

# Bornean freshwater crabs of the genus *Arachnothelphusa* gen. nov. (Crustacea: Decapoda: Brachyura: Gecarcinucidae)

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Ng, P. K. L. Bornean freshwater crabs of the genus *Arachnothelphusa* gen. nov. (Crustacea: Decapoda: Brachyura: Gecarcinucidae).

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A new genus, *Arachnothelphusa* gen. nov., is established for five species of Bornean freshwater crabs (Gecarcinucidae) previously placed in *Thelphusula* Bott, 1969. One species from Sabah, *A. terrapes*, is here described as new. The genus is characterised by its long ambulatory legs, shape of the carapace and structure of the male pleopods.

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## Introduction

Ng & Goh (1987: 326), in describing a new cavernicolous freshwater crab species, *Thelphusula rhadamanthysi*, from Sabah, Borneo, commented that the genus *Thelphusula* Bott, 1969, is probably heterogeneous in composition. They noted that it could easily be divided into three groups on the basis of carapace shape, length of ambulatory legs, and male first and second pleopod structures.

One group, *Thelphusula* sensu stricto was "... characterised by its rather squarish carapace, almost undiscernible epibranchial tooth, straight (parallel) posterolateral margins, having ambulatory legs of normal length, a slender, sinuous G1 [male first pleopod] with a relatively long and cylindrical terminal segment, and a G2 [male second pleopod] with a short flagellum". The second group "... can be distinguished by its distinctly convex anterolateral margins, convergent posterolateral margins, long legs, especially the meri which have their margins smooth, a slender and sinuous G1 in which the terminal segment is cylindrical, and a G2 with a short flagellum". The third group is characterised by its "... squarish carapace, convex surfaces, broad external orbital angles, indistinct epibranchial tooth, elongated meri of the chelipeds, extremely long legs (much longer than even those of the second group) which have the dorsal margins of the meri gently serrated, a stout G1 which has a short, stout and cone-shaped terminal segment, and a G2 with a long flagellum". The two new groups, however, were not formally named as new taxa, but more recently the name *Stygothelphusa* was established by Ng (1989b: 63) for the long-legged Sarawakian species *Potamon (Thelphusa) bidiense* Lanchester, 1900 (Ng & Goh's third group). Two other papers (Ng, 1989a; Ng & Stuebing, 1990) have also commented on the possible trichotomy of the genus *Thelphusula* sensu lato. To facilitate future studies on the Bornean gecarcinucoids, a name is formally proposed in this paper for the unnamed second group of Ng & Goh, viz., *Arachnothelphusa* gen. nov. In addition a

partial revision of this genus is attempted.

All measurements are in millimetres, and are of the carapace width and length respectively. The terminology essentially follows that used by Ng (1988). The specimens discussed here are deposited in the Nationaal Natuurhistorisch Museum (Rijksmuseum van Natuurlijke Historie), Leiden, The Netherlands (RMNH); Zoological Reference Collection, National University of Singapore, Singapore (ZRC); Senckenberg Museum, Frankfurt, Germany (SMF), and the University of Turin Museum, Turin, Italy (MUT).

### Descriptive part

Family Gecarcinucidae Rathbun, 1904  
Genus *Arachnothelphusa* gen. nov.

*Thelphusula* Bott, 1970: 58 (part).

Type-species: *Potamon (Potamon) melanippe* De Man, 1899.

Diagnosis.— Carapace transverse; surface slightly convex. Meri of chelipeds not distinctly elongated. Ambulatory legs long, especially merus, subequal to length of carapace; dorsal margins of meri smooth. G1 slender, sinuous; terminal segment cylindrical, tapered, about one third of total length of G1, G2 with distal segment less than one quarter of length of basal segment.

Etymology.— The generic name is derived from “Arachne” (Greek for spider), alluding to the long spider-like legs of members of the genus, together with the name “*Thelphusa*”.

Distribution.— Borneo (western Kalimantan, Sabah, Sarawak).

