

A Newly Recorded Sea Star of Genus *Henricia* (Asteroidea: Spinulosida: Echinasteridea) from the East Sea of Korea

Sook Shin* and Michael D. Ubagan

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

Abstract - Asteroid specimens were collected from Shinnam, Gangwondo in the East Sea of Korea with fishing nets on 12 September 2014. The specimens were identified as *Henricia reticulata* Hayashi, 1940, belonging to family Echinasteridea of order Spinulosida. This species can be distinguished by a larger disc and broader arms compared to those other *Henricia* species. The morphological characteristics of this species are re-described with illustrations. By previous work of this genus, six species have been reported in the Korean fauna.

Key words: *Henricia reticulata*, Echinasteridea, Spinulosida, sea star, East Sea, Korea

INTRODUCTION

The class Asteroidea (also known as sea star or starfish) is the most diverse and familiar class of the living Echinodermata, including over 1,800 species, distributed in the Atlantic, Indian and Pacific as well as Arctic and Southern Oceans, inhabiting intertidal to 6,000 m abyssal settings (Mah 2015). The genus *Henricia* Gray, 1840 is a large genus of slender-armed sea stars belonging to family Echinasteridea Verrill, 1870. This family is characterized by an open or closed meshed skeleton bearing numerous small spinelets either in a group or scattered along the ridges, composing the skeleton and marginal plates distinguishable from dorsal plates (Fisher 1911). This genus is remarkably well represented in the North Pacific coast. Fisher (1911) has described numerous species and named varieties or subspecies from the Northwest coast. According to Clark and Downey (1991), *Henricia* is a difficult genus taxonomically due to its high degree of variation and tendency to form local forms that are more or less morphologically distinct, whereas they are capable of interbreeding with each other

and overlapping to produce intermediates, according to Fisher (1911). Fisher (1911) also recognized as many as eight species and five subspecies in the North Pacific, nine of which were described by him. Hayashi (1940) described 10 new nominal species among the 17 species distinguished from Japan, and D'yakonov (1950) described eight new species among 19 species from the USSR. Clark (1996) listed 76 species and 11 subspecies of this genus. Clark and Jewett (2010) reported 13 new species of *Henricia* from the Aleutian Island Archipelago. Xiao *et al.* (2011) reported eight species and three subspecies of *Henricia*, based on collections from coastal waters of mainland China and the East China Sea. Six *Henricia* species, *H. leviuscula*, *H. nipponica*, *H. ohshimai*, *H. pachyderma*, *H. regularis*, and *H. reniessa*, were recorded from the Korean fauna (Shin and Rho 1996; Shin 2010).

MATERIALS AND METHODS

Some asteroid specimens were collected from Shinnam, Gangwondo in the East Sea of Korea with fishing nets on 12 September 2014. The collected specimens were preserved in 95% ethanol. Morphological features of the specimen were photographed by a scanning electron microscope (JSM-

* Corresponding author: Sook Shin, Tel. 02-3399-1717, Fax. 02-3399-1729, E-mail. shins@syu.ac.kr

