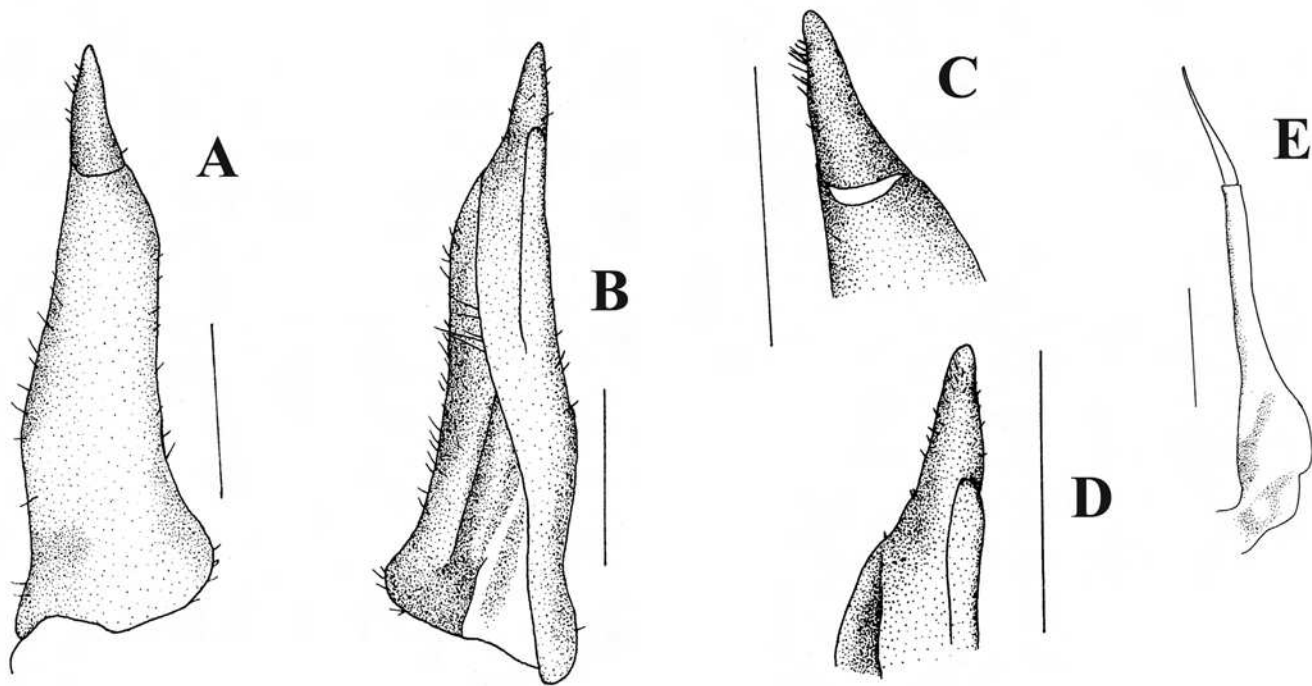


Fig. 41. *Vanni deepta*, new species, holotype male (19.0 × 13.8 mm) (ZRC 2003.0233) (formerly WHT 10648): A, left G1 dorsal view; B, left G1 ventral view; C, left G1 terminal segment dorsal view; D, left G1 terminal segment ventral view; E, left G2 ventral view. Scale bars = 1.0 mm.

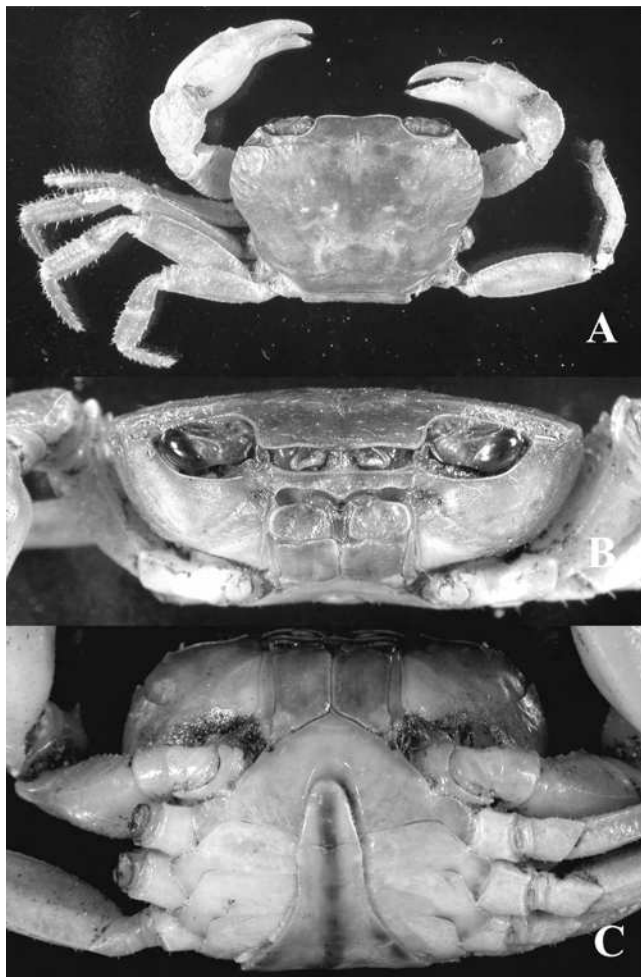


Fig. 42. *Vanni deepta*, new species, holotype male (19.0 × 13.8 mm) (ZRC 2003.0233) (formerly WHT 10648): A, dorsal view; B, frontal view; C, ventral view.

Paratypes – 1 male (18.8 mm × 13.0 mm) (WHT 10652), 1 male (17.1 × 12.4 mm) (WHT 10653), 1 male (15.3 × 11.1 mm) (WHT 10654), 1 male (20.7 × 14.9 mm) (WHT 10650), 1 male (16.5 × 12.3 mm) (WHT 10651), same data as holotype.

Diagnosis. – Carapace not deep, dorsal surface slightly convex, smooth except postorbital, epigastric cristae and lateral margins; postorbital cristae distinct, reaches rugose epigastric cristae; epibranchial tooth small, blunt, distinct, cleft visible; cervical grooves very shallow; H-shaped groove distinct; external orbital angle outer margin ca. 2 times length of inner margin (Fig. 42A, B). Suture between anterior male thoracic sternites 2–3 very shallow, not reaching lateral margins, suture between sternites 3–4 indistinct (Fig. 42C). Male abdomen broadly T-shaped; sixth segment squarish, broader than long, same length–slightly longer than telson (Fig. 42C). G1 almost straight, with narrowly cone-shaped, relatively long terminal segment, ca. 0.3 times length of subterminal segment; inner margin of G1 characteristically curved or angled just below juncture between terminal and subterminal segments; outer margin of the basal half of subterminal segment of G1 convex (Fig. 41A–D). G2 with relatively long distal segment, ca. 0.4 times length of basal segment (Fig. 41E).

Etymology. – The specific epithet, *deepta*, is derived from the Sanskrit word for ‘golden’, alluding to the golden yellow live colouration of its chelipeds. Used as a noun in apposition.

