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# 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. eurysoma*, *G. monticola* and *G. takuan* are found only in altitudes between 1000 to 2000 m above sea level.

## CONTENTS



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## 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 (gonopds) 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 | TL/FAL |
| *G. caesia* | 3.4 | 5.5 | 2.2 | 5.3 | 0.16 |
| *G. ancylophallus* | 3.0 | 4.8 | 3.8 | 4.4 | 0.21 |
| *G. chiui** | - | 6.3 | - | 6.0 | - |
| *G. albogilva* | 3.2 | 6.0 | 3.4 | 8.8 | 0.21 |
| *G. wangi* | 3.8 | 5.9 | 2.5 | 5.2 | 0.12 |
| *G. eucrinodonta* | 3.0 | 6.4 | 2.3 | 2.6 | 0.23 |
| *G. wutai* | 3.4 | 5.6 | 2.8 | 2.7 | 0.20 |
| *G. tsayae* | 3.0 | 6.3 | 2.4 | 3.0 | 0.13 |
| *G. bicolor* | 2.9 | 5.2 | 2.9 | 4.2 | 0.11 |
| *G. miyazakii* | 3.3 | 7.8 | 2.2 | 2.9 | 0.15 |
| *G. candidiensis* | 3.3 | 6.7 | 1.9 | 4.0 | 0.14 |
| *G. ferruginea* | 3.9 | 6.0 | 2.1 | 3.8 | 0.12 |
| *G. tali* | 3.5 | 6.6 | 2.2 | 3.3 | 0.12 |
| *G. dolichopodes* | 3.2 | 6.2 | 2.3 | 5.0 | 0.19 |
| *G. taroko* | 3.1 | 6.6 | 2.2 | 4.2 | 0.13 |
| *G. monticola* | 3.3 | 6.1 | 3.0 | 3.8 | 0.15 |
| *G. gracilipes* | 3.3 | 6.4 | 2.4 | 3.3 | 0.12 |
| *G. eurysoma* | 2.9 | 4.9 | 2.6 | 3.1 | 0.13 |
| *G. yangmingshan* | 3.0 | 5.5 | 3.1 | 3.6 | 0.16 |
| *G. takuan* | 3.0 | 6.8 | 1.9 | 3.5 | 0.12 |
| *G. lanyu* | 3.1 | 7.4 | 2.1 | 2.6 | 0.16 |
| *G. nanhsi* | 3.4 | 7.1 | 2.3 | 3.2 | 0.17 |
| *G. tawu* | 2.9 | 5.1 | 2.7 | 3.6 | 0.15 |
| *G. lutao* | 3.0 | 5.7 | 1.9 | 2.7 | 0.17 |
| *G. cinerea* | 3.3 | 6.4 | 3.5 | 3.5 | 0.14 |
| *G. nanao* | 3.3 | 8.0 | 2.3 | 3.2 | 0.17 |
| *G. ilan* | 3.3 | 5.8 | 2.6 | 3.2 | 0.17 |
| *G. olea* | 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 it to it since Rathbun (1898), including species from Africa. Bott (1967, 1970) resurected *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

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

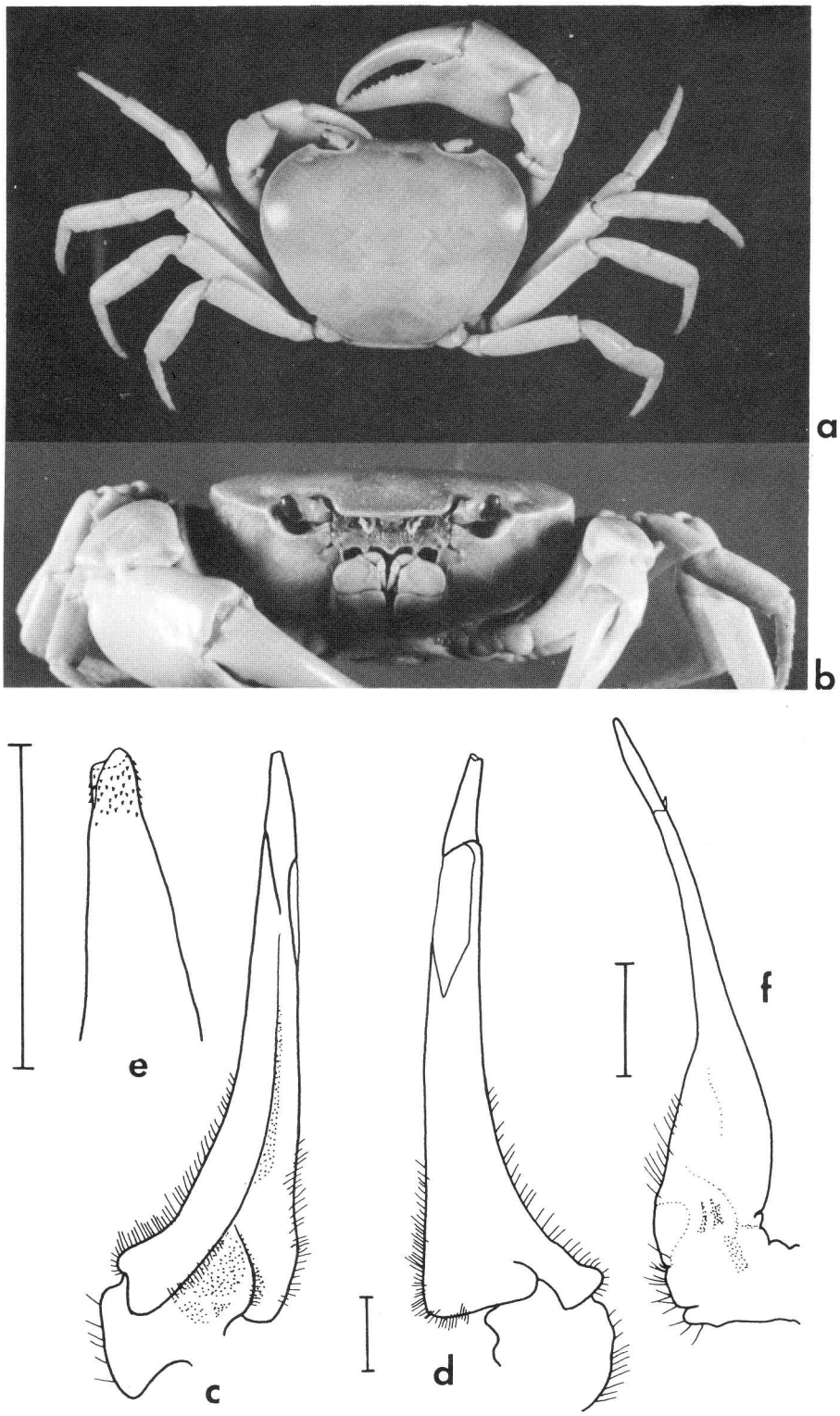



Fig. 1. *Geothelphusa caesia*, new species. Holotype male, 32.2 by 24.8 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

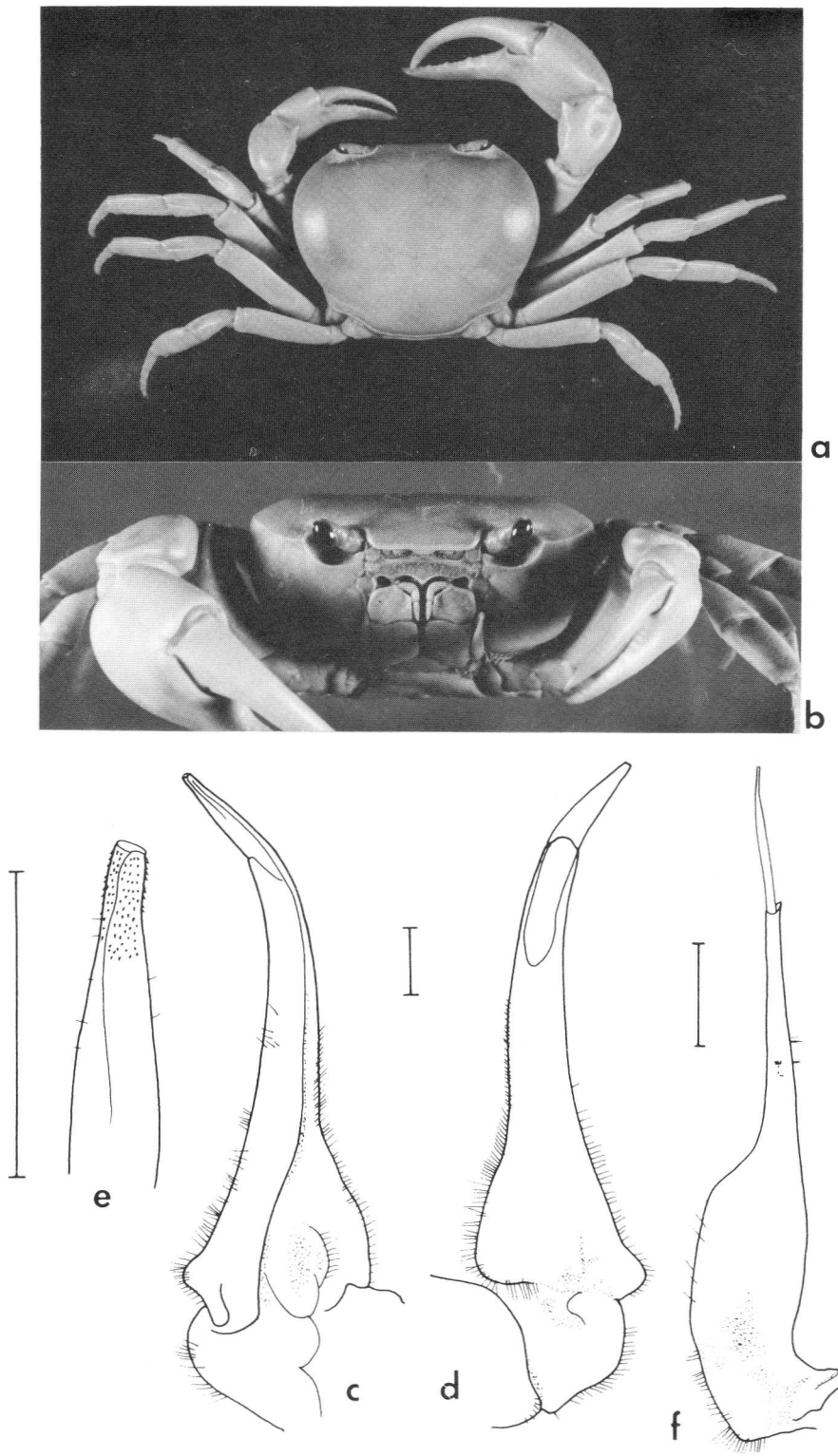



Fig. 2. *Geothelphusa ancylophallus*, new species. Holotype male, 32.4 by 25.6 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

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.

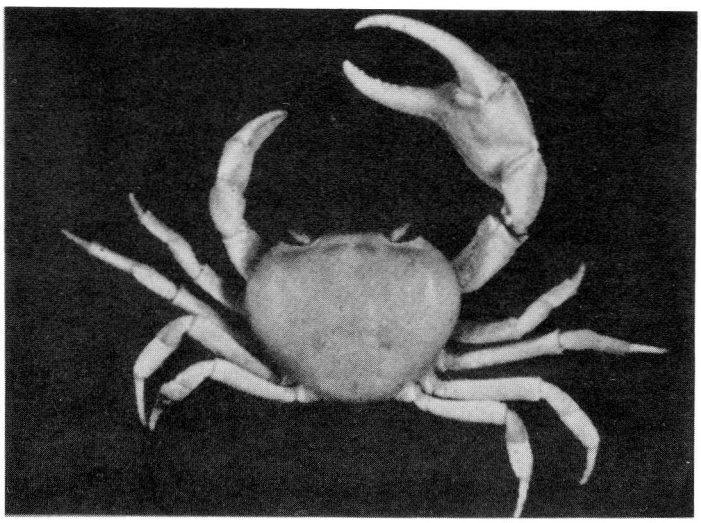
***Diagnosis.*** - Carapace smooth, strongly convex transversely and longitudinally. Anterolateral margin smooth. Fingers of chela forming wide gape when closed. Ambulatory legs slender, smooth, with very short hairs; second ambulatory leg 1.4 times as long as broad; dactylus slender. Male abdominal 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).



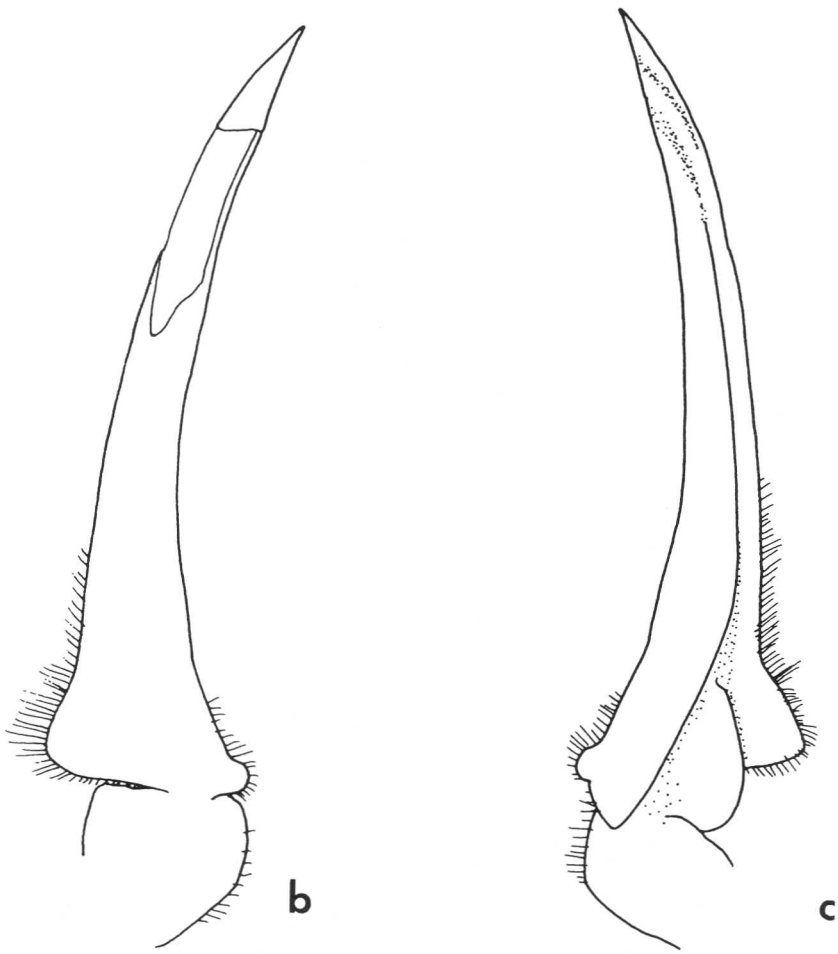




Fig. 3. *Geothelphusa chiui* Minei, 1974. Holotype male, 34.0 by 26.7 mm. a: dorsal view; b: dorsal view of G1; c: ventral view of G1. (After Minei, 1974).

***Remarks.*** - The identity of this species causes some problems as we have not been able to find specimens in Taiwan exactly referrable to it. Minei (1974) described the holotype from a town called Nanpu in Hsinchu Hsien (northwestern Taiwan) and provided good descriptions and illustrations of the species, including its G1. Fresh collections made in and around Nanpu have not uncovered this but another species instead, *G. olea*, new species. *Geothelphusa olea* differs from *G. chiui* in several aspects, viz. the carapace is more flattened (against distinctly swollen in *G. chiui*), the anterolateral margin of the carapace is distinctly cristate and granulated (indistinctly cristate and smooth in *G. chiui*), the larger male chela of adult males does not have a large gape when the fingers are closed (with a very wide gape in *G. chiui*) and the G1 terminal segment gently curves upwards (curves outwards in *G. chiui*). We have not been able to find any species in the Hsinchu area which has the inflated physiognomy characteristic of *G. chiui* s. str.

The holotype male and one female were supposedly collected by a parasitologist, Dr. Chiu Jui-Kuang in December 1960 (Minei, 1974: 243) but no other data is available. It is interesting to note that in Chiu's (1964) paper detailing his crab collections and their association with *Paragonimus*, there were no records from Nanpu in Hsinchu Hsien. It is possible that the specimens were actually collected from other areas and had been incorrectly labelled.

We have obtained three other new species (*G. albogilva*, *G. ancylophallus* and *G. wangi*) which also have a similar physiognomy to *G. chiui*, but their G1s all differ from that of *G. chiui* substantially (see Minei, 1974: Fig. 6E, F). Only in *G. chiui* is the G1 terminal segment gently curving outwards.

The identities of the other specimens reported by Minei (1974: 243) from Kuanhsi (Hsinchu Hsien), Hsin-I (Nantow Hsien) and "Taiwan" as "*G. chiui*" will have to checked to ascertain their identities. It is possible that these specimens contain more than one species. We have not been able to obtain the type specimens of *G. chiui* as they are not easily accessible. The collections of the Zoological Laboratory of the Kyushu University, where the specimens were originally deposited, have been transferred to the Kitayushu Museum of Natural History (K. Baba and M. Takeda, pers. comm.), and much of the crab collections have not been properly arranged and cannot be easily located without a detailed search.

Once the types are available, it would be best to redescribe in detail *G. chiui* and sort out the actual identities of Minei's other specimens. For the moment, we feel that it is best to recognize *G. chiui* as a distinct species.

### ***Geothelphusa albogilva*, new species**
(Fig. 4)

*Geothelphusa chiui* - Hwang & Mizue, 1985: 13 (part), text fig. 8, pl. IIB (nec *Geothelphusa chiui* Minei, 1974)

***Material examined.*** - Holotype - Male, 42.1 by 32.9 mm (NTOU F10189), PINGTUNG HSIEN: Hengchun, Shehding, coll. J.Y. Shy & P.H. Ho, 19.xii.1990.

Paratypes - PINGTUNG HSIEN: Hengchun, Shehding - 1 male, 2 females (NTOU F10001), coll. J.Y. Shy & P.H. Ho, 19.xii.1990; 1 male, 1 female (NTOU F10003), coll. J.Y. Shy & P.H. Ho, 22.i.1992; 1 male, 2 females (NTOU F10008), coll. J.Y. Shy & P.H. Ho, 23.i.1992; 1 male, 5 females [1 ovigerous] (NTOU F10006), coll. J.Y. Shy & P.H. Ho, 7.v.1992. — Hengchun, Byitztou - 1 male, 2 females

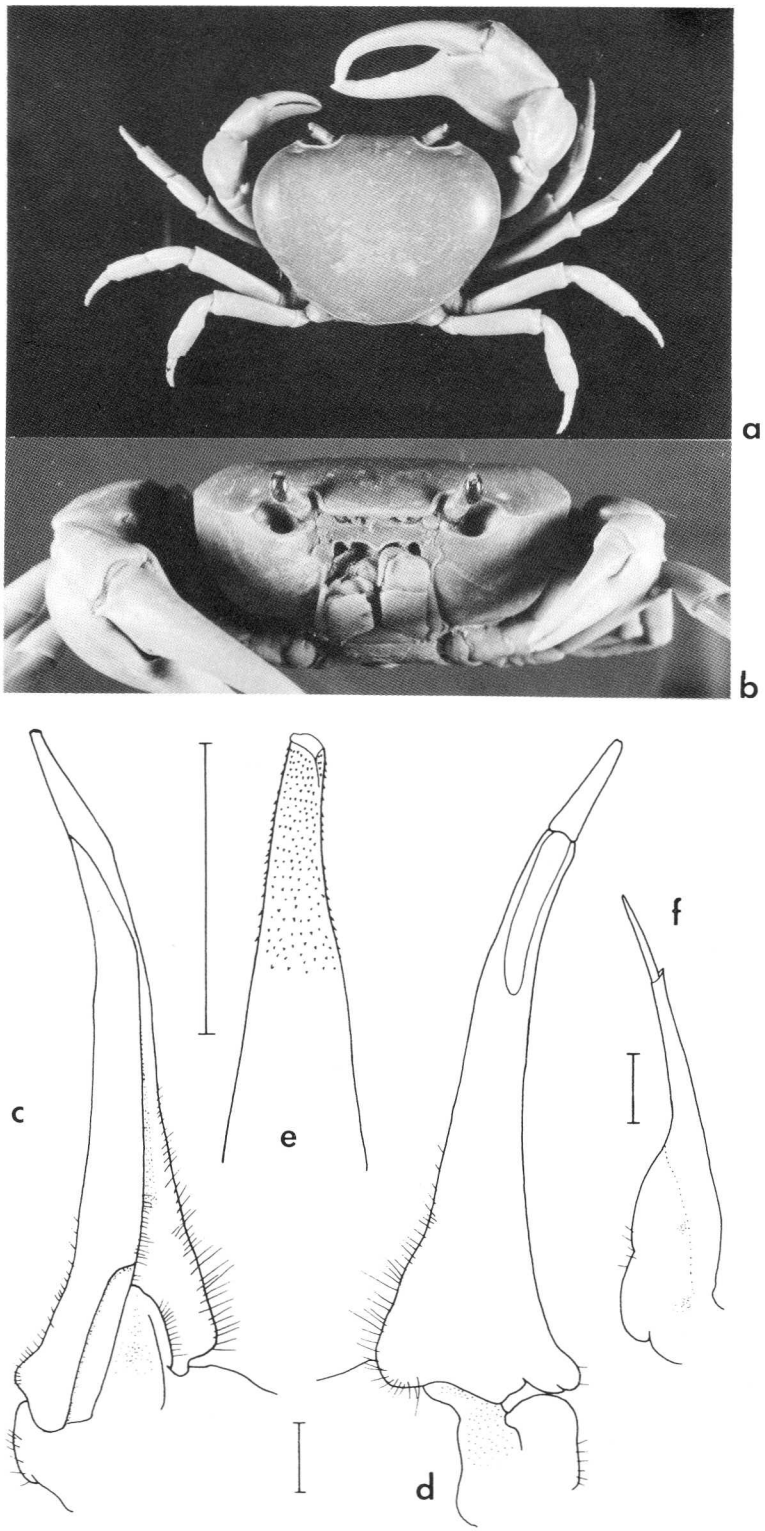



Fig. 4. *Geothelphusa albogilva*, new species. Holotype male, 42.1 by 32.9 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

(NTOU F10007), J.Y. Shy & W.L. Tsay, 4.viii.1992. — Chialuohshoei - 1 male (NTOU F10014), coll. J. Y. Shy & P. H. Ho, 22.i.1992. — Kending - 1 male, 2 females (NTOU F10012), coll. J.F. Hwang, 24.vi.1988. — Manchow, Kangkou - 1 male (NTOU F10015), coll. J.Y. Shy, 7.vii.1990. — Manchow, Jeouperng - 1 female (NTOU F10013), coll. J.Y. Shy & P.H. Ho, 22.i.1992; 2 females (NTOU F10017), coll. P.H. Ho, 19.iii.1992. — Manchow, Nanren Lake - 1 male, 2 females (NTOU F10004), coll. J.Y. Shy, 7.vii.1990. — Suchongshi, - 12 males, 12 females (NTOU F10002), coll. H.P. Yu & J.J. Hwang, 14.vii.1982; 1 male (NTOU F10016), coll. J.Y. Shy & H.G. Lai, 11.x.1986; 2 males, 1 female (NTOU F10005), 1 male, 1 female (ZRC 1994.4221), coll. J.Y. Shy, 7.vii.1990; 1 male (NTOU F10011), coll. J.Y. Shy & P.H. Ho, 6.v.1992. — Wutai - 4 males, 1 female (NTOU F10010), coll. H.P. Yu & J.J. Hwang 12.vii.1982.

TAITUNG HSIEN: Tawu - 1 male, 1 female (NTOU F10009), coll. H.P. Yu & J.J. Hwang, 29.xii.1982.

***Diagnosis.*** - Carapace smooth, carapace length 1.5 times longer than depth, strongly convex transversely and longitudinally. Anterolateral margin with faint, smooth crista, without epibranchial tooth. Cervical groove very shallow, faint. Tip of medium lobe of epistome stout. Fingers of chela forming very wide gape when closed. Second ambulatory leg short, about 1.7 times carapace length. G1 subterminal segment gently curved outwards; outer proximal margin with a tooth, inner proximal margin dilated; distal part of G1 terminal segment slightly curved upwards (Fig. 4c-e).

***Coloration.*** - The carapace is generally yellow to yellowish-gray.

***Habitat.*** - Lives in burrows along the banks of the stream, usually outside the water proper.

***Size.*** - Largest male 42.1 by 32.9 mm (NTOU F10189); largest female 48.3 by 36.7 mm (NTOU F10002); smallest mature female 26.7 by 21.0 mm (NTOU F10015).

***Distribution.*** - Southern Taiwan.

***Remarks.*** - This species is allied to *G. wangi*, but it distinguished by the following aspects: 1. the cristate anterolateral margin is smooth, without granules; 2. the male abdominal segment 6 is proportionately longer, the length to width ratio is 2.3; 3. the G1 terminal segment is slender and curving inwards, with the length to width ratio 3.4; and 4. the G2 distal segment is long, with the total length to distal segment length ratio 0.21.

***Etymology.*** - The name is derived from the Latin for yellowish-white, with reference to the distinctive carapace colour of adult crabs.