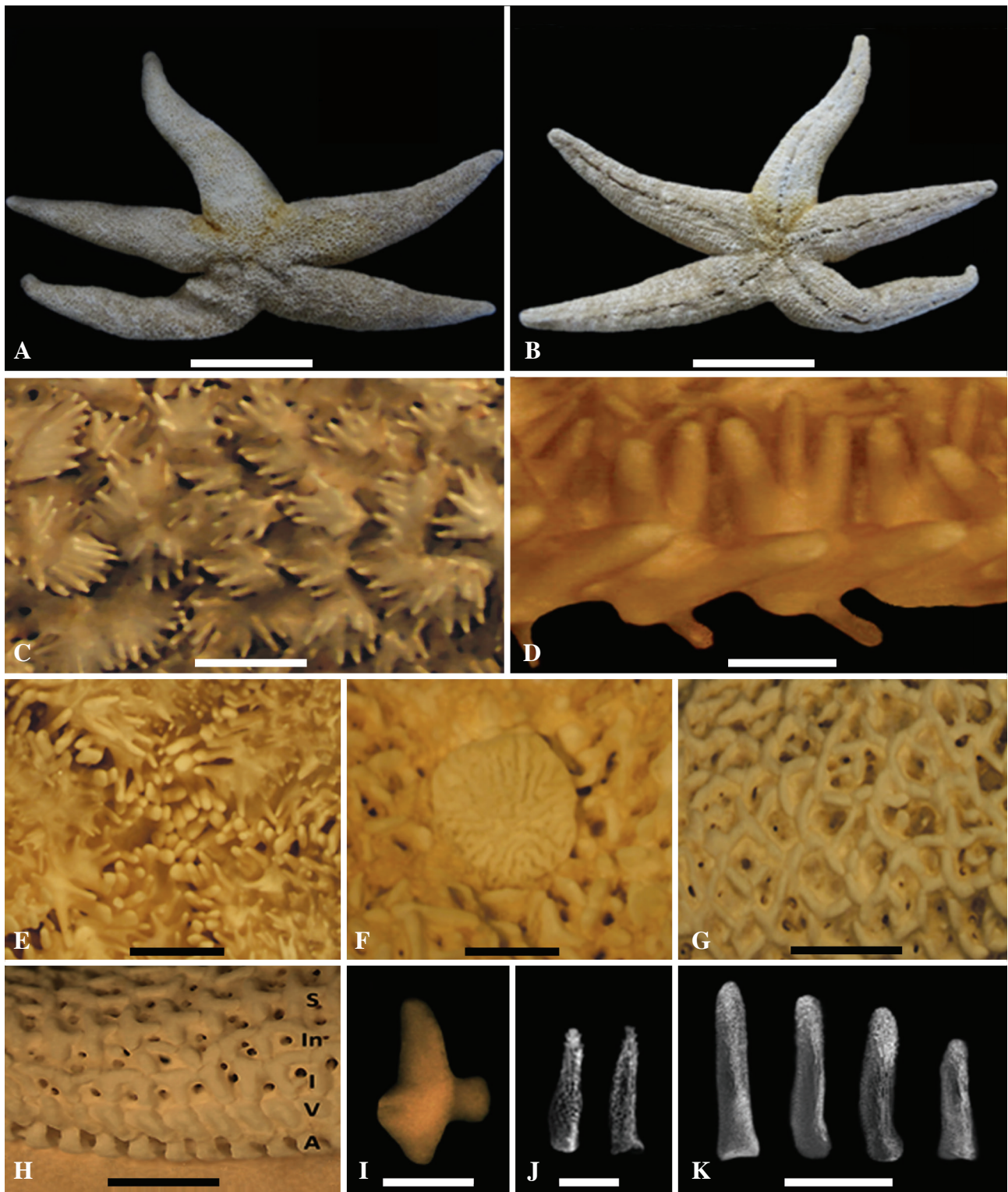


Fig. 1. *Henricia reticulata*. A. dorsal view; B. ventral view; C. dorsal spines; D. adambulacral spines; E. oral part; F. madreporite; G. dorsal skeleton; H. ventral skeleton: adambulacral plate (A), ventrolateral plate (V), inferomarginal plate (I), intermediate (In), supermarginal plate (S); I. supermarginal plate; J. dorsal spines; K. adambulacral spines. Scale bars: A, B = 2 cm, C, D, G, H = 2 mm, E, F = 1 mm, I = 3 mm, J = 100 μ m, K = 300 μ m.

6510, JEOL Ltd., Tokyo, Japan), stereo microscope (Nikon SMZ1000, Nikon Co., Tokyo, Japan), and digital camera (Nikon D7000). Morphological characteristics were determined, such as the size of disc, arms (upper and proximal portion), adambulacral spines, dorsal skeleton and ventral skeleton. Abbreviations for measurements are as follows: R, major radius from disc centre to arm tip; r, minor radius from disc centre to edge of the disc.

SYSTEMATIC ACCOUNTS

Class Asteroidea de Blainville, 1830
Order Spinulosida Perrier, 1884
Family Echinasteridea Verill, 1870
Genus *Henricia*, Gray, 1840

Henricia reticulata Hayashi, 1940

그물애기불가사리 (신칭) (Fig. 1A-K)

Henricia reticulata Hayashi, 1940: 162, pl. 9, figs. 1, 2; Mah, 2014: 369140.

