

**CRABS OF THE GENUS *GEOTHELPHUSA* STIMPSON, 1858
(CRUSTACEA: DECAPODA: BRACHYURA: POTAMIDAE)
FROM TAIWAN, WITH DESCRIPTIONS OF
25 NEW SPECIES**

Jhy-Yun Shy, Peter K. L. Ng and Hsiang-Ping Yu

ABSTRACT. - Twenty-eight potamid crabs of the genus *Geothelphusa* are reported from Taiwan. Of these, 25 are described as new, most of which have restricted distributions and occur in relatively low altitudes (less than 1000 m above sea level). Of the new species, only *G. olea* has a relatively wide distribution in western Taiwan, while *G. eurysona*, *G. monticola* and *G. takuan* are found only in altitudes between 1000 to 2000 m above sea level.

CONTENTS

Introduction	782
Material and methods	782
Taxonomy	783
<i>Geothelphusa</i> Stimpson, 1858	783
Key to the Taiwanese species of <i>Geothelphusa</i>	786
<i>Geothelphusa caesia</i> , new species	789
<i>Geothelphusa ancylorhynchus</i> , new species	789
<i>Geothelphusa chiui</i> Minei, 1974	792
<i>Geothelphusa albopilva</i> , new species	794
<i>Geothelphusa wangi</i> , new species	796
<i>Geothelphusa eucrinodonta</i> , new species	799
<i>Geothelphusa wutai</i> , new species	801
<i>Geothelphusa tsayae</i> , new species	801
<i>Geothelphusa bicolor</i> , new species	803
<i>Geothelphusa miyazakii</i> (Miyake & Chiu, 1965)	805
<i>Geothelphusa candidiensis</i> Bott, 1967	807
<i>Geothelphusa ferruginea</i> , new species	809
<i>Geothelphusa tali</i> , new species	811
<i>Geothelphusa dolichopodes</i> , new species	813
<i>Geothelphusa taroko</i> , new species	815
<i>Geothelphusa monticola</i> , new species	815

J.-Y. Shy, H.-P. Yu - Graduate School of Fishery Science, National Taiwan Ocean University, Keelung, Taiwan, Republic of China. **P.K.L. Ng** - Department of Zoology, National University of Singapore, Kent Ridge, Singapore 0511, Republic of Singapore.

<i>Geothelphusa gracilipes</i> , new species	818
<i>Geothelphusa eurysoma</i> , new species	820
<i>Geothelphusa yangmingshan</i> , new species	823
<i>Geothelphusa takuan</i> , new species	823
<i>Geothelphusa lanyu</i> , new species	825
<i>Geothelphusa nanhsi</i> , new species	827
<i>Geothelphusa tawu</i> , new species	829
<i>Geothelphusa lutao</i> , new species	829
<i>Geothelphusa cinerea</i> , new species	832
<i>Geothelphusa nanao</i> , new species	834
<i>Geothelphusa ilan</i> , new species	837
<i>Geothelphusa olea</i> , new species	837
Acknowledgements	840
Literature cited	840

INTRODUCTION

The freshwater crabs of Taiwan have been studied by a number of workers, notably de Man (1914), Parisi (1916), Miyake & Chiu (1965), Bott (1967, 1968a, b, 1969, 1970), Minei (1974), and Hwang & Mizue (1985). Six species in four genera and two families, viz. Potamidae: *Candidiopotamon rathbuni* (de Man, 1914), *Nanhaipotamon formosanum* (Parisi, 1916), *Geothelphusa miyazakii* (Miyake & Chiu, 1965), *G. candidiensis* Bott, 1967, *G. chiui* Minei, 1974, and Parathelphusidae: *Somanniathelphusa taiwanensis* Bott, 1968, are now known at present from Taiwan. The genus *Candidiopotamon* had been placed in the family Sinopotamidae, and *Nanhaipotamon* in the Isolapotamidae (Bott, 1970), but both families are here regarded as junior synonyms of the Potamidae (Ng, 1988; Ng & Dudgeon, 1992).

In recent years, the authors and their colleagues have made extensive collections of freshwater crabs throughout Taiwan. On examination of these, 31 species in four genera are now known to occur in Taiwan. The majority, 28, belong to the genus *Geothelphusa* Stimpson, 1858, of which 25 are here described as new.

In the present study, all the species belonging to the genus *Geothelphusa* in Taiwan are revised.

MATERIAL AND METHODS

Most of the specimens were collected by hand, or with nets, traps and spades in various rivers, streams and springs throughout Taiwan. The specimens examined are deposited in the Graduate School of Fishery Science, National Taiwan Ocean University (NTOU), Keelung, Taiwan; Taiwan Museum (TMCD), Taipei, Taiwan; Department of Life Sciences, National Tsing Hua University (CHCD), Hsinchu, Taiwan, and the Zoological Reference Collection (ZRC), Department of Zoology, National University of Singapore.

