

## Taxonomy of the freshwater crab *Coccusa cristicervix* Ng & Grinang, 2004 (Decapoda: Brachyura: Gecarcinucidae), with description of a new species of *Thelphusula* from Sarawak, Malaysia, Borneo

Jongkar Grinang<sup>1\*</sup> & Peter K. L. Ng<sup>2</sup>

**Abstract.** The taxonomy of the Sarawakian gecarcinucid freshwater crab *Coccusa cristicervix* Ng & Grinang, 2004, is revised with the recent discovery of males, and the species is transferred to *Thelphusula* Bott, 1969. The male abdomen, first and second gonopods are described and figured for the first time. A new species, *Thelphusula pueh*, is also described from swampy habitats in Kampung Sebako in Pueh, Lundu District, Sarawak.

**Key words.** Crustacea, Brachyura, Gecarcinucidae, taxonomy, *Thelphusula*, Sarawak, Malaysia

### INTRODUCTION

The Bornean gecarcinucid genus *Thelphusula* Bott, 1969, has nine recognised species: *T. baramensis* (De Man, 1902), *T. buergeri* (De Man, 1899) (= *Gecarcinucus* (*Cylindrothelphusa*) *buergeri lebangensis* (Balss, 1937)), *T. dicerophilus* Ng & Stuebing, 1990, *T. granosa* Holthuis, 1979, *T. hulu* Tan & Ng, 1997, *T. luidana* (Chace, 1938), *T. sabana* Tan & Ng, 1998, *T. styx* Ng, 1989b, and *T. tawauensis* Tan & Ng, 1998 (cf. Tan & Ng, 1998; Ng et al., 2008). The distribution of the genus in Borneo appears to be confined to the northern half of the island, with *T. buergeri* found in central Kalimantan. On the other hand, the allied genus *Coccusa* Tan & Ng, 1998, established for *C. isophallus* Tan & Ng, 1998 (type species) and *C. adipis* (Ng & Wowor, 1990), occurs in eastern and western Kalimantan. The distributions of these taxa may not be real and merely a consequence of collecting efforts, with Sarawak and Sabah being relatively better surveyed. Species of *Thelphusula* and *Coccusa*, however, have very cryptic habits, being nocturnal and burrowers in swampy and/or well forested areas, and hence not easily collected (Tan & Ng, 1998; pers. obs.). More species can be expected to be discovered from Borneo.

*Coccusa cristicervix* Ng & Grinang, 2004, was described from the Bau area in western Sarawak on the basis of one adult female specimen. We have since collected more specimens of this species, and the male characters require that it be transferred to *Thelphusula*. We also describe a new species,

*T. pueh*, from Kampung Sebako, Pueh, Lundu District, in eastern Sarawak.

### MATERIAL AND METHODS

The terminology used follows Ng (1988), with the abbreviations G1 and G2 used for the male first and second gonopods, respectively. Measurements provided (in millimetres) are of the carapace width and length, respectively. The Malay words Kampung and Gunung are used for village and mountain, respectively. The specimens are deposited in the Sarawak Biodiversity Centre (SBC), Kuching, Sarawak, Malaysia; and the Zoological Reference Collection (ZRC) of the Lee Kong Chian Natural History Museum (ex Raffles Museum of Biodiversity Research), National University of Singapore.

### TAXONOMY

#### Family Gecarcinucidae Rathbun, 1904

#### *Thelphusula* Bott, 1969

**Remarks.** *Thelphusula* Bott, 1969, was established with *Potamon* (*Geothelphusa*) *buergeri* De Man, 1899, as the type species. Bott (1969) recognised five other species in the genus as he defined it at the time: *Potamon* (*Potamonautes*) *baramensis* De Man, 1902, *Potamon* (*Geothelphusa*) *hendersonianum* De Man, 1899, *Potamon* (*Geothelphusa*) *kadamaianum* Borradaile, 1900, *Parathelphusa* (*Liothelphusa*) *luidana* Chace, 1938, and *Potamon* (*Potamon*) *melanippe* De Man, 1899 (see also Bott, 1970: 58). *Potamon* (*Thelphusa*) *bidiensis* Lanchester, 1900, was regarded as a junior subjective synonym of *Thelphusula melanippe*, while *Potamon kadamaianum* was treated as its subspecies by Bott (1970). Ng (1989a: 64) questioned Bott's (1970) concept of *Thelphusula* and argued that it should be separated into three distinct morphological groups. He disputed Bott's (1970)

