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A NEW SPECIES OF FRESHWATER CRAB OF THE GENUS *GEOTHELPHUSA* STIMPSON, 1858 (CRUSTACEA, DECAPODA, BRACHYURA, POTAMIDAE) FROM TAIWAN

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***ABSTRACT.* –** A new species of potamid freshwater crab of the genus *Geothelphusa* (Potamidae) is reported from the Sun-Moon Lake in central Taiwan. This species is similar to *G. olea* and *G. candidiensis*, but the shape of the male first gonopod is very diagnostic and easily distinguishes it. The present new species is also the first Taiwanese potamid known from lacustrine habitats.

***KEY WORDS.* –** Freshwater crab, new species, Potamidae, *Geothelphusa*, Taiwan.

INTRODUCTION

The freshwater crabs of Taiwan were first studied by de Man (1914) when he described *Candidiopotamon rathbunae* (as *Potamon rathbuni*) from Sun-Moon Lake in central Taiwan. However, the freshwater crabs of Taiwan were largely neglected and up to 1985, only six species were known (Miyake & Chiu, 1965; Minei, 1973; Hwang & Mizue, 1985). During the last decade, the present author has actively studied the freshwater crabs of Taiwan, and currently 34 species (Shy et al, 1994; Tan & Liu, 1998; Shy et al., 2000) are known.

The present new species, *Geothelphusa leeae*, the 35th species of freshwater crab known from Taiwan, was collected from Sun-Moon Lake (Fig. 1), which is the largest lake in Taiwan and is at an altitude of 748m above sea level (Chen & Wang, 1997). Only two freshwater crabs, namely *C. rathbunae* and *G. candidiensis* Bott, 1967, have been known from nearby this lake previously. These two species mainly inhabit the peripheral streams of the lake and are seldom found in the main lake. *Geothelphusa leeae*, however, occurs only in the main lake and is also the only freshwater crab in Taiwan with lacustrine tendencies. Furthermore, it could only be collected from shallow areas of the lake during the night. In the day they are probably living in the deeper parts of the lake.

Geothelphusa leeae is mostly similar to *G. candidiensis* Bott, 1967, and *G. olea* Shy, Ng and Yu, 1994, from western Taiwan. However, the shapes of the carapace and gonopods easily separate them. The morphological characters of this species and comparisons with *G. olea* and *G. candidiensis* form the basis of the present study. Specimens examined are deposited in the Graduate School of Fisheries, National

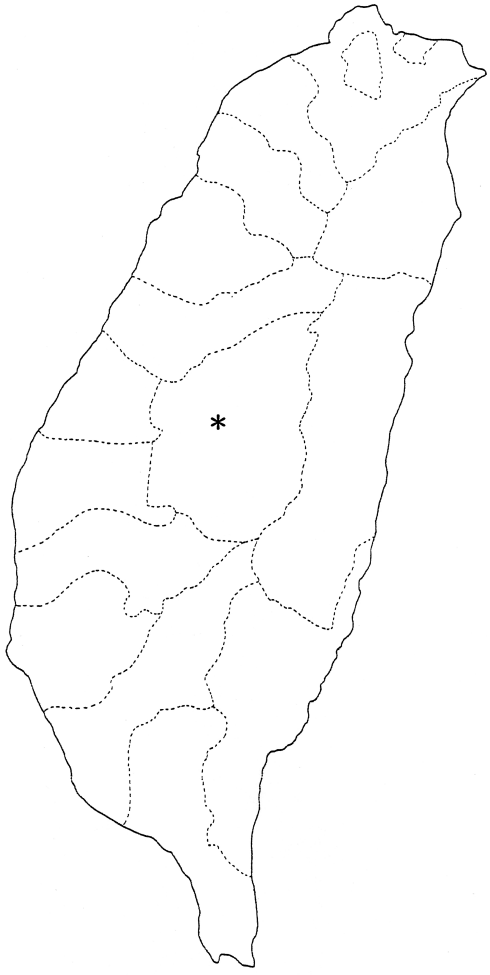

Fig. 1 The type locality of *Geothelphusa leeae* in Taiwan.

