

ON TWO NEW SPECIES OF FRESHWATER CRABS (CRUSTACEA: DECAPODA: BRACHYURA: POTAMIDAE) FROM SOUTHERN TAIWAN

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ABSTRACT. – Two new species of freshwater crabs of the genus *Geothelphusa* Stimpson, 1858, are described from Pingtung county in southern Taiwan, viz. *G. shernshan* and *G. lili*. *G. shernshan* is a medium-sized species (ca. 30 mm carapace width) and occurs about 400 meters above sea level. *Geothelphusa lili* is a relatively small species obtained from 120 meters above sea level. Both species are diagnosed and figured, and comparisons with allied species are provided.

KEY WORDS. – New freshwater crabs, Potamidae, *Geothelphusa*, Taiwan.

INTRODUCTION

The freshwater crabs of Taiwan are currently represented by 35 species (Shy et al., 1994; Tan & Liu, 1998; Chen et al., 1998; Shy & Yu, 1999; Shy et al., 2000; Chen et al., 2003; Shy, 2005). In Shy and Yu's monograph (1999), the genus *Candidiopotamon* was placed in the family Sinopotamidae with *Nanhaipotamon* in the Isolapotamidae. However, Dai (1999) and Ng et al. (2001) regarded these two families as junior synonyms of the Potamidae. As such, the freshwater crabs of Taiwan now consists of just two families and four genera, viz., Potamidae: *Nanhaipotamon*, *Geothelphusa*, *Candidiopotamon* and Parathelphusidae: *Somanniathelphusa*.

The present paper describes two new potamid crabs, *Geothelphusa shernshan*, new species, and *G. lili*, new species, from Pingtung county in southern Taiwan (Fig. 1). Therefore, there are now 34 species in to the genus *Geothelphusa* from Taiwan.

MATERIALS AND METHODS

Specimens examined are deposited in the Graduate School of Fishery Sciences, National Taiwan Ocean University (NTOU), Keelung, Taiwan. Department of Biological

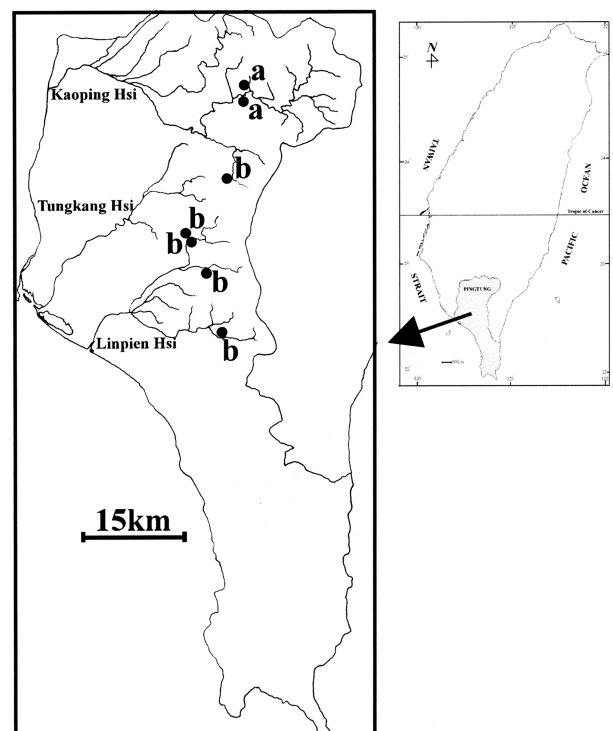


Fig. 1. The locality of *Geothelphusa shernshan*, new species (a) and *G. lili*, new species (b) in Taiwan.

Sciences, National Sun Yat-sen University (SYSU), Kaohsiung, Taiwan. The scanning electron microscopy (SEM) techniques to observe the male first gonopod were modified from Felgenhauer (1987). The abbreviations G1 and G2 are used for the male first and second gonopods, respectively.

The measurements and terms used in this study essentially follow those used by Ng (1988), Shy et al. (1994) and Dai (1999).

TAXONOMY

Geothelphusa shernshan, new species

(Figs. 2A, B, 5)

Material examined. – Holotype - male (29.5 by 22.5mm) (NTOU F000101), Wutai, Pingtung county, coll. W.J. Chen, C.F. Tseng & C.Y. Lian, 2 Feb. 2000.