The measurements provided are of the carapace width and length respectively. The abbreviations G1 and G2 are used for the male first and second pleopods (gonopods) respectively. The terms used in this study essentially follow those used by Ng (1988).

For the G1, the ratios used include the total length divided by the carapace length (TL/CL), terminal segment length (TL/TSL); terminal segment length divided by width (TSL/

TSW); and synovial membrane length divided by width (SML/SMW). The ratios of the total G1 length divided by the distal segment length of the G2 (TL/FAL) are provided (Table 1).

Table 1. The G1 and G2 ratios of 28 *Geothelphusa* species of Taiwan. G1, first gonopod; G2, second gonopod; TL, total length; SW, subterminal segment width TSL, terminal segment length; TSW, terminal segment width; SML, synovial membrane length; SMW, synovial membrane width; FAL, distal segment length.

Character	G1			G2	
	Species	TL/SW	TL/TSL	TSL/TSW	SML/SMW
<i>G. caesia</i>	3.4	5.5	2.2	5.3	0.16
<i>G. ancylophallus</i>	3.0	4.8	3.8	4.4	0.21
<i>G. chiui*</i>	-	6.3	-	6.0	-
<i>G. albogilva</i>	3.2	6.0	3.4	8.8	0.21
<i>G. wangi</i>	3.8	5.9	2.5	5.2	0.12
<i>G. eucrinodonta</i>	3.0	6.4	2.3	2.6	0.23
<i>G. wutai</i>	3.4	5.6	2.8	2.7	0.20
<i>G. tsayae</i>	3.0	6.3	2.4	3.0	0.13
<i>G. bicolor</i>	2.9	5.2	2.9	4.2	0.11
<i>G. miyazakii</i>	3.3	7.8	2.2	2.9	0.15
<i>G. candidiensis</i>	3.3	6.7	1.9	4.0	0.14
<i>G. ferruginea</i>	3.9	6.0	2.1	3.8	0.12
<i>G. tali</i>	3.5	6.6	2.2	3.3	0.12
<i>G. dolichopodes</i>	3.2	6.2	2.3	5.0	0.19
<i>G. taroko</i>	3.1	6.6	2.2	4.2	0.13
<i>G. monticola</i>	3.3	6.1	3.0	3.8	0.15
<i>G. gracilipes</i>	3.3	6.4	2.4	3.3	0.12
<i>G. eurysona</i>	2.9	4.9	2.6	3.1	0.13
<i>G. yangmingshan</i>	3.0	5.5	3.1	3.6	0.16
<i>G. takuan</i>	3.0	6.8	1.9	3.5	0.12
<i>G. lanyu</i>	3.1	7.4	2.1	2.6	0.16
<i>G. nanhsi</i>	3.4	7.1	2.3	3.2	0.17
<i>G. tawu</i>	2.9	5.1	2.7	3.6	0.15
<i>G. lutao</i>	3.0	5.7	1.9	2.7	0.17
<i>G. cinerea</i>	3.3	6.4	3.5	3.5	0.14
<i>G. nanao</i>	3.3	8.0	2.3	3.2	0.17
<i>G. ilan</i>	3.3	5.8	2.6	3.2	0.17
<i>G. olea</i>	4.1	7.5	2.9	5.0	0.20

* after Minei (1974)

TAXONOMY

FAMILY POTAMIDAE ORTMANN, 1896

Geothelphusa Stimpson, 1858

Geothelphusa Stimpson, 1858: 100; Miers, 1886: 214; Ortmann, 1897: 300; Rathbun, 1898: 27; Bott, 1967: 211; Bott, 1970: 154.

Potamon (*Geothelphusa*) - Rathbun, 1905: 200; Alcock, 1910: 59; Kemp, 1913: 298; Balss, 1937: 167; Sakai, 1965: 174.

Type species. - *Geothelphusa obtusipes* Stimpson, 1858, by subsequent designation by Rathbun (1898).

Diagnosis. - Carapace oval-shaped, appears rounded, dorsal surfaces almost smooth or slightly rugose. Epigastric and postorbital cristae absent or very low. Anterolateral margin strongly convex, cristate or appears smooth, rounded; epibranchial tooth small, sometimes absent; Third maxilliped with distinct flagellum, not extending beyond with of merus. Male abdomen triangular. G1 long, slender or slightly stout, groove for G2 ventral, subterminal segment very gradually tapering from relatively broad base, terminal segment usually cone-shaped, tapered, straight, curved inwards, upwards or outwards, much shorter than one third length of subterminal segment, synovial membrane distinct. G2 with distal segment shorter than half length of basal segment.

Distribution. - Taiwan, Ryukyu Islands and Japan.

