

# The Shallow-water Echinoderms from Lanyu, Taiwan

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**Abstract.** In April 1997, echinoderms were collected for 10 days by scuba and snorkeling from Lanyu (22° 05'N, 121° 30'E), southeast of Taiwan. A total of 39 species in 19 families of shallow water echinoderms were collected. Among these, 13 species are new records from the island. The seastar *Valvaster striatus* (Lamarck), sea cucumber *Stichopus noctivagus* Cherbouner and a brittle star *Ophionereis porrecta* Lyman are new records for Taiwan. To date, a total of 47 species in 20 families of echinoderms are now reported from Lanyu.

**Key words:** Echinoderms, Fauna, Taiwan.

## INTRODUCTION

Lanyu (or Orchid island) (22° 05'N, 121° 30'E) is a small volcanic island of ca. 46 km<sup>2</sup> in area, reaching 548 m in elevation, and is located 60 km away from the coast of Taiwan (Fig. 1) and 390 km north of Luzon Island, the Philippines. The western and southern coast of the island is bordered by narrow fringing reefs. These coasts have intertidal zones covered by thin limestone rocks. Several sandy bays and beaches are located on the western coast. Although the eastern and northern coasts are composed of black volcanic rocks, and affected by surf wave action in autumn and winter, no reefs are found. In general, the intertidal zone of this island is narrow with poor developed limestone rocks, especially on the eastern and northern coasts.

The subtidal zone, less than 10 m in depth, is also narrow. Near the shore, the substrate falls abruptly to more than 10 m depth. On the northern and eastern coasts, at depth less than 5 m, the substrates are composed major by hard volcanic rocks. Over 5 m depth, stones usually cover the substrate. On the western and southern coasts, scleractinian corals flourish from the low tide mark to 5 m depth. Deeper than 5 m, sandy and stony substrates were found.

Neither terrestrial nor marine ecosystems are thoroughly investigated, primarily because access

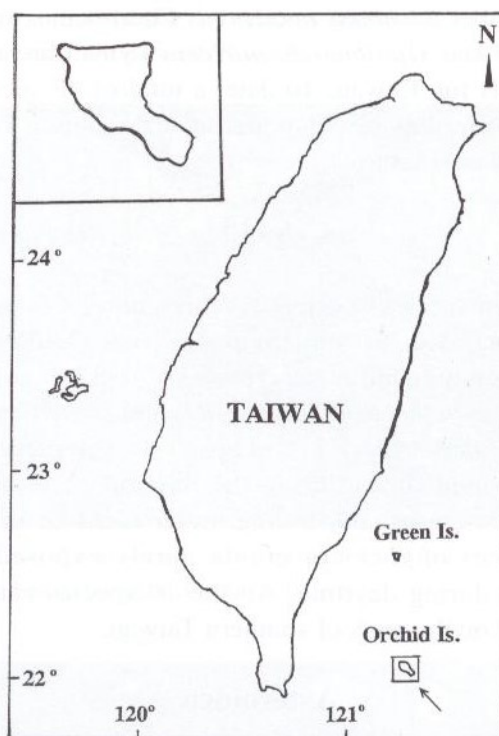


Fig. 1. Map showing Lanyu (Orchid Is.).

to the island is limited. There are very few studies on the fauna and flora from this island, especially on marine creatures. Echinoderms are common invertebrates off the coast of Lanyu. Only few papers (Applegate, 1984; Chao, 1986; Chang, et al., 1989; Chao, 1999) have documented the 18 species recorded from this island (Table 1). To date, no study has focused on the animals from this island.

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## MATERIALS AND METHODS

In April 1997, shallow water echinoderms were collected for 10 days by the staff of the National Museum of Natural Science, Taichung, Taiwan. Animals were captured by daytime scuba diving to depths of 20 meters. Snorkeling and collections from the intertidal zone were done both day and night during low tides. Animals were relaxed and soaked in 10%  $MgCl_2$  for about 3 hours before being transferred to 10% formalin for 1 day. Specimens were preserved in 70% alcohol, and deposited in the National Museum of Natural Science.

## RESULTS AND DISCUSSIONS

A total of 39 species in 19 families of shallow water (< 20 m depth) echinoderms were collected. Among these, 13 are new records from the island. The seastar *Valvaster striatus* (Lamarck), sea cucumber *Stichopus noctivagus* Cherbonnier and a brittle star *Ophionereis porrecta* Lyman are new records for Taiwan. To date, a total of 47 species in 20 families of echinoderms are reported from this island (Table 1).