Paratypes – 1 male (31.4 by 23.5 mm), 1 female (NTOU F000201), same data as holotype; 2 males, 2 females (larger female 30.6 by 23.2 mm) (NTOU F001001), Wutai, Pingtung county, coll. W.J. Chen & C.F. Tseng, 7 Oct. 2000; 3 males (larger male 24.3 by 18.5 mm) (NTOU F011201), Wutai, Pingtung county, coll. W.J. Chen, 2 Dec. 2001.

Diagnosis. – Carapace with some fine pits, width and length about 2.2 and 1.7 times depth; width about 1.3 times length; frontal width about 0.3 times carapace width (Table 1). Gastric region smooth, anterolateral region, epigastric region and branchial regions swollen. Postorbital cristae faint, orbital and frontal regions distinctly concaved, divided into 2 lobes. Anterolateral crista distinct, epibranchial tooth almost absent. Cervical groove shallow, faint. H-shaped gastric groove very distinct. Posterolateral margin broadly rounded, with several shortly, transverse fine striae. Posterior epistomal margin sinuous, median lobe acutely triangular (Fig. 2A).

Abdomens of male and female with 7 distinct segments (including telson); in male, length of telson 0.6 times width, longer than 6th, as in female (Table 2). Distance between tip of male abdomen and anterior margin of thoracic sternite 4 about 2 times of that between sternites 1-3.

Chelipeds unequal, in large chela, outer surface of palm smooth, upper margin length 0.6 times length of dactylus, height 0.5 times length of chela (Table 3). Length of dactylus 0.7 times that of chela. Fingers with obliquely triangular gape when closed, without conspicuous cutting teeth. Carpus of large chela with 1 large spine on inner-upper surface and a small one below it. Inner surface of merus of chelipeds glabrous, outer surface with fine striae.

Ambulatory legs slender, glabrous, except dactylus and propodus; second longest, last shortest. In last 2 segments of right second ambulatory leg, width of propodus 0.4 times length, 0.3 times length of dactylus length; length of propodus 0.9 times dactylus length (Table 4). Dactylus with a row of

4-9 spines on each of 4 longitudinal margins, propodus with 2 ventral rows of 4-6 spines.

G1 slender (Fig. 5). Subterminal segment curved outwards at base; outer proximal margin with tooth, inner proximal margin dilated, both proximal margins with plumose setae, prominently on inner proximal margin. Terminal segment of G1 straight, slightly curved upwards, distal scales are sparsely distributed and has 2-3 rings of small spines (Fig. 3A). Total length of G1 5.4 times of terminal segment length, 3.4 times subterminal segment width. Terminal segment length of G1 2.6 times width, synovial membrane length 3.7 times width (Figs. 3D, 5C). Basal segment of G2 broad. Distal segment of G2 straight, flat, directed upwards, length 0.2 times of total G2 length (Fig. 5D).

Coloration. – Carapace dark brown, with upper surfaces of ambulatory legs, subhepatic region light brown. Fingers of chelipeds and abdomen whitish, sometimes orange, with all joints of ambulatory legs and chelipeds usually yellowish-orange (Figs. 2A, B).

Habitat. – Lives in shallow burrows under boulders near stream.

Etymology. – The species is named after its type locality and the name is used as a noun in apposition.

Remarks. – With regards to the adult body size, colour type, distribution, and general G1 form, *G. shernshan* is perhaps closest to *G. neipu* Chen, Cheng & Shy, 1998. However, these two species can easily be distinguished in the form of the G1 terminal segment. In *G. shernshan* (Figs. 3A, D), the G1 terminal segment distal scales are more sparsely distributed than in *G. neipu* (Fig. 3B, E); in *G. shernshan*, the total length of the G1 is 5.4 times the terminal segment length, but is 7 times in *G. neipu* (Shy et al., 2000:148); and in *G. shernshan*, the length of the G1 terminal segment is 2.6 times the width, but only 1.9 times of that in *G. neipu* (Shy et al., 2000:148). Although *G. neipu* is also closely allied to *G. pingtung* Tan & Liu, 1998 (Shy et al., 2000:149; Ng et al., 2001), we can distinguish *G. pingtung*, *G. neipu* and *G. shernshan* easily when mature males (cw > 30.0 mm) are available. In *G. neipu*, the G1 terminal segment distal scales are more sparsely distributed than in *G. pingtung* (Fig. 3B, C). The posterior border of the carapace (pc) of *G. pingtung* (cw/pc mean \pm SE = 2.8 ± 0.04 , n = 5) is also wider than *G. neipu* (cw/pc mean \pm SE = 3.0 ± 0.05 , n = 5). As such *G. pingtung* is more quadrate than *G. neipu*.