Remarks. - The genus *Geothelphusa* was erected by Stimpson (1858) for two species, *G. dehaani* (White, 1847) and *G. obtusipes* Stimpson, 1858. The type species was not indicated. Rathbun (1898) fixed the type species as *Geothelphusa obtusipes* Stimpson, 1858. The genus was characterised by the carapace being rounded, smooth, the anterolateral margins convex, and the epigastric and postorbital cristae absent or almost so (Stimpson, 1858, 1907). *Geothelphusa* has however, frequently been used merely as a subgenus of *Potamon*. In any event, with the then understanding of the genus, many more species have been referred to it since Rathbun (1898), including species from Africa. Bott (1967, 1970) resurrected *Geothelphusa* as a distinct genus, redefining it for species with a slender sword-shaped G1, the groove for the G2 being ventral, and the terminal segment cone-shaped. He recognised three species and one subspecies, all from Japan, Taiwan and the nearby islands, viz. *G. obtusipes* Stimpson, 1858 (Ryukyu Islands), *G. dehaani dehaani* (White, 1847) (Japan), *G. dehaani candidiensis* Bott, 1967 (Taiwan) and *G. levicervix* (Rathbun, 1898) (Ryukyu Islands). Minei (1973) revised the Japanese members of this genus, resurrecting *Potamon* (*Geothelphusa*) *sakamotoanus* Rathbun, 1905, as a distinct species. Bott (1967) originally regarded this taxon as a subspecies of *G. dehaani*, but he later (Bott, 1970) synonymised it with *G. obtusipes*. Minei (1973) recognised a total of eight species in the genus - *G. obtusipes*, *G. dehaani*, *G. sakamotoana*, *G. levicervix*, *G. tenuimana* (Miyake & Minei, 1965) (Okinawa, Ryukyus), *G. miyazakii* (Miyake & Chiu, 1965) (Iriomote and Taiwan), *G. candidiensis* (as a distinct species) and *G. aramotoi* Minei, 1973 (Okinawa, Ryukyus). Bott (1970: 155, in addendum) regarded *G. tenuimana* as a synonym of *G. levicervix* but Minei (1973) argued for its separation, a view which the present authors fully agree with. Another species, *G. chiui* Minei, 1974, was later described from Taiwan. Minei (1968) presented some general ecological data on Japanese *Geothelphusa*. Suzuki & Sato (1994) figured *G. dehaani*, *G. obtusipes*, *G. sakamotoana*, *G. levicervix* and an undescribed *Geothelphusa* from Kagoshima, southern Japan, providing notes on their ecology. Suzuki & Tsuda (1994) described the Kagoshima species (*Geothelphusa exigua*) subsequently. Hwang & Mizue (1985) describes and provides detailed figures of what they identified as *G. chiui*, *G. candidiensis* and *G. miyazakii* from Taiwan, including the male and female abdomens and their third maxilliped features. Yamaguchi & Baba (1993) discussed the types of *G. dehaani* in his review of the Japanese crabs studied by De Haan.

Shen (1932) reported a male of *Potamon* (*Geothelphusa*) *dehaani* from Shantung (northern China) but his record has not been substantiated. This record was not listed by Bott (1967, 1970). Shen's figures however, show a species which has a different carapace and G1 from any known *Geothelphusa*. The carapace of Shen's specimen resembles some

species of *Sinopotamon* but the G1 tip is very slender and tapering, unlike known *Sinopotamon* or other mainland Chinese genera. Bott (1967) lists specimens of *Geothelphusa dehaani* from Yentempo and Tsingtao in China, but in his record of distribution, he writes "Küste von China (?)" (Bott, 1967: 212), reflecting his doubt about their identities. A detailed re-examination will probably show that the mainland Chinese specimens belong to another genus and species. The genus *Geothelphusa* is thus not reliably known outside Japan, Ryukyus and Taiwan.

The records of *G. miyazakii* and *G. candidiensis* from the Ryukyu Islands by Minei (1973) almost certainly do not belong to these species. We have examined specimens from Japan previously referred to *G. miyazakii* and *G. candidiensis* and they actually represent undescribed species. These taxa will be described at a later date when the potamid fauna of the Ryukyus is revised.

The genus *Geothelphusa* Stimpson, 1858, as presently defined, contains 35 described species (Table 2).