### Crinoidea

Ten species of crinoids representing 4 families are recorded. *Comanthus parvicirrus* (Müller) is commonly found in the crevices of rocks or corals. *Oxycomanthus bennetti* (Müller) and *Himerometra magnipinna* Clark are exposed on scleractinian corals and rocks during the daytime. The other species are usually hiding under rocks or in the crevices of rocks or corals, rarely exposed on rocks during daytime. All the 10 species can be found on the reefs of southern Taiwan.

### Asteroidea

*Linckia multifora* (Lamarck) is common and occurs at 1-5 m depth (Fig. 2). All encountered individuals were in regeneration status. Without stable populations, the other five species occurred sporadically. *Leiaster glaber* recorded from this island by Applegate (1984) is confirmed to be *Leiaster speciosus* (Chao, 1999; Chao, et al., 1990). Only one *Valvaster striatus* (Lamarck) was collected from the undersides of rocks at 5 m depth (Fig. 3). This species has not been reported from the coast of Taiwan, but it has a wide

distribution from the Mascarene Islands to New-Caledonia, the Philippine Islands, Hawaii and Cook Is. (Fisher, 1906; Clark and Rowe, 1971; Marsh, 1974; Guille, et al., 1986). Few individuals of the crown-of thorns starfish, *Acanthaster planci* (Linnaeus) were found. It is rare on the island. Except for *V. striatus* and *Neoferdina insolita* Livingstone (Fig. 4), these species also occur in southern Taiwan.



Fig. 2. *Linckia multifora* (Lamarck). R (from disc center to arm tip) = 3.5 cm.



Fig. 3. *Valvaster striatus* (Lamarck). R = 2.6 cm.

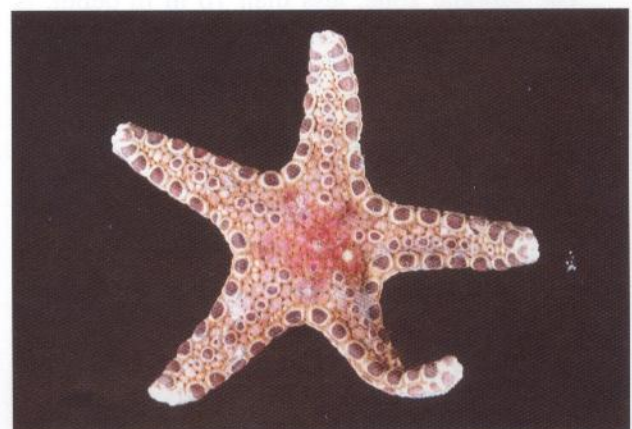


Fig. 4. *Neoferdina insolita* Livingstone. R = 2.3 cm.



## Ophiuroidea

*Ophiocoma scolopendrina* (Lamarck) occurs in the crevices of rocks at the intertidal, but not in the dense aggregations as those found in southern Taiwan. The pink brittle star, *Ophiomastix annulosa* (Lamarck), is common hiding in the crevices of rock at 1-3 m deep. They always extend 2-3 arms to whip the water to collect food. *Ophiocoma pica* Müller & Troschel are common in the crevices of the scleractinian corals *Acropora* and *Pocillopora*. From 3 to 10 m depth, *O. dentate* Müller & Troschel is abundant under the stone and pebbles. Collected under a rock at 2 m depth, *Ophionereis porrecta* Lyman is also a new record from nearby Taiwan Island (Fig. 5). *Ophiocoma brevipes* Peters and *O. erinaceus* Müller & Troschel (Fig. 6) were found under rocks and stones at 2-8 meters depth. Except for *Ophionereis porrecta*, all of these brittle stars also occur in southern Taiwan.



Fig. 5. *Ophionereis porrecta* Lyman. Disc diameter = 1.8 cm.



Fig. 6. *Ophiocoma erinaceus* Muller et Troschel. Disc diameter = 1.5 cm.

## Echinoidea

*Echinometra mathaei* (de Blainville) are common at the surf low tide line. *Tripneustes gratilla* (Linnaeus) were occasionally found in harbor walls. At the surf low tide line of the northern and eastern coast, *Colobocentrotus mertensii* Brandt is abundant (Fig. 7). Its gonads are commonly harvested by the Yamae aboriginal. When I first visited this island in 1983, the slate pencil urchin, *Heterocentrotus mammillatus* (Linnaeus), was common on the island. The Yamae aboriginal use its spines to make necklaces. It is quite rare at present, only one individual was found during this field survey. Chang et al. (1989) recorded *Echinostrephus aciculatus* A. Agassiz as common to the island, but we could not find any. *Echinostrephus molaris* (de Blainville), however, were common in the holes or crevices of rocks at 2-5 m deep (Fig. 8). Therefore, I suspect *E. aciculatus* reported by Chang et al. (1989) to be *E. molaris*. All of the 14 species found on the island occur on the coast of Taiwan.