Remarks. – *Vanni deepta* is most similar to *Vanni malabarica* in external and gonopod morphology. However, they do still differ in the following: postorbital cristae distinctly reaching epigastric cristae (vs. postorbital cristae not reaching epigastric cristae); frontal margin narrow, ca. 0.33 times of

carapace width (vs. frontal margin broad, ca. 0.40 times of carapace width); epibranchial tooth comparatively sharp (vs. comparatively blunt); G1 terminal segment comparatively narrower (vs. broad); and G2 distal segment long, ca. 0.35 times length of basal segment (vs. G2 distal segment comparatively short, ca. 0.25 times length of basal segment) (Figs. 33A–C, 34A, B, 41A, B, E, 42A, B).

Ecological notes. – Specimens were collected next to a drying stream, under stones and from moist soil.

Distribution. – The species is known only from the type locality Kaduappara, between Mundakayam-Kumerly, Kerala, southwestern India.

***Vanni giri*, new species**
(Figs. 43, 44)

Material examined. – Holotype, male (18.8 × 14.2 mm) (ZRC 2003.0271) (formerly WHT 10658), between Munnar-Maraiyoor, on Munnar-Pollachchi, Kerala, India, 10°07'54.2"N 77°03'20.8"E, alt. 1,570 m.

Paratype – 1 immature male (14.6 × 11.4 mm) (WHT 10659), same data as holotype.

Others – 1 immature female (18.8 × 14.1 mm) (WHT 10660), 1 immature female (17.5 × 13.3 mm) (WHT 10662), same data as holotype.

Diagnosis. – Carapace not deep, dorsal surface slightly convex, smooth except postorbital, epigastric cristae and

lateral margins; postorbital cristae distinct, granular, reaches rugose epigastric cristae; epibranchial tooth small, blunt, distinct, cleft visible; frontal margin, orbital margins distinctly granular; cervical grooves distinct, deep; H-shaped groove distinct; external orbital angle outer margin ca. 3 times length of inner margin (Fig. 44A, B). Suture between thoracic sternites 2–3 very shallow, reaching lateral margins, suture between sternites 3–4 shallow and reaching lateral margins (Fig. 44C). Male abdomen broadly T-shaped; sixth segment squarish, almost as long as broad slightly longer than telson (Fig. 44C). G1 almost straight, with short, stout, cone-shaped terminal segment, ca. 0.25 times length of subterminal segment with short tip turning outwards with inner margin of G1 characteristically curved or angled just below juncture between terminal and subterminal segments (Fig. 43A–D). G2 with distal segment, ca. 0.25 times length of basal segment (Fig. 43E).

Etymology. – The specific epithet, *giri*, means ‘mountain’ in Sanskrit, a reference to the highland (1,570m altitude) habitat in which this species was discovered. Used as a noun in apposition.

Remarks. – *Vanni giri* is immediately separated from its congeners by having a more convex median carapace in frontal view (vs. flat to very gently convex) (Figs. 32B, 34B, 36B, 38B, 40B, 42B, 44B). Other differences are discussed under Remarks for *Vanni ashini*.

Ecological notes. – Specimens were collected from just beside a streamlet, in moist soil and under stones, between Munnar-Maraiyoor above 1,570 m altitude.

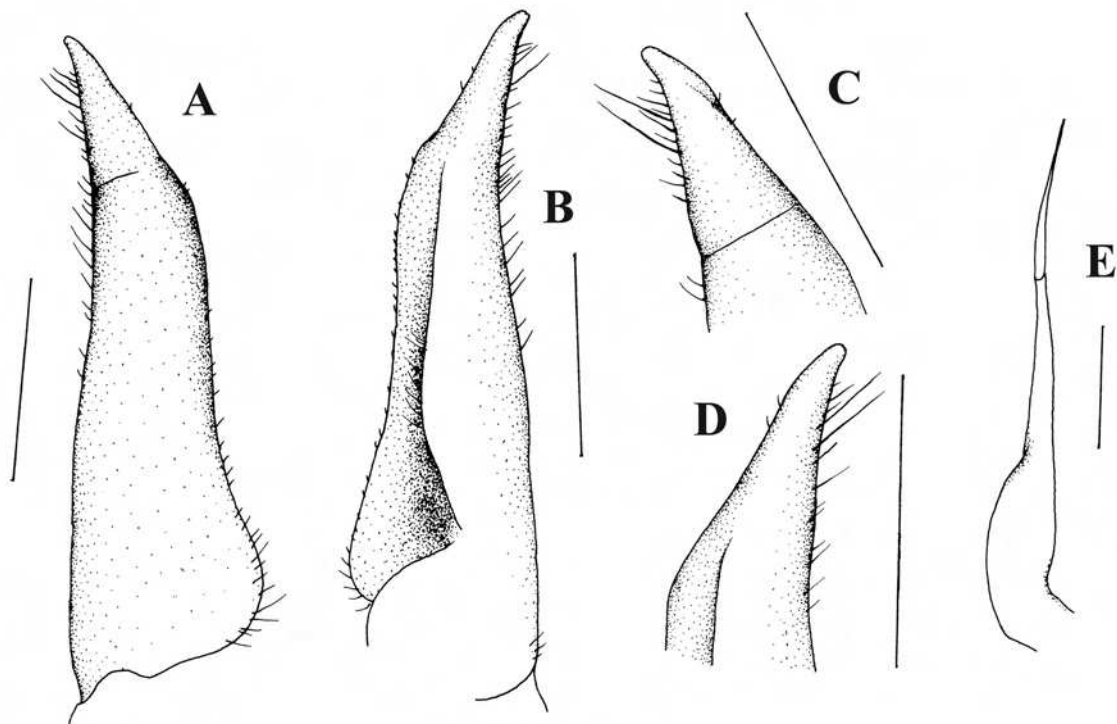


Fig. 43. *Vanni giri*, new species, holotype male (18.8 × 14.2 mm) (ZRC 2003.0271) (formerly WHT 10658): A, left G1 dorsal view; B, left G1 ventral view; C, left G1 terminal segment dorsal view; D, left G1 terminal segment ventral view; E, left G2 dorsal view. Scale bars = 1.0 mm.

Distribution. – The species is known only from the type locality between Munnar-Maraiyoor, on Munnar-Pollachchi, Kerala, southwestern India.

Vela, new genus

Type species. – *Vela virupa*, new species, by present designation.