Table 2. List of known *Geothelphusa* species

<i>Geothelphusa albogilva</i> , new species (Taiwan)
<i>Geothelphusa ancyliphallus</i> , new species (Taiwan)
<i>Geothelphusa aramotoi</i> Minei, 1973 (Ryukyus)
<i>Geothelphusa bicolor</i> , new species (Taiwan)
<i>Geothelphusa caesia</i> , new species (Taiwan)
<i>Geothelphusa candidiensis</i> Bott, 1967 (Taiwan)
<i>Geothelphusa chiui</i> Minei, 1974 (Taiwan)
<i>Geothelphusa cinerea</i> , new species (Taiwan)
<i>Geothelphusa dehaani</i> (White, 1847) = <i>Cancer (Thelphusa) berardi</i> De Haan, 1835 (Japan)
<i>Geothelphusa dolichopodes</i> , new species (Taiwan)
<i>Geothelphusa eucrinodonta</i> , new species (Taiwan)
<i>Geothelphusa eurysoma</i> , new species (Taiwan)
<i>Geothelphusa exigua</i> Suzuki & Tsuda, 1994
<i>Geothelphusa ferruginea</i> , new species (Taiwan)
<i>Geothelphusa gracilipes</i> , new species (Taiwan)
<i>Geothelphusa ilan</i> , new species (Taiwan)
<i>Geothelphusa lanyu</i> , new species (Taiwan)
<i>Geothelphusa levicervix</i> (Rathbun, 1898) (Ryukyus)
<i>Geothelphusa lutao</i> , new species (Taiwan)
<i>Geothelphusa miyazakii</i> (Miyake & Chiu, 1965) (Taiwan)
<i>Geothelphusa monticola</i> , new species (Taiwan)
<i>Geothelphusa nanao</i> , new species (Taiwan)
<i>Geothelphusa nanhsi</i> , new species (Taiwan)
<i>Geothelphusa obtusipes</i> Stimpson, 1858 (type species) (Ryukyus)
<i>Geothelphusa olea</i> , new species (Taiwan)
<i>Geothelphusa sakamotoanus</i> (Rathbun, 1905) (Ryukyus)
<i>Geothelphusa takuan</i> , new species (Taiwan)
<i>Geothelphusa tali</i> , new species (Taiwan)
<i>Geothelphusa tawu</i> , new species (Taiwan)
<i>Geothelphusa tenuimana</i> (Miyake & Minei, 1965) (Ryukyus)
<i>Geothelphusa tsayae</i> , new species (Taiwan)
<i>Geothelphusa taroko</i> , new species (Taiwan)
<i>Geothelphusa wangi</i> , new species (Taiwan)
<i>Geothelphusa wutai</i> , new species (Taiwan)
<i>Geothelphusa yangmingshan</i> , new species (Taiwan)

KEY TO THE TAIWANESE SPECIES OF *GEOTHELPHUSA*

1. Anterolateral margin faintly cristate, cristae sometimes indistinct, with margin appearing smooth, rounded 2
Anterolateral margin distinctly cristate 6
2. Epibranchial tooth low to very low, but visible; branchial region distinctly swollen (Kaohsiung, southern Taiwan) *G. caesia*
Epibranchial tooth absent; branchial region gently convex or appears almost flat .. 3
3. Total length of second ambulatory leg 2.0 times carapace length; G1 subterminal segment strongly curving outwards (Kaohsiung, southern Taiwan)
..... *G. ancylorhynchus*
Total length of second ambulatory leg less than 2.0 times carapace length; G1 subterminal segment gently curving outwards, with the tip sometimes directed upwards 4
4. G1 subterminal and terminal segments curving outwards (Hsinchu, western Taiwan)
..... *G. chiui*
G1 subterminal segment gently curving outwards, terminal segment slightly curved inwards or upwards 5
5. Carapace very high, width to height ratio 1.9; G1 terminal segment slender, length to width ratio about 3.4 (Pingtung, southern Taiwan). *G. albobilva*
Carapace width to high ratio 2.0; G1 terminal segment length to width about 2.5 (Ilan, northeastern Taiwan) *G. wangi*
6. Anterolateral margin lined with small rounded granules 7
Anterolateral margin not lined with small rounded granules, or if present, very low and indistinct 14
7. Epibranchial tooth present 8
Epibranchial tooth absent or very faint 10
8. Dorsal surface of carapace flat, width to height ratio 2.3; epibranchial tooth well developed, distinct; outer proximal margin of G1 subterminal segment with a distinct tooth (Taipei, northern Taiwan) *G. eucrinodonta*
Dorsal surface of carapace gently convex, width to height ratio 2.1; epibranchial tooth small; outer proximal margin of G1 entire, without tooth or if present, low and indistinct 9
9. Anterolateral region covered with well developed, distinct striae; G1 subterminal segment curving inwards; G2 total length about 5.4 times length of distal segment (Wutai, southern Taiwan) *G. wutai*
Anterolateral region covered with fine striae; G1 subterminal segment straight; G2 total length about 7.7 times length of distal segment (Kaohsiung, Pingtung, southern Taiwan) *G. tsayae*
10. Dorsal surface of carapace gently convex, width to height ratio 2.1; G1 terminal segment slender, length to width ratio 2.9 (Hwalien, eastern Taiwan) *G. bicolor*