Fig. 7. *Colobocentrotus mertensii* Brandt. H. d. (horizontal diameter of test) = 3.7 cm.



Fig. 8. *Echinostrephus molaris* (de Blainville). H. d. = 3.5 cm.



## Holothuroidea

In the tropical and subtropical areas, sea cucumbers usually occur at the intertidal and subtidal and subtidal zones less than 5 m deep. Sea cucumbers are not common at Lanyu probably due to the wave action and the small intertidal zone. The two holothurians common to reef areas, *Holothuria atra* Jaeger and *Holothuria leucospilota* (Brandt), are rare on the island. Most of the sea cucumbers are found in harbors or small bays where there is little current or wave action, such as *H. pervicax* Selenka (Fig. 9). *Holothuria cinerascens* (Brandt) are common in the crevices of rocks at the low tide line. *Thelenota ananas* (Jaeger) (Fig. 10) were once found on this island and were found several times from the northern Green Island (Fig. 1), but there are no stable populations at either site. Except for *T. ananas* and *Stichopus noctivagus* Cherbouner (Fig. 11), the other 8 holothurians occur on the reefs of southern Taiwan. *S. noctivagus* also is a new record from the water off Taiwan.



Fig. 9. *Holothuria pervicax* Selenka. L = 18 cm.



Fig. 10. *Thelenota ananas* (Jaeger). L = 40 cm.



Fig. 11. *Stichopus noctivagus* Cherbouner. L = 20 cm.

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Table 1. Records of echinoderms from Lanyu.

Taxa	Abundance	Source
<b>ECHINODERMATA 棘皮動物門</b>		
<b>CRINOIDEA 海百合綱</b>		
<b>COMASTERIDAE 櫛羽星科</b>		
<i>Comanthus parvicirrus</i> (Müller 1841) 小卷海齒花	C	2, t
<i>Comanthina schlegelii</i> (Carpenter 1888) 許氏大羽花	R	2, t
<i>Comatella nigra</i> (Carpenter 1888) 黑櫛羽球	R	2
<i>C. maculata</i> (Carpenter 1888) 斑櫛羽球	R	2
<i>Comaster multifidus</i> (Müller 1841) 多環櫛羽球	R	2
* <i>Oxycomanthus bennetti</i> (Müller 1841) 本氏海齒花	C	t
<b>COLOBOMETRIDAE 短羽枝科</b>		
<i>Colobometra perspinosa</i> (Carpenter 1881) 餘刺短羽枝	R	2
<i>Oligometra serripinna</i> (Carpenter 1881) 鋸刺寡羽枝	R	2
<b>HIMEROMETRIDAE 美羽枝科</b>		
<i>Himerometra magnipinna</i> A. H. Clark 1908 巨翅美羽枝	R	2, t
<b>ZYGOMETRIDAE 櫛羽枝科</b>		
* <i>Catoptometra magnifica</i> (A. H. Clark 1908) 巨彩羽枝	R	t
<b>ASTEROIDEA 海星綱</b>		
<b>ACANTHASTERIDAE 長棘海星科</b>		
<i>Acanthaster planci</i> (Linnaeus 1758) 棘冠海星	R	2, t
<b>OPHIDIASTERIDAE 蛇星科</b>		
<i>Leiaster speciosus</i> von Martens 1866 麗紅蛇星	R	3, t
<i>Linckia laevigata</i> (Linnaeus 1758) 藍指海星	R	1, t
<i>L. multifora</i> (Lamarck 1816) 多節指海星	O	3, t
<i>Neoferdina insolita</i> Livingstone 1936 棕綠蛇星	R	3, t
<b>ASTEROPSEIDAE 瓣海星科</b>		
* <i>Valvaster striatus</i> (Lamarck 1816) 條紋瓣海星	R	t
<b>OPHIUROIDEA 蛇尾綱</b>		
<b>OPHIOCOMIDAE 櫛蛇尾科</b>		
<i>Ophiocoma brevipes</i> Peters 1851 短腕櫛蛇尾	O	2, t
<i>O. dentata</i> Müller & Troschel 1842 齒櫛蛇尾	A	2, t
* <i>O. erinaceus</i> Müller et Troschel 1842 黑櫛蛇尾	R	t
<i>O. pica</i> Müller & Troschel 1842 畫櫛蛇尾	C	2, t
<i>O. scolopendrina</i> (Lamarck 1816) 蜈蚣櫛蛇尾	C	2, t
<i>Ophiomastix annulosa</i> (Lamarck 1816) 環棘鞭蛇尾	A	1, 2, t
<b>OPHIONEREIDIDAE 蝨蛇尾科</b>		
* <i>Ophionereis porrecta</i> Lyman 1860 韭廣蛇尾	R	t
<b>OPHIODERMATIDAE 皮蛇尾科</b>		
<i>Ophiarachnella gorgonia</i> (Müller & Troschel 1842) 綠蛛蛇尾	R	2, t
<b>ECHINOIDEA 海膽綱</b>		
<b>CIDARIDAE 頭帕科</b>		
* <i>Eucidaris metularia</i> (Lamarck 1816) 冠棘真頭帕	R	t
<b>DIADEMATIDAE 冠海膽科</b>		
<i>Chaetodiadema granulatum</i> Mortensen 1903 粒狀毛冠海膽	R	1