Diagnosis. – Carapace very deep, dorsal surface distinctly convex in frontal and dorsal views; epistomal median lobe without a acute median tooth; postorbital cristae distinct, sharp, confluent with smooth epigastric cristae; anterolateral margin of carapace distinctly convex in dorsal view; external orbital angle broad; epibranchial tooth broad, small, blunt, distinct, cleft visible; dorsal margin of frontal median triangle distinct, no lateral walls; cervical grooves distinct; H-shaped groove distinct (Figs. 46A, B, 48A, B). Third maxilliped exopod with long flagellum. Suture between thoracic sternites 2–3 prominent, deep, not reaching lateral margins, suture between sternites 3–4 prominent, deep and reaching lateral margins (Figs. 45A, 46C, 47A, 48C). Male abdomen narrow, T-shaped; sixth segment distinctly long, longer than the tongue-shaped telson (Fig. 45B). G1 almost straight, with

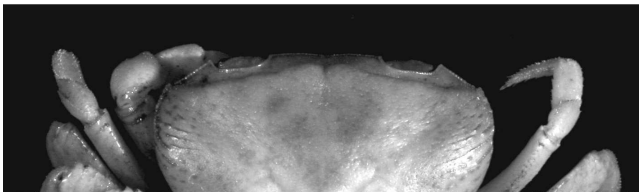


Fig. 44. *Vanni giri*, new species, holotype male (18.8 × 14.2 mm) (ZRC 2003.0271) (formerly WHT 10658): A, dorsal view; B, frontal view; C, ventral view.

long, cone-shaped terminal segment, ca. 0.45–0.50 times length of subterminal segment (Figs. 45C–E, 47B–E). G2 with long distal segment, ca. 0.4 times length of basal segment (Figs. 45F, 47F).

Etymology. – The genus name, *Vela*, means ‘rice field’ in Sinhala—a reference to the marshy habitat in which the type species was discovered. Gender feminine. Used as a noun in apposition.

Remarks. – *Vela*, new genus [type species: *Vela virupa*, new species], is distinguished from all other Indian genera by the following combination of characters: male abdomen very slender (especially sixth segment); sutures between thoracic sternites 3 and 4 demarcated by prominent deep grooves; and carapace relatively high and swollen; and G1 and G2 with long terminal segments. In addition to the type species, two other species are also included in this genus, namely *Vela pulvinata* (Alcock, 1909) and *Vela carli* (Roux, 1931). *Vela pulvinata* is included for completeness and because its type locality, Coorg district in Karnataka, is adjacent to northern Kerala and generally considered part of southern India.

Bott (1970b: 31) synonymised *Paratelphusa* (*Barytelphusa*) *pulvinata* Alcock, 1909, with *Barytelphusa* (*Barytelphusa*) *cunicularis* (Westwood, 1836) [type species of *Barytelphusa* Alcock, 1909]. However, Alcock (1910b: 86) already stated that *P. (B.) pulvinata* “...is at once distinguished from everything in this subgenus [*Paratelphusa* (*Barytelphusa*)] by the long, narrow, 6th abdominal segment of the adult male, and by the remarkable convexity of the carapace...”. In addition, *Vela* can be further separated from *Barytelphusa* Alcock, 1909 [= *Maydelliathelphusa* Bott, 1969] by its much higher, more convex carapace (vs. carapace lower and flatter); presence of distinct grooves demarcating suture between thoracic sternites 3 and 4 (vs. grooves absent); and much slenderer male abdomen (vs. male abdomen broader); long G2 distal segment (vs. G2 distal segment short or vestigial); and low, rounded epistomal posterior margin median tooth (vs. epistomal posterior margin median tooth sharp) (Figs. 2D, 3B, 45F, 46B, 47F, 48B, 49E, 50B; Westwood, in Sykes & Westwood, 1836: Fig. 1; Bott, 1970b: Pl. 2 Figs. 19, 20).

The swollen carapace and slender male abdomen of *Vela* superficially resembles that of *Gecarcinucus* [type species: *Gecarcinucus jacquemontii* H. Milne Edwards, 1844]. *Vela*, however, can be distinguished from *Gecarcinucus* by the male telson being proportionately shorter and stouter (vs. telson very long and slender) and sixth segment being slenderer (Figs. 45B, 46C, 50C) (vs. sixth segment distinctly broader); and the G1 with the terminal segment being straight and clearly demarcated from the subterminal segment (Figs. 45C, 47B, C, 49A, B, F, G) (vs. G1 with the terminal segment being twisted longitudinally and curved inwards distally and not demarcated from the subterminal segment) (unpublished data and see figs in Bott, 1970b: Pl. 2 fig. 16, Pl. 26 fig. 12).

Vela species have a convex dorsal carapace similar to *Baratha*. However, other external characters as well as G1 characters easily separate them (see Remarks for *Baratha*, new genus).

Ecological notes. – See under type species account.

Distribution. – Known from southwestern Indian states of Kerala and Karnataka.

Key to the species of *Vela*

1. Carapace relatively higher in frontal view; cervical grooves deep; frontal margin distinctly sinuous; epistome with lateral and outer parts of posterior margin forming continuous sinuous margin, with lateral parts convex and outer parts almost straight. Sixth male abdominal segment with lateral margins gently diverging distally. Tip of G1 slightly but distinctly curved (Figs. 49, 50) *Vela pulvinata*
- Carapace relatively lower in frontal view; cervical grooves shallow; frontal margin almost straight; epistome with lateral and outer parts of posterior margin forming almost straight margin. Sixth male abdominal segment with lateral margins gently converging distally. Tip of G1 straight 2
2. G1 with cone-shaped terminal segment (Fig. 45C–E) *Vela virupa*, new species
- G1 with basal two-thirds of terminal segment stouter, and distal one-third cylindrical (Fig. 47C–E) *Vela carli*

***Vela virupa*, new species**

(Figs. 45, 46)

Material examined. – Holotype, male (27.0 × 19.3 mm) (ZRC 2003.0236) (formerly WHT 10696), between Kumerly-Munnar, Kerala, India, 09°42'26.4"N 77°09'40.2"E, alt. 1,140 m.

Paratypes – 1 male (18.4 × 13.4 mm) (WHT 10691), 1 male (18.0 × 13.4 mm) (WHT 10692), 1 male (16.9 × 12.7 mm) (WHT 10693), 1 female (16.1 × 12.1 mm) (WHT 10695), 1 female (16.0 × 12.1 mm) (WHT 10694), same data as holotype; 1 male (18.3 × 13.1 mm) (WHT 10688), 1 female (17.9 × 13.8 mm) (WHT 10689), 1 male (13.8 × 10.6 mm) (WHT 10690), near Perumedu, between Perumedu-Kumerly, Kerala, India, 09°34'44.8"N 77°02'47.2"E, alt. 1,050 m.

Diagnosis. – Carapace deep, dorsal surface highly convex in dorsal and frontal views, smooth except postorbital, epigastric cristae and lateral margins; postorbital cristae distinct, external half sharper, strong, reaches epigastric cristae; epibranchial tooth small, blunt, distinct, cleft visible; cervical grooves and H-shaped groove distinct; external orbital angle outer margin longer than inner margin (Fig. 46A, B). Suture between male thoracic sternites 2–3 prominent, deep, not reaching lateral margins, suture between sternites 3–4 prominent, deep, reaching lateral margins (Figs. 45A, 46C). Male abdomen T-shaped; sixth segment very long, longer than broad and longer than telson, lateral margins gently converging distally; telson narrow, long (Figs. 45B, 46C). G1 almost straight, with narrowly long, cone-shaped terminal segment, ca. 0.4 times length of subterminal segment with inner margin of G1 smoothly but characteristically curved or angled just below juncture between terminal and subterminal segments (Fig. 45C–E). G2 with relatively long distal segment, ca. 0.4 times length of basal segment (Fig. 45F).

