

# ZOOLOGISCHE MEDEDELINGEN

UITGEGEVEN DOOR HET

RIJKSMUSEUM VAN NATUURLIJKE HISTORIE TE LEIDEN  
(MINISTERIE VAN WELZIJN, VOLKSGEZONDHEID EN CULTUUR)

Deel 63 no. 6

21 juli 1989

ISSN 0024-0672

---

## **A NEW CAVERNICOLOUS FRESHWATER CRAB, *THELPHUSULA STYX* SPEC. NOV. (CRUSTACEA: DECAPODA: BRACHYURA: GECARCINUCIDAE), FROM GUNONG MULU, SARAWAK, BORNEO**

by

**PETER K.L. NG**

Ng, P.K.L.: A new cavernicolous freshwater crab, *Thelphusula styx* spec. nov. (Crustacea: Decapoda: Brachyura: Gecarcinucidae), from Gunong Mulu, Sarawak, Borneo.

Zool. Med. Leiden 63 (6), 21-vii-1989: 53-59, figs. 1-2. — ISSN 0024-0672.

Key words: Decapoda; Crustacea; Brachyura; Gecarcinucidae; *Thelphusula* spec. nov.; cavernicole; Gunong Mulu, Sarawak, Borneo.

A new species of gecarcinucid freshwater crab, *Thelphusula styx* spec. nov., is described from Gunong Mulu National Park in Sarawak, Borneo. This is the third species of *Thelphusula* reported from the area.

Peter K.L. Ng, Department of Zoology, National University of Singapore, Kent Ridge, Singapore 0511, Republic of Singapore.

### INTRODUCTION

The genus *Thelphusula* Bott, 1969, *sensu lato* is a wholly Bornean taxon, of which nine species are currently recognised, viz.: *T. buergeri* (De Man, 1899) (type species), *T. hendersoniana* (De Man, 1899), *T. luidana* (Chace, 1938), *T. baramensis* (De Man, 1902), *T. granosa* Holthuis, 1979, *T. melanippe* (De Man, 1899), *T. kadamiana* (Borradaile, 1900), *T. bidiensis* (Lanchester, 1900) and *T. rhadamanthysi* Ng & Goh, 1987 (see Bott, 1970: 58; Ng & Goh, 1987: 325).

Ng & Goh (1987: 325) commented, however, that the genus can be divided into three distinct and apparently monophyletic groups. Of these three groups, *Thelphusula sensu stricto* is characterised by its rather squarish

carapace, poorly developed or absent epibranchial tooth, straight posterolateral margins which are almost parallel, ambulatory legs not strongly elongated, a slender and sinuous first pleopod (G1) with a relatively long and cylindrical terminal segment, and a second pleopod (G2) with a short flagellum. This group contains the following species: *T. buergeri*, *T. hendersoniana*, *T. luidana*, *T. baramensis* and *T. granosa*.

In this paper, a new species of *Thelphusula sensu stricto* is described from Gunong Mulu National Park, Sarawak, Borneo.

## DESCRIPTIVE PART

### ***Thelphusula styx* spec. nov.**

(figs. 1, 2)

*Thelphusula ? kadamiana*; Holthuis, 1986: 594 (not *Potamon (Geothelphusa) kadamianum* Borradaile, 1900: 94).

Holotype. — 1♂, carapace 13.4 by 9.2 mm (RMNH Crust. D 33953), Gua Kelawar (Lubang Kelaiq) ("Bat Cave"), in pitfall trap, just south of forest station at Long Pala (river junction), Gunong Mulu National Park, 4°01'36''N, 114°47'58''E, northern Sarawak, East Malaysia, Borneo, 10.ii.1980, leg. P. Chapman.

Diagnosis. — Carapace convex; cervical grooves deep, extending backwards throughout most of posterolateral regions. Frontal margin sinuous; external orbital angle straight, confluent with convex anterolateral margins. Postorbital cristae very low, rounded, confluent with low, rounded epigastric cristae. First pleopod (G1) slender; terminal segment one third of total length, tapered. Second pleopod (G2) without (or with very short?) flagellum.

