

ANOMURAN CRUSTACEANS OF TAIWAN PART I. DIOGENIDAE*

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ABSTRACT

The present paper reports 22 species of hermit-crabs of Taiwan. Among them, 8 species: *Clibanarius corallinus*, *C. virescens*, *Dardanus impressus*, *D. deformis*, *D. lagopodes*, *D. megistos*, *Aniculus aniculus* and *Calcinus laevimanus* were previously reported. The rest of 14 species are considered to be the first record from Taiwan.

The present study is based on the hermit-crab collections made by Mr. S. K. Wu and the author from February 1963 to August 1968 and housed in the Institute of Zoology, Academia Sinica, Taipei, Taiwan.

The study reports 22 species of the hermit-crabs from Taiwan. Among them, 8 species: *Clibanarius corallinus*, *C. virescens*, *Dardanus impressus*, *D. deformis*, *D. lagopodes*, *D. megistos*, *Aniculus aniculus* and *Calcinus laevimanus* were reported by the previous workers: Terao (1913a, 1914), Maki and Tsuchiya (1923) and Miyake (1956). The other 14 species are recorded for the first time from Taiwan.

METHODS

Synonymies are not intended to be complete. The general terminology used in the keys and descriptions are illustrated in Fig. 1. Carapace length is measured from the tip of the rostrum to the posterior transverse margin of the carapace and is abbreviated as "cl". All measurements are given in millimeters (mm). All specimens collected during the present study were

fixed and preserved in 10% formalin.

SYSTEMATIC ACCOUNTS

Key to the genera of Diogenidae of Taiwan

1. First two abdominal segments of male and first abdominal segment of female have the paired pleopods. Dactyli of chelipeds open and close horizontally. Fourth pair of pereopods are non-chelate (simple). Eyestalks slender.....*Paguristes*
1. No paired pleopods present. Dactyli of chelipeds open and close horizontally or obliquely. Fourth pair of pereopods chelate or subchelate. Eyestalks slender or stout.....2
2. Chelipeds equal or subequal; dactyl tips corneous and black spooned; dactylus open and close horizontally...*Clibanarius*
2. Left cheliped usually is vastly larger than the right one; dactyl tips corneous or calcareous, spooned or not, dactylus open and close obliquely3
3. Dactyl tips of chelipeds corneous and black4
3. Dactyl tips of chelipeds calcareous and white.....5
4. Chelipeds subequal or the left one is vastly larger than the right one; dactyl tips somewhat spooned. In female the pleopods are triramous. A setose fleshy

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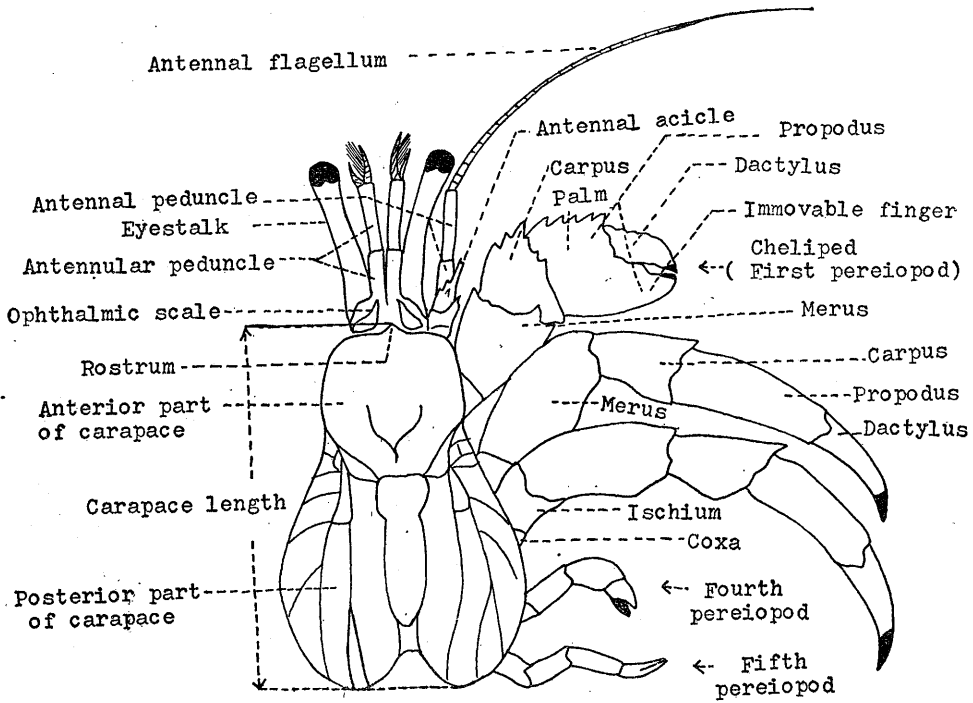


Fig. 1. Terminology used in the present paper

- spur presents behind third pleopod *Dardanus*
- 4. Chelipeds equal and similar; dactyl tips deeply spooned; the first three pereiopods transversely scutellated. In female the pleopods are biramous. Spur absent *Aniculus*
- 5. The rostriform process protrudes from ophthalmic somite and lies between ophthalmic scales. Dactyl tips of chelipeds acuminate *Diogenes*
- 5. The rostriform process absent. Dactyl tips of chelipeds much spooned. Antennal flagellum and left cheliped propodus bared *Calcinus*

Genus *Paguristes* Dana, 1852

1. *Paguristes kagoshimensis* Ortmann, 1892 (Fig. 2)

Paguristes kagoshimensis Ortmann, 1892: 281, pl. 12, fig. 8.

Materials; 5 males, cl. 14.2-17.8; Tun-

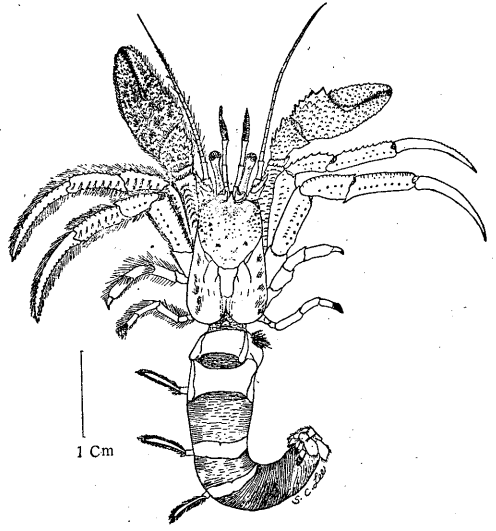


Fig. 2. *Paguristes kagoshimensis* Ortmann, male

gkang; muddy bottom, 105 m. depth; husing in the shells of *Fulgoraria* sp., and

some species of Turridae.

Description: Anterior part of carapace (or carapace shield) strongly calcified, being minutely granulated and pitted. The lateral margins of carapace furnished with few hairs. The slender rostrum extends beyond middle of ophthalmic scale. The frontal margin of carapace distinctly concaved. Eyestalk has a row of setae on the middorsal. The eyestalk is shorter than the anterior width of carapace and distinctly shorter than that of antennular peduncle. Ophthalmic scale is broad triangle, notched anteriorly. Antennal flagellum distinctly exceeds the carapace length and have long hairs. Antennal acicle, setose and serrulate, reaches to the middle of the last segment of the peduncle. Chelipeds subequal and similar: merus covers with serrulate and scutelate scales; carpus, cheliped dactylus and propodus cover with granules and spiniform tubercles, of which those are strong on dorso-medial ridge; dorsal surfaces of cheliped dactylus and propodus cover with dense hairs. Cutting edges of dactyli are black and corneous. The second pereopod: dactylus is distinctly longer than propodus; dorsal edges of carpus and propodus spinose; each segment fully furnished with long hairs on both dorsal and ventral surfaces and with 1 or occasionally 2 lateral rows of shorter ones. Third pereopod similar to the second except the dorsal edges of carpus and propodus weakly serrated instead of spinulated.

Color (in formalin): Uniformly yellowish pink. Dactyl tip and cutting edge black.

Distribution: Japan. This is the first record of this species from Taiwag.