Remarks.— As discussed earlier, *Arachnothelphusa* gen. nov. is established for several Bornean species previously classified by Bott (1970: 58) in the genus *Thelphusula* Bott, 1969, viz.: *T. melanippe* (De Man, 1899), *T. kadamaiana* (Borradaile, 1900), and the recently described *T. rhadamanthysi* (Ng & Goh, 1987). Another poorly known species, *Parathelphusa (Liotelphusa) nobilii* Colosi, 1920 - incorrectly synonymised with *Thelphusula melanippe buergeri* De Man, 1899, by Bott (1970: 61) - also appears to belong to *Arachnothelphusa*, and the same holds for the new species recently obtained from Sabah.

Very little is known about the biology of members of the genus, except for the brief comments made by Chapman (in Ng & Goh, 1987: 326) for *A. rhadamanthysi* and observations made by Drs S.C. Choy and H.K. Voris of *A. terrapes* spec. nov. (see later). Most species have semiterrestrial habits and seem adapted to a cursorial life-style, as suggested by their long ambulatory legs.

### Key to the species of the genus *Arachnothelphusa*

1. External orbital angle separated from epibranchial tooth by a deep, broad cleft. Tip of G1 distinctly upcurved; (Sabah) ..... *A. terrapes*

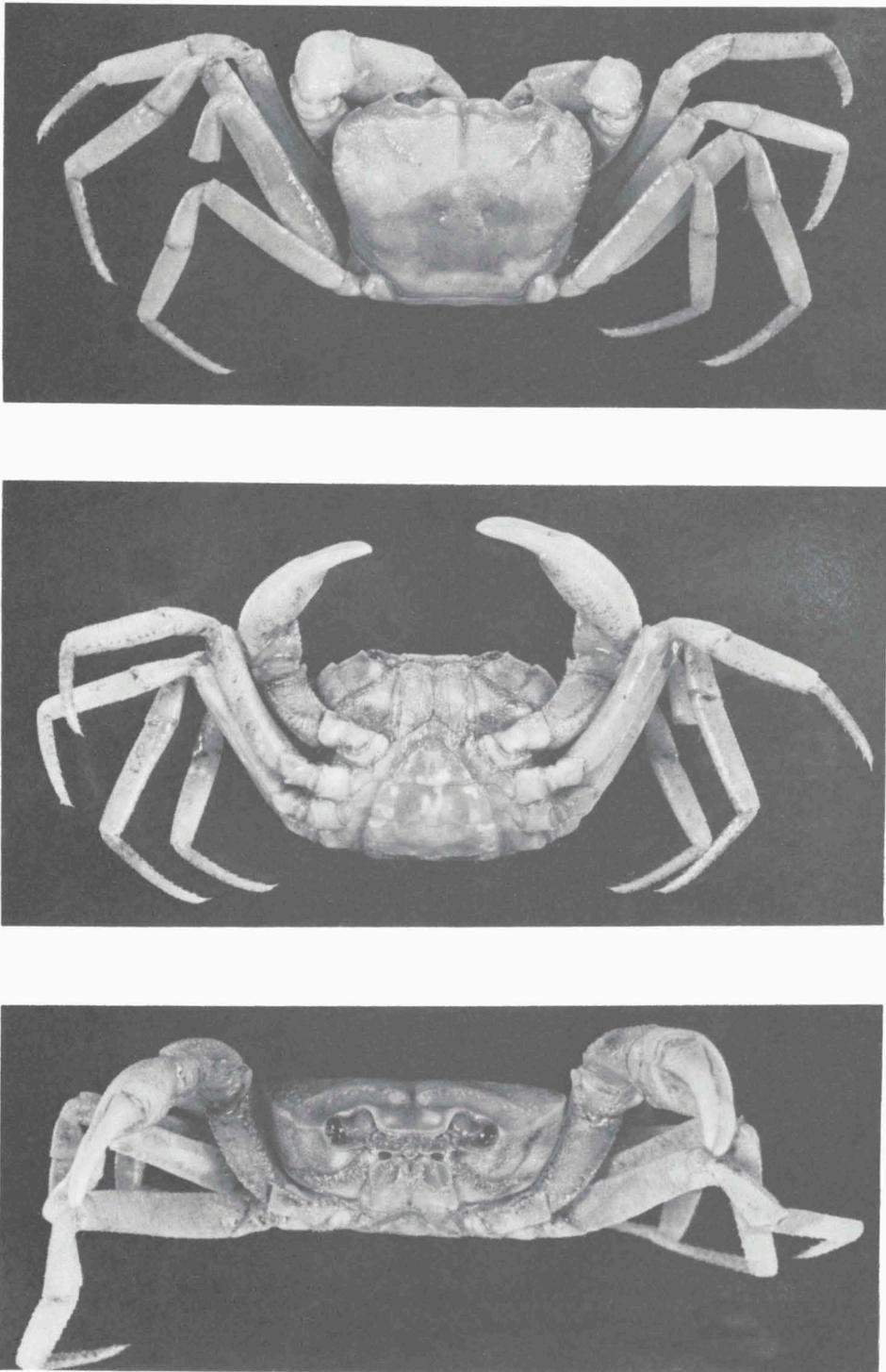


Fig. 1. *Arachnothelphusa melanippe* (De Man, 1899). Paratype, ♀ (RMNH D1303b), Mt. Liang Koebeng, Kalimantan, Borneo, 21.4 by 16.7 mm.

- External orbital angle separated from epibranchial tooth by narrow cleft; sometimes almost confluent. Tip of G1 not upcurved ..... 2
- 2. Carapace smooth, much inflated; branchial regions swollen; outer margin of external orbital angle slightly convex; (Sabah) ..... *A. rhadamanthysi*
- Carapace slightly to distinctly rugose; surface and branchial regions convex but not distinctly inflated; outer margin of external orbital angle straight or slightly concave; (Sarawak, Sabah, Kalimantan) ..... 3
- 3. Outer margin of external orbital angle smooth; epibranchial tooth well developed, sharp; (central Borneo) ..... *A. melanippe*
- Outer margin of external orbital angle serrate; epibranchial tooth low or acutely triangular; (Sarawak, Sabah) ..... 4