<sup>1</sup>Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; Email: gjongkar@ibec.unimas.my (\*corresponding author)

<sup>2</sup>Lee Kong Chian Natural History Museum, Faculty of Science, National University of Singapore, 6 Science Drive 2, 117543 Singapore; Email: dbsngkl@nus.edu.sg

synonymisation of *Potamon bidiensis* with *T. melanippe*; recognised it as a distinct species and referred it to a monotypic genus, *Stygothelphusa* Ng, 1989a. Ng (1991) subsequently established a new genus, *Arachnothelphusa*, for *Potamon (Potamon) melanippe* De Man, 1899, and *Potamon (Geothelphusa) kadamaianum* Borradaile, 1900, treating both as distinct species. Ng (1995), in describing a new genus from western Sarawak, showed that *Potamon (Geothelphusa) hendersonianum* De Man, 1899, had been incorrectly placed in *Thelphusula* as it has differently structured G1 and G2, and should be transferred to *Bakousa* Ng, 1995, instead. Tan & Ng (1998) revised *Thelphusula*, restricted the diagnosis for nine species and established a new genus, *Coccusa*, for two species from Borneo in which the carapace is ovate and much smoother, and most significantly, the G1 terminal segment is very long, slender and as long as the subterminal segment (versus distinctly shorter than the subterminal segment in *Thelphusula* s. str.).

Ng & Grinang (2004) recognised a third species of *Coccusa* from western Sarawak. Although only one adult female specimen was available, they noted that the general carapace shape and features agreed better with *Coccusa* and therefore referred it to this genus, even though it was the most granulated of the three known taxa. The collection of more specimens of the Sarawakian species, including males, shows that *Coccusa* should be restricted for species with smoother carapaces. On the basis of the gonopod structures, *Coccusa cristicervix* Ng & Grinang, 2004, must be transferred to *Thelphusula* instead.

***Thelphusula cristicervix* (Ng & Grinang, 2004),  
new combination  
(Figs. 1, 3A–E, 4)**

*Coccusa cristicervix* Ng & Grinang, 2004: fig. 5; Ng, 2004: 321; Ng & Yeo, 2007: 9; Ng et al., 2008: 69; Cumberlidge et al., 2009: Appendix 1.

**Material examined.** Holotype: female (19.9 × 14.3 mm) (SBC.C.00130), Gunung Doya, limestone outcrop, Bau District, Sarawak, coll. A. Denis et al., 2 October 2002. Others: 2 males (20.0 × 14.8 mm, 21.8 × 16.6 mm) (SBC), Sama Jaya Nature Reserve, lowland heath swamp forest, 16 m above sea level, Kuching Division, Sarawak, coll. J. Grinang et al., 3 July 2013; 4 males (15.1–19.4 mm × 11.3–14.8 mm), 4 females (19.1–24.8 mm × 14.6–18.7 mm) (ZRC), Sama Jaya Nature Reserve, lowland heath swamp forest, 16 m above sea level, Kuching Division, Sarawak, coll. P.K.L. Ng et al., 13 September 2013.

**Diagnosis.** Carapace gently ovate; cervical groove deep, prominent, with distinct rows of cristae running along length; postorbital cristae low, rounded, not sharp, separated from low, rounded epigastric cristae low by shallow depressions; anterolateral margin entire, epibranchial teeth not discernible; H-shaped depression relatively shallow (Fig. 1A, B). Frontal margin deflexed; frontal median triangle not clearly discernible, area marked by depression (Fig. 1C). Median tooth on posterior margin of epistome subtruncate (Fig. 1C). Ambulatory legs relatively long (Fig. 1A). Major chela stout, with gap at base of closed fingers (Fig. 1G). Male abdomen

with somite 6 elongate, lateral margins gently concave (Fig. 1D). G1 terminal segment subconical, tip sharply tapering, about 2 times length of subterminal segment (Fig. 3A, C–E). G2 with distal segment very short, tip sharp (Fig. 3B).