Genus *Clibanarius* Dana, 1852

Key to the species

1. Antennular peduncle is longer than eyestalk. Proximal end of ventromedial

- border of the cheliped merus with a strong tooth. Eyestalks and legs with distinct red brown or yellow longitudinal stripes.....*Clibanarius infraspinatus*
1. Antennular peduncle is same length as eyestalk. Proximal end of the ventromedial border of the cheliped merus without a strong tooth2
2. Carapace much depressed. Coxae of fifth pair of pereiopods are widely separated. Carapace has red-brown stripes.....*C. eurysternus*
2. Carapace not distinctly depressed. Coxae of fifth pair of pereiopods are not widely separated3
3. Dactylus of left third pereiopod is shorter than propodus. Pereiopods without longitudinal stripes.....4
3. Dactylus of left third pereiopod is longer than propodus. Pereiopods with distinct longitudinal stripes5
4. Carapace usually elongated. Antennal acicle with 5 or 6 spinules. Left third pereiopod densely hirsuted. Body uniformly dark brown.....*C. corallinus*
4. Carapace not elongated. Antennal acicle with 2 spinules. Left third pereiopod sparsely hirsuted. Body uniformly olive green, but darker at the distal end of propodi; dactyli of second and third pereiopods yellow with a ring of dark olive green on the middle of the segment.....*C. virescens*
5. Second and third pairs of pereiopods have a red-bordered blue or brown-bordered white stripe.....*C. longitarsus*
5. Second and third pairs of pereiopods have red or dark brown longitudinal stripes. The spines on the dorsal border of cheliped propodus strong and stout *C. striolatus*

2. *Clibanarius infraspinatus* (Hilgendorf, 1869)
(Fig. 3)

Clibanarius infraspinatus, Alcock, 1905: 44; Buitendijk, 1937: 251; Yap-Chiongco,

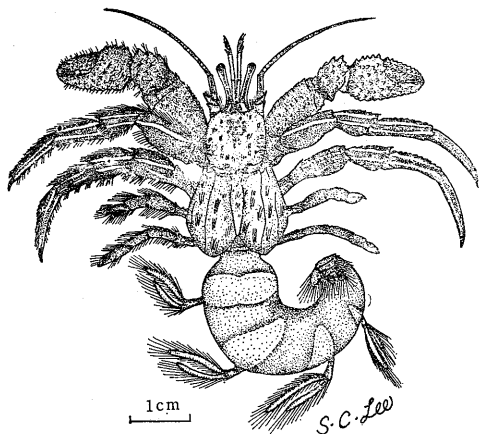


Fig. 3. *Clibanarius infraspinatus* (Hilgendorf), female

1938: 191, pl. 2, fig. 4.

Materials: 2 females, cl. 23.2-25.0; Haipu, Changhua County; oyster bed.

Description: Carapace densely covers with tufts of yellowish hairs; anterior part of carapace granulated and pitted. Rostrum minute and acute, at the same level as that of the round lateral teeth. Eyestalk is same length as that of the anterior width of carapace but shorter than that of antennular peduncle. Ophthalmic scale, triangular, with 3 spinules anteriorly. Antennal acicle sharp, serrate and setose, reaches a little beyond the proximal end of the last segment of the antennal peduncle. Chelipeds equal and similar: merus has a weakly serrated dorsal edge and a strongly serrated ventral edge; ventromedial border of proximal end has a strong tooth; lateral sides of carpus and cheliped propodus cover with large tubercles while the dorsomedial border arms with a row of strong teeth. Dactyli of second and third pereopods are distinctly longer than that of propodi.

Color (in formalin): Carapace brownish pink. Cheliped, pereopods, eyestalk and antennal acicle red-brown. The lateral sides of second and third pereopods and

eyestalk have two red or yellow longitudinal stripes respectively.

Distribution: Red Sea, Mergui, Bay of Bengal, Singapore, Tavoy, Philippines and Sydney. This is the first record of this species from Taiwan.

3. *Clibanarius eurysternus* Hilgendorf, 1878

Clibanarius eurysternus, Buitendijk, 1937: 258; Miyake, 1956: 310, figs. 4-5.

Materials: 5 ovig. females, cl. 9.3-12.2, 2 females, cl. 8.2-9.5, 1 male, cl. 17.5; Mao-Pi-tou, Pingtung County; reef shore; housing in the shells of *Conus fulmen*, *C. lividus*, *Drupa morum*, *Canarium microrrceum*, *Cyprae* sp. 1 male, cl. 9.7; Pa-chih-men, Keelung; rocky shores.

Description: Carapace distinctly depressed and the lateral margin is setose. Eyestalk is same length as that of anterior width of carapace and is longer than that of antennular peduncle. Ophthalmic scale triangular, tipped with 3 spinules. Antennal acicle sharp, spinulate and setose, reaches slightly beyond the proximal end of last segment of antennal peduncle. Chelipeds subequal, setose and spinose: merus has two spines on distolateral margin; dorsal surface of carpus studded with tubercles and dorsomedial border of distal end provides with a strong spine; propodus, and dactylus, have sharply conical spines on dorsal surface and sometimes accompanies with tubercles; cutting edges of dactyli have three teeth. Second to fifth pair of pereopods densely furnish with long hairs; dactyli of second and third pereopods are longer than propodi and furnish with about 12 spinules on their ventral side. The coxae of fifth pair of pereopods are widely separated.

Color (when alive): Carapace light yellow, with some dark brown longitudinal stripes; eyestalk, cheliped and pereopods have dark brown stripes. The stripe is red-brown when preserves in alcohol.

Distribution: Celebes, Sulu, Tenimber, Timor, Spermonde, Amboina and northward to Japan. This is the first record of this species from Taiwan.

4. *Clibanarius corallinus* (H. Milne Edwards, 1848)

Clibanarius corallinus, Alcock, 1905: 48, pl. 5, fig. 1; Terao, 1913a: 360; 1914: 181; Buitendijk, 1937: 264; Yap-Chiongco, 1938: 187, pl. 1, fig. 11; Miyake, 1956: 313, figs. 6-7.

Materials: 3 females, cl. 8.3-10.8; Olan-pi, Pingtung County; reef shore; housing in the shell of *Vasum turbinellus*. 5 males, cl. 7.2-17.3; Mao-pi-tou, Pingtung County; reef shore; housing in the shells of *Trochus stellatus*, *Drupa morum*, *D. arachnoides*, *Ritena undata*.

Description: Carapace elongate, anterolateral margin with tufts of yellow hairs. Eyestalk is slightly longer than antennular peduncle. Ophthalmic scale tips with 1 or 2 spinules. Antennal acicle has 5 or 6 spinules and reaches slightly beyond the proximal end of the last segment of the peduncle. Chelipeds subequal: dorsal surfaces of carpus, propodus and dactylus have white sharply conical spines which is bordered with tufts of hairs. Second and third pereopods furnish with tufts of hairs which are most densely hirsute on the flattened outer surface of left third pereopod; dactyli are shorter than propodi.

Color (when alive): Carapace dark brown: anterior part has black spots and posterior part has fine white spots. Pereopods are dark brown.

Distribution: Andamans, Nicobars, Amboina, Tahiti, Funafuti, Wake, Coco, Fiji, Bonin, New Guinea, Celebes, Malaya Archipelago, Philippines, Taiwan, Ryu Kyu Islands and Japan.

5. *Clibanarius virescens* (Krauss, 1843)

Clibanarius virescens, de Man, 1888: 247;

Buitendijk, 1937: 263; Miyake, 1956: 315, figs. 8-9; Utinomi, 1961: 65, pl. 33, fig. 5.

Clibanarius bimaculatus, Terao, 1913a: 360; 1914: 109.

Clibanarius pacificus, Maki and Tsuchiya, 1923: 103, pl. 9, fig. 3.

Materials: 1 male, cl. 14.0; Hsiaomen, Penghu County; rocky shore; housing in the shell of *Tegula lischkei*. 3 males, cl. 11.4-14.0; Pa-chih-men, Keelung; rocky shore; housing in the shells of *Tegula lischkei*, *Monodonta labio*. 5 males, cl. 11.2-15.5, 2 ovig. females, cl. 8.8-10.0; Pa-tou-tzu, Keelung; rocky shore; housing in the shells of *Tegula lischkei*, *Turbo coronatus granulatus*.

Description: Eyestalk is same length as that of antennular peduncle and is slightly longer than anterior width of carapace. Ophthalmic scale hirsute and tips with 3 or 4 spinules. Antennal acicle has a spinule, reaches slightly beyond the proximal end of the last segment of the antennal peduncle. Chelipeds setose: carpus has few spinules on dorsal border; dorsal surface of propodus arms with strong spines and interspersed with few tubercles. Second and third pereopods densely furnish with tufts of hairs; dactyli are slightly shorter than propodi and have a sharp ridge on outer dorsolateral side.

Color (when alive): Olive green. Anterolateral margin of carapace margined with brown green. All propodi of second and third pereopods are uniformly olive green; dactyli have an olive green in the middle of segment. Eyestalk is green. Antennal flagellum is blue.

