Three New Records of Auger Shells (Mollusca: Gastropoda: Terebridae) from Taiwan

Chia-Feng Chang[1], Chih-Ying Lin[2], and Ming-Hui Chen[3,*]

[1]Institute of Marine Biodiversity and Evolution, National Dong Hwa University, Checheng, Pingtung, Taiwan 944, R.O.C.

[2]Department of Life Science, National Tsing Hua University, Hsinchu, Taiwan 300, R.O.C.

[3]Department of Biology, National Museum of Marine Biology and Aquarium, Checheng, Pingtung, 944, Taiwan, R.O.C.

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Abstract. Individuals of three species, *Hastula lanceata* (Linnaeus, 1767), *H. solida* (Deshayes, 1857), and *Terebra guttata* (Roeding, 1798), belonging the family Terebridae were collected from southern Taiwan. In the present study, we report the first records of the above three species from Taiwan and also review all species in the family Terebridae from Taiwan and adjacent islands, including the Dongsha Atoll and Nansha Islands of the South China Sea.

Key words: *Hastula lanceata, Hastula solida, Terebra guttata,* Terebridae.

INTRODUCTION

Auger shells are a group of mollusks which have very elongate and sculptured shells (Simone, 1998, 1999). There are more than 300 species in the family Terebridae (Simone, 1998, 1999). Most species in the Terebridae are mainly distributed in the tropical Indo-Pacific region (Bratcher and Cernohorsky, 1987). Terebrids are sand-dwelling snails which usually burrow into the sand to a depth not exceeding their shell length (Kornicker, 1961; Miller and Croker, 1970; Kohn, 1998). Some species of auger shells live in clean sand on coral reefs, others reside in the surf zone of beaches, and a few species dwell in muddy sand (Bratcher and Cernohorsky, 1987). All auger shells are carnivorous and feed on polychaete worms (Miller and Croker, 1970).

There are four genera in the Terebridae: *Hastula, Duplicaria, Terenolla,* and *Terebra.* However, placement of the genus *Terenolla* in this family is tentative (Bratcher and Cernohorsky, 1987). The shell characters of these genera are listed in Table 1.

There are 57 species in the Terebridae from Taiwan and adjacent islands, including the Dongsha Atoll and Nansha Islands recorded during past surveys (Table 2; Kuroda, 1941; Fang and Li, 1994; Jung and Lai, 2000; Lee, 2001; Chao and Lee, 2002; Lee and Chao, 2003, 2004; Chen, 2005). The first report of the three species of *Hastula lanceata* (Linnaeus, 1767), *H. solida* (Deshayes, 1857), and *Terebra guttata* (Roeding, 1798), of the Terebridae from Taiwan is given in the present study.

MATERIALS AND METHODS

Specimens were collected by scuba diving from April to August 2006 in southern Taiwan. Shell length was measured with digital calipers, and all measurements are in millimeters (mm). Specimens are deposited at the National Museum of Marine Biology and Aquarium, Pingtung, Taiwan,(NMMB).

TAXONOMY

Family: Terebridae Morch, 1852.

Genus: *Hastula* H. & A. Adams, 1853.

*Corresponding author. E-mail: minghui@nmmba.gov.tw

Table 1. Shell characters of the four genera in the family Terebridae

Genus	Shell characters
Duplicaria	Shell with a subsutural groove cutting through axial sculpturing of ribs; no spiral sculpturing or very weak spiral lines present on shell
Hastula	Shell smooth and shiny; with axial sculpturing of crenulations below the slender ribs; no spiral sculpturing or very weak spiral lines present on shell
Terenolla	Shell small and straight-sided; rims of the outer lip and columella brown
Terebra	Features of members of this genus inconsistent with those of the other genera

Table 2. List of the species in the family Terebridae from Taiwan and adjacent islands

Species	Site[1]											Reference[2]
	NE	WT	HP	ET	KSI	PH	HLC	GI	LY	DSA	NS	
Duplicaria albozonata (Smith, 1875)		o										C
Duplicaria badia (Deshayes, 1859)		o										C
Duplicaria baileyi Bratcher & Cernohorsky, 1982	o											C
Duplicaria duplicata (Linnaeus, 1758)	o	o										A, C
Duplicaria dussumieri (Kiener, 1839)		o										A, C
Duplicaria evoluta (Deshayes, 1859)		o										C
Duplicaria fictilis (Hinds, 1844)					o							E
Duplicaria raphanula (Lamarck, 1822)		o										C
Hastula albula (Menke, 1843)	o	o	o									C, E, H
Hastula anomala (Gray, 1834)							o					A
Hastula caerulescens (Lamarck, 1822)		o										C
Hastula hectica (Linnaeus, 1758)		o	o									A, C
Hastula lanceata (Linnaeus, 1767)			*								o	B, J
Hastula martheroniana (Deshayes, 1859)		o										A, C
Hastula penicillata (Deshayes, 1859)			o									H
Hastula rufopunctata (Smith, 1877)		o					o					A, C, F
Hastula solida (Deshayes, 1857)			*									J
Hastula strigilata (Linnaeus, 1758)		o										A, C
Terebra affinis Gray, 1834			o				o				o	A, B, H
Terebra alveolata Hinds, 1844	o	o										C
Terebra amanda Hinds, 1844		o										C
Terebra anilis Roeding, 1798		o										A, C
Terebra arabella Thiele, 1925		o										C
Terebra areolata (Link, 1807)	o	o	o							o		C, G, I
Terebra argus (Hinds, 1844)										o		B, I
Terebra babylonia Lamarck, 1822										o		B, I
Terebra bathyraphe Smith, 1875		o										A
Terebra boucheti Bratcher, 1981		o										C
Terebra caliginosa Deshayes, 1859		o										C
Terebra cerithina Lamarck, 1822		o									o	C
Terebra cingulifera Lamarck, 1822		o										C
Terebra crenulata (Linnaeus, 1758)		o	o				o				o	A, C, H
Terebra dimidiata (Linnaeus, 1758)	o	o	o							o	o	A, C, H, I