Taiwan Ocean University (NTOU), Keelung, Taiwan, and Zoological Reference Collection (ZRC) of the Raffles Museum, National University of Singapore. The abbreviations G1 and G2 are used for the male first and second gonopods respectively.

TAXONOMIC ACCOUNT

Geothelphusa leeae new species
(Figs. 2, 3)

Material examined. – Holotype - 1 male, 22.7 by 18.2 mm(NTOU F10986), Nantow county: Sun-Moon Lake, , coll. K. Lee & C. L. Lee, Oct. 6. 1999.

Paratypes – Nantow county: Sun-Moon Lake - 1 female (19.4 by 15.8 mm) Nantow county: Sun-Moon Lake, coll. K. Lee & C. L. Lee, Oct. 6. 1999. (NTOU F10987), coll. K. Lee & C. L. Lee, Oct. 6. 1999. 1 male (17.2 by 14.1mm) Nantou county: Sun-Moon Lake, coll. K. Lee & C. L. Lee, Oct. 6. 1999. (ZRC), coll. K. Lee & C. L. Lee, Oct. 6. 1999.

Others –Nantow county: Sun-Moon Lake - 3 males (27.8 by 21.8 mm, 23.3 by 20.7 mm and 22.7 by 18.6 mm), 3 females (24.3 by 20.0 mm, 23.5 by 19.1 mm and 23.0 by 18.7 mm) Nantow county: Sun-Moon Lake, coll. J. Y. Shy & K. Lee, Mar. 11. 2005. (NTOU F11020)

Diagnosis. – Carapace smooth, moderately convex longitudinally and transversely. Carapace length and width 1.6 times and 2.0 times of carapace depth, respectively. Frontal region faintly divided into 2 lobes; supraorbital cristae smooth, without granules; infraorbital cristae smooth to almost smooth, sometimes lined with very low granules. External orbital angle sharp. Anterolateral crista distinct, lined with small granules; epibranchial tooth small, just discernible. Postorbital crista rough, with striae. Frontal, orbital, branchial and anterolateral regions covered with weak striae; gastric, cardiac and intestinal regions smooth. Cervical groove faint; H-shaped median gastro-cardiac depression distinct. Posterior margin of epistome with sharp median projection. Distance between tip of closed male abdomen and anterior margin of thoracic sternite 4 about 1.5 times length of thoracic sternites 1-3. External margin of palm smooth; fingers of right chela forming ovate gape when closed. Ambulatory legs of normal length; total length of second leg about 2.0 times carapace length; length of merus about 3.9 times maximum width. Telson of male abdomen bell-shaped. G1 with subterminal segment moderately curving outwards, outer proximal margin with tooth, inner proximal margin moderately dilated; terminal segment straight, distal one-third slender, with spinules and setae; total length of G1 7.0 times of terminal segment; length of synovial membrane about 3.0 times maximum width. G2 with outer proximal margin of basal segment dilated, faintly divided into 2 lobes; distal segment short, about 0.16 times total length.