- Dorsal surface of carapace almost flat, width to height ratio 2.2 or more; G1 terminal segment relatively stout, length to width ratio less than 2.4 11
11. Ambulatory legs lined with long, thin hairs, in life, with distinct orange and purple banding; G1 S-shaped (Taipei, Keelung and Ilan, northern Taiwan)...*G. miyazakii*
Ambulatory legs lined with thick or thin short hairs, in life legs not distinctly banded; G1 slightly sinuous or almost straight 12
12. Dorsal surface of carapace flat, width to height ratio 2.2; total length of second ambulatory leg about 1.9 times carapace length; G1 terminal segment short, length to width ratio 1.9 (Taipei to Nantow, western Taiwan)*G. candidiensis*
Dorsal surface of carapace almost flat, width to height ratio more than 2.2, total length of second ambulatory leg more than 2.0 times carapace length; G1 terminal segment length to width ratio more than 2.1 13
13. Carapace width to height ratio 2.3; tip of medium lobe of epistome rounded; total length of second ambulatory 2.1 times carapace length; G1 straight (Pingtung, Southern Taiwan)*G. ferruginea*
Carapace flat, width to high ratio 2.4; tip of medium lobe of epistome sharp; total length of second ambulatory leg 2.0 times carapace length; G1 gently sinuous (Ilan, northeastern Taiwan) *G. tali*
14. Ambulatory legs long, total length of second ambulatory legs more than 2.2 times carapace length 15
Ambulatory legs relatively shorter, total length of second ambulatory less than 2.2 times carapace length 16
15. Anterolateral region covered with with fine striae; G1 subterminal and terminal segments straight, inner proximal margin dilated (Hwalien, eastern Taiwan)
.....*G. dolichopodes*
Anterolateral region covered with small, low, rounded granules; G1 slightly S-shaped, inner proximal margin not dilated, terminal segment gently curving outwards (Hwalien, eastern Taiwan) *G. taroko*
16. Ambulatory legs slender, length of second ambulatory merus more than 4.5 times width 17
Ambulatory legs relatively stouter, length of second ambulatory merus less than 4.2 times width 19
17. Carapace width to length ratio 1.3; G1 subterminal segment slightly S-shaped, terminal segment straight, high montane species (ca. 2000 m above sea level) (Taichung, middle Taiwan)*G. monticola*
Carapace width to length ratio 1.4; G1 subterminal segment straight or curving outwards; montane species (ca. 1000-1500 m above sea level) 18
18. G1 straight, total length about 6.4 times length of short terminal segment (Hwalien, eastern Taiwan)*G. gracilipes*
G1 curving inwards, total length about 4.9 times length of slender terminal segment (Taichung, middle Taiwan) *G. eurysoma*

19. Ambulatory legs slender, length of second ambulatory merus more than 4.0 times width 20
 Ambulatory legs stout, length of second ambulatory merus less than 4.0 times width 21
20. Dorsal surface of carapace smooth, convex, external orbital angle acutely triangular, sharp; G1 sinuous (Taipei, northern Taiwan) *G. yangmingshan*
 Dorsal surface of carapace rough, flat, external orbital angle triangular, stout; G1 straight or slight curving inwards 22
21. Anterolateral margin rough, lined with with ridges or small, rounded granules 23
 Anterolateral margin somewhat rough, with or without faint ridges 25
22. Epibranchial tooth low, faint, anterolateral region of carapace without ridges (Taoyuan, northwestern Taiwan) *G. takuan*
 Epibranchial tooth absent, anterolateral region of carapace with ridges (Lanyu, southeastern island) *G. lanyu*
23. Dorsal surface of carapace convex, width to height ratio 2.0, epibranchial tooth faint; ambulatory legs lined with short, thick short hairs (Tainan, southeastern Taiwan) *G. nanhsi*
 Dorsal surface of carapace gently flat, width to high ratio 2.2, epibranchial tooth absent; ambulatory legs lined with thin short hairs 24
24. Outer proximal margin of G1 subterminal segment with tooth, terminal segment slender, length to width ratio 2.7 (Taitung, southeastern Taiwan) *G. tawu*
 Outer proximal margin of G1 subterminal segment entire, without tooth, terminal segment stout, length to width ratio 1.9 (Lutao, southeastern island) *G. lutao*
25. External orbital angle acutely triangular, sharp; G1 straight, inner proximal margin slightly dilated, terminal segment slender, length to width ratio 3.5 (Hwalien and Taitung, eastern Taiwan) *G. cinerea*
 External orbital angle triangular, stout; G1 curving inwards or outwards, outer proximal margin dilated, terminal segment length to width ratio less than 3.5 26
26. Dorsal surface of carapace almost flat, width to height ratio 2.2; G1 subterminal segment almost straight, terminal segment slightly curving outwards *G. nanao*
 Dorsal surface of carapace convex, width to height ratio 2.0; G1 subterminal segment gently curving outwards, terminal segment gently curving outwards or inwards 27
27. Distance between tip of male abdomen and anterior margin of sternite 4 about 2.0 times that of length of sternites 1-3; G1 terminal segment gently curving outwards, ratio of total length to terminal segment length 5.8, synovial membrane length to width ratio 3.2 *G. ilan*
 Distance between tip of male abdomen and anterior margin of sternite 4 about 1.4 times that of length of sternites 1-3; G1 terminal segment slight curving inwards, ratio of total length to terminal segment length 7.5, synovial membrane length to width ratio 5.0 (Taipei to northern Kaohsiung, western Taiwan) *G. olea*

Geothelphusa caesia, new species

(Fig. 1)

Material examined. - Holotype - Male, 32.2 by 24.8 mm (NTOU F10022), KAOHSIUNG HSIEN: Chiahsien, coll. J.Y. Shy & W.L. Tsay, 6.viii.1992.

