

In Press

ASED http://e-ASED.org
Animal Systematics, Evolution and Diversity

**Morphological Description of a Newly Recorded *Strombus luhuanus*
(Strombidae: Gastropoda) from Korea**

Junhee Lee¹, Joong-Ki Park^{1,2,*}

¹ Department of Parasitology, College of Medicine, Chungbuk National University,
Cheongju 361-763, Korea

² Graduate Program in Cellular Biology and Genetics and Department of Parasitology,
College of Medicine, Chungbuk National University, Cheongju 361-763, Korea

Running title: A New Record of *Strombus luhuanus* in Korea

***To whom correspondence should be addressed**

Tel: 82-43-261-2843, Fax: 82-43-272-1603

E-mail: jkpyou@chungbuk.ac.kr

ABSTRACT

The *Strombus* Linné, 1758 is a genus of marine mollusks belonging to the class Gastropoda, and is distributed in the tropical waters of the world. Typically, the family Strombidae includes five extant genera (*Strombus*, *Lambis*, *Terebellum*, *Tibia*, and *Rimella*), all of which are mostly found in tropical waters. Five individuals of *Strombus luhuanus* Linné, 1758 were collected from Uljin, Gyeongsangbuk-do province for the first time. In this study, we describe details of shell morphology and radula characters of the species with scanning electron microscopy images of the radula. This is a new record of *Strombus luhuanus* Linné, 1758 from Korean waters.

Keywords: *Strombus luhuanus*, Strombidae, shell morphology, radula characters, Korea

INTRODUCTION

The *Strombus* Linné, 1758 is a genus of marine mollusks belonging to the class Gastropoda. This is one of five extant genera of the family Strombidae Rafinesque, 1815 (*Strombus*, *Lambis*, *Terebellum*, *Tibia*, and *Rimella*), all of which have a wide distribution in the tropical warm sea waters of the world (Abbott, 1960). The *Strombus* shell is normally medium to large, ranging from 1 to 30 cm in size, and is characterized by a solid, thickened shell having a very narrow aperture with a notched outer lip near the anterior end (conventionally called ‘stromboid notch’). To date, two strombid species (*Strombus dentatum* Linné, 1758 and *S. japonicus* Reeve, 1851) have been recorded to occur in Korean waters (Lee, 1956; Higo, 1973; Choe and Park, 1997). In the present study, *Strombus luhuanus* Linné, 1758 is described on the basis of shell morphology and radula characters. This is the first report of its occurrence in Korean waters.

Five individuals of the species were collected from Uljin nuclear power plant (NPP) at a drainage hole, of depth of 5–10 m, by SCUBA diving on 21st June in 2011, and were transported to the laboratory after fixing with 95% ethanol solution. Shell morphology was observed using a stereomicroscope (Leica MZ12.5; Leica, Germany). The radular characters were examined using scanning electron microscopy (SEM, LEO-1530; Carl Zeiss, Germany). For the SEM preparation of the radula, a radula ribbon was extracted from the buccal mass of the specimen under stereomicroscope, was then placed in 1 M potassium hydroxide solution, and was shaken vigorously to remove extra tissues. Water and ethanol were removed from the radula, dried and the radula was then coated with gold ion particles before the observation of radula morphology using SEM microscope. Voucher specimens were deposited in the Marine Mollusk Resources Bank of Korea (MMRBK) at Chungbuk National University, Korea, with the registration number (MMRBK no. G00000140).

SYSTEMATIC ACCOUNTS

Class Gastropoda Cuvier, 1797

Order Littorinimorpha Golikov & Starobogatov, 1975

Order Mesogastropoda Thiele, 1925

Superfamily Stromboidea Rafinesque, 1815

Family Strombidae Rafinesque, 1815

Genus *Strombus* Linné, 1758

¹Strombus luhuanus* Linné, 1758 (Figs. 1, 2)**

Strombus luhuanus Linné, 1758: 744, no. 432; Reeve, 1850: sp. 19 (cited from Kuroda et al., 1971).

Strombus (Conomurex) luhuanus: Abbott, 1960: 35, 135-137, Pl. 14, fig. 15; Okutani, 2000: 182-183, Pl. 91, fig. 14.

