

# A Newly Recorded Sea Star of the Genus *Lophaster* (Asteroidea: Velatida) from Korea

Tack Jun Lee and Sook Shin\*

Department of Life Science, Sahmyook University, Seoul 139-742, Korea

## ABSTRACT

A new asteroid specimen was collected at a depth of 400 m in the East Sea. It was identified as *Lophaster furcilliger* Fisher, 1905 belonging to the family Solasteridae of the order Velatida. This species is new to the Korean fauna. Thirty asteroid species including *L. furcilliger* have been reported in the East Sea of Korea so far.

**Key words:** Solasteridae, *Lophaster*, East Sea

## INTRODUCTION

The order Velatida is one of seven major orders of the class Asteroidea, which is one of the largest and most familiar classes of the phylum Echinodermata. Until now more than 1,800 asteroid species have been reported from all over the world (Mah, 2009). The Korean asteroids have been for the first time recorded in 'On the Asteroidea and Echinoidea of the Korean Seas' (Sladen, 1879), and 50 species have so far been recorded from South Korea (Shin, 2007).

The asteroid specimen used in this study was collected by using the fishing net at a depth of about 400 m in Daejin harbor of Gangwon-do. The sample was preserved in 95% ethyl-alcohol and the important morphological parts of specimen were photographed using stereomicroscope and light microscope.

In this study we report one species identified into *Lophaster furcilliger* Fisher, 1905 belonging to the family Solasteridae of the order Velatida. This species is new to the Korean fauna. Its morphological characteristics were redescribed with illustrations, and the key to the genera of family Solasteridae was prepared. Therefore, thirty species including this species have been reported in the East Sea, Korea (Rho and Shin, 1980; Shin, 1995; Shin and Rho, 1996) so far.

## SYSTEMATIC ACCOUNTS

Phylum Echinodermata Klein, 1734  
Class Asteroidea de Blainville, 1830

\*To whom correspondence should be addressed  
Tel: 82-2-3399-1717, Fax: 82-2-3399-1729  
E-mail: shins@syu.ac.kr

<sup>1</sup>\*Order Velatida Perrier, 1884  
Family Solasteridae Virguier, 1878

### Key to the genera of family Solasteridae in Korea

- Marginal paxillae in two conspicuous and almost equally developed series, arms five ..... *Lophaster*  
– Marginal paxillae in either one or two series, arms more than five ..... 2
- A spine of paxillae not forming bundle, one or two series of paxillae on marginal plate ..... *Solaster*  
– A spine of paxillae forming bundle, one series of paxillae on marginal plate ..... *Crossaster*

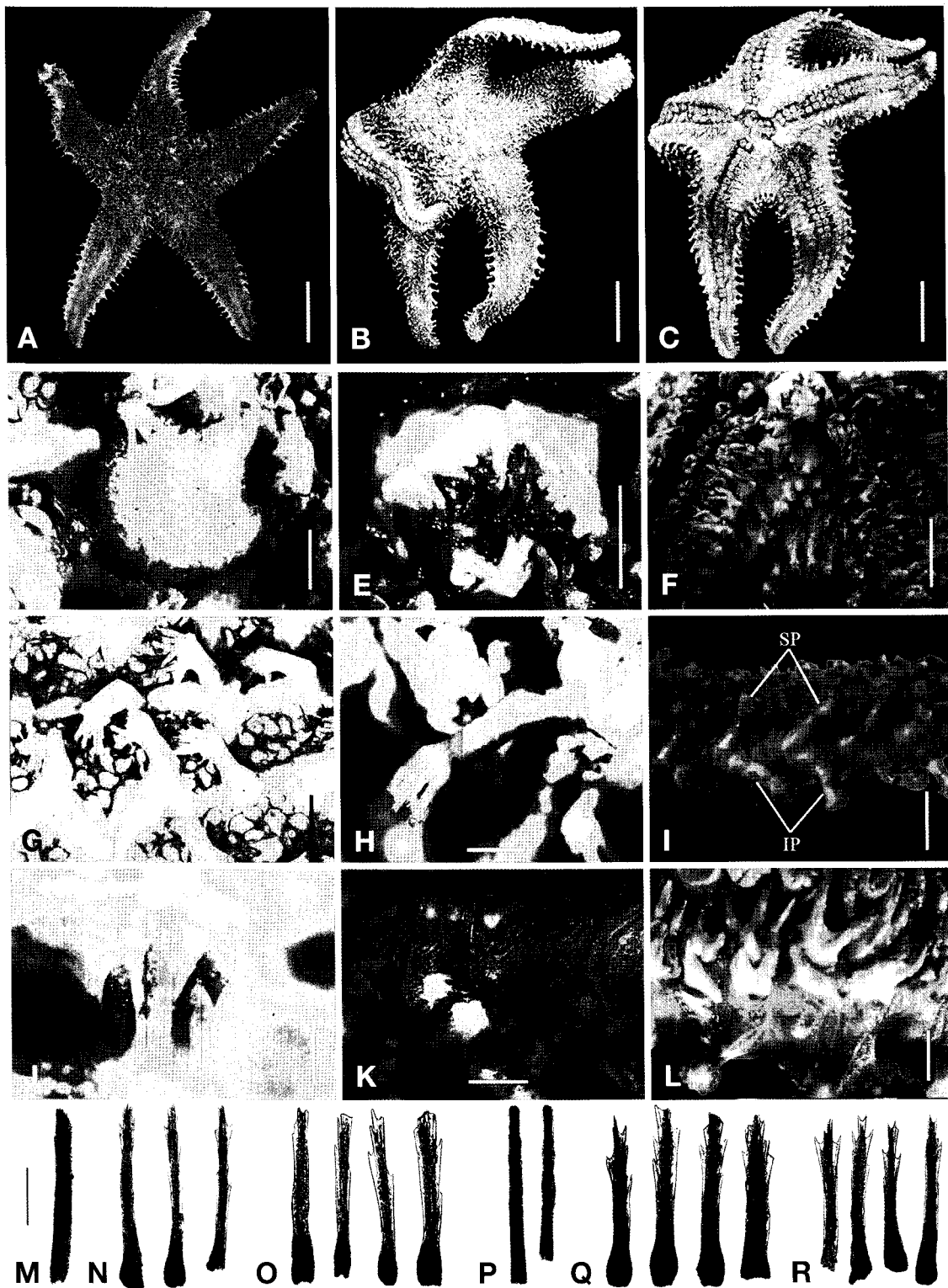
<sup>2</sup>\*Genus *Lophaster* Verrill, 1878  
Type species: *Lophaster furcifer* (Düben & Koren, 1846).

