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THREE OVULIDS (GASTROPODA: OVULIDAE) FROM SOUTHERN TAIWAN

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Shi-Kuei Wu, Chung-Chi Chen and Kun-Hsiung Chang (1990) Three ovulids (Gastropoda: Ovulidae) from southern Taiwan. *Bull. Inst. Zool., Academia Sinica* **29**(4): 273-282. Three ovulids are found to associate with gorgonians in southern Taiwan. These ovulids are *Prosimnia semperi* (Weinkauff), *Hiata coarctata* (Adams & Reeve) and *Primovula dentata* (Adams & Reeve). Among these, *H. coarctata* and *P. detata* are new records from Taiwan. A systematic account and remarks of ovulids are presented and supplemented with a description of the host gorgonians.

Key words: Ovulids, Gastropoda, Systematic account, Gorgonians.

The ovulids are usually found living on gorgonians, on sea fans (including sea whips), on various species of kelp, and even occasionally on algae-covered substrate (Cate, 1973). In our study of gorgonaceans of southern Taiwan, two of us (Chen and Chang) have collected gorgonaceans and their ovulid gastropod commensals. Three species of ovulids are found to associate with gorgonaceans, namely *Prosimnia semperi* (Weinkauff), *Hiata coarctata* (Adams & Reeve) and *Primovula dentata* (Adams & Reeve). *Prosimnia semperi* (Weinkauff) has been previously reported by Cate (1973); however, *H. coarctata* (Adams & Reeve) and *P. dentata* (Adams & Reeve) are recorded here as a first record from Taiwan.

MATERIALS AND METHODS

The gorgonaceans and ovulid snails were collected by SCUBA within depths of 30 meters from Hsiashuiku south to Maupitou and east to Oluanpi in southern Taiwan (Fig. 1). The underwater photographs were taken with a Nikonos IV-A camera and Nikonos SB120 flash.

The classification of the Family Ovulidae used below and usage of terminology follows Cate's (1973) systematic revision of the recent Ovulidae. The shell photomicrographs were taken with a M5 Wild Dissecting Microscope and MPS15/11 Semiphotomat. The only available radula of *Primovula dentata* was prepared according to the method described by Wu (1965). All drawings

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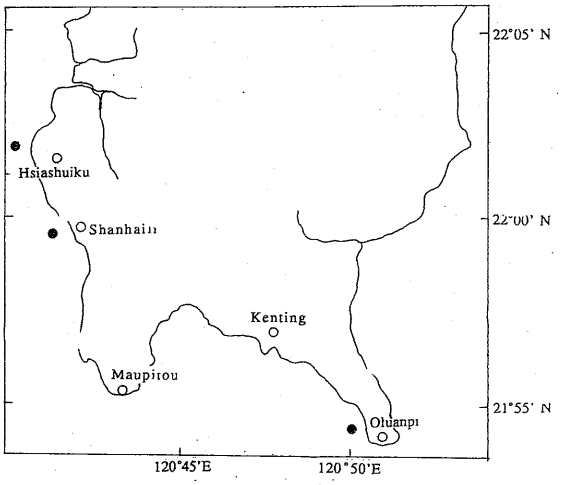


Fig. 1. Map of southern Taiwan: black circles indicate the collecting sites.

except Fig. 1 were made with the aid of the camera lucida on a M5 Wild Dissecting Microscope.

In general, Wu is responsible for the taxonomic and radular description and Chen and Chang are responsible for collecting the information, host data and for photographing the living animals.

RESULTS

HOST SPECIES

Mopsella aurantia (Esper) (Fig. 2): The colony is dichotomously branched and is fan-shaped, perpendiculary orientated to the current direction, reaching 17.6 cm in height and 11.3 cm in width. The polyps are whitish in color; the coenenchyme is thin and has a red axis (Chen, 1986). The colony occurs either on the top or sides of reef block or knoll at a depth of 3 to 10 meters. The symbionts are: *Prosimnia semperi* (Weinkauff) and brittle-stars, *Ophiothela danae* Verril (Chen, 1986).