Conomurex luhuanus: Kira and Habe, 1965: 33–35, Pl. 16, fig. 8; Uchida and Uchida, 1966: 71, fig. 244; Kuroda et al., 1971: 126 (in Japanese), 82 (in English), Pl. 22, figs. 9–11; Higo and Goto, 1993: 113, no. 1558.

Korean name: ¹*검은입술수정고둥 (신칭)

Type locality. Luhu Islands, Amboina, Ceram, Indonesia.

Material examined. 5 individuals, Korea: Gyeongsangbuk-do, Uljin-gun, Buk-myeon, Bugu-ri, Uljin NPP drainage hole, depth of 5 m by scuba diving, 21 Jun 2011.

Measurement. Shell height 615 mm; shell width 345 mm.

Description (shell). Shell conical, solid, white and brown in color; shell height 600–630 mm, spire short reaching approximately 1/5th of entire height; number of spiral whorl is six with well-developed sutures; body whorl surface smooth with poorly developed spiral and axial ribs, but somewhat weakly inscribed with six to eight brown colored twisted-bands. Aperture narrow and white-orange in color, and columella smooth, black-brown in color, as

long as length of body whorl. In outer lip, ‘stromboid notch’ and ‘posterior notch’ well-developed at anterior and posterior edges. Spiral canal short and widely opened.

Remarks. This species is similar to *Strombus decorus* (Röding, 1798) both in size and external shape, but is different from it in the color of the inner lip: in *S. luhuanus*, inner lip is black-brown in color, whereas it is white in *S. decorus*.

Description (radula). As in many other mesogastropods, the radula of this species is taenioglossate-form and follows the formula 2:1:1:1:2 (Fig. 2A). The central tooth (CT) has seven cusps, with the middle one (central cusp) isosceles triangle-shape and most prominent in size (Fig. 2B). The two lateral teeth (LT) are trapezoid in shape with five to six obtuse cusps the innermost of which (innermost cusp) is the most prominent in size. The two marginal teeth (MT; inner marginal tooth [IMT] and outer marginal tooth [OMT]) are narrow and fern-shaped, each having six cusps.

Remarks. Compared to *Strombus (Conomurex) persicus*, a representative of *Strombus* species for which radula morphology was relatively well-described (Mutlu, 2004), *S. luhuanus* has almost the same number of cusps on each central tooth, lateral teeth, and marginal teeth, as those found in *S. persicus*, but differ from it in having a relatively smaller, less-prominent central cusp of central tooth and relatively smaller innermost cusp of lateral teeth.

Habitat. Fine sand floors in warm, tropical water, normally at a shallow depth of 5–10 m.

Distribution. Indonesia, Fajuma, Fiji, Papua New Guinea, Australia, Japan, Korea (Uljin, Gyeongsangbuk-do).

ACKNOWLEDGMENTS

This study was supported by a grant from Marine Biotechnology Program funded by Ministry of Land, Transport and Maritime Affairs (MMRBK; Marine Mollusk Resource Bank of Korea) of Korean Government and by the research grant of Chungbuk National University in 2012.

REFERENCES

- Abbott RT, 1960. The genus *Strombus* in the Indo-Pacific. *Indo-Pacific Mollusca*, 1:33-146.
- Choe BL, Park JK, 1997. Gastropoda. In: List of animals in Korea (excluding insects) (Ed., Korean Society of Systematic Zoology). Academy Publishing Co., Seoul, pp. 90-113.
- Higo S, 1973. A catalogue of molluscan fauna of the Japanese Islands and the adjacent area. Nagasaki Biological Society, Japan, pp. 1-397.
- Higo S, Goto Y, 1993. A systematic list of molluscan shells from the Japanese Is. and the adjacent area. Elle Scientific Publications, Osaka, pp. 1-693.
- Kira T, Habe T, 1965. Shells of the western pacific in color. Vol. 1. Hoikusha, Osaka, pp. 1-224.
- Kuroda T, Habe T, Oyama K, 1971. The sea shells of Sagami Bay. Maruzen Co., Tokyo, pp. 1-235.
- Lee BD, 1956. The catalogue of molluscan shells of Korea. *Bulletin of Pusan Fisheries College*, 1:53-100.
- Linné C, 1758. *Systema Naturae*. 10th ed. Vol. 1. Laurentii Salvii, Stockholm, pp. 1-824.
- Mutlu E. 2004. Sexual dimorphisms in radula of *Conomurex persicus* (Gastropoda: Strombidae) in the Mediterranean Sea. *Marine Biology*, 145:693-698.
- Okutani T, 2000. Marine mollusks in Japan. Tokay University Press, Tokyo, pp. 1-1173.
- Uchida K, Uchida T, 1966. New illustrated encyclopedia of the fauna of Japan. Vol. 2. Hokuryukan, Tokyo, pp. 1-803.