**Colour.** In life, the species is red to bright red overall all the dorsal surfaces and pereopods (adult male chelae usually more orangish-red), with the ventral surfaces yellowish-white (Fig. 4A, B).

**Remarks.** The recent series of specimens of *T. cristicervix* from Sama Jaya Nature Reserve just outside Kuching city is about 40 km from the type locality in Bau, but agree extremely well with the holotype specimen in all aspects; including the structure of the carapace and proportions of the ambulatory legs. The good series, which includes small and large specimens, leaves little doubt to their conspecificity.

The morphology of the G1 of this species agrees well with what has been diagnosed and figured for *Thelphusula* Bott, 1969, by Tan & Ng (1998), with the terminal segment slender, cylindrical and distinctly shorter than the subterminal segment (Fig. 3A, C). The carapace shape, as well as granulation of *T. cristicervix*, while relatively more ovate than other known species of *Thelphusula* which have more quadrate ones, approaches the condition in more species like *T. dicerophilus* and *T. granosa* which have relatively more inflated carapaces (cf. Holthuis, 1979: pl. 5; Ng & Stuebing, 1990: pl. 1).

In contrast to the moist karst forest where the holotype of *T. cristicervix* was collected, the recent specimens were all collected from a swampy part of a well-shaded kerangas forest. The soil is wet and loamy, usually with a dense root system permeating it. The crabs dig relatively deep burrows, up to perhaps a metre in depth in places and come out only at night. The presence of the species in both limestone and kerangas forests indicates that its distribution is delimited by soil conditions rather than forest type.

Ng & Yeo (2007: 9) noted that the species was endangered, commenting that “the Bau area [type locality] does not have long-term protection and the species occurs in low-lying areas, it is very vulnerable to anthropogenic and associated effects.” (see also Cumberlidge et al., 2009: Appendix 1). The discovery of *T. cristicervix* in a nature reserve near Kuching city does not change its status as the protected area is open to the public and the species is known mainly from one small patch of swamp only several hundred square metres in area.

***Thelphusula pueh*, new species  
(Figs. 2, 3F–J, 5)**

**Material examined.** Holotype: male (16.2 × 12.1 mm) (ZRC), edge of rice field with swampy vegetation, 26 m above sea level, Kampung Sebako, Pueh, Lundu District, Sarawak, coll. R. Sujang, 29 November 2013. Paratypes: 6 females (12.6–19.8 mm × 9.9–15.6 mm) (ZRC), 4 females (15.8–19.4 mm × 11.4–14.5 mm) (SBC), same data as holotype; 1 female (24.1 × 14.8 mm) (ZRC), in rice field, 31 m above sea level,