Description. – Carapace deep, broader than long, dorsal surface highly convex; dorsal surface of carapace smooth

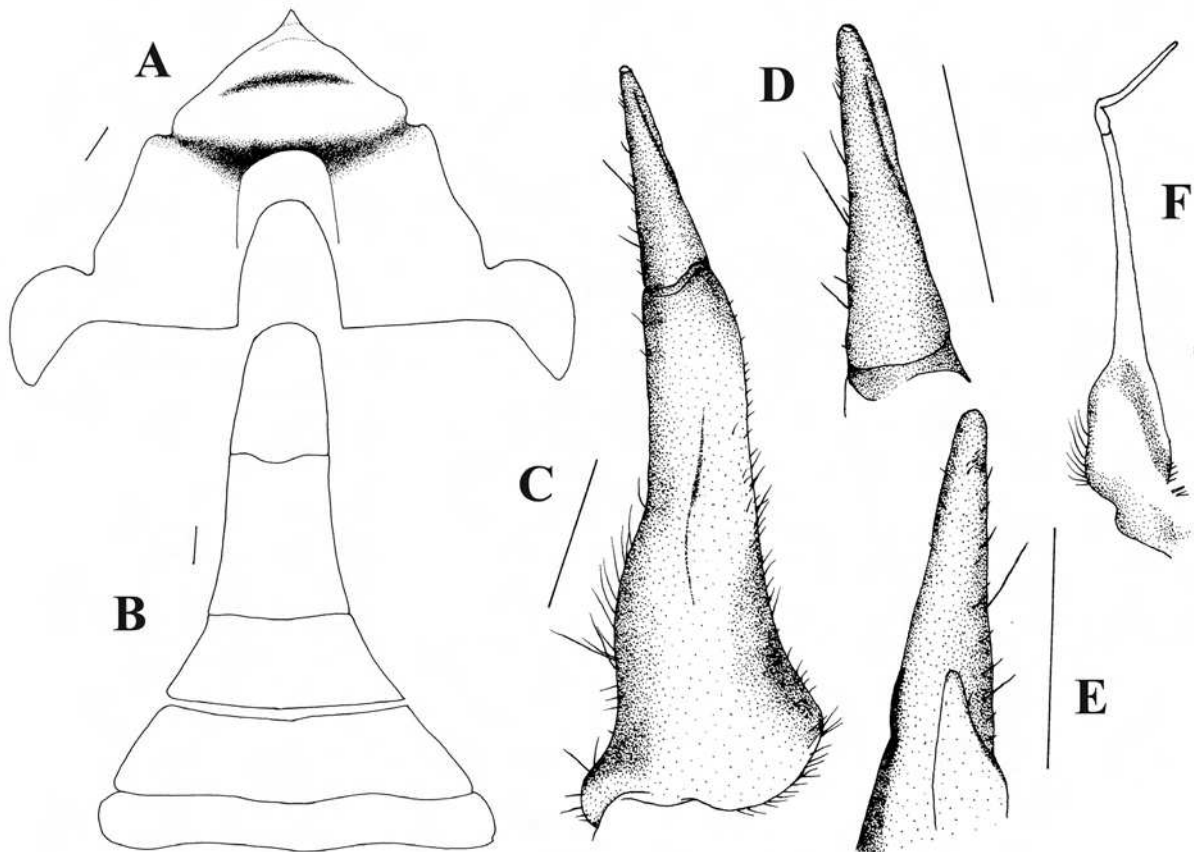


Fig. 45. *Vela virupa*, new species; new species, holotype male (27.0 × 19.3 mm) (ZRC 2003.0236) (formerly WHT 10696): A, anterior male thoracic sternites; B, male abdomen; C, left G1 dorsal view; D, left G1 terminal segment dorsal view; E, left G1 terminal segment ventral view; F, left G2 dorsal view. Scale bars = 1.0 mm.

except postorbital cristae, and lateral margins; postorbital and epigastric cristae well-developed, confluent; epigastric cristae smooth, raised; external half of postorbital cristae sharper; epigastric groove narrow, weakly bifurcate; external orbital angle broadly triangular, with convex long outer margin; epibranchial tooth distinct, blunt, small, separated from external orbital angle by distinct cleft; postorbital region distinctly concave; cervical grooves distinct; H-shaped groove visible; branchial region with striae throughout adjacent to lateral margins; frontal margin with cristate dorsal margin (Fig. 46A, B).

Third maxilliped ischium rectangular, with indistinct sulcus; exopod reaching mid length of merus, with long, well-developed flagellum.

Chelae distinctly unequal in large males, gaping when fingers closed. Major tooth of chelipedal carpus large with smooth outer margin.

Suture between anterior male thoracic sternites 2–3 prominent, deep as a broad groove not reaching lateral margins, suture between sternites 3–4 distinct, deep and reaching lateral margins (Figs. 45A, 46C).

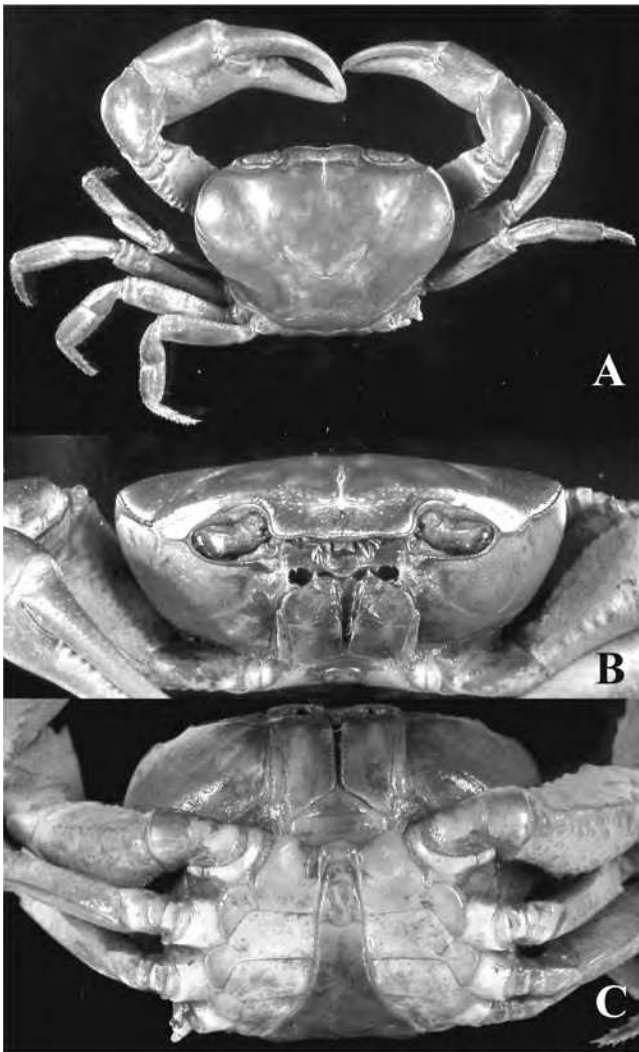


Fig. 46. *Vela virupa*, new species, holotype male (27.0 × 19.3 mm) (ZRC 2003.0236) (formerly WHT 10696): A, dorsal view; B, frontal view; C, ventral view.