Description. — Carapace quadrilateral, surface convex, glabrous, almost smooth except for distinct striae and flattened granules on anterolateral and branchial regions. Regions well defined. H-shaped central groove shallow and inconspicuous. Cervical grooves very prominent, relatively broad, extending far backward across carapace, parallel with posterolateral margin. Branchial regions well-developed, inflated, carapace appearing swollen. Pterygostomial, sub-branchial, suborbital and subhepatic regions slightly rugose. Epigastric cristae low, slightly swollen, slightly rugose, the two lobes distinctly separated by a deep notch. Postorbital crista low but distinct, separated from epigastric by a small, shallow notch, curving to join anterolateral margin at anterolateral margin. Frontal margin slightly deflexed, sinuous but entire, gently



Fig. 1. *Thelphusula styx* spec. nov., ♂, holotype, 13.4 by 9.2 mm, dorsal view.

joining smooth supraorbital margin, without median triangle and with only a poorly developed ridge just above the median part of front, the lateral edges of which do not meet the frontal margin. Orbits small. Eyes small but relatively well-developed, the black pigmentation of the cornea distinct. Epibranchial tooth very low, almost undiscernible, appearing confluent with strongly convex, slightly serrated anterolateral margin. Posterolateral margin slightly concave, distinctly converging. Posterior margin straight. Median lobe of posterior margin of epistome broadly triangular with blunt, truncated tip and lateral margins each with a blunt, broadly triangular lobe. Ischium of third maxillipeds with distinct but shallow obliquely longitudinal sulcus which is closer to the inner margin. Outer margin of merus cristiform, median portion depressed, exopod reaches half length of merus, with well developed flagellum which extends beyond width of merus. Terminal segment of mandibular palp with two lobes.

Chelipeds symmetrical, fingers slightly longer than palm, cutting edges of fingers with several denticles and teeth. Distal half of fingers beige-coloured.

Ambulatory legs relatively long, smooth and glabrous; upper margin of merus not serrated. Second pair longest.

Male abdomen distinctly T-shaped; first and second segments broad, third to sixth progressively trapezoidal lateral margins of sixth slightly concave, seventh triangular, tip rounded, lateral margins almost straight. First pleopod

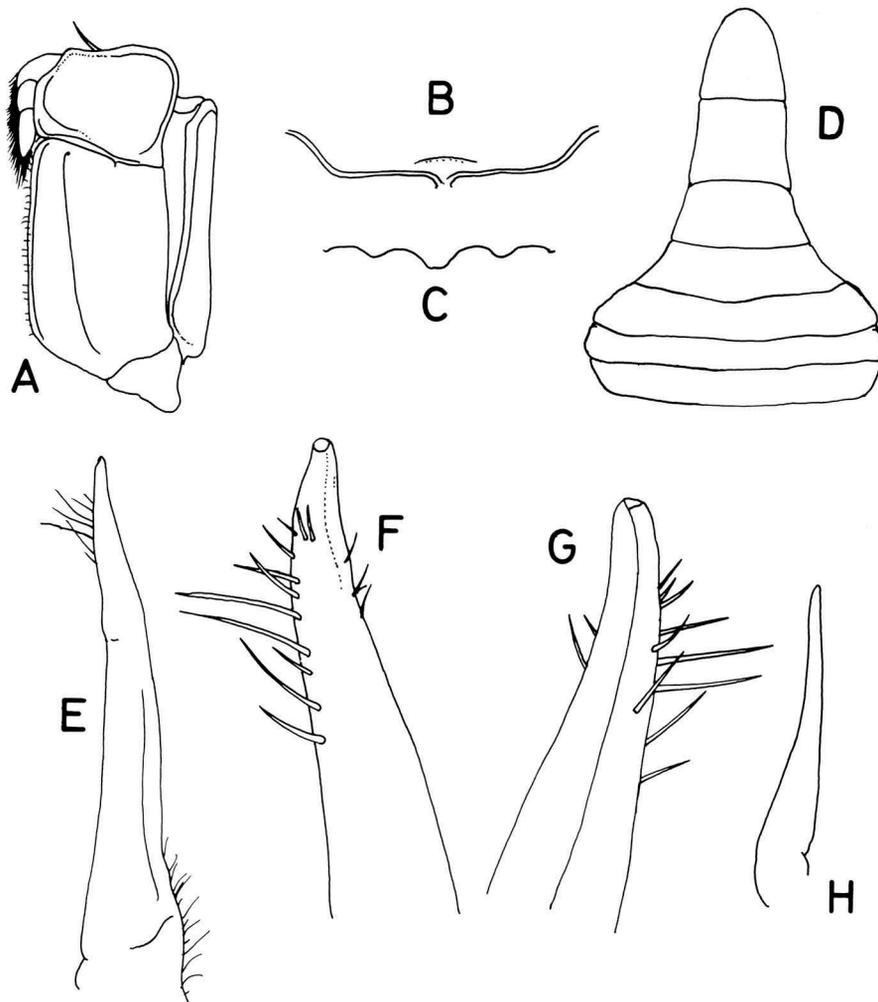


Fig. 2. *Thelphusula styx* spec. nov., ♂, holotype. A, left third maxilliped; B, frontal margin (frontal view); C, posterior margin of epistome; D, male abdomen; E, left G1 (ventral view); F, left G1, terminal segment (ventral view); G, G1, terminal segment (dorsal view); H, left G2.

