

## Fresh-water Crabs of Taiwan

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The authors collected specimens of fresh-water crabs from 23 places in Taiwan. Ten species, including an undescribed species, were found: *Eriocheir japonicus*, *E. rectus*, *Varuna litterata*, *Varuna* sp. (Grapsidae); *Somniathelphusa taiwanensis* (Parathelphusidae); *Nanhaipotamon formosanum* (Isolapotamidae); *Candidiopotamon rathbuni* (Sinopotamidae); *Geothelphusa chiui*, *G. Candidiensis* and *G. miyazakii* (Potamidae).

Distributions of some of these crabs are limited either in east or west of the central mountain range of Taiwan.

## Introduction

Fresh-water crabs are plentiful in the rivers, creeks and springs of Taiwan. They are intermediate hosts of the lung fluke which is injurious to the health of both humans and animals.

Ten species (including one new species) representing five families and six genera were collected by the authors in Taiwan fresh-waters. This paper describes the main characteristics, habitat and distribution of them and presents a classification based on the shape of the first pleopod.

## Collection, Measurement and Discussion

## Family Grapsidae Dana, 1851

The carapace is depressed and squarish. The front is broader than the rear region. A gap is present between the two external maxillipeds.

Most of the crabs in this family are found among the rocks or on sand, some species are found clinging on floating timbers. We found two genera of this family; *Varuna* H. Milne-

Edwards and *Eriocheir* De Haan.

Key to the genera of Grapsidae from Taiwan fresh-waters:

1. The merus of the external maxillipeds as long as it is wide, the palms of the cheliped with a tuft of hair, the propodus of the ambulatory legs cylindrical. . . . . *Eriocheir*
2. The merus of the external maxilliped strongly auriculate, the palms lack hair, the propodus of the ambulatory legs flattened and natatorial. . . . . *Varuna*

Genus *Eriocheir* De Haan, 1835

The carapace is rectangular, flattened and somewhat vaulted. The front rarely exceeds more than one-third the width of the carapace. There are four teeth behind the orbital angle and the last tooth is minute. The palms of the cheliped are bearded with a tuft of soft hair. The endopod articulates with the middle portion of the margin of the merus of the external maxilliped.

Two species were found; *Eriocheir japonicus* De Haan and *E. rectus* Stimpson.

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Key to the species of genus *Eriocheir*:

- 1. The front edge straight, the palms of the chelipeds covered with a patch of hair on the outside..... *E. rectus*
- 2. The front edge wavy, the palms of the chelipeds covered with thick hair..... *E. japonicus*

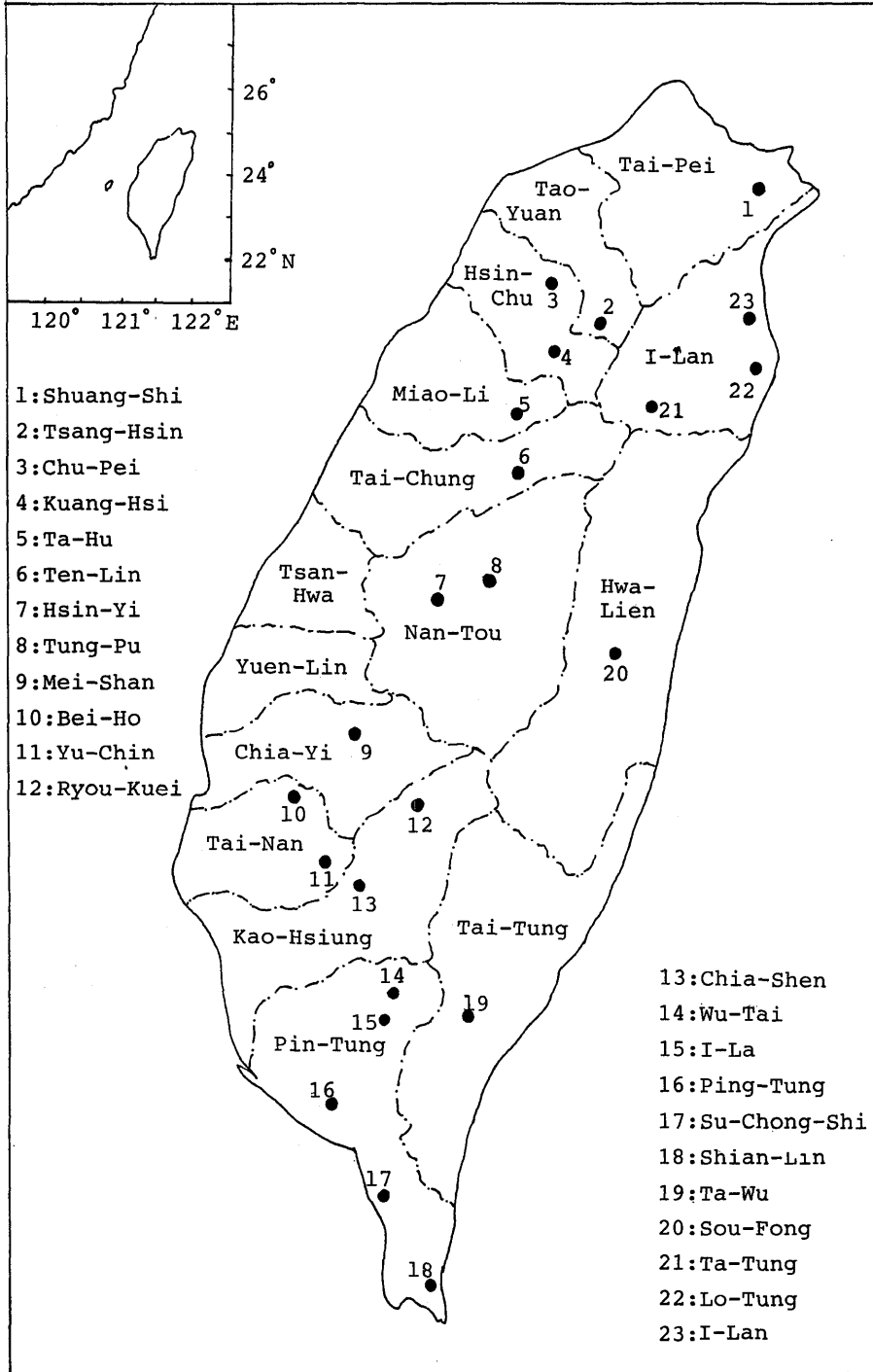


Fig. 1 Collection places in Taiwan

*Eriocheir japonicus* De Haan, 1835

(Fig.2)

*Eriocheir japonicus*; Edwards 1853, p. 176; Ortmann 1893, p. 716; Doflein 1902, p. 665; Panning 1938, p. 105; Sakai 1976, p. 664, pl. 221

Material examined:

Lo-Tong, I-Lan county, 8 ♂♂, 2 ♀♀. Nov.23, 1983. Hwang leg.

Ping-Tong county, 1 ♂. Nov. 23, 1983.

Hwang leg.

Chu-Pei, Hsin-Chu county, 1 ♂, 1 ♀. Sep. 8, 1983. Yu leg.

Shuang-Shi, Taipei County, 1 ♂, 3 ♀♀. June 6, 1982. Yu leg.

Ta-Hu, Miao-li County, 4 ♂♂, 3 ♀♀. July 25, 1984. Hwang leg.

Tsang-Hsin, Tao-Yuan county, 1 ♂, 1 ♀. July. 27, 1984. Hwang leg.

Ta-Wu, Tai-Tung county, 1 ♂. July 31, 1983. Hwang leg.