Figure legends

Fig. 1. Shell of *Strombus luhuanus* Linné, 1758. A, Ventral view; B, Dorsal view; C, Lateral view. PN, posterior notch; SN, stromboid notch. Scale bar: A–C=20 mm.

Fig. 2. Radula of *Strombus luhuanus* Linné, 1758. A, Taenioglossate teeth with radula formula of 2:1:1:1:2; B, Close-up view of central and lateral teeth; C, D, Close-up view of marginal and lateral teeth. cc, central cusp; CT, central tooth; ic, innermost cusp; IMT, inner marginal tooth; LT, lateral teeth; MT, marginal teeth; OMT, outer marginal tooth. Scale bars: A=200 µm, B–D=100 µm.

Figure 1

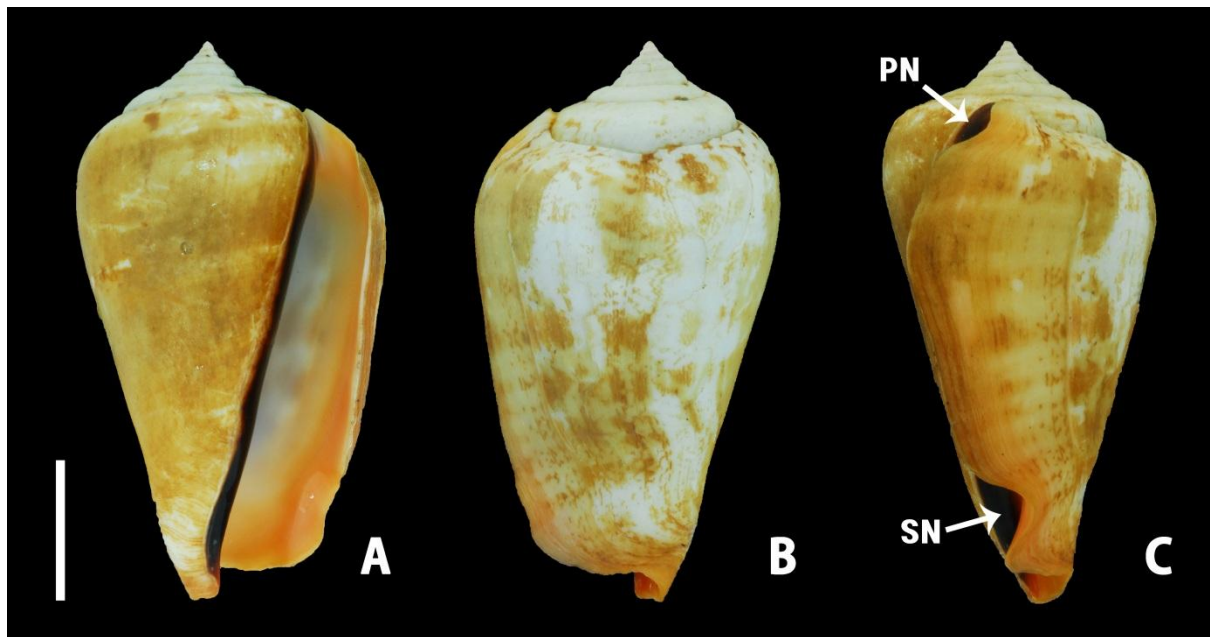


Figure 2