## *Geothelphusa wangi*, new species
(Fig. 5)

***Material examined.*** - Holotype - Male, 29.0 by 23.9 mm (NTOU F10197), ILAN HSIEN: Chilan, coll. C.H. Wang, 11.xi.1981.

Paratype - ILAN HSIEN: Chilan - 1 female (NTOU F10186), coll. C.H. Wang, 11.xi.1981.

***Diagnosis.*** - Carapace smooth, convex transversely and longitudinally, carapace length 1.5 times longer than depth. Anterolateral margin with faint, smooth crista, lined with small, very low granules, without epibranchial tooth. External obital angle sharp. Distance between tip of male abdomen and anterior margin of sternite 4 about 1.9 times length of sternites 1-3. Fingers of chela forming very wide gape when closed. Male abdominal segment 7 bell-

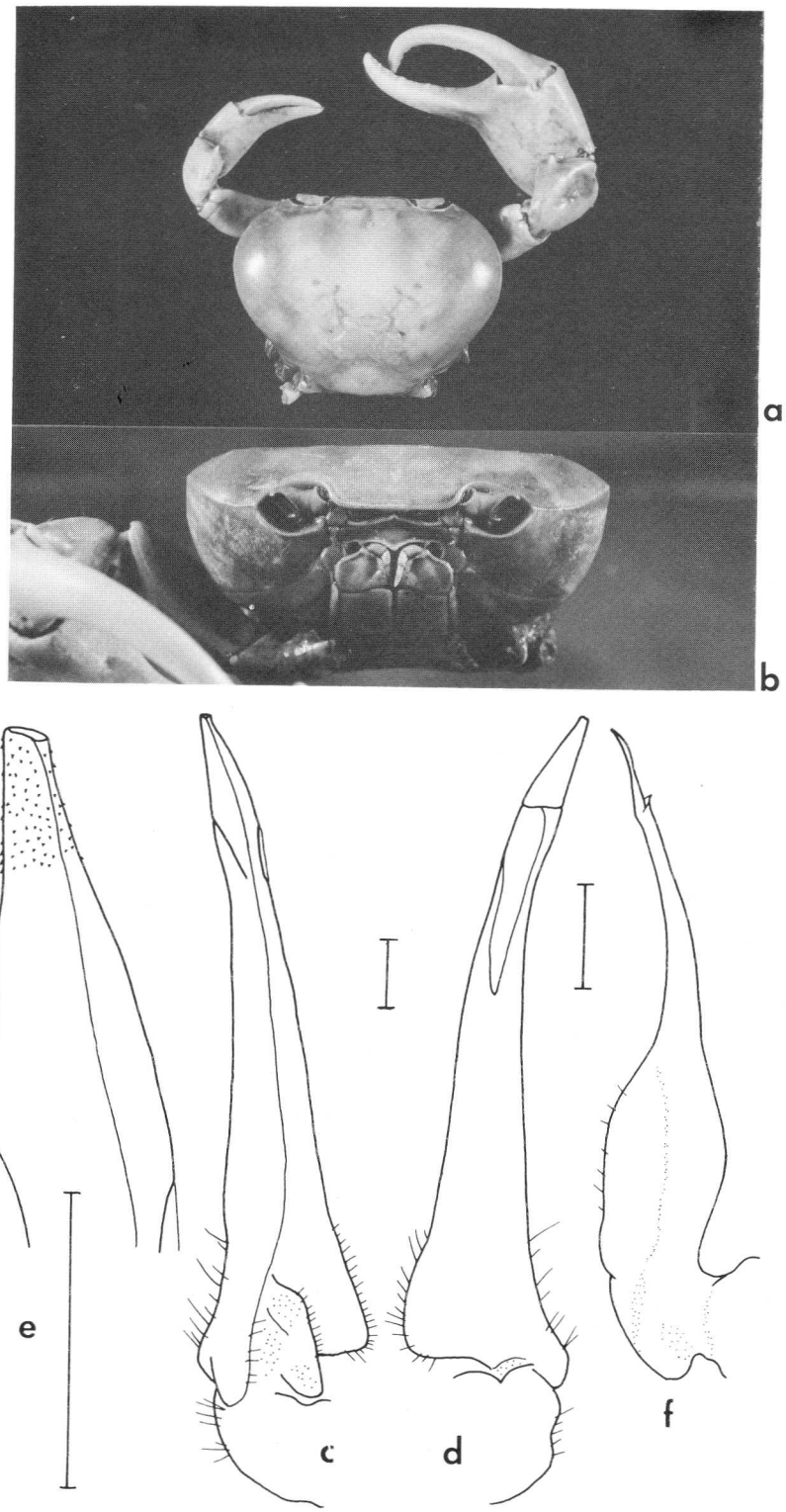



Fig. 5. *Geothelphusa wangi*, new species. Holotype male, 40.5 by 31.0 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

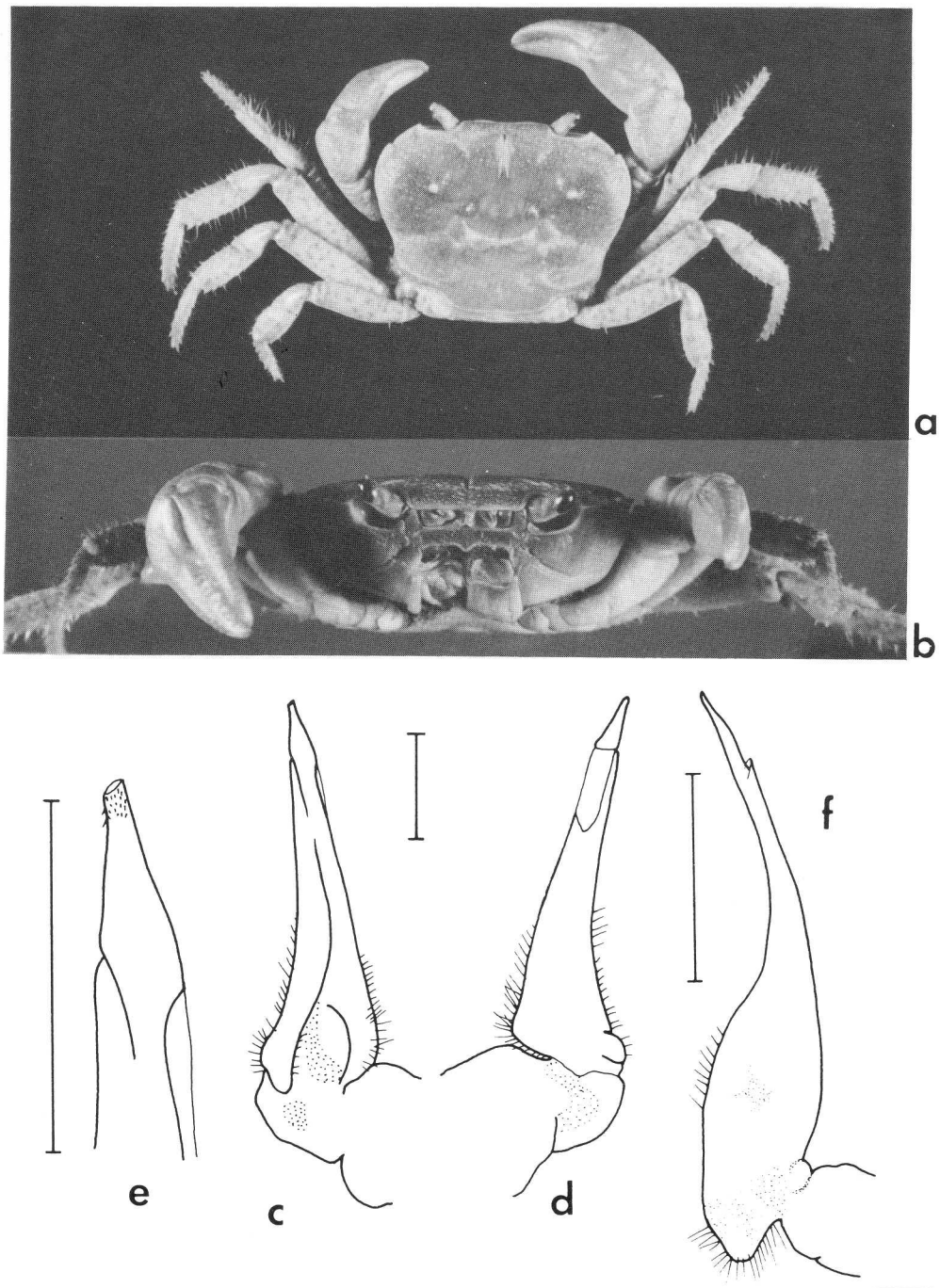



Fig. 6. *Geothelphusa eucrinodonta*, new species. Holotype male, 18.5 by 13.8 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

shaped and short, width about 1.5 times length. G1 subterminal segment gently curved outwards, outer proximal margin with a tooth, inner proximal margin dilated; terminal segment cone-shaped, almost straight (Fig. 5c-e).

***Coloration***. - Not known.

***Habitat***. - Not known.

***Size***. - Holotype male 29.0 by 29.3 mm (NTOU F10197); female 41.3 by 32.7 mm (NTOU F10186).

***Distribution***. - Northeastern Taiwan.

***Remarks***. - This species is allied to *G. albogilva*. The distinguishing features of the species have already been discussed under the ***Remarks*** for *G. albogiva*.

***Etymology***. - The species is named after Mr. Wang Chia-Hsiang of the Taiwan Provincial Museum for all his help during this study.

### *Geothelphusa eucrinodonta*, new species
(Fig. 6)

***Material examined***. - Holotype - Male, 18.5 by 13.8 mm (NTOU F10199), TAIPEI HSIEN: Kungliao, Homei, coll. J.Y. Shy & W.L. Tsay, 3.ix.1993.

Paratypes - TAIPEI HSIEN: Kungliao, Homei - 1 males, 3 females (NTOU F10097), coll. J.Y. Shy & W.L. Tsay, 3.ix.1993; 1 male (NTOU F10099), J.Y. Shy, 29.iv.1992; 2 males, 3 females (NTOU F10098), coll. C.S. Heh, 28.vii.1993.

***Diagnosis***. - Carapace flat, with fine concave pits, width and length about 2.3 and 1.7 times depth respectively. Gastric region smooth, anterolateral region rough, with fine striae. Anterolateral crista distinct, lined with granules, epibranchial tooth present. Distance between tip of male abdomen and anterior margin of sternite 4 about equal to length of sternites 1-3. Length of second ambulatory leg about 1.9 times carapace length; length of dactylus about 1.1 times that of propodus. Male abdominal segment 7 slightly bell-shaped. G1 relatively short; subterminal segment straight or slightly curved outwards, outer proximal margin with a tooth; terminal segment straight or slightly curved outwards, spinules on about distal one-fifth (Fig. 6c-e).

***Coloration***. - Carapace brownish-green to orangish-green. Chelae orangish-yellow with dark brown spots. Ambulatory legs light brownish-green with dark-coloured spots.

***Habitat***. - Lives under boulders of streams.

***Size***. - Largest male 18.1 by 13.7 mm (NTOU F10199); largest female 19.6 by 15.5 mm (NTOU F10098); smallest mature female 19.6 by 15.5 mm (NTOU F10098).

***Distribution***. - Northeastern Taiwan.

***Remarks***. - This species is allied to *G. lanyu*, but it distinguished by the following aspects: 1. the carapace is flatter than *G. lanyu* and the anterolateral margin has a distinct

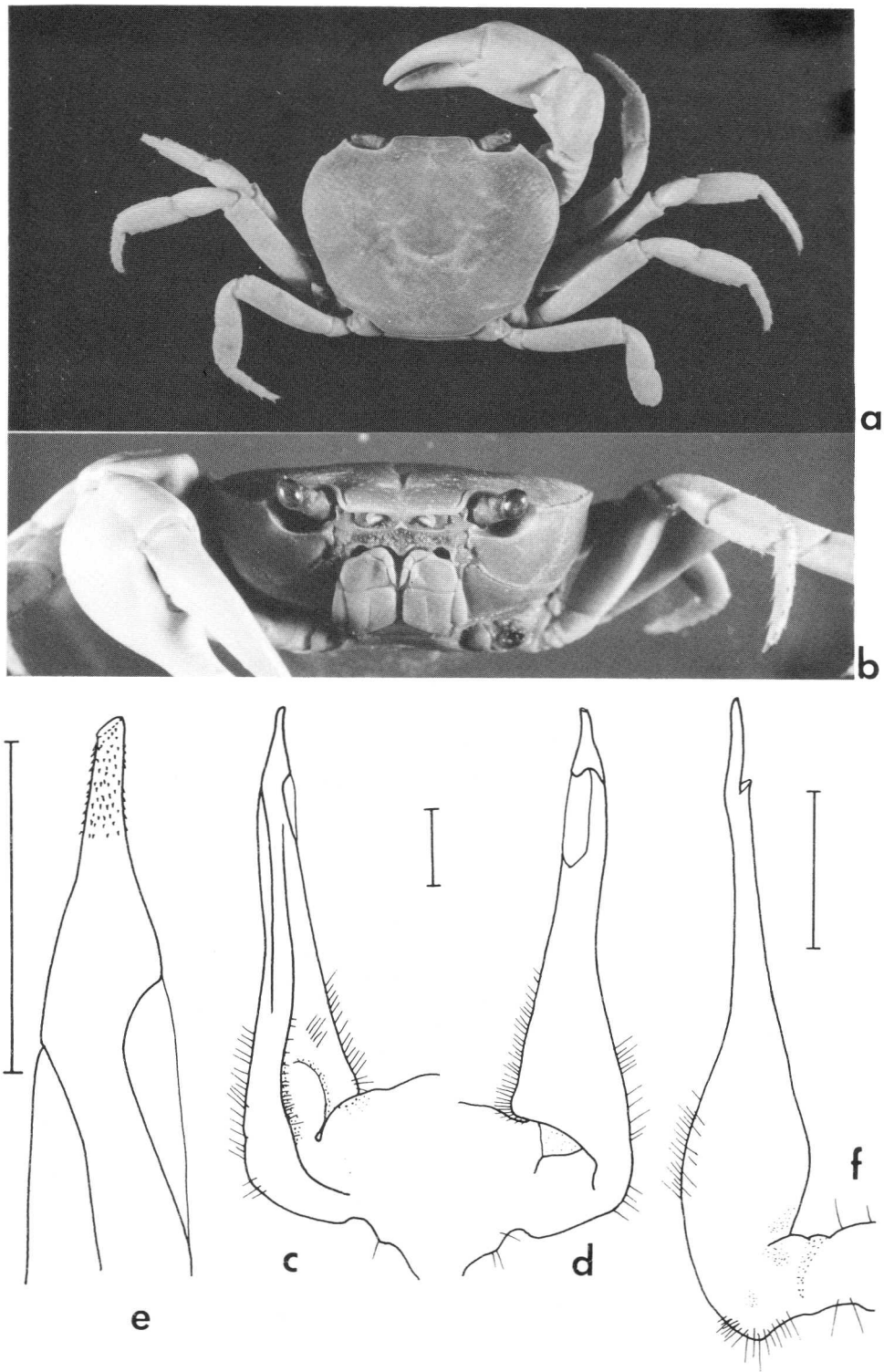



Fig. 7. *Geothelphusa wutai*, new species. Holotype male, 26.0 by 20.8 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm

epibranchial tooth; 2. the distance between the tip of the male abdomen and anterior margin of sternite 4 is equal in length to sternites 1-3 (shorter in in *G. lanyu*); and 3. the G1 terminal segment is curved outwards (curved inwards and only has fine setae on the distal part in *G. lanyu*).

***Etymology***. - The name is derived from the Greek "eukrinos" (for distinct) and "odontus" (for tooth), alluding to the particularly distinct anterolateral tooth present on the species.

### *Geothelphusa wutai*, new species
(Fig. 7)

***Material examined***. - Holotype - Male, 26.0 by 20.8 mm (NTOU 10197), PINGTUNG HSIEN: Wutai, Ila, coll. H.P. Yu.

Paratypes - PINGTUNG HSIEN: Wutai, Ila - 6 males, 10 females (only one mature) (NTOU 10081), coll. H.P. Yu.

***Diagnosis***. - Carapace flat, length about 1.7 times depth. Gastric region smooth, anterolateral region rough, with distinct striae. External orbital angle sharp. Anterolateral crista distinct, lined with small, low granules, epibranchial tooth small but distinct. Cervical groove shallow, faint. Fingers of chela forming oval gape when closed. Male abdominal segment 6 about 0.9 times length of segment 7. G1 subterminal segment slightly curved inwards, outer and inner proximal margin dilated, but without tooth; synovial membrane length about 2.7 times width; distal part of terminal segment especially slender, almost straight, spinules on about distal one-third (Fig. 7c-e).

***Coloration***. - Not known.

***Habitat***. - Not known.

***Size***. - Largest male 26.0 by 20.8 mm (NTOU F10197); largest female 20.3 by 16.3 mm (NTOU F10109).

***Distribution***. - Southern Taiwan.

***Remarks***. - This species is allied to *G. tsayae*, but it distinguished by the following aspects: 1. the dorsal striae on the anterolateral region are stronger and more distinct; 2. the G1 subterminal segment is slightly curved inwards (straight in *G. tsayae*); and 3. the total length of the G2 is about 5.1 times that of the distal segment (7.7 times in *G. tsayae*).

***Etymology***. - The species is named after the type locality, and the name is used as a noun in apposition.

### *Geothelphusa tsayae*, new species
(Fig. 8)

*Geothelphusa miyazakii* - Hwang & Mizue, 1985: 13 (part), text fig. 10, pl. IIC (nec *Potamon* (*Geothelphusa*) *miyazakii* Miyake & Chiu, 1965).

***Material examined***. - Holotype - Male, 26.5 by 20.6 mm (NTOU F10082), KAOHSIUNG HSIEN: Sanmin, coll. W.L. Tsay & J.Y. Shy, 6.viii.1992.

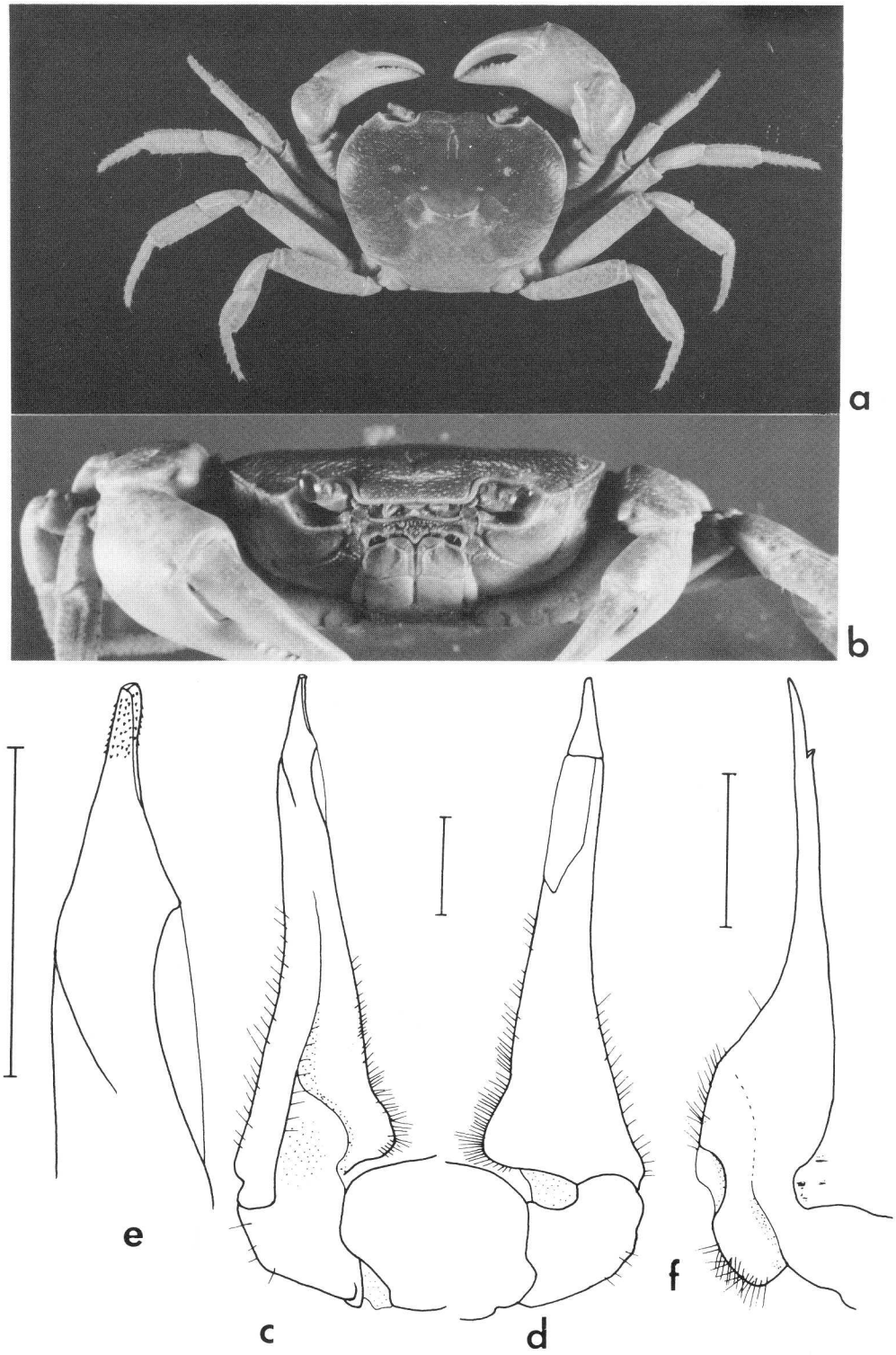



Fig. 8. *Geothelphusa tsayae*, new species. Holotype male, 26.5 by 20.6 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

Paratypes - KAOHSIUNG HSIEN: Meinung - 11 males, 3 females (NTOU F10085), 1 male, 1 female (ZRC 1994.4222), coll. J.Y. Shy & P.H. Ho, 8.v.1992.

Others - KAOHSIUNG HSIEN: Neimen, Mucha - 1 male (NTOU F10084), coll. J.Y. Shy & P.H. Ho, 8.v.1992. — Meinung - 2 males (TMCD 2859), coll. J.T. Lin, 26.xi.1992. — Chiahsien - 1 male (TMCD 2860), coll. 27.v.1993.

PINGTUNG HSIEN: Sandeman - 2 females (NTOU F10083), coll. S.P. Yeh, iv.1991.

***Diagnosis***. - Carapace moderately convex, and length about 2.1 and 1.6 times depth respectively, with fine concave pits. Gastric region smooth, anterolateral region rough, with striae. External orbital angle sharp, anterolateral crista distinct, lined with small, low granules, epibranchial tooth small; frontal region faintly divided into 2 lobes. Distance between tip of male abdomen and anterior margin of sternite 4 long, about 1.7 times length of sternites 1-3. Fingers of chela forming oval gape when closed. G1 subterminal segment straight or slightly curved inwards, outer and inner proximal margins dilated, outer margin with a very small tooth; synovial membrane length about 3.0 times width; distal part of terminal segment especially slender, slightly curved inwards, spinules on about distal one-quarter (Fig. 8c-e). Outer proximal margin of G2 basal segment dilated, margin straight to slightly concave (Fig. 8f).

***Coloration***. - Anterior half of carapace dark orange, posterior half light greenish-brown. Chelae orangish-yellow. Chelae and ambulatory legs with orange spots.

***Habitat***. - Lives under boulders of streams.

***Size***. - Largest male 29.5 by 23.4 mm (TMCD 2860); largest female 28.5 by 22.0 mm (NTOU F10083); smallest mature female 24.6 by 19.8 mm (NTOU F10083).

***Distribution***. - Southwestern Taiwan.

***Remarks***. - This species is allied to *G. wutai*, and the differences between these two species have been discussed under the ***Remarks*** for *G. wutai*.

***Etymology***. - This species is named after Miss Winney Tsay of the National Taiwan Ocean University, Department of Fishery Science, Crustacean Laboratory, for all her help during this study.

## *Geothelphusa bicolor*, new species
(Fig. 9)

*Geothelphusa candidiensis* - Minei, 1974: 241 (part), text fig. 2, 6-A, B; Hwang & Mizue, 1985: 13 (part) test fig. 9, pl. IID (nec *Geothelphusa dehaani candidiensis* Bott, 1967).

***Material examined***. - Holotype - Male, 31.4 by 23.9 mm (NTOU F10191), TAITUNG HSIEN: Chiben, coll. J.Y. Shy & W.L. Tsay, 25.viii.1992.

Paratypes - TAITUNG HSIEN: Chiben - 2 males, 3 females (NTOU F10058), coll. J.Y. Shy & W.L. Tsay, 25.viii.1992. — Chiben - 2 males (NTOU F10059), coll. J.Y. Shy & W.L. Tsay, 25.viii.1992. — Peinan, Taiping - 4 males (NTOU F10065), coll. J.Y. Shy & W.L. Tsay, 26.viii.1992.

Others - TAITUNG HSIEN: Tungho - 1 male, 1 female (NTOU F10062), coll. J.Y. Shy & H.G. Lai, 15.viii.1992; 1 male (NTOU F10064), coll. J.Y. Shy & W.L. Tsay, 26.viii.1992. — Peinan, Tananshi - 8 males, 4 females (TMCD 2855), coll. 4.vi.1993.