Table 2. Continued

Species	Site[1]											Reference[2]
	NE	WT	HP	ET	KSI	PH	HLC	GI	LY	DSA	NS	
Terebra felina (Dillwyn, 1817)										o	o	B, I
Terebra fenestrata Hinds, 1844	o											C, E
Terebra guttata (Roeding, 1798)			*							o	o	B, I, J
Terebra jeffreysi (Smith, 1879)											o	B
Terebra jungi Lai, 2001										o		D, I
Terebra laevigata Gray, 1834	o			o		o						A
Terebra lima Deshayes, 1857		o										C
Terebra livida Reeve, 1860		o		o								A
Terebra maculate (Linnaeus, 1758)		o		o		o				o	o	A, B, C, I
Terebra milelinae Aubry, 1999					o							E
Terebra nebulosa Sowerby, 1825	o	o		o		o	o					A, C
Terebra nitida Hinds, 1844		o										A
Terebra pertusa (Born, 1778)		o										C
Terebra pretiosa Reeve, 1842		o										C
Terebra pseudopertusa Bratcher & Cernohorsky, 1985		o										C
Terebra pygmaea (Hinds, 1844)							o	o	o			A, F
Terebra stearnsii Pilsbry, 1891	o	o										C
Terebra subulata (Linnaeus, 1767)	o	o	o			o				o	o	A, B, C, H, I
Terebra succincta (Gmelin, 1791)	o	o										C
Terebra swainsoni Deshayes, 1859					o							E
Terebra taiwanensis Aubry, 1999					o							E
Terebra tricincta Smith, 1877		o										C
Terebra tricolor Sowerby, 1825						o						A
Terebra triseriata Gray, 1834		o										C
Terebra turrita (Smith, 1873)		o										C

[1] NE, northeastern Taiwan; WT, western Taiwan; HP, Hengchun Peninsula; ET, eastern Taiwan; KSI, Kueishan Island; PH, Penghu Islands; HLC, Hsiao-Liuchiu; GI, Green Island; LY, Lanyu (Orchid Island); DSA, Dongsha Atoll; NS, Nansha Islands. o, in references; *, this study.

[2] A, Kuroda, 1941; B, Fang and Li, 1994; C, Jung and Lai, 2000; D, Lai, 2001; E, Lee, 2001; F, Chao and Lee, 2002; G, Lee and Chao, 2003; H, Lee and Chao, 2004; I, Chen, 2005; J, the present study.

***Hastula lanceata* (Linnaeus, 1767)**

(Figs. 1A, B, 2)

Hastula lanceata (Linnaeus, 1767): Springsteen and Leobrera, 1986: 259, pl. 73.

Material examined: One individual (NMMB-M004496) collected by Ming-Hui Chen in shallow water (< 10 m) in southern Taiwan (21°57.196'N, 120°45.350'E) on Sept. 1, 2006.

Description: Shell long, smooth, glossy, whitish with reddish-brown lines (Figs. 1, 2). Spire very high and turreted with impressed sutures. Subsutural band (groove) and spiral sculpturing lacking. Aperture elongate-ovate and white. Outer lip thin. Columella short and slightly curved.

Measurement: Shell length 50 mm.

Distribution: This species is distributed in the Indo-Pacific region.

Remarks: *Hastula lanceata* is similar to *H. pencillata* (Hinds, 1844). The shell of the latter is broader with diffused lines and blotches.

***Hastula solida* (Deshayes, 1857)**
(Fig. 1C, D)

Hastula solida (Deshayes, 1857): Springsteen and Leobrera, 1986: 262, pl. 74.

Material examined: One individual (NMMB-M004495) collected by Ming-Hui Chen in shallow water (< 10 m) in southern Taiwan (21°57.196'N, 120°45.350'E) on Sept. 1, 2006.

