

First Record of *Bantariella bocki* (Bryozoa: Ctenostomata) from Korean Waters

Ji Eun Seo^{1,*}, Seung Jik Suh² and Bum Sik Min³

¹Department of Rehabilitation Welfare, College of Health Welfare, Woosuk University,
Jeonbuk 565-701, Korea

²Tae'an Oil Spill Research Group, National Park Research Institute,
Chungnam 357-907, Korea

³Department of Biology, Graduate School of Woosuk University, Jeonbuk 565-701, Korea

ABSTRACT

A ctenostomatous bryozoan, *Bantariella bocki* is reported from Jeju Island of South Korea. This is the first report from Korean waters. Each zooid is produced from each kenozooid which arranged in two and originated opposite each other at intervals of about 0.64 mm along the stolon. *B. bocki* collected from black corals is considered to be an invasive species introduced from Bonin Islands located in the subtropical waters. The redescription, some distributional remarks and illustrations of *B. bocki* are provided.

Key words: taxonomy, alien species, Ctenostomata, Bryozoa, South Korea

INTRODUCTION

The family Mimosellidae Hincks, 1877 currently includes two genera, *Mimosella* Hincks, 1851 and *Bantariella* Jebram, 1973 (D'Hondt, 1983). According to Banta (1968), the species of *Mimosella* fall into two groups. *M. bocki*, *M. gracilis* Hincks, 1851 and *M. bigeminata* Waters, 1914, belongs to the first group of the genus *Mimosella*. The second group includes *M. verticillata* (Heller, 1867), *M. fermata* Marcus, 1938, *M. tenuis* Harmer, 1915 and *M. cookae* Banta, 1968. Since Jebram separated *Bantariella* from *Mimosella* on the basis of the number of autozooids arising from each kenozooid, two species which used to belong to the genus *Mimosella*, *M. cookae* and *M. tenuis*, were transferred into the genus *Bantariella*. Since then, Gordon (1984) mentioned that all of the species included in Banta's second group should be transferred into the genus *Bantariella*. However, the taxonomic status of the mimosellid species still remained uncertain.

Recently, it was observed that the colony of some black corals such as *Antipathes japonica* Brook, 1889 and *A. lata* Siberfeld, 1909, and some sea fans were entirely covered with fluffy animals (Fig. 1). The polyps of corals were easily cut off in fragments when they were touched by SCUBA diver. This fluffy animal turned out to be a ctenostomatous bryozoan, *Bantariella bocki* (Silén, 1942) new to the Korean fauna. Only one mimosellid Ctenostomata, *Mimosella verticillata*, had been recorded from Korean waters so far (Rho

and Kim, 1981; Rho and Seo, 1986; Seo, 2005). Thus, the genus *Bantariella* is newly introduced to the Korean bryozoan fauna. An ecological study on the above species in Korea was already done with the black corals at Munseom I. in Jeju Island as *Bantariella* sp. (Moon and Song, 2007). Its invasion rate on host species, depth habitat and seawater temperature and invasion rates were investigated with this species.

We provide a redescription, some distributional remarks and illustrations of *Bantariella bocki*.

MATERIALS AND METHODS

Jeju Island is the biggest southern island of South Korea. The underwater ecosystem of Seogwipo, southern city of Jeju Island, shows somewhat subtropical climate. It is one of well-known sites for SCUBA divers because of a variety of soft corals protected by CITES nowadays. Munseom I. (33° 13'25"N, 126° 33'58"E) is located at about 1 km away from the southern coast of Seogwipo and influenced directly by the Tsushima warm current (Moon and Song, 2007).

The materials examined in the present study were collected from Hangaechang at Munseom I. by SCUBA diving from 10-30 m in depth on 6 and 30 Nov., 2005 and 9 Jan. 2009. The colonies were picked up from the black corals as if they were some wads of cotton, because they have entirely covered and concealed the surfaces of the black corals and sea fans. The underwater camera (NIKON F5) was used to photograph the colony. The photographs of the zooids were taken with a SEM (HITACHI S-3000N).