HWALIEN HSIEN: Yuli - 3 males (CHCD 134), coll. H.C. Liu, 12.v.1993. — Juisui - 1 male

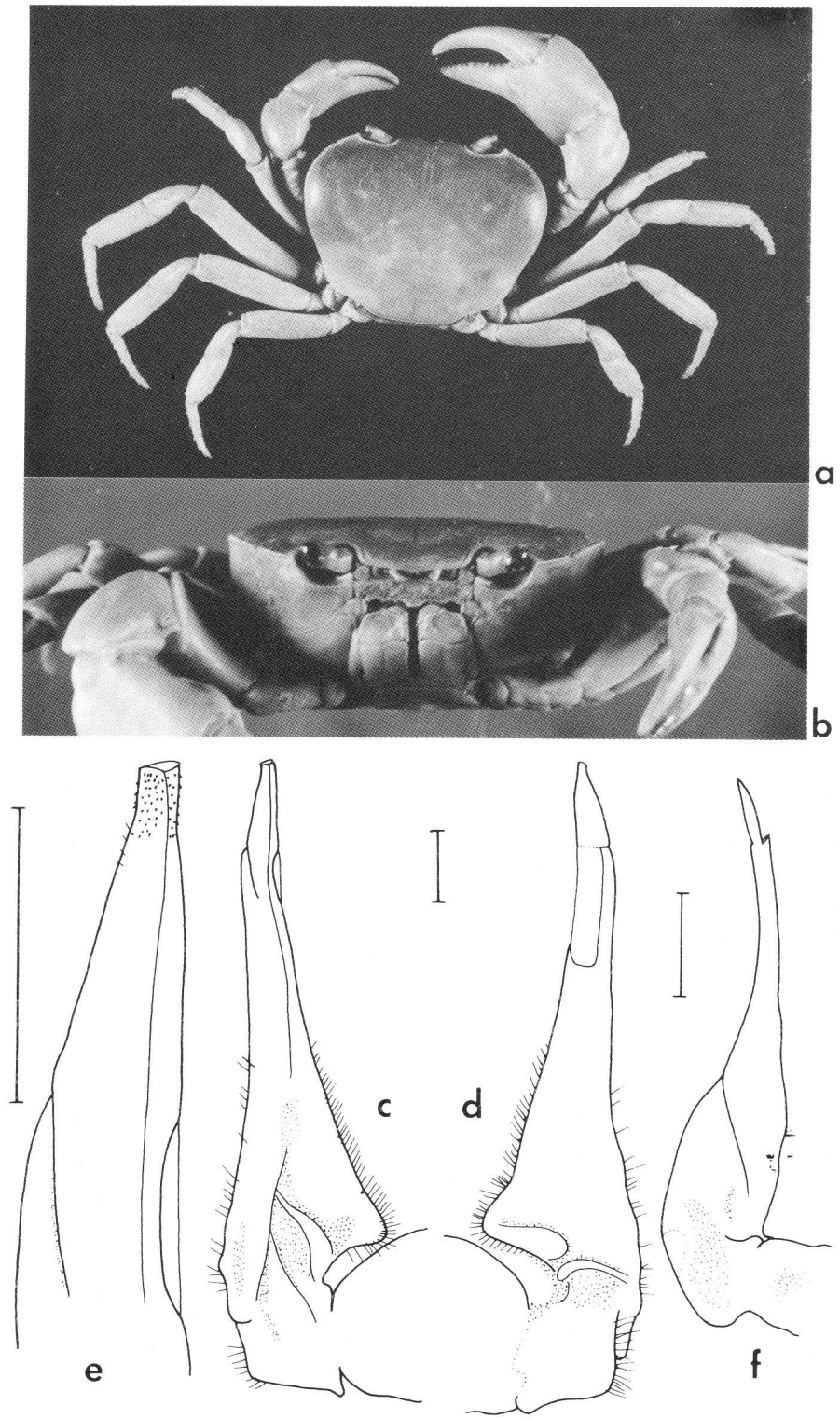



Fig. 9. *Geothelphusa bicolor*, new species. Holotype male, 31.4 by 23.9 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

(NTOU F10063), coll. J.Y. Shy & W.L. Tsay, 27.viii.1992. —Kwungfu - 1 male (NTOU F10061), coll. J.Y. Shy & K.Lee, 6.xi.1992. — Shoufeng, Takangkou - 1 female (NTOU F10060), coll. J.Y. Shy & K. Lee, 7.xi.1992.

***Diagnosis***. - Carapace smooth. Anterolateral crista distinct, lined with small granules, epibranchial tooth present. Anterolateral region with faint striae and granules (distinct in small individuals). Cervical groove shallow, faint. Merus of second ambulatory legs moderately flattened laterally, total length about 2.1 times carapace length, merus length about 3.9 times width; propodus as long as dactylus. Male abdominal segment 7 bell-shaped. G1 moderately curved inwards; outer proximal margin of subterminal segment entire or with very small tooth, inner proximal margin dilated; terminal segment straight or slightly curved inwards, with spinules on about distal one-sixth (Fig. 9c-e). Total length of G2 about 8.8 times distal segment length (Fig. 9f).

***Coloration***. - Anterior half of carapace dark brown, posterior half yellowish-brown. Chelae light orange. Ambulatory legs with fine brown spots.

***Habitat***. - Under boulders and stones of fast-flowing streams or near waterfalls.

***Size***. - Largest male 31.4 by 23.9 mm (NTOU F10191); largest female 32.8 by 24.9 mm (NTOU F10058); smallest mature female 22.0 by 16.3 mm (NTOU F10060).

***Distribution***. - Eastern Taiwan.

***Remarks***. - This species is allied to *G. taroko*, but it distinguished by the following aspects: 1. the color of the carapace is distinctly separated into two parts, the anterior part being deep brown whilst the posterior part is yellowish-brown; 2. the male abdominal segment 6 is proportionately wider, the width being about 2.3 times that of the length and 1.2 times the width of male abdominal segment 7 (about 2.2 times and 1.3 times respectively in *G. taroko*); and 3. the G1 is moderately curved inwards, the outer proximal margin of the subterminal segment has no tooth and the inner proximal margin is dilated.

***Etymology***. - The name is derived from the Latin, alluding to the distinctive two-colour tone of the carapace of adult crabs.

### *Geothelphusa miyazakii* (Miyake & Chiu, 1965)
(Fig. 10)

*Potamon* (*Geothelphusa*) *miyazakii* Miyake & Chiu, 1965: 595, pls. 13, 14 [type locality: Alilao, Taipei Hsien, Taiwan]
*Geothelphusa miyazakii* - Minei, 1974: 242, figs. 3, 6C, D.
*Geothelphusa miyazakii* - Hwang & Mizue, 1985: 13, text fig. 10, pl. IIC.

(nec *Geothelphusa miyazakii* - Minei, 1973: 214, figs. 8, 9 G, H)

***Material examined***. - TAIPEI CITY: Nankang, Denqshanli - 1 male (TMCD 2043), coll. W.Y. Lin, 5.viii. 1984.

TAIPEI HSIEN: Shuangchi - 1 male, 1 female (NTOU F 10095), coll. H.P. Yu, 1.vi.1982. — Chisingshan - 1 female (NTOU F10096), coll. 17.vii.1984. Alilao - 1 male (TMCD 2225), coll. T.S. Wu, xii.1986. — Yehliou - 1 male, 1 female (NTOU F10215), coll. 30.iv.1993. — Juipin - 1 male (NTOU F10091), coll. J.Y. Shy & H.G. Lai, 8.v.1993.

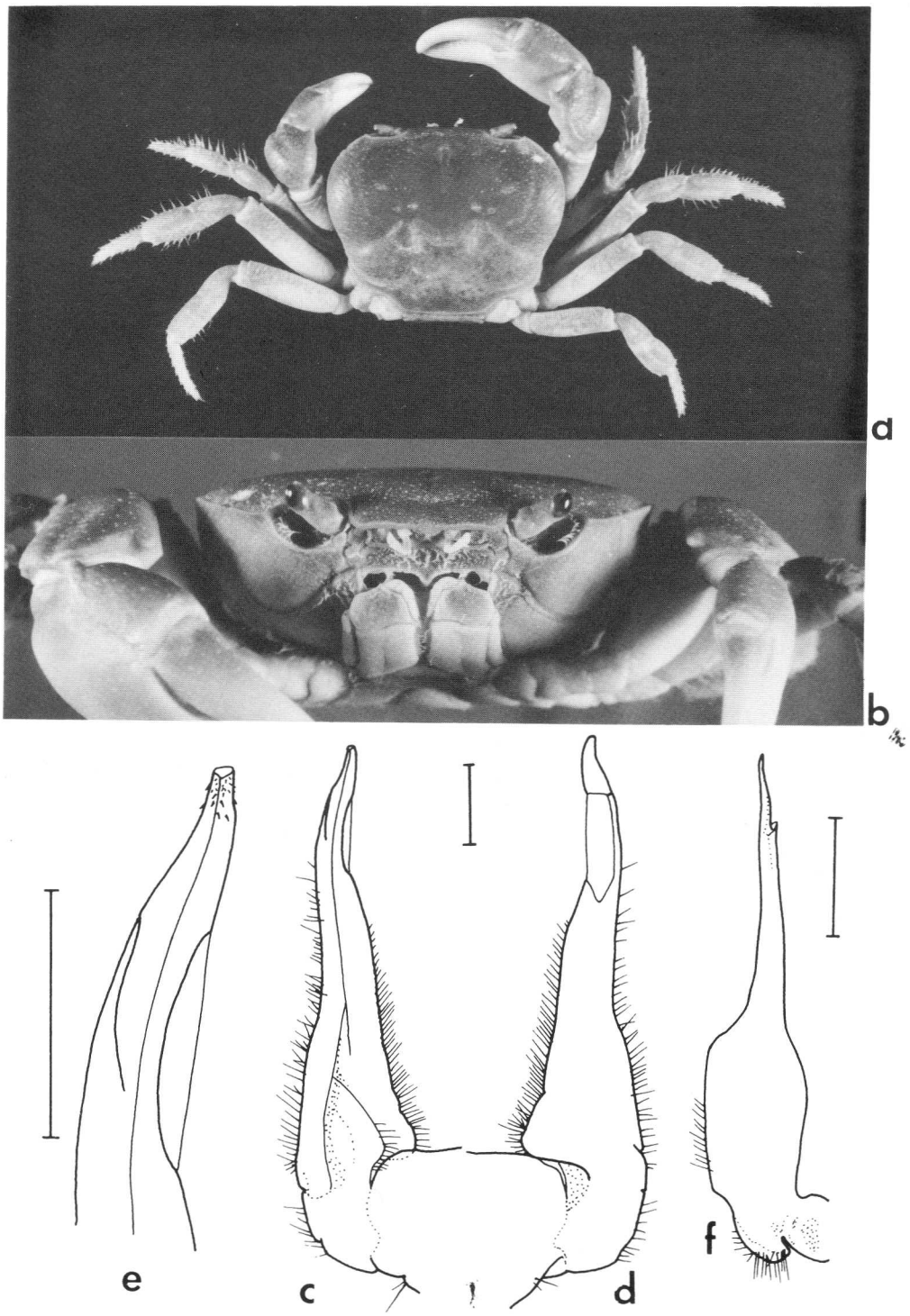



Fig. 10. *Geothelphusa miyazakii* (Miyake & Chiu, 1965). Male, 27.0 by 21.4 mm (NTOU F10091). a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

KEELUNG CITY: 1 male (NTOU F10094), coll. P.H. Ho, 1.vii.1986. — 1 male, 1 female (NTOU F10116), D.Y. Wang, 1.i.1986.

ILAN HSIEN: Chiaochi - 2 males (NTOU F10092), coll. T.Y. Chan, 7.iii.1985. — 1 male (NTOU F10093), no data.

***Diagnosis.*** - Carapace with fine concave pits. Anterolateral region with striae. Distance between tip of male abdomen and anterior margin of sternite 4 about equal to length of sternites 1-3. Margins of dactylus and propodus of ambulatory legs lined with strong spines and long setae. Male abdominal segment 7 long, elongate bell-shaped. G1 distinctly sinuous, outer proximal margin of subterminal segment entire; terminal segment curved inwards, with spinules on about distal one-quarter (Fig. 10c-e).

***Coloration*** - Carapace purple. Ambulatory legs with purple and orange rings in alternately.

***Habitat.*** - In sandy-muddy holes near springs or small streams.

***Size.*** - Largest male 31.3 by 24.5 mm (NTOU F10092); largest female 33.3 by 26.2 mm (NTOU F10096); smallest mature female 28.3 by 22.4 mm (NTOU F10116).

***Distribution.*** - Northern Taiwan.

***Remarks.*** - Fresh specimens of this species are very easy to distinguish from other *Geothelphusa* species in Taiwan because of the purple carapace, and the purple ambulatory legs which have orange rings around them. They can also be distinguished by the long setae and strong spines present on the margins of the ambulatory dactylus and propodus, as well as the very sinuous G1.

Specimens from the Ryukyus referred to *G. miyazakii* by Minei (1973) seem unlikely to be this species. The G1 of the Japanese specimens (Minei, 1973: Fig. 9G, H) seem to be more slender and proportionately longer, and the terminal segment also appears to be proportionately more elongate.

### *Geothelphusa candidiensis* Bott, 1967
(Fig. 11)

*Geothelphusa dehaani candidiensis* Bott, 1967: 212, fig. 12. pl. 53 [type locality: Candidius-See, Formosa (Sun-Moon Lake, Nantow Hsien, Taiwan]; Bott, 1970: 157, pl. 40, figs. 62, 63; pl. 53, fig. 64.
*Geothelphusa candidiensis* - Minei, 1974: 241, figs. 2, 6A, B; Hwang & Mizue, 1985: 13, text-fig. 9, pl. IID.

***Material examined.*** - TAIPEI CITY: Neishuangchi - 1 female (NTOU F10087), coll. J.Y. Shy & P.H. Ho, 25.i.1992. — Nankang - 1 male (TMCD 2042), coll. W.Y. Lin, 5.viii.1984.
TAIPEI HSIEN: Hsintine - 1 male, 1 female (TMCD 2835), coll. C.H. Wang, 29.viii.1983; 2 males, 3 females (TMCD 2753), coll. C.H. Wang, 5.i. 1992. -Pinglin - 4 females (NTOU F10088), coll. J.Y. Shy, 4.ii.1992. — Chinshan - 3 females [1 ovigerous] (NTOU F10089), coll. J.Y. Shy, 27.vi.1993.
HSINCHU HSIEN: Hengshan - 3 males, 1 female (TMCD 2663), coll. I.P. Fann, 20.ix.1990.
NANTOW HSIEN: Dihli - 1 male (NTOU F10090), coll. J.Y. Shy, 28.ix.1986.

***Diagnosis.*** - Carapace with fine concave pits. Gastric region smooth. Anterolateral region rough, covered with small granules. Anterolateral crista distinct, lined with small granules,

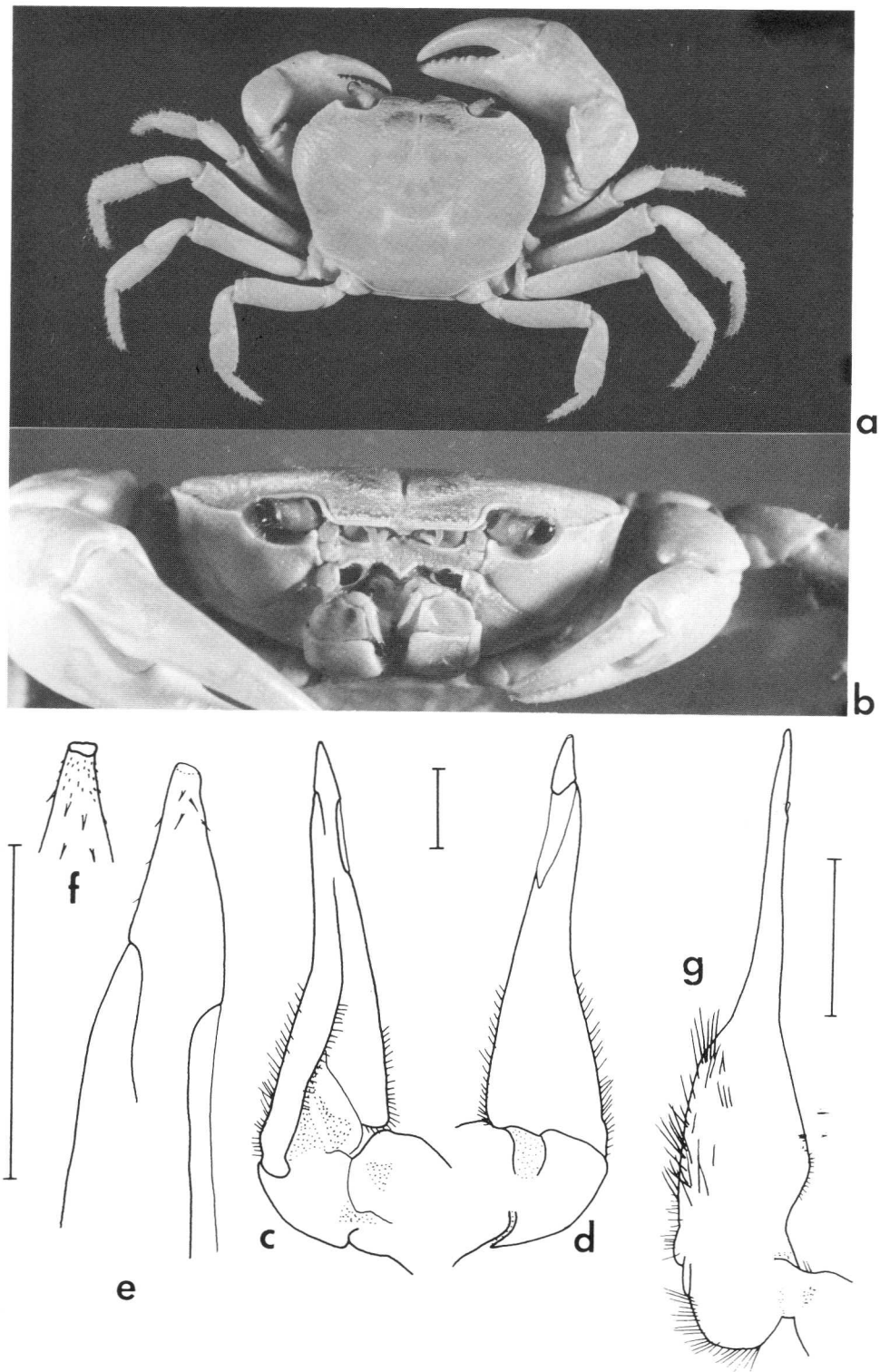



Fig. 11. *Geothelphusa candidiensis* Bott, 1967. Male, 28.0 by 21.9 mm (NTOU F10090). a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e, f: terminal segment of G1; g: ventral view of right G2. Scale = 1.0 mm.

epibranchial tooth small. Fingers of chela forming long, wide gape when closed. G1 almost straight, outer proximal margin of subterminal segment almost entire or with a very weak tooth; terminal segment short, straight or slightly curved inwards, with scattered spinules on about distal one-third (Fig. 11c-f).

***Coloration.*** - Anterior half of carapace brown, posterior part and ambulatory legs greenish-brown to light orange, chelae yellowish-orange, all with darker coloured spots.

***Habitat.*** - Lives under stones and boulders of streams.

***Size.*** - Largest male 28.0 by 21.9 mm (NTOU F10090); largest female 24.7 by 18.8 mm (NTOU F10087); smallest mature female 17.2 by 13.1 mm (NTOU F10089).

***Distribution.*** - Northwestern Taiwan.

***Remarks.*** - The identity of *G. candidiensis* has been rather problematic because it is supposed to have a very wide distribution in Taiwan (Bott, 1970; Minei, 1974) and has also been reported from the Ryukyu islands (Minei, 1973). The good series of specimens presently available, as well as topotypic material from Lake Candidus (= Sun Moon Lake) allows us to define the species more accurately. The G1 of the holotype as figured by Bott (1967: fig. 12; 1970: pl. 40 figs. 62, 63) is very misleading as it seem to show a very slender, gently tapering and elongated terminal segment. Bott apparently, had not positioned the G1 horizontally and it had been figured from the inner marginal view. From the ventral or dorsal planes, the G1 terminal segment of the present specimens of *G. candidiensis* s. str. is very short, but appears elongate from the inner marginal view. This probably led to workers (e.g. Minei, 1973) to misinterpret Bott's figures and incorrectly identify their specimens.

The present study also shows that what is generally called "*G. candidiensis*" in Taiwan actually consists of several species, including a good number of new ones. *Geothelphusa candidiensis* s. str. is perhaps most closely allied to *G. nanhsi*, but it is most easily distinguished by the anterolateral region of carapace having small granules. Other differences have been discussed under the *Remarks* for *G. nanhsi*.

Specimens from Japan (Ryukyu islands) referred to *G. candidiensis* by Minei (1973) are not this species. We have examined specimens from the Ryukyus and there are two species, both undescribed. It seems possible that once more collections from the Ryukyus become available, there might perhaps be more than two species. The new Japanese species will be described elsewhere at a later date.

### *Geothelphusa ferruginea*, new species
(Fig. 12)

***Material examined.*** - Holotype - Male, 16.3 by 12.9 mm (NTOU F10202), PINGTUNG HSIEN: Manchow, Jeouperng, coll. J.Y. Shy & P.H. Ho, 6.v.1992.

Paratypes - PINGTUNG HSIEN: Manchow, Jeouperng - 1 male (NTOU F10105), coll. J.Y. Shy & P.H. Ho, 6.v.1992. — Manchow, Jeouperng - 3 males, 1 female (NTOU F10107), coll. J.Y. Shy & P.H. Ho, 22.i.1992.

Others - PINGTUNG HSIEN: Manchow, Jeouperng - 1 male (NTOU F10106), coll. P.H. Ho, 19.iii.1992. — Manchow, Nanren Lake - 1 male, 1 female [ovigerous] (NTOU F10108), coll. J.Y. Shy & C.L. Lee, 7.vii.1992.

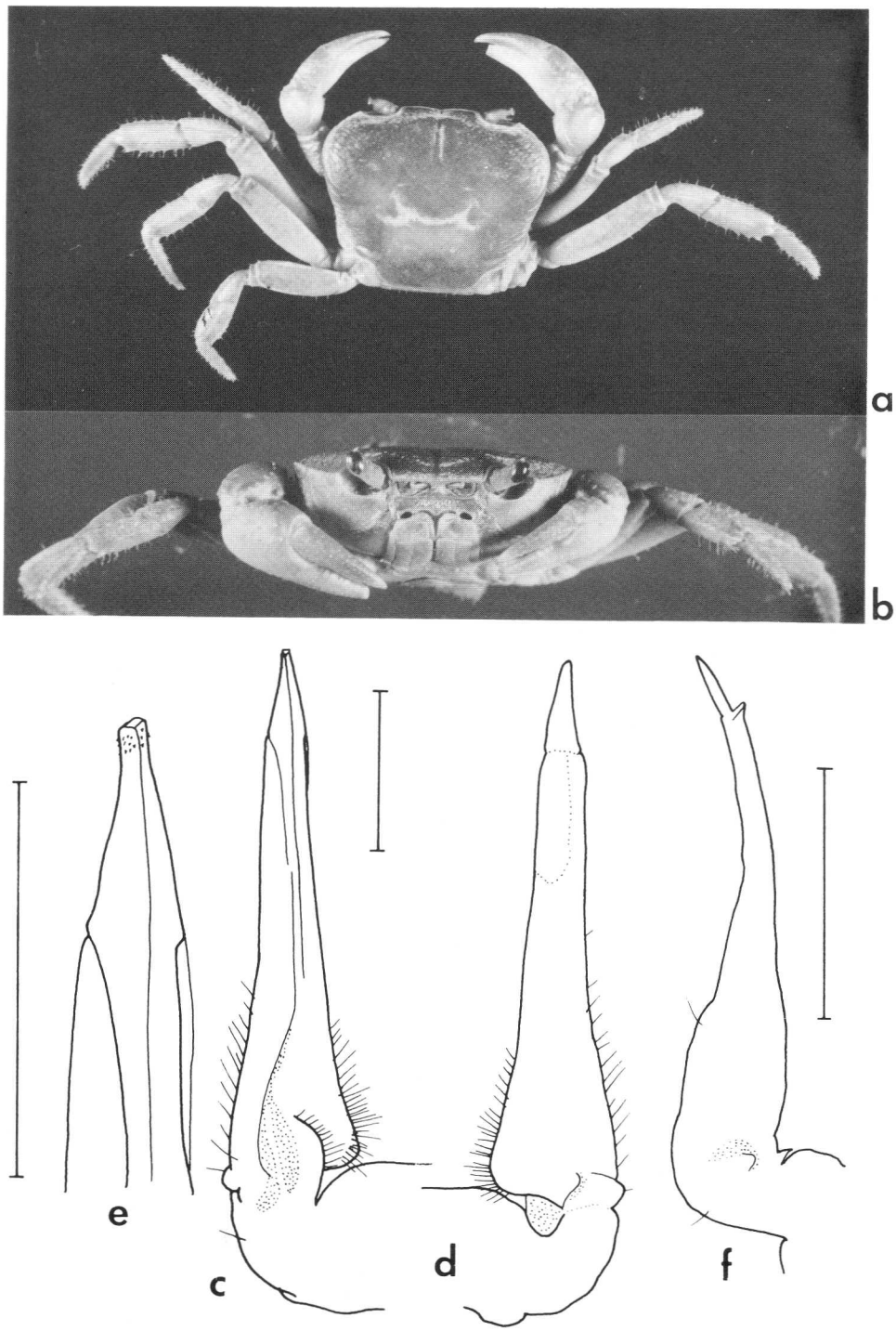



Fig. 12. *Geothelphusa ferruginea*, new species. Holotype male, 16.3 by 12.9 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

***Diagnosis***. - Carapace with fine concave pits, width and length about 2.3 and 1.8 times depth. Gastric region smooth, anterolateral region rough, with striae. Anterolateral crista distinct, lined with small granules. Distance between tip of male abdomen and anterior margin of sternite 4 about equal to length of sternites 1-3. Outer surface of chelae rough, lined with small granules; fingers of chela forming long, oval gape when closed. Second ambulatory leg about 2.1 times carapace length. Male abdominal segment 7 moderately bell-shaped. G1 subterminal segment straight, outer proximal margin with a tooth; synovial membrane length about 3.8 times width; terminal segment slightly curved inwards, with spinules on distal one-tenth (Fig. 12c-e).