Distribution. – Wutai township, Pingtung county, southern Taiwan (present study).

Geothelphusa lili, new species

(Figs. 2C,D, 6)

Material examined. – Holotype - male (20.1 by 15.5 mm) (NTOU F000701), Laii, Pingtung county, coll. W.J. Chen, 26 Jul. 2000.

Table 1. Measurements and proportions of carapace of *Geothelphusa shernshan* new species, *G. lili* new species, and allied species.

	<i>G. shernshan</i>		<i>G. neipu</i> *		<i>G. lili</i>		<i>G. ferruginea</i>	
	male	female	male	female	male	female	male	female
Carapace length (Cl)	22.5	23.2	28.1	27.9	15.5	14.9	16.5	12.5
Carapace width (Cw)	29.5	30.6	35.5	35.4	20.1	18.7	21.1	16.5
Carapace depth (Cd)	13.5	14.8	16.9	17.2	8.8	8.1	9.3	6.9
Front width (Fw)	8.2	7.8	10.1	9.6	6.6	6.2	7.0	5.7
Front-orbital width (Fow)	19.2	19.1	23.1	22.9	14.6	13.0	15.2	11.6
Cl/Cw	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Cd/Cl	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.6
Fw/Fow	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.5
Fw/Cw	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4

*after Shy et al. (2000)

Paratypes – 4 females (largest female 18.7 by 14.9 mm)(NTOU F000701), same data as holotype; 2 males, 2 females (NTOU F001001), Laii, Pingtung county, coll. W.J. Chen & C.F. Tseng, 15 Oct. 2000.

Others – 1 male (18.5 by 15.1 mm)(NTOU F010101), Laii, Pingtung county, coll. W.J. Chen & C.F. Tseng, 1 Jan. 2001. 1 male, 3 females (largest female 20.0 by 15.4 mm) (SYSU F01122802), Machia, Pingtung county, coll. W.J. Chen, 28 Oct. 2001. 2 males, 1 female (largest male 18.3 by 14.1 mm) (SYSU F02010601), Sandimen,

Pingtung county, coll. W.J. Chen, 6 Jan. 2002. 2 males, 1 female (largest male 20.2 by 16.1mm) (SYSU F010217), Taiwu, Pingtung county, coll. W.J. Chen & C.F. Tseng, 17 Feb. 2001.

Diagnosis. – Carapace with fine pits, width and length about 2.3 and 1.8 times depth; width about 1.3 times length; frontal width about 0.3 times carapace width (Table 1). Gastric region smooth, anterolateral and posterolateral regions with striae. Postorbital crista faint, orbital and frontal region gently