Discussion: The present species is very closely related to *C. bimaculatus* (de Hann, 1849), but can be distinguished by: (1) having spinules on cheliped propodus, (2) chelipeds are equal and similar, and (3) dactyli of pereopods have dark ring.

Distribution: West and Southeast Afr-

ica, Sulu, Spermonde, Amboina, Fiji, Taiwan and Japan.

6. *Clibanarius longitarsus* (de Haan, 1849)

Pagurus longitarsus de Haan, 1849: 211, pl. 50, fig. 3.

Clibanarius longitarsus, Terao, 1913a: 361; Buitendijk, 1937: 253.

Materials: 1 female, cl. 27.0, 1 male, cl. 6.1; Chikeng and Makung, Penghu County; rocky shore; housing in the shells of *Pleuroploca trapezium* and *Turbo articulatus*. 1 ovig. female, cl. 15.0 and 1 male, cl. 7.8.

Description: Carapace hairy: anterior part of carapace minutely granulated and pitted. Eyestalk is slightly longer than anterior width of carapace and same length as that of antennular peduncle. Ophthalmic scale is an elongate triangular with 2 terminal spinules. Antennal acicle reaches half way beyond or almost to the distal end of the penultimate segment of the peduncle. Chelipeds: merus has white granules and distal end of ventrolateral angle arms with a spine; carpus has tubercles with 1 or 2 black tipped spines at the distal end of dorsal surface. Cheliped propodus and dactylus furnish with tubercles and black tipped spines. Pereiopods furnish sparsely with tufts of hairs. Dactylus of left third pereiopod is distinctly longer than propodus.

Color (in formalin): Carapace brown; darker anteriorly. Pereiopods dark brown: either sides of second and third pereiopods have a red-bordered blue or brown-bordered white stripes. Eyestalk yellow.

Distribution: Nicobars, Pondicherry, Sulu, Amboina, Tenimber and Japan. This is the first record of this species from Taiwan.

7. *Clibanarius striolatus* Dana, 1852

(Fig. 4)

Clibanarius striolatus, Alcock, 1905: 46,

pl. 4, fig. 7; Terao, 1913a: 362; Buitendijk, 1937: 258; Yap-Chiongco, 1938: 192, pl. 1, fig. 1.

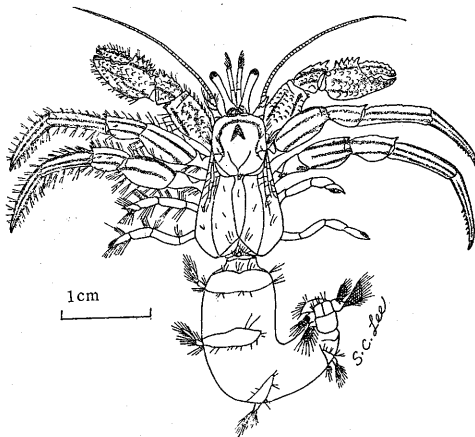


Fig. 4. *Clibanarius striolatus* Dana, male

Materials: 4 males, cl. 10.4-14.7; Chikeng and Makung, Penghu County; rocky shore; housing in the shells of *Pionoconus magnus*, *Peristernia nassatula* and *Turbo articulatus*. 3 males, cl. 9.2-11.8 1 ovig. female, cl. 9.0; the estuary of Tamsui River; housing in the shell of *Turbo coronatus granulatus*.

Description: Carapace, antennal peduncle including acicle and legs have soft hairs. Eyestalk is shorter than the anterior width of carapace, and, same length as that of antennular peduncle. Ophthalmic scale is tall triangular with 2 terminal spinules. Antennal acicle reaches the proximal end of the last segment of the peduncle. Chelipeds: merus has two spinules at the distal end of ventrolateral angle; carpus has acute spines on the dorsomedial angle; propodus and dactylus have tubercles and spines, of which the latter is strongly developed at the dorsomedial angle. Dactylus of left third pereiopod is longer than the propopus.

Color (in formalin): Yellow brown. The frontal margin of carapace has dark brown stripe; the anterior part of carapace has

dark brown arrow-shape patterns. Lateral sides of second and third pereopods have distinct red or dark brown longitudinal stripes. Eyestalk uniformly yellow.

Discussion: The present species can be distinguished from the *Clibanarius longitarsus* by having stouter and stronger spines on dorsomedial angle of cheliped propodus and with distinct longitudinal dark lines on second and third pereopods. The present species is closely related to *Clibanarius padavensis* but the latter has distinct stripes on eyestalks and the eyestalk is longer than the anterior width of carapace; cheliped propodus is longer and its dorsal surface is smooth.

Distribution: Gulf of Aden, Persian Gulf, Karachi, Mergui, Trincomalee, Amboina, Celebes, Maratocia, Sulu, Spermonde, Fiji, Seychelles and Tahiti. This is the first record of this species from Taiwan.

Genus *Dardanus* Paulson, Rathbun, 1903

Key to the species

1. Eyestalk stout, shorter than antennular peduncle; cornea much enlarged and is more than one-third of the distal segment of the stalk.....2
1. Eyestalk moderately long, equal or slightly longer than antennular peduncle; cornea is shorter than one-third of the distal segment of the stalk.....6
2. Both chelipeds equal and similar*Dardanus hessii*
2. Left cheliped is much larger than the right one3
3. Outer surfaces of chelipeds and next two pairs of pereopods entirely furnished with transverse scutes.....*D. arrosor*
3. No scutes present.....4
4. Outer surface of immovable finger of left cheliped has a deep triangular groove between granular ridges; dorsal half of outer surface of propodus has several longitudinal rows of blunt spines, ventral half is granulated.
- Propodi and carpi of second and third pereopods have a broad purple-red crossband and the meri have two crossbands*D. impressus*
4. Outer surface of immovable finger of left cheliped lacks a triangular deep groove5
5. Dactylus of left cheliped has a sharply serrated crest on dorsomedial border; dorsolateral surface of propodus bears two rows of tubercles or blunt teeth and a row of sharp teeth along the dorsomedial border, ventrolateral surface smooth. Dorsolateral side of dactylus and propodus of left third pereopod have a sharp crest.....*D. deformis*
5. Both cheliped propodi densely cover with tubercles of which, each of them provides with 1 or 2 black-tipped spines. Dorsomedial border of dactylus of left cheliped and dorsolateral border of distal two segments of left third pereopod have no crest. Carapace and legs scattered with small dark-red dots. Basal two-thirds of eyestalk is blue purple*D. diogenes*
6. Outer surface of left third pereopod either transverse striation or regular transverse squamiform scutes present...7
6. Neither transverse striation nor squamiform scutes present.....8
7. Outer surface of distal two segments of left third pereopod has regular squamiform scutes, outer surface of the propodus forms a sharp crest. Chelipeds and pereopods are pink with red crossbands on meri and carpi, the carpi without polished patch...*D. crassimanus*
7. Distal three segments of left third pereopod have transverse striation; outer surface of the propodi slightly produced but does not form a sharp crest. Chelipeds and pereopods are red brown with white spots and the carpi have white-polished patch. Carapace much depressed and broad...*D. guttatus*

8. The joints of distal half of antennal flagellum are strongly gibbous. Carpi and meri of second and third pereopods have broad red crossbands. Outer surface of propodus of left third pereopod much flattened*D. lagopodes*
8. The joints of distal half of antennal flagellum are not gibbous. Chelipeds and pereopods have numerous thorn-like spines. Carapace, chelipeds and pereopods are dark brown with white black-edged ocelli. Carpi and meri lack crossbands.....*D. megistos*

8. *Dardanus hessii* (Miers, 1884)

Pagurus hessii, Alcock, 1905: 93, bl. 8, fig. 4.

Materials: 1 ovig. female, cl. 19.3; Chikeng, Penghu County; rocky shore; housing in the shell of *Bursa rana*. 1 male, cl. 45.5, 1 ovig. female, cl. 28.5, 1 female, cl. 32.0; Tungkang; muddy bottom, 15 m depth; housing in the shells of *Tonna sp.* and *T. tessellata*. 2 females, cl. 18.5-22.0; Anping, Tainan; muddy bottom, 16-40 m depth; housing in the shells of *Murex trapa* and *Babylonia formosae*.