***Coloration***. - Carapace and ambulatory legs brown. Chelae reddish-brown.

***Habitat***. - Lives under boulders of streams or in shallow burrows nearby.

***Size***. - Largest male 19.6 by 15.7 mm (NTOU F10202); largest female 21.0 by 16.7 mm (NTOU F10107); smallest mature female 20.3 by 15.9 mm (NTOU F10108).

***Distribution***. - Southern Taiwan.

***Remarks***. - This species is allied to *G. lutao*, but it distinguished by the following aspects: 1. the carapace is flatter than that of *G. lutao*, and the distance of the tip of the male abdomen and anterior margin of sternite 4 is about equal to that of the length of sternites 1-3; 2. the G1 is more slender, the total length being about 3.9 times that of the subterminal segment (about 3.0 times in *G. lutao*); and 3. the outer proximal margin of the G1 subterminal segment has a tooth and the terminal segment is distinctly curved outwards.

***Etymology***. - The name is derived from the Latin for rust-coloured, with reference to the general colour of the carapace of the species.

### *Geothelphusa tali*, new species
(Fig. 13)

***Material examined***. - Holotype - Male, 14.9 by 11.3 mm (NTOU F10187), ILAN HSIEN: Tali, coll. J.Y. Shy & W.L. Tsay, 4.ix.1993.

Paratypes - ILAN HSIEN: Tali - 8 males, 7 females (NTOU F10187), coll. J.Y. Shy & W.L. Tsay, 4.ix.1993.

***Diagnosis***. - Carapace rough, flat, with fine concave pits, width and length about 2.4 and 1.8 times depth respectively. Anterolateral region rough, with striae. Anterolateral crista distinct, lined with granules, without epibranchial tooth. Length of second ambulatory leg about 2.0 times carapace length; length of dactylus equal to that of propodus. Male abdominal segment 7 bell-shaped. G1 sinuous, outer proximal margin of subterminal segment with a tooth, inner proximal margin dilated; distal part of G1 terminal segment almost straight or slightly curved inwards (Fig. 13c-e).

***Coloration***. - Carapace olive to greenish-orange, palm and dactylus of chelae orange; ambulatory legs yellowish-gray, with scattered, darker-coloured stripes.

***Habitat***. - Lives under boulders of streams.

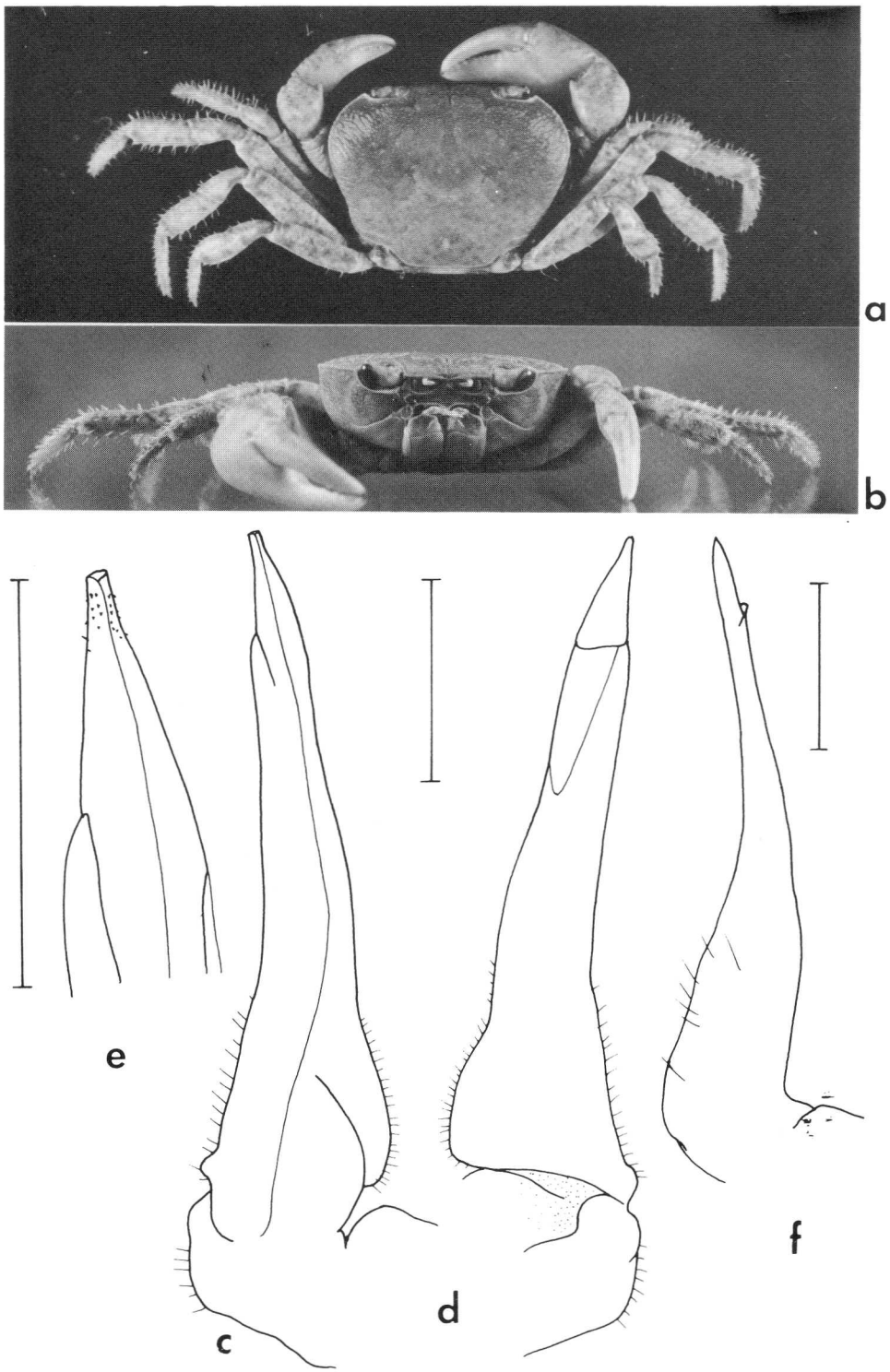



Fig. 13. *Geothelphusa tali*, new species. Holotype male, 14.9 by 11.3 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

***Size***. - Largest male 14.9 by 11.3 mm (NTOU F10187); largest female 20.6 by 15.6 mm (NTOU F10187); smallest mature female 13.3 by 10.2 mm (NTOU F10187).

***Distribution***. - Northeastern Taiwan.

***Remarks***. - This species is allied to *G. eucrinodonta* and *G. gracilipes*, but it distinguished by the following aspects: 1. the carapace is flatter than *G. eucrinodonta* and *G. gracilipes*; 2. there is no epibranchial tooth (present in *G. eucrinodonta*); and 3. the ambulatory legs of this species and *G. eucrinodonta* are wider than *G. gracilipes*.

***Etymology***. - The species is named after the type locality, and the name is used as a noun is apposition.

### *Geothelphusa dolichopodes*, new species
(Fig. 14)

***Material examined***. - Holotype - Male, 30.1 by 23.2 mm (NTOU F10194), HWALIEN HSIEN: Hsiulin, Chingshui, coll. J.Y. Shy & K. Lee, 8.xi.1992.

Paratypes - HWALIEN HSIEN: Hsiulin, Chingshui - 4 males, 2 females (NTOU F10070), coll. J.Y. Shy & K. Lee, 8.xi.1992. — Hsiulin, Shiaochingshui - 4 males, 8 females (TMCD 2852), coll. P.K.L. Ng & C.H. Wang, 3.vi.1993.

Others - HWALIEN HSIEN: Hsiulin, Chungte - 1 male, 1 female (TMCD 2851), coll. P.K.L. Ng & C.H. Wang, 3.vi.1993. — Hsiulin, Shakatang Hsi - 8 males, 5 females (CHCD 111), coll. H.C. Liu.

***Diagnosis***. - Carapace smooth, frontal margin divide into 2 lobes, (especially in large specimens). Anterolateral region with fine lateral striae. Anterolateral crista distinct, smooth, without epibranchial tooth. Ambulatory legs long, thin, total length of second ambulatory legs about 2.3 times carapace length, length of merus about 4.4 times width, width about 2.0 times height. Male abdominal segment 7 slightly bell-shaped. G1 subterminal segment straight, outer proximal margin with a tooth, inner proximal margin dilated; terminal segment almost straight, spinules on distal one-third (Fig. 14c-e).

***Coloration***. - Not known.

***Habitat***. - Lives under stones and boulders of small streams.

***Size***. - Largest male 31.6 by 23.6 mm (TMCD 2852); largest female 36.6 by 26.8 mm (TMCD 2851); smallest mature female 25.8 by 19.4 mm (TMCD 2852).

***Distribution***. - Eastern Taiwan.

***Remarks***. - This species is allied to *G. nanao*, but it distinguished by the following aspects: 1. the distance between the tip of the male abdomen and anterior margin of sternite 4 is about 1.2 times the length of sternites 1-3 (about 1.5 times in in *G. nanao*); 2. the total length of the second ambulatory leg is about 2.3 times that of the carapace length (about 2.1 times in in *G. nanao*); and 3. the total length of the G1 is about 6.2 times that of the terminal segment (about 8.0 times in *G. nanao*).

***Etymology***. - The name is derived from the Greek "dolichos" (for long) and "podes" (for legs), alluding to the very long legs of this species.

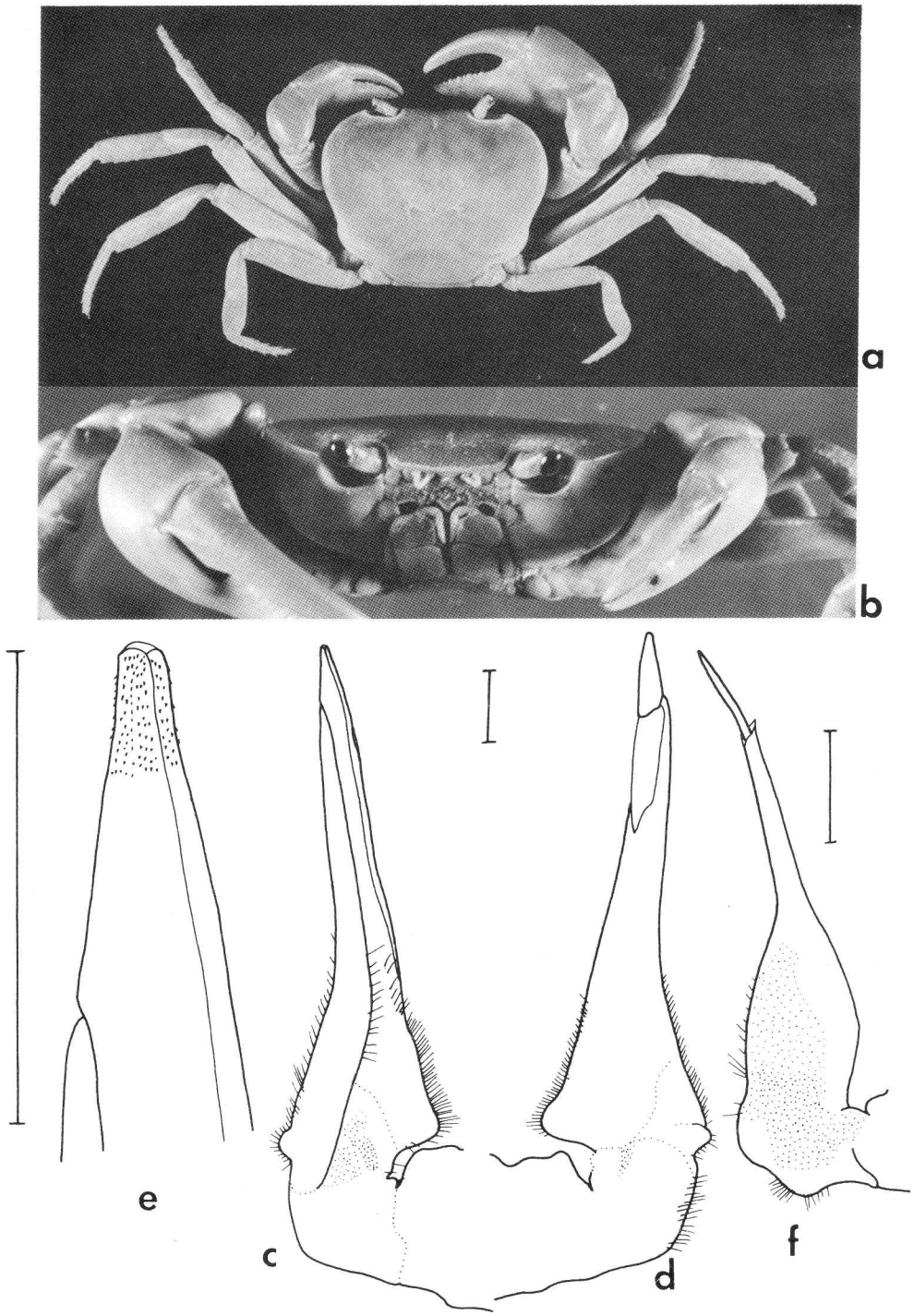



Fig. 14. *Geothelphusa dolichopodes*, new species. Holotype male, 30.1 by 23.2 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

### *Geothelphusa taroko*, new species
(Fig. 15)

***Material examined.*** - Holotype - Male, 21.3 by 16.2 mm (NTOU F10192), HWALIEN HSIEN: Taroko, coll. J.Y. Shy & K. Lee, 5.xi.1992.

Paratypes - HWALIEN HSIEN: Taroko - 2 males (NTOU F10066), coll. J.Y. Shy & K. Lee, 5.xi.1992. — Hsiulin, Loshao - 2 males (NTOU F10067), coll. J.Y. Shy & K. Lee, 6.xi.1992.

Others - HWALIEN HSIEN: Hsiulin, Chankuang Temple - 19 males, 7 females (TMCD 2853), 1 male, 1 female (ZRC *****), P.K.L. Ng & C.H. Wang, 3.vi.1993.

***Diagnosis.*** - Carapace smooth, with fine concave pits; frontal margin gently sinuous, appears to be divided into 2 broad lobes. External orbital angle stout. Anterolateral region slightly rough, with fine concave pits and small, low granules. Anterolateral crista distinct, lined with small, low granules, epibranchial tooth small. Total length of second ambulatory legs about 2.4 times carapace length. G1 subterminal segment sinuous, outer proximal margin with a tooth, inner proximal margin almost straight; terminal segment short, distal part slightly curved inwards (Fig. 15c-e).

***Coloration.*** - Carapace orangish-red. Chelae orangish-yellow. Ambulatory legs with fine brown spots.

***Habitat.*** - Lives under stones and boulders of streams.

***Size.*** - Largest male 21.9 by 17.1 mm (TMCD 2853); largest female 27.7 by 21.7 mm (TMCD 2853); smallest mature female 17.7 by 13.9 mm (TMCD 2853).

***Distribution.*** - Eastern Taiwan.

***Remarks.*** - This species is allied to *G. gracilipes*, but it distinguished by the following aspects: 1. the anterolateral region of the carapace is slightly rough but is without striae and has a small epibranchial tooth; 2. the total length of the second ambulatory leg is about 2.4 times that of the carapace length (about 2.1 times and has more setae in *G. gracilipes*); and 3. the G1 subterminal segment is slightly sinuous and the length of the synovial membrane is about 4.2 times that of the width (straight and about 3.3 times in *G. gracilipes*).

***Etymology.*** - The species name is derived from the type locality, Taroko National Park, and is used as a noun in apposition.

### *Geothelphusa monticola*, new species
(Fig. 16)

***Material examined.*** - Holotype - Male, 21.9 by 16.5 mm (NTOU F10204), TAICHUNG HSIEN: Hoping, Sheauyeakow, coll. J.Y. Shy & W.L. Tsay, 28.vi.1993.

Paratypes - TAICHUNG HSIEN: Hoping, Sheauyeakow - 1 male, 2 females (NTOU F10112), coll. J.Y. Shy & W.L. Tsay, 28.vi.1993. — Lishan - 1 male, 1 female (NTOU F101130), coll. J.Y. Shy & W.L. Tsay, 28.vi.1993.

Others - TAICHUNG HSIEN: Hoping, Shenqguang - 1 male (TMCD 2843), coll. S.K. Chan, 5.vii.1977. — Hoping, Songbor - 1 female (NTOU F10114), coll. J.Y. Shy & K. Lee, 30.xi. 1992.

***Diagnosis.*** - Carapace with concave pits, frontal margin divided into 2 lobes. Gastric region smooth, anterolateral region rough, concave pits present slightly larger than those on

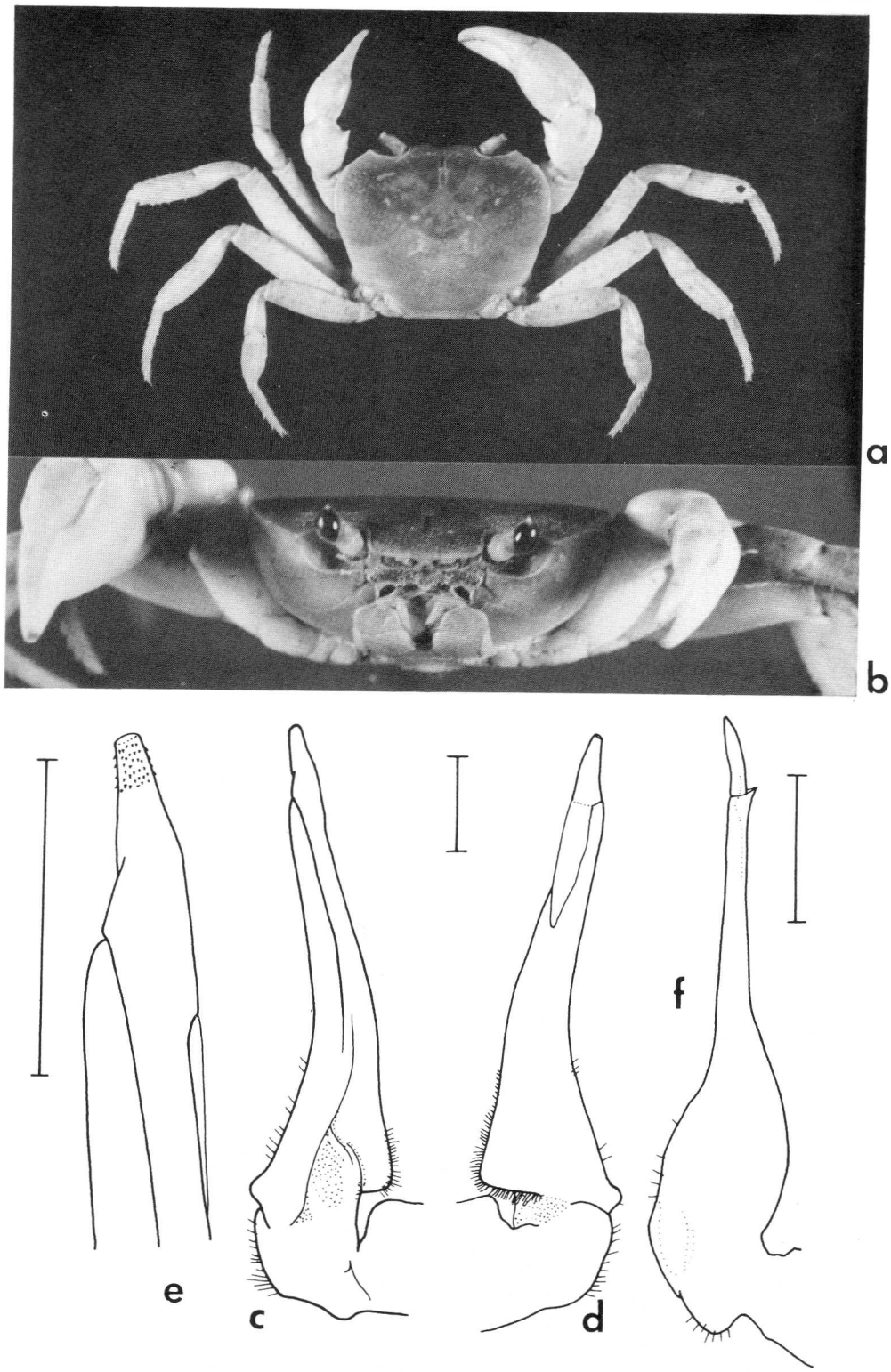



Fig. 15. *Geothelphusa taroko*, new species. Holotype male, 21.3 by 16.2 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

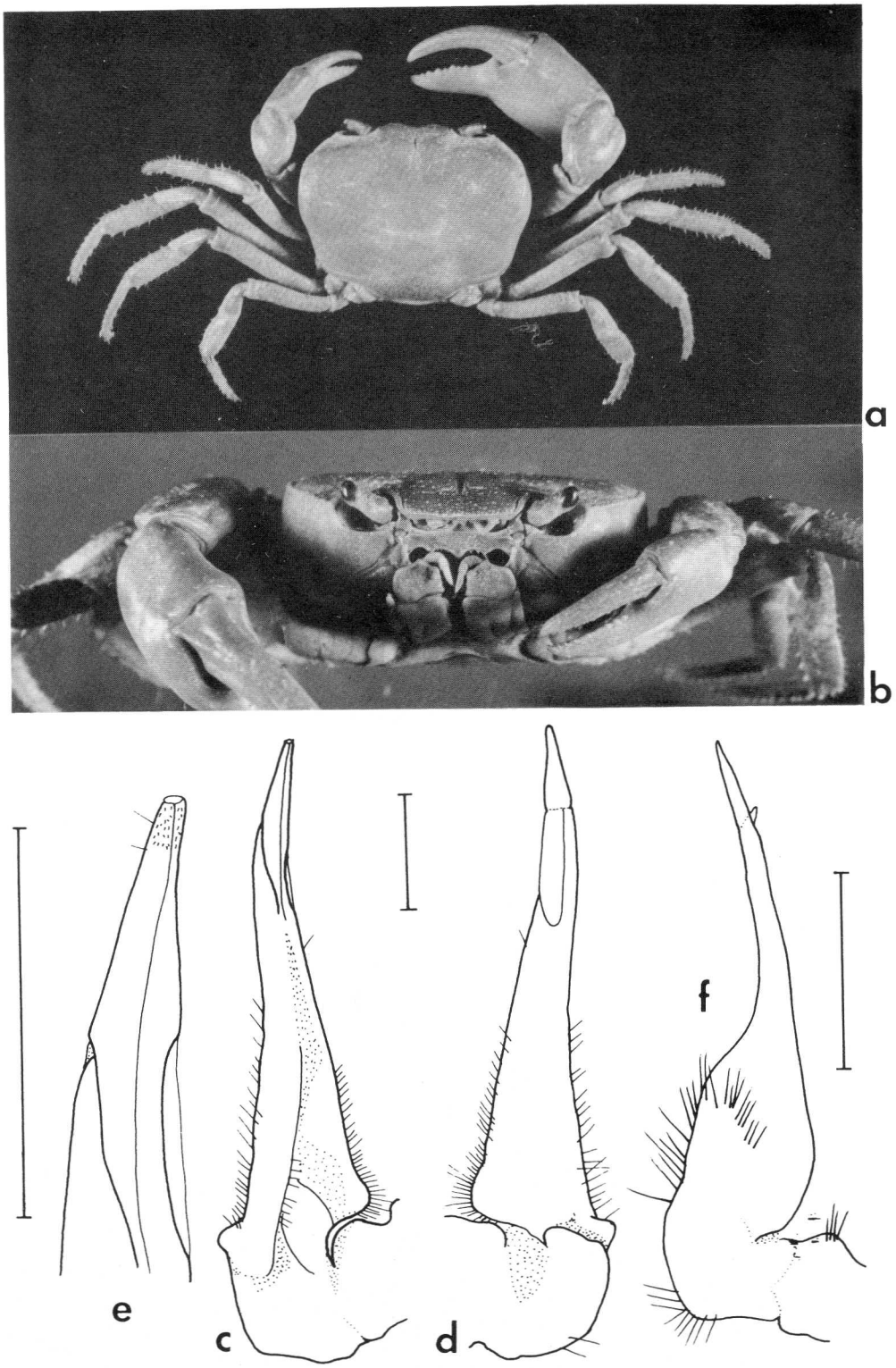



Fig. 16. *Geothelphusa monticola*, new species. Holotype male, 21.9 by 16.5 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

gastric region. Anterolateral crista distinct, lined with low, small granules, epibranchial tooth low. Fingers of chela forming long, oval gape when closed. Merus of ambulatory legs slender, merus length of second ambulatory leg about 4.6 times width. Width of male abdominal segment 6 about 2.7 times length, about 1.4 times of length of male abdominal 7 which is bell-shaped. G1 slightly sinuous, outer proximal margin with a tooth; terminal segment slender, straight (Fig. 16c-e).