- 4. Epibranchial tooth very low, blunt, almost confluent with external orbital angle. G1 very slender; (Sabah) ..... *A. kadamaiana*
- Epibranchial tooth acutely triangular. G1 not known; (Sarawak) ..... *A. nobilii*

***Arachnothelphusa melanippe* (De Man, 1899)**  
(figs. 1, 2)

*Potamon (Potamon) melanippe* De Man, 1899: 105, pl. 9 fig. 11; Rathbun, 1904: 305.  
*Thelphusula melanippe melanippe*; Bott, 1970: 60 (part), pl. 9 figs. 97-99.

Material.— Lectotype, ♂ (RMNH D1303a), Liang Koebeng Mountains, Kalimantan, leg. 1897 (18.9 by 14.4 mm). Paralectotype: ♀ (RMNH D1303b), same data as lectotype (21.4 by 16.7 mm).

Diagnosis.— Carapace surfaces distinctly convex, smooth, except for rugose antero- and postero-lateral regions; antero-lateral margin convex; epibranchial tooth small but distinct; outer margin of external orbital angle smooth, straight or slightly concave; epigastric and postorbital cristae distinct. G1 slender, sinuous; terminal segment cylindrical, about one third of length of subterminal segment. G2 with short distal segment less than one quarter of length of basal segment.

Distribution.— Known only from the type locality.

Remarks.— This species is known only from the two type specimens and has not been reported since. Bott (1970: 60) regarded it as the nominate subspecies of *Thelphusula melanippe* with two other subspecies, *T. m. kadamaiana* and *T. m. buergeri*. Holthuis (1979: 33) challenged the recognition of *T. buergeri* as a subspecies of *A. melanippe*, citing significant differences in carapace features and ambulatory leg proportions. All three taxa are here regarded as distinct species.

The holotype male of *A. melanippe* has asymmetrical third maxilliped exopod flagella. The left exopod has only a short flagellum whereas the right has a long and well developed one (fig. 1A, B).

De Man (1899: 109) records the colour of the preserved specimens as reddish-brown, being paler on the legs, with the chelae yellowish and the distal half of the fingers brown. The dark colour of freshly preserved specimens of this species argues against it being a cavernicole despite its long legs. Most of De Man's material (see also Büttikofer, 1897) was obtained from small forest streams.