Male abdomen T-shaped in large males; sixth segment distinctly longer than broad and longer than telson, lateral margins gently converging distally, telson distinctly longer than broad (Figs. 45B, 46C).

G1 straight, with long, cone-shaped terminal segment, ca. 0.4 times length of subterminal segment; inner margin characteristically curved or angled just below juncture between terminal and subterminal segment (Fig. 45C–E). G2 with long distal segment, ca. 0.4 times length of basal segment (Fig. 45F).

Etymology. – The specific epithet, *virupa*, is the Sanskrit word for ‘ugly’, alluding to the plain brownish colour of this species. Used as a noun in apposition.

Remarks. – *Vela virupa* most closely resembles *V. carli* but differs in the following external morphological characters: postorbital cristae appearing concave in dorsal view (vs. straight); epibranchial tooth comparatively sharp and large, with cleft visible in dorsal view (vs. blunt, small and cleft indiscernible in dorsal view); sutures between male anterior thoracic sternites very deep (vs. comparatively shallow); and G1 terminal segment cone-shaped (vs. basal two-thirds of G1 terminal segment distinctly stouter than the clearly cylindrical distal part) (Figs. 45A, C–E, 46A, 47A–E, 48A).

Ecological notes. – Specimens were obtained from deep burrows along a paddy field bund between Kumerly-Munnar at 1,140 m altitude, as well as from deep burrows in a muddy stream margin near Perumedu, between Perumedu-Kumerly, Kerala, India, at 1,050 m altitude.

Distribution. – The species is known only from two localities in Kerala, southwestern India: between Kumerly-Munnar and near Perumedu, between Perumedu-Kumerly.

***Vela carli* (Roux, 1931)**

(Figs. 47, 48)

Paratelphusa (*Barytelphusa*) *carli* Roux, 1931: 50, Figs. 12, 13.
Travancoriana carli – Bott, 1970a: 336; 1970b: 43, Pl. 5 figs. 48–50, Pl. 26 fig. 23.

Material examined. – Lectotype, male (29.9 × 20.7 mm) (MGE), Mudumalai, Nilgiris, coll. J. Carl.

Paralectotype – female (23.0 × 15.6 mm) (MGE), same data as lectotype.

Diagnosis. – Carapace deep, dorsal surface highly convex, smooth except postorbital cristae and lateral margins; postorbital cristae distinct, fused with epigastric cristae; epibranchial tooth small, blunt, distinct, cleft visible; cervical grooves shallow; H-shaped groove distinct; external orbital angle outer margin ca. 2 times length of inner margin (Fig. 48A, B). Suture between anterior male thoracic sternites 2–3 prominent, deep, not reaching lateral margins, suture between sternites 3–4 prominent, deep, reaching lateral margins (Figs. 47A, 48C). Male abdomen T-shaped; sixth

segment very long, longer than broad and longer than telson, lateral margins gently converging distally; telson narrow, long (Roux, 1931: Fig. 13). G1 almost straight, with long, cone-shaped terminal segment, ca. 0.4 times length of subterminal segment with slender distal part; inner margin of G1 characteristically curved or angled just below juncture between terminal and subterminal segments (Fig. 47B–E). G2 with relatively long distal segment, ca. 0.4 times length of basal segment (Fig. 47F).

Remarks. – Bott (1970a, b) assigned *Paratelphusa* (*Barytelphusa*) *carli* Roux, 1931, to *Travancoriana* Bott, 1969 [type species: *Travancoriana schirnerae* Bott, 1969]. However, the generic characters of *Vela* clearly distinguish *P. (B.) carli* from *Travancoriana* sensu stricto, viz., the male abdomen being very slender (vs. male abdomen broader); carapace being relatively high and swollen (vs. carapace relatively low and flat) (Figs. 7D, 8A, B, 10A, B, 13A, B, 15A, B, 16D, 17A, B, 46A, B, 48A, B; Roux, 1931: Fig. 13).

Vela carli is most likely confused with *V. virupa*. They can nevertheless be separated by a combination of carapace and G1 characters (see Remarks for *Vela virupa*).

Ecological notes. – Ecology not known.

Distribution. – The species is known only from the type locality, Mudumalai, Nilgiris, Kerala, southwestern India.

***Vela pulvinata* (Alcock, 1909)**
(Figs. 49, 50)

Paratelphusa (*Barytelphusa*) *pulvinata* Alcock, 1909b: 376, 1910b: 86, Fig. 21.

Barytelphusa (*Barytelphusa*) *cunicularis* – Bott, 1970b: 31 (part) (not *Thelphusa cunicularis* Westwood, 1836).

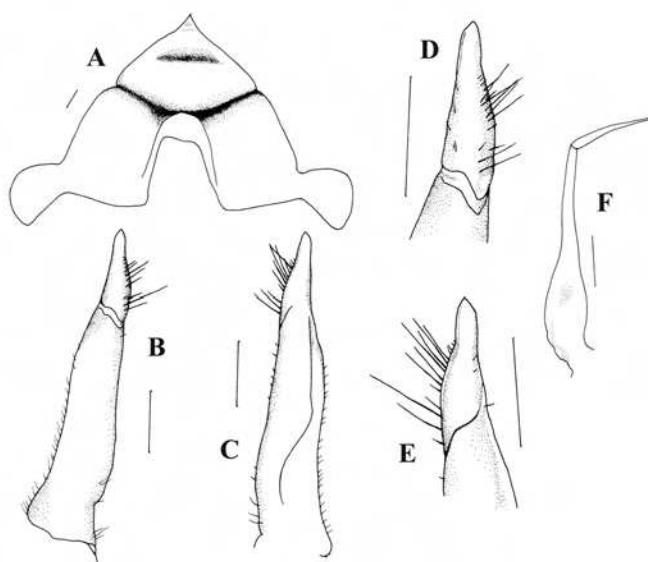


Fig. 47. *Vela carli* (Roux, 1931), lectotype male (29.9 × 20.7 mm) (MGE): A, anterior male thoracic sternites; B, right G1 dorsal view; C, right G1 ventral view; D, right G1 terminal segment dorsal view; E, right G1 terminal segment ventral view; F, right G2 dorsal view. Scale bars = 1.0 mm.

Material examined. – Lectotype, male (41.8 × 29.9 mm) (NHM 1909.10.13.3), Coorg, presented by Indian Museum.

Paralectotypes – 3 males (largest 43.0 × 30.4 mm), 1 female (32.9 × 24.4 mm) (ZSI 6419/3), Coorg, coll. G. L. Hadfield.