(G1) slender, tapering, subterminal segment gradually tapering from wider base, terminal segment cone-shaped, less than half length of subterminal, tip slightly but distinctly upturned, with scattered short hairs especially at the distal part. Second pleopod (G2) basal segment well developed, elongate, tip blunt, flagellum absent.

Remarks. — Chapman (1984: 2), in his account of the invertebrate fauna of the caves of Gunung Mulu National Park, listed a small crab collected by

him (tentatively identified by Dr. L.B. Holthuis of RMNH, Leiden) as “*Thelphusula* prob. *kadamiana* (Borradaile)”. He recorded it as an “accidental”, i.e. “a stray epigean species having no ecological dependence on cave habitats”, and speculated that it was probably an alluvial plain dweller. In his review of the cavernicolous decapod crustaceans of the world, Holthuis (1986) listed Chapman’s (1984) specimen as “*Thelphusula* ? *kadamiana*” and classified it as a stygophile (= troglophile) or stygoxene (= troglaxene).

A re-examination of the specimen showed that it does not belong to Borradaile’s (1900) species, but to an undescribed species of *Thelphusula sensu stricto*. It is here made the type of a new species, *T. styx*. Although this new species is described on the basis of only one specimen, its characters are considered sufficiently distinct to warrant its recognition.

Ng & Goh (1987: 326) placed *T. kadamiana* (together with *T. melanippe* and *T. rhadamanthysi*) is the second group of the *Thelphusula*, which is differentiated from *Thelphusula sensu stricto* in having a more distinctly inflated carapace, especially in the more swollen branchial regions and strongly convex anterolateral margins, distinctly convergent posterolateral margins, and the very long ambulatory legs, especially the meri, which has its dorsal margins smooth. All these differences also hold good for *T. styx* and *T. kadamiana*. The carapace of *T. styx* is much less broad than that of *T. kadamiana*, with the external orbital angle almost smoothly confluent with the epibranchial tooth, both forming a convex anterolateral margin. *Thelphusula kadamiana* was described by Borradaile (1900: 94) on the basis of a single female from Mount Kinabalu, Sabah, and a topotypic male specimen was figured by Bott (1970).

The G1 and G2 of the single male type of *T. styx* are probably not fully developed and suggest immaturity of the specimen. The general structure of the G1, however, is typical for the genus as defined at present. The only other *Thelphusula* species known from Gunong Mulu are *T. baramensis* and *T. granosa* (fide Holthuis, 1979). *Thelphusula styx* can be separated from *T. baramensis* by its more convex carapace, more convex anterolateral margin, broader external orbital angle, and sinuous frontal margin. *Thelphusula styx* can be distinguished from *T. granosa* by its much less granulate and rugose carapace, ambulatory legs and chelipeds, as well as its much lower and broader carapace. Although superficially resembling *Adeleana chapmani* Holthuis, 1979, also described from Gunong Mulu, *T. styx* has a straight external orbital angle outer margin, distinctly shorter ambulatory legs, and very different G1 and G2 structures. In spite of its poorly developed (immature) condition, the G1 of *T. styx* possesses sufficiently diagnostic characters to ally this species with *Thelphusula* and not *Adeleana*. In *Adeleana*, the G1 is

stouter and the terminal segment is short and cone-shaped. The G2 of *Adeleana* also has a distinctly longer flagellum.

Dr. P. Chapman (*in litt.* 6 August 1988) recorded the carapace colour of the live specimen of *T. styx* as brownish, with dirty-cream ambulatory legs. He also noted that the specimen was collected “. . . next to a small stream which had flooded its banks the night before and inundated the [pitfall] trap (which was full of water, with the crab on the bottom)”. The pale coloration of the specimen might indicate that *T. styx* is a troglobite, although its eyes are well developed and distinctly pigmented. The only other two cavernicolous species of *Thelphusula sensu lato*, viz. *T. rhadamanthysi* (Gomantong Caves, eastern Sabah) and *T. bidiensis* (Bidi Caves, western Sarawak), also have pale coloration.