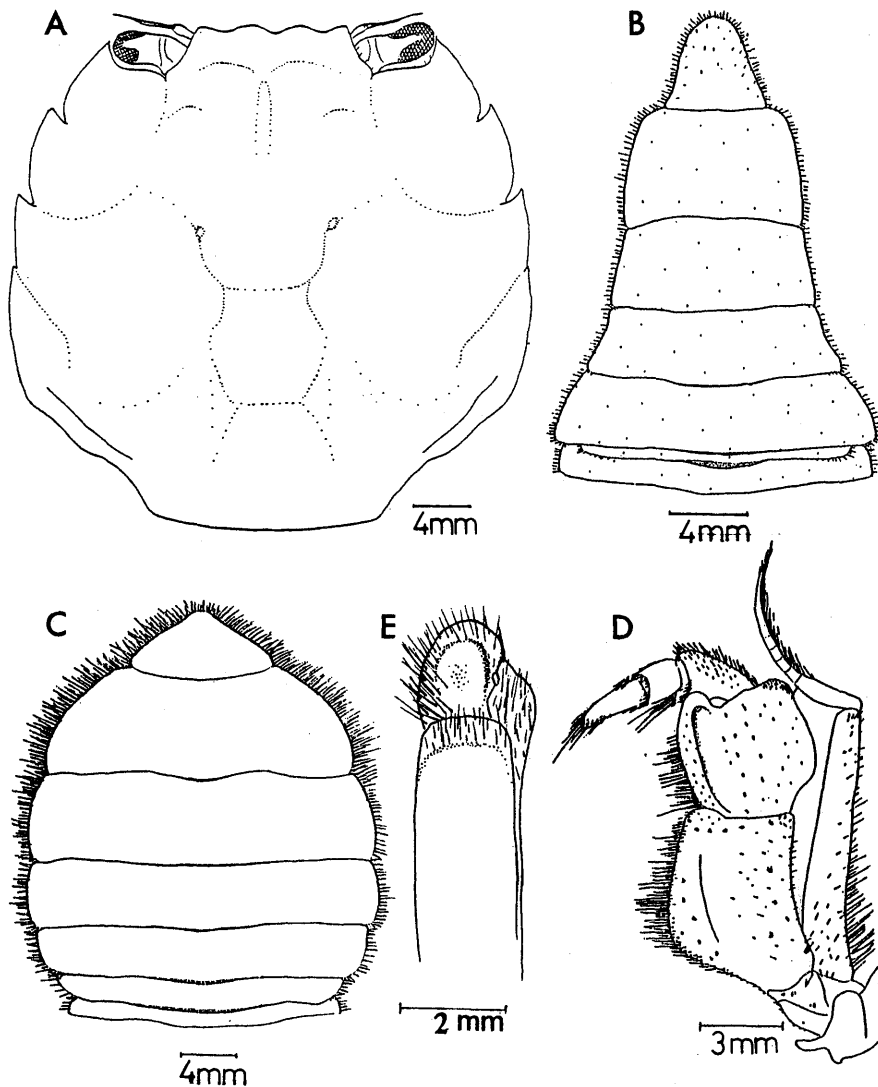


Fig. 2 *Eriocheir japonicus*

A : Carapace B : Abdomen of male C : Adbomen of female  
 D : Third maxilliped E : Dorsal view of first pleopod

## Measurements:

1 ♂, 38 mm CB (Carapace breadth), 34.5 mm CL (Carapace length); 1 ♀, 48.5 mm CB, 51 mm CL.

The carapace is squarish and flat, but the antero-lateral margin is a little convergent. The front edge is wavy. The surface of the carapace is flat and smooth with an H-shaped groove in the central region. The chelipeds are symmetrical and covered with thick hair on both the outer and inner sides of the palm.

There is a spine on the distal part of the medial margin of the carpus of the chelipeds. The length of the ambulatory legs is one and a half to two times that of the carapace. The distal three segments of the ambulatory legs have short hairs in longitudinal rows.

## Distribution:

Taiwan, Hong Kong, Mainland China, Japan and its archipelago, north and east coast of Korea, Vladivostock and Sakhalin.

## Remarks:

*E. japonicus* is the only fresh-water crab eaten in Taiwan and it is the second intermediate host of the lung fluke *paragonimus pulmonalis* (Baelz, 1880)

*Eriocheir rectus* Stimpson, 1858  
(Fig. 3; pl. IA)

*Eriocheir rectus*: Stimpson 1907, p. 125; Kemp 1918, p. 232; Tesch 1918, p. 107; Sakai 1935, p. 5; Edwards 1938, p. 107; Panning 1939, p. 107; Sakai 1939, p. 669, pl. 109, fig. 3; 1976, p. 647, figs. 355a-c.

## Material examined:

Sou-Fong, Hwa-Lien county, 1 ♀. Aug. 22, 1982. Yu & Hwang leg.  
Shian-Lin, Ping-Tong county, 1 ♂. Nov. 26, 1983. Hwang leg.

## Measurements:

1 ♂, 35.5 mm CB, 36 mm CL; 1 ♀, 31.5 mm CB, 32.5 mm CL.

The carapace is flat and is more depressed than that of *E. japonicus*. The frontal margin is almost straight. The antero-lateral margin has three large and one rudimentary teeth. The chelipeds are provided with a patch of hair only on the outer side of the palm. The ambulatory legs have growths of short dark hair just like that of *E. japonicus*.

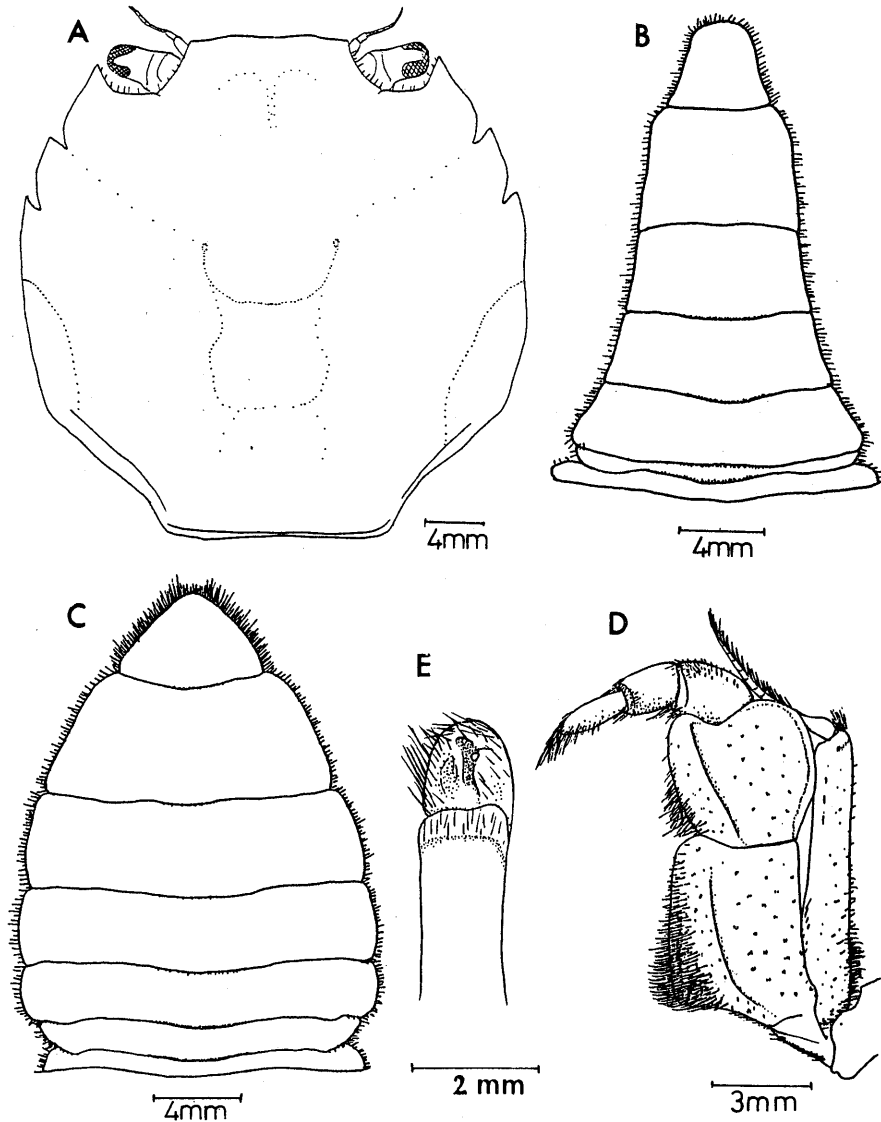
## Distribution:

This species is found only in Taiwan and northern China.

## Remarks:

This species was first found in southern China by Stimpson (1858). Though closely related to *E. japonicus*, the crab has 1) flatter carapace, 2) nearly straight front edge, and 3) chelipeds bearing dense hair only on the outer side of the palm.

Shen (1932) reported collection of this species from northern China. However, his description and figures suggest that his specimen was *E. leptognathus*. Moreover, Kemp (1918) once classified this species as the juvenile of *E. sinensis*. The specimen we collected indicates that it is certainly different from both *E. japonicus* and *E. sinensis*.

Fig. 3 *Eriocheir rectus*

A : Carapace B : Abdomen of male C : Abdomen of female  
 D : Third maxilliped E : Dorsal view of first pleopod

Genus *Varuna* H. Milne-Edwards, 1830

The carapace is flattened and depressed. The front is horizontal and straight. The upper orbital margin is notched conspicuously, the third maxilliped is auriculate and the palp articulates at the subdistal upper anterior margin. The exognath is narrower than the ischium. The ambulatory legs are flattened and heavily fringed at both margins.

Remarks:

The genus includes only two species; *V. litterata* (Fabricius) and *V. tomentosa* Pfeffer. The former is widely distributed in the Indo-Pacific region; the latter is known only from East Africa.