Paratypes - KAOHSIUNG HSIEN: Chiahsien - 2 females (NTOU F10018), coll. H.P. Yu, 13.vii.1982; 1 male, 2 females (NTOU F10019), coll. H.P. Yu, 17.iv.1983; 1 male, 1 female (NTOU F10021), coll. J.Y. Shy & W.L. Tsay, 6.viii.1992.

Others - KAOHSIUNG HSIEN: Meinung - 1 male (NTOU F10020), coll. J.Y. Shy & P.H. Ho, 8.v.1992; 1 female (TMCD 2845), coll. J.T. Lin, 9.viii.1992; 3 males (TMCD 2846), coll. J.T. Lin, 26.xi.1992; 1 male (TMCD 2849), coll. J.T. Lin, 27.v.1993.

Diagnosis. - Carapace smooth, anterolateral margin with faint, smooth crista and very small epibranchial tooth. Cervical groove shallow, faint. Branchial region flat. Carapace length 1.6 times longer than deep. Tip of medium lobe of epistome stout. Sternites 1-3 long, about 1.9 times length between tip of male abdomen and anterior margin of sternite 4. Fingers of chela forming wide, oval gape when closed. Second ambulatory leg 2.0 times carapace length. G1 almost straight to slightly curved outwards; base of subterminal segment relatively narrow, total length about 3.8 times basal width; terminal segment almost straight, with spinules on distal one-sixth (Fig. 1c-e).

Coloration. - Anterior half of carapace bluish, posterior half and ambulatory legs yellowish.

Habitat. - Lives in burrows near small streams.

Size. - Largest male 33.8 by 26.5 mm (TMCD 2846); largest female 37.3 by 28.0 mm (NTOU F10019); smallest mature female 29.5 by 23.7 mm (NTOU F10021).

Distribution. - Southwestern Taiwan.

Remarks. - This species is allied to *G. albogilva*, but it distinguished as follows: 1. the branchial region of the carapace is flatter and the cardiac region is distinctly flattened; 2. the G1 subterminal segment is only slightly curved outwards and the synovial membrane length is about 5.3 times the width; and 3. the G2 distal segment is shorter, the total length being about 6.2 times the distal segment length (4.8 times in *G. albogilva*).

Etymology. - The name is derived from the Latin for bluish-gray, with reference to the carapace colour of the adult crabs.

Geothelphusa ancylorhynchus, new species

(Fig. 2)

Material examined. - Holotype - Male, 32.4 by 25.6 mm (NTOU F10117), KAOHSIUNG HSIEN: Neimen, Mucha, coll. J.Y. Shy & P.H. Ho, 8.v.1992.

Paratypes - KAOHSIUNG HSIEN: Neimen, Mucha, 1 male, 1 female (NTOU F10023), coll. J.Y. Shy & P.H. Ho, 8.v.1992; 3 males, 1 female (NTOU F10024), coll. J.Y. Shy & P.H. Ho, 9.v.1992.

Others - TAINAN HSIEN: Nanhsi - 1 male (NTOU F10025), coll. J.Y. Shy & P.H. Ho, 7.viii.1992.

Diagnosis. - Carapace smooth, strongly convex transversely and longitudinally, carapace length about 1.5 times depth. Anterolateral margin with smooth crista, without epibranchial tooth. Cervical groove shallow, faint. Branchial region higher than gastric region. Distance