Verrucella umbraculum (Ellis & Solander) (Fig. 3): The colony occurs on the side of reef block or knoll at a depth below 10 meters. The substrate between reef blocks is muddy and sandy. It branches in one plane, flabelliform, usually anastomosing. It reaches 25.7 cm in height and 23.5 cm in width. The stem is short (about 2.5 cm in length); the round stem and axis are 4.8 mm and 4.2 mm in diameters, respectively; the branchelets are dorso-ventrally compressed. The coenenchyme and calyces are orange; the stem and axis are olive and the branchelet axis are white in color. The symbionts are: 2 *Hiata coarctata* (Adams & Reeve) and 1,464 brittlestars, *Ophithola danae* Verril (Chen, 1986).

Ellisella robusta (Simpson) (Fig. 4): The colony occurs on a sand and gravel bottom on a limestone belt patch. The colony is usually solitary and is bushy and branched, reaching 23.8–30.3 cm in height and 8.9–9.8 cm in width. The calyces and coenenchyme are brick-red and the polyps are white in color. The symbiont is *Hiata coarctata* (Adams & Reeve) (Chen, 1986).

Euplexaura sp. (Fig. 5): The colony occurs on the surface of a reef knoll, covered with algae, sponges, tunicates and some branching and encrusting stony corals. It is bushy, forming a profusely branched clump and reaches 23 cm in height and 24.5 cm in diameters. The calyces are implanted on all sides of the stem and branches. The live colony is light buffy brown in color. The symbiont is *Primovula dentata* (Adams & Reeve).

TAXONOMY

Family Ovulidae

Genus *Prosimnia* Schilder, 1927

The shell is cylindrically elongated, with broad terminal ends. There are transverse angular ridges over the dorsum at either end of the body whorl, a subserrated outer lip, and an uneven, subgranulose shell surface (Cate, 1973).

***Prosimnia semperi* (Weinkauff, 1881)**

(Figs. 2, 6-8)

The shell (Figs. 2, 6-8) is narrowly

Fig. 2. *Prosimnia semperi* (Weinkauff) and its host, *Mopsella aurantia* (Esper). (Scale=1 cm)

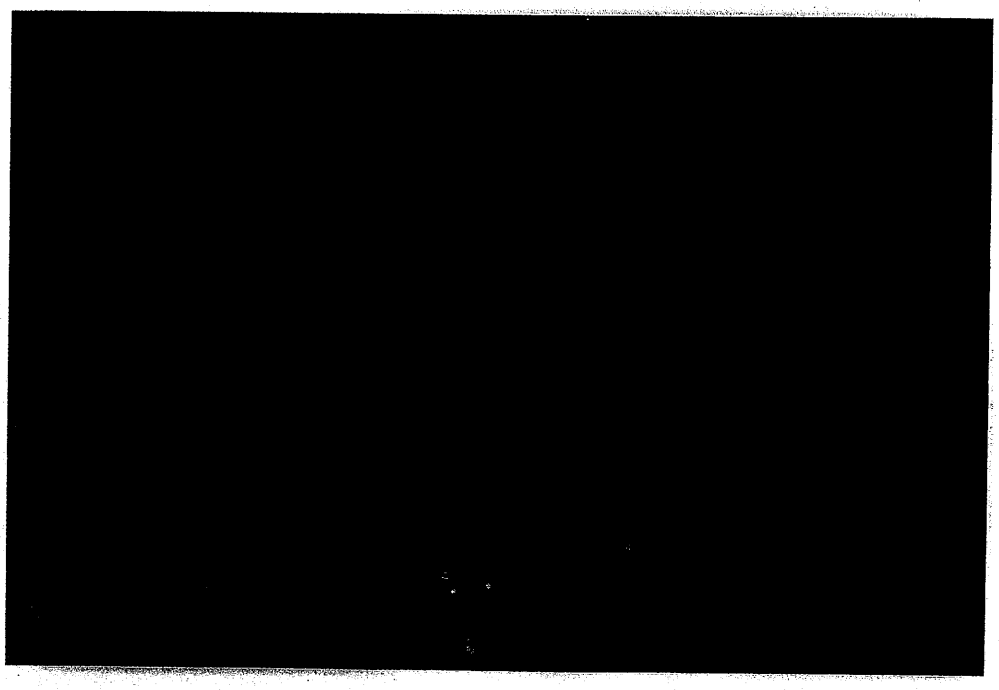


Fig. 3. *Hiata coarctata* (Adams & Reeve) and its host, *Verrucella umbraculum* (Ellis & Solander). (Scale=1 cm)

Fig. 4. *Ellisella robusta* (*Simpson*).