Description: Carapace sparsely covers with tufts of short hairs. Eyestalk depressed and expanded distally; its length is shorter than the antennular peduncle but same length as that of the antennal peduncle. Cornea length is one-third the distal segment of the eyestalk. Ophthalmic scales are widely separated and fan-shaped with three or more apical spinules. Antennal acicle, not spinulate, reaches one-third of the last segment of the peduncle. Chelipeds equal and similar: merus is spinose on dorsomedial border and smooth at outer surface; the outer surface of carpus has three longitudinal rows of spines among which the innermost row is the strongest; outer surface of propodus has 5 rows of spines and dactylus has 2 or 3 rows of the spines which are the strong-

est at dorso-medial border. Distal three segments of second and third pair of pereopods spinose dorsally; dactyli are longer than the propodi. Cheliped and pereopods densely furnished with long hairs.

Color (in formalin): Yellow-brown. Dactylus and immovable finger of cheliped propodus are dark red. Meri of cheliped and the second and third pereopods have dark crossbands.

Distribution: Maldives, Bay of Bengal, Gulf of Martaban, Penang, Celebes sea, Arafura sea, Arakan, Ganjam. This is the first record of this species from Taiwan.

9. *Dardanus arrosor* (Herbst, 1796)

(Fig. 5)

Pagurus striatus de Haan, 1849: 206, pl. 49, fig. 1; Miers, 1881: 274; Henderson, 1888: 56.

Pagurus arrosor, Milne-Edwards, 1900: 178; Terao, 1913a: 375.

Dardanus arrosor, Makarov, 1938: 159, pl. 1, fig. 1.

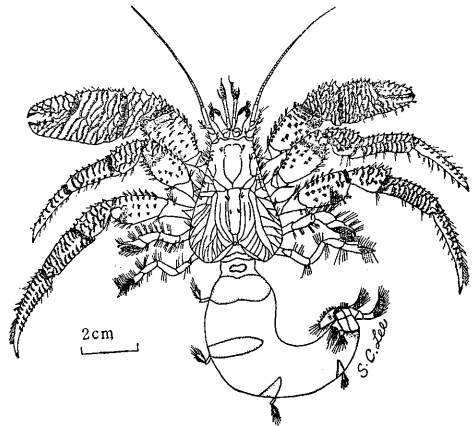


Fig. 5. *Dardanus arrosor* (Herbst), male

Materials: 2 males, cl. 33.8-43.0, 1 ovig. female, cl. 32.1; Tungkang, Pingtung County; muddy bottom, 100 m depth; housing in the shell of *Tonna olivarium* which is encrusted by sea anemone *Paracalliactis japonica*.

Description: Carapace sparsely covers with tufts of short hairs. Eyestalk depressed and expended distally; its length is much shorter than antennular peduncle and slightly shorter than antennal peduncle. Eyestalk has few setae of which the distal setae extend beyond the cornea. Cornea is about two-thirds of the distal segment of the stalk. Ophthalmic scales are fan-shaped with about 4 apical spinules and widely separated each other. Antennal acicle, spinose and hairy, reaches or slightly exceeds the midway of the last segment of the peduncle. Cheliped and next two pereopods usually entire and their distal three segments have transverse scutes which fringe with golden hairs. Left cheliped is larger than the right one. The dorsolateral surface of cheliped propodus and carpus have two longitudinal rows of spines of which the inner row is stronger. Dactyli of second and third pereopods have long dorsal setae; dorsomedial edge of carpi have about 6 sharp teeth directed anteriorly; dorsal edges of propodi and dactyli are spinose.

Color (when alive): Orange to brown. Anterior margins of the meri of the chelipeds and next two pereopods have red bands respectively. Eyestalk has two red crossbands.

Distribution: Mediterranean and Adriatic seas, Medeira, Senegambia, West Africa, St. Helena Is., Red sea, Australia, Philippines, Korea and Japan sea. This is the first record of this species from Taiwan.

10. *Dardanus impressus* (de Haan, 1849)

Pagurus impressus de Haan, 1849: 207, pl. 49, fig. 3; Terao, 1913a: 378; Maki and Tsuchiya, 1923: 102, pl. 9, fig. 5.

Materials: 1 male, cl. 22.0; Hsiahsang, Tainan County; muddy and sandy bottom, 70 m depth; housing in the shell of *Bursarana*, which is usually encrusted by cirrip-

eds *Pachyplasma japonicum*. 1 female, cl. 22.8; Anping, Tainan; muddy bottom, 50 m depth; housing in the shell of *Murex tiremis*. 1 female, cl. 19.0; Tungkang, Pingtung County; housing in the shell of *Natica* sp.

Description: Eyestalk is much shorter than antennular peduncle but same length as that of antennal peduncle. Cornea length is near half of the distal segment of the stalk. Ophthalmic scale with 3 or 4 apical spinules, outer margin notched. Antennal acicle hairy, exceeds well the proximal end of the last segment of the antennal peduncle. Left cheliped: outer surface of immovable finger has a deep triangular groove between granular ridges; dorsal half of outer surface of propodus has several longitudinal rows of blunt spines, ventral half granulated. Dactylus of left third pereopod is longer than propodus, its dorsolateral border with sharp teeth and ventral side with blunt teeth, outer surface of dactylus distinctly concaved.

Color (when alive): Carapace brown-purple. Cheliped dactyli and propodi, and dactyli of the second and third pereopods are red while other portions of cheliped and pereopods are brown purple. The meri of the first three pereopods have two fine red crossbands and the carpi of second and third pereopods have a broad crossband. Eyestalk has two red crossbands.

Distribution: Taiwan, Bonin Islands, and Japan.

11. *Dardanus deformis* (H. Milne Edwards, 1836)

Pagurus deformis H. Milne Edwards, 1836: 272, pl. 14, fig. 2; de Man, 1888: 15; Henderson, 1888: 57; Alcock, 1905: 88, pl. 9, fig. 4; Terao, 1913a: 376; Maki and Tsuchiya, 1923: 100, pl. 9, fig. 2; Laurie, 1926: 157; Yap-Chiongco, 1938: 195, pl. 1, fig. 10.

Pagurus cavipes, White, 1847: 122.

Dardanus deformis, Buitendijk, 1937: 275.

Materials: 1 male, cl. 20.0; Pa-tou-tzu, Keelung; rocky shore.

Description: Eyestalk short and depressed, expanded distally, its length is much shorter than antennular peduncle and shorter than antennal peduncle. Cornea length is more than half of the distal segment of the stalk. Ophthalmic scale with 4 or 5 apical spinules. Antennal acicle surpasses the proximal end of the last segment of the peduncle, outer margin serrulate and setose. Left cheliped: the outer surface of carpus has longitudinal rows of spines among which the innermost row (along dorsomedial border) are the strongest; dorsolateral surface of propodus has two shallow grooves and bears two rows of blunt teeth and has a row of sharp teeth along the dorsomedial border; ventrolateral surface smooth, ventromedial border serrated; dorsomedial border of cheliped dactylus has a sharply serrated crest. Dorsolateral sides of dactylus and propodus of left third pereiopod have a sharp crest; lateral side of dactylus distinctly grooved while that of propodus has a median ridge.

Color (in formalin): Uniformly light yellow. The second and third pereiopods have a faint red crossband. Eyestalk has dark crossbands.

Distribution: East coast of Africa, Balabac straight, Ceylon, Mauritius, Seychelles, New Islands, Papiete, Tahiti, Andamans, Mergui, South sea, Philippines, Taiwan and Ryukyu Islands.

12. *Dardanus diogenes* (de Haan, 1849)
(Fig. 6)

Pagurus diogenes de Haan, 1849: 208; Terao, 1913a: 377.

Dardanus diogenes, Utinomi, 1961: 65, pl. 33, fig. 1.

Materials: 1 ovig. female, cl. 45.5; Chongchou, Kaohsiung; muddy bottom, 15 m depth; housing in the shell of *Tonna*

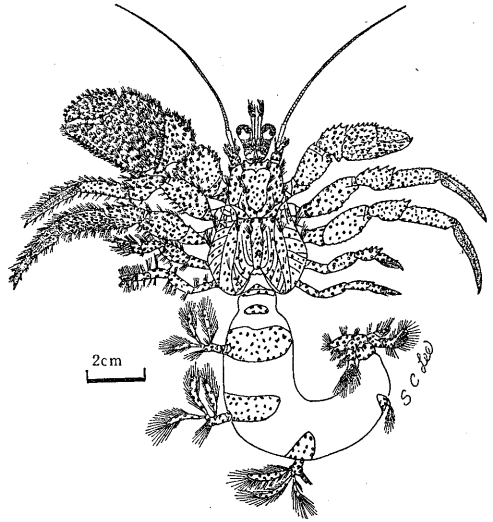


Fig. 6. *Dardanus diogenes* (de Haan), female

olearium. 1 female, cl. 66.0; Tungkang, Pingtung County; muddy bottom, 30 m depth; housing in the shell of *Tonna tessellata* which is usually encrusted by sea anemone.