*To whom correspondence should be addressed

Tel: 82-63-290-1516, Fax: 82-63-290-1516

E-mail: jeseo@woosuk.ac.kr

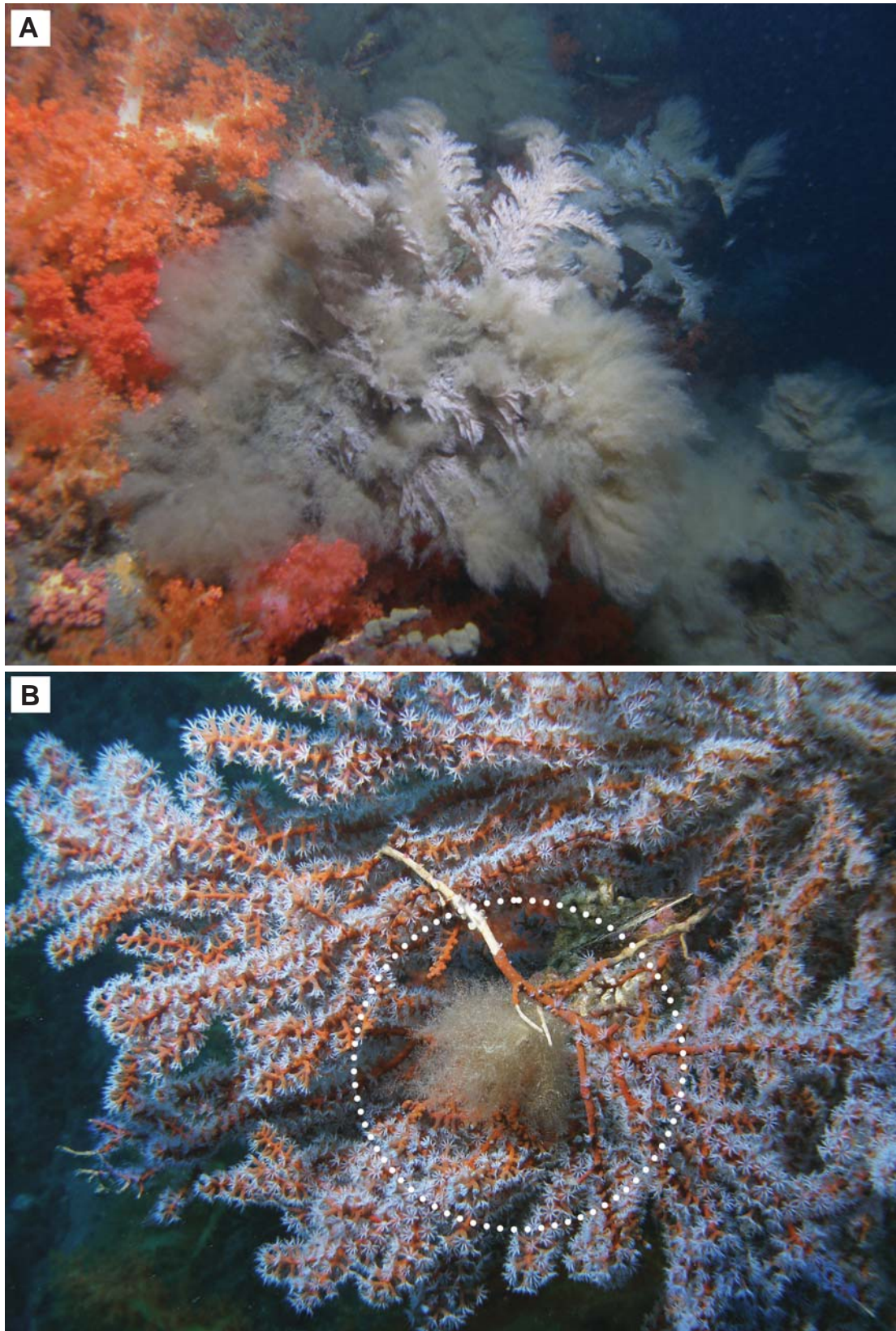


Fig. 1. *Bantariella bocki* Silén, 1942. A, colony entangled in the black corals; B, colony invading sea fans.