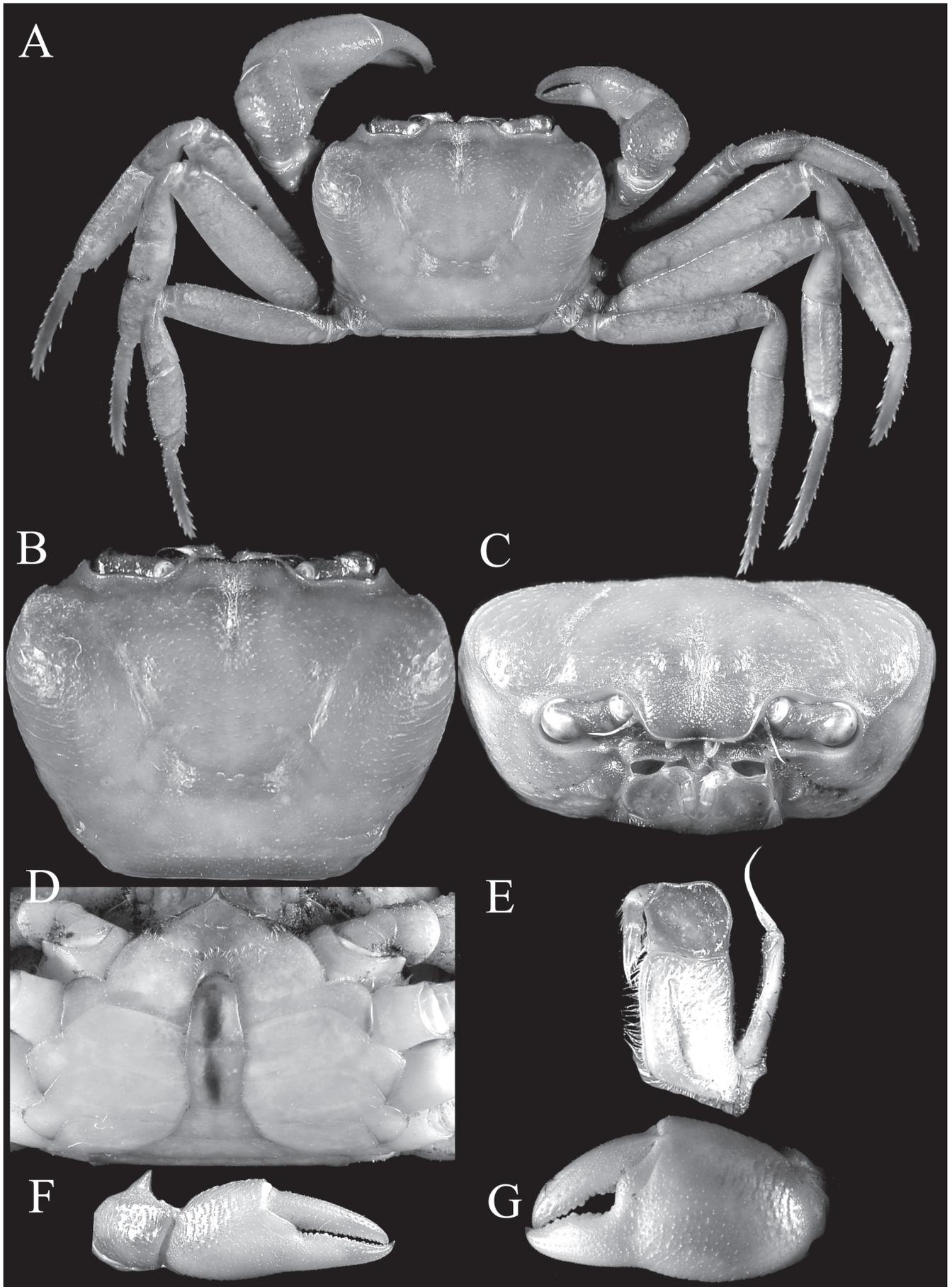


Fig. 1. *Thelphusula cristicervix* (Ng & Grinang, 2004). Male (19.4 × 14.8 mm) (ZRC), Sama Jaya Nature Reserve, Kuching Division, Sarawak. A, overall dorsal view; B, dorsal view of carapace; C, frontal view of carapace; D, ventral view showing anterior thoracic sternum and male abdomen; E, left third maxilliped; F, outer view of right chela; G, outer view of left chela.