Description: Shell high, convex, stepped spire with impressed sutures (Fig. 1). Sculpturing convex with broad axial ribs. Subsutural band with spiral ribs. Aperture elongate-ovate, outer lip thin. Body whorl inflated. Columella white and curved. Color of middle of each spire whorl white with 1 grayish spiral band. Body whorl with 3 spiral bands.

Measurement: Shell length 18 mm.

Distribution: This species is distributed in the Indo-West Pacific region.

Genus *Terebra* Bruguière, 1789
***Terebra guttata* (Roeding, 1798)**
(Fig. 1E-H)

Terebra guttata (Roeding, 1798): Springsteen and Leobrera, 1986: 256, pl. 73.

Material examined: One individual (NMMB-M002692) collected by Ming-Hui Chen in shallow water (< 10 m) in southern Taiwan (21°57.196'N, 120°45.350'E) on Apr. 29, 2006. A second individual (NMMB-M004494) collected by Yu-Chao Huang in shallow water (< 10 m) at the same site on Aug. 27, 2006. Third one (NMMB-M002376) collected by Yu-Chao Huang in shallow water (< 10 m) in southern Taiwan (21°57.003'N, 120°46.338'E) on May 20, 2006.

Description: Shell long, wavy, smooth, orange-brown (Fig. 1). Outline of whorls straight with axial sculpturing. Subsutural groove obsolete. More-obvious subsutural band (groove) near rear. Subsutural band white with rounded nodes. Nodes faintly convex and more curved near rear. Two rows on body whorl. Outer lip thin without teeth. Aperture orange, nearly quadrate. Columella curved with teeth.

Measurement: Shell lengths of 3 specimens 80 (NMMB-M002692), 126 (NMMB-M004494), and 81 mm (NMMB-M002376).

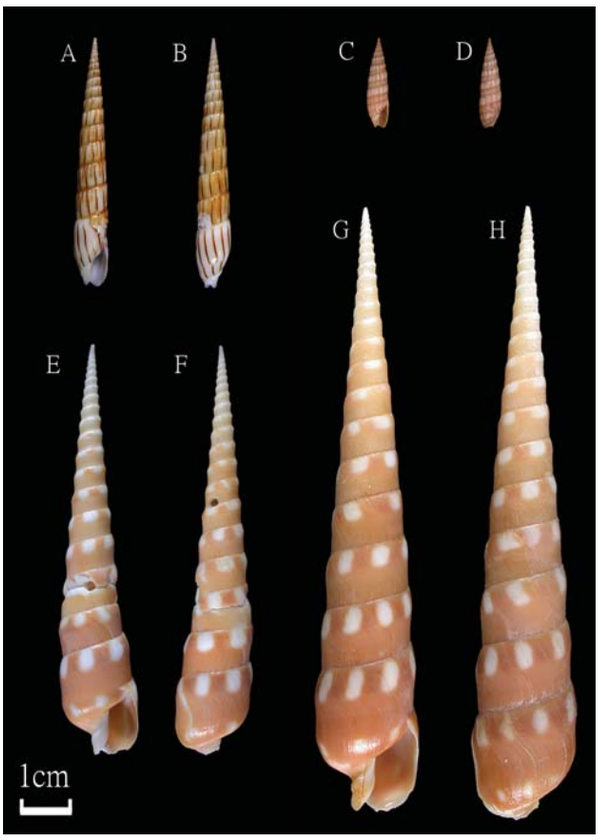

Fig. 1. The photographs of A, B. *Hastula lanceata*; C, D. *Hastula solida*; E, F. *Terebra guttata* (NMMBA-M002376); G, H. *Terebra guttata* (NMMB-M004494).

Fig. 2. A photograph of a living auger shell *Hastula lanceata* on the sand flat under 10 meters at southern Taiwan.

Distribution: This species is distributed in the tropical Indo-Pacific region.

Remarks: This auger shell resembles the species *T. quoygaimardi*. Shells of both species are orange-brown and their apertures nearly quadrate.

However, the subsutural band of *T. guttata* has a white spot on it, while dense nodes are present on the subsutural band of *T. quoygaimardi.*

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三種臺灣筍螺科的新紀錄

張嘉峰[1] 林志穎[2] 陳明輝[3]

[1]國立東華大學生物多樣性及演化研究所

[2]國立清華大學生命科學系

[3]國立海洋生物博物館生物馴養組

本報告紀述三種採集於臺灣南部的筍螺科螺類，分別爲長矛筍螺*Hastula lanceata* (Linnaeus,1767)、堅實筍螺*H. solida* (Deshayes,1857)和白斑筍螺*Terebra guttata* (Roeding,1798)。這三種筍螺皆爲臺灣地區之新紀錄種。文中除描述這三種筍螺的型態特徵外，並列表整理至今筍螺科螺類於臺灣與各離島間（含東沙環礁與南沙群島）之種類紀錄。

關鍵詞：長矛筍螺，堅實筍螺，白斑筍螺，筍螺科。

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