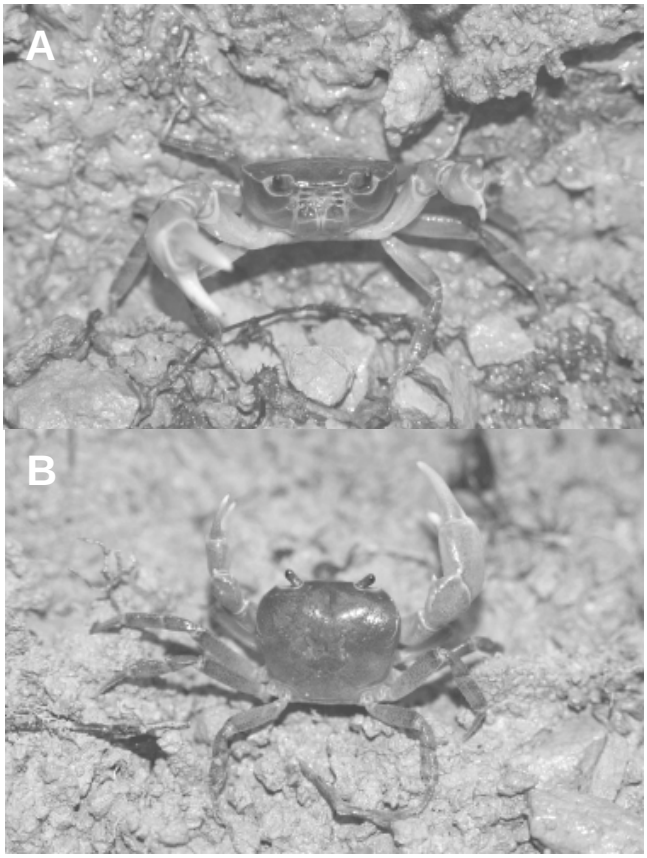

Fig. 2. The morphology of *Geothelphusa leeae*. (A: frontal view. B: dorsal view.)

Colouration. – Carapace and ambulatory legs greenish to orange, sometimes ambulatory legs covered with scattered darker coloured stripes.

Habitat. – Probably in burrows along the banks of the lake under the water.

Size. – Largest male 27.1 by 21.8 mm (NTOU F11020); largest female 24.3 by 20.0 mm (NTOU F11020).

Distribution. – Nantow County, central Taiwan.

Etymology. – The species is named after Miss Kari Lee of the National Taiwan Ocean University, Department of Fishery Science, Crustacean Laboratory, all for her help to find this species.

Remarks. – Although Sun-Moon Lake is a natural freshwater lake at an altitude of about 750m above sea level, this lake experiences a daily tide. During the day, the water is allowed to flow out of conduits into a lower altitude pond to generate hydroelectric power; and the water level gradually decreases. About at midnight, the company utilizes the excess electric power to pump water up from this pond back into Sun-Moon Lake; and the water level rises back up. Under these special conditions, we have been able to find *G. leeae* only at midnight (i.e. at lowest tide). At this time, we can also find many burrows along the bank which we believe have been dug by the crabs.

Of the known *Geothelphusa* species in Taiwan, *G. olea* (Fig. 4) is most similar to the present new species but there are some distinct morphological differences between them,

Table 1. Morphological characteristics and differences between *G. olea* and *G. leeae*.

Characteristics	*G. olea*	*G. leeae*
Body size	Large (CW≥34.5 mm)	Medium (CW≥25.1 mm)
Infraorbital crista	Without trace of granules	With low granules
External orbital angle	Blunt	Sharp
Posterior margin of epistome	Stout	Sharp
G1 L/W	4.1	3.4
G1 Synovial membrane L/W	5.0	3.0
G1 L/TSL	7.5	7.0
G2 Outer proximal margin of basal segment	1 lobe	2 lobes
G2 DSL/L	0.20	0.16

L: length. W: width. TSL: Terminal segment length. DSL: Distal segment length.

notably in the carapace and gonopods (Table 1). The most obvious difference is the body size of *G. leeae*, which is smaller than *G. olea*. Although we have only 9 specimens of *G. leeae*, the female specimen is already fully mature. Specimens of *G. olea*, the size of this female as *G. leeae* is still immature. Another possible difference is their habitat. Although both species live in burrows, their specific habitats are rather different. *Geothelphusa olea* lives in burrows along the banks of streams above the water, but *G. leeae* seems to prefer to be underwater. So far, this species is the only lake habitat species of freshwater crab in Taiwan.

Geothelphusa candidiensis (Fig. 5) is also similar to present new species, but we can distinguished by several characters. The major differences are: the epibranchial tooth is small but very clear in *G. candidiensis*, but is faint in *G. leeae*; the G1 outer proximal margin is without a tooth in *G. candidiensis* but there is a distinct tooth in *G. leeae*; and the G1 subterminal segment is almost straight in *G. candidiensis* but directed outwards in *G. leeae*.