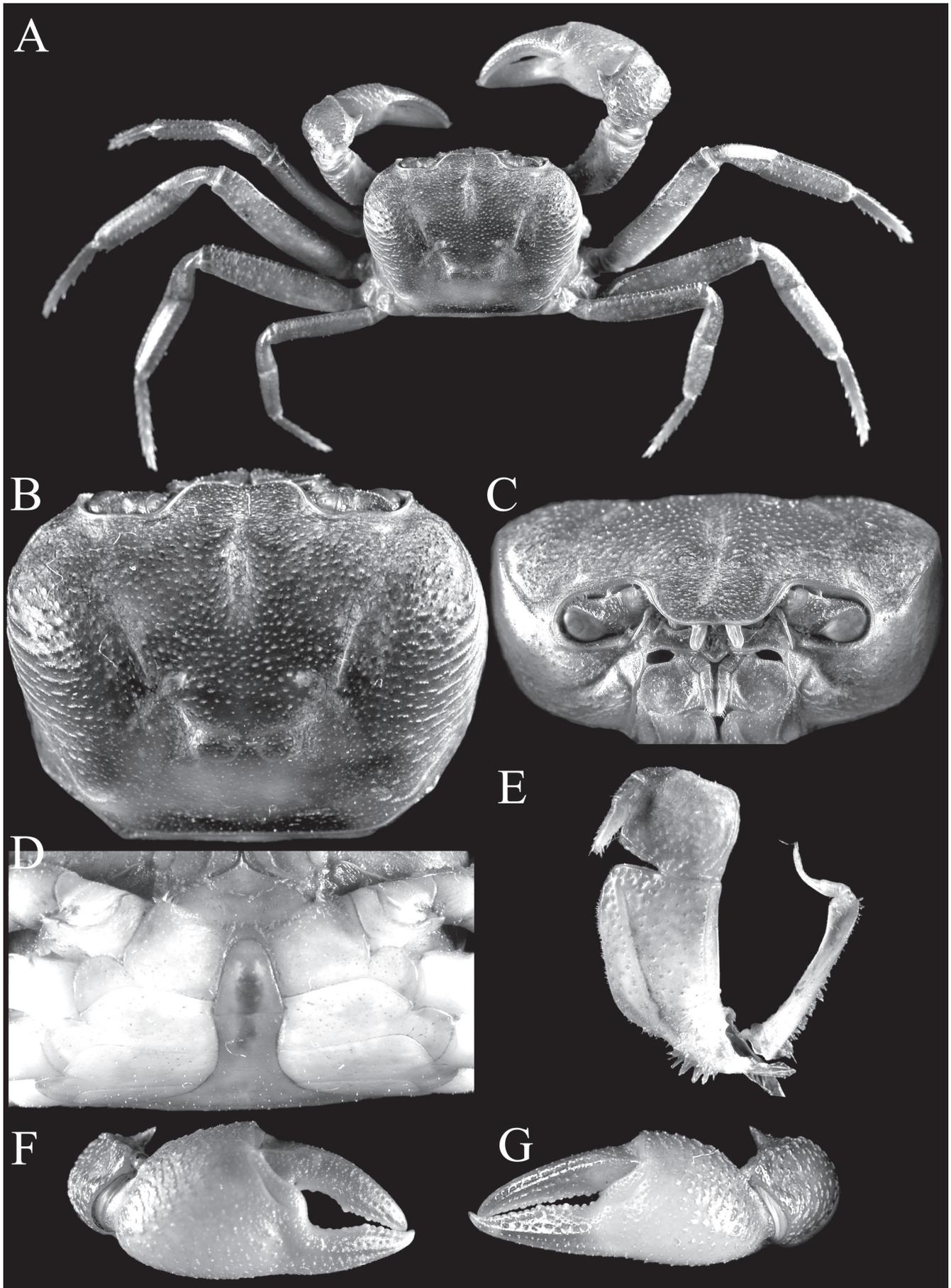


Fig. 2. *Thelphusula pueh*, new species. Holotype male (16.2 × 12.1 mm) (ZRC), Kampung Sebako, Pueh, Lundu District, Sarawak. A, overall dorsal view; B, dorsal view of carapace; C, frontal view of carapace; D, ventral view showing anterior thoracic sternum and male abdomen; E, left third maxilliped; F, outer view of right chela; G, outer view of left chela.