Diagnosis. – Carapace deep, dorsal surface highly convex, smooth except postorbital cristae and lateral margins; postorbital cristae distinct, fused with epigastric cristae; epibranchial tooth small, blunt, distinct, cleft visible; cervical grooves deep; H-shaped groove distinct; external orbital angle outer margin ca. 2 times length of inner margin (Fig. 50A, B). Suture between anterior male thoracic sternites 2–3 prominent, deep, not reaching lateral margins, suture between sternites 3–4 prominent, deep, reaching lateral margins (Fig. 50B, C). Male abdomen T-shaped; sixth segment very long, longer than broad and longer than telson, lateral margins gently diverging distally; telson narrow, long (Fig. 50C). G1 almost straight, with long, cone-shaped terminal segment, ca. 0.4 times length of subterminal segment with slender distal part, tip slightly but distinctly curved; inner margin of G1 characteristically curved or angled just below juncture

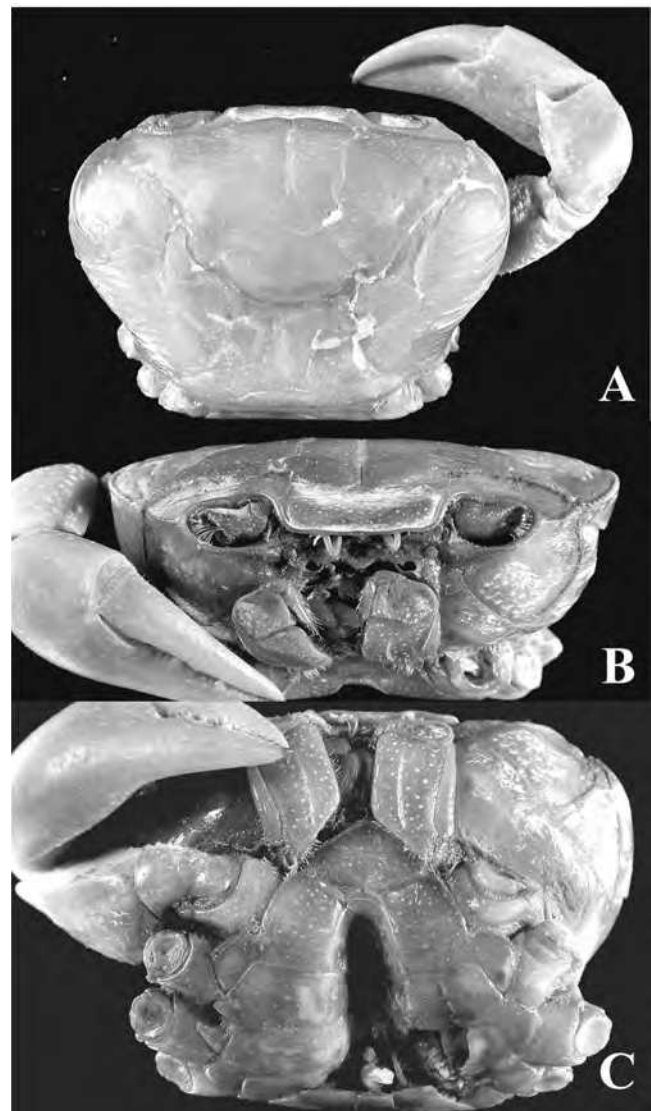


Fig. 48. *Vela carli* (Roux, 1931), lectotype male (29.9 × 20.7 mm) (MGE): A, dorsal view; B, frontal view; C, ventral view.

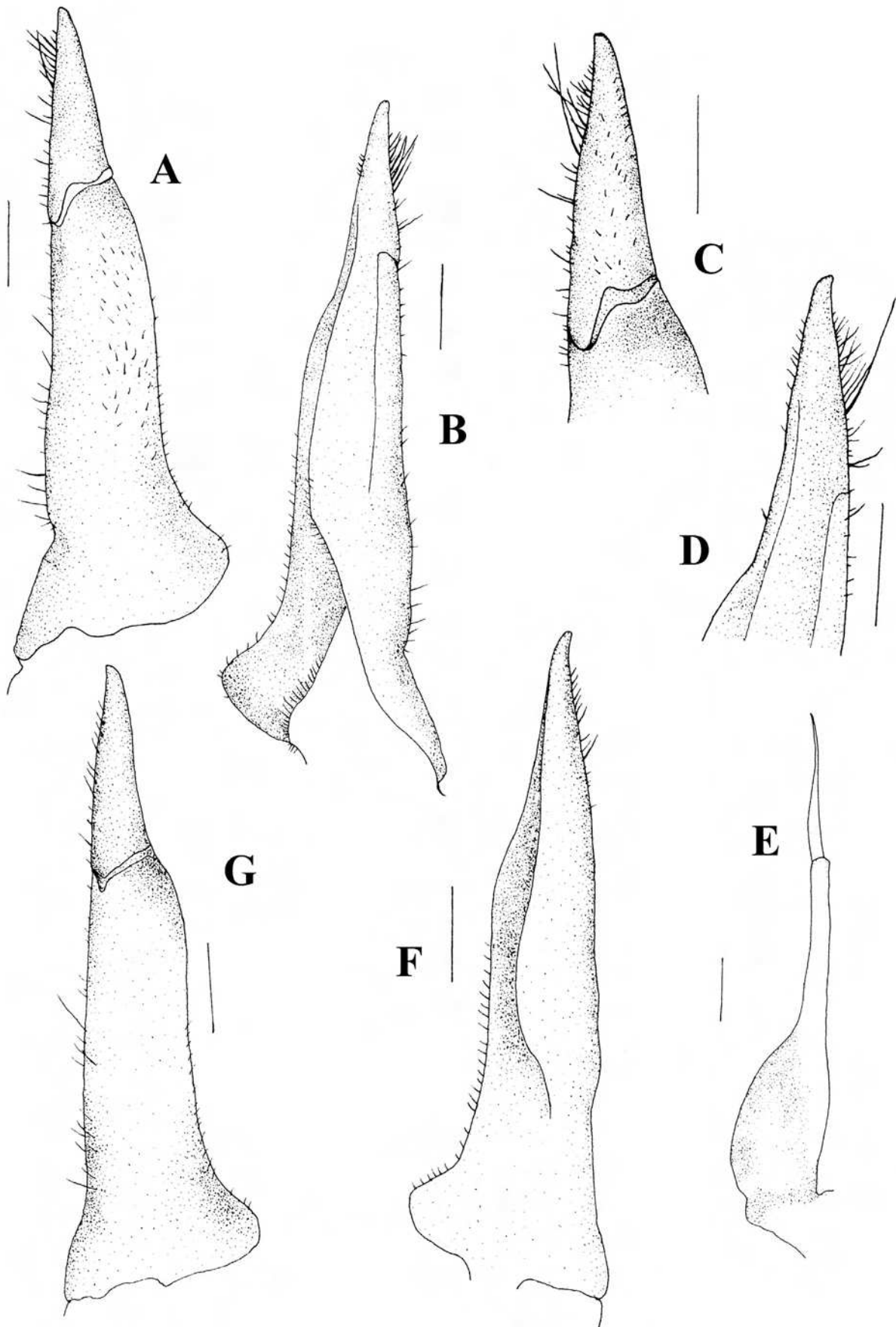


Fig. 49. *Vela pulvinata* (Alcock, 1909): A–E: lectotype male (41.8 × 29.9 mm) (NHM 1909.10.13.3), F, G: paralectotype male (43.0 × 30.4 mm) (ZSI 6419/3). A, G, left G1 dorsal view; B, F, left G1 ventral view; C, left G1 terminal segment dorsal view; D, left G1 terminal segment ventral view; E, left G2 dorsal view. Scale bars = 1.0 mm.

between terminal and subterminal segments (Fig. 49A, B, F, G). G2 with relatively long distal segment, ca. 0.4 times length of basal segment (Fig. 49E).