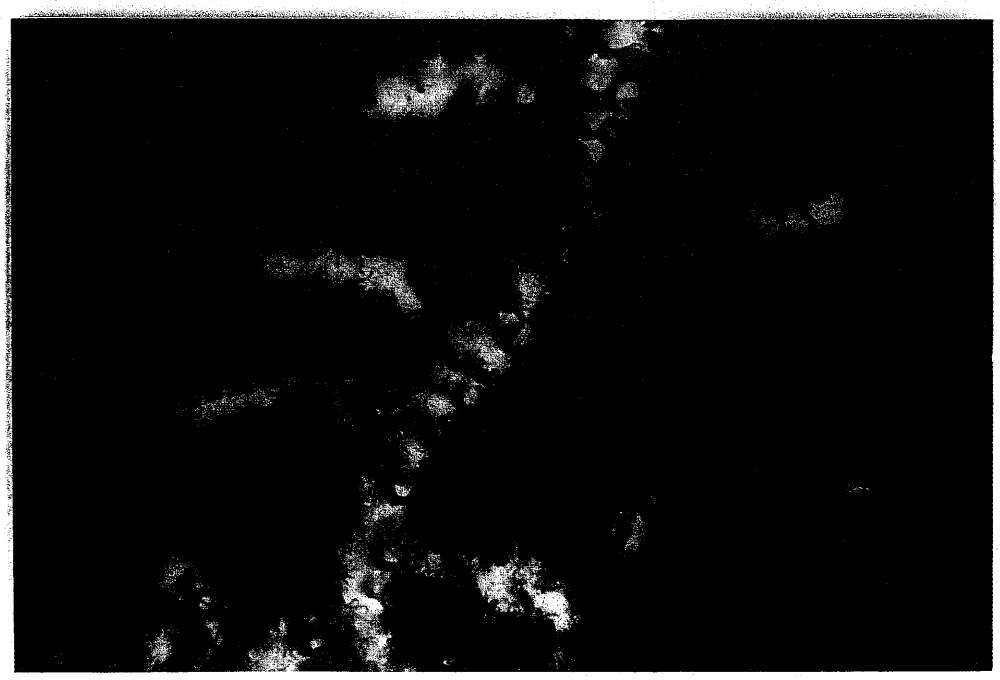
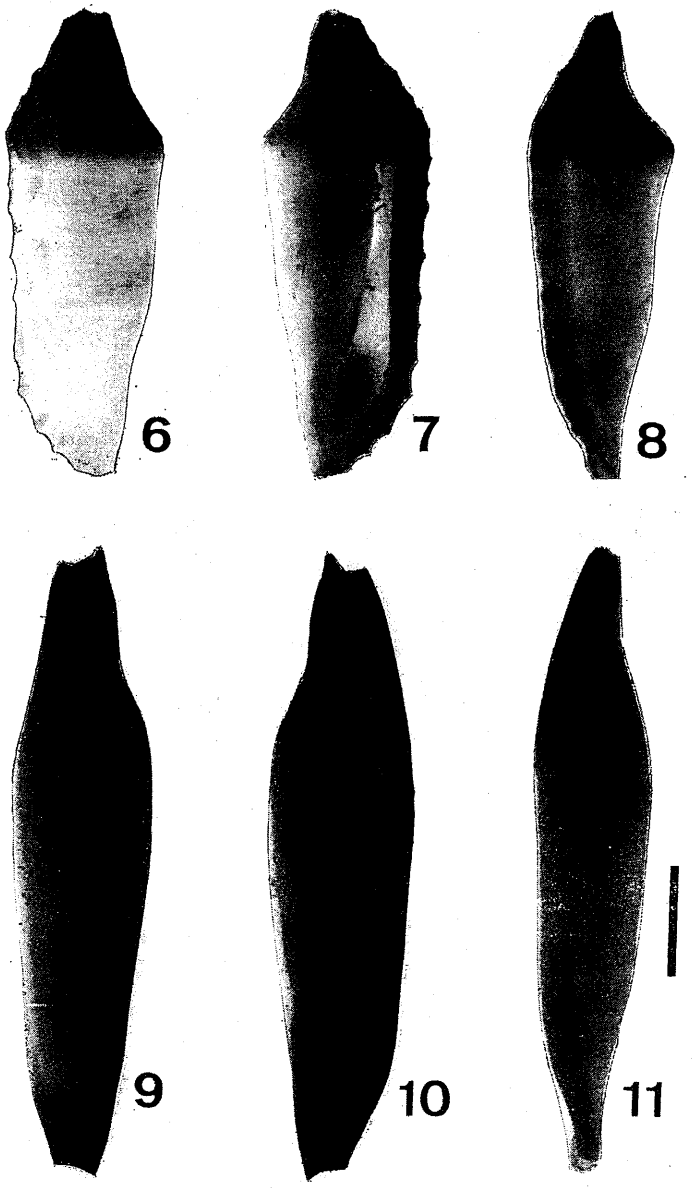