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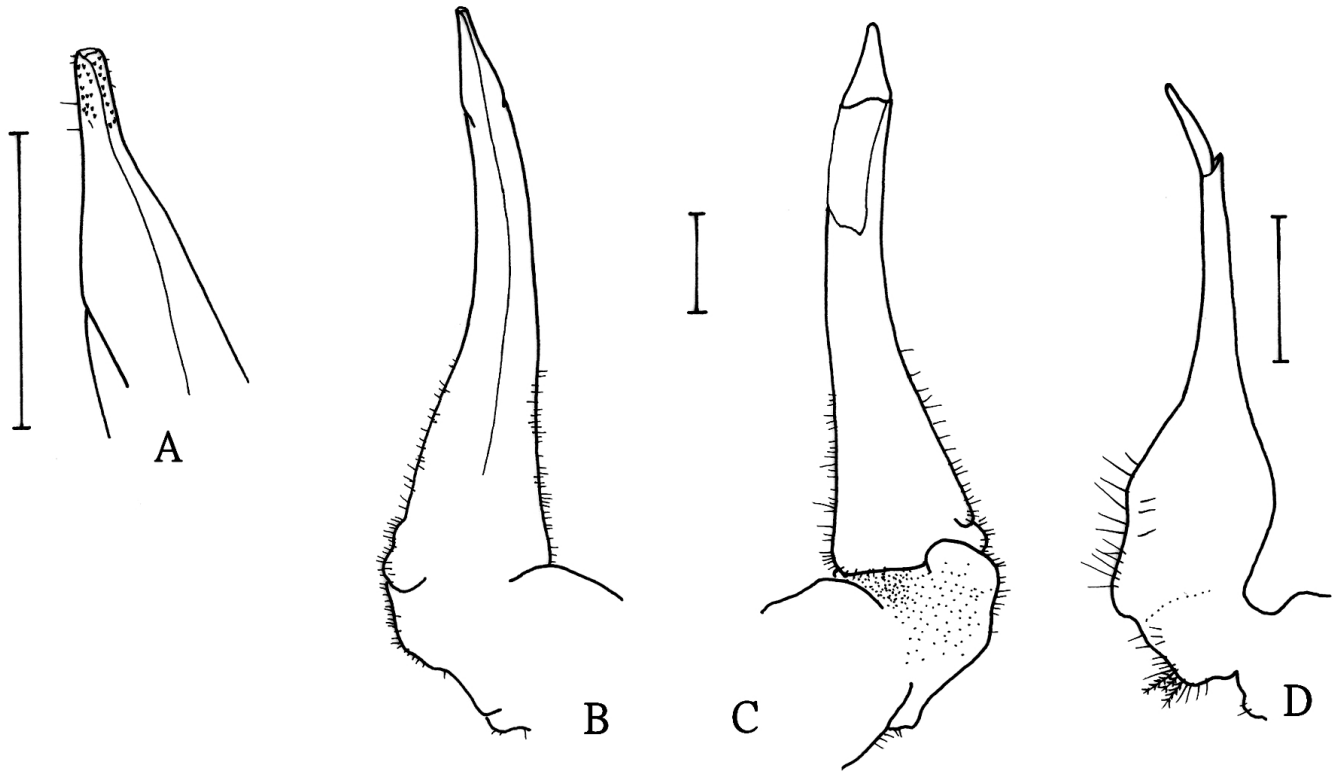

Fig. 3. Gonapods of *Gelthelphusa leeae*. A: ventral view of right G.1 terminal segment. B: ventral view of right G1. C: dorsal view of right G1. D: ventral view of right G2. (scale = 1.0 mm)

