

The Brachyuran Crabs (Crustacea: Decapoda: Eumedonidae and Portunidae) Symbiotic with Echinoderms in Taiwan

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Peter K. L. Ng and Ming-Shiou Jeng (1999) The brachyuran crabs (Crustacea: Decapoda: Eumedonidae and Portunidae) symbiotic with echinoderms in Taiwan. *Zoological Studies* 38(3): 268-274. Five species of brachyuran crabs in 2 families (Eumedonidae and Portunidae) are reported as symbiotic with echinoderms in Taiwan. *Echinoecus pentagonus* is associated with sea urchins (Echinoidea), while *Harrovia albolineata*, *Permanotus purpureus*, and *Tiaramedon spinosum* are reported from featherstars (Crinoidea). All four are eumedonids. One portunid, *Lissocarcinus orbicularis*, is reported from sea cucumbers (Holothuroidea). Of these, 4 species, *Echinoecus pentagonus*, *Harrovia albolineata*, *Permanotus purpureus*, and *Lissocarcinus orbicularis* are new records for the island. Specimens previously recorded as *Harrovia elegans* are here shown to be *H. albolineata* instead.

Key words: Brachyura, Taiwan, Eumedonidae, Portunidae, Echinoderm symbionts.

Three families of brachyuran crabs are closely associated symbiotically with various species of echinoderms, viz. the Eumedonidae, Portunidae, and Pinnotheridae. In Taiwan, only 2 species of crabs, both eumedonids, have been reported thus far, both of which are known crinoid symbionts. Lin (1949) and Wang and Chen (1981) reported *Harrovia elegans* De Man, 1887, while Hwang and Yu (1980) recorded *Tiaramedon spinosum* (Miers, 1879) (as a *Ceratocarcinus* species).

The present report records 4 species of eumedonids as well as 1 portunid species from Taiwan. The eumedonids are: *Echinoecus pentagonus* (A. Milne Edwards, 1879), *Harrovia albolineata* Adams and White, 1849; *Permanotus purpureus* (Gordon, 1934); and *Tiaramedon spinosum* (Miers, 1879); while the portunid is *Lissocarcinus orbicularis* Dana, 1852. Measurements provided are of the carapace length and width respectively. Specimens examined are deposited in the Institute of Zoology, Academia Sinica, Taipei, Taiwan (ASIZ); Taiwan Museum, Taipei, Taiwan (TMCD); National Taiwan Ocean University, Keelung,

Taiwan (NTOU); and the Zoological Reference Collection of the Raffles Museum, National University of Singapore (ZRC).

Family Eumedonidae

Echinoecus pentagonus (A. Milne Edwards, 1879) (Figs. 1, 2)

Diagnosis: Carapace ovate, dorsal surface gently convex longitudinally and transversely, regions poorly defined; rostrum variable in length; surfaces of carapace, chelipeds, and sometimes ambulatory legs, glabrous, smooth to pitted. Antero- and posterolateral margins not well demarcated, anterolateral margin arcuate without any dentition. Antennules distinctly folding obliquely. Chelipeds relatively short, stout; carpus with 1 inner distal spine, merus with 1 inner and 1 outer distal tooth; chela relatively stout; fingers not crested. First ambulatory leg not distinctly longer than 2nd leg; merus subcristate, unarmed, distal margin rounded, never with distinct

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tooth in adults. Color in life variable, but usually dark colored (black to purple) with lighter symmetrically arranged blotches on carapace.

Type locality: Mauritius, Indian Ocean (A. Milne Edwards, 1879).

Material: 1 female (ca. 10.0 by 10.7 mm, carapace slightly crushed) (ASIZ 71990), Lutao (Green Is.), southeastern Taiwan, 5 m depth, coll. M-S Jeng, 14 Apr. 1998.

Remarks: This is a very widely distributed species ranging from the Indian Ocean to Hawaii (Stevcic et al. 1988, Chia et al. 1999), although it is conspicuously rare or absent in continental shelf waters. The taxonomy of this species is relatively well known and a large number of names is now regarded as synonymous with *E. pentagonus*, viz. *Echinoecus pentagonus* Rathbun, 1894; *Eumedon convictor* Bouvier and Seurat, 1905; *Liomedon pentagonus* Klunzinger, 1906; *Eumedonus petiti* Gravier, 1922; *Echinoecus rathbunae* Miyake, 1939; *Echinoecus rathbunae convictor* Miyake, 1939; and *Echinoecus klunzingeri* Miyake, 1939 (Chia et al. 1999).