Remarks. – In the present study, in addition to type material of *Vela pulvinata* from ZSI, we examined a male specimen (41.8 × 29.9 mm), also collected from “Coorg” in the NHM (catalogue number 1909.10.13.3) (Figs. 49A–E, 50) but labelled as a type of *Barytelphusa* (*Barytelphusa*) *cunicularis*. We found that it was wrongly labelled, in accordance with Bott (1970b), and is actually a type specimen of *P. (B.) pulvinata*. The specimen matches the present ZSI type specimens as well as Alcock’s (1909b: 376, 1910b: 86, Fig. 21) description and illustration of *P. (B.) pulvinata* perfectly, and clearly differs from *B. (B.) cunicularis* by characters mentioned in the genus Remarks for *Vela* (see earlier). Further, Coorg is the type locality of *P. (B.) pulvinata*, not *B. (B.) cunicularis*. This justifies recognition of *P. (B.) pulvinata* as a valid species. To prevent further confusion, the male type specimen (41.8 × 29.9 mm; NHM 1909.10.13.3; from “Coorg”) that we have examined and illustrated (Figs. 49A–E, 50) is designated here as the lectotype of *Paratelphusa* (*Barytelphusa*) *pulvinata* Alcock, 1909.

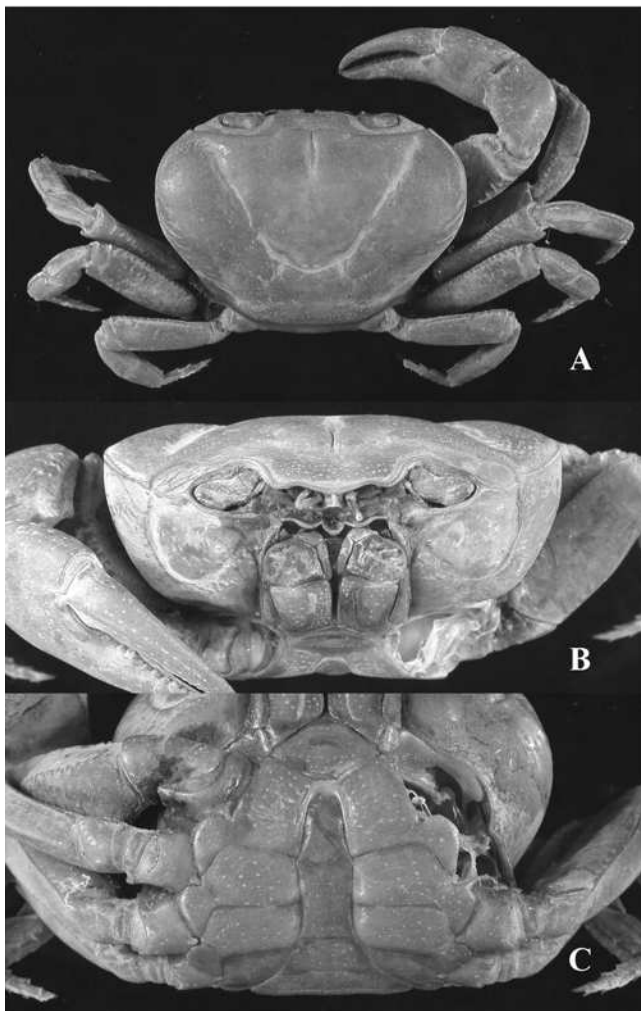


Fig. 50. *Vela pulvinata* (Alcock, 1909), lectotype male (41.8 × 29.9 mm) (NHM 1909.10.13.3): A, dorsal view; B, frontal view; C, ventral view.

Bott (1970b: 31, 32) had, based on a male *Paratelphusa* (*Barytelphusa*) *pulvinata* specimen from ZSI, regarded the species, as being conspecific with *Barytelphusa* (*Barytelphusa*) *cunicularis* (Westwood, 1836), but provided no further explanation despite their very different external appearances (see Westwood, in Sykes & Westwood, 1836: Fig. 1; Alcock, 1910b: Fig. 21; Bott, 1970b: Pl. 2 fig. 19). These differences have already been discussed in the genus Remarks for *Vela* (see earlier).

Vela pulvinata possesses the diagnostic features of the genus and is easily distinguished from its congeners (*V. virupa* and *V. carli*) by its higher carapace with deeper cervical grooves (vs. lower carapace with shallow cervical grooves); distinctly sinuous frontal margin (vs. frontal margin almost straight); epistome with lateral and outer parts of posterior margin forming continuous sinuous margin, with lateral parts convex and outer parts almost straight (vs. epistome posterior margin with almost straight lateral and outer parts); sixth male abdominal segment with lateral margins gently diverging distally (vs. margins gently converging posteriorly); and distinctly curved tip of the G1 (versus G1 tip straight) (Figs. 45–50).

Ecological notes. – Ecology not known.

Distribution. – The species is known only from the type locality, Coorg, Karnataka, which is adjacent to northern Kerala, southwestern India.

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LITERATURE CITED

- Alcock, A., 1909a. Diagnoses of new species and varieties of freshwater crabs. Nos. 1–3. *Records of the Indian Museum*, **3**: 243–252.
- Alcock, A., 1909b. Diagnoses of new species and varieties of freshwater crabs. No. 4. *Records of the Indian Museum*, **3**: 375–381.
- Alcock, A., 1910a. On the classification of the Potamonidae (Telphusidae). *Records of the Indian Museum*, **5**: 252–261.