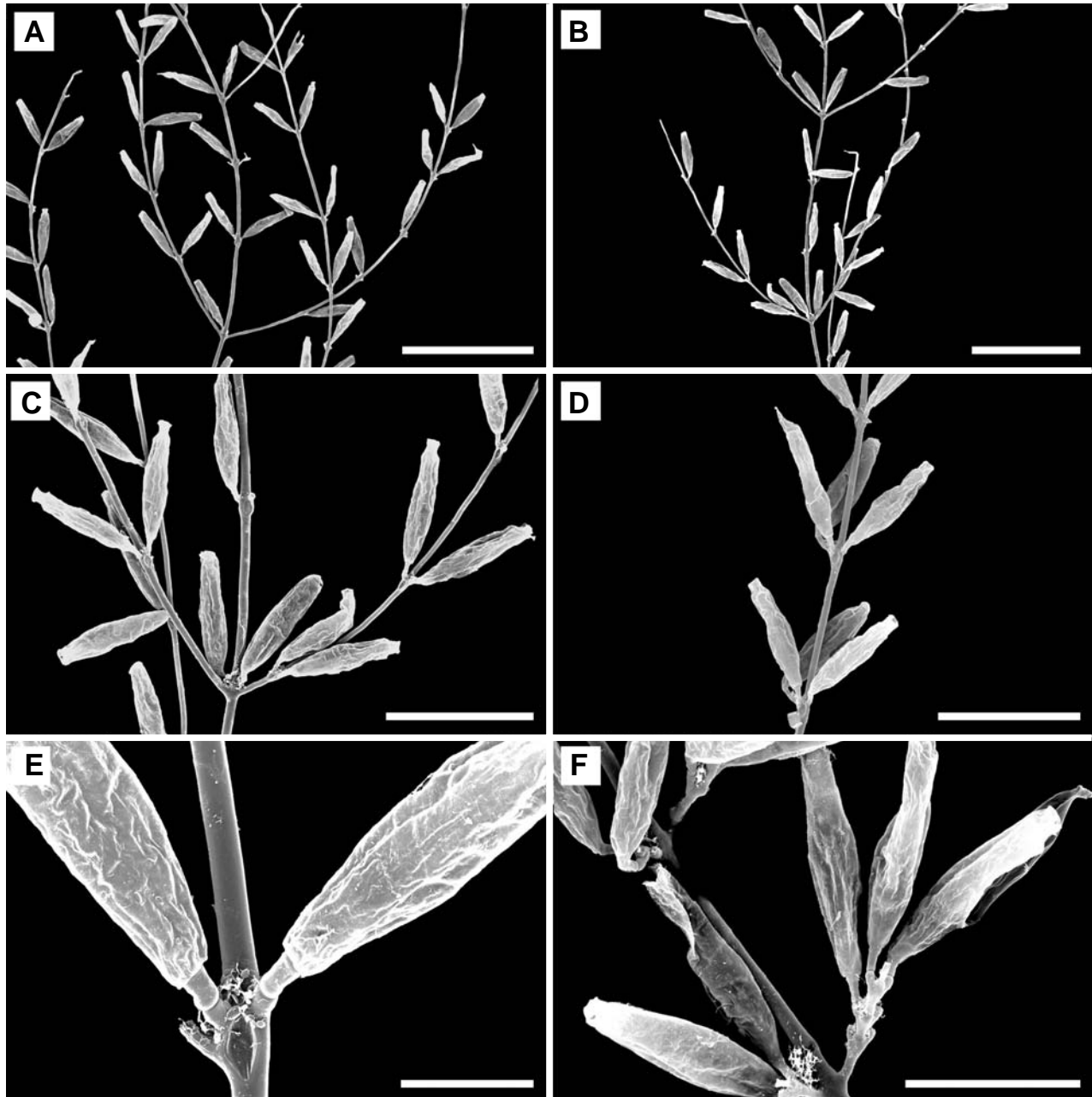


Fig. 2. *Bantariella bocki* Silén, 1942. A, colony with main stolon and lateral branches; B, note a pair of zooids just above ramification point; C, a pair of zooids at intervals along the stolon and branches; D, three zooids; E, each zooid arising from each kenozooid; F, unusual numbers of zooids. Scale bars=1 mm (A, B), 0.5 mm (C, D), 0.1 mm (E), 0.3 mm (F).

SYSTEMATIC ACCOUNTS

Phylum Bryozoa Ehrenberg, 1831
Class Gymnolaemata Allman, 1856
Order Ctenostomata Busk, 1852

Family Mimosellidae Hincks, 1877
Genus ^{1*}*Bantariella* Jebram, 1973
^{2*}*Bantariella bocki* (Silén, 1942) (Figs. 1, 2)
Mimosella bocki Silén, 1942, p.29, figs. 21-24; Banta, 1968,
p. 251; D'Hondt, 1983, p. 77, fig. 43F, G.

^{1*}반타이끼벌레속 (신칭), ^{2*}보키반타이끼벌레 (신칭)

Material examined. Hangaechang at Munseom I. (Jejudo I.), 6 and 30 Nov. 2005 (J.-I. Song, and S.J. Suh); 8 Jan. 2009 (J.E. Seo and B.S. Min).

Substratum. Black corals, such as *Antipathes japonica* and *Antipathes lata*, and sea fans.