*Varuna litterata* (Fabricius, 1798)

(Fig. 4; pl. IB)

*Varuna litterata*: Edwards 1853, p. 176; Ortmann 1893, p. 713; De Man 1898, p. 112; Alcock 1900, p. 401; Dorflein 1902, p. 664. Schenkel 1902, p. 545; Lenz 1905, p. 370; Stimpson 1907, p. 124; Kemp 1918 p.230; Tesch 1918, p. 85; Sakai 1935, p. 227, pl. 63, fig. 2; Barnard 1950, p. 122, figs. 22 (c), 23 (f), 24 (d); Crosnier 1965, p. 34 figs. 40-1, 46, pl. 6 fig. 1.

Material examined:

Su-Chong-Shi, Ping-Tong county, 2 ♂♂ .

July 14, 1982. Yu & Hwang leg.

Sou-Fong, Hwa-Lien county, 2 ♂♂ , 2 ♀♀ .

Aug. 22 1982. Yu & Hwang leg.

Yu-Chin, Tai-Nan county, 2 ♂♂ . Nov. 12, 1983  
Yu & Hwang leg.

Ta-Tong, I-Lan county, 7 ♂♂ , 6 ♀♀ . Nov.  
1983. Hwang leg.

Shian-Lein, Ping-Tong county, 4 ♂♂ . Nov. 25  
1983. Hwang leg.

Lo-Tong, I-Lan county, 5 ♂♂ , 7 ♀♀ . July 20,  
1984. Hwang leg.

Measurement:

1 ♂ , 45.8 mm CB, 41.5 mm CL; 1 ♀ , 43 mm CB,  
40 mm CL.

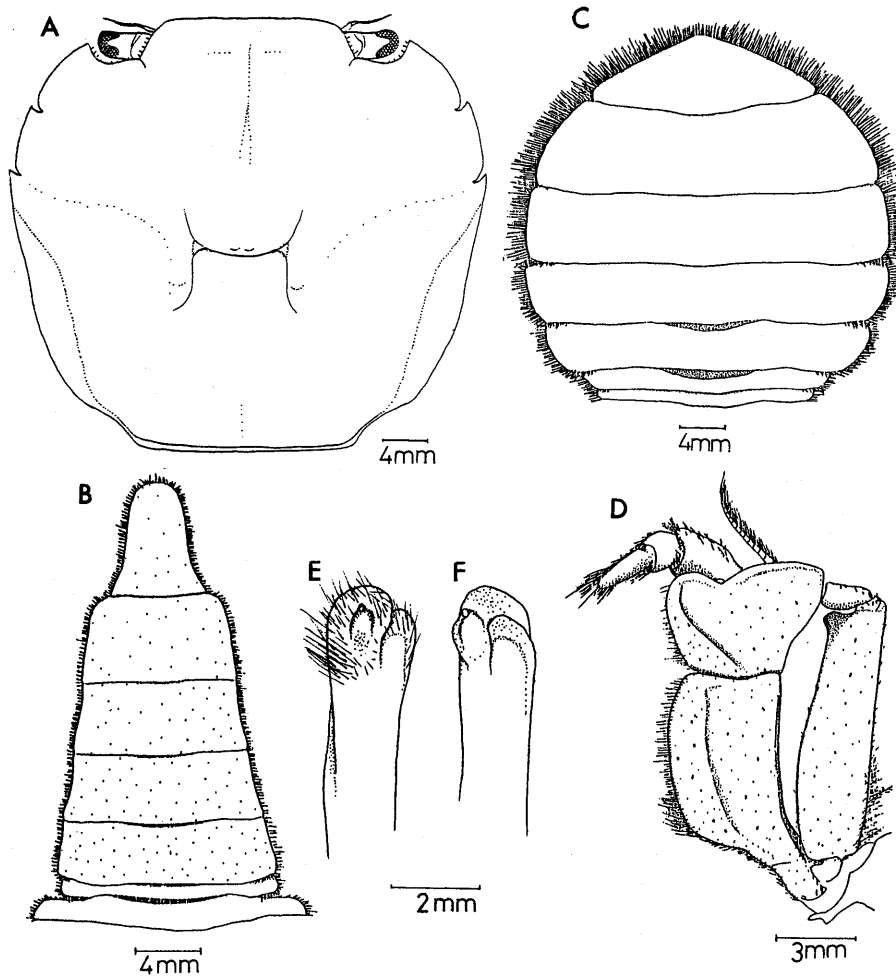


Fig. 4 *Varuna litterata*

A : Carapace B : Abdomen of male C : Abdomen of female

D : Third maxilliped E : Dorsal view of first pleopod

F : Lateral view of first pleopod

The carapace is depressed, flattened, glabrous and pitted. The antero-lateral margin is very thin with three teeth including the outer orbital tooth. The front edge is straight. An H-shaped mark is present between the mesogastric region and the cardiac region. There is a gap between the external maxillipeds. The distal region of the first pleopod is bilobed and concave. In the female, the abdomen covers the whole of the sternum and has a hairy margin. The ambulatory legs are swimming paddles and are fringed with hairs.

**Distribution:**

From the Indo-Pacific region, the east coast of Africa through Taiwan to Japan.

**Remarks:**

This crab is called the 'flat crab' in the countryside of Taiwan since its carapace is very flattened. This kind also lives in brackish water and is found clinging to floating objects in the sea.

*Varuna* sp.

In appearance, this species is very similar to *Varuna litterata* but many characteristics are different. The authors consider this to be a new species which will be described in detail in later paper.

Family Parathelphusidae Colosi, 1920

The palp of the mandible has two parts, and the subfrontal region is triangular in shape with the base upwards.

The antero-lateral margin has two or three spines behind the orbital angle. The abdomen of the male in most cases is T-shaped and slender. The first pleopod is particularly short with the last two segments fused together and slender with a spiral apex.

This family has only one genus in Taiwan, *Somaniathelphusa* Bott.

Genus *Somaniathelphusa* Bott, 1968

The carapace is smooth, there are three spines behind the outer orbital angle; the first pleopod is trumpet-shaped with a broad base gradually tapering to a slender distal end, and it is contorted towards the outside.

The only species in Taiwan is *S. taiwanensis* Bott.

*Somaniathelphusa taiwanensis* Bott, 1968

(Fig. 5; pl. IC)

*Potamon (Parathelphusa) sinensis*: Parisi 1916, p. 169.

*Parathelphusa (Parathelphusa) Sinensis*: Make M. and H. Tsuchiya 1923, p. 155, pl. 19 fig. 5.

*Somaniathelphusa Sinensis taiwanensis*: Bott 1970, p. 113, pl.21 figs. 48-50, pl.30 fig. 83.

*Somaniathelphusa taiwanensis*: Minei 1974, p.240, fig. 1.

**Material examined:**

Mei-Shan, Chia-Yi county, 7 ♂♂, 2 ♀♀. Nov.9, 1982. Yu & Hwang leg.

**Measurements:**

1 ♂, 25.8 mm CB, 21.3 mm CL; 1 ♀ 24.9 mm CB, 20.5 mm CL.

The carapace is very smooth and a little convex, especially in the branchial region, the front region is protuberant and the orbital region is sunken.

The antero-lateral margin has four acute spines including an outer orbital spine. The postero-lateral margin has many short striae. The epigastric region is divided by a little groove. The cervical groove forms a clear 'H' mark on the middle of the carapace. The dactylus is long, the cutting edges oppose each other almost without any intervening space. There is a big sharp spine on the inner side of the carpus and a small spine on the upper surface of the merus on each cheliped.