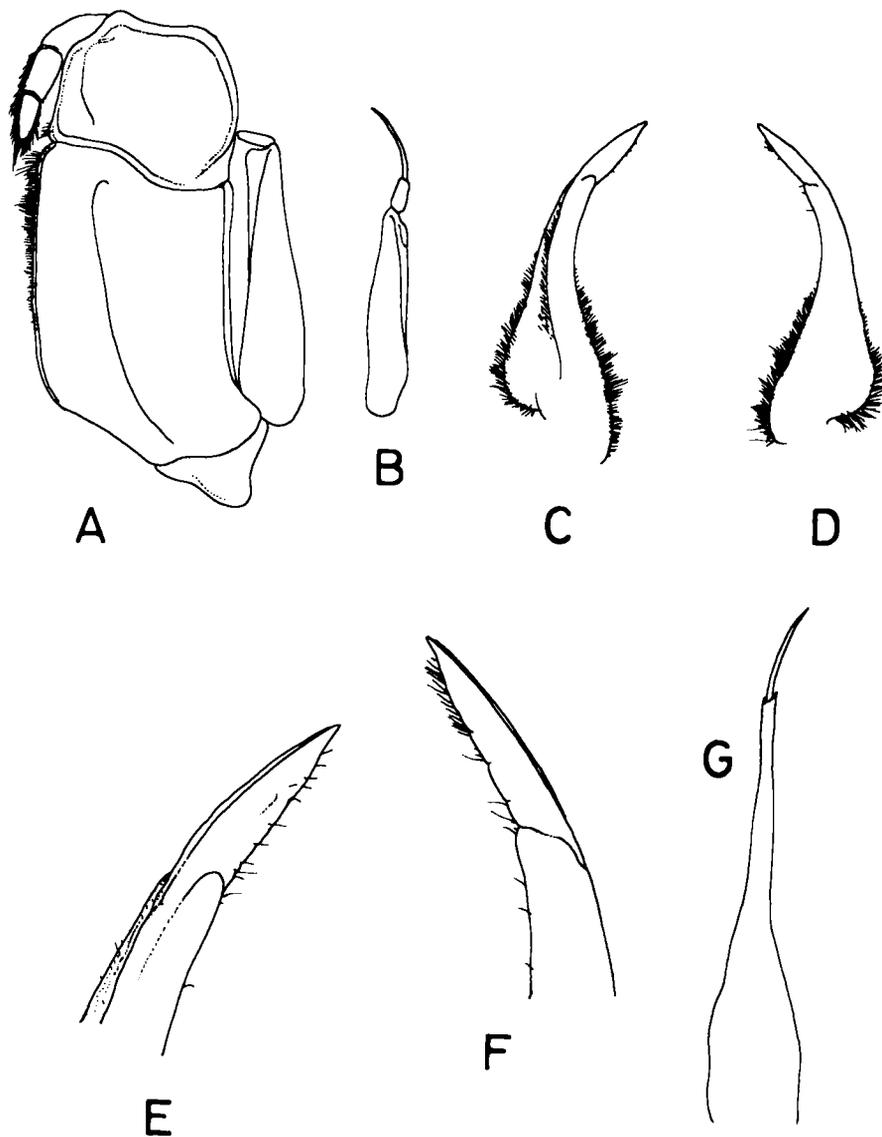


Fig. 2. *Arachnothelphusa melanippe* (De Man, 1899), Lectotype, ♂ (RMNH D1303a), Mt. Liang Koebeng, Kalimantan, Borneo, 18.9 by 14.4 mm. A, left third maxilliped; B, exopod of right third maxilliped; C-F, left G1; G, left G2. C, E, ventral views; D, F, dorsal views; E, F, terminal segments of G1.

### *Arachnothelphusa kadamaiana* (Borradaile, 1900)

*Potamon* (*Geothelphusa*) *kadamaianum* Borradaile, 1900: 94; Hanitsch, 1900: 10; Rathbun, 1905: 207.

*Paratelphusa* (*Liotelphusa*) *kadamaiana*; Tweedie, 1936: 70.