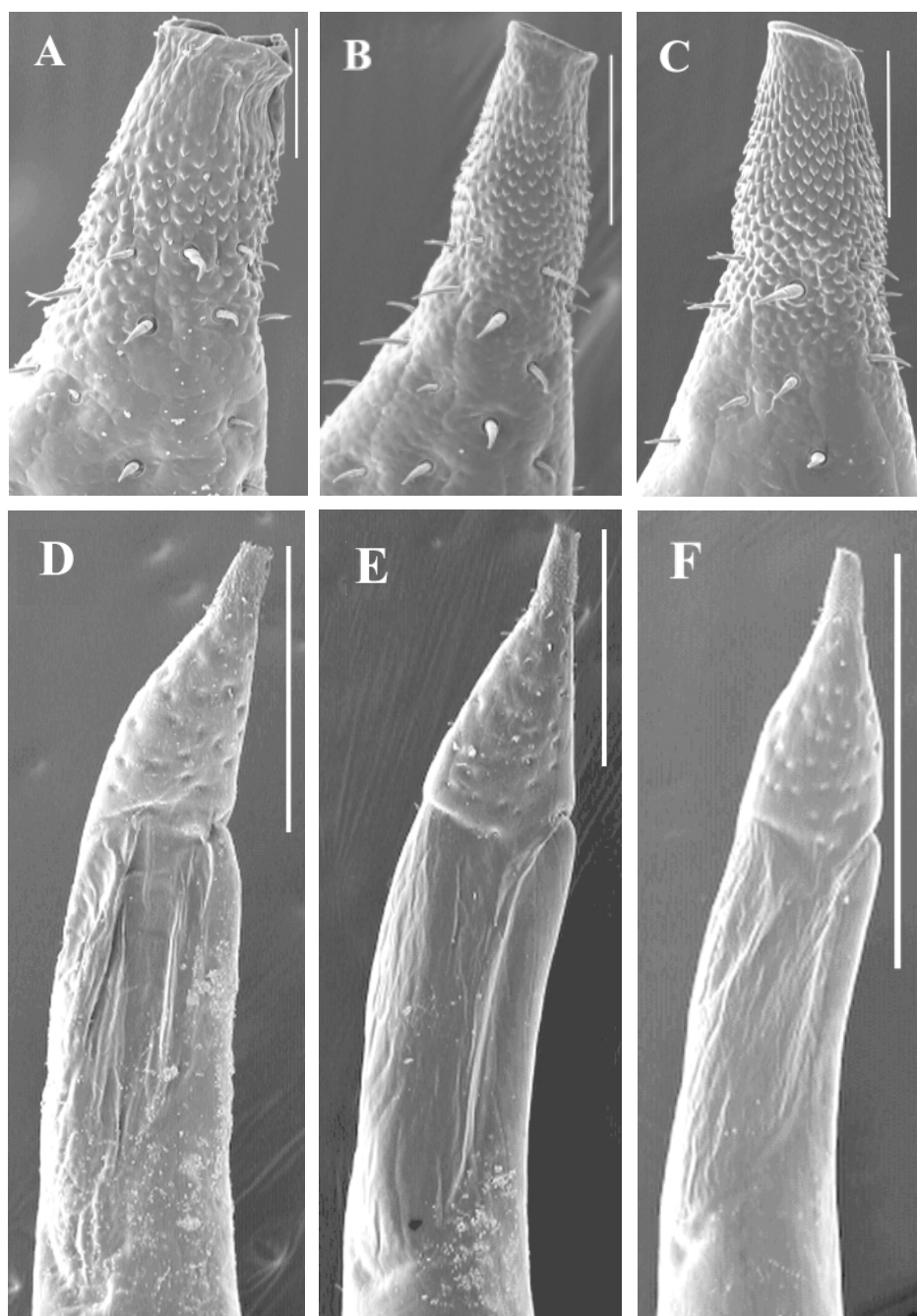


Fig. 2, A-B: *Geothelphusa shernshan*, new species. Holotype male, 29.5 by 22.5 mm (NTOU F000101). C-D: *G. lili*, new species. Holotype male, 20.1 by 15.5 mm (NTOU F000701). A, C: dorsal view ; B, D: frontal view.

Table 2. Measurements and proportions of the last two segments of abdomen of *Geothelphusa shernshan* new species, *G. lili* new species, and allied species.

	<i>G. shernshan</i>		<i>G. neipu</i> *		<i>G. lili</i>		<i>G. ferruginea</i>	
	male	female	male	female	male	female	male	female
Carapace width (Cw)	29.5	30.6	35.5	35.4	20.1	18.7	21.1	16.5
Length of telson (L7)	4.0	5.3	5.5	6.4	3.3	3.6	3.5	2.6
Width of telson (W7)	6.4	12.0	7.8	14.2	4.3	6.7	4.2	4.8
Length of 6th segment (L6)	3.5	5.0	4.7	6.8	2.6	3.2	2.8	2.5
Width of 6th segment (W6)	8.2	15.7	9.2	20.0	5.1	9.8	5.7	6.8
L7/W7	0.6	0.4	0.7	0.5	0.8	0.5	0.8	0.5
L7/W6	0.5	0.3	0.6	0.3	0.6	0.4	0.6	0.4
L7/L6	1.1	1.0	1.2	0.9	1.3	1.1	1.3	1.0
L6/W6	0.4	0.3	0.5	0.3	0.5	0.3	0.5	0.4

*after Shy et al. (2000)

Fig. 3. A, D: *Geothelphusa shernshan*, new species. Paratype male, 24.3 by 18.5 mm (NTOU F011201). B, E: *G. neipu*. Paratype male, 34.1 by 26.4 mm (NTOU F001004). C, F: *G. pingtung*. Paratype male, 35.9 by 28.9 mm (NTOU F001005). All dorsal view of G1, A - C: terminal segment; D - F: synovial membrane. Scale, A = 100 μm; B,C = 200 μm; D,E = 1 mm; F = 2 mm.

concaved, divided into 2 lobes. Anterolateral crista distinct, epibranchial tooth absent, lined with small granules. Cervical groove shallow, faint. H-shaped gastric groove is distinct. Posterior epistomal margin sinuous, median lobe not acutely triangular.