***Coloration.*** - Carapace and ambulatory legs yellowish-green. Chelae orangish-red, spotted.

***Habitat.*** - Lives in high altitude habitats (about 2000 m above sea level), under boulders or in burrows near springs.

***Size.*** - Largest male 22.5 by 16.9 mm (NTOU F10112); largest female 23.7 by 17.8 mm (NTOU F10112); smallest mature female 16.6 by 13.0 mm (NTOU F10113).

***Distribution.*** - Middle Taiwan.

***Remarks.*** - This species is allied to *G. eurysoma* and the differences between them have already been discussed under the ***Remarks*** for *G. eurysoma*.

***Etymology.*** - The name is derived from the Latin "montis" (for mountain) and "colus" (for preference), alluding to the montane habitat of the species.

### *Geothelphusa gracilipes*, new species
(Fig. 17)

***Material examined.*** - Holotype - Male, 21.6 by 16.0 mm (NTOU F10193), HWALIEN HSIEN: Hsiulin, Lushui, coll. J.Y. Shy & K. Lee, 6.xi.1992.

Paratypes - HWALIEN HSIEN: Hsiulin, Lushui - 1 male, 3 females (NTOU F10068), coll. J.Y. Shy & K. Lee, 6.xi.1992. — Hsiulin, Holiu - 2 males, 7 females (NTOU F10069), coll. J.Y. Shy & K. Lee, 5.xi.1992.

Others - HWALIEN HSIEN: Hsiulin Lushui - 15 males, 18 females [4 ovigerous] (TMCD 2854), coll. P.K.L. Ng & C.H. Wang, 3.vi.1993. — Hsiulin, Paiyang - 2 males (TMCD 2858), coll. H.C. Liu, 10.vi.1993.

***Diagnosis.*** - Carapace slightly wider than most known Taiwanese *Geothelphusa* species, width and length about 2.3 and 1.4 times of depth respectively, width about 1.7 times length, with fine concave pits; frontal margin indistinctly divided into 2 lobes. Gastric region smooth; anterolateral region rough, with small striae and granules. Anterolateral crista distinct, lined with low, small granules, epibranchial tooth completely absent. Distance between tip of male abdomen and anterior margin of sternite 4 about 1.2 times length of sternites 1-3. Ambulatory legs with dense hairs, merus slender, merus length of second ambulatory leg about 4.7 times of width. Male abdominal segment 7 bell-shaped. Outer proximal margin of G1 subterminal segment with a very distinct tooth, inner proximal margin moderately dilated, subterminal and terminal segments almost straight (Fig. 17c-e).

***Coloration.*** - Carapace greenish-brown. Chelae orange, ambulatory legs with scattered brown stripes.

***Habitat.*** - Lives under boulders and stones in streams.

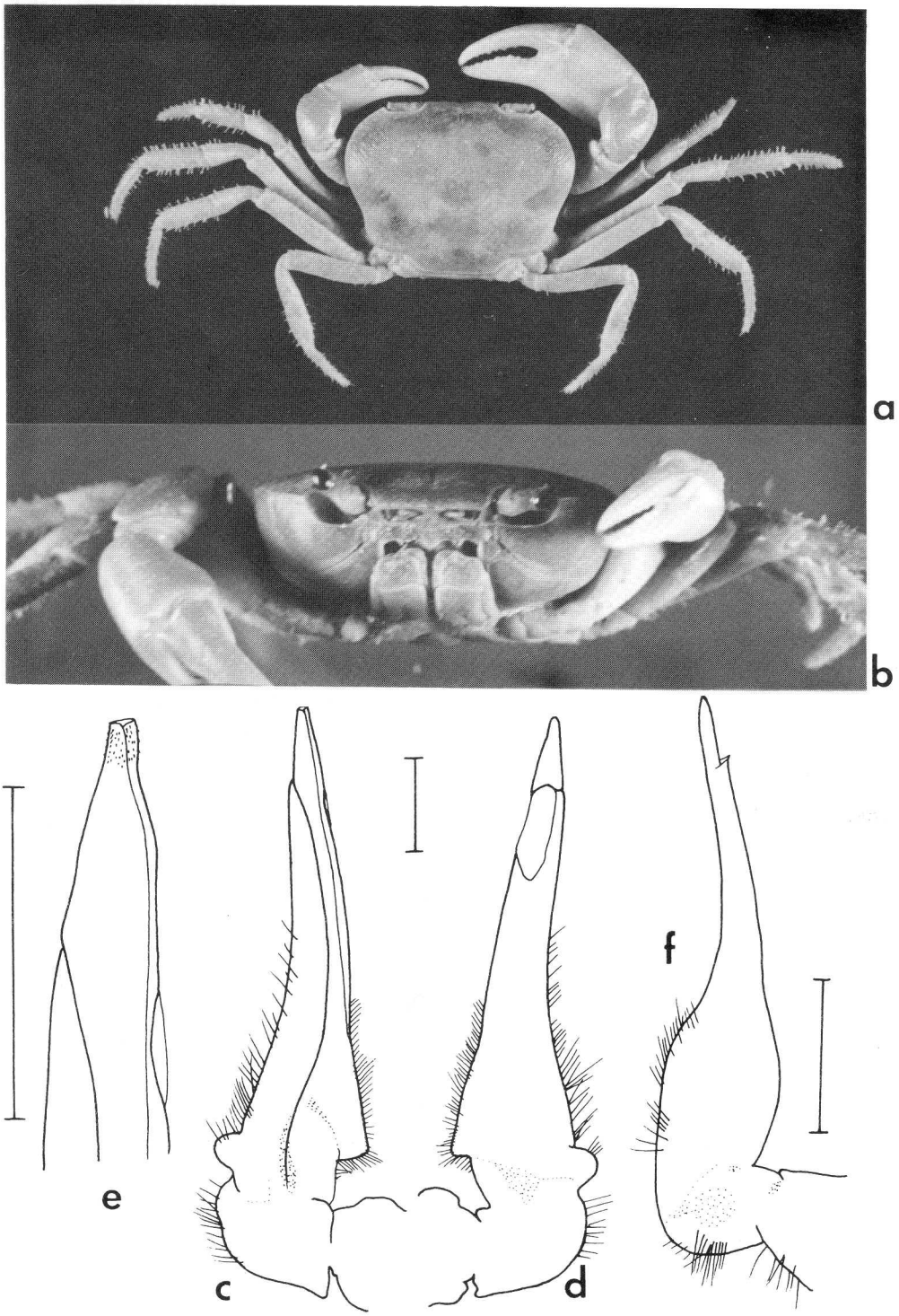



Fig. 17. *Geothelphusa gracilipes*, new species. Holotype male, 21.6 by 16.0 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

***Size.*** - Largest male 23.3 by 17.5 mm (TMCD 2854); largest female 23.7 by 17.8 mm (TMCD 2854); smallest mature female 15.7 by 12.0 mm (NTOU F10068).

***Distribution.*** - Eastern Taiwan.

***Remarks.*** - This species is allied to *G. taroko*. The distinguishing features have been discussed under the ***Remarks*** *G. taroko*.

***Etymology.*** - The name is derived from the Latin "gracilis" (for slender) and "pes" (for legs), alluding to the slender ambulatory merus of the species.

### *Geothelphusa eurysoma*, new species
(Fig. 18)

***Material examined.*** - Holotype - Male, 21.8 by 15.8 mm (NTOU F10110), TAICHUNG HSIEN: Hoping, Chingshan, coll. J.Y. Shy & K. Lee, 19.x.1992.

Paratypes - TAICHUNG HSIEN: Hoping, Chingshan - 2 females (NTOU F10111), coll. J.Y. Shy & K. Lee, 19.x.1992.

***Diagnosis.*** - Carapace with fine concave pits, slightly wider than most Taiwanese *Geothelphusa* species (similar to *G. gracilipes*), width about 2.3 and 1.4 times of length and depth respectively; frontal region indistinctly divided into 2 lobes. Anterolateral crista very distinct, smooth, epibranchial tooth small. Cervical groove shallow, faint. Distance between tip of male abdomen and anterior margin of sternite 4 long, about 1.8 times length of sternites 1-3. Merus of second ambulatory leg slender, total length leg about 4.5 times width, width about 1.6 times height. Male abdominal segment 6 short, width about 2.5 times length; male abdominal segment 7 bell-shaped. Subterminal segment of G1 curved outwards; terminal segment distinctly curved inwards, distal one-third with spinules (Fig. 18c-e).

***Coloration.*** - Anterior two-thirds of carapace reddish-brown, posterior one-third and ambulatory legs light greenish-brown, spotted. Upper part of chelae reddish-brown, lower part orangish-yellow.

***Habitat.*** - Occurs in high altitude habitats (more than 1000 m above sea level), in burrows near springs.

***Size.*** - Largest male 21.8 by 15.8 mm (NTOU F10110); largest female 19.0 by 14.3 mm (NTOU F10111); smallest mature female 17.9 by 13.8 mm (NTOU F10111).

***Distribution.*** - Middle Taiwan.

***Remarks.*** - This species is allied to *G. monticola*, but it distinguished by the following aspects: 1. the carapace is wider and deeper in *G. eurysoma* (the carapace width is about 2.1 and 1.3 times that of the depth and length respectively in *G. monticola*); 2. the lower region of the G1 is wider and the lower margin of the G1 has a very low tooth; and 3. the total length of the G2 is about 8.5 times that of the distal segment (about 6.6 times in *G. monticola*).

***Etymology.*** - The name is derived from the Greek "eurys" (for broad) and "soma" (for body), alluding to the particularly broad carapace of the species.

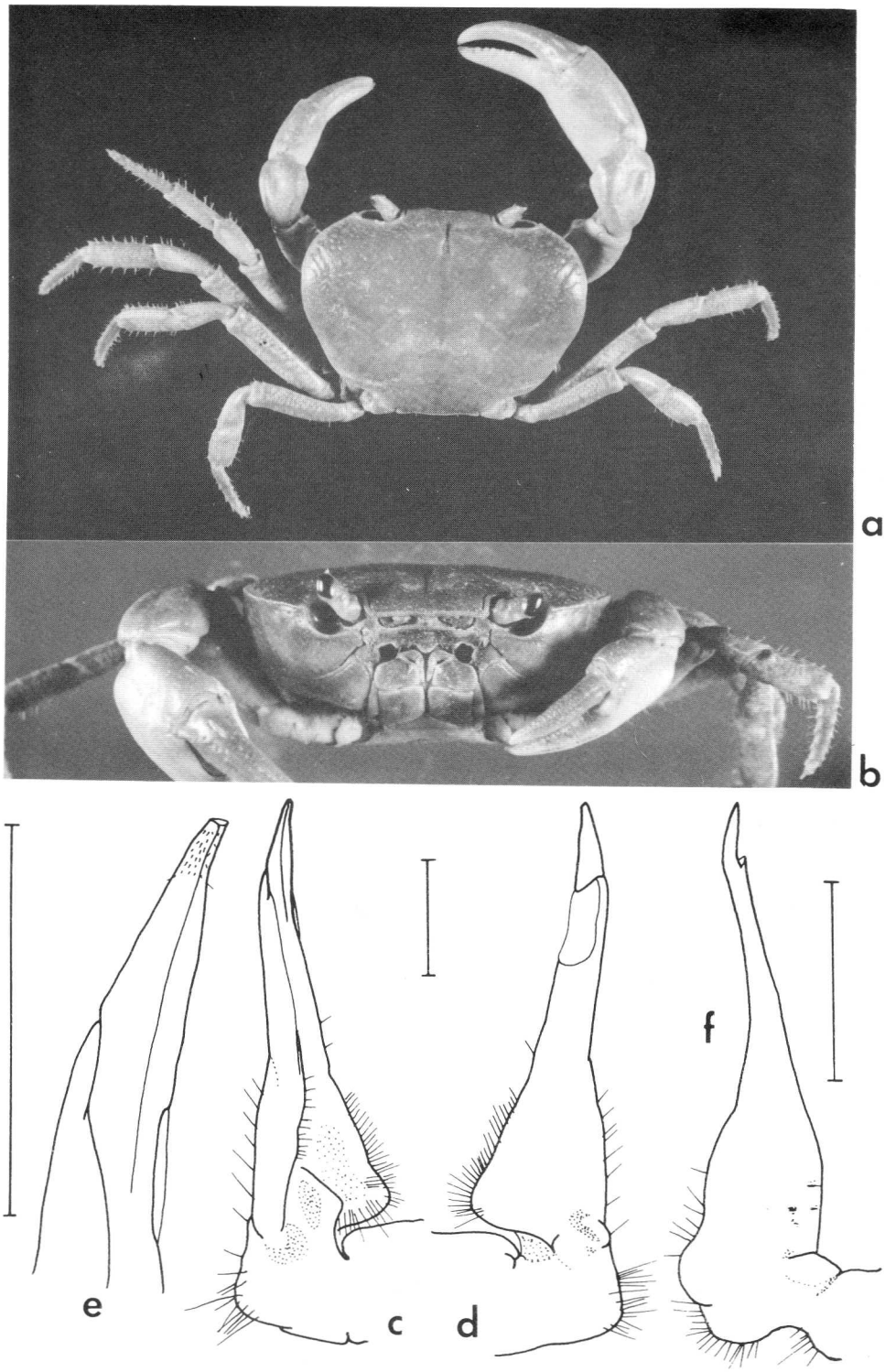



Fig. 18. *Geothelphusa eurysoma*, new species. Holotype male, 21.8 by 15.8 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

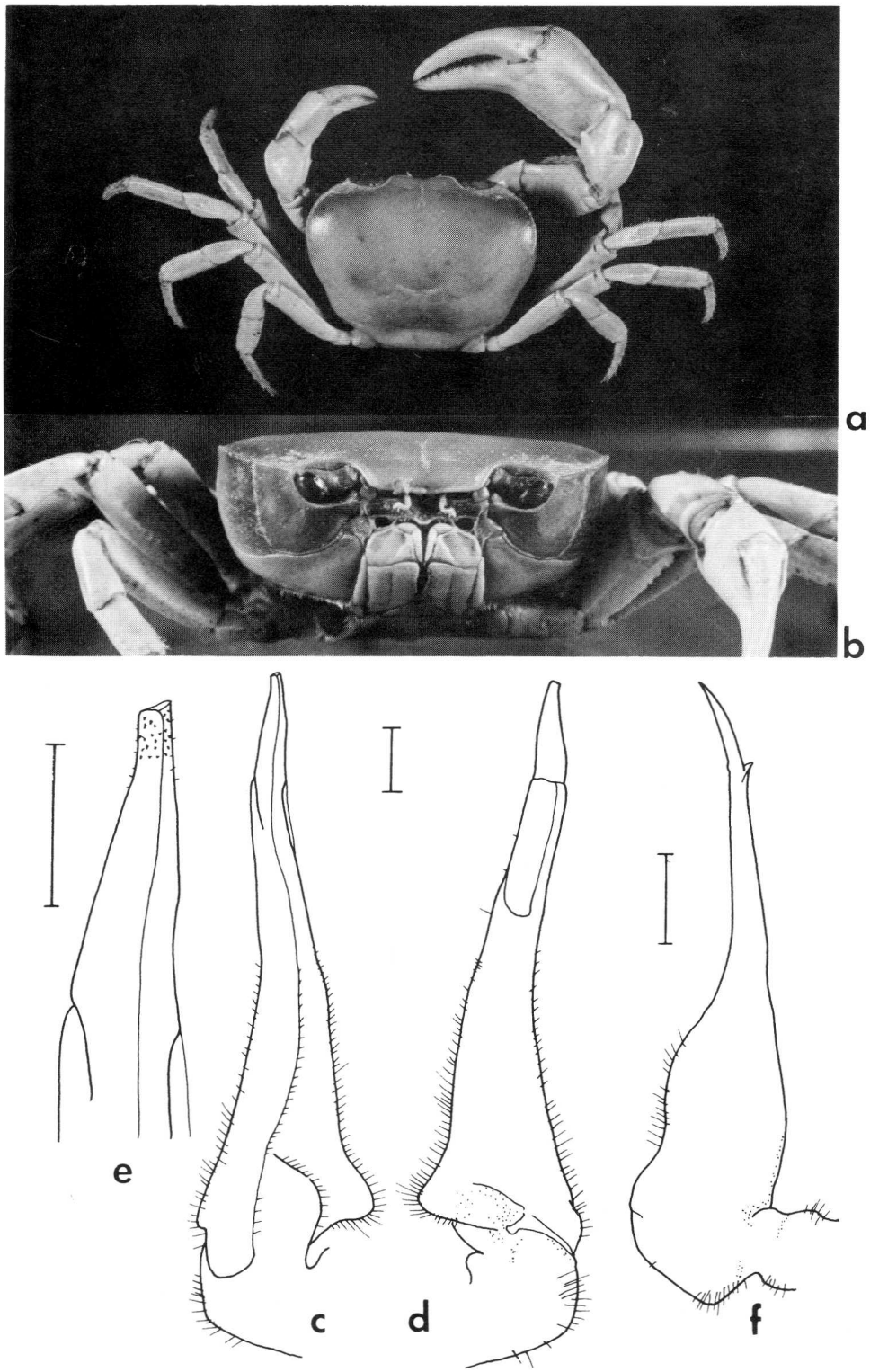



Fig. 19. *Geothelphusa yangmingshan*, new species. Holotype male, 31.4 by 24.3 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

### *Geothelphusa yangmingshan*, new species
(Fig. 19)

***Material examined.*** - Holotype - Male, 31.4 by 24.3 mm (NTOU F10185), TAIPEI CITY: Yangmingshan, coll. H.Y. Cheng, iv.1989.

***Diagnosis.*** - Carapace smooth, anterolateral crest distinct, with small, low granules; epibranchial tooth very low, indistinct. External orbital angle sharp. Cervical groove shallow, faint. Distance between tip of male abdomen and anterior margin of sternite 4 about 1.6 times to that of length of sternites 1-3. Fingers of chela forming long, oval gape when closed. Length of second ambulatory leg about 2.1 times carapace length. G1 sinuous; outer proximal margin of subterminal segment with a weak tooth, inner proximal margin dilated; terminal segment gently slender, length about 3.1 times width, distal part gently sinuous (Fig. 19c-e).

***Coloration.*** - Not known.

***Habitat.*** - Not known.

***Size.*** - Holotype male 31.4 by 21.3 mm (NTOU F10185).

***Distribution.*** - Northern Taiwan.

***Remarks.*** - This species is allied to *G. bicolor*, but it distinguished by the following aspects: 1. the anterolateral region of the carapace is smooth; 2. the G1 subterminal segment curves outwards; and 3. the G2 outer proximal margin of basal segment is divided into two lobes.

***Etymology.*** - The species name is named after its type locality, Yangmingshan National Park, and is used as a noun in apposition.

### *Geothelphusa takuan*, new species
(Fig. 20)

***Material examined.*** - Holotype - Male, 16.6 by 12.9 mm (NTOU F10205), TAOYUAN HSIEN: Fuhsing, Takuan, coll. J.Y. Shy & W.L. Tsay, 1.xi.1992.

Paratypes - TAOYUAN HSIEN: Fuhsing, Takuan - 1 male, 4 females (NTOU F10115), coll. J.Y. Shy & W.L. Tsay, 1.xi.1992.

***Diagnosis.*** - Carapace with concave pits, frontal margin vaguely divided into 2 lobes. Gastric region smooth, anterolateral region rough, concave pits here slightly larger than those on gastric region. Anterolateral crista distinct, lined with small, low granules, epibranchial tooth small. Distance between tip of male abdomen and anterior margin of sternite 4 about equal to that of length of sternites 1-3. Fingers of chela forming long, oval gape when closed. Ambulatory legs slender, total length of second ambulatory leg about 2.2 times carapace length. Width of male abdominal segment 6 about 2.6 times length. Subterminal segment of G1 moderately curved inwards, outer proximal margin with a tooth; terminal segment short, almost straight; total length about 6.8 times of terminal segment length, terminal segment length about 1.9 times of width (Fig. 20c-e).

***Coloration.*** - Carapace and chelae reddish-brown. Ambulatory legs light greenish-brown.

***Habitat***. - Occurs in high altitude habitats (above 1500 m asl), living under boulders and stones of streams.

***Size***. - Largest male 16.6 by 12.9 mm (NTOU F10205); largest female 18.9 by 14.2 mm (NTOU F10115); smallest mature female 14.6 by 11.2 mm (NTOU F10115).

***Distribution***. - Northern Taiwan.

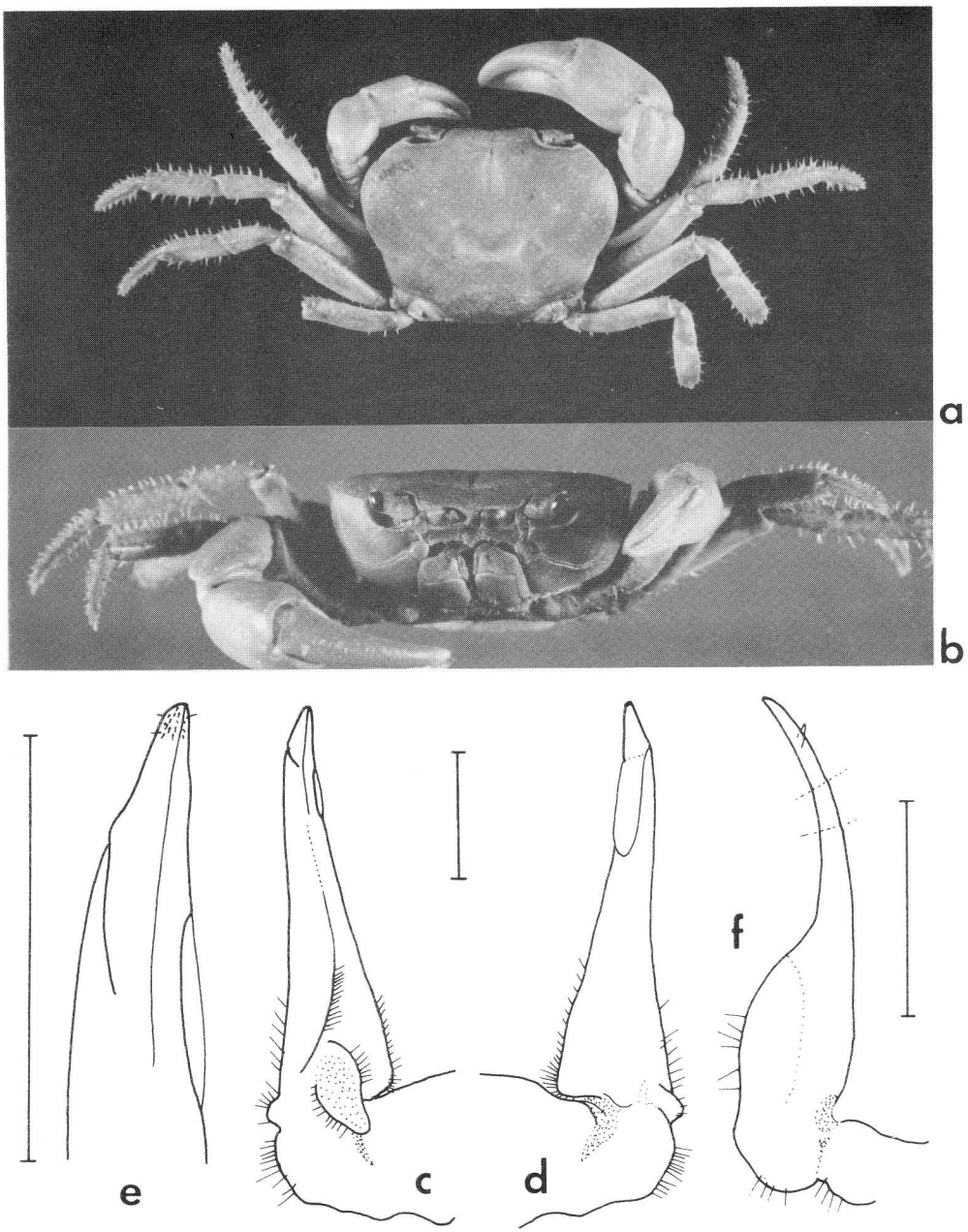



Fig. 20. *Geothelphusa takuan*, new species. Holotype male, 16.6 by 12.9 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

***Remarks***. - This species is allied to *G. eurysoma* and *G. monticola*, but it distinguished by the following aspects: 1. the carapace has a epibranchial tooth (epibranchial tooth is absent or very small in *G. eurysoma* and *G. monticola* respectively); 2. the distance between the tip of the male abdomen and anterior margin of sternite 4 is about equal to that of the length of sternites 1-3 (distinctly longer in *G. eurysoma* and *G. monticola*); 3. the G1 is slightly curved inwards in *G. takuan* (sinuous and curved outwards in *G. monticola* and *G. eurysoma* respectively); and 4. the outer proximal margin of the G1 subterminal segment has a tooth in *G. takuan* and *G. monticola* (absent in *G. eurysoma*).