*Thelphusula melanippe kadamiana*; Bott, 1970: 61 (part), pl. 9 figs. 1-3, pl. 27 fig. 40.

Diagnosis.— Carapace surface convex, rugose, finely granular; antero-lateral margins convex, gently serrated; epibranchial tooth very low, barely separated from external orbital angle, sometimes appearing almost confluent, outer margin of external orbital angle straight or slightly concave, distinctly serrated; postorbital cristae relatively weak. G1 very slender, its terminal segment cylindrical, about one third of length of subterminal segment.

Type locality.— Kadamaian River, Mt. Kinabalu, Sabah, Borneo.

Size.— 19.0 by 14.0 mm (holotype female) (SMF 4281).

Distribution.— Known only from the type locality.

Remarks.— Bott (1970: 61) regarded Borradaile's species to be only a subspecies of *Potamon (Potamon) melanippe*. However, considering the differences in the structure of the outer margin of the external orbital angle (shorter and smooth in *A. melanippe*, longer and serrate in *A. kadamaiana*), G1 (distinctly more slender in *A. kadamaiana*), and the known distribution of these two taxa, I prefer to recognize it as a separate species.

Hanitsch (1900: 10) recorded specimen(s) of this species present in the Raffles Museum, and Tweedie (1936: 70) reported the holotype female (leg. Hanitsch) present in the same museum collection (at present ZRC). Tweedie also described a male collected at the same place and time by Hanitsch. These specimens could not be found. Bott (1970: 61) listed two specimens he examined in the SMF, but provided no other data, but, interestingly, referred to the male depicted in his plate 9 figs. 1-3 as a paratype. However, as Borradaile (1900: 94) described the species on the basis of a single female, this is an obvious mistake. The alleged paratype in all probability is the male described by Tweedie. Tweedie (1936) commented that he had sent both his specimens to Roux in the Basel Museum for confirmation of his identification, but it is not known whether they were returned. Bott (1970: 61) listed these specimens as SMF 4281 (female) and SMF 4282 (male). On the basis of this information, Bott (1970) probably obtained the holotype female and Tweedie's male from the Raffles Museum or the Basel Museum for study, and they have remained in the Senckenberg Museum. No other specimens seem to have been collected since.

The spelling of the specific name should be "*kadamaiana*" and not "*kadamiana*" as used by some workers. Although the Kadamaian River is occasionally spelled "Kadamian", the original spelling used by Borradaile (1900) should be retained.

Bott (1970: 61) regarded Chace's (1938: 16, pl. 3) record of *Parathelphusa (Liotelphusa) kadamiana* as accurate, but, as Holthuis (1979: 29) pointed out, Chace's specimens are more likely to be conspecific with *Adeleana forcarti* Bott, 1969. The present author has examined some of the specimens identified by Chace as *P. (L.) kadamiana* and is here able to validate Holthuis' suspicions. In contrast to *A. kadamaiana* sensu stricto, Chace's specimens have rather more squarish carapaces, much shorter legs, differently structured chelipeds and much stouter G1's, with the terminal segment short, stout and cone-shaped, not long, slender and upcurved like in *Thelphusula* sensu stricto or *Arachnothelphusa*.

Holthuis (1986: 594), with a query, referred a specimen from the Gunong Mulu Caves in Sarawak, Borneo, to this species, but the present author has re-examined his specimen and concluded that it is not *A. kadamaiana*. The specimen, a young male, has much shorter legs, and has been referred to a new species, *Thelphusula styx* (see Ng, 1989a).

**Arachnothelphusa nobilii** (Colosi, 1920)

*Potamon* (*Geothelphusa*) *Kenepai*; Nobili, 1903: 15; (not *Potamon* (*Geothelphusa*) *kenepai* De Man, 1899).

*Parathelphusa* (*Liothelphusa*) *nobilii* Colosi, 1920: 25.

[*Thelphusula*] *nobilii*; Bott, 1970: 62.

*Thelphusula hendersoniana*; Bott, 1970: 58 (part).

*Thelphusula melanippe buergeri*; Bott, 1970: 61 (part) (not *Potamon* (*Geothelphusa*) *buergeri* De Man, 1899).