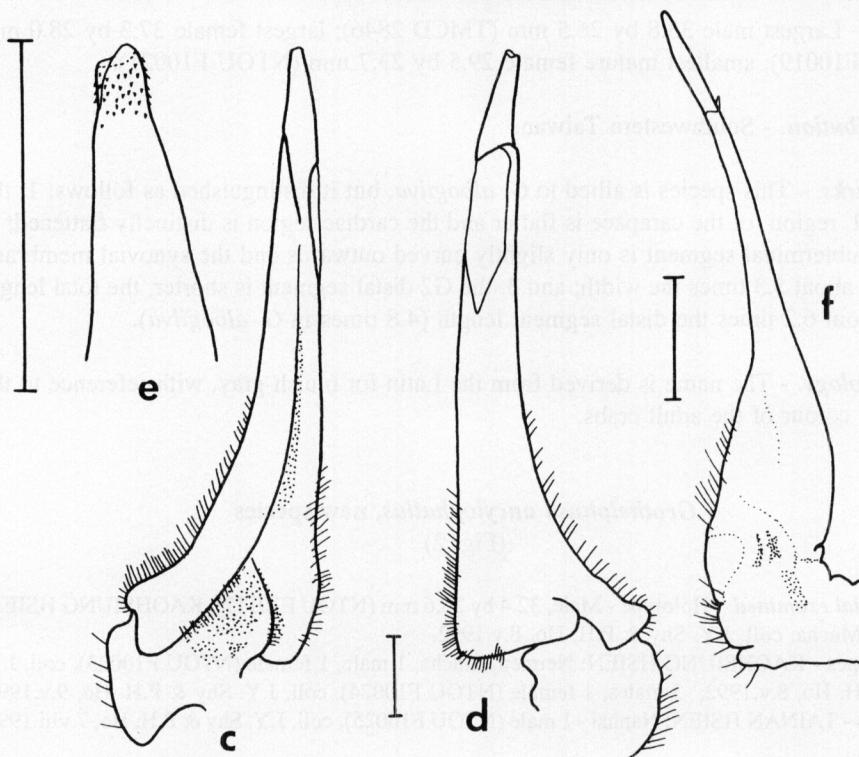
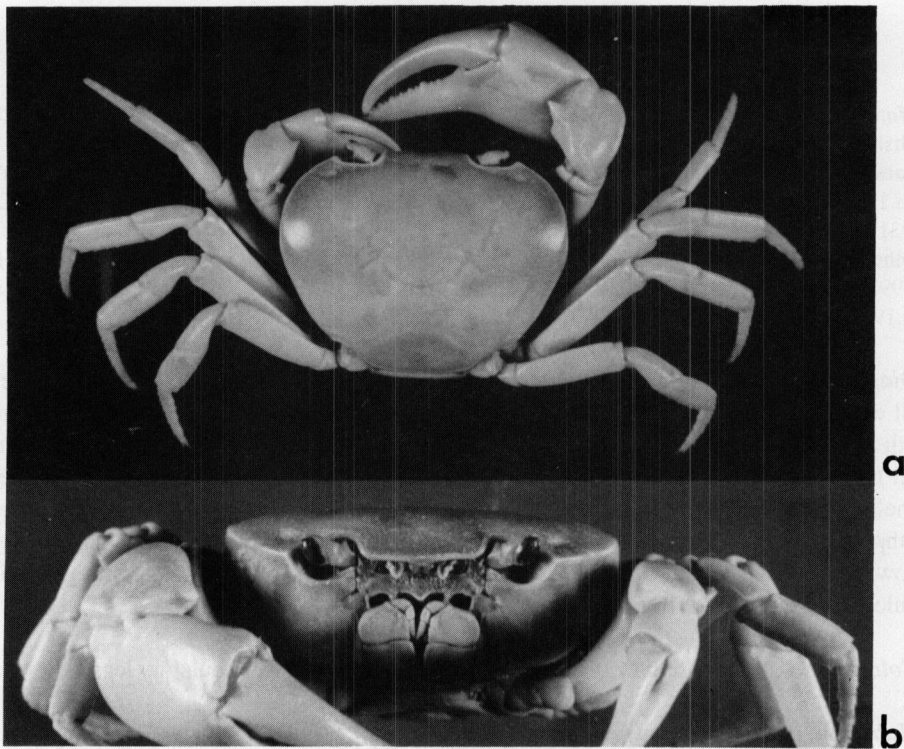


Fig. 1. *Geothelphusa caesia*, new species. Holotype male, 32.2 by 24.8 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