Abdomens of male and female with 7 distinct segments (including telson); in male, length of telson 0.8 times width, longer than 6th, as in female (Table 2). Distance between tip of male abdomen and anterior margin of thoracic sternite 4 about 0.9 times of sternites 1-3.

Chelipeds unequal, in large chela, outer surface of palm smooth, upper margin length 0.7 times length of dactylus, height 0.6 times length of chela (Table 3). Length of dactylus 0.7 times that of chela. Fingers forming obliquely triangular gape when closed, with faint cutting teeth. Carpus of large chela with 1 large spine on inner, upper surface and a subequal one below it. Inner and outer surfaces of merus with fine striae.

Ambulatory legs slender, with simple setae; second longest, last shortest. Second ambulatory leg about 1.8 times carapace length. In last 2 segments of right second ambulatory leg, width of propodus 0.4 times length, 0.4 times the length of dactylus; length of propodus 0.8 times dactylus (Table 4). Dactylus and propodus with a row of 3 - 9 spines on each of 4 longitudinal margins.

G1 subterminal segment straight; outer proximal margin with faint tooth and inner proximal margin dilated, both proximal margins with plumose setae, especially on inner proximal

margin (Fig. 6). Terminal segment of G1 straight, slightly curved outwards, 4-5 rings of distal scales are distributed and subterminal has sparsely small spines (Figs. 4A, B). Total length of G1 5.5 times of terminal segment length, 3.0 times of subterminal segment width. Terminal segment length of G1 2.8 times of its width, synovial membrane length 4.6 times of its width (Fig. 4A). Distal segment of G2 straight, flat, directed upwards, length 0.2 times of total length (Fig. 6D).

Coloration. – Carapace and upper surface of ambulatory legs dark brown, but posterior half of carapace slightly dark green. Dorsal part of outer and inner surfaces of cheliped purple (Figs. 2C, D).

Habitat. – Lives under boulders near springs.

Etymology. – The species is named after its type locality and the name is used as a noun in apposition.

Remarks. – This species is allied to *G. ferruginea* Shy, Ng & Yu, 1994, but it can be distinguished by the following aspects: in *G. lili*, the G1 synovial membrane length is 4.6 times its width, but 3.8 times in *G. ferruginea* (Shy, Ng & Yu, 1994: 783); in *G. lili*, terminal segment of G1 straight and slightly curves outwards but in *G. ferruginea* it curves inwards towards the median part of the sternum (Figs. 4A, C; 6B, C); in *G. lili*, the total length of the G1 is 5.5 times the terminal segment length, but 6.0 times in *G. ferruginea* (Shy, Ng & Yu, 1994: 783).

Distribution. – Northern Pingtung county, southern Taiwan (present study).