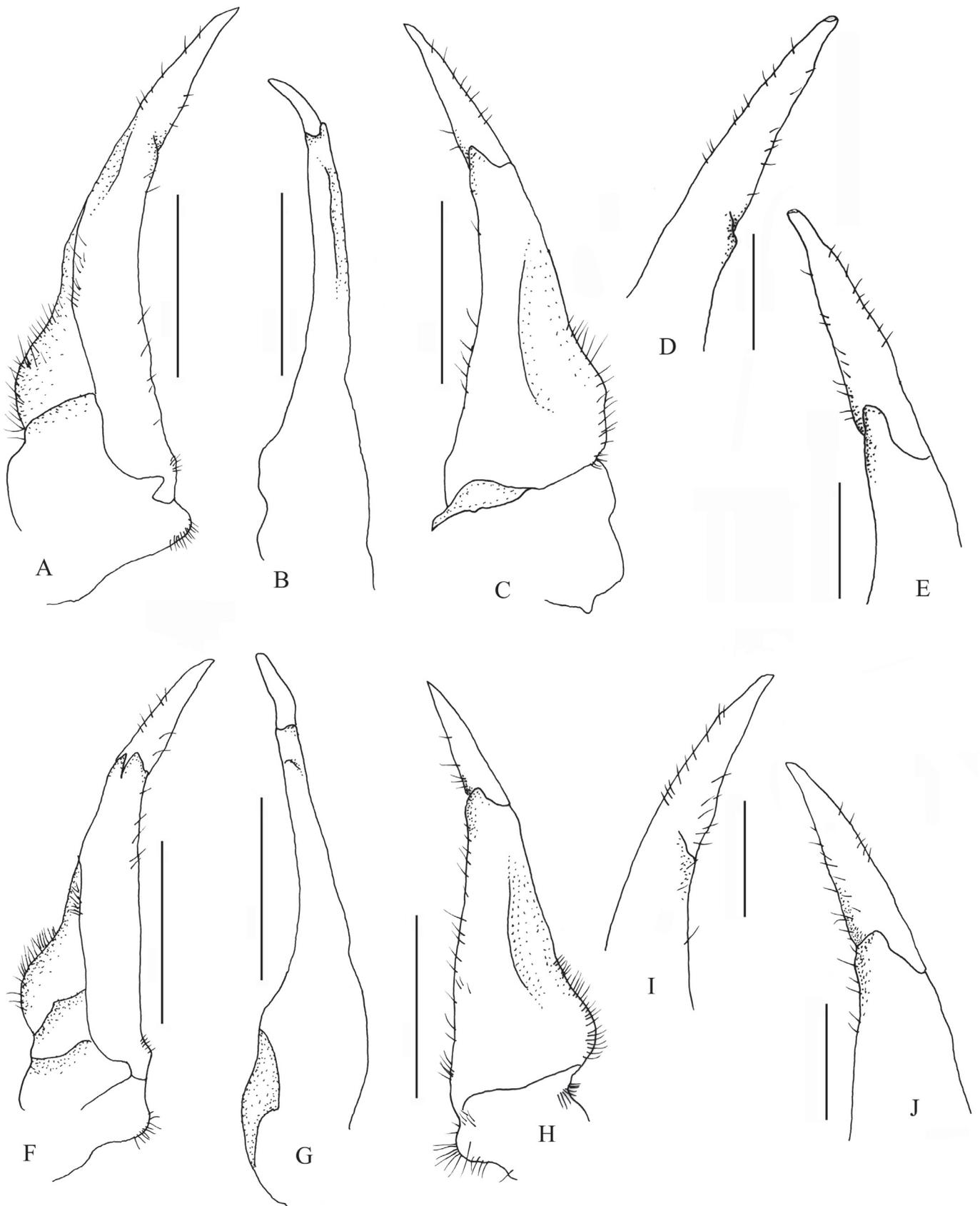


Fig. 3. A–E, *Thelyphusula cristicervix* (Ng & Grinang, 2004), male (19.4 × 14.8 mm) (ZRC), Sama Jaya Nature Reserve, Kuching Division, Sarawak; F–J, *Thelyphusula pueh*, new species, male (16.2 × 12.1 mm) (ZRC), Kampung Sebako, Pueh, Lundu District, Sarawak. A, F, ventral view of left G1; B, G, ventral view of left G2; C, H, dorsal view of left G1; D, I, ventral view of terminal segment of left G1; E, J, dorsal view of terminal segment of left G1. Scale bars: A–C, F–H = 1.0 mm; D, E, I, J = 0.5 mm.

Kampung Peninjau Lama, Gunung Serambu, Bau District, Sarawak, coll. L. Noun, 10 November 2013.

**Diagnosis.** Carapace gently ovate, wider than long, dorsal surface rugose, anterolateral margin convex, epibranchial tooth absent, cervical groove relatively shallow, shallow crista; postorbital cristae weak; H-shaped depression shallow (Fig. 2A, B). Frontal margin deflexed; frontal median triangle absent (Fig. 2C). Median tooth on posterior margin of

epistome subtruncate (Fig. 2C). Ambulatory legs not distinctly elongated (Fig. 2A). Major chela with large gap between fingers when closed (Fig. 2F). Male abdomen with somite 6 relatively short, lateral margins distinctly concave (Fig. 2D). G1 terminal segment relatively cylindrical, straight, slightly more than 2 times length of subterminal segment (Fig. 3F, H–J). G2 distal segment short, curved, tip rounded (Fig. 3G).