Fig. 5. *Euplexaura* sp.

elongated and cylindrical, with a transverse angular, more or less tuberculated ridge, about 1/4 the shell length from the apical (posterior) terminal end. The surface has transversely incised striations with indistinct longitudinal growth lines. Both abapical (anterior) and apical terminal ends are open and truncated. The apical end of the columella (funicular area) has 6-7 transverse ridges, while the abapical half has white, short fossula which disappear at the mid-portion and are bent slightly toward the left at the apical portion. The outer lip is flat, thick and crenulated along its entirety. The ground color of the shell is red-brown,



Figs. 6-11. *Prosimnia semperi* (Weinkauff) and *Hiata coarctata* (Adams & Reeve): 6-8, Dorsal, ventral and left side views of *P. semperi*. 9-11, Dorsal, ventral and left side views of ***Hiata coarctata*** (Adams & Reeve) (Scale=2 mm). (Scales of Figs. 6-10 are at Fig. 11).

except for two yellow bands around the shell, and the yellowish mid-portion of the outer lip.

Materials Examined: Pingtung Hsien, Shanhaili (Lat. 21° 59.3′N, Long. 120° 41.4′E), depth 9–12 m, 3 December 1985, 1 specimen (UCM No. 33214).

Measurements: Shell Length (SL) 8 mm, shell width (SW) 2.7 mm, shell height (SH) 2.2 mm.

Host: Mopsella aurantia (Esper) (Fig. 2).

General distribution: Northern half of Western Australia (Exmouth Gulf); Queensland coast of Eastern Australia; East Indies, Central Pacific Islands, East coast of Asia (from Sulu Sea, Philippines, Taiwan, Ryukyu and Japan) (Cate, 1973), South China Sea, West Sand Island (Ma, 1986).

Remarks: Cate's (1973) opinion was that this is apparently an extremely variable species in shell morphology, seeming to vary from one population to another, frequently even within the same locality. Yet Cate provisionally recognized two new subspecies, namely *boshuensis* from Japan and *draconis* from Palau Island and Caroline Islands. Since morphological differences are not distinct among his 3 subspecies, and they are not allopatric, we do not believe subspecies status is warranted.

Genus *Hiata* Cata, 1973

The shell of this genus are notable for their open terminal canal endings, and their straight or nearly straight shell apertures; otherwise, the shells are long and narrowly subcylindrical (Cate, 1973).

Hiata coarctata (Adams & Reeve, 1848)

(Figs. 3-4, 9-12)

The shell (Figs. 3, 9-11) is lanceolate and cylindrical, gradually attenuated at both ends, which are open and truncated. The surface of the shell is glossy and truncated, and has transversely incised striations which are crossed by longitudinal growth lines. The aperture is almost straight; it is widest at the abapical portion and narrows apically (Fig. 10). The columellar side of the aperture (the fossular area) has an adaxial longitudinal carinal ridge. The outer lip is smooth and thick. The marginal callus is not distinct. The shell is uniformly orange-red in color.

Mantle (Fig. 12): Mantle is decorated with a regularly spaced circular tentacular crown papillae.

Materials Examined: Pingtung Hsien, Hsiashuiku (Lat. 22° 01.9′N, Long. 120° 41.4′E), depth 15–18 m, 7 December 1985, 3 specimens (UCM No. 33215); depth 20 m, 15 March 1989, 1 specimen (UCM No. 34729).

Host: Verrucella umbraculum (Ellis & Solander) (Fig. 3)
Ellisella robusta (Simpson) (Fig. 4)

Measurements: UCM No. 33215: SL 12, 11, and 10 mm, SW 2.4, 2.7 and 2.2 mm, SH 2.3, 2.1 and 1.9 mm, respectively. UCM No. 34729: SL 14.5 mm, SW 3.2 mm, SH 2.9 mm.