Cavernicoles in Gunong Mulu include the potamoids *Cerberusa caeca* Holthuis, 1979, *Cerberusa tipula* Holthuis, 1979, and *Isolapotamon collinsi* Holthuis, 1979; and the gecarcinucoids *Adeleana chapmani* and *Sundathelphusa tenebrosa* Holthuis, 1979. *Cerberusa caeca* is the only confirmed true troglobite, with very pale carapace coloration and reduced eyes without a trace of pigmentation. *Cerberusa tipula* is also almost certainly a true troglobite, although its reduced eyes still retain distinct pigmentation and the carapace coloration is darker. The eyes of *Adeleana chapmani* are not reduced and the pigmentation distinct, but it has a pale carapace coloration as well as other characters usually associated with cavernicolous life. It is not possible to determine the habits and ecology of *T. styx* with confidence on the basis of the single specimen available. Chapman (1984) listed it from the caves of Gunong Mulu (as *Thelphusula* prob. *kadamiana*) as an accidental, obviously because *T. kadamiana* was collected from epigeal habitats. The type locality of *T. kadamiana* is Mount Kinabalu in Sabah, over 370 km to the northeast of Gunong Mulu, and since troglobitic cave species usually have very restricted distributions, and the caves of Gunong Mulu are very unlikely to be linked subterraneanly with Mount Kinabalu, it would be difficult to conceive of *T. kadamiana* as a troglobitic species. Holthuis (1986), however, listed it as being either a troglaxene or troglophile, because of the pale coloration of the specimen.

Interestingly, Holthuis (1986: 589) noted that the presence of long ambulatory legs and a pale coloration is not generally recognised as proof of a troglobitic life-style, unless the eyes were also reduced. There are some species, however, with relatively well developed eyes which appear to be troglobites. An example is *Thelphusula bidiensis* with well developed eyes, long legs and pale coloration. In recent years, this species has been collected regularly and exclusively in caves. In point of fact, it is not illogical to expect

at least some relatively recent troglobites to have retained one or more pre-troglobitic characters, such as non-reduced eyes, whereas they may “already” have lost the dark coloration as a consequence of their cavernicolous habits. *Thelphusula styx* may belong into this category, just as *T. bidiensis* and *T. rhadamanthysi*. Considering that there occur in the caves of Gunung Mulu one troglobitic genus of potamoidea (*Cerberusa*) and probably a troglobitic gecarcinucooid species (*Adeleana chapmani*), the additional presence of a troglobitic species of *Thelphusula* (*T. styx*) would not be surprising.

Etymology. — *Thelphusula styx* is named after the river Styx, the subterranean river that flows through the Underworld in Greek mythology.

#### ACKNOWLEDGEMENTS

The author is grateful to Professor Dr. L.B. Holthuis for loan of the specimen described in the present paper, and critically reading the manuscript, as well as to Dr. P. Chapman for making available relevant field notes. Thanks are also due to Dr. P. Chapman and Mr. S. Yussof for sharing their observations of cavernicolous crabs, and to Dr. Danièle Guinot for her comments about the troglobitic condition in crabs.

#### REFERENCES

- Borradaile, L.A., 1900. On a small collection of decapod crustaceans from freshwaters in North Borneo. — Proc. Zool. Soc. Lond., 1900: 93-95.
- Bott, R., 1970. Die Süßwasserkrabben von Europa, Asien, Australien und ihre Stammesgeschichte. Eine Revision der Potamoidea und Parathelphusoidea. (Crustacea, Decapoda). — Abh. Senckenberg. Naturf. Ges. 526: 1-338, pls. 1-58.
- Chapman, P., 1984. The invertebrate fauna of the caves of Gunung Mulu National Park. — Sarawak Mus. J., Kuching, n.s., 30 (51): 1-18, pls. 1-4.
- Holthuis, L.B., 1979. Cavernicolous and terrestrial decapod crustacea from northern Sarawak, Borneo. — Zool. Verh., 171: 1-47, Pls. 1-8.
- Holthuis, L.B., 1986. Decapoda: 589-615. In: L. Botosaneanu (ed.): Stygofauna Mundi. A faunistic, distributional, and ecological synthesis of the World fauna inhabiting subterranean waters (including the Marine Interstitial): i-vi + 1-740, Leiden.
- Ng, P.K.L. & R. Goh, 1987. Cavernicolous freshwater crabs (Crustacea Decapoda, Brachyura) from Sabah, Borneo. — Stygologia, 3 (4): 313-330, pls. 1-3.