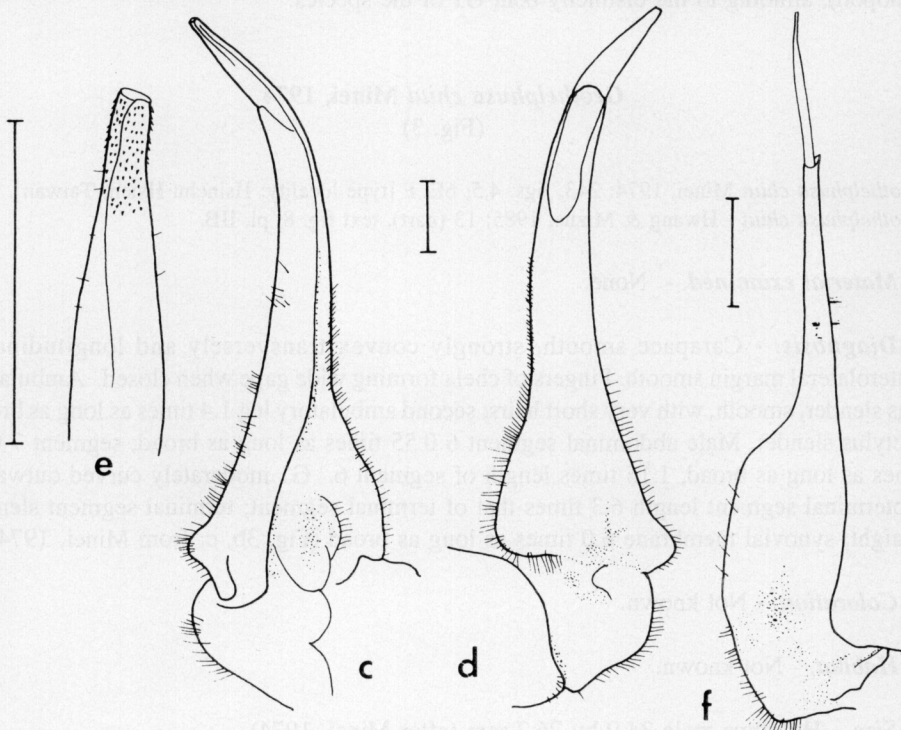
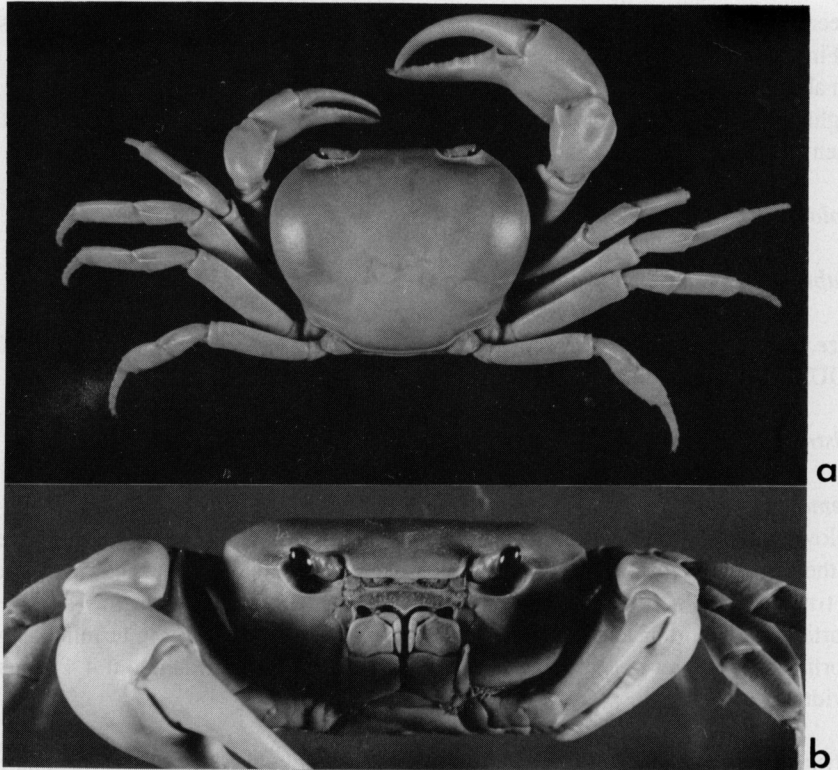


Fig. 2. *Geothelphusa ancyllophallus*, new species. Holotype male, 32.4 by 25.6 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

between tip of male abdomen and anterior margin of sternite 4 about 1.8 times of sternites 1-3. Fingers of chela forming large gape when closed. Male abdominal segment 7 short, width about 1.5 times length. G1 strongly curved upwards; terminal segment long, straight or slightly curved outwards, total length about 4.8 times length of terminal segment; terminal segment length about 3.8 times width (Fig. 2c-e).

Coloration. - Carapace and ambulatory legs generally yellowish-gray.

Habitat. - Live in burrows near streams.

Size. - Largest male 32.4 by 25.6 mm (NTOU F10117); largest female 29.9 by 24.2mm (NTOU F10023); smallest mature female 24.8 by 19.3 mm (NTOU F10024).

Distribution. - Southwestern Taiwan.

Remarks. — This species is allied to *G. albogilva* and *G. caesia*, but it can distinguished as follows: 1. the second ambulatory legs is longer, being about two times the carapace length, with the merus being more rounded in cross-section, the width about 1.6 times the height (1.8 times in *G. albogilva* and *G. caesia*); 2. the male abdominal segment 7 is proportionately shorter; and 3. the G1 is strongly curved outwards, the terminal segment is proportionately longer and the length of the synovial membrane is about 4.4 times that of the width.

Etymology. - The name is derived from the Greek “ankylos” (for bent) and “phallus” (for gonopod), alluding to the distinctly bent G1 of the species.

Geothelphusa chiui Minei, 1974

(Fig. 3)

Geothelphusa chiui Minei, 1974: 243, figs. 4,5; 6E, F [type locality: Hsinchu Hsien, Taiwan].

Geothelphusa chiui - Hwang & Mizue, 1985: 13 (part), text fig. 8, pl. IIB.

Material examined. - None.

Diagnosis. - Carapace smooth, strongly convex transversely and longitudinally. Anterolateral margin smooth. Fingers of chela forming wide gape when closed. Ambulatory legs slender, smooth, with very short hairs; second ambulatory leg 1.4 times as long as broad; dactylus slender. Male abdominal segment 6 0.55 times as long as broad; segment 7 0.78 times as long as broad, 1.15 times length of segment 6. G1 moderately curved outwards; subterminal segment length 6.3 times that of terminal segment; terminal segment slender, straight; synovial membrane 6.0 times as long as broad (Fig. 3b, c; from Minei, 1974).

Coloration. - Not known.

Habitat. - Not known.

Size. - Holotype male 34.0 by 26.7 mm (after Minei, 1974).

Distribution. - Western Taiwan (after Minei, 1974).