General distribution: Straits of Sunda near Java (Cate, 1973) and southern Taiwan (this paper).

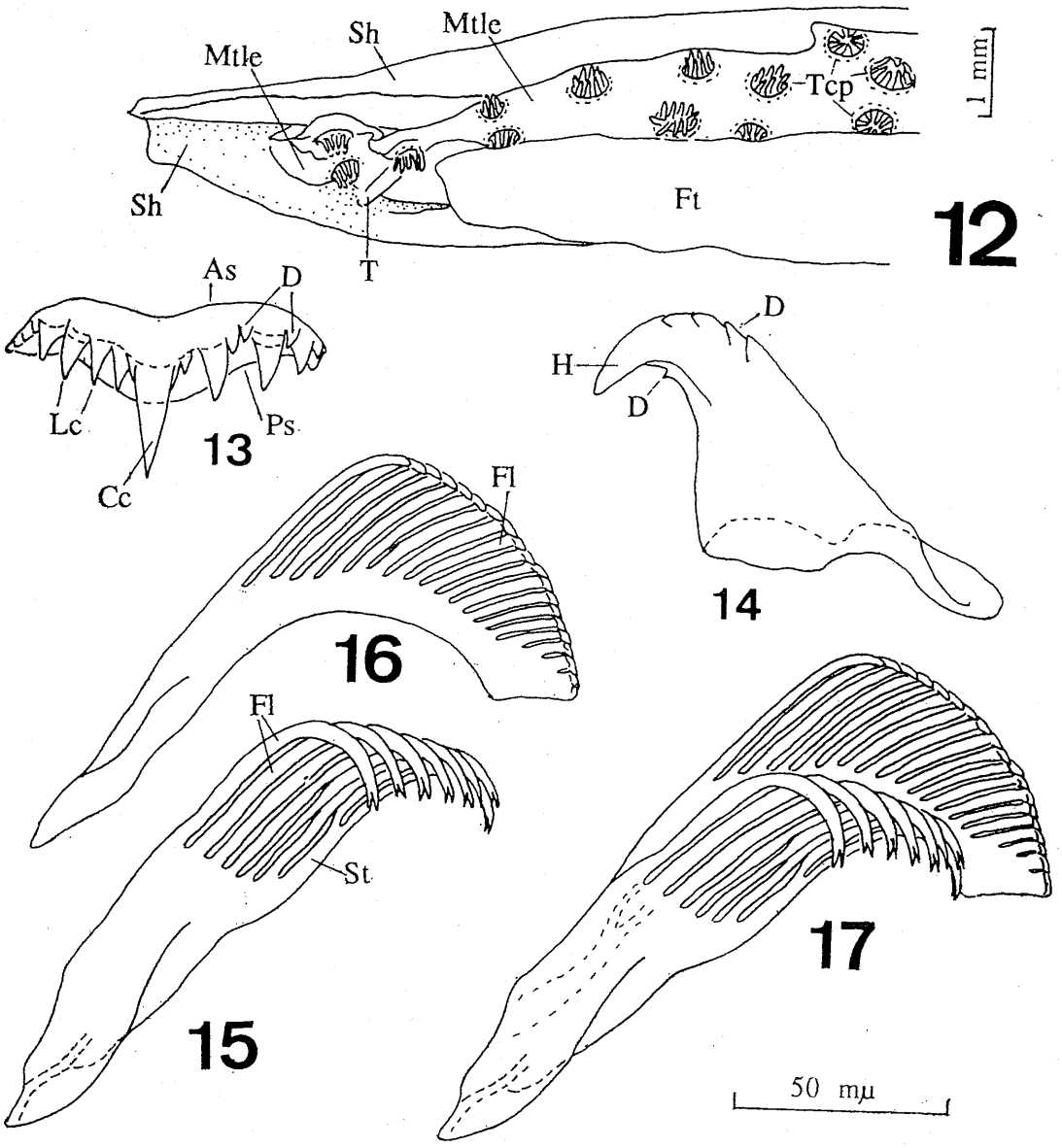
Genus *Primovula* Thiele, 1925

The shells are small, pyriform, with narrow apertures. The outer lip is distinctly thickend and denticulated. The funiculum is distinctly and fully developed (Thiele, 1925; Cate, 1973).