***Etymology***. - The species is named after the type locality, and the name is used as a noun in apposition.

### *Geothelphusa lanyu*, new species
(Fig. 21)

*Geothelphusa candidiensis* - Minei, 1974: 241 (part), test fig. 2-5, 6 (nec *Geothelphusa dehaani candidiensis* Bott, 1967)

***Material examined***. - Holotype - Male, 20.2 by 15.8 mm (NTOU F10100), TAITUNG HSIEN: Lanyu, coll. J.Y. Shy & K. Lee, 18.iv.1993.

Paratypes - TAITUNG HSIEN: Lanyu - 4 males, 2 females (NTOU F10101), 1 male, 1 female (ZRC 1994.4224), coll. J.Y. Shy & K. Lee, 17.iv.1993.

Others - TAITUNG HSIEN: Lanyu - 2 males (NTOU F10102), coll. B.F. Shieh, 22.xii.1992; 1 male, 8 females (TMCD 2848), coll. P.K.L. Ng & C.H. Wang, 23.iv.1993; 9 males, 9 females [1 ovigerous] (TMCD 2856), coll. P.K.L. Ng & C.H. Wang, 5.vi.1993; 1 male (NTOU F10103), coll. B.F. Shieh & M.S. Hung, 24.vi.1993.

***Diagnosis***. - Carapace with fine concave pits. Gastric region smooth, anterolateral region rough, with fine dorsal ridges. Anterolateral crista distinct, lined with small, low granules, epibranchial tooth absent. Distance between tip of male abdomen and anterior margin of sternite 4 short, about 0.6 times of sternites 1-3. Merus of ambulatory legs slender, merus length of second ambulatory leg about 4.2 times width. Male abdominal segment 7 moderately bell-shaped. Subterminal segment of G1 straight or slightly curved inwards, outer proximal margin with a tooth, inner proximal margin dilated; length of synovial membrane length about 2.6 times width; terminal segment short, straight, lined with only fine hairs (Fig. 21c-e).

***Coloration***. - Carapace brown. Chelae orangish-red. Ambulatory legs spotted.

***Habitat***. - Live under stones and boulders of small streams.

***Size***. - Largest male 20.2 by 15.8 mm (NTOU F10100); largest female 20.7 by 15.8 mm (TMCD 2856); smallest mature female 14.4 by 11.0 mm (TMCD 2848).

***Distribution***. - Lanyu Island, southeastern Taiwan.

***Remarks***. - This species is allied to *G. lutao*, but it distinguished by the following aspects: 1. the distance between the tip of the male abdomen and anterior margin of sternite 4 is less than that of the length of sternites 1-3 ((longer in *G. lutao*); 2. the dactylus of the ambulatory leg is longer than the propodus (about equal in length in *G. lutao*); and 3. the outer proximal

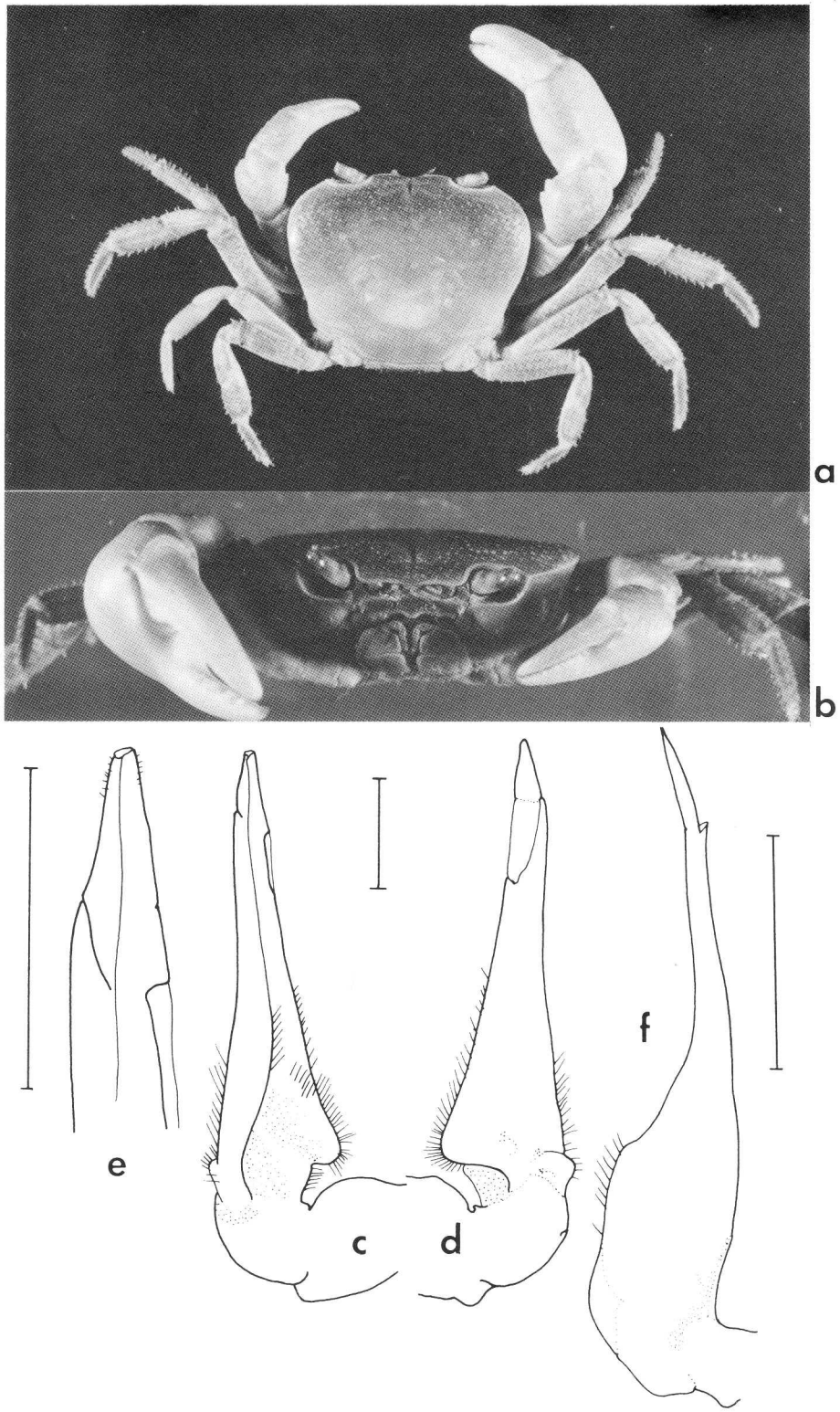



Fig. 21. *Geothelphusa lanyu*, new species. Holotype male, 20.2 by 15.8 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

margin of the G1 subterminal segment has a tooth and the terminal segment is straight (curved inwards in *G. lutao*), with the total length of the G1 being about 7.4 times that of the terminal segment (about 5.7 times in in *G. lutao*).

***Etymology***. - The species if named after the type locality, and the name is used as a noun in apposition.

### *Geothelphusa nanhsi*, new species
(Fig. 22)

***Material examined***. - Holotype - Male, 23.3 by 18.3 mm (NTOU F10198), TAINAN HSIEN: Nanhsi, coll. J.Y. Shy & W.L. Tsay, 7.viii.1992.

Paratypes - TAINAN HSIEN: Nanhsi - 2 males, 3 females (only one mature) (NTOU F10086), coll. J.Y. Shy & W.L. Tsay, 7.viii.1992.

***Diagnosis***. - Carapace smooth, frontal margin vaguely divided into 2 lobes. Anterolateral region rough. Anterolateral crest distinct, lined with indistinct low granules, epibranchial tooth very small. Distance between tip of male abdomen and anterior margin of sternite 4 about 1.3 times length of sternites 1-3. Length of second ambulatory leg about 2.0 times carapace length. Male abdominal segment 7 bell-shaped, length of segment 6 about 0.9 times length. Outer proximal margin of G1 subterminal segment dilated, with very a low tooth, inner proximal margin straight; terminal segment gently curved inwards, spinules on distal three-fifths (Fig. 22c-e).

***Coloration***. - Carapace, chelae and ambulatory legs orangish- to light yellow.

***Habitat***. - Lives in shallow burrows under stones near streams.

***Size***. - Largest male 23.3 by 18.3 mm (NTOU F10198); largest female 22.6 by 17.4 mm (NTOU F10086).

***Distribution***. - Southwestern Taiwan.

***Remarks***. - This species is allied to *G. candidiensis* s. str., but it distinguished by the following aspects: 1. the carapace is more convex transversely and longitudinally, with the carapace width and length being about 2.0 and 1.6 times of the carapace depth respectively; 2. the male abdominal segment 6 is longer, the width being about 2.0 times that of the length (about 2.5 times in *G. candidiensis*); and 3. the G1 terminal segment is more slender, the length being about 2.3 times that of the width (about 1.9 times in *G. candidiensis*).

***Etymology***. - The species is named after the type locality, and the name is used as a noun in apposition.

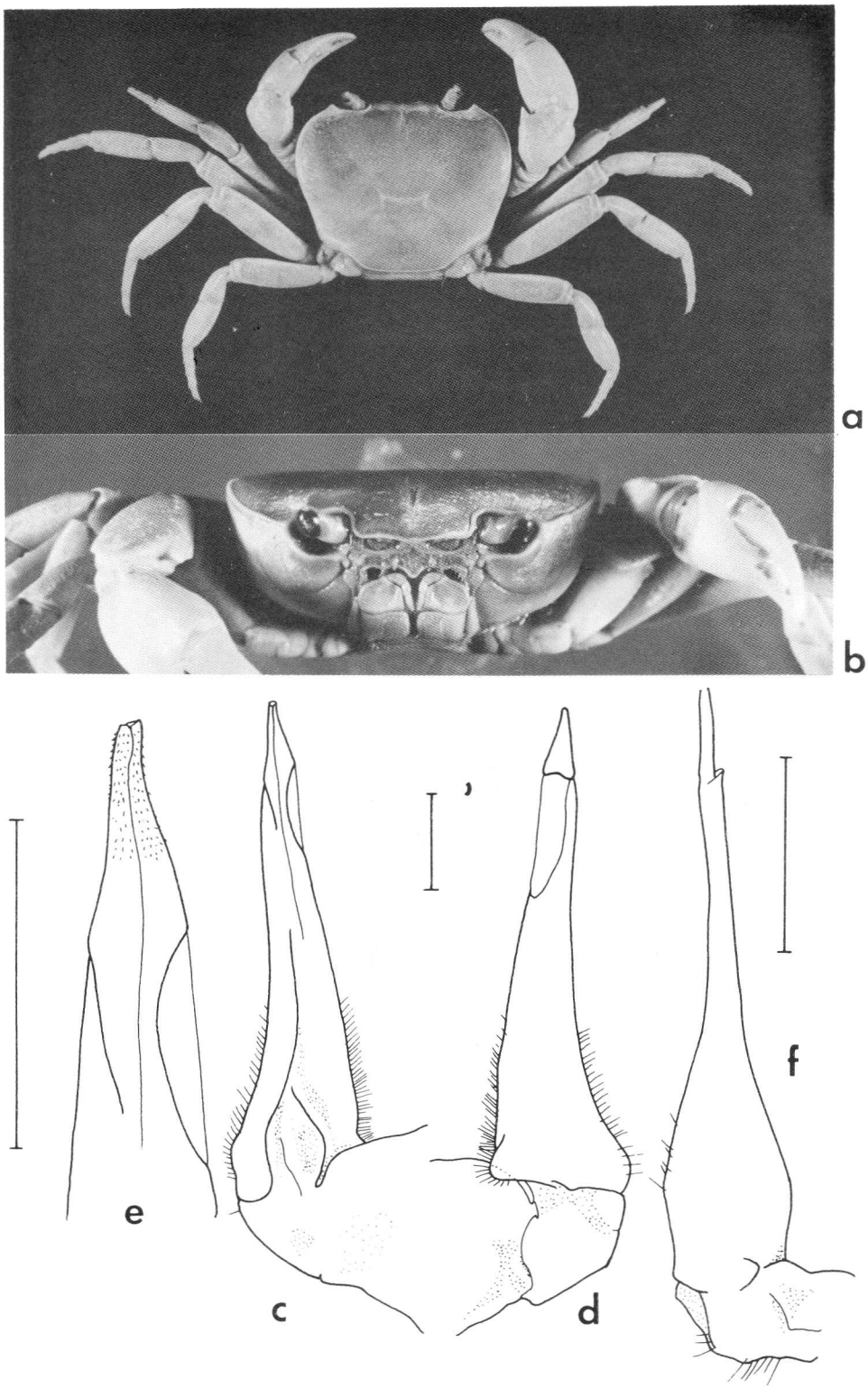



Fig. 22. *Geothelphusa nanhsi*, new species. Holotype male, 23.3 by 18.3 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

### *Geothelphusa tawu*, new species
(Fig. 23)

***Material examined.*** - Holotype - Male, 18.4 by 14.2 mm (NTOU F10203), TAITUNG HSIEN: Tawu, coll. J.Y. Shy & W.L. Tsay, 24.viii.1992.

Paratypes - TAITUNG HSIEN: Tawu - 3 females (only one mature) (NTOU F10109), coll. J.Y. Shy & W.L. Tsay, 24.viii.1992.

***Diagnosis.*** - Carapace with fine concave pits. Anterolateral crista distinct, lined with low, small granules. Gastric region smooth; anterolateral region rough, with fine striae. Distance between tip of male abdomen and anterior margin of sternite 4 about 1.1 times length of sternites 1-3. Fingers of chela forming long, oval gape when closed. Length of second ambulatory leg about 2.0 times carapace length, dactylus about 1.2 times longer than propodus. Width of male abdominal segment 7 about 1.2 times length, width of male abdominal segment 6 about 1.4 times width of segment 7. G1 slightly curved outwards, with small tooth on outer proximal margin of subterminal segment; terminal segment slightly curved inwards (Fig. 23c-e).

***Coloration.*** - Not known.

***Habitat.*** - Live under stones and boulders of streams.

***Size.*** - Largest male 18.4 by 14.2 mm (NTOU F10203); largest female 16.3 by 12.2 mm (NTOU F10109).

***Distribution.*** - Southern Taiwan.

***Remarks.*** - This species is allied to *G. ferruginea* and *G. lutao*, but it distinguished by the following aspects: 1. the carapace width and length is about 2.2 and 1.7 times that of the depth in *G. lutao* and *G. tawu* (about 2.3 and 1.8 times respectively in *G. ferruginea*); 2. the distance between the tip of the male abdomen and anterior margin of sternite 4 about equal to the length of sternites 1-3 in *G. ferruginea* and *G. tawu* (about 1.6 times in *G. lutao*); 3. the proportions of the length of the G1 synovial membrane to the width are different (2.7, 3.8 and 3.6 times in *G. lutao*, *G. ferruginea* and *G. tawu* respectively); and 4. the G1 terminal segment is curved inwards in *G. lutao* and *G. tawu* (curved outwards in *G. ferruginea*).

***Etymology.*** - The species is named after the type locality, and the name is used as a noun in apposition.

### *Geothelphusa lutao*, new species
(Fig. 24)

***Material examined.*** - Holotype - Male, 21.4 by 16.2 mm (NTOU F10200), TAITUNG HSIEN: Lutao, coll. P.K.L. Ng & C.H. Wang, 6.vi.1993.

Paratypes - TAITUNG HSIEN: Lutao - 11 males, 3 females (NTOU F10104), coll. P.K.L. Ng & C.H. Wang, 6.vi.1993. — Lutao - 6 males, 13 females (TMCD 2857), 1 male, 1 female (ZRC 1994.4225), coll. P.K.L. Ng & C.H. Wang, 6.vi.1993.

***Diagnosis.*** - Carapace with fine concave pits. Cervical groove shallow, faint. Gastric region smooth, anterolateral region rough, with fine striae. Anterolateral crista distinct, lined with

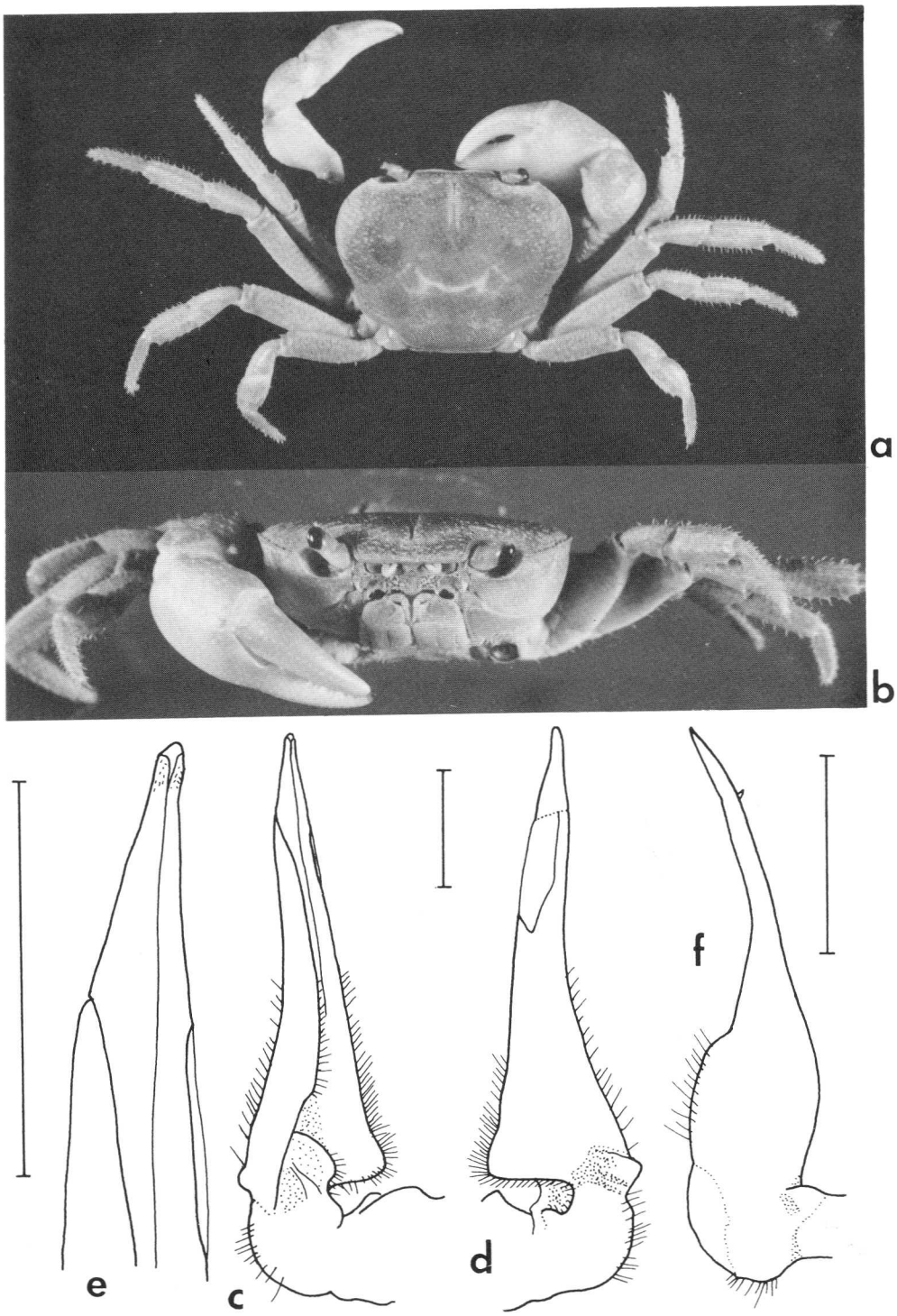



Fig. 23. *Geothelphusa tawu*, new species. Holotype male, 18.4 by 14.2 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

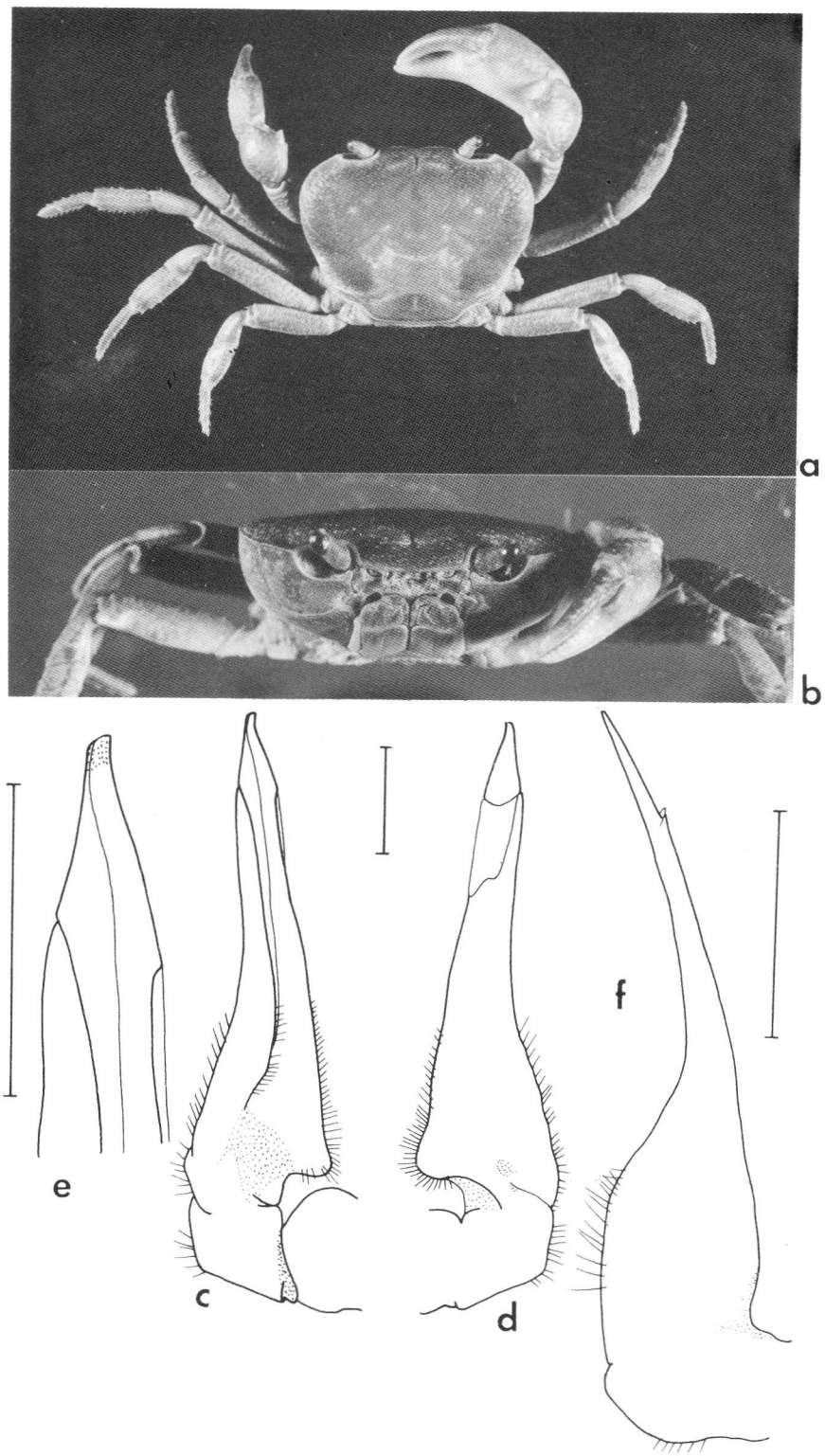



Fig. 24. *Geothelphusa lutao*, new species. Holotype male, 21.4 by 16.2 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

low, small granules, without epibranchial tooth. Distance between tip of male abdomen and anterior margin of sternite 4 about 1.6 times length of sternites 1-3. Propodus length of ambulatory legs equal to dactylus length. Width of male abdominal segment 6 about 2.4 times length. Outer proximal margin of G1 subterminal segment without or with faint tooth, G1 straight or slightly curved outwards; terminal segment gently curved inwards, about distal one-seventh with spinules (Fig. 24c-e).

***Coloration***. - Carapace purplish-red.

***Habitat***. - Not known.

***Size***. - Largest male 21.4 by 16.2 mm (NTOU F10200); largest female 23.8 by 17.7 mm (TMCD 2857); smallest mature female 15.7 by 12.0 mm (NTOU F10104).

***Distribution***. - Lutao Island, southeastern Taiwan.

***Remarks***. - The species is allied to *G. lanyu* and the differences for these two species have been discussed under the ***Remarks*** for *G. lanyu*.

***Etymology***. - The species is named after the type locality, and the name is used as a noun in apposition.

### *Geothelphusa cinerea*, new species
(Fig. 25)

***Material examined***. - Holotype - Male, 33.7 by 26.3 mm (NTOU F10052), HWALIEN HSIEN: Juisui, coll. J.Y. Shy & W.L. Tsay, 27.viii.1992.