Diagnosis.— External orbital angle acutely triangular, outer margins serrated. Other characters not precisely known.

Type locality.— Mt. Saribau, Sarawak, Borneo.

Size.— 15.0 by 12.3 mm (lectotype male) (MUT).

Distribution.— Known only from the type locality.

Remarks.— Nobili (1903: 15) identified two males and a female collected from 2500 feet asl. in Mount Saribau, Sarawak, as *Potamon kenepai* De Man, 1899. Colosi (1920), on re-examining Nobili's specimens, commented that Nobili had attached a label to these specimens identifying them as a new species "*Potamon saribanensis* Nob.". This name was never published. Colosi (1920: 25) concurred with Nobili's unpublished findings and formally named the Mount Saribau specimens *Parathelphusa nobilii*. Colosi noted that compared to *Potamon kenepai*, *Parathelphusa nobilii* had very long ambulatory legs like "*Potamon bidiense* Lanchester" (classified at present in *Stygothelphusa*; cf. Ng, 1989b) and "*Potamon araneum* Rathbun" from Hanoi, the inner carpal spine of the cheliped being blunter, the chelae more robust and larger, and the form of the external orbital angle different. These characters, as well as the descriptions of Nobili and Colosi, ally *P. nobilii* very closely with *Arachnothelphusa*, and pending a re-examination of the types, it is here tentatively transferred to that genus.

Colosi's description of the species (without any figures) is too brief to enable *A. nobilii* to be accurately identified. He recorded the outer margins of the external orbital angle as having denticles (i.e. serrated), a character also found in *A. kadamiana* from Sabah.

Bott (1970: 58) synonymised *A. nobilii* with *T. hendersoniana* without comment. The diagnostic characters noted by Colosi (1920: 25) and cited above for *A. nobilii* however, are very different from those of *T. hendersoniana* and argue strongly against their synonymy. Interestingly, Bott (1970: 62) later mentioned "*nobilii*" in his discussion of *Thelphusula melanippe buergeri*, noting their relationship.

**Arachnothelphusa rhadamanthysi** (Ng & Goh, 1987)

*Thelphusula rhadamanthysi* Ng & Goh, 1987: 325, pls 3A-B.

Material examined.— Holotype, ♀ (ZRC 1990.443), Simud Puteh Cave, Gomantong, Sabah, Borneo, 5°33'N, 118°06'E, leg. P. Chapman, 25.iii.1986 (16.9 by 12.0 mm).

Diagnosis.— Carapace surface smooth, strongly convex; branchial regions appearing inflated; antero-lateral margins strongly convex, with distinct epibranchial tooth on each side; outer margin of external orbital angle slightly convex, smooth; epigastric and postorbital cristae distinct.

Distribution.— Known only from the type locality.

Remarks.— *Arachnothelphusa rhadamanthysi* can be separated from its congeners by its more inflated carapace, especially around the branchial regions, broader carapace, more convex antero-lateral margins, very pale coloration and troglobitic habits. The distinct epibranchial tooth present in *A. rhadamanthysi* also easily distinguishes it from *A. kadamaiana*; in *A. kadamaiana* the epibranchial tooth is low, and almost confluent with the external orbital angle.

*Arachnothelphusa rhadamanthysi* is the second species of the genus from Sabah, the first being *A. kadamaiana*, described from Mount Kinabalu. It is unfortunate that no males were obtained, so that no comparison of their G1's with the other taxa is possible.

The colour was described as being pale straw-yellow with white legs. Details of the habits of the species can be found in Ng & Goh (1987: 326).

### *Arachnothelphusa terrapes* spec. nov.

(figs. 3-6)

Material examined.— Holotype, ♂ (ZRC), Danum Valley Field Centre, Station 507, in dry stump on ridge, Lahad Datu, Sabah, Borneo, leg. H. K. Voris, 23.x.1990 (17.6 by 13.3 mm). Paratype: ♀ (ZRC), Danum Valley, Lahad Datu, Sabah, Borneo, leg. S. C. Choy, 21.vii.1989 (25.7 by 18.6 mm).

