

A New Species and a New Record of *Escharoides* (Bryozoa: Gymnolaemata: Flustridae) in Korea

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ABSTRACT

Two species from the genus *Escharoides* Milne Edwards, 1836, *E. biseriata* and *E. buffonellarioides* n. sp. were first found in Korean waters in this study. Their colonies were collected from two locations in the South Sea, Korea: Tongyeong Marine Ranch in 2004 and Daeyeon Port in 2009. *Escharoides biseriata* shows a difference in the position of avicularia from the Chinese specimens. While avicularia are lateral to the orifice in Chinese specimens, the ones in Korean specimens seem to be located more latero-proximally. Since *Escharoides biseriata* was reported as fouling bryozoans in China in 2001, this species first occurred at Daeyeon Port in Korea in this study. *Escharoides buffonellarioides* n. sp. is similar to *E. adeonelloides* in morphological features of zooids but is clearly distinguished by having the erect colonial form of small masses. With the addition of two species reported herein, four Korean *Escharoides* are recorded: *E. biseriata*, *E. buffonellarioides*, *E. excavata*, and *E. sauroglossa*.

Keywords: Bryozoa, *Escharoides*, *E. buffonellarioides* n. sp., *E. biseriata*, Korea, description

INTRODUCTION

The genus *Escharoides* Milne Edwards, 1836 is one of two genera (*Escharoides* and *Exochella*) in the family Exochellidae Bassler, 1935. The species of *Escharoides* show the morphological features, which are a frontal shield with marginal areolar pores, avicularia lateral to the orifice, oral spines on the distal rim of the orifice, well-developed peristome with denticle, and a prominent ovicell (Hayward and Ryland, 1999; Seo, 2005; Cook et al., 2018). Thus, the genus *Escharoides* with complex skeletal characters can be recognized easily. However, species determination is still challenging, as reflected by errors in the taxonomic literature (Kuklinski et al., 2007). *Escharoides monstrosa*, which Kuklinski et al. (2007) considered to belong elsewhere due to the lack of lateral avicularia, is still listed in the genus *Escharoides*. Moreover, *Escharoides rutata* is regarded as a taxon inquirendum, and nine species of *Escharoides* are transferred into the other genera (WoRMS, <https://www.marinespecies.org>; 1 Dec 2023). As such, even though 27 species of *Escharoides* have been recorded worldwide (WoRMS, 1 Dec 2023), some are still

questionable species that need to be reviewed with skeletal morphology using scanning electron microscope (SEM).

Only two species of *Escharoides*, *E. excavata* and *E. sauroglossa*, have previously been reported from Korea (Rho and Kim, 1981; Rho and Seo, 1986; Seo, 1992, 2005; Chae and Seo, 2019; Seo and Kil, 2019). *Escharoides excavata* was found in all Korean waters (East Sea, South Sea, Yellow Sea, and Jeju waters) and was a fouling bryozoan collected from the anchors, fish traps, and ropes (Seo, 2005; Seo and Min, 2009; Chae and Seo, 2019). However, *Escharoides sauroglossa* has not been collected since Seo (1992) reported it from Gwantaldo (5 m deep) on 19 Aug 1988. On finding *E. sauroglossa* from Korean waters again, more specimens of *Escharoides* were collected from the Marine Ranch and port. This study aims to report some species of *Escharoides*.