**Colour.** In life, the species is dark brown overall on all the dorsal surfaces, with the palm of the chela and sometimes the legs more orange (Fig. 5A, B).

**Etymology.** The species is named after Pueh, the area where it was collected. The name is used as a noun in apposition.

**Remarks.** *Thelphusula cristicervix* and *T. pueh*, new species, are the only two species of *Thelphusula* known from western Sarawak. They are easily differentiated from congeners in having a relatively more ovate carapace, a more convex anterolateral margin and more strongly deflexed frontal margin. Their G1s are also superficially similar in shape. *Thelphusula pueh* can most easily be separated from *T. cristicervix* by its live colours; with the carapace and legs of *T. cristicervix* red (Fig. 4A, B), even in small specimens, whereas *T. pueh* is dark brown (Fig. 5A, B). *Thelphusula pueh* also has proportionately shorter ambulatory legs (Fig. 2A) (versus longer in *T. cristicervix*, Fig. 1A); relatively shallower cervical grooves (Fig. 2B) (versus distinctly deeper in *T. cristicervix*, Fig. 1A); smooth lateral margins of abdomen (Fig. 2D) (versus uneven in *T. cristicervix*, Fig. 1D); and the outer margin of the G1 subterminal segment is almost straight with the terminal segment more strongly bent (Fig. 3F, H) (versus outer margin of G1 subterminal segment gradually curved with the terminal segment gently bent in *T. cristicervix*, Fig. 3A, C).

Like *T. cristicervix*, *T. pueh* has a preference for damp soils and constructs shallow burrows. Its presence in a more open habitat (ricefields) may not be natural.

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Fig. 4. Colours in life, *Thelphusula cristicervix* (Ng & Grinang, 2004). A, male (ca. 19.0 mm carapace width), in situ in forest, specimen not collected; B, female (19.3 × 14.2 mm) (ZRC) [Photograph by: Tan HH]. Both specimens from Sama Jaya Nature Reserve, Kuching Division, Sarawak.



Fig. 5. Colours in life, *Thelphusula pueh*, new species. A, paratype female (16.3 × 12.9 mm) (SBC); B, paratype female (13.0 × 10.1 mm) (SBC). Both specimens from Kampung Sebako, Pueh, Lundu District, Sarawak.