Diagnosis.— Carapace surface covered with small granules, convex; branchial regions inflated; antero-lateral margins very convex, with distinct epibranchial tooth on each side, separated from obtuse and truncate external orbital angle by deep, broad cleft; outer margin of external orbital angle almost straight, smooth; epibranchial teeth positioned forward of carapace with tips extending slightly beyond frontal margin; frontal regions appearing narrow; epigastric and postorbital cristae distinct. G1 slender, sinuous, with cone-shaped terminal segment; tip tapering, distinctly upcurved, about one quarter of length of subterminal segment. G2 with short distal segment less than one fifth length of basal segment.

Remarks.— In July 1989, Dr S.C. Choy (Universiti Brunei Darussalam) obtained a large female specimen from Danum Valley in Sabah, Borneo, which moulted shortly after capture and died before the carapace could harden (pers. comm.). Although it was preserved immediately, the condition remained poor. The exuvium is badly damaged and the original carapace has disintegrated. The form of the carapace of the exuvium agrees with that of the preserved specimen. Fortunately, it was photographed before preservation (figs.

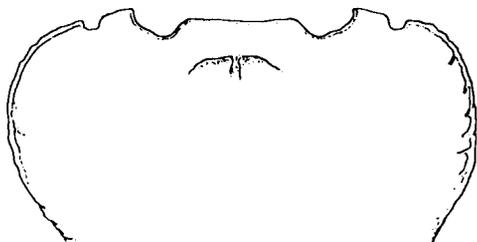


Fig. 5. *Arachnothelphusa terrapes* spec. nov. Paratype, ♀, (ZRC), Danum Valley, Lahad Datu, Sabah, Borneo, 25.7 by 18.6 mm. Details of frontal and anterolateral margins.

3, 4). It is clearly a species of *Arachnothelphusa*. The antero-lateral margin of the moulted specimen is very distinctive, being sharply indented at the junction between the external orbital angle and epibranchial tooth, forming a wide cleft between these two structures. The form and width of the gap is unique for any known *Arachnothelphusa* species, and suggests that the



Fig. 3. *Arachnothelphusa terrapes* spec. nov. Paratype, ♀ (ZRC), Danum Valley, Lahad Datu, Sabah, Borneo. Freshly moulted, and before preservation, 25.7 by 18.6 mm. Photo: S.C. Choy.



Fig. 4. *Arachnothelphusa terrapes* spec. nov. Paratype, ♀ (ZRC), Danum Valley, Lahad Datu, Sabah, Borneo. Exuvium, 25.7 by 18.6 mm. Photo: S.C. Choy.