MATERIALS AND METHODS

The specimens were found in the Marine Bryozoans Resources Bank of Korea (MBRBK) collection at Woosuk

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Table 1. Sampling localities of two *Escharoides* specimens in the South Sea, Korean waters

Locality	Coordinates	Date	Depth
Tongyeong Marine Ranch, Gyeongsangnam-do	33°27'15.53"N, 128°26'04.45"E	29 Aug 2004	10–20 m
Daeyeon Port, Busan	35°13'27.06"N, 129°13'42.3"E	30 Jun 2009 19 Sep 2009	Intertidal

University. These colonies were collected from Tongyeong Marine Ranch in 2004 and Daeyeon Port in 2009 and were preserved in 95% ethyl alcohol. For identification, the external features of the zooid were observed under a stereomicroscope (Stemi SV6; Carl Zeiss, Germany), and parts of the specimen bleached with hot aqueous sodium hypochlorite, washed and gold coated (MCM-100; SEC, Korea) were observed with a SEM (SNE-3200M Mini; SEC) at 15 kV accelerating voltage. Measurements were made on SEM images of zooids using Image J (National Institutes of Health, Bethesda, MD, USA). Sampling localities of the specimens mentioned in this study are given in Table 1.

RESULTS AND DISCUSSION

Phylum Bryozoa Ehrenberg, 1831
 Class Gymnolaemata Allman, 1856
 Order Cheilostomatida Busk, 1852
 Family Exochellidae Bassler, 1935
 Genus *Escharoides* Milne Edwards, 1836

¹**Escharoides biseriata* Liu, 2001 (Fig. 1)

Escharoides biseriata Liu et al., 2001: 551, pl. 38, figs. 4–6.

Material examined. Korea: Busan: Gijgang-gun, Daeyeon Port, 30 Jun 2009, MABIK IV00173458; 19 Sep 2009.

Substratum. Stone, shells of oyster (*Crassostrea* sp.)

Description. Colony encrusting, light yellowish. Autozooids hexagonal, distinct, separated by fine grooves, longer than wide, 0.7–0.80 (0.70 ± 0.03) mm long and 0.39–0.46 (0.41 ± 0.02) mm wide (Fig. 1A). Frontal shield convex distally, flattened latero-proximally, smooth, with 2 rows of marginal pores, with fine radial ribs between pores, lacking pores centrally (Fig. 1A, B). Orifice, suborbicular, longer than wide, 0.16–0.21 (0.18 ± 0.02) mm long and 0.14–0.16 (0.15 ± 0.01) mm wide, deeply immersed in peristome (Fig. 1C). Peristome raised latero-proximally, with thickened and round proximal rim, extending upwards so looking like cylinder when viewed from front, with one hidden columnar

denticle inside (Fig. 1A, B). 4 distal oral spines (Fig. 1C) usually present, 2 oral spines beside proximal corners of ovicell in mature zooids. Avicularia (Fig. 1A, B) usually single, sometimes paired or lacking, situated latero-proximal to orifice, with complete crossbar; avicularian chamber well developed, raised, with several scattered pores at base, vary in size; rostrum directed laterally, usually elongate spatulate, curved frontally at end. Ovicell globular, large, equal in length to in width, 0.19–0.20 (0.20 ± 0.007) mm long and 0.18–0.21 (0.20 ± 0.018) mm wide, with a row of large marginal pores between radiating grooves extending from central conical umbo, convex frontally, immersed in distal zooid (Fig. 1B, D).

Remarks. Most morphological features of Korean specimens are identical to Chinese specimens in Liu et al. (2001). However, both specimens show a difference in the position of avicularia. While avicularia are situated lateral to the orifice in Chinese specimens, the ones in Korean specimens seem to be located more latero-proximally, as it were, on the frontal shield laterally. This species is distinct in having 2 rows of marginal pores in the frontal shield. However, 3–4 rows of marginal pores are shown in rare zooids. Most avicularia have a complete bar but have no bar on rare occasions.

Since *E. biseriata* was described as a new species from a depth of 0.5–4 m in Chinese waters (Liu et al., 2001), the occurrence from Korea is the first addition worldwide. Moreover, this species was reported as fouling bryozoans in China (Liu et al., 2001) and also found in Daeyeon Port.

Distribution. Korea (South Sea) and China.