Table 1. Continued

Taxa	Abundance	Source
* <i>Diadema savignyi</i> (Michelin 1845) 沙氏冠海膽	O	t
<i>D. setosum</i> (Leske 1778) 刺星海膽	R	1, 2
<i>Echinothrix calamaris</i> (Pallas 1774) 環刺棘海膽	R	1, 2, t
<i>E. diadema</i> (Linnaeus 1758) 冠刺棘海膽	R	1, 2, t
<b>ECHINOMETRIDAE 長毒海膽科</b>		
<i>Colobocentrotus mertensii</i> Brandt 1835 陣笠海膽	A	4, t
<i>Heterocentrotus mammillatus</i> (Linnaeus 1758) 鉛筆海膽	R	1, 2, t
<i>Echinometra mathaei</i> (de Blainville 1825) 梅氏長海膽	A	1, 2, t
<i>Echinostrephus aciculatus</i> A. Agassiz 1863 白尖紫叢海膽	O	2
* <i>E. molaris</i> (de Blainville 1825) 紫叢海膽	O	t
<b>STOMOPNEUSTIDAE 口鰓海膽科</b>		
<i>Stomopneustes variolaris</i> (Lamarck 1816) 口鰓海膽	R	1, 2, t
<b>TOXOPNEUSTIDAE 毒棘海膽科</b>		
* <i>Tripneustes gratilla</i> (Linnaeus 1758) 白棘三列海膽	O	t
<b>CLYPEASTERIDAE 楯海膽科</b>		
* <i>Clypeaster reticulatus</i> (Linnaeus 1758) 網楯海膽	R	t
<b>HOLOTHUROIDEA 海參綱</b>		
<b>HOLOTHURIIDAE 海參科</b>		
<i>Actinopyga mauritiana</i> (Quoy & Gaimard 1833) 白底輻肛參	R	2, t
<i>Holothuria leucospilota</i> (Brandt 1835) 蕩皮參	R	2, t
<i>H. atra</i> Jaeger 1833 黑海參	R	2, t
* <i>H. cinerascens</i> (Brandt 1835) 黑刺星參	C	t
* <i>H. pervicax</i> Selenkal 1867 虎紋參	R	t
<b>STICHOPODIDAE 刺參科</b>		
* <i>Stichopus noctivagus</i> Cherbonnier 1980 夜行刺參	R	t
<i>Thelenota ananas</i> (Jaeger 1833) 梅花參	R	2, t
<b>SYNAPTIDAE 錨參科</b>		
<i>Synapta maculata</i> (Chamisso & Eysenhardt 1821) 斑錨參	R	2, t
<b>CHIRIDOTIDAE 指參科</b>		
<i>Polycheira fusca</i> (Quoy & Gaimard 1833) 紫輪參	R	2, t

The symbol "\*" represent new records from Lanyu. A = abundant, C = common, O = occasional, R = rare; t = this report, 1 = Applegate (1984), 2 = Chang et al. (1989), 3 = Chao (1999), 4 = Chao and Lee (2001).

# 蘭嶼的棘皮動物

趙世民

國立自然科學博物館動物學組

本文記載在1997年4月在蘭嶼採獲的19科39種水深20公尺以內的棘皮動物，其中13種是蘭嶼新紀錄種。條紋瓣海星 *Valvaster striatus* (Lamarck)，夜行刺參 *Stichopus noctivagus* Cherbonnier 及韭廣蛇尾 *Ophionereis porrecta* Lyman 也是三種臺灣海域的新紀錄種。本文並回顧及表列蘭嶼產20科47種棘皮動物，文中也提及這些棘皮動物的豐富度。

關鍵詞：棘皮動物，動物誌，臺灣。