Paratypes - HWALIEN HSIEN: Juisui - 1 male (NTOU F10052), coll. J.Y. Shy & W.L. Tsay, 27.viii.1992. — Juisui - 1 male (NTOU F10055), coll. J.Y. Shy & W.L. Tsay, 27.viii.1992.

Others - HWALIEN HSIEN: Shoufeng, Shyrtiping - 1 male (NTOU F101210, coll. J.Y. Shy & K. Lee, 26.iv.1986. — Shoufeng, Takangkou - 1 male (NTOU F10054), coll. J.Y. Shy & W.L. Tsay, 28.viii.1992. — Yuli - 1 male (CHCD 134), coll. H.C. Lin, 12.v.1993.

TAITUNG HSIEN: Tungho - 1 female (NTOU F10057), coll. J.Y. Shy & H.G. Lai, 15.viii.1992; 1 male (CHCD 123), coll. H.C. Liu, 10.v.1993. — Tungho, Dergualao - 2 males (NTOU F10053), coll. J.Y. Shy & W.L. Tsay, 27.viii.1992. — Tungho, Taiyung - 1 male, 2 females (CHCD 131), coll. H.C. Liu, 11.v.1993. — Lichi - 1 male, 4 females [1 ovigerous] (NTOU F10056), coll. J.Y. Shy & W.L. Tsay, 27.viii.1992. — Peinan, Chiafong - 3 males, 1 female [ovigerous] (TMCD 2850), coll. H.C. Liu, 3.vi.1993.

***Diagnosis***. - Carapace smooth, with fine concave pits. Branchial and gastric regions higher than other regions, anterolateral region rough, with fine striae; anterolateral crista distinct, lined with small, low granules, with low, indistinct epibranchial tooth. Distance between tip of male abdomen and anterior margin of sternum 4 about 1.5 times to that of length of sternum 1-3. G1 almost straight, outer proximal margin of subterminal segment with a distinct tooth; terminal segment straight, with spinules at about distal one fifth, total length about 6.4 times of terminal segment length; synovial membrane length about 3.5 times width (Fig. 25c-e). Total length of G2 about 6.9 times distal segment length (Fig. 25f).

***Coloration***. - Carapace bluish-gray, chelae and ambulatory legs grayish, with faint scattered stripes.

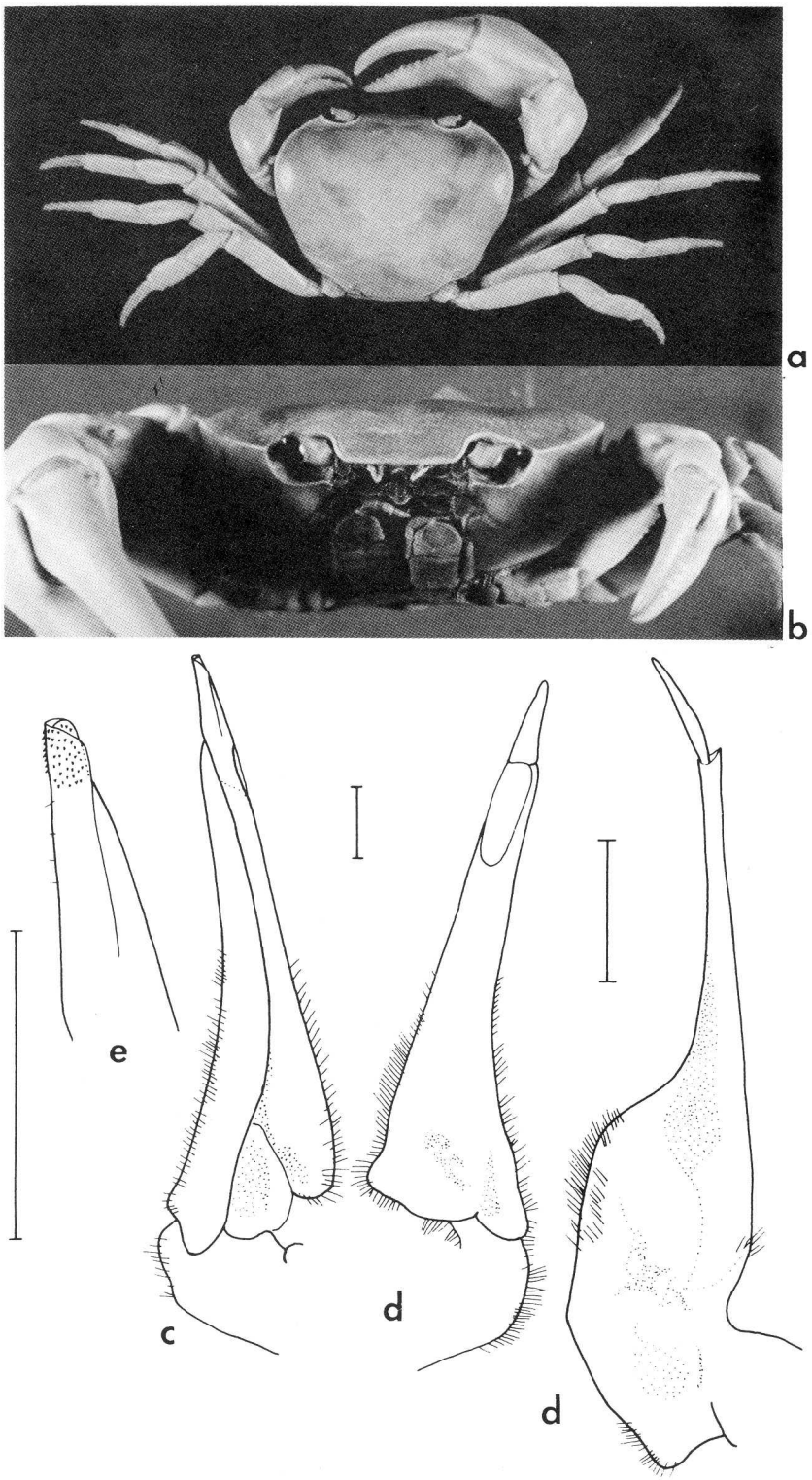



Fig. 25. *Geothelphusa cinerea*, new species. Holotype male, 33.7 by 26.3 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

***Habitat.*** - Live in burrows by the banks of streams.

***Size.*** - Largest male 33.7 by 26.3 mm (NTOU F10052); largest female 32.8 by 25.6 mm (NTOU F10056); smallest mature female 27.1 by 20.9 mm (NTOU F10056).

***Distribution.*** - Eastern Taiwan.

***Remarks.*** - This species is allied to *G. caesia*, but it distinguished by the following aspects: 1. the anterolateral region of the carapace is swollen and lined with fine striae; 2. the anterolateral crista is distinct and lined with small granules; and 3. the G1 is straight, the length of the synovial membrane being about 3.5 times that of the width.

***Etymology.*** - The name is derived from the Latin for ashy-coloured, with reference to the colour of the carapace.

### *Geothelphusa nanao*, new species
(Fig. 26)

***Material examined.*** - Holotype - Male, 26.2 by 20.2 mm (NTOU F10195), ILAN HSIEN: Nanao, Chinyang, coll. J.Y. Shy & M.S. Hung, 30.iii.1992.

Paratypes - ILAN HSIEN: Nanao, Chinyang - 1 male, 1 female (NTOU F10071), coll. J.Y. Shy & M.S. Hung, 30.iii.1992. — Nanao, Chinyang - 3 males, 1 female (NTOU F10073), coll. J.Y. Shy & W.L. Tsay, 3.ix.1993; 1 female (NTOU F10075), coll. J.Y. Shy & M.S. Hung, 15.viii.1991; 1 female (NTOU F10074), coll. J.Y. Shy & M.S. Hung, ix.1992.

Others - ILAN HSIEN: Nanao, Chinyang - 1 female (NTOU F10072), coll. J.Y. Shy, 17.v.1991. — Nanao, Suhwa Road - 5 males, 8 females [1 ovigerous] (NTOU F10076), coll. Wang. — Nanao - 2 males, 2 females (TMCD 2720), coll. G.S. Liu, iv.1991.

***Diagnosis.*** - Carapace with fine concave pits. Cervical groove shallow, faint. Gastric region smooth, anterolateral region rough, with fine striae. Anterolateral crista distinct, smooth, without or with very small epibranchial tooth. Distance between tip of male abdomen and anterior margin of sternite 4 about 1.5 times length of sternites 1-3. Merus of ambulatory legs slender, merus width of second ambulatory leg about 2.1 times of height. G1 subterminal segment almost straight, outer proximal margin with a tooth, inner proximal margin dilated; terminal segment short, curved outwards, total length about 8.0 times of terminal segment length; length of synovial membrane about 3.2 times width (Fig. 26c-e).

***Coloration.*** - Carapace greenish-brown to orange. Smaller specimens with deep orange carapace, ambulatory legs covered with dark brown spots.

***Habitat.*** - Lives in shallow burrows under stones near streams.

***Size.*** - Largest male 26.2 by 20.2 mm (NTOU F10195); largest female 30.5 by 22.8 mm (NTOU F10076); smallest mature female 22.1 by 17.4 mm (NTOU F10076).

***Distribution.*** - Northeastern Taiwan.

***Remarks.*** - This species is allied to *G. dolichopodes*, but it can be distinguished by the shorter G1 terminal segment. Other differences have been discussed under the ***Remarks*** for *G. dolichopodes*.

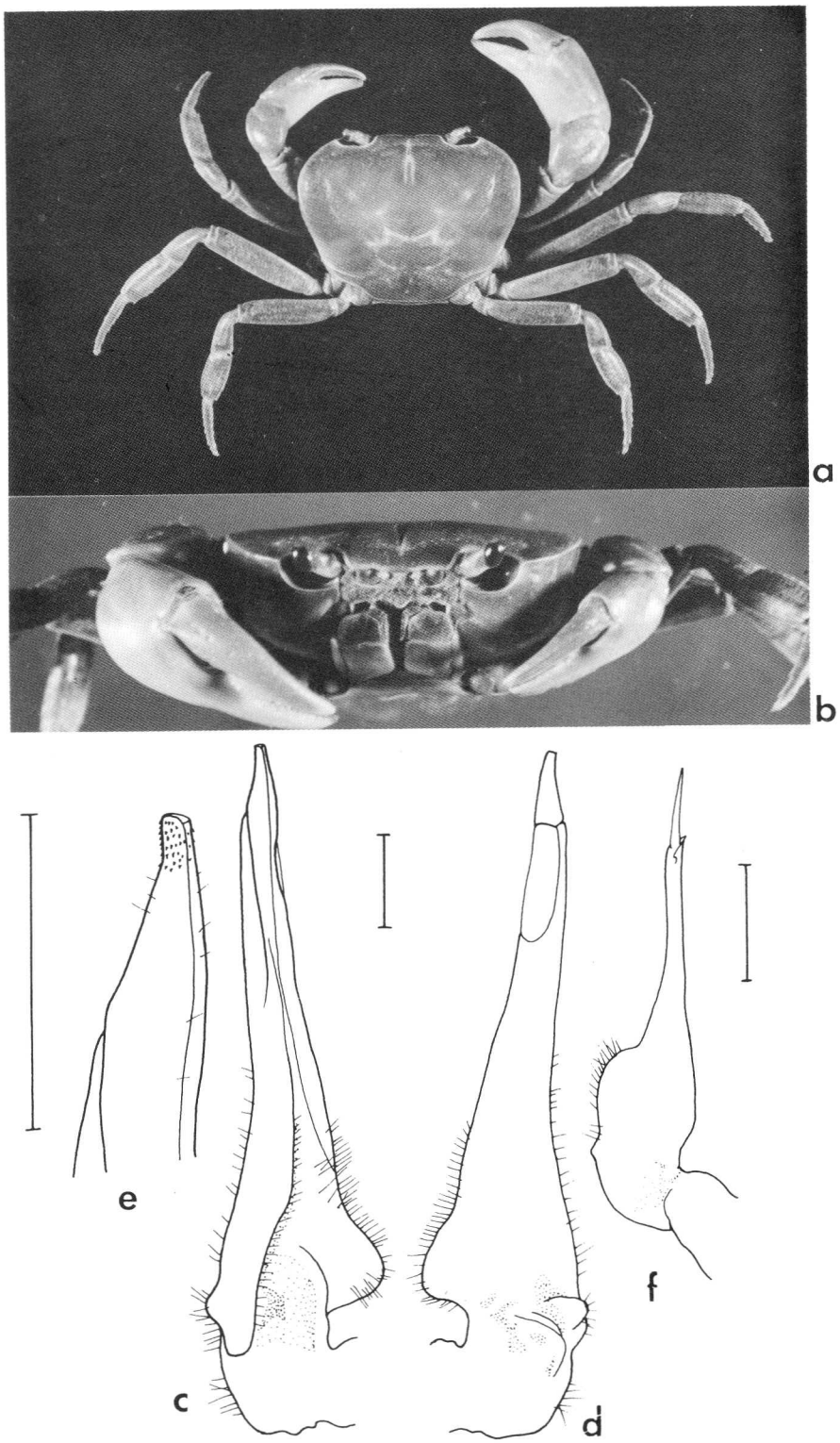



Fig. 26. *Geothelphusa nanao*, new species. Holotype male, 26.2 by 20.2 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

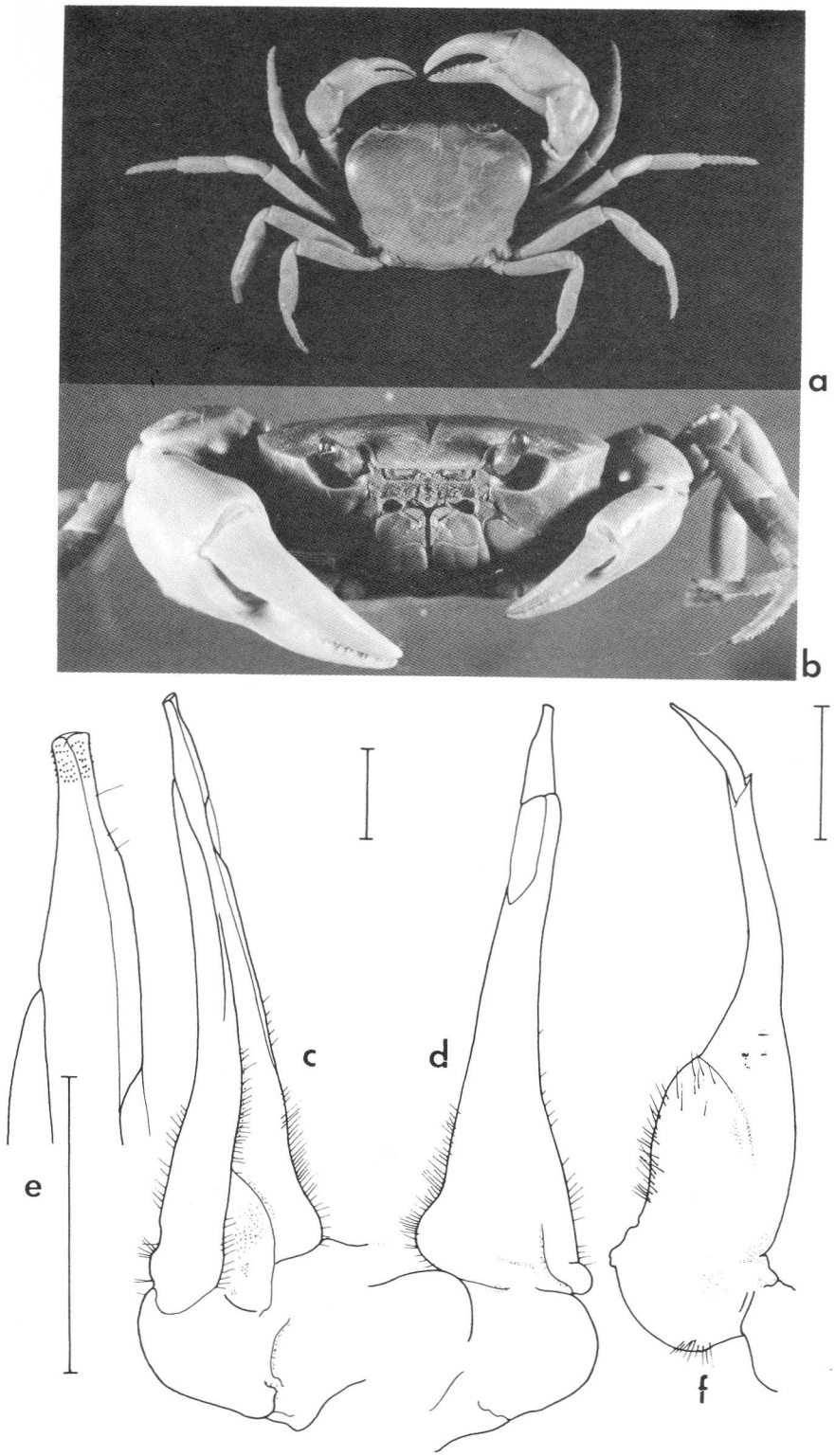



Fig. 27. *Geothelphusa ilan*, new species. Holotype male, 27.8 by 22.2 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

***Etymology***. - The species is named after its type locality (pronounced as "Nan-Aou") and the name is used as a noun in apposition.

### *Geothelphusa ilan*, new species
(Fig. 27)

***Material examined***. - Holotype - Male, 27.8 by 22.2 mm (NTOU F10196), ILAN HSIEN: Lotung, coll. J.J. Hwang, 27.xi.1983.

Paratypes - ILAN HSIEN: Lotung - 5 males (NTOU F10077), coll. J.J. Hwang, 27.xi.1983. — Tatung - 3 males, 4 females (NTOU F10078), coll. J.J. Hwang, 27.xi.1983.

Others - ILAN HSIEN: Sanshing - 5 males, 2 females (NTOU F10079), coll. 7.viii.1982; 1 female (NTOU F10080), coll. Wang, 9.viii.1989. — Tatung Jiuntow - 1 male (NTOU F10207), coll. J.Y. Shy & W.L. Tsay, 3.ix.1993; 1 male, 2 females (NTOU F10208), coll. J.Y. Shy & W.L. Tsay, 7.ix.1993. — Tatung Shnagtsukeng - 9 males (NTOU F10188), coll. J.Y. Shy & C.S. Heh, 30.i.1994.

***Diagnosis***. - Carapace smooth with fine concave pits. Cervical groove distinct; frontal margin divided into 2 lobes. Anterolateral region with fine striae. Anterolateral crista distinct, lined with low, small granules, without epibranchial tooth. Distance between tip of male abdomen and anterior margin of sternite 4 long, about 2.0 times length of sternites 1-3. Fingers of chela forming oval gape when closed. Lateral margins of male abdominal segment 6 slightly convex. G1 moderately curved outwards, outer proximal margin with a tooth, inner proximal margin dilated; terminal segment moderately curved outwards, spinules lining distal one-fifth (Fig. 27c-e).

***Coloration***. - Anterior half of carapace red-brown, ambulatory legs with fine blue spots.

***Habitat***. - Lives in shallows under stones near stream.

***Size***. - Largest male 28.5 by 22.3 mm (NTOU F10077); largest female 30.3 by 23.7 mm (NTOU F10078); smallest mature female 21.9 by 16.4 mm (NTOU F10079).

***Distribution***. - Northeastern Taiwan.

***Remarks***. - This species is allied to *G. nanao*, but it distinguished by the following aspects: 1. the carapace is more convex transversely and longitudinally, the carapace width and length being about 2.0 times and 1.6 times of the carapace length respectively; 2. the cervical groove is distinct and the anterolateral crista is lined with small granules; and 3. the total length of the G1 is about 5.8 times that of the terminal segment.

***Etymology***. - The species is named after the type locality, and the name is used as a noun in apposition.

### *Geothelphusa olea*, new species
(Fig. 28)

*Geothelphusa chiui* - Hwang & Mizue, 1985: 13 (part), text fig. 8, pl. IIB (nec *Geothelphusa chiui* Minei, 1974)

***Material examined***. - Holotype - Male, 21.9 by 16.5 mm (NTOU F10026), TAINAN HSIEN: Nanhsi, coll. J.Y. Shy & W.L. Tsay, 7.viii.1992.

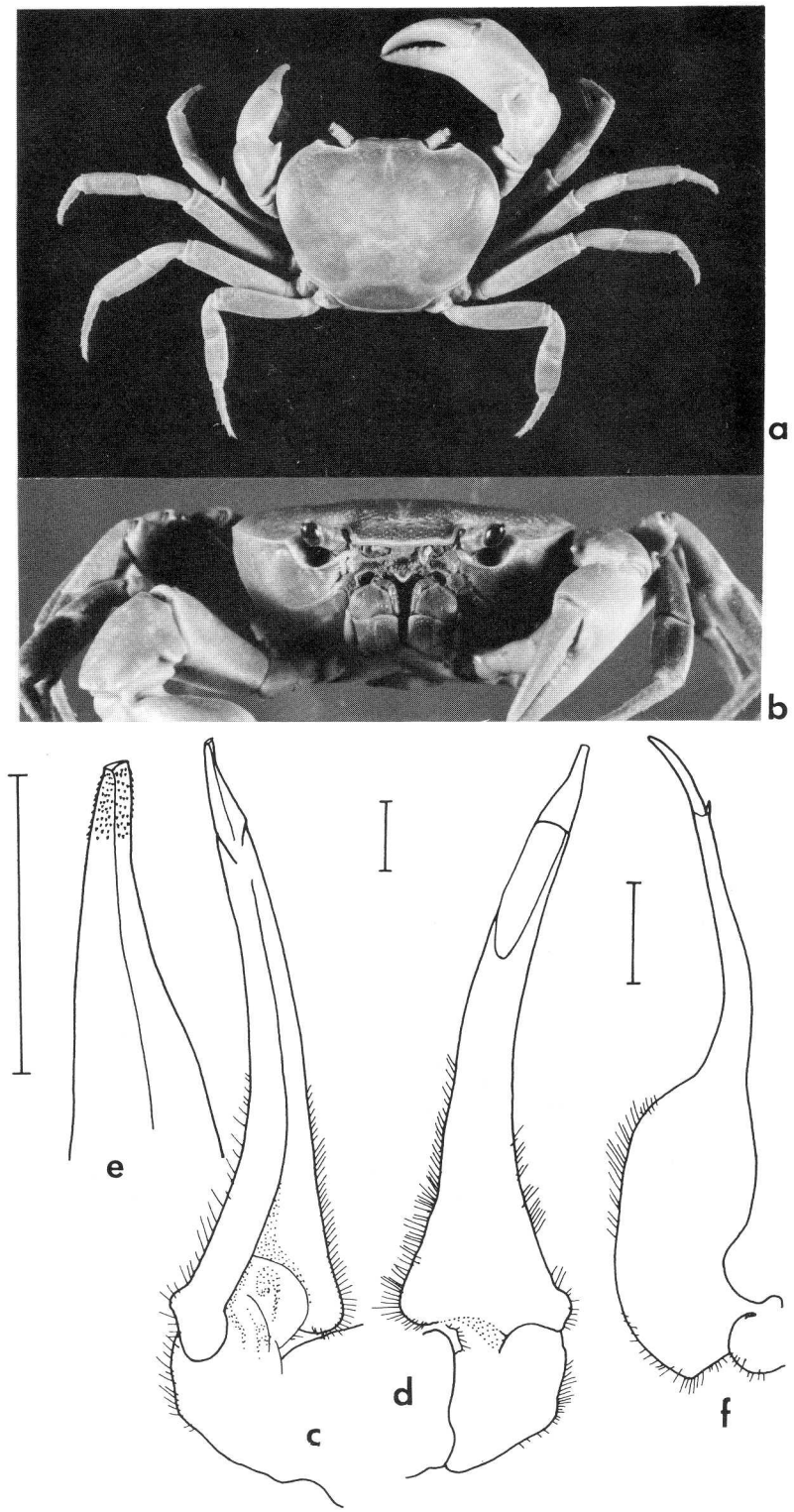



Fig. 28. *Geothelphusa olea*, new species. Holotype male, 30.1 by 23.8 mm. a: dorsal view; b: frontal view; c: ventral view of right G1; d: dorsal view of right G1; e: terminal segment of G1; f: ventral view of right G2. Scale = 1.0 mm.

Paratypes - TAINAN HSIEN: Nanhsi - 2 males, 1 female (NTOU F10026), coll. J.Y. Shy & W.L. Tsay, 7.viii.1992.

HSINCHU HSIEN: Peipu, Nanpu - 10 males, 3 females (NTOU F10046), coll. J.Y. Shy & K. Lee, 15.vi.1993.

Others - TAIPEI HSIEN: Chungho - 1 male, 1 female [ovigerous] (NTOU F10041), coll. C.S. Heh, 25.vi.1993; 2 males (NTOU F10032), coll. J.Y. Shy & C.S. Heh, 26.vi.1993. — Tanshui - 2 males, 1 female (NTOU F10118), coll. J.Y. Shy & K. Lee, 30.iv.1993. — Sanchih - 1 male, 2 females (NTOU F10119), coll. J.Y. Shy, 27.vi.1993; 1 male (NTOU F10120), coll. C.L. Lee, iii.1993.

TAOYUAN HSIEN: Fuhsing, Kaoyih - 1 male, 1 female (NTOU F10031), coll. J. Y. Shy & K. Lee, 14.vi.1993.