<sup>3</sup>\**Lophaster furcilliger* Fisher, 1905 (Fig. 1A-R)  
*Lophaster furcilliger* Fisher, 1905, p. 312; 1911, p. 334, pl. 79, figs. 1, 2, pl. 114, figs. 1, 1a-g, pl. 116, fig. 5; D'yakonov, 1950, p. 64; Imaoka et al., 1991, p. 91; Clark, 1996, p. 183.  
*Lophaster furcilliger vexator*: Fisher, 1911, p. 338, pl. 80, figs. 1, 2, pl. 114, figs. 2, 2a.

*Material examined.* 1 individual. Daejin harbor, 400 m deep. 23 Feb. 2009, by fishing net (Lee T.J. and J.H. Lee).

*Description.* R=133 mm, r=47 mm, R=2.8r. Disk broad and thick. Arms five in number, wide at base and tapering toward tips. Dorsal plates cruciform and regularly arranged in longitudinal series along arm. Paxillae of body well developed, slender and more spaced. Paxilla have usually 14-16 delicate glassy radiating spinelets at tip, and each spinelet generally looks like stump but has five to eight tips. Papulae

<sup>1</sup>\*망목목 (신칭), <sup>2</sup>\*갈기불가사리속 (신칭), <sup>3</sup>\*붉은갈기불가사리(신칭)



**Fig. 1.** *Lophaster furcilliger*. A, dorsal side in life; B, dorsal side in preservation; C, ventral side in preservation; D, madreporite; E, oral part; F, interbranchial area; G, paxillae and papulae on disk; H, a paxilla on disk; I, marginal paxillae (SP: superomarginal paxillae, IP: inferomarginal paxillae); J, a bundle of spines in interbranchial area; K, bundles of spines in ventrolateral plates on arm (↓); L, adambulacral spines; M, oral spine; N, spines of interbranchial bundle; O, spinelets of disk paxillae; P, furrow spines; Q, spinelets of marginal paxillae; R, spines of ventrolateral bundle on arm. Scale bars=4 cm (A-C), 2 mm (D, H, J-M, P), 1 cm (E), 2 cm (F), 1 mm (G, I), 0.5 mm (N, O, Q), 0.3 mm (R).

crowded, about 22-25 in a mesh of skeleton, and decreasing in size and number toward tip of arm. Madreporite large, convex, circular form, and situated near center of disk.