Description: Carapace covers with tufts of short yellow hairs. Eyestalk depressed and expanded distally, its length is shorter than antennular peduncle and same length as antennal peduncle. Cornea length is about two-fifths of the distal segment of the stalk. Ophthalmic scale broad triangular, notches at lateral side and has 3 apical spinules. Antennal acicle is densely setose and has 2 blunt spinules, reaches the proximal end of the last segment of the peduncle. Left cheliped is larger than the right one. Dorsomedial border of carpus has 4 sharp teeth while outer surface covers with few teeth; propodus short and broad, densely covers with small and somewhat scale-like tubercles. Each tubercle armed with 1 or 2 black-tipped spines. The spines are the strongest at the dorsomedial border of propodus; propodus densely furnishes with short hairs. The second and third

pereiopods cover with black-tipped spines and hairs which distribute densely on distal two segments of the left third pereiopod; dactyli are longer than propodi.

Color (when alive): Carapace and pereiopods are light brown and scattered with small red-brown dots. Cornea is blue; base and distal half of the stalk is chocolate, the rest is violet. Dactyli of second and third pereiopods are dark red.

Distribution: Indo-Pacific region. This is the first record of this species from Taiwan.

13. *Dardanus crassimanus* (H. Milne Edwards, 1836)

(Fig. 7)

Pagurus setifer, de Haan, 1849: 209; Alcock, 1905: 83, pl. 8, fig. 3; Terao, 1913a: 379.

Dardanus crassimanus, Utinomi, 1961: 64, pl. 32, fig. 8.

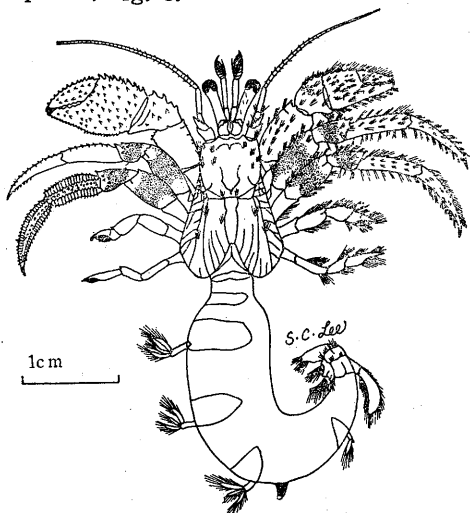


Fig. 7. *Dardanus crassimanus* (H. Milne Edwards), female

Materials: 1 female, cl. 14.0; Anping, Tainan; muddy bottom, 35 m depth; housing in the shell of *Fulgoraria rupestris*.

Description: Carapace covers with fine hairs. Eyestalk is same length as the anterior width of carapace and antennular

peduncle as well. Cornea length is about one-fourth of the distal segment of the stalk. Ophthalmic scale, fan-shaped with 3 or 4 spinules, and widely separated each other. Antennal acicle is short, spinose and setose, and reaches the proximal end of the last segment of the peduncle. Left cheliped is stronger than the right one. Cheliped and pereiopods beset with black-tipped spines, soft fine hairs, and intersperse with granules. Dactyli of second and third pereiopods are longer than propodi; outer surfaces of the distal two segments of left third pereiopod have a median longitudinal groove, and both dorsal and ventral surfaces have regular transverse squamiform markings.

Color (when alive): Anterior part of carapace is pink with red blotches and branchial region of carapace is orange with white spots. Eyestalk is light purple. Cheliped and pereiopods are pink light purple, scattered with red and white spots; carpi and meri of second and third pereiopods have a broad red band.

Distribution: East Africa, Ceylon, Arakan, Malabar, Gulf of Manar, Hongkong and Japan. This is the first record of this species from Taiwan.

14. *Dardanus guttatus* (Olivier, 1811)
(Fig. 8)

Pagurus guttatus, Milne Edwards, 1836: 273; Alcock, 1905: 87, pl. 9, fig. 1; Yap-Chiongco, 1938: 200, pl. 1, fig. 13; Kamalaveni, 1949: 81.

Materials: 1 male, cl. 28.0 and 1 ovig. female, cl. 42.0; Mao-pi-tou, Pingtung County; reef shore; housing in the shells of *Dariocomus textilis* and *Lambis* sp.

Discription: Carapace greatly depressed. Frontal and anterolateral margins fringe with tufts of red hairs. Eyestalk is same length as the antennular peduncle and exceeds the anterior width of carapace. Cornea length is shorter than one-third of the distal segment of the stalk. Ante-

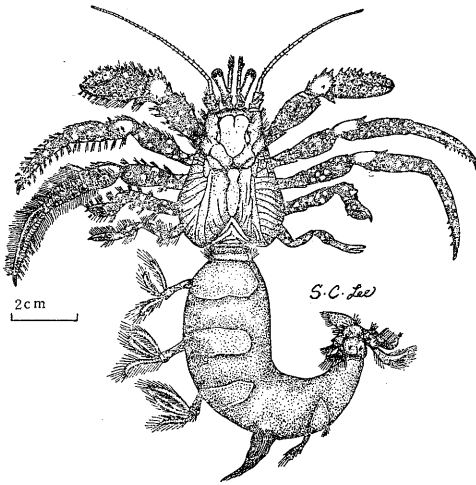


Fig. 8. *Dardanus guttatus* (Olivier), female

nnal acicle is spinose and reaches the proximal end of the last segment of the peduncle. Chelipeds spinose and subequal: the left one is slightly larger than the right one. Chelipeds and pereopods are hairy, especially the distal two segments. The hairs form the brush along the ventral border of left cheliped propodus and along both dorsal and ventral borders of distal two segments of left third pereopod, the hair of which sometimes extends to the merus. Outer surfaces of dactylus and propodus of left third pereopod have transverse striation. Dactyli of second and third pereopods are longer than propodi.

Color (in formalin): Carapace light yellow with few brown patches. Eyestalk, antennule and antenna are orange. Cheliped and pereopods are dark brown, scattered with small white spots, while carpi have a large white polished patch.

Distribution: Mazambique, Sandwich, Minnokoy, Ibo, Australia, South sea and philippines. This is the first record of this species from Taiwan.

15. *Dardanus lagopodes* (Forskål, 1775)

Pagurus euopsis, Henderson, 1888: 58;

Zehntner, 1894: 191, pl. 8, fig. 20 and 20a; Alcock, 1905: 86, pl. 9, fig. 2; Riddell, 1911: 261; Terao, 1913a: 377; Maki and Tsuchiya, 1923: 98, pl. 8, fig. 4; Laurie, 1926: 157; Yap-Chiongco, 1938: 200, pl. 1, fig. 7.

Dardanus euopsis, Buitendijk, 1937: 275.

Dardanus sanguinolentus, Utinomi, 1961: 64, pl. 32, fig. 7.

Dardanus lagopodes, Lewinsohn, 1969: 32

Materials: 1 ovig. female, cl. 22.7 and 2 females, cl. 17.3-18.7; Pa-tou-tzu, Keelung; rocky shore; housing in the shells of *Comus textile*, *C. capitaneus* and *Tectus pyramis*.

Description: Eyestalk slightly exceeds the antennular peduncle and is longer than the anterior width of carapace as well. Cornea length is about one-fifth of the distal segment of the stalk. Ophthalmic scale, fan-shaped, spinulate and setose anteriorly. Antennal acicle, just reaches the proximal end of the last segment of the peduncle. The joints of the distal half of the antennal flagellum are strongly gibbous. Left cheliped is slightly larger than the right one. Cheliped and pereopods beset with thorn-like spines and furnish densely with white tipped red-brown hairs. Outer surface of propodus of left third pereopod much flattened and distinctly shorter than the dactylus.

Color (in formalin): Pale brown. A larger red-brown patch presents on anterior part of gastric region of carapace. Branchial region of carapace is red brown with white spots. Carpi and meri of second and third pereopods have a red-brown crossband. Eyestalk is light yellow.

Discussion: The present species is similar to *D. megistos* in their hairness, and spinosity of chelipeds and pereopods. The differences between *D. euopsis* and *D. megistos* were discussed in detail by Alcock(1905).

Distribution: East and South Africa, Red sea, Seychelles, Mauritius, Andamans,

Amboina, Samoa, Malaya Archipelago, South sea, philippines, Taiwan and Japan.