The external maxillipeds seldom have a gap

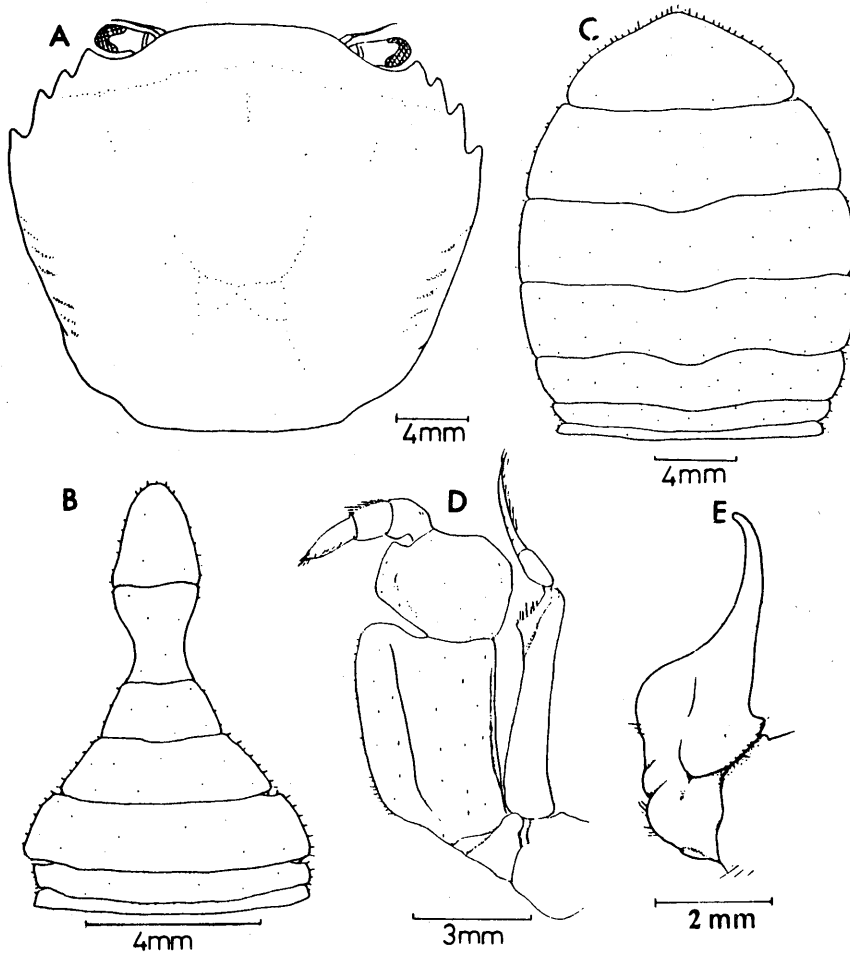


Fig. 5 *Somaniathelphusa taiwanensis*

A : Carapace B : Abdomen of male C : Abdomen of female  
D : Third maxilliped E : Dorsal view of first pleopod

between them, the exognath of the third maxilliped is very narrow and the width of the merus is greater than the length. The abdomen of the male is T-shaped, the last segment is semielliptical and the base of penultimate segment is broader proximally than distally.

#### Distribution:

This species has never been found in any other place except Chia-Yi county of Taiwan.

#### Remarks:

According to Bott 1968, this species is a subspecies *S. sinensis* (H.Milne-Edwards, 1853). However, Minei (1974) proposed that it was a

distinct species because of the following features:

1) the shape of the first pleopod, 2) the striae of the post-orbital region, 3) the adult size, 4) the antero-lateral teeth. Therefore, the present name is used.

#### Family Isolapotamidae Bott, 1970

The palp of the mandible is simple. The distal end of the first pleopod is not conical, it is either cut trans-versely or round in shape.

In Taiwan there is only one genus, *Nanhaipotamon* Bott.



Genus *Nanhaipotamon* Bott, 1968

The last segment of the first pleopod is flat and triangular.

One species is found in Taiwan, *N. formosanum* (Parisi).

*Nanhaipotamon formosanum*: (Parisi, 1916)  
(Fig. 6; pl. ID)

*Potamon (potamon) formosanum*: Parisi 1916,

p. 156, pl. 8, fig. 16.

*Isopotamon (Nanhaipotamon) formosanum*: Bott 1968,  
p. 124, fig. 9.

*Nanhaipotamon formosanum formosanum*: Bott 1970,  
p. 195, fig. 8.

*Nanhaipotamon formosanum*: Minei 1974, p.248  
figs.10-12.

Material examined:

Mei-Shan, Chia-Yi county, 1 ♂ . Nov. 9, 1982.

Yu & Hwang leg.

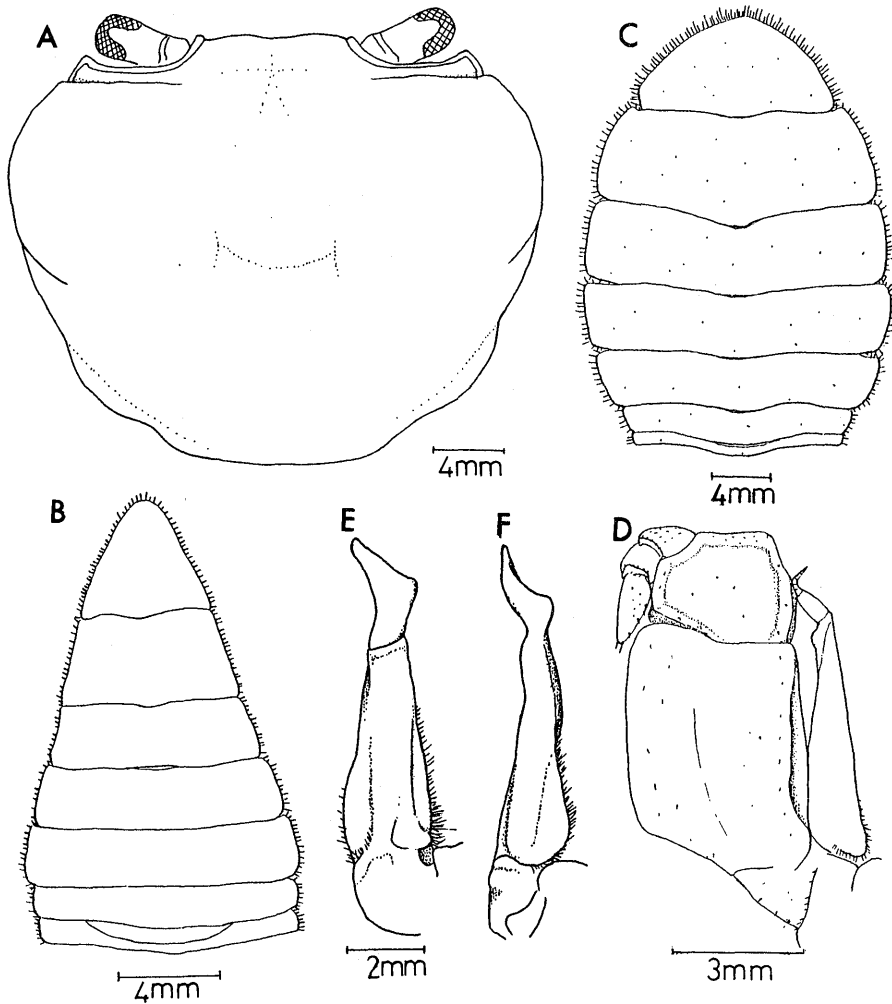


Fig. 6 *Nanhaipotamon formosanum*

A : Carapace B : Abdomen of male C : Abdomen of female

D : Third maxilliped E : Dorsal view of first pleopod

F : Lateral view of first pleopod

Bai-Ho, Tai-Nan county, 3 ♂♂, 1 ♀. Nov. 14, 1982. Yu & Hwang leg.

Measurements:

1 ♂, 30 mm CB, 24.2 mm CL; 1 ♀, 36.8 mm CB, 29.5 mm CL.

The carapace is smooth and strongly convex in an antero-posterior direction. The front is very deflexed, and is less than a-third of the breadth of the carapace. The depth is about two-thirds of the maximum breadth of the carapace. The cervical groove is very faint. The post orbital region has a groove which extends from the antero-lateral margin inwards on both sides. The edge ridge of the merus of the external maxilliped is prominent; the middle region is concave.

The first pleopod is almost triangular in shape at its distal end, and appears twisted when viewed from the lateral side. The chelipeds are similar in shape but different in dimensions. The walking legs are little slender. The color is greenish-yellow in the living state.

Distribution:

Taiwan only.

Remarks:

This species resembles *N. yaeyuma* Minei 1973, and *N. globosum* (Parise, 1916). Pretzmann (1963), Bott (1968) and Minei (1974) had already pointed out that this species differs distinctly from *N. yaeyuma* and *N. globosum* in the first pleopod.

Family Sinopotamidae Bott, 1970

The palp of the mandible is simple; The first pleopod is twisted inwards and is mostly short and blunt.

Only one genus is found in Taiwan which is *Candidiopotamon* Bott.

Genus *Candidiopotamon* Bott, 1967

In this genus the first pleopod is spiral in shape and twisted backwards, the distal region is twisted inwards.

Only one species is found in Taiwan.

*Candidiopotamon rathbuni* (De Man, 1914)

(Fig. 7; pl. II A)

*Potamon (potamon) rathbuni*: thbuni: Parisi 1916, p. 153; Maki & Tsuchiya 1923, p. 153, pl. 19 fig. 12.

*Potamon rathbuni*: Koba 1936a, p. 202, fig. 1; 1936b, p. 166, pl. 2, fig. 1; Pretzmann 1963, p. 365, pl. 4, fig. 15.

*Candidiopotamon rathbuni*: Bott 1967, p. 210, fig. 10; Bott 1970, p. 189, pl. 40 fig. 74, pl. 55 fig. 75; Minei 1974, p. 246, figs. 7-8.

Material examined:

Mei-Shan, Chia-Yi county, 6 ♂♂, 2 ♀♀. Nov. 9, 1982. Yu & Hwang leg.

I-La, Ping-Tong county, 10 ♂♂, 7 ♀♀. June 12, 1982. Yu & Hwang leg.

Ten-Lin, Tai-Chung county, 1 ♂. Aug. 28, 1982. Yu leg.