HSINCHU HSIEN: Herngshan - 1 male (NTOU F10051), coll. J.Y. Shy, 16.vi.1993.

MIAOLI HSIEN: Shanwan, Tahodi - 4 males (NTOU F100430, coll. J.Y. Shy & K. Lee, 15.vi.1993.

TAICHUNG HSIEN: Taiping, Tsaohu - 1 male, 1 female (TMCD 2844), coll. H.C. Liu, 10.ix.1988; 1 male (TMCD 2847), coll. C.H. Wang, 15.x.1992. — Hoping, Tianlerng - 4 males, 2 females (NTOU F10039), coll. J.Y. Shy & W.L. Tsay, 19.x.1992; 1 male, 2 females (NTOU F10040), coll. J.Y. Shy & K. Lee, 29.vi.1993.

NANTOW HSIEN: Tsaotun, Jeoujeoufong - 2 males, 2 females (NTOU F10028), coll. J.Y. Shy & K. Lee, 25.xi.1992. — Puli - 1 male (NTOU F10037), coll. J.Y. Shy & K. Lee, 27.xi.1992. — Shuili - 1 female [ovigerous] (NTOU F10047), coll. J.Y. Shy & K. Lee, 30.vi.1993.

YUNLIN HSIEN: Kukeng - 1 male, 1 female (NTOU F10050), coll. P.H. Ho, 5.ii.1992. — Linnei, Linpei - 1 male, 3 females [1 ovigerous] (NTOU F10042), coll. J.Y. Shy & K. Lee, 30.vi.1993.

CHIAYI HSIEN: Meishan - 1 female (NTOU F10049), coll. H. P. Yu, 9.xi.1982; 1 male, 1 female (NTOU F10033), coll. J.Y. Shy, 1.vii.1993. — Chuchi - 2 females (NTOU F10030), coll. J.Y. Shy & P.H. Ho, 16.xii.1990; 1 female (NTOU F10038), coll. J.Y. Shy & W.L. Tsay, 15.vii.1992; 1 male, 4 females (NTOU F10034), coll. J.Y. Shy, 21.xii.1992. — Chuchi, Paichii - 2 males (NTOU F10036), J.Y. Shy, 19.xii.1992. — Meishan, Yeongshing 2 males, 1 female (NTOU F10029, coll. J.Y. Shy & H.G. Lai. — Tapu, Tamaopu 3 males, 2 females (NTOU F10027), coll J.Y. Shy & K. Lee, 28.xi.1992.

CHIAYI CITY: Jiuntou - 1 male, 1 female (NTOU F10048), coll. J.Y. Shy & H.G. Lai, 3.iv.1992.

TAINAN HSIEN: Yuching - 19 males, 2 females (NTOU F10044), coll. H.P. Yu, 12.xi.1983. — Nanshi - 1 female (NTOU F10045), coll. J.Y. Shy, 7.viii.1992.

KAOHSIUNG HSIEN: Sanmin, Minchu - 1 male (NTOU F10035), coll. J.Y. Shy & W.L. Tsay, 6.viii.1992.

***Diagnosis***. - Gastric region of carapace smooth. Anterolateral region slightly rough, branchial region flat. Epibranchial tooth faint, anterolateral crista distinct, lined with small, low granules. Fingers of chela forming wide, oval gape when closed. G1 slightly curved outwards, base of subterminal segment narrow, total length about 4.1 times width of base, outer proximal margin with a tooth; terminal segment moderately curved inwards, total length about 7.5 times of terminal segment length (Fig. 28c-e).

***Coloration***. - Carapace and ambulatory legs greenish-gray to yellowish-green. In younger individuals, the ambulatory legs are covered with scattered darker coloured stripes.

***Habitat***. - Lives in burrows along the banks of streams.

***Size***. - Largest male 35.4 by 28.2 mm (NTOU F10031); largest female 36.2 by 27.9 mm (NTOU F10030); smallest mature female 21.2 by 17.0 mm (NTOU F10044).

***Distribution***. - Western Taiwan.

***Remarks***. - This species is allied to *G. albogilva*, but it distinguished by the following aspects: 1. the anterolateral crista is distinct, lined with small granules and has a small epibranchial tooth; 2. the base of the G1 subterminal segment is narrow and the length of

the synovial membrane is about 4.4 times that of the width; and 3. the distance between the tip of the male abdomen and anterior margin of sternite 4 is about 1.4 times of sternites 1-3 (about 1.7 times in *G. albogilva*).

***Etymology***. - The name is derived from the Latin for olive, alluding to the colour of the carapace. The name is used as a noun in apposition.

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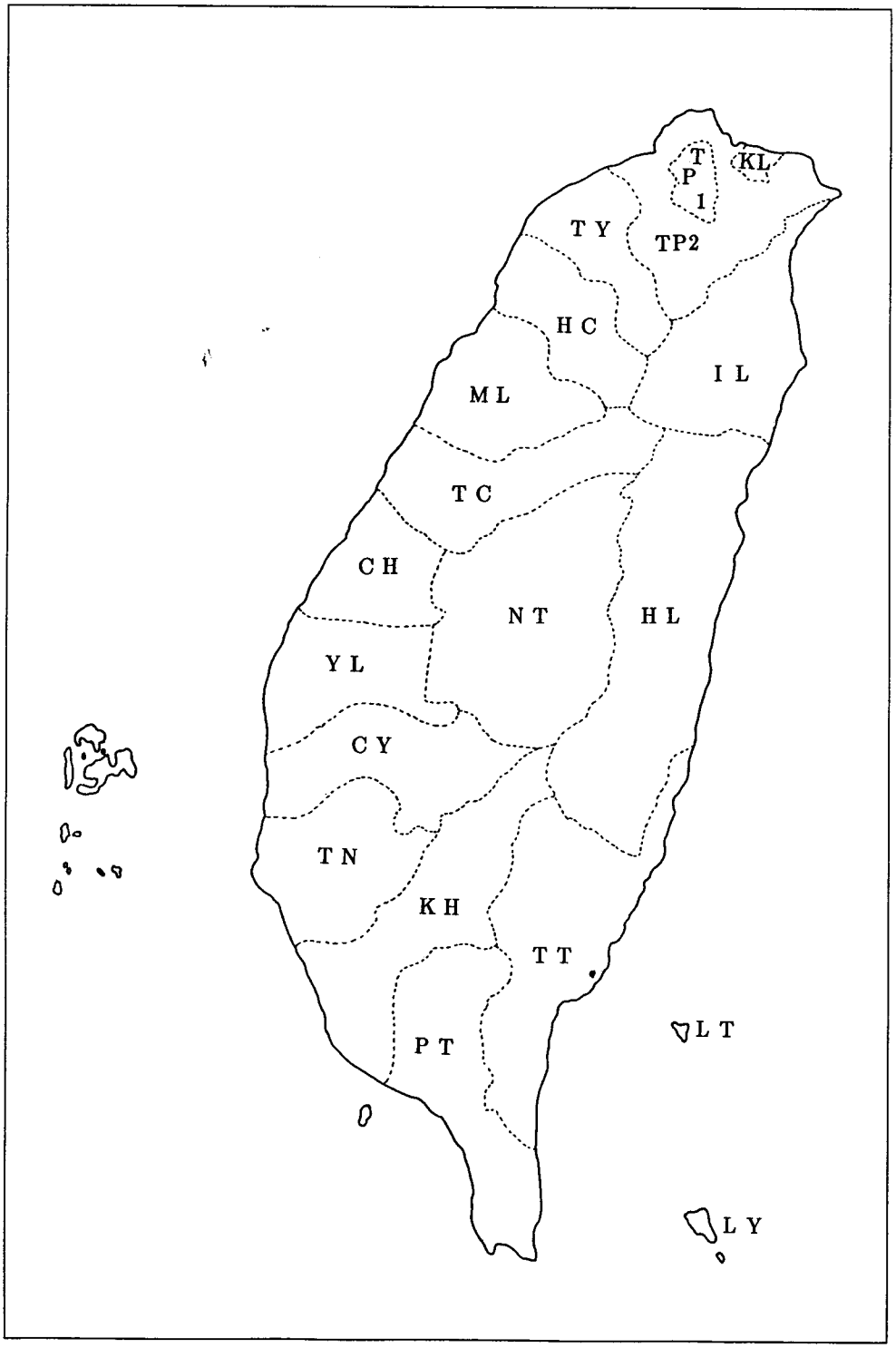


Fig. 29. Map of Taiwan showing main districts.: (TP1) Taipei City; (TP2) Taipei Hsien; (KL) Keelung City; (TY) Taoyung Hsien; (HC) Hsinchu Hsien; (ML) Miaoli Hsien; (TC) Taichung Hsien; (CH) Chunghwa Hsien; (NT) Nantow Hsien; (YL) Yunlin Hsien; (CY) Chiayi Hsien; (TN) Tainan Hsien; (KH) Kaohsiung Hsien; (PT) Pingtung Hsien; (IL) Ilan Hsien; (HL) Hwalien Hsien; (TT) Taitung Hsien; (LT) Lutao; (LY) Lanyu.

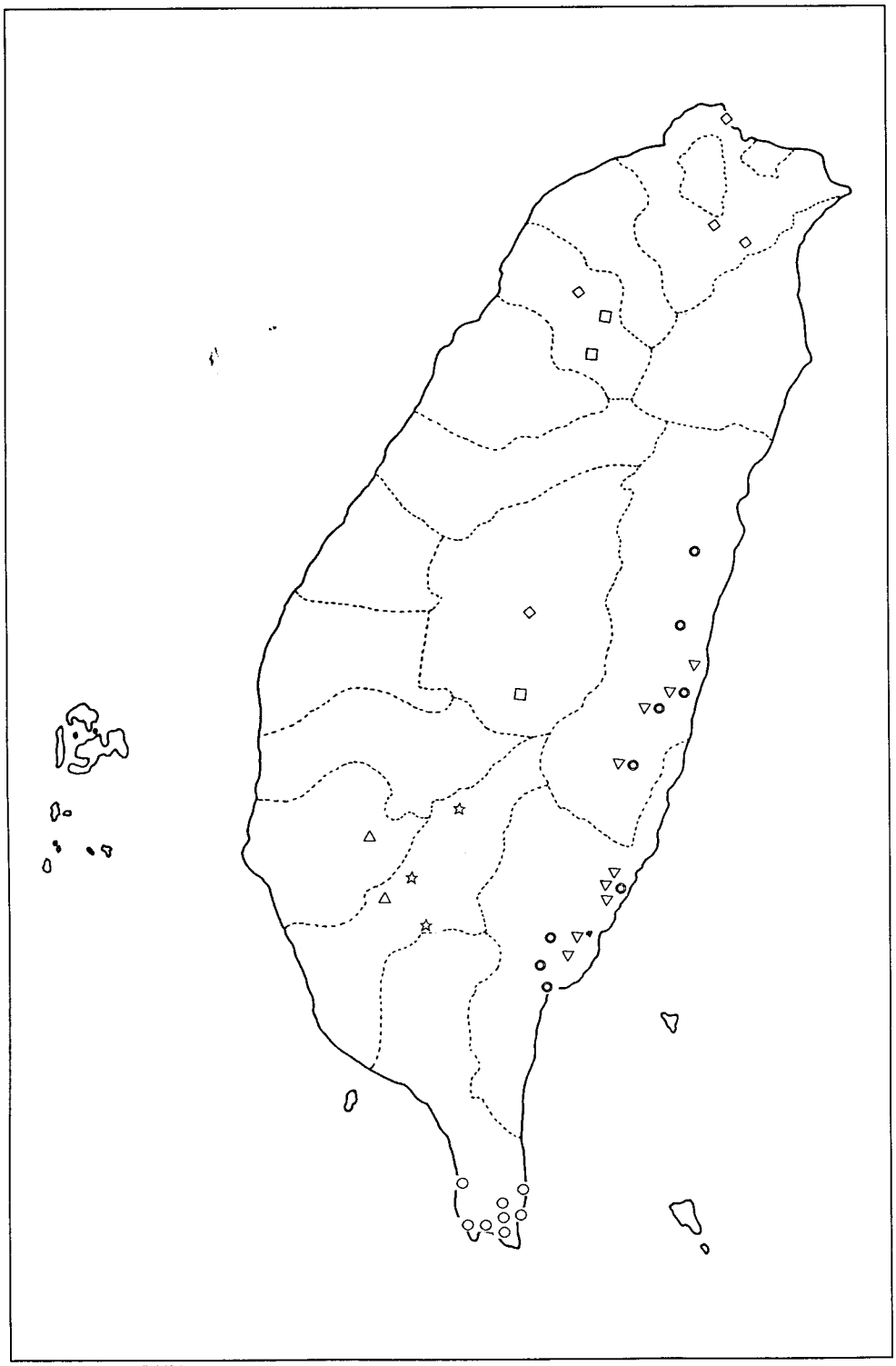

Fig. 30. The distributions of seven species of freshwater crabs in Taiwan.

○ : *G. albogilva*; △ : *G. ancylophallus*; ◎ : *G. bicolor*; ☆ : *G. caesia*;
◇ : *G. candidiensis*; □ : *G. chiui*; ▽ : *G. cinerea*.

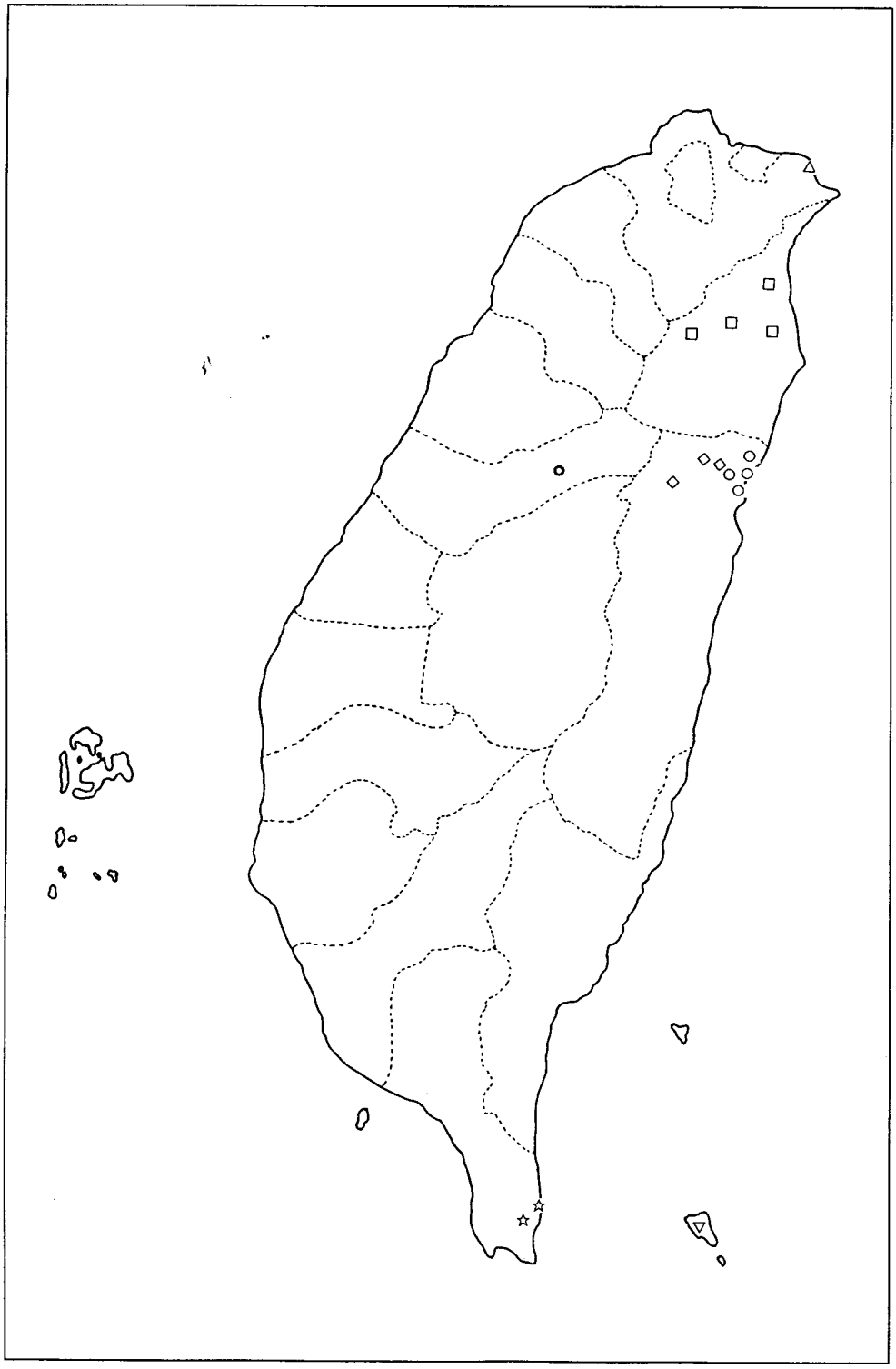

Fig. 31. The distributions of seven species of freshwater crabs in Taiwan.

○ : *G. dolichopodes*; △ : *G. eucrinodonta*; ◎ : *G. eurysoma*; ☆ : *G. ferruginea*; ◇ : *G. gracilipes*; □ : *G. ilan*; ▽ : *G. lanyu*.

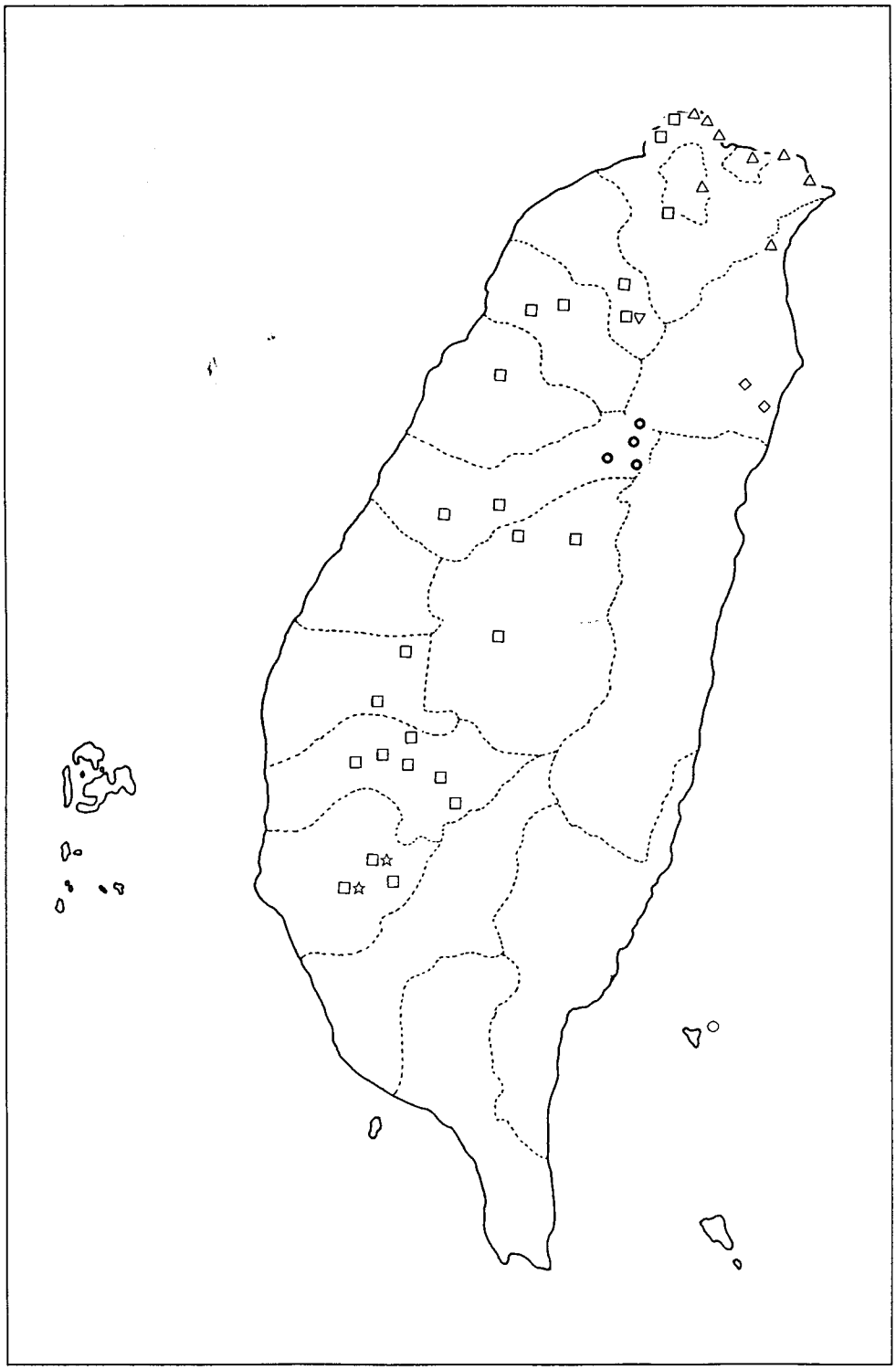

Fig. 32. The distributions of seven species of freshwater crabs in Taiwan.

○ : *G. lutao*; △ : *G. miyazakii*; ◎ : *G. monticola*; ☆ : *G. nanhsi*;
◇ : *G. nanao*; □ : *G. olea*; ▽ : *G. takuan*.

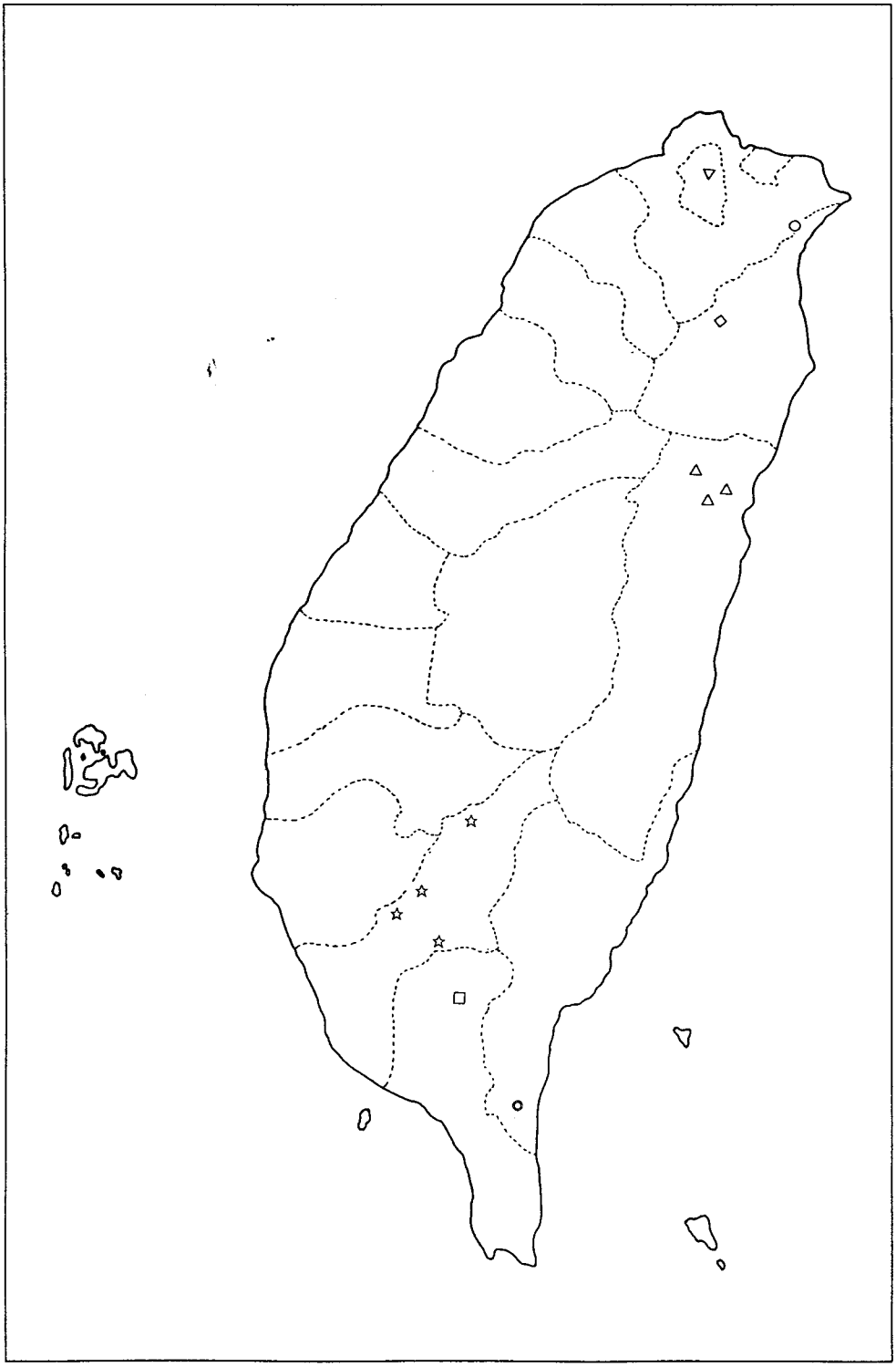

Fig. 33. The distributions of seven species of freshwater crabs in Taiwan.

○ : *G. tali*; △ : *G. taroko*; ◎ : *G. tawu*; ☆ : *G. tsayae*;
◇ : *G. wangi*; □ : *G. wutai*; ▽ : *G. yangmingshan*.

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