Marginal plates have well developed marginal paxillae which arranged in two series along arm, well spaced, and become smaller at tip of arm. Supermarginal paxillae situate above inferomarginal paxillae and not alternate. These paxillae stout, much larger than adjacent dorsal paxillae, and each composed of long pedicels (3.5-4 mm) and 15-16 delicate glassy spinelets (1-1.2 mm) on tip, each of which have five to seven sharp teeth scattered along outer margin. Inferomarginal paxillae 24-25 in number, similar to supermarginal paxillae, but somewhat larger than supermarginal ones. Interbrachial area poorly developed and have 13 or 14 bundles, and each bundle made up of four or five spines (1 mm). Ventrolateral plates extend to tip of arm and each plate has four or five spines forming a bundle which locates between inferomarginal plates and so widely separated with each other.

Adambulacral plates short, broad and equipped with adambulacral spines which composed of furrow series and separate dorsal series. Furrow spines of each plate four or three in number, rather long, delicate, skin-covered and united for about a third or a half of their length by a web, but middle one usually longest. Separate dorsal spines well spaced, three or rarely four in a plate and as long as or even longer than width of plate. Mouth plates comparatively large, spade-shaped, with median wide suture, and have slightly stout furrow spines which seven or eight, long, and united for about a third to a half of their length by a web. Near middle of suture usually five spines located which slenderer and shorter than furrow ones, and webbed at base.

*Distribution.* Korea (East Sea), Japan, Okhotsk Sea, Bering Sea, Alaska, California, Galapagos Island.

*Remarks.* This species was characterized to have long paxillae with long pedicels and spinelets, and to have dark red color in life except light yellow tip of arm. Disk of our specimen was larger than that of Fisher (1905)'s original description. Similar to the description of *L. furcilliger vexator* (see Fisher, 1911) not distributed in deeper waters, the base of arm of the species was wide, and the papulae on disk were usually 22-25 in number and have gathered in a group resulting from loosely spaced dorsal skeleton, and the paxilla was more dentate by having five to eight spinelets which can be compared with one to three in Fisher's specimens (1905, 1911). And the number of furrow spine in case of Fisher's specimen (1905) was two from the middle of arm, and one at the tip of arm but ours was always three. Fisher (1911) divided *L. furcilliger vexator* (137-670 m) from *L. furcilliger*

(350-2,000 m) according to the depth of inhabit. But there were many transitions between the typical form and subspecies (see D'yakonov, 1950), and since then *L. furcilliger vexator* have been regarded as a form of *L. furcilliger* (see Clark, 1996). Our specimen collected at 400 m deep was identified as *L. furcilliger*.

## ACKNOWLEDGEMENTS

This work was supported by Sahmyook University Research Fund in 2008 and partially by the project on survey and excavation of Korean indigenous species of the National Institute of Biological Resources (NIBR) under the Ministry of Environment, Korea.

## REFERENCES

- Clark, A.M., 1996. An index of names of recent Asteroidea. Part 3. Velatida and Spinulosida. Echinoderm Studies 5, pp. 183-250.
- D'yakonov, A.M., 1950. Sea stars (Asteroidea) of the USSR seas. Zool. Inst. Acad. Sci. USSR, 34: 54-55.
- Fisher, W.K., 1905. New starfishes from deep water of California and Alaska. Bull. Bur. Fish., 24: 312-313.
- Fisher, W.K., 1911. Asteroidea of the North Pacific and adjacent waters. Pt. 1. Phenerozonia and Spinulosa. U.S. Nat. Mus. Bull., 76: 334-336.
- Imaoka, T., S. Irimura, T. Okutani, C. Oguro, T. Oji and K. Kanazawa, 1991. Echinoderms from continental shelf and slope around Japan. Vol. II. The intensive research of unexploited fishery resources on continental slopes. Jap. Fish. Res. Cons. Ass., pp. 1-203.
- Mah, C.L., 2009. World Asteroidea database. Available online at <http://www.marinespecies.org/asteroidea>.
- Rho, B.J. and S. Shin, 1980. A systematic study on the Echinodermata in Korea. 4. Asteroidea. J. Korean Res. Inst. Better Liv., Ewha Womans Univ., 26: 65-104.
- Shin, S., 1995. A systematic study on the Asteroidea in the East Sea, Korea. Korean J. Syst. Zool., 11(2): 243-263.
- Shin, S. and B.J. Rho, 1996. Illustrated encyclopedia of fauna & flora of the Korea. Vol 36. Echinodermata. Min. Edu., Korea, pp. 1-780.
- Shin, S., 2007. A new record of sea star (Asteroidea: Phanerozonia) from Jejudo Island, Korea. Korean J. Syst. Zool., 23(2): 251-253.
- Sladen, W.P., 1879. On the Asteroidea and Echinodea of the Korean Seas. J. Linn Soc. Lond., 14: 424-445.

Received October 23, 2009  
Accepted November 16, 2009