## LITERATURE CITED

- Balss H (1937) Potamoniden (Dekapoda Brachyura) der Philippinen und des Malayischen Archipels. Internationale Revue der gesamten Hydrobiologie und Hydrographie, 34(3–5): 143–197, figs. 1–36.
- Borradaile LA (1900) On a small collection of decapod crustaceans from freshwaters in North Borneo. Proceedings of the Zoological Society of London, 1900(1): 93–95.
- Bott R (1969) Flußkrabben aus Asien und ihre Klassifikation (Crustacea, Decapoda). Senckenbergiana Biologica, 50(5–6): 359–366.
- Bott R (1970) 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 FA Jr (1938) Freshwater water decapod crustacea from Mount Kinabalu, British North Borneo. Proceedings of the New England Zoological Club, 17: 9–22, figs. 1, 2, pls. 1–4.
- Cumberlidge N, Ng PKL, Yeo DCJ, Magalhães C, Campos MR, Alvarez F, Naruse T, Daniels SR, Esser LJ, Attipoe FYK, Clotilde-Ba F-L, Darwall W, Mcivov A, Collen B & Ram M (2009) Freshwater crabs and the biodiversity crisis: importance, threats, status, and conservation challenges. Biological Conservation, 142: 1665–1673.
- Holthuis LB (1979) Cavernicolous and terrestrial decapod crustacean from northern Sarawak, Borneo. Zoologische Verhandlungen, 171: 1–47, pls. 1–8.
- Lanchester WF (1900) On some malacostracous crustaceans from Malaysia in the collection of the Sarawak Museum. Annals and Magazine of Natural History, (7)6(33): 249–265, pl. 12.
- Man JG De (1899) Zoological results of the Dutch scientific expedition to central Borneo. The Crustacea. Part II, Brachyura. Notes from the Leyden Museum, 21: 53–144, pls. 5–12.
- Man JG De (1902) Die von Herrn Professor Kükenthal im indischen Archipel gesammelten Dekapoden und Stomatopoden. In: Kükenthal W (ed.), Ergebnisse einer zoologischen Forschungsreise in den Molukken und Borneo, in Aufträge der Senckenberg. Naturforschenden Gesellschaft ausgeführt von Dr. Willy Kükenthal. Abhandlungen der Senckenbergischen naturforschenden Gesellschaft, 25(3): 467–929, pls. 19–27.
- Ng PKL (1988) The Freshwater Crabs of Peninsular Malaysia and Singapore. Department of Zoology, National University of Singapore, Shinglee Press, Singapore, i–viii, 1–156 pp, figs. 163, 4 colour pls.
- Ng PKL (1989a) The identity of the cavernicolous freshwater crab *Potamon (Thelphusa) bidiense* Lanchester, 1900 (Crustacea: Decapoda: Brachyura: Gecarcinucidae) from Sarawak, Borneo, with description of a new genus. Raffles Bulletin of Zoology, 37(1 & 2): 63–72.
- Ng PKL (1989b) A new cavernicolous freshwater crab, *Thelphusula styx* spec. nov. (Crustacea: Decapoda: Brachyura: Gecarcinucidae), from Gunong Mulu, Sarawak, Borneo. Zoologische Mededelingen, 63(6): 53–59.
- Ng PKL (1991) Bornean freshwater crabs of the genus *Arachnothelphusa* gen. nov. (Crustacea: Decapoda: Brachyura: Gecarcinucidae). Zoologische Mededelingen, 65(1): 1–12.
- Ng PKL (1995) The freshwater crabs and prawns (Crustacea: Decapoda) of Bako National Park, Sarawak, Malaysia, with descriptions of one new genus and three new species. Raffles Bulletin of Zoology, 43(1): 181–205.
- Ng PKL (2004) Crustacea: Decapoda, Brachyura. In: Yule CM & Yong HS (eds.) The Freshwater Invertebrates of the Malaysian Region. Academy Science of Malaysia, Kuala Lumpur. Pp. 311–336.
- Ng PKL, Guinot D & Davie PJF (2008) Systema Brachyurorum Part I. An annotated checklist of extant brachyuran crabs of the world. Raffles Bulletin of Zoology, Supplement 17: 1–286.
- Ng PKL & Grinang J (2004) Decapod crustaceans with descriptions of three new species. In: Yong HS Ng FSP & Yen EEL (eds.) Sarawak Bau Limestone Biodiversity. Sarawak Museum Journal, 59, No. 80 (New Series), Special Issue No. 6: 299–325.
- Ng PKL & Stuebing R (1990) *Thelphusula dicerophilus* sp. nov., a new species of freshwater crab (Crustacea: Decapoda: Brachyura: Gecarcinucidae) found in mud wallows of the Sumatran Rhinoceros from Sabah, Borneo. IndoMalayan Zoology, (1989)6(1): 45–51, pl. 1.
- Ng PKL & Wowor D (1990) *Terrathelphusa adipis*, new species (Crustacea: Decapoda: Brachyura: Sundathelphusidae) from Kalimantan, Borneo. Raffles Bulletin of Zoology, 38(2): 263–268.
- Ng PKL & Yeo DCJ (2007) Malaysian freshwater crabs: conservation prospects and challenges. In: Chua L (ed.) Proceedings of the Seminar on the Status of Biological Diversity in Malaysia and Threat Assessment of Plant Species in Malaysia, 28–30 June 2005. Forest Research Institute Malaysia, Kepong. Pp. 95–120.
- Rathbun MJ (1904) Les crabes d'eau douce (Potamonidae). Nouvelles Archives du Muséum d'Histoire naturelle, Series 4, 6: 225–312.
- Tan SH & Ng PKL (1998) Revision of the genus *Thelphusula* (Decapoda: Brachyura: Gecarcinucidae) with description of a new genus and three new species. Journal of Crustacean Biology, 18(4): 808–822.