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

Peter K. L. Ng¹ and Ming-Shiou Jeng²,*

¹School of Biological Sciences, National University of Singapore, Kent Ridge, Singapore 119260, Republic of Singapore
²Institute of Zoology, Academia Sinica, Taipei, Taiwan 115, R.O.C.

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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 postero-lateral 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

*To whom correspondence and reprint requests should be addressed. Fax: 886-2-27858059. E-mail: jengms@gate.sinica.edu.tw*
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 (Stevvic 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. *Echinococcus pentagonus* Rathbun, 1894; *Eumedon convictor* Bouvier and Seurat, 1905; *Liomedon pentagonus* Klunzinger, 1906, *Eumedon petiti* Gravier, 1922; *Echinococcus rathbunae* Miyake, 1939, *Echinococcus rathbunae convictor* Miyake, 1939; and *Echinococcus klunzingeri* Miyake, 1939 (Chia et al. 1999).

*Echinococcus 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 *Echinococcus* 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 thin with 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 prostogastric 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-
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).

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

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

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

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

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

黃禮麟¹  鄭明修²

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（Tiaramedon 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。

¹School of Biological Science, National University of Singapore, Singapore 119260, Republic of Singapore
²中央研究院動物研究所