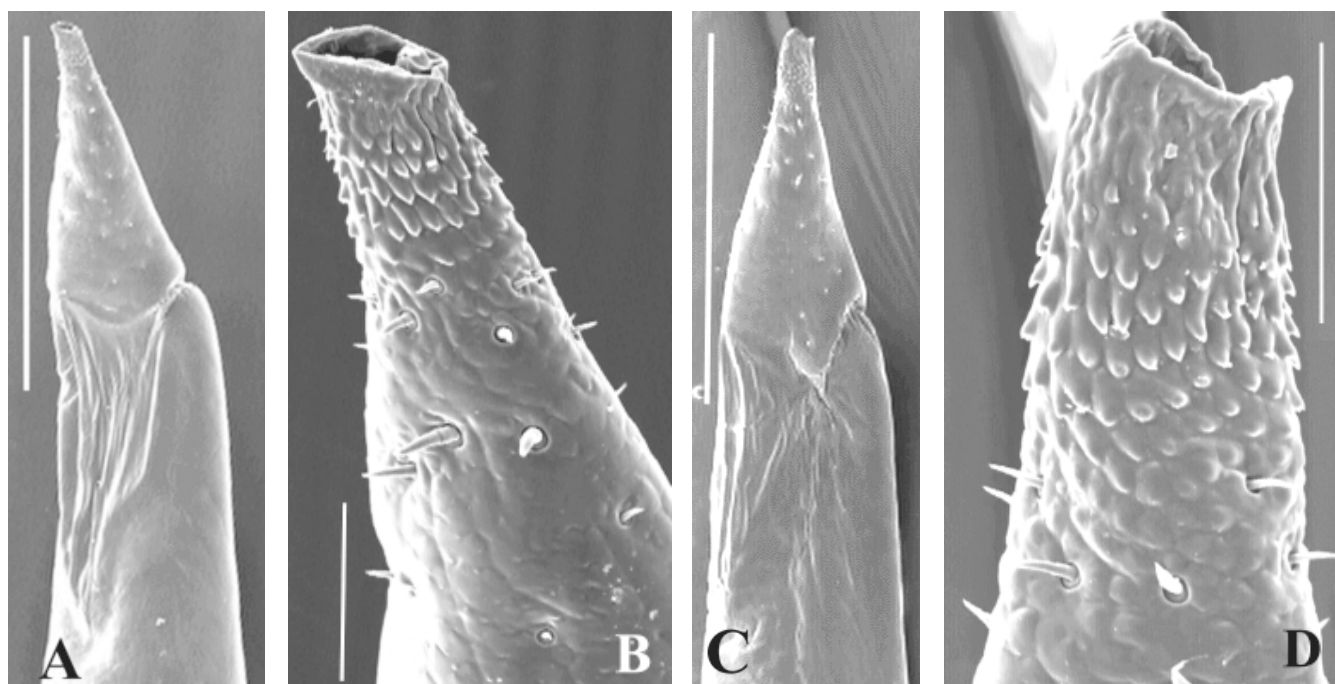


Fig. 4, A, B: *Geothelphusa lili*, new species. Paratype male, 18.5 by 15.1 mm (NTOU F010101). C, D: *G. ferruginea*. Paratype male, 20.8 by 16.5 mm (NTOU F020601). All dorsal view of G1; B, D: terminal segment; A, C: synovial membrane. Scale, A, C = 1 mm; B, D: 100 μ m.