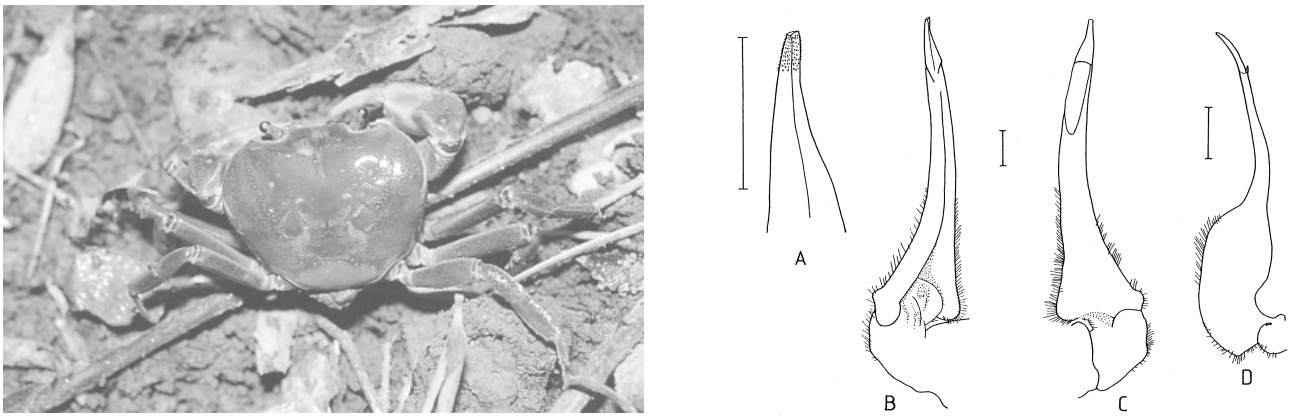

Fig. 4. Dorsal carapace view and gonopods of *Geothelphusa olea*. A: ventral view of right G.1 terminal segment. B: ventral view of right G1. C: dorsal view of right G1. D: ventral view of right G2. (dorsal view from Shy & Yu, 1999; gonopods from Shy, 1994; scale = 1.0 mm)

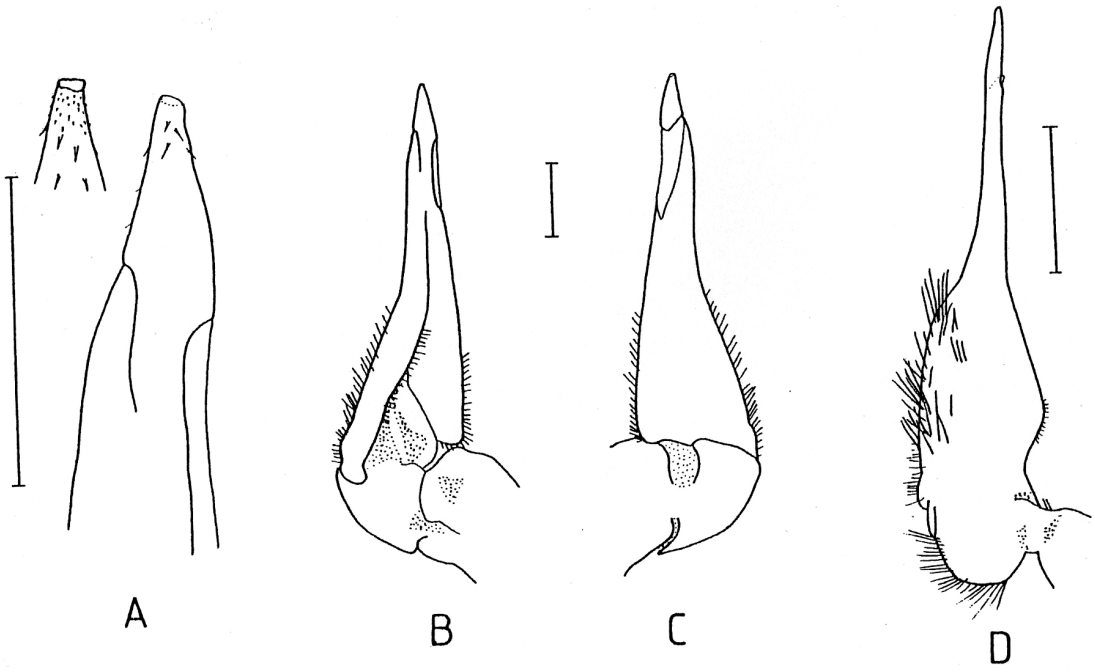

Fig. 5. Gonopods of *Geothelphusa candidiensis*. A: ventral view of right G.1 terminal segment. B: ventral view of right G1. C: dorsal view of right G1. D: ventral view of right G2. (gonopods from Shy, 1994; scale = 1.0 mm)

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