Chia-Shen, Kao-Hsiung county, 3 ♂♂. July 13, 1982. Yu & Hwang leg.

Wu-Tai, Ping-Tong county, 6 ♂♂, 3 ♀♀. July 11, 1982. Yu & Hwang leg.

Ryou-Kuei, Kao-Hsiung county, 5 ♂♂, 1 ♀. Apr. 18, 1983. Yu & Hwang leg.

Su-Chong-Shi, Ping-Tong county, 7 ♂♂, 4 ♀♀. July 14, 1982. Yu & Hwang leg.

Ta-Hu, Miao-Li county, 3 ♂♂, 4 ♀♀. July 25 1984. Hwang leg.

Tung-Pu, Nan-Tou county, 1 ♂, 1 ♀. July 24, 1984. Yu & Hwang leg.

Measurements:

1 ♂, 38.5 mm CB, 31.9 mm CL; 1 ♀, 37.8 mm CB, 31 mm CL.

The carapace is a little flattened in the

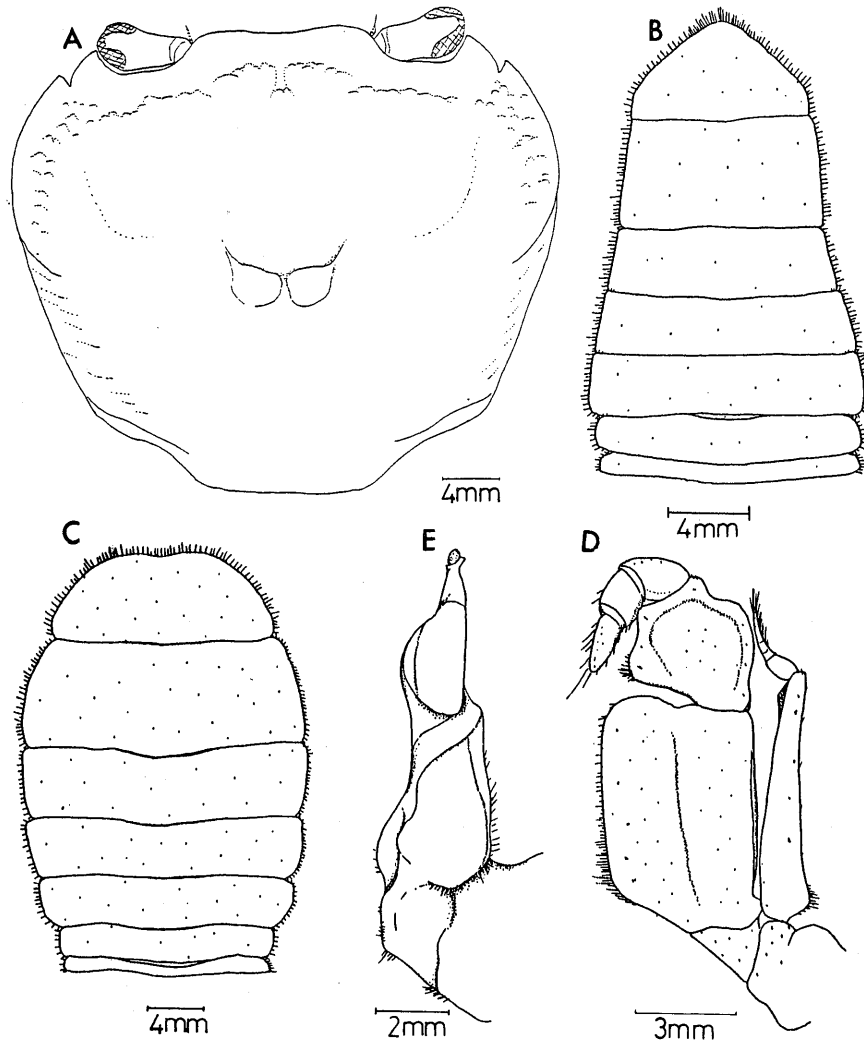


Fig. 7 *Candidiopotamon rathbuni*

A : Carapace B : Abdomen of male C : Abdomen of female  
D : Third maxilliped E : Dorsal view of first pleopod

middle region and the posterior region of the carapace is smooth. The front is slightly deflexed, protuberant and straight. The post frontal crest is distinctly convex, the antero-lateral margin is conspicuously crenulate and this region bears vesiculous granules. The external maxillipeds rarely have a gap in between them. The first pleopod is spiral. The chelipeds are similar in shape but one is a little smaller than the other. The colour is orange-red in the living state.

**Distribution:**

Taiwan only.

**Remarks:**

*C. rathbuni* is closely allied to *C. okinawaense*, *C. kumejimense* and *C. amamense*. Nevertheless, we can recognize one from another by the first pleopod and the post orbital region.

Family Potamidae Ortmann, 1896

The first pleopod is narrow, points outwards

and the distal end is conical.

This family has only one genus in Taiwan, it is *Geothelphusa* Stimpson.

Genus *Geothelphusa* Stimpson, 1858

The first pleopod is sword shaped, slender, long and curved outwards. Three species are found in Taiwan: *G. chiui* Minei, *G. candidiensis* Bott, and *G. miyazakii* (Miyake and Chiu).

Key to the species of genus *Geothelphusa*:

1. Medium or small in size, carapace is a little convex, synovial membrane never over five

times as long as broad. . . . . 2

-Big size, carapace very convex, antero-lateral margin more smooth and faint than the others, synovial membrane over five times as long as broad. . . . . *G. chiui*

2. Small in size, antero-lateral margin crenulate, epibranchial region has many tubercles, the distal three segments of the ambulatory legs have many spines and bristles in rows . . . . . *G. candidiensis*

-Medium size, an obtuse spine or notch after the outer orbital angle, the epibranchial region smooth. . . . . *G. miyazakii*

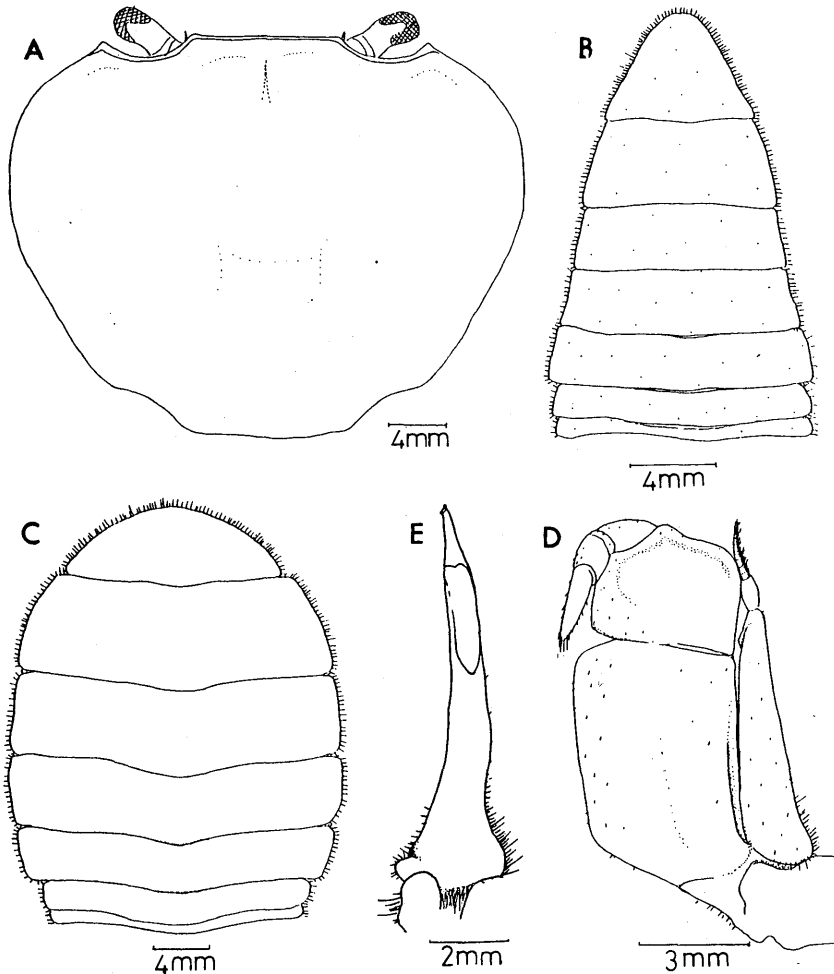


Fig. 8 *Geothelphusa chiui*

A : Carapace B : Abdomen of male C : Abdomen of female  
 D : Third maxilliped E : Dorsal view of first pleopod

*Geothelphusa chiu* Minei, 1974

(Fig. 8; pl. II B)

*Geothelphusa chiu*: Minei 1974, p. 243,  
figs. 4, 5, 6E, F.

## Material Examined:

Shian-Lein, Ping-Tong county, 1 ♂, 1 ♀.  
Nov. 25, 1983. Hwang leg.