Description. Colony free from black corals and sea fans, but entangled in substrata and covering entire colony of black corals and sea fans, looking like wad of cotton or thin thread, erect or rather fragile, fluffy (Fig. 1), comprising main stolon ramified with intervals of about 1.98 mm between a pair of lateral branches and next lateral branches (Fig. 2A). Main stolon thicker than lateral branches. Zooids small, about 0.44 mm long, 0.087 mm wide, elongate rounded stick-shaped, slightly swollen at middle with a short basal pedicel more narrowing than remainder of zooid; each zooid produced from a single kenozooid arranged in two opposite directions (Fig. 2E); arising in a pair of zooids from short branches of kenozooids at intervals of about 0.64 mm along main stolon and lateral branches (Fig. 2C), sometimes arising in three or four zooids (Fig. 2D); unusual numbers of zooids very rarely found (Fig. 2F). A pair of zooids always present just after ramification along stolon (Fig. 2B). Oval part observed just below kenozooids along stolon and branches, however never found below ramification point.

Remarks. Korean specimen shows a single kenozooid protruding a single zooid, while each autozooid seems to bear three or four kenozooids at its base according to Silén (1942)'s description. However, most parts of his figures clearly show each zooid arising from each kenozooid. According to Jeb-ram (1973) and D'Hondt (1983), the genus *Bantariella* is characteristic of having a single zooid arising from a single kenozooid. *M. bocki* is thus suggested to be transferred into the genus *Bantariella* herein.

Bantariella bocki has been only known from Bonin Islands, far southward from the main land of Japan from 100-150 m in depth in 1942 and, thus, it is considered to be a invasive species introduced from the subtropical waters into Korean waters and harmful to the black corals and seafans. According to SCUBA diver in Seogwipo city, this species showed up about ten years ago, and the colony has dramatically increased since 2005. Bonin Islands are located in the similar latitude to Taiwan, situated in the boundary between subtropical and tropical waters. The sea water temperature in southern part of Jejudo Island, seems to be getting warmer probably because of global warming, allowing *B. bocki* to inhabit Korean waters. Besides, the construction of bulwark near Munseom I. may have resulted in environmental changes, such as changes of seawater temperature, tidal current and turbidity by disturbance of seawater. This may also a cause of the occurrence *B. bocki* in Jejudo Island waters.

However, *B. bocki* proliferates in winter time in South

Korea. In winter the lowest seawater temperature of Munseom I. is 14°C and the low water temperature may lead to the highest invasion rates of *B. bocki* on the black corals (Moon and Song, 2007). This shows the coincidence with that all of Japanese specimens were collected from 100-150 m in depth which the sea water temperature is likely to decrease by thermocline. Consequently, the correlation between *B. bocki* and seawater temperature will need further review.

Distribution. Korea (southern part of Jejudo I. waters), Japan (Bonin Islands southward far away from main land of Japan).

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REFERENCES

- Banta, W.C., 1968. *Mimosella cookae*, new species (Bryozoa, Ctenostomata), with a review of the family Mimosellidae. Bull. S. Cal. Acad. Sci., 67(4): 245-254.
- Gordon, D.P., 1984. The marine fauna of New Zealand: Bryozoa: Gymnolaemata from the Kermadec Ridge. N. Z. Oceanogr. Inst. Mem., 91: 1-144.
- D'Hondt, J.-L., 1983. Tabular keys for identification of the recent ctenostomatous Bryozoa. Mem. Inst. Oceanogr., Monaco, 14: 1-134.
- Jeb-ram, D., 1973. Stolonen-Entwicklung und Systematik bei den Bryozoa Ctenostomata. Z. zool. Syst. Evolutionsforsch., 11(1): 1-48 (cited from Gordon, 1984).
- Moon, H.-W. and J.-I. Song, 2007. Impact of bryozoan, *Bantariella* sp., on black corals at Munseom in Jejudo Island. Korean J. Environ. Biol., 25(2): 139-148.
- Rho, B.J. and H.K. Kim, 1981. A study on the marine bryozoans in Korea 3. Stenolaemata and Gymnolaemata. J. Korean. Res. Inst. Better. Liv. Ewha Womans University, 27: 57-80.
- Rho, B.J. and J.E. Seo, 1986. A systematic study on the marine bryozoans in Cheju-do. Korean J. Zool., 29(1): 31-60.
- Seo, J.E., 2005. Illustrated Encyclopedia of Fauna and Flora of Korea Vol. 40. The Ministry of Education and Human Resources Development, pp. 1-596.
- Silén, L., 1942. Cheilostomata Anasca (Bryozoa) collected by Prof. Dr. Sixten Bock's expedition to Japan and the Bonin Islands 1914. Ark. Zool., 34A(8): 1-33.

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