16. *Dardanus megistos* (Herbst, 1804)

Pagurus punctatus, Miers, 1877: 138; 1880: 374; Alcock, 1905: 81, pl. 8, fig. 1; Maki and Tsuchiya, 1923: 95, pl. 18, fig. 3; Yap-Chiongco, 1938: 197, pl. 1, fig. 3.

Pagurus megistos, Terao, 1913a: 378; Laurie, 1926: 156.

Dardanus megistos, Buitendijk, 1937: 273; Utinomi, 1961: 64, pl 32, fig. 10.

Materials: 1 male, cl. 15.2; pa-tou-tzu, Keelung; rocky shore; housing in the shell of *Comus textile*.

Description: Eyestalk is same length as that of antennular peduncle but much longer than the anterior width of carapace. Cornea length is about one-fourth of the distal segment of the stalk. Ophthalmic scale is broad triangular with 2 apical spinules, Antennal acicle slightly surpasses the proximal end of the last segment of the peduncle. Left cheliped is slightly massive. Cheliped and pereopods have numerous thorn-like spines. Cheliped and pereopods also furnish with long hairs which mostly densely distribute on their distal three segments. Dactyli of second and third pereopods distinctly longer than propodi.

Color (in formalin): Uniformly red brown, scattered with black edged white ocelli. Antennular and antennal peduncles including acicles are yellow.

Distribution: East and South Africa, Madagascar, Red sea, Andamans, Laccadives, Sandwich, Nicobars, Mergui, Tahiti, Australia, Philippines, South sea, Taiwan and Japan.

Genus *Bniculus* Dana, 1852

17. *Aniculus aniculus* (Herbst, 1791)

Pagurus aniculus, Milne Edwards, 1836: 279; de Haan, 1849: 209.

Aniculus aniculus, Alcock, 1905: 94, pl. 7, fig. 6 Terao, 1913a: 356; 1913b: 548; Maki and Tsuchiya, 1923: 105, pl. 10, fig. 2; Laurie, 1926: 159; Yap-Chiongco, 1938: 201, pl. 2, fig. 2; Utinomi, 1961: 63, pl. 32, fig. 6.

Materials: 1 ovig. female, cl. 37.0 and 1 male, cl. 40.5; O-lan-pi, Pingtung County; reef shore; 1 male, cl. 24.5, Mao-pi-tou, Pingtung County; reef shore.

Description: Eyestalk is slightly shorter than anterior width of carapace but longer than either antennular or antennal peduncle. Ophthalmic scale notches near apex and tips with a bifid spinules. Antennal acicle, setose but not serrulate, reaches the middle way of the last segment of the antennal peduncle. Antennal flagellum is longer than carapace length, each segment has two minute setae. Frontal and anterolateral sides of carapace and pereopods densely furnished with long yellow hairs. Cheliped and next two pereopods cover with overlapping transversely scutelike plates: each plate frings with short cilia. Dactyli of second and third pereopods are shorter than that of the propodi.

Color (In formalin): Anterior half of carapace is yellow and red, and posterior half is red with vermiform yellow stripes. Rostrum and ophthalmic scale are dark red. Eyestalk is light brown distally and red at base. Pereiopods are yellow with broad dark red bands on carpi and propodi.

Discussion: The present species is very close to *A. tenebrarum* Alcock (1905) except the latter species is not so shaggy and has much longer eyestalk. The present species is also related to *A. strigatus* except the carapace of the latter species is greatly depressed.

Distribution: South India, Gulf of Manaar and Rodriguez, Mauritius, Mozambique, Simoda, Seychelles, Society Islands, Auckland, Paumotu, New Zealand, Malay

Peninsula, Philippines, South sea, Taiwan and Japan.

Genus *Diogenes* Dana, 1852

18. *Diogenes edwardsii* (de Haan, 1849)

(Fig. 9)

Pagurus edwardsii de Haan, 1849: 211, pl. 50, fig. 1.

Diogenes edwardsii, Terao, 1913a: 362; 1914: 245; Makarov, 1938: 150, pl. 1, fig. 3; Yokoya, 1939: 280; Utinomi, 1961: 65, pl. 33, fig. 3.

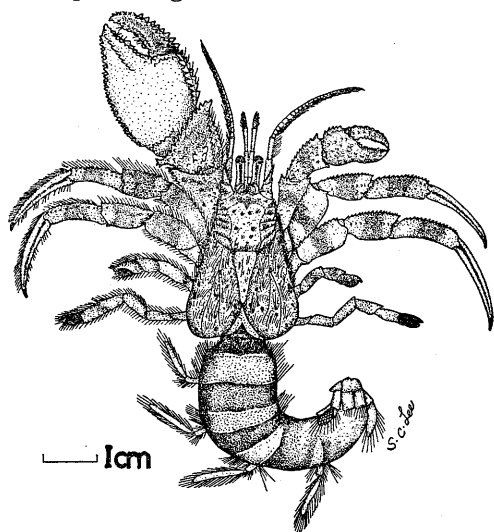


Fig. 9. *Diogenes edwardsii* (de Haan), male

Materials: 1 female, cl. 28.0 and 1 male, cl. 19.5; Anping, Tainan; muddy bottom; 16-35 m depth; housing in the shell of *Cymatium pileare*.

Description: Carapace covers with tufts of hairs; anterolateral border of carapace is finely serrated. Lateral side of gastric suture has several transverse or obliquely serrate and setose ridge. Rostrum is a broad triangular and tips with a movable process between both sides of ophthalmic scales. The process is slightly shorter than the ophthalmic scales. Eyestalk is much shorter than antennular peduncle. Ophthalmic scales are fan-shaped and closely located each other. Anterior margin of ophthalmic scale is spinulate.

Antennal acicle setoses and not reaches the proximal end of the last segment of the peduncle; its free edge has 5 or 6 spinules. The length of antennal flagellum is same as carapace length and the flagellum is ciliated ventrally. Left cheliped is stronger than the right. Carpus is triangle and granulated, its dorsal border has a longitudinal row of sharp spines; anterior margin of carpus frings with strong spines, ventrolateral angle of its outer surface has 3 acute spines. Dorsal border of the propodus has several rows of spines: the outer row is stout and direct horizontally; the ventral border has two rows of similar spines: the outer row being sharper. Outer surface of propodus finely granulated, and has an obliquely serrated or granulated ridge running toward the tip of immovable fingers. The dorsal border of the dactylus is spinose. The cutting edges of dactylus and immovable finger have a granulated ridge; outer surface of dactylus grooved. Right cheliped propodus and dactylus granulated and densely covered with hairs. The second and third pairs of pereopods are setose and spinose on the dorsal borders and outer sides of carpus and merus; dactyli are much longer than propodi, and have a median longitudinal groove.

Color (when alive): Pale red-brown. Carapace scattered with many small red purple dots. Propodi, carpi and meri of second and third pereopods have a black brown crossbands. Eyestalk is yellow with a dark brown band.

Distribution: East Africa, Persian Gulf, Nicobar, Mergui, Madras, Singapore, Tongking Bay, Philippines, China sea, Hongkong, Japan, Shamara Bay and Ussuri Bay. This is the first record of this species from Taiwan.

Genus *Calcinus* Dana, 1852

Key to the species

1. Eyestalk equal to the anterior width of carapace. Right cheliped propodus entire on dorsal border...*Calcinus laevimanus*
1. Eyestalk much longer than the anterior width of carapace. Right cheliped propodus serrated on dorsal border....2
2. Dactyli of cheliped closely covered with pearly tubercles. Second and third pereopods alternate with crossbands of dark brown (or red-brown) and blue (or white).....*C. elegans*
2. Dactyli of cheliped without pearly tubercles. Second and third pereopods lack of crossbands3
3. Hairs on ventral border of dactylus and propodus of third pereopod much closely beset and form a brush. Chelipeds and pereopods dark brown except their tip which are white. Proximal two-thirds of eyestalk is dark brown and distal one-third blue...*C. gaimardi*
3. Hairs of dactylus and propodus of third pereopod sparsely beset and not form a brush. Chelipeds and pereopods dark green except cheliped dactyli and dactyli of pereopods white while the proximal ends of dactyli of pereopods have dark purplish rings. Eyestalk uniformly blue*C. latens*

19. *Calcinus laevimanus* (Randall, 1840)

Calcinus laevimanus, Terao, 1913a: 358; 1913b: 591; Laurie, 1926: 155; Buitendijk, 1937: 267; Miyake, 1956: 21, figs. 14-15.

Calcinus herbstii, Alcock, 1905: 53, pl. 5, fig. 4; Yap-Chiongco, 1938: 205, pl. 2, fig. 5.