Echinoecus pentagonus is a well-known symbiont with many species of sea urchins (Castro 1978). The form of the rostrum in *E. pentagonus* is remarkably variable, and this fact is not always related with sex, although females usually have relatively shorter ones (Chia et al. 1999). Similarly, the dorsal surface of carapace is smooth to strongly pitted (as in the present specimen from Taiwan). The carapace, however, never appears eroded. The color of live specimen also varies with the host, usually matching that of the host. The genus *Echinoecus* currently contains 3 species, *E. pentagonus* (A. Milne Edwards, 1879), *E. nipponicus* Miyake, 1939; and *E. sculptus* (Ward, 1934) (see Chia et al. 1999).

***Harrovia albolineata* Adams and White, 1849**

(Fig. 3)

Diagnosis: Carapace quadrate to subquadrate; dorsal surface usually with thin but distinct pubescence; regions poorly defined, usually with 2 tubercles each on protogastric and branchial regions; inner supra-orbital teeth well developed. Antero- and postero-lateral margins clearly demarcated; antero-lateral margin with 4 teeth (including external orbital angle) separated by shallow to deep fissures; 1st tooth low, subtruncate; 2nd tooth low; 3rd tooth large, subtruncate; 4th tooth large, dentiform; 3rd tooth slightly smaller than 4th tooth. Antennules folding obliquely. Chelipeds elongate, surfaces granular; carpus with sharp spine

or low, rounded tubercle on inner distal angle; outer proximal margin of merus with low granules or tubercles; chelae elongated; fingers not crested. Ambulatory legs short, stout; 1st leg much longer than 2nd ambulatory leg. Color of carapace in life usually banded transversely white and brown, but white pattern may be obscured in larger specimen, especially female.

Type locality: Borneo, the Philippines (White 1847).

Materials: 1 dried female (7.3 by 10.1 mm) (TMCD 263), Hengchun Peninsula, southern Taiwan, coll. CY Wei, 25 Aug. 1955; 1 male (dried) (TMCD 475), Tainan Fish Market, coll. CY Wei, Feb. 1971; 1 female (NTOU), Keelung, 97 m depth, coll. Taiwan University, May 1997.

Remarks: The specimen reported as "*H. elegans* de Man, 1887" by Wang and Chen (1981) was re-examined. It proves to be *H. albolineata*. The 2 species are very close, as both are symbionts of crinoids and have relatively stout ambulatory legs. Chia et al. (1993) redefined *H. albolineata* s. str. and showed that the presence of a distinct tubercle or tooth on the inner distal surface of the carpus of the cheliped was a useful diagnostic character. This feature is present in only 1 other *Harrovia* species, *H. tuberculata* Haswell, 1880, but this species has 1 to 2 distinct spines on the ambulatory merus (smooth to almost smooth in *H. albolineata*) (Chen and Xu 1991, Chia and Ng 1998). It thus seems that Lin's (1949) earlier record of *H. elegans* from Taiwan may be *H. albolineata* as well. It is possible, however, that *H. elegans* s. str. is also present in Taiwan as it has a wide distribution from the Indian Ocean to Indonesia and various parts of the western Pacific.

Harrovia albolineata is known from various parts of Southeast Asia and reaches Papua New Guinea (Chia and Ng 1998). It occurs on crinoids locating in non-reef environment in somewhat deeper waters (10-140 m) (see Chia et al. 1993). Its ecology was briefly discussed by Ng and Lim (1990).

***Permanotus purpureus* (Gordon, 1934)**

(Figs. 4, 5)

Diagnosis: Carapace subquadrate; dorsal surface usually covered with thin pubescence; regions well defined, gastric and protogastric regions distinct, weakly tuberculated, cardiac region slightly swollen; hepatic regions depressed; regions smooth to being covered with scattered, very small granules; rostrum short; inner supra-orbital teeth very small; frontal margin appearing entire from dorsal view. Antero- and postero-lateral margins clearly demar-

cated; antero-lateral margin not lamelliform, with 4 lobes/teeth (including external orbital angle); first 3 lobes truncate, separated by very narrow fissures, sometimes fused, lined with small granules; 4th tooth confluent with lobes but stronger, and sharp. Antennules folding obliquely. Chelipeds elongate; carpus smooth; fingers not crested. Ambulatory legs relatively slender; 1st leg much longer than 2nd leg. Color of carapace in life usually transversely banded white and brown, with margin dirty white.