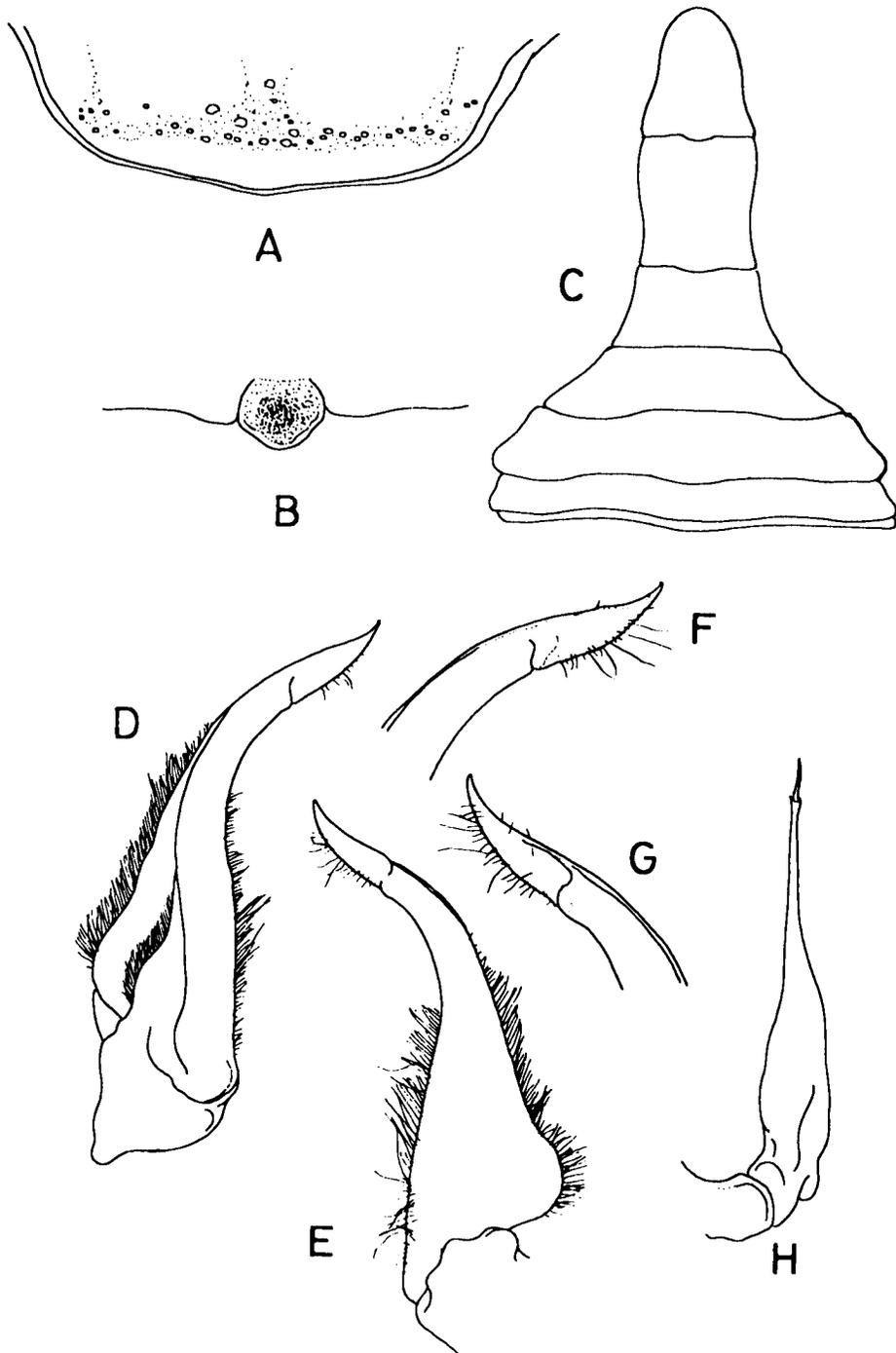


Fig. 6. *Arachnothelphusa terrapes* spec. nov. Holotype, ♂ (ZRC), Danum Valley, Lahad Datu, Sabah, Borneo, 17.6 by 13.3 mm A, frontal margin; B, posterior margin of epistome; C, abdomen; D-G, left G1, left G2. D, F, ventral views; E, G, dorsal views; F, G, terminal segments of G1. H, left G2.

specimen represents an undescribed species.

In October 1990, Dr H.K. Voris (Chicago Field Museum) managed to obtain a male of the same species while making herpetological studies at the Danum Valley Field Centre. The non-sexual features of the male agree with those of the female in almost all respects. The G1 of the species is distinctive, the tip of the terminal segment being cone-shaped and distinctly upcurved. The observed differences warrant the recognition of a new species for the Danum Valley specimens, here named *A. terrapes* spec. nov.

*Arachnothelphusa terrapes* is closely allied to *A. rhadamanthysi*, described from the nearby Gomantong Caves. The two species agree with regard to the swollen branchial regions, relatively broad carapace and very convex antero-lateral margins. However, the carapace of *A. terrapes* is distinctly broader and more granulose with the epibranchial teeth extending more forwardly, slightly beyond the frontal margin, so that the frontal region appears very narrow. In addition the cleft between the epibranchial tooth and external orbital angle is broad, and the external orbital angle is more obtuse and truncated, the outer margin being almost straight (not convex as in *A. rhadamanthysi*).

The holotype male was found hiding in a dry tree stump on a ridge in primary rainforest, some distance away from the nearest stream; it was very agile on land. The colour of the living specimen was a deep reddish-brown on all the dorsal surfaces, chelipeds and legs (H.K. Voris, pers. comm.).

**Etymology.**— The species name is derived from the Latin “terra” (= land), and “pes” (= leg), alluding to its terrestrial habits.

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