Primovula dentata (Adams & Reeve, 1884)

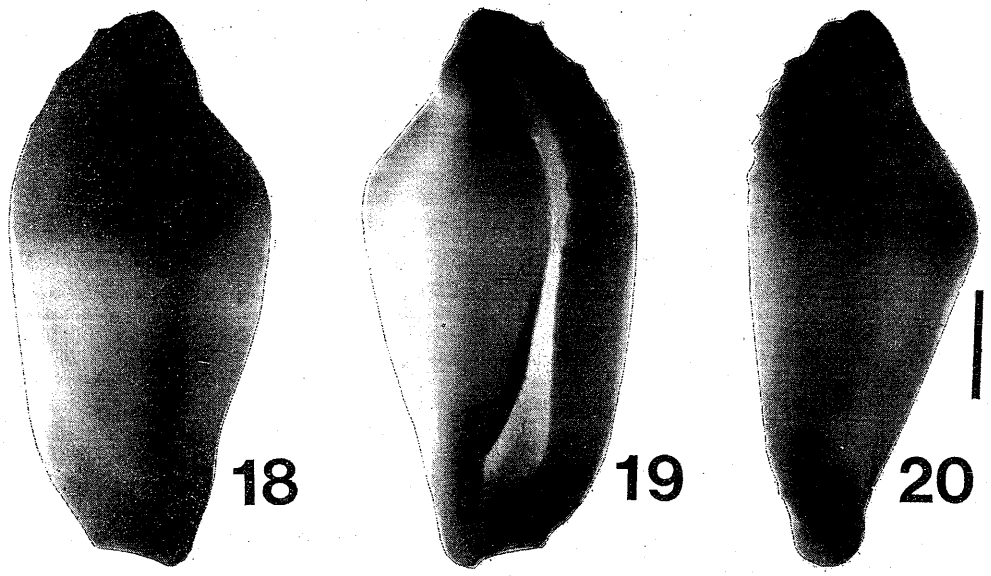
(Figs. 5, 13-20)

The shell (Figs. 18-20) is fusiform and thick. The dorsum is humped and transversely angulated at one-third the shell length from the apical terminal end. The



Figs. 12-17. The anterior half of *Hiata coarctata* (Adams & Reeve) and the radula of *Primovula dentata* (Adams & Reeve): 12, ventral and left side views of *H. coarctata*, showing reflected mantle with circular tentacular crowns, tentacle and foot (Scale=1 mm). 13, the 41st central tooth; 14, lateral tooth; 15, inner marginal teeth; 16, outer marginal tooth; 17, inner and outer marginal teeth in natural position (Scale=50 μm) (Scales of Figs. 13-15 are at Fig. 16). Abbreviations: As, anterior side of central tooth; Cc, central cusp; D, denticles; Fl, flabella; Ft, foot; H, hook; Mtle, mantle; Lc, lateral cusp; Ps, posterior side of central tooth; Sh, shell; St, stalk of flabella; T, tentacle; Tcp, tentacular crown papilla.

dorsal surface is finely transversely striated. The ventral side is inflated and is also finely transversely striated, but it is covered by a translucent callus. The aperture (Fig. 19) is slightly curved at both abapical (anterior) and apical (posterior) ends, and is widest at the abapical end. The abapical terminal end



Figs. 18-20. *Primovula detata* (Adams & Reeve): Dorsal, ventral and left side views (Scale=2 mm). (Scales of Figs. 18-19 are at Fig. 20)

is open and obliquely truncated, while the apical end is open and round. The apical end of the columella forms a distinct funiculum with 2-3 ridges, while the abapical half has a longitudinal adaxial carinal ridge (fossula). The outer lip is flat, broad and thickened with 7-8 transverse low ridges and is crenulated along the inner (7-8) and outer (4) edges at its posterior half. The ground color of the shell is whitish-purple, except for the funiculum, which is tinged with orange. The round, transversely angular ridge at the dorsum, the columella, and the fossula and outer lip are whitish in color.