Type locality: Sorong, western New Guinea (= Irian Jaya, Indonesia) (Gordon 1934).

Materials: 1 male (4.1 by 4.6 mm), 1 female (4.6 by 5.1 mm) (ASIZ 72033), Lanyu (Orchid Is.), on crinoid, coll. M-S Jeng, 9 Aug. 1988; 1 male (5.2 by 6.9 mm), 1 female (7.0 by 10.2 mm) (ASIZ 70055), Shanhaii, Hengchun Peninsula, southern Taiwan, in 10 m water, on crinoid, coll. M-S Jeng, 24 Apr. 1988; 1 female (5.8 by 8.4 mm) (ASIZ 72037), Hsiashuiku, Hengchun Peninsula, southern Taiwan, in 20 m water, on crinoid, coll. M-S Jeng, 8 Mar. 1997.

Remarks: This is a widely distributed crinoid-associated species in the western Pacific, reaching Australia (Stevcic et al. 1988, Castro 1989, Takeda and Maramura 1994, Chia and Ng 1998). The species was previously classified as *Harrovia*, but Chia and Ng (1998) recently transferred it to its own monotypic genus. *Permanotus purpureus* is currently regarded as a synonym of *Harrovia bituberculata* Shen, Dai and Chen, 1982, described from Hainan Is., China (Chia and Ng 1998).

***Tiamedon spinosum* (Miers, 1879)**

(Fig. 6)

Diagnosis: Carapace squarish; surfaces smooth, covered with dense short, stiff setae arranged in a regular manner; regions well defined, proto-, metagastric, branchial, and cardiac regions with strong, long dorsally directed spines, those on protogastric region longest. Frontal lobes triangular, short, strongly deflexed downwards, front appears triangular from dorsal view. Inner supra-orbital teeth long, produced beyond front, obscuring most of deflexed frontal margin. Antero- and postero-lateral margins distinctly demarcated; antero-lateral margin sub-lamelliform, without trace of teeth or lobes; lateral carapace teeth strong, sharp. Antennules folding obliquely. Chelipeds relatively short, stout, covered with short setae; merus unarmed; carpus with 1 sharp spine on inner distal angle and 1 tooth on outer distal angle; fingers not crested. First ambulatory leg much longer than 2nd leg; surfaces covered with setae; meri with distinct tooth on subdistal dorsal

margin. Color in life usually red to dark reddish brown, sometimes with faint, narrow longitudinal stripes on carapace.

Type locality: Eastern Seas (Miers 1879).

Materials: 2 females (5.5 by 7.1 mm and 4.5 by 6.0 mm) (ASIZ 72036), 1 female (ZRC), Lanyu, on crinoid, coll. M-S Jeng, 9 Aug. 1988.

Remarks: *Tiamedon spinosum* is a very distinctive species occurring with crinoids. Hwang and Yu (1980) first recorded this species from Lanyu, Taiwan. We are unable to locate their specimen, but their figure leaves little doubt as to the identity of this species. *T. spinosum* is a widely distributed species, occurring in both the Sunda and Sahul Shelves, as well as in Japan, Taiwan, and New Caledonia (Stevcic et al. 1988, Chia and Ng 1998). Its previous placement in the genus *Ceratocarcinus* was questioned by Serène et al. (1958), and the distinct form of its antennae and carapace structures led Chia and Ng (1998) to transfer the species to its own monotypic genus.

Family Portunidae

***Lissocarcinus orbicularis* Dana, 1852**

(Figs. 7, 8)

Diagnosis: Carapace subcircular; dorsal surface strongly convex medially; frontal margin entire, broadly triangular, without median notch; preorbital tooth reduced; anterolateral margin strongly arcuate, without well-defined teeth, lobes separated by narrow fissures, margin appearing entire. Color pattern distinctive, background yellowish to reddish-brown with symmetrically arranged purple blotches of various sizes; ambulatory legs and chelipeds appear banded.

Type locality: Fiji (Dana 1852).