Material examined: 2 specimens, Shinnam harbor, Gangwon-do, 12 September 2014, Shin, S. and Kim, D.

Description: Disk large. Arms five in number, broad but not constricted at base and moderately tapering towards tips. Dorsal skeleton reticulated forming irregular mesh, composed of slender, elongated rod-like plates having three or four lobes. Dorsal paxillae small and pointed bearing four to 11 spinelets, forming like a comb and some formed by pair. Madreporite situated about midway between center and margin of disk, covered with small spinelets similar to adjacent dorsals and bearing circular in form. Noticeably, ventrolateral plates next to adambulacrals arranged in a row until tip of arm. Adambulacral spines four to seven in number, slender to blunt tips, arranged in two transverse or in a zigzag rows and inner spine facing furrow spine longer and outer spines decreasing in length and size. Furrow spine single.

Size: R = 67 mm, r = 16 mm, R: r = 4.1.

Habitat: Muddy-sandy and rocky substrates.

Distribution: Okhotsk Sea, Japan (Onagawa Bay Honshu, Muroran Hokkaido), Korea (East Sea).

Deposition: These specimens were deposited in the Marine Echinoderm Resource Bank of Korea (MEBRK), Sahmyook

University, Seoul, Korea.

Remarks: As recorded by Hayashi, 1940 in Japan, this species is more or less similar to *Henricia sanguinolenta* (O.F. Müller) of Fisher's description (1911), but differs in shorter and broader arms, fewer adambulacral spines, and wider intermarginal and ventrolateral areas. This species is not widely distributed in adjacent and surrounding regions compared to circumpolar *H. sanguinolenta* which is also distributed in the North Atlantic and North Pacific Oceans. Body color of this species is orange or yellowish light red in life. This species was recorded in Korea for the first time.

ACKNOWLEDGEMENT

This study was supported by the Survey of Korean Indigenous species, NIBR, a grant from the Marine Biotechnology Program funded by Ministry of Oceans and Fisheries (MERBK: Marine Echinoderm Resource Bank of Korea), and the program of Management of Marine Organisms causing Ecological Disturbance and Harmful Effects, funded by KIMST/MOF, Korea.

REFERENCES

- Clark AM. 1996. An index of names of recent Asteroidea-Part 3. Velatida and Spinulosida. In: Jangoux M and JM Lawrence (eds.). Echinoderms Studies 5:183-250.
- Clark AM and ME Downey. 1991. Starfishes of the Atlantic. Chapman and hall, London 794 pp.
- Clark RN and SC Jewett. 2010. A new genus and thirteen new species of sea stars (Asteroidea: Echinasteridea) from the Aleutian Island Archipelago. Zootaxa 2571:1-36.
- D'yakonov AM. 1950. Sea Stars (Asteroids) of the USSR Seas. Keys to the Fauna of the U.S.S.R. 34:74-88 (In Russian, English translation, Jerusalem 1968).
- Fisher WK. 1911. Asteroidea of the North Pacific and Adjacent Waters. Pt. 1. Phanerozonia and Spinulosa. U S Nat. Mus. Bull. 76:1-420.
- Hayashi R. 1940. Contributions to the Classification of the Sea-stars of Japan : I. Spinulosa. J. Fac. Imp. Sci. Hokkaido Univ. Ser. 7:107-204.
- Mah C. 2015. *Henricia reticulata* Hayashi, 1940. World Asteroidea database. Accessed through: World Register of Marine Species at <http://marinespecies.org/aphia.php?p=tax>

details&id=369140 on 2015-05-11.

Shin S. 2010. Invertebrate Fauna of Korea, Sea stars, 32(1). National Institute of Biological Resources, Ministry of Environment. 150pp.

Shin S and BJ Rho. 1996. Illustrated Encyclopedia of Fauna & Flora of the Korea, Vol. 36. Echinodermata. Ministry of Education, Seoul 780 pp.

Xiao N, YL Liao, RY Liu and JY Liu. 2011. Records of the genus *Henricia* Gray, 1840 (Echinodermata: Asteroidea: Echinasteridae) from Chinese waters. *Zootaxa* 3115:1-20.

Received: 13 May 2015

Revised: 12 June 2015

Revision accepted: 12 June 2015