Su-Chong-Shi, Ping-Tong county, 2 ♂♂, 4 ♀♀.  
July. 14, 1982. Yu & Hwang leg.

Ta-Hu, Miao-Li county, 2 ♂♂, 1 ♀. July 25,  
1984. Hwang leg.

Kuang-Hsi, Hsin-Chu county, 1 ♂ 1 ♀. July  
26, 1984. Hwang leg.

## Measurements:

1 ♂, 35.2 mm CB, 27.4 mm CL; 1 ♀, 43.2 mm  
CB, 33.8 mm CL.

The carapace is very convex from front to aft. Front is straight, behind the outer orbital angle there is no spine or notch. Antero-lateral margin is smooth. The cervical groove is faint. The chelipeds are unequal in dimension. There is a big gap in between cutting edges of the big chelae. The length of the merus of external maxilliped is a little less than the breadth. The first pleopod is slender and straight, synovial membrane is about one-third time the length of the first pleopod. Ambulatory legs are scattered with very short bristles.

## Distribution:

Taiwan only

## Remarks:

In this species, the shape of abdomen in both sexes and first pleopod are almost the same as *G. miyazakii* and *G. chiu*. But the overall morphology of each is quite different. We can distinguish one from another very easily with other characteristics.

*Geothelphusa candidiensis* Bott, 1967

(Fig. 9; pl. II D)

*Potamon (Geothelphusa) obtusipes*: Miyake 1963  
p.66, fig.4.

*Geothelphusa dehaani candidiensis*: Bott 1967,  
p.122, pl.10, fig.12; 1970, p.157, pl.40 figs.62,  
63. pl.53 fig. 64.

*Geothelphusa candidiensis*: Minei 1973, p.212,  
figs.7, 9E F; 1974, p.214, fig. 2, 6A, B.

## Material Examined:

Sou-Fong, Hwa-Lien county. 3 ♂♂, 4 ♀♀.  
Aug. 22, 1982. Yu & Hwang leg.

Tsang-Hsin, Tao-Yuan county. 8 ♂♂, 5 ♀♀.  
July 27, 1984. Hwang leg.

Kuang-Hsi, Hsin-Chu county. 4 ♂♂, 2 ♀♀.  
July 26, 1984. Hwang leg.

## Measurements:

1 ♂, 18.6 mm CB, 14.5 mm CL; 1 ♀, 20.2 mm CB,  
15.2 mm CL.

The carapace is smooth and a little convex in an antero-posterior direction. The antero-lateral margin is crenulated. The orbital and frontal margin are rimmed but not strongly. The outer orbital tooth is blunt, the surface of the postero-lateral margin has faint oblique rugae. The chelipeds are different in dimension in the male, and there is a big gap between the cutting edges of the big hand. The ambulatory legs are covered with tufts of bristles and spines.

## Distribution

Taiwan and Ryukyu archipelago.

## Remarks:

This species allied to *G. miyazakii* but differs in the size of the chelipeds of the male. Bott (1970) classified this species in subgenus *G. dehaani*. However, Minei 1973 distinguished it as different by the crenulate striae of the carapace and the shape of the first pleopod, so, we have agreed to consider it as *G. candidiensis*.

*Geothelphusa miyazakii* (Miyake & Chiu, 1965)

(Fig. 10; pl. II C)

*Potamon (Geothelphusa) miyazakii* : Miyake & Chiu  
1965, p. 595, pls. 13, 14.

*Geothelphusa miyazakii* : Minei 1973, p.214, figs.8  
9G, H; 1974, p. 242, figs. 3, 6C, D.

Material Examined:

Suang-Shi, Taipei county, 2 ♂♂, 1 ♀. June 1,  
1982. Yu leg.

Chia-Shan, Kao-Hsiung county, 3 ♂♂, 1 ♀.  
Apr. 17, 1983. Yu & Hwang leg.

Hsin-Yi, Nan-Tou county. 1 ♂. Jul. 24, 1984.  
Yu & Hwang leg.

I-Lan county. 2 ♂♂, 1 ♀ July 19, Hwang leg.

Ta-Hu, Miao-Li county, 1 ♂, 1 ♀. July 25,  
1984. Hwang leg.

Measurements:

1 ♂, 23 mm CB, 18.5 mm CL; 1 ♀, 29 mm CB,  
22.9 mm CL.

The carapace of this species is smooth and a

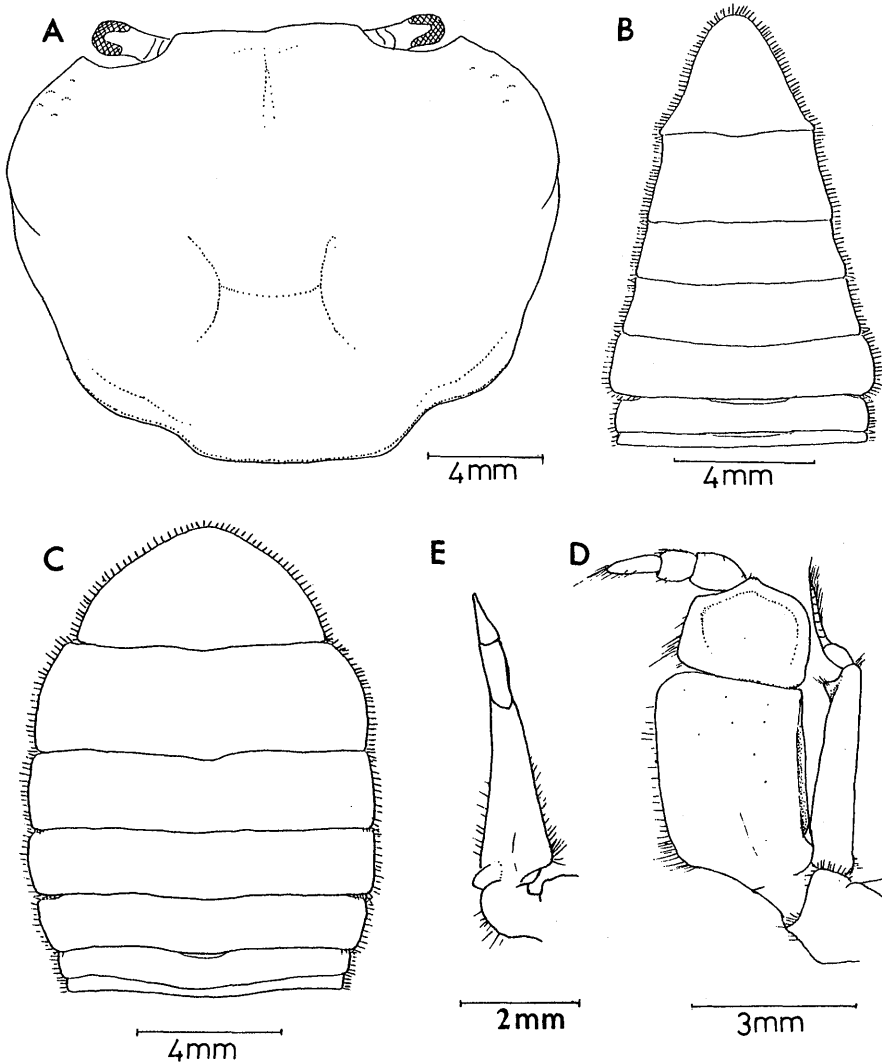


Fig. 9 *Geothelphusa candidiensis*

A : Carapace B : Abdomen of male C : Abdomen of female  
D : Third maxilliped E : Dorsal view of first pleopod

little convex. The cervical groove is conspicuous and extends transversely to the branchial region. The front is deflexed and the breadth is almost one-third of the breadth of the entire carapace. The orbital and frontal margins are very faintly rimmed, the outer orbital angle is absent. The postero-lateral portions have short oblique tuberculate rugae. The chelipeds are unequal but the shape is the same in both sexes. The distal three segments of the ambulatory legs are

bearded with bristles and spines.

Distribution:

Taiwan and Ryukyu archipelago.

Remarks:

This species is very much like *G. candidiensis*, but this species is medium sized whereas *G. candidiensis* is small. From the appearance we can distinguish them easily.