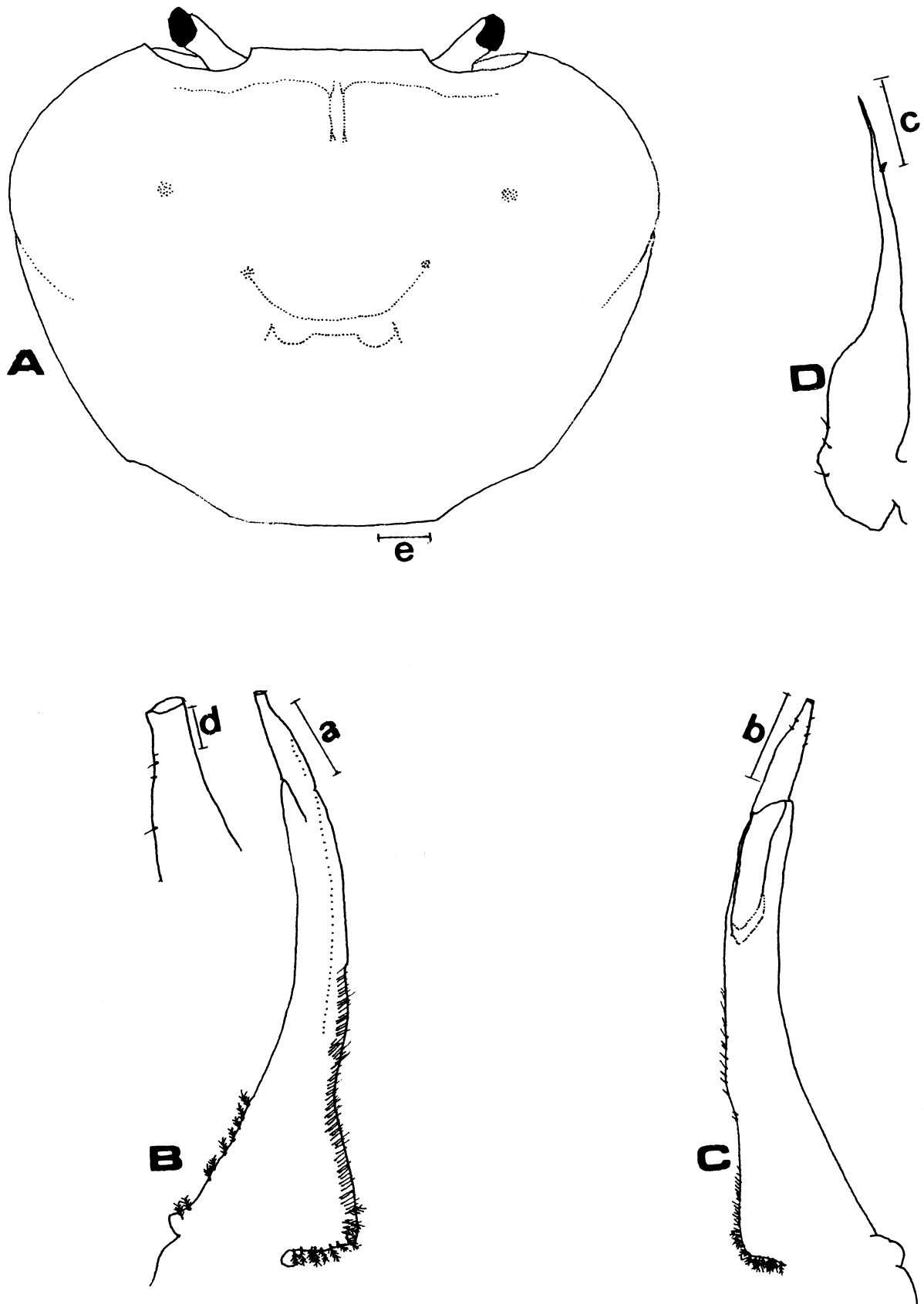


Fig. 5, *Geothelphusa shernshan*, new species. Holotype male, 29.5 by 22.5 mm (NTOU F000101). A: carapace; B: ventral view of right G1; C: dorsal view of right G1; D: ventral view of right G2; e: ventral view of right G1 terminal segment. Scale: a – c = 1 mm, d = 0.1 mm, e = 3 mm.