Materials: 1 ovig. female, cl. 11.0, 4 males, cl. 10.2-19.8; Pa-tou-tzu, Keelung; rocky shore; housing in the shells of *Tegula lischkei*, *Turbo coronatus granulatus*, *Dentarene sarcina* and *Monodonta labio*. 1 female, cl. 17.0; Hsiao-men, Penghu County; rocky shore. 1 ovig. female, cl. 7.0, 6 males, cl. 9.0-18.0; Mao-pi-tou, Pingtung County;

reef shore; housing in the shells of *Thais armigera*, *Cantharus undosus*, *Nerita costata*, *Bursa sp.*, and *Ritena undata*.

Description: Eyestalk is same length as the anterior width of carapace. Antennal acicle, short and spinulose, slightly exceeds the proximal end of the last segment of the antennal peduncle. Chelipeds smooth and unarmed: the left one is much more massive than the right one. Dorsal border of left cheliped carpus has an oblique groove. Cutting edge of dactylus fringes with few setae; immovable finger has an obtuse tooth. Dactyli of second and third pereopods have few tufts of setae on their ventral border.

Color (in formalin): Carapace is light brown with few dots. Distal two-thirds of eyestalk is orange and the rest is white. Cheliped except the dactylus is red-blue or dark-orange; dactylus and ventral half of outer surface of left cheliped propodus and dactyl tips of right cheliped are white. Second and third pereopods except the dactyli are orange; meri and carpi have red-brown longitudinal stripe while the dactyli have red-brown spots and crossbands.

Distribution: South and East Africa, Zanzibar, Mauritius, Mozambique, Seychelles, Andamans, Amboina, Palk Strait, Suheliper, Laccadives, Balabac Strait, Ceylon, Coco Islands, Sandwich, Paumotu, Wake, Samoa, Hawaii, South sea, Philippines, Taiwan, Ryukyu Islands, Bonin Islands and Japan.

20. *Calcinus elegans* (H. Milne Edwards, 1836) (Fig. 10)

Pagurus elegans Milne Edwards, 1836: 278, pl. 13, fig. 2.

Calcinus elegans, Alcock, 1905: 55, pl. 5, fig. 2; Terao, 1913a: 357; 1913b: 591; Laurie, 1926: 155; Buitendijk, 1937: 268; Yap-Chiongco, 1938: 206, pl. 2, fig. 10; Miyake, 1956: 320, figs. 12-13.

Materials: 1 ovig. female, cl. 9.3-11. 2,

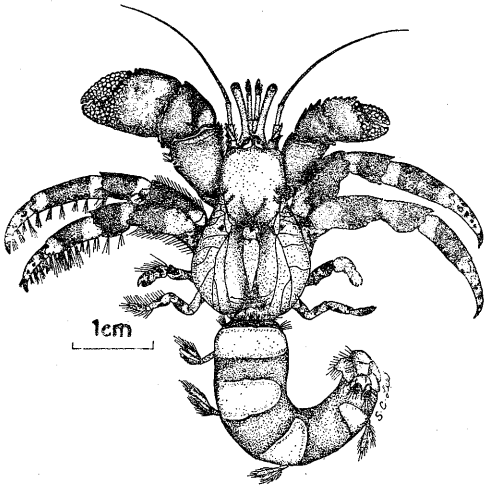


Fig. 10. *Calcinus elegans* (H. Milne Edwards), male

3 males, cl. 10.9-20.0; Mao-pi-tou, Pingtung County; rocky shore; housing in the shells of *Thais armigera*, *Drupa morum*, *Colubrellina* sp., 1 female, cl. 14.5, 1 male, cl. 14.0; Nan-fan-ao, Ilan County; rocky shore; housing in the shells of *Chicoreus* sp., and *Mancinella tuberosa*.

Description: Anterior part of carapace minutely pitted; either lateral margins or behind cervical suture has tufts of purplish hairs. Eyestalk is longer than anterior width of carapace. Ophthalmic scale is elongate triangle with acuminate tip. Antennular peduncle is longer than antennal peduncle but shorter than eyestalk. Antennal acicle spinose, reaches far beyond the proximal end of the last segment of the antennal peduncle. The left cheliped is larger than the right one; dorsal border of carpus has an oblique groove. Dactyli of both chelipeds have white pearly tubercles. Cutting edges of cheliped dactyli have 3 or 4 granular teeth and few tufts of purplish hairs. Dorsomedial sides of propodus and carpus of right cheliped are strongly serrated. The dactyli of second and third pereopods are longer than those

of propodi. The latter two pairs of pereopods have tufts of purplish hairs on their ventral sides.

Color (when alive): Anterior part of carapace is light green. Eyestalk is blue; its base and ophthalmic scale are dark brown. Antennule and antenna are orange. Cheliped is olive or dark brown except distal white pearly tubercles. Second and third pereopods alternate with broad bands of dark brown and blue; dactyli are blue with some dark brown spots.

Distribution: Natal, Mauritius, Seychelles, Laccadives, Pacific coast of Patagonia, Sandwich, Wake, Paumotu, New Ireland, Tahiti, South sea, Philippines, Ryukyu Islands and Japan. This is the first record of this species from Taiwan.

21. *Calcinus gaimardi* (H. Milne Edwards, 1848)
(Fig. 11)

Calcinus gaimardi, Alcock, 1905: 56, pl. 5, fig. 3; Terao, 1913a: 358; Buitendijk, 1937: 268; Miyake, 1956: 326, figs. 16-17.

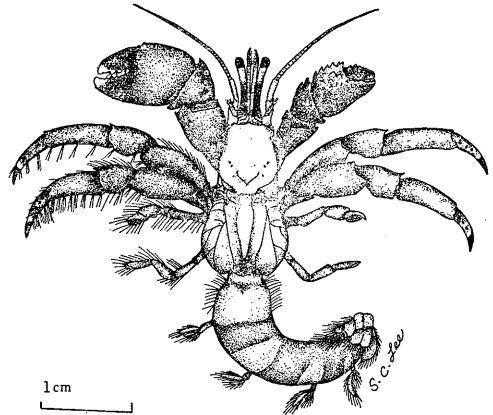


Fig. 11. *Calcinus gaimardi* (H. Milne Edwards), male

Materials: 1 ovig. female, cl. 10.9, 1 male, cl. 15.3; Pa-tou-tzu, Keelung; rocky shore; housing in the shells of *Murex torrefatus*, *Trochus maculatus*. 2 males, cl. 17.1-18.8; Pi-tou, Keelung; rocky shore;

housing in the shell of *Chicoreus* sp. 1 male, cl. 12.6; Nan-fan-ao, Ilan County; rocky shore; housing in the shell of *Chicoreus* sp. 2 males, cl. 11.9-14.4; Chengkong, Taitung County; rocky shore; housing in the shell of *Trochus* sp. 2 ovig. females, cl. 8.3-8.9, 1 female, cl. 12.2, 2 males, cl. 13.6-14.3; Mao-pi-tou, Pingtung County; reef shore; housing in the shells of *Drupa morum*, *Cypraea caputserpentis*, *Trochus* sp., *Trochus stellatus*.

Description: Anterior part of carapace minutely pitted, lateral margins and a little behind level of cervical groove furnish with tufts of red hairs. Eyestalk is 1.5 times of anterior width of carapace and is longer than antennular peduncle. Ophthalmic scale triangular tipped with a simple spinule. Antennal acicle is spinose and setose, reaches beyond the proximal end of the last segment of the antennal peduncle. Left cheliped is stronger than the right one: outer surface of carpus has an oblique groove and has a spine at distal end of dorsal border; outer surface of propodus is smooth; dactylus and immovable finger finely granulated. Cutting edge of dactylus usually has 4 teeth (Occasionally with 2 or 3), while the immovable finger has 2 or more teeth. Cutting edges furnish with few short hairs. Dorsal sides of carpus and propodus of right cheliped strongly serrated and those of outer surfaces strongly granulated. Dactyli of second and third pereopods are much shorter than their propodi; ventral sides of them furnish with long hairs.

Color (when alive): Carapace is light blue; lateral margins of anterior part of carapace are dark brown. Proximal two-thirds or half of eyestalk and ophthalmic scale are dark brown while the rest are blue. Antennule and antenna are orange. Cheliped dark brown except tips of fingers. Second and third pereopods are dark brown; dactyli have few red-brown spots

and a white crossband behind the black claw.