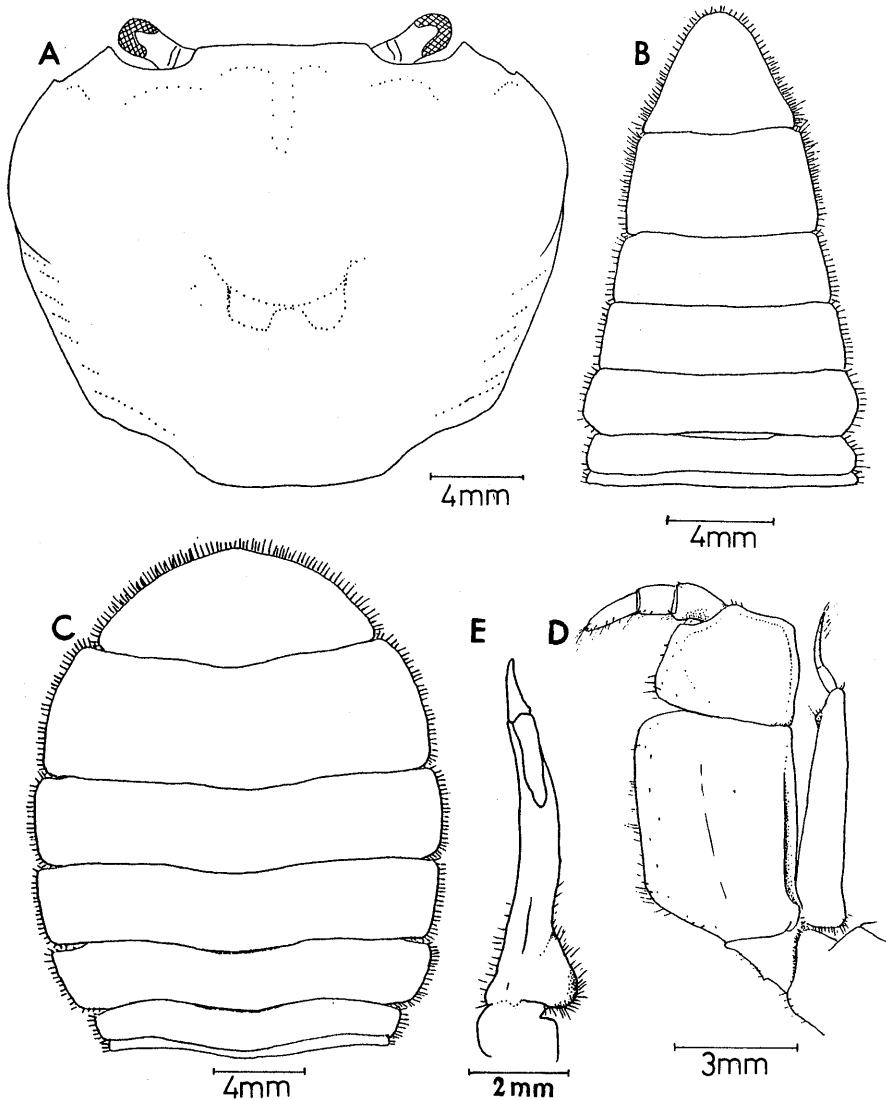


Fig. 10 *Geothelphusa miyazaki*

A : Carapace B : Abdomen of male C : Abdomen of female  
 D : Third maxilliped E : Dorsal view of first pleopod

Table 1. The distribution of fresh-water crabs in Taiwan

County	Species 1)									
	ja.	re.	li.	ta.	fo.	ra.	ch.	mi.	ca.	
Tai-Pei	○		○							○
I-Lan	○		○					○		○
Tao-Yuan	○									○
Hsin-Chu	○					○	○			○
Mieo-li	○						○	○		○
Tai-Chung	○					○				
Nan-Tou	○				○		○			
Chia-Yi				○	○	○				
Tai-Nan	○		○		○					
Kao-Hsiung						○		○		
Ping-Tung	○	○	○		○	○	○			○
Hwa-Lien	○	○	○					○		○
Tai-Tung	○					○				

1) The full name of each species is as follows:

ja. : *E. japonicus* re. : *E. rectus* li. : *V. litterata*

ta. : *S. taiwanensis* fo. : *N. formosanum* ra. : *C. rathbuni*

ch. : *G. chiui* mi. : *G. miyazakii* ca. : *G. candidiensis*

Table 2. The abundance of fresh-water crabs in Taiwan

Species	Abundance			
	abundant	common	few	rare
<i>E. japonicus</i>	○			
<i>E. rectus</i>				○
<i>V. litterata</i>		○		
<i>S. taiwanensis</i>				○
<i>N. formosanum</i>				○
<i>C. rathbuni</i>	○			
<i>G. chiui</i>			○	
<i>G. miyazakii</i>		○		
<i>G. candidiensis</i>	○			

but *E. rectus*, *S. taiwanensis* and *N. formosanum* are found in small numbers. However, *C. rathbuni*, *N. formosanum*, *S. taiwanensis* and *G. chiui* are most widely distributed to the west of the central mountain range.

According to Minei (1981) and Dai et al. (1977) four species are distributed both in Taiwan and Japan, namely *E. japonicus*, *V. litterata*, *G. candidiensis* and *G. miyazakii*. Also three species are distributed both in Taiwan and mainland China, which are *E. rectus*, *V. litterata* and *N. formosanum*.

#### General habitat and life style

#### Distribution

The distribution of crabs in Taiwan is influenced by geographic features. There is central mountain range which extends from the northern tip to the south of the island, and the distribution of fresh-water crabs in Taiwan is divided into two parts; one part to the east of the central mountain range and the other to the west.

Tables 1 and 2 shows the species are easily found in rivers or creeks include *E. japonicus*, *V. litterata*, *C. rathbuni*, *G. candidiensis* and *G. miyazakii*,

Each species of fresh-water crabs in Taiwan has its own particular habitat and life style (Tables 3, 4). In general, bigger crabs such as *Varuna litterata*, *Eriocheir japonicus* and *E. rectus* of the family Grapsidae live either beneath rocks in river or in burrows, but when they spawn, they migrate to river mouths or estuaries. They spend their whole lives moving back and forth between fresh water, brackish water, and sea water. Other smaller crabs such as Parathelphusidae, Isolapotamidae, Sinopotamidae and Potamidae live



Table 3. The habitat of the fresh-water crabs in Taiwan

Species	Habitat				
	Rice paddy dike	Creek bank	Farming area or pond	River or creek	Fresh-water to brackish
<i>E. japonicus</i>					○
<i>E. rectus</i>					○
<i>V. litterata</i>					○
<i>S. taiwanensis</i>	○				
<i>N. formosanum</i>			○		
<i>C. rathbuni</i>				○	
<i>G. chiui</i>		○			
<i>G. miyazakii</i>		○			
<i>G. candidiensis</i>				○	

Table 4. The life style of the fresh-water crabs in Taiwan

Species	Life style		
	aquatic	amphibitious	terrestrial
<i>E. japonicus</i>	○		
<i>E. rectus</i>	○		
<i>V. litterata</i>	○		
<i>S. taiwanensis</i>			○
<i>N. formosanum</i>			○
<i>C. rathbuni</i>		○	
<i>G. chiui</i>		○	
<i>G. miyazakii</i>		○	
<i>G. candidiensis</i>	○		

only in fresh water.

*Somaniathelphusa taiwanensis* of the family Parathelphusidae lives in holes in the rice fields and dike walls covered with weeds or shrubs. *Nanhaipotamon formosanum* of the family Isolapotamidae lives in ponds or holes near wet farming areas. *Candidipotamon rathbuni* of the family Sinopotamidae and *Geothelphusa candidiensis* of Potamidae live beneath pebbles in clean and clear creeks. *G. miyazakii* and *G. chiui* of the family Potamidae live in holes in the rocky banks or muddy burrows along creeks during the daytime, and hunt for food in the creeks during the night. In the monsoon or sometimes in the day time they move out of the burrows and wander on the slopes or bank of the creeks.

According to Minei (1981) the life style of fresh-water crabs can be categorized into three types;

aquatic, amphibious and terrestrial. From field observations we found the life styles of the crabs that we collected also fall into these three categories. Grapsidae and Sinopotamidae belong to the aquatic type and feed in water. Potamidae and Parathelphusidae are amphibious and feed both in water and on land. Isolapotamidae belongs to the terrestrial type and feeds on land most of the time.