²**Escharoides buffonellarioides* n. sp. (Fig. 2)

Material examined. Korea: Holotype, MABIK IV00173459, Gyeongsangnam-do: Tongyeong, Tongyeong Marine Ranch, 29 Aug 2004 (Seo JE) by SCUBA diving from 10–20 m depth; Paratype, same data as for holotype.

Substratum. Shells of *Mytilus galloprovincialis* Lamarck, 1819.

Etymology. The Latin *buffonellarioides* refers to a similar colonial form to *Buffonellaria acutirostris*.

Korean name: ¹*두줄옆구멍이끼벌레 (신칭), ²*뽕족턱두꺼비불이끼벌레 (신칭)

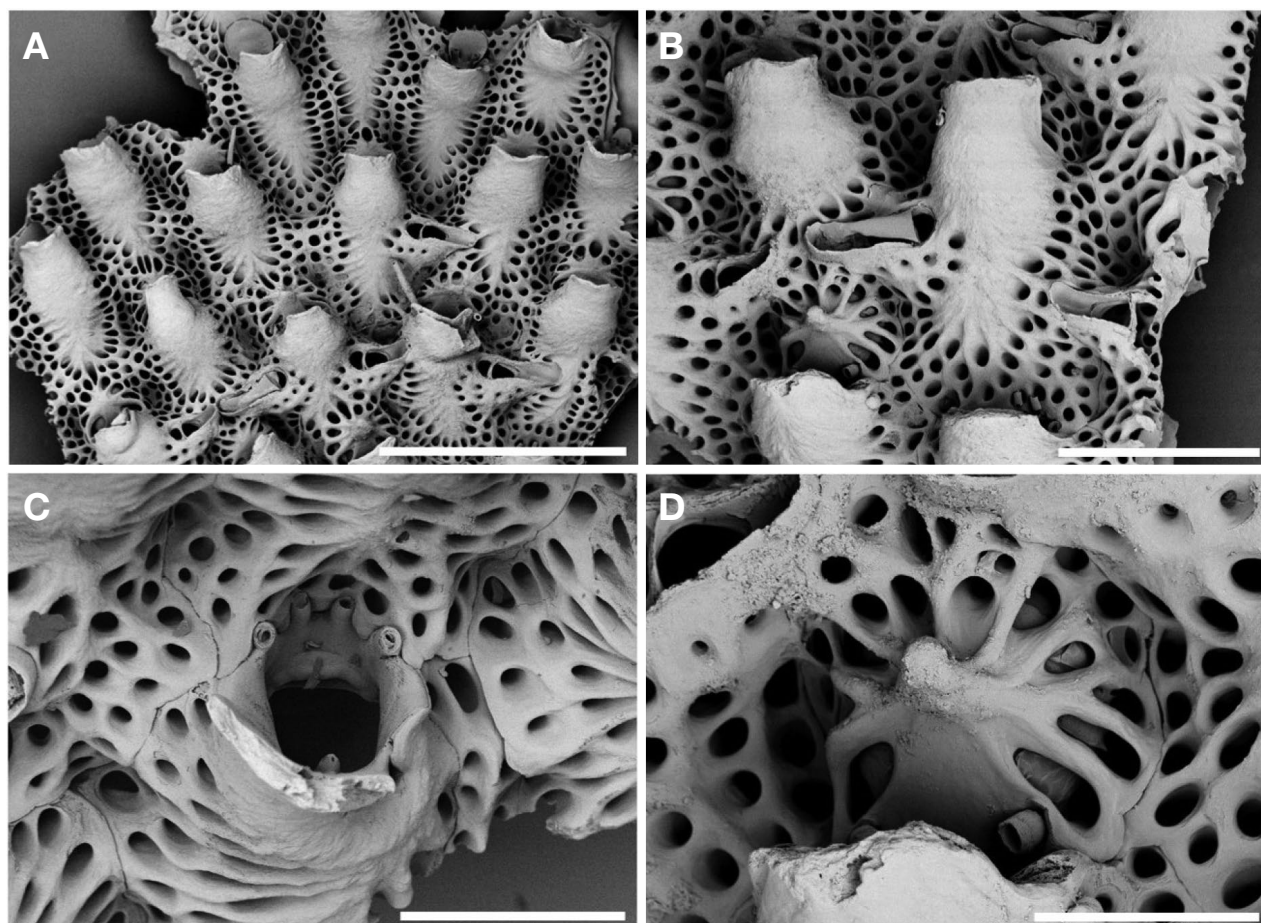


Fig. 1. *Escharoides biseriata* Liu, 2001. A, Colony showing zooidal arrangement; B, Autozooids with raised peristome, large avicularium and ovicell; C, Detailed orifice with oral spines and one hidden denticle; D, Detailed ovicell with central conical umbo. Scale bars: A=1 mm, B=0.5 mm, C=0.3 mm, D=0.2 mm.

Description. Colony encrusting first and forming erect, bilamellar-foliaceous irregular small mass, brownish yellow (Fig. 2A). Autozooids in longitudinal row, hexagonal, distinct, longer than wide, 0.50–0.63 (0.59 ± 0.04) mm long and 0.32–0.45 (0.40 ± 0.04) mm wide. Frontal shield smooth and somewhat granular, with 1–3 rows of large marginal pores, without pores in center (Fig. 2B). Orifice suborbicular, wider than long, 0.15–0.18 (0.16 ± 0.01) mm long and 0.21–0.23 (0.22 ± 0.01) mm wide, deeply immersed in peristome (Fig. 2C). Peristome developed, with a distinct narrow and deep u-shaped sinus, and a hidden denticle inside (Fig. 2C). 