- Alcock, A., 1910b. *Brachyura I. Fasc. II. The Indian Freshwater Crabs - Potamonidae. Catalogue of the Indian Decapod Crustacea in the collection of the Indian Museum*. Calcutta, pp. 1–135, Pls. 1–14.
- Bahir, M. M., 1998. Three new species of montane crabs of the genus *Perbrinckia* (Crustacea, Parathelphusidae) from the central mountains of Sri Lanka. *Journal of South Asian Natural History*, **3**: 197–212.
- Bahir, M. M., 1999. Description of three new species of freshwater crabs (Crustacea: Decapoda: Brachyura: Parathelphusidae: *Ceylonthelphusa*) from the southwestern rain forests of Sri Lanka. *Journal of South Asian Natural History*, **4**: 117–132.
- Bahir, M. M. & P. K. L. Ng, 2005. Descriptions of ten new species of freshwater crabs (Crustacea: Decapoda: Parathelphusidae: *Ceylonthelphusa*, *Mahatha*, *Perbrinckia*) from Sri Lanka. In: Yeo, D. C. J., P. K. L. Ng & R. Pethiyagoda (eds.), Contributions to biodiversity exploration and research in Sri Lanka. *The Raffles Bulletin of Zoology*, Supplement No. **12**: 47–76.
- Bahir, M. M., P. K. L. Ng, K. Crandall & R. Pethiyagoda, 2005. A conservation assessment of the freshwater crabs of Sri Lanka. In: Yeo, D. C. J., P. K. L. Ng & R. Pethiyagoda (eds.), Contributions to biodiversity exploration and research in Sri Lanka. *The Raffles Bulletin of Zoology*, Supplement No. **12**: 121–126.
- Bahir, M. M. & D. C. J. Yeo, 2005. A revision of the genus *Oziotelphusa* Müller, 1887 (Crustacea: Decapoda: Parathelphusidae), with description of eight new species. In: Yeo, D. C. J., P. K. L. Ng, and R. Pethiyagoda (eds.), Contributions to biodiversity exploration and research in Sri Lanka. *The Raffles Bulletin of Zoology*, Supplement No. **12**: 77–120.
- Balss, H., 1937. Potamoniden (Dekapoda Brachyura) der Philippinen und des Malayischen Archipels. *Internationale Revue Gesellschaft Hydrobiologie und Hydrographie*, **34**(3–5): 143–187.
- Balss, H., 1957. Decapoda, VIII: Systematik. In: Bronn, H. G. (ed.), *Klassen und Ordnungen des Tierreichs*. Band 5, Abteilung 1, **7**(12): 1505–1672.
- Bossuyt, F., M. Meegaskumbura, N. Baenerts, D. J. Gower, R. Pethiyagoda, K. Roelants, A. Mannaert, M. Wilkinson, M. M. Bahir, K. Manamendra-Arachchi, P. K. L. Ng, C. J. Schneider, O. van Oomen & M. C. Milinkovitch, 2004. Local endemism within the Western Ghats–Sri Lanka Biodiversity Hotspot. *Science*, **306**: 479–481.
- Bott, R., 1969. Fließkrabben aus Asien und ihre Klassifikation. (Crustacea, Decapoda). *Senckenbergiana biologica*, Frankfurt, **50**(5/6): 359–366.
- Bott, R., 1970a. Betrachtungen über Entwicklungsgeschichte und Verbreitung der Süßwasserkrabben nach der Sammlung des Naturhistorischen Museums in Genf/Schweiz. *Revue Suisse de Zoologie*, **77**(2): 327–344, Pls. 1, 2, Maps 1, 2.
- Bott, R., 1970b. Die Süßwasserkrabben von Europa, Asien, Australien und ihre Stammesgeschichte. Eine Revision der Potamoidea und Parathelphusoidea (Crustacea, Decapoda). *Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft*, Frankfurt, **526**: 1–338, Pls. 1–58.
- Chace, F. A., Jr., 1942. III. Decapod Crustacea. In: Scientific results of a fourth expedition to forested areas in east Africa. *Bulletin of the Museum of Comparative Zoology, Harvard College*, **91**(3): 185–233.
- Chuensri, C., 1974. *Key to freshwater crabs (excluded Pseudothelphusidae and Potamocarcinidae)*. College of Fisheries, Kasetsart University, 52pp.
- Colosi, G., 1920. I Potamonidi del R. Museo Zoologico di Torino. *Bollettino dei Musei di Zoologia ed Anatomia comparata*, R. Università di Torino, **35**(734): 1–39.
- Henderson, J. R., 1893. A contribution to Indian carcinology. *Transactions of the Linnean Society of London (Zoology)*, ser. 2. **5**: 325–458.
- Henderson, J. R., 1912. Description of a new species of freshwater crab from southern India. *Records of Indian Museum*, **7**(11): 111–112.
- Henderson, J. R., 1913. A new variety of freshwater crab from Travancore. *Records of the Indian Museum*, **9**(2): 47–49.
- Dutta, S. K., 1997. *Amphibians of India and Sri Lanka (Checklist and bibliography)*. Bhubaneswar, Odyssey Publishing House. 342 pp.
- Kingsley, J. S., 1880. Carcinological notes No. 1. *Proceedings of the Academy of Natural Science of Philadelphia*, **1880**: 34–37.
- Man, J. G. De, 1898. Viaggio di Leonardo Fea in Birmania e regioni vicine. *Annali del Museo Civico Storia natura Genova*, (2)**19**: 284–440.
- Milne Edwards, H., 1844. In: Jacquemont, V., *Voyage dans l'Inde 1828–1832*, **4**. Zoologie, Crustacés: 4.
- Milne Edwards, H., 1853. Mémoire sur la Famille des Ocypodiens. *Annales des Sciences naturelles, Zoologie*, (3)**20**: 163–228, Pls. 6–11.
- Ng, P. K. L., 1988. *The Freshwater Crabs of Peninsular Malaysia and Singapore*. Dept. Zool., National University of Singapore, Shinglee Press, Singapore, pp. i–viii, 1–156, Figs. 1–63, 4 colour plates.
- Ng, P. K. L., 1994. A note on the freshwater crabs of the genus *Spiralothelphusa* Bott 1968 (Crustacea; Decapoda; Brachyura; Parathelphusidae), with description of a new species from Sri Lanka. *Journal of South Asian Natural History*, **1**: 27–30.
- Ng, P. K. L., 1995a. A revision of the Sri Lankan montane crabs of the genus *Perbrinckia* Bott, 1969 (Crustacea: Decapoda: Brachyura: Parathelphusidae). *Journal of South Asian Natural History*, **1**: 129–174.
- Ng, P. K. L., 1995b. *Ceylonthelphusa scansor*, a new species of tree-climbing crab from Sinharaja Forest in Sri Lanka (Crustacea: Decapoda: Brachyura: Parathelphusidae). *Journal of South Asian Natural History*, **1**: 175–184.
- Ng, P. K. L. & F. W. M. Tay, 2001. The freshwater crabs of Sri Lanka (Decapoda: Brachyura: Parathelphusidae). *Zeylanica*, **6**(2): 113–199.
- Ortmann, A., 1896. Das system der Decapoden-Krebse. *Zoologische Jahrbucher (Systematic)*, **9**: 409–453.
- Rathbun, M. J., 1904. Les crabes d'eau douce. *Nouvelles Archives du Muséum d'Histoire naturelle*, Paris, (4)**6**: 225–312, Pls. 9–18.
- Rathbun, M. J., 1905. Les crabes d'eau douce. *Nouvelles Archives du Muséum d'Histoire naturelle*, Paris, (4)**7**: 159–323, Pls. 13–22.
- Rathbun, M. J., 1906. Les crabes d'eau douce. *Nouvelles Archives du Muséum d'Histoire naturelle*, Paris, (4)**8**: 30–122.
- Roux, J., 1931. Crustacés Décapodes d'eau douce de l'Inde méridionale. *Revue Suisse de Zoologie*, **38**: 31–62.

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- Srivastava, O. P., 2005. Freshwater crabs (Potamonids) in the collection of the southern regional station, Zoological Survey of India, Chennai. *Records of the Zoological Survey of India*, **104**: 115–122.
- Sykes, W. H. & J. O. Westwood, 1836. Some Account of the Land-crabs of the Dukhun; by Lieut.-Col. W. H. Sykes. With a Description of the Species, by J. O. Westwood. *Transactions of the Entomological Society of London*, **1**: 183–184, Pl. 19.
- Wood-Mason, J., 1871. Contribution to Indian carcinology. *Journal of the Asiatic Society of Bengal*, **40**(2): 189–207, 449–454, Pls. 11–14, 27.
- Zehntner, L., 1894. Crustacés de l'Archipel Malais. *Revue Suisse de Zoologie*, **2**: 135–214.