Distribution: Minnikoy, Maldives, Nicobars, Amboina, Balabac Strait, Sulu sea, Rotuma, Tahiti, Fiji, Funafuti, Ohosima, Ryukyu Islands and Japan. This is the first record of this species from Taiwan.

22. *Calcinus latens* (Randall, 1840)

(Fig. 12)

Calcinus terrae-reginae, Alcock, 1905: 57, pl. 5, fig. 7; Yap-Chiongco, 1938: 206; Miyake, 1956: 328, figs. 18-19.

Calcinus latens var. *terrae-reginae*, Buitendijk, 1937: 269.

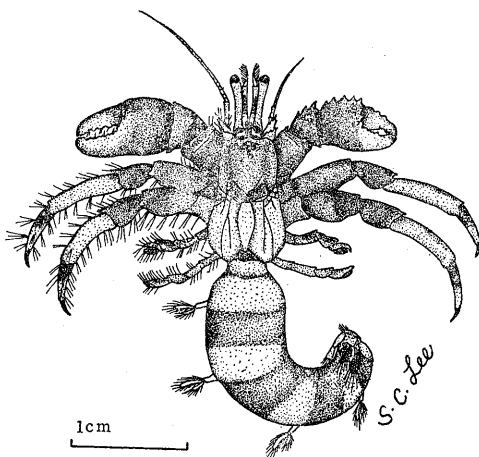


Fig. 12. *Calcinus latens* (Randall), male

Materials: 5 males, cl. 6.0-12.7; Patou-tzu, Keelung; rocky shore; housing in the shells of *Drupa arachnoides*, *Tectus pyramis*, *Trochus sacellum rota*. 2 males, cl. 7.5-7.8; Mao-pi-tou, Pingtung County; reef shore; housing in the shell of *Drupa morum*.

Description: Hair patterns on carapace is similar to *C. gaimardi*. Eyestalk is much longer than the anterior width of carapace and slightly longer than antennular peduncle. Ophthalmic scale is triangle tips with a single spinule. Antennal acicle is setose and spinose, reaches the proximal end of the last segment of the antennal

peduncle. Left cheliped is slightly larger than the right one: carpus has a spine at distal end of dorsal side and a faint oblique groove on outer surface; dorsal and ventral borders of propodus smooth; dactylus and immovable finger finely granulated. Cutting edge of dactylus has 2 obtuse teeth while immovable finger has 4 or more small teeth and few tufts of short yellow hairs. Dactyli only meet at tips and leave a wide gap proximally. Right cheliped much compressed, distodorsal angle of carpus has a strong spine and 1 or 2 weak spines; dorsal border of propodus strongly serrated and is nearly smooth on ventral border; outer surface of propodus and carpus scattered with granules which fringed with hairs: dorsal border of dactylus is serrated. Second and third pairs of pereopods sparsely furnish with short hairs.

Color (when alive): Anterior part of carapace is dark green while posterior part is blue. Proximal two-thirds or three-fourths of eyestalk is orange while the rest is pale blue. Occasionally eyestalks are uniformly orange-brown in some specimens. Antennular peduncle alternates with purple-brown and blue bands; antennal peduncle and flagellum are orange-brown. Cheliped is dark green except the dactyl tip which is pale yellow. Meri and carpi of second and third pereopods are dark green except the basal two-thirds of meri and coxae of third pereopod which is orange-brown. The proximal three-fourths of propodi of these two pairs are orange-brown while distal one-fourth is pale green; dactyli are yellow with basal purple crossbands.

Distribution: Minnikoy, Maldives, Mergui, Gulf of Bengal, west coast of Australia, Queensland, Malaya Archipelago, Philippines and Japan. This is the first record of this species from Taiwan.

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LITERATURE CITED

- ALCOCK, A. 1905 *Catalogue of the Indian Decapod Crustacea in the collection of the Indian Museum II. Anomura. Fasc. 1. Pagurides*. Indian Museum, Calcutta. 197 pp, 16 pls.
- BUITENDIJK, A.M. 1937 Biological results of the Snellius Expedition. IV. The Paguridea of the Snellius Expedition. *Temminckia*, 2: 251-280.
- de HAAN, W. 1849 *Siebold's Fauna Japonica I. Crustacea*. Amstelodami apud J. Muller et Co., 244 pp, 55 pls.
- de MAN, J.G. 1888 Report on the podophthalmous crustacea of the Mergui Archipelago, collected for the Trustees of the Indian Museum. Calcutta by Dr. John Anderson. *J. Linn. Soc. Zool.*, 22: 1-312.
- HENDERSON, J.R. 1888 Report on the Anomura collected by H.M.S. Challenger during the years 1873-1876. *Challenger Report. Zool.*, 27: 1-221.
- KAMALAVENI, S. 1949 On hermit-crabs (Family Paguridae) in the collection of the Indian Museum. *Rec. Indian Mus.*, 47: 77-85.
- LAURIE, D. 1926 Anomura collected by M.J. Stanley Gardiner in the Western Indian Ocean in H.M.S. "Sealark". *Trans. Linn. Soc. London*, 2, 19: 121-167.
- MAKAROV, V.V. 1938 Fauna of U.S.S.R. Crustacea. Anomura, Zool. Inst. Acad. Sci., U.S.S.R. No. 16. (translated from Russian in 1962).
- MAKI, M. and TSUCHIYA, H. 1923 A monograph of the Decapod Crustaceans from Formosa. *Rept. Dept. Agric. Gov. Res. Inst. Formosa*, 3: 1-215. (In Japanese).
- MIERS, E.J. 1877 On a collection of crustacea made by the Rev. G. Brown C.M.Z.S., on Duke-of-York Island. *Proc. Zool. Soc. London*, 133-138.
- _____ 1880 On a collection of crustacea from the Malaysian Region. Pt. 3. Crustacea Anomura and Macrura (except Penaeidea), *Ann.*

- Mag. Nat. Hist.*, 5, 5: 370-384.
- _____ 1881 On a collection of crustacea made by Baron Hermann Maltzan at Goree Island, Senegambia. *Ibids.*, 8, 5: 259-281.
- MILNE EDWARDS, H. 1836 Observations Zoologique sur les Pagurus et description d'un nouveau de la tribu des Paguriens. *Ann. Sci. Nat. Zool.*, 2, 6: 257-288.
- MILNE EDWARDS, A. 1900 *Expéditions Scientifiques du Travailleur et du Talisman, Crustaces. Décapodes Première partie Brachyures et Anomoures*, Masson et C^{te}, Editeurs, Paris.
- MIYAKE, S. 1956 Invertebrate Fauna of the intertidal zone of the Tokara Islands. XIII. Anomura. *Publ. Seto Mar. Biol. Lab.*, 5: 303-337.
- _____ 1957 Anomuran Decapod Fauna of Hokkaido, Japan. *J. Fac. Sci., Hokkaido Univ.*, 6, 13: 85-92.
- ORTMANN, A.E. 1892 *Die Decapoden-Krebse des Strassburger Museums*. IV. Die Abtheilungen Galatheidea und Paguridea. *Zool. Jahrb., Syst.*, 6: 241-326. (Not seen).
- RIDDELL, W. 1911 Report on the marine biology of Sudanese Red Sea from collections made by Cyril Crossland. XII. The Anomura. *J. Linn. Soc., Zool.* 31: 260-264.
- TERAO, A. 1913a A catalogue of Hermit-crabs found in Japan (Paguridea excluding Lithodidae) with descriptions of four new species. *Annot. Zool. Japan.* 8: 355-391.
- _____ 1913b 日本産寄居蟲類 *Zool. Mag.* 25: 368-370; 404-405; 548-550; 591-593.
- _____ 1914 日本産寄居蟲類 (續) *Zool. Mag.* 26: 60-61; 109-110; 181-182; 245-248; 469-470; 497-500.
- UTINOMI, H. 1961 *Coloured Illustrations of Sea shore animals of Japan*. Hoikusha, Osaka, Japan. 167 pp, 64 pls.
- WHITE, A. 1847 Descriptions of some new species of crustacea in the collection of the British Museum. *Proc. Sool. Soc. London*, 15: 84-86; 116-127.
- YAP-CHIONGCO, J.V. 1938 The littoral Paguridea in the collection of the University of the Philippines. *Philippine J. Sci.*, 66: 183-219.
- YOKOYA, Y. 1939 Macrura and Anomura of decapod crustacea found in the neighbourhood of Onagawa, Miyagi-Ken. *Sci. Rept. Tohoku Imp. Univ.*, 14: 261-289.
- ZEHNTNEI, L. 1894 Crustaces de L'archipel Malais. *Rev. Suisse. Zool.*, 2: 135-214.