4 distal oral spines (Fig. 2C): 2 oral spines beside proximal corners of ovicell in matured zooids. Avicularia (Fig. 2D) typically paired at lateral to orifice, vary in size, usually one smaller than other (Fig. 2E), sometimes single or absent, small or large spatulate with pointed tip, slightly curving distally; avicularian chamber raised with several scattered pores at base; rostrum directed outwards, pointed triangular

or sometimes tongue-shaped with fine serrated end; crossbar complete. Ovicell immersed in distal zooids, somewhat longer than wide, 0.27 (0.27 ± 0.009) mm long and 0.23–0.24 (0.24 ± 0.005) mm wide, smooth centrally, with large marginal pores by radiating grooves (Fig. 2F).

Remarks. *Escharoides buffonellarioides* is very similar to *Escharoides adeonelloides* in sharing most of the morphological features of zooids, such as developed peristomes, shape of avicularia and numbers of spines. However, *E. buffonellarioides* is the most distinguished in the colonial form with *E. adeonelloides*. This new species is similar to *Buffonellaria acutirostris* in the colonial form because it forms a mass from the encrusting base and is erect when grown. Regarding colonial forms, only three species of *Escharoides*, *E. adeonelloides*, *E. ramulosum* and this new species are erect. *Smittia adeonelloides* has erect *Adeonella*-type branching, and *Escharoides ramulosum* is cylindrical, freely erect, and branched dichotomously (Hirose, 2010). On the other hand,