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#### References

- Alock, A. (1900). Materials for a carcinological fauna of Indo. no. 6. The Brachyura Cato-metopa or Grapsidae. *J. Asiatic Soc. Bengal.* 69, 279-456.
- (1910). Catalogue of the Indian Decapod Crustacea in the collection of the Indian Museum. Part I. Brachyura. Fasc. II. The Indian Fresh-water crabs. Potamonidae. *Culcutta.*, 1-130
- Barnard, K. H. (1950). Descriptive catalogue

- of south African Decapod Crustacea. *Ann. South Africa Mus.* 38, 1-837. figs. I-154.
- Boradaile, L. A. (1907). On the classification of the Decapod Crustaceans. *Ann. Mag. Nat. Hist. Ser. 7* (19), 457-486.
- Bott, R. (1967). Potamiden aus Ost-Asien. *Senck. Biol.* 48, 203-220.
- (1968). Potamiden aus Süd-Asien. *Senck. Biol.* 49, 119-130.
- (1970). Die Süßwasserkrabben von Europa, Asien, Australien und ihre Stammesgeschichte. *Abh. Senck. Natur. Ges.*, 526, 1-338.
- Crosnier, A. (1965). Crustacés décapodes. Grapsidae et Ocypodidae. *Faune de Madagascar.* 18, 33-37.
- Dai, A. Y., et al. (1975). Description of several new species of fresh-water crabs belong to the intermediate hosts of lung-flukes. *ACTA Zool. Sinica.* 21 (3), 257-264.
- (1979). On new species of fresh-water crabs harbouring metacercariae of lungflukes. *ACTA Zootaxonomica Sinica*, 4 (2), 122-131.
- Doflein, F. (1902). Ostasiatische Dekapoden. *Abh. K. bayer. Akad. Wiss. Cl. II.* 21 (3), 662-665.
- Gordon, I. (1931). Brachyura from the coast of China. *Linn. Soc. Zool.* 37 (254), 525-558.
- Kemp, S. (1913). Zoological results of the Abor Expedition. 1911-1912. no. 20. Crustacea Decapoda. *Rec. Ind. Mus.* 8, 289-310.
- (1918). Crustacea Decapoda and Stomatopoda. 'Zoological results of a tour in the Far-East'. *Mem. Asiat. Soc. Bengal.* 6, 229-248.
- Koba, K. (1936). Studies on the Japanese Potamonidae (1). Notes on *Potamon rathbuni* de Man as a second intermediate host of *Paragonimus westermani* (Kerbert) in Formosa. *Trans. Nat. Hist. Soc. Formosa.* 26, 164-172.
- (1936). Revision of the specific name of a crabs as a second intermediate host of *Paragonimus westermani* in Formosa. *Sci. Rep. Tokyo Bunrika Daigaku. Sec. B.* 2, 155-207.
- Lanchester, W. (1901) On the Crustacea collected during the Skeet-Expedition to the Malayan Peninsula. *Proc. Zool. Soc. Lond.* 534-574, pls. 33-34.
- Lenz, H. (1905). Ostafrikanische Dekapoden und Stomatopoden gesammelt von Herrn Prof. Dr. A. Voeltzkow. *Abh. Senckenb. Nat. Ges.* 27, 370.
- (1910). Crustacean von Madagaskar, Ostafrika und Ceylon. Reise in Ostafrika in den Jahren 1903-1905. In: *Voeltzkow. Wissenschaftliche, Ergebnisse* 2, 539-576.
- Make, M. & H. Tsuchiya. (1923). Illustrated reports of the Crustacea decapod from Formosa. *Rep. Dept. Agric. Formosa.* 3. 150-194, pls. 19-23.
- De Man, J. G. (1902). Ergebnisse einer zoologischen Forschungsreise in den Malukken und Borneo, in Auftrage der senckenberg. naturforsch. Gesellschaft ausgeführt von Dr. Willy Kukenthal. Teil 2. Reisergebn. Bd. 3. Heft 3. *Abh. Senckenberg. Naturf. Ges. Bd.* 25, Heft 3, 467-929.
- (1914). Note sur quelques crustacés décapodes brachyures terrestres et d'eau douce appartenant au Musée Civique de Gènes. *Ann. Mus. Civ. Stor. Nat.* 6, 128-135.
- Minei, H. (1974). Potamoid crabs of Taiwan, with description on one new species (Crustacea, Decapoda) *J. Fac. Agr. Kyushu Univ.* 18, 239-251.
- (1981). Distribution and general habitat of the fresh-water crabs of Japan. Rept. Grant-in-Aid for co-operative Res. 1978-1980. Ministry of Education, Japan.
- Miyake, S. & J. K. Chiu. (1965). A New Potamonid Crab, *Potamon (Geothelphusa) miyazakii* sp. nov., as an intermediate host of the lung-fluke from Formosa. *J. Fac. Agric., Kyushu Univ.*, 13, 595-600.
- Ortmann, A. (1893). Die Dekapoden-Krebse des Strassburger Museums, mit besonderer Berücksichtigung der von Herrn Dr. Döderlein bei Japan und bei den Liu-Kiu-Inseln gesammelten und zur Zeit im Strassburger

- Museum aufbewahrten Formen. III. Zool. Jahrb. Syst. 7, 699-716.
- Parisi, B. (1916). I Decapodi giapponesi del Museo di Milano IV. Cyclometopa, *Atti della Soc. Ital. Sci. Nat.* 55, 153-170.
- (1918). I Decapodi giapponesi del Museo di Milano VI. Catometopa e Paguridea. *Atti della Soc. Ita. Soc. Ita. Sc. Nat.* 57, 90-114.
- Pretzmann, G. (1963). Über einige süd- und ostasiatische Potamoniden, *Ann. Naturh. Mus., Wien*, 66, 361-372.
- Rathbun, M. J. (1904-1906). Les crabes d'eau douce. (Potamonidae) *Nouv. Arch. Mus. Hist. Nat. Ser.* 4(6) 225-312; 7, 159-321; 8, 33-122.
- Sakai, T. (1934) Brachyura from the coast of Kyushu, Japan. *Sc. Rep. Tokyo Bunrika Daigaku, Sect. B.* 1 (25), 281-330.
- (1935). Crustacea of Jehol. Tribe Brachyura Rep. *First Sci. Exped. to Manchoukuo. Sect. V. Div. I. pt. 2. art. 7*, 1-16, figs.1-4, pls. 1-3.
- (1965). The Crabs of Sagami Bay. Maruzen, Tokyo. p. 174, pls. 1-100.
- (1976). Crabs of Japan and the Adjacent Seas. *Kodansha Tokyo*. p. 627-648.
- Schenkel, E. (1902). Beitrag zur Kenntnis der Dekapodenfauna von Celebes. *Verh. Naturf. Ges. Basel.* 13, 525-545, pls. 7-11.
- Shen, C. J. (1932). The Brachyuran Crustacea of north China. *Zoologica Sinica, ser. A. Invertebrates of China. vol. 9 Fasc. 1, Peiping*, 84-92, 155-185.
- Stimpson, W. (1858). Prodrum descriptionis animalium evertibratorum, quae in Expeditione ad Oceanum Pacificum Setentrionalem. e Republica Federata missa, CADWALADARO RINGGOLD et JOHANNES ROPHRTD DUCIBUS, Observavit et descripsit Parts 5, Crustacea Ocyropodidea. *Proc. Acad. Nat. Sci. Philad.* 10, 93-110.
- (1907). Report on the Crustacea collected by the North Pacific Exploring Expedition 1853-1856. *Smithsonian Inst. misc. Coll. Washington*, 49, 112-114.
- Tai, A. Y. & Y. C. Sung. (1975). A preliminary study of the fresh-water crabs as intermediate hosts of lung flukes from China. *ACTA Zool. Sinica*, 21(2), 169-177.
- Tesch, J. J. (1918). The Decapoda Brachyura of the Siboga Expedition. I. Hymenosomidae Retroplumidae, Ocyropodidae, Grapsidae, and Gecarcinidae. Siboga-Exped. Monogr. 39C. Leiden. 82-85, pls. 1-6.

## Summary

台湾の淡水産カニ類について  
黄娟娟・水江一弘

台湾の全土にわたる23ヶ所において淡水産カニ類を採集し、次の5科10種を得た：

*Eriocheir japonicus*, *E. rectus*, *Varuna litterata*, *Varuna* sp. (以上はGrapsidae); *Somaniathelphusa taiwanensis* (Parathelphusidae); *Nanhaipotamon formosanum* (Isolapotamidae); *Candidiopotamon rathbuni* (Sinosotamidae); *Geothelphusa Chiui*, *G. candidiensis*, *G. miyazakii* (Potamidae).

これらのうち *Varuna* sp. は未記載種と思われる。一部のカニ類の分布は地理的に偏在していて、*Eriocheir recutus* は東部にのみ、*Somaniathelphusa taiwanensis*, *Nanhaipotamon formosanum* および *Geothelphusa chiui* は西部にのみ生息している。なお、*Eriocheir rectus*, *Varuna litterata* および *Nanhaipotamon formosanum* は中国大陸に、また *Eriocheir japonicus*, *Varuna litterata*, *Geothelphusa candidiensis* および *G. miyazakii* は日本にも分布している。



Plate I

- A : *Eriocheir rectus* (♂)
- B : *Varuna litterata* (♂)
- C : *Somaniathelphusa taiwanensis* (♂)
- D : *Nanhaiopotamon formosanum* (♀)



Plate II

- A : *Candidiotamon rathbuni* (♂)  
B : *Geothelphusa chitui* (♀)  
C : *Geothelphusa miyazakii* (♂)  
D : *Geothelphusa candidiensis* (♂)



# 長崎大学水産学部研究報告

## 第 57 号

### 正 誤 表

P.10	右 8 行目 thbuni:	削 除
P.27	右 6 ~ 7 行 誤 bass-ensis	正 <i>bass-iensis</i>