Radula: The single radular specimen (10 mm in SL) examined had 103 transverse rows (including nascent rows). The width of the central tooth (Fig. 13) is 80 μm. It has a markedly long central cusp, which is flanked by 6-8 shorter lateral cusps on both sides. A small denticle is always presented on both sides of the central cusp, and denticles are irregularly presented between more medially located lateral cusps. The posterior side of the central tooth is round and the anterior side of the central tooth is concaved in the middled. The lateral tooth (Fig. 14) has a spatulate base with a recurved narrow hook, which is flanked by 5-6 denticles on both sides. The inner marginal tooth (Figs. 15, 17) has 8 hooked flabellae, all of which are bifurcated at their terminal tips. The outermost 2 flabellae are actually branching out from the same stalk. The outer marginal tooth (Figs. 16, 17) has a rather regular base from which about 20 weakly bifurcated flabellae fan out.

Materials Examineds: Pingtung Hsien-Oluanpi near Light House (Lat. 21° 54.2′N, Long. 120° 50′E), depth 15 m, 2 specimens; 11 August 1986 (UCM No. 33216).

Measruements: SL 13.3 and 10 mm, SW 6.3 and 4.9 mm, SH 5.4 and 4.1 mm, respectively.

Host: Euplexaura sp. (Fig. 5)

Genaral Distribution: Japan (Cate, 1973), Philippines (Cate, 1973; Springsteen & Leobrera, 1986), and Taiwan (this paper).

Remarks: Our specimens agree best with Cate's description (1973) of *Crenavolva cuspis* from Kii Channel, Japan, but they also agree well with Cate's *C. rosewateri* from Jole Island, Philippines. They also agree with the figures of Cate (1973, fig. 103) for the type of *Ovulum dentatum* Adams & Reeve, and those of Tryon (1885, figs. 79-80) for *Ovula dentata.* The latter species was unfortunately united together with *O. dorsuosum* under the name *O. striatula* Sowerby (1828), by Tryon (1885). Our specimens also agree with Yamamoto's (1971) description on *Primovula tigris* from off Yuzaki, Sirahama, Japan, except for shell coloration and mantle pattern. Habe (1961) figured this species (pl. 19, fig. 4), but identified it as *P. formosa* (Adams & Reeve). Springsteen & Leobrera (1986) figured this species (pl. 25, fig. 13), but only identified it as *Dentiovula* sp.

Cate (1973) illustrated (fig. 106) the type of *Ovulum dentatum* Adams & Reeve and questionably synonymized it under the species *Prosimnia renovata* Iredale (1930) merely based on Iredale's explanation, "Schilder separates the subfamily Amphiperatinae into two tribes ("subgenera" would be a better name) and, under the European genus *Simnia,* proposes a subgenus, *Prosimnia,* with a type *semperi* Weinkauff, a group of small elongated species including *dentata* Adams & Reeve from Australia. As Adams and Reeve's choice had been anticipated the new name *Prosimnia renovata* is proposed." Cate's (1973) fig. 103 for *Crenavolva renovata* and fig. 106 for *Ovula dentata* are two different species. The authors consider *O. dentata* to be a valid species and *Crenavolva rosewateri* and *C. cuspis* to be conspecific. *Ovula dentata* is closely related to both *P. dorsuosa* (Hinds, 1844) from the Straits of Malacca and *P. formosa* (Adams & Reeve, 1848) from the east coast of Borneo. However, *P. dorsuosa* is shorter and broader, and *P. formosa* is narrower, than this species. Cate (1973) also discussed the differences between *C. cuspis* and *C. formosa.*

The radular morphology of this species (Figs. 13-17) agrees with that of *Primovula diaphana* (Liltved, 1987).

The host species of this species is the same as that of *Primovula tigris* (Yamamoto, 1971) on the gorgonoid octocoral genus *Euplexaura.*

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南臺灣產三種海兎螺

吳錫圭　陳仲吉　張崑雄

本文描述棲息於南臺灣海域角珊瑚上的三種海兎螺。這三種分別是桶形前凹螺 *Prosimnia semperi* (Weinkauff)，端正縫口螺 *Hiata coarctata* (Adams & Reeve) 和尖突原梭螺 *Primovula dentata* (Adams & Reeve)。其中端正縫口螺 (*H. coarctata*) 和尖突原梭螺 (*P. dentata*) 爲臺灣地區的新記錄種。描述內容包括海兎螺個體的特徵，海兎螺所棲息的角珊瑚及尖突原梭螺 (*P. dentata*) 齒舌的細部構造等等。