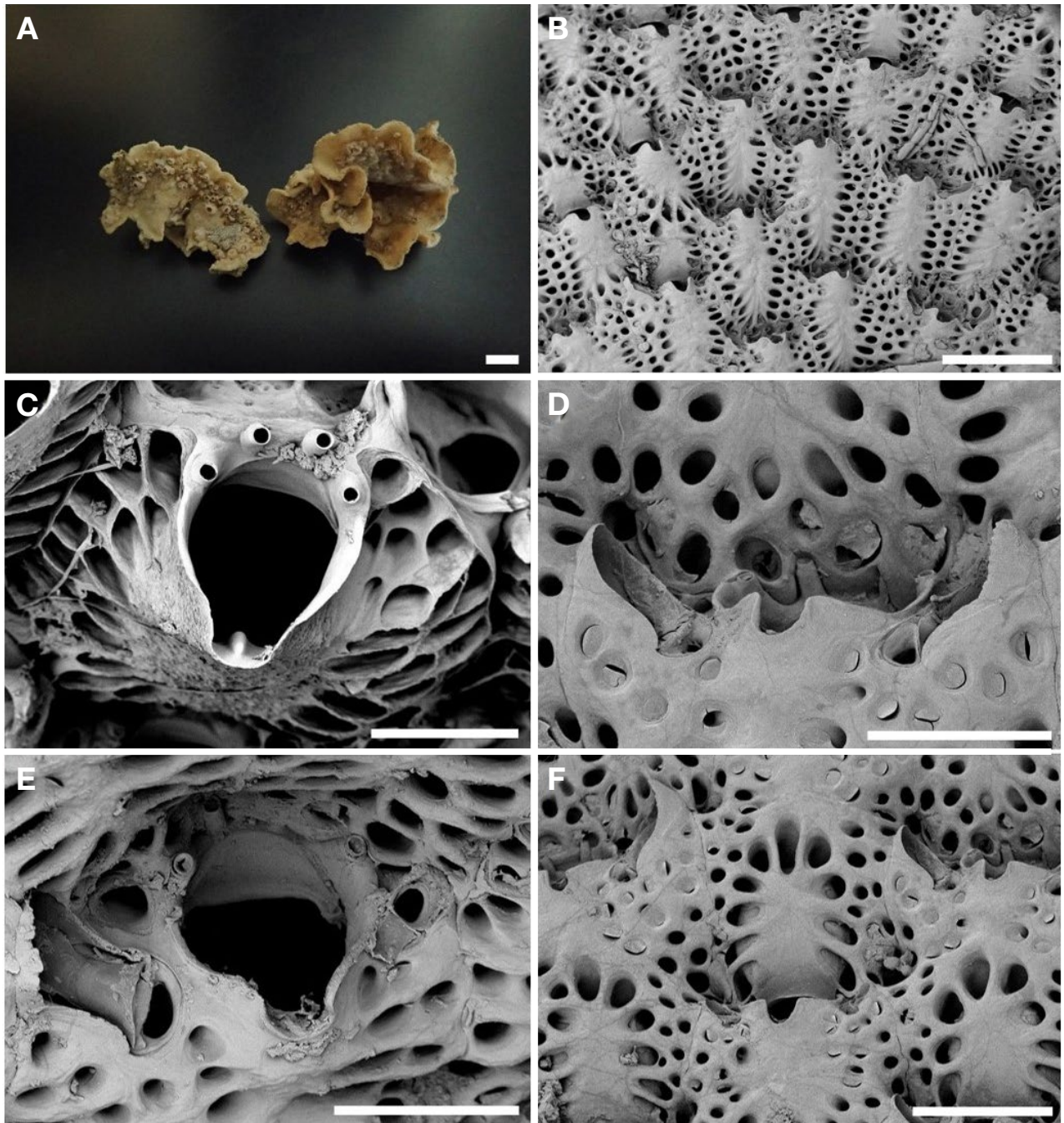


Fig. 2. *Escharoides buffonellarioides* n. sp. A, Two colonies; B, Arrangement of zooids; C, Detailed orifice showing four oral spines and a hidden denticle; D, Avicularia with fine serrated end; E, Two different sizes of avicularia; F, Ovicell with large marginal pores formed by radial ribs. Scale bars: A=3 mm, B=0.5 mm, C-E=0.2 mm, F=0.3 mm.

the Korean new species, *E. buffonellarioides*, is erect and becomes a bilamellar-foliaceous mass when grown. Thus, *Escharoides buffonellarioides* is distinguished by its colonial form with the remaining two species of erect *Escharoides*.

Distribution. Korea (South Sea).

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CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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