Material: 1 female (9.9 by 10.8 mm) (ASIZ 72035), Lanyu, southeastern Taiwan, 2-6 m depth, on holothurian, coll. M-S Jeng, 3 Sept. 1996.

Remarks: *Lissocarcinus orbicularis* is widely distributed in the Indo-West Pacific and is a well-known symbiont on a variety of various sea cucumber species (see also Crosnier 1962). Another related species known from Taiwan, *L. laevis* Miers, 1886 (Lin 1949, Chang 1963, Wang and Chen 1981, Huang and Yu 1997) is a known symbiont on sea anemones. In the 2nd author's collection are several recent specimens of *L. laevis* (1 male, 10.5 by 13.0 mm, ASIZ 71803, Tahsi fishing port, coll. M-S Jeng, 24 Nov. 1997; 2 females, 9.9 by 11.5 mm, 9.1 by 10.5 mm, ASIZ 71626, Tahsi fishing port, coll. M-S Jeng, 24 Sept. 1997) from Taiwan (Figs. 9, 10).



Fig. 1. *Echinoecus pentagonus*. Female (10.0 by 10.7 mm) (ASIZ-71990), live colors.



Fig. 4. *Permanotus purpureus*. Male (4.1 by 4.6 mm) (ASIZ-72033), live colors.

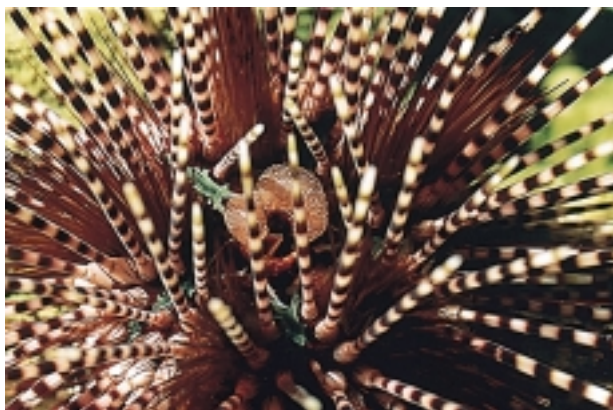


Fig. 2. *Echinoecus pentagonus*. Female (10.0 by 10.7 mm) (ASIZ-71990), in situ on sea urchin anus; crab with only rostrum showing.



Fig. 5. *Permanotus purpureus*. Female (4.6 by 5.1 mm) (ASIZ-72033), live colors.



Fig. 3. *Harrovia albolineata*. Female, not preserved, from Singapore, in situ on featherstar, showing live colors. Taiwanese specimens are all dried or preserved.



Fig. 6. *Tiarmedon spinosum*. Female (5.5 by 7.1 mm) (ASIZ-72036), live colors.



Fig. 7. *Lissocarcinus orbicularis*. Female (9.9 by 10.8 mm) (ASIZ-72035), with bopyrid on left part of carapace, live colors.



Fig. 9. *Lissocarcinus laevis*. Male (10.5 by 13.0 mm) (ASIZ-71803), live colors.



Fig. 8. *Lissocarcinus orbicularis*. Female (9.9 by 10.8 mm) (ASIZ-72035), in situ on sea cucumber.



Fig. 10. *Lissocarcinus laevis*. Female (9.1 by 10.5 mm) (ASIZ-71626), live colors.

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臺灣海域棘皮動物共生蟹
(甲殼綱：十足目：真護蟹科與梭子蟹科) 之研究

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本文報導產於臺灣海域二科（真護蟹科與梭子蟹科）五種的棘皮動物共生蟹，其中四種屬於真護蟹，包括五角海膽蟹(*Echinoecus pentagonus*)和海膽共生，白條短角蟹(*Harrovia albolineata*)、紫色短角海蟹(*Permanotus purpureus*)和多刺角菱蟹(*Tiamedon spinosum*)則發現和海百合種類共生在一起；另外一種梭子蟹為紫斑光背蟹(*Lissocarcinus orbicularis*)和海參有共生關係。五角海膽蟹、白條短角蟹、紫色短角蟹和紫斑光背蟹等四種是臺灣新記錄種。以往被記述為美麗短角蟹(*Harrovia elegans*)的標本，在此被認定是白條短角蟹。

關鍵詞：短尾類，臺灣，真護蟹科，梭子蟹科，棘皮動物共生物。

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