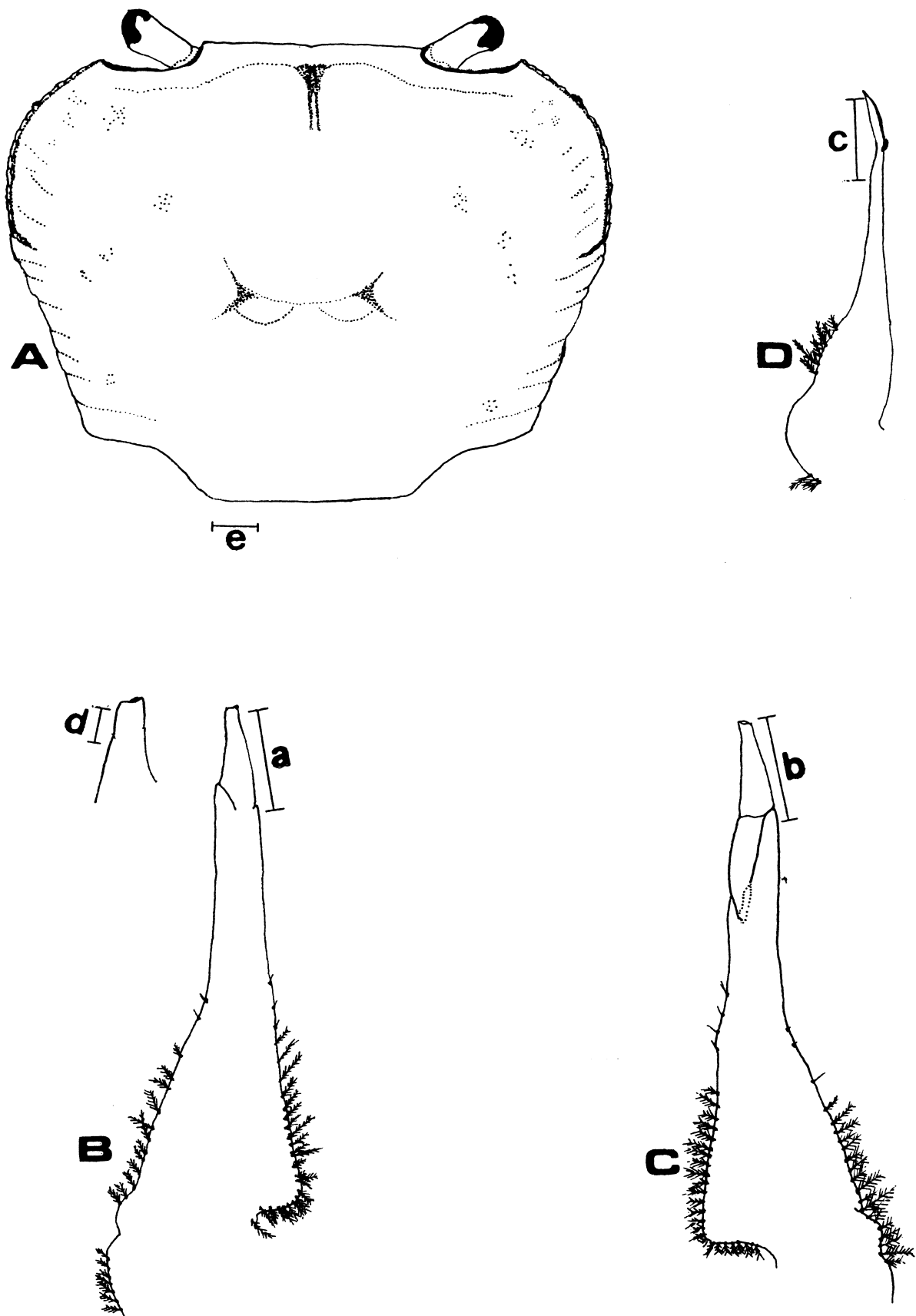


Fig. 6, *Geothelphusa lili*, new species. Holotype male, 20.1 by 15.5 mm (NTOU F000701). A: carapace; B: ventral view of right G1; C: dorsal view of right G1; D: ventral view of right G2; d: ventral view of right G1 terminal segment. Scale: a – c = 1 mm, d = 0.1 mm, e = 1.5 mm.

Table 3. Measurements and proportions of the large chelae of *Geothelphusa shernshan* new species, *G. lili* new species, and allied species.

	<i>G. shernshan</i>		<i>G. neipu</i> *		<i>G. lili</i>		<i>G. ferruginea</i>	
	male	female	male	female	male	female	male	female
Carapace width (Cw)	29.5	30.6	35.5	35.4	20.1	18.7	21.1	16.5
Length of palm (Lp)	11.9	7.8	12.8	10.4	7.1	3.8	5.2	4.0
Height of palm (Hp)	14.3	9.5	17.1	13.9	9.3	4.8	7.8	5.0
Length of dactylus (Ld)	19.2	12.5	23.5	19.7	10.7	5.9	8.9	5.8
Length of chela (Lch)	26.1	19.5	31.4	27.1	16.3	10.2	13.6	9.6
Lp/Hp	0.8	0.8	0.7	0.7	0.8	0.8	0.7	0.8
Lp/Ld	0.6	0.6	0.5	0.5	0.7	0.6	0.6	0.7
Hp/Lch	0.5	0.5	0.5	0.5	0.6	0.5	0.6	0.5
Ld/Lch	0.7	0.6	0.7	0.7	0.7	0.6	0.7	0.6

*after Shy et al. (2000)

Table 4. Measurements and proportions of the last two segments of the second ambulatory legs of the *Geothelphusa shernshan* new species, *G. lili* new species, and allied species.

	<i>G. shernshan</i>		<i>G. neipu</i> *		<i>G. lili</i>		<i>G. ferruginea</i>	
	male	female	male	female	male	female	male	female
Carapace width (Cw)	29.5	30.6	35.5	35.4	20.1	18.7	21.1	16.5
Length of propodus (Lp)	9.4	8.7	11.1	10	5.7	6.0	6.4	5.6
Width of propodus (Wp)	3.3	3.0	3.8	3.7	2.4	2.5	2.8	2.5
Length of dactylus (Ld)	10.9	10.7	13.0	13.2	6.9	7.3	7.9	6.5
Wp/Lp	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4
Lp/Ld	0.9	0.8	0.9	0.8	0.8	0.8	0.8	0.9
Wp/Ld	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4

*after Shy et al. (2000)

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