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Three Korean Cheilostomatous Bryozoans from Gageodo Island – new additions to the Korean fauna

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Three cheilostomatous bryozoan species collected from Gageodo Island of Korea in 1999, which are *Chorizopora brongniartii* (Audouin, 1826), *Microporella marsupiata* (Busk, 1860) and *Celleporina costazii* (Audouin, 1826), are newly added to the Korean fauna. The redescriptions of three species are provided with distributional data and detailed illustrations herein. As a result of this study, a total of 32 bryozoan species from Gageodo Island waters are now reported.

Keywords: Bryozoa, *Celleporina costazii*, *Chorizopora brongniartii*, Korea, *Microporella marsupiata*

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Introduction

Gageodo Island is located at the southern end of the Yellow Sea, where it is about 140 km away from Mokpo, Korea and northern part of the East China Sea. As 29 bryozoan species are already recorded from Gageodo Island waters, it is presumptively proved that Gageodo Island waters shows diverse marine invertebrates fauna by influences of the Kuroshio Warm (Seo and Min, 2009) and the Yellow Sea Cold Current. *Electra tenella* (Hincks, 1880) was reported from Gageodo Island by Gong and Seo (2004) for the first time and then, Seo and Min (2009) added 28 species to the Gageodo Island fauna. They are as follows: *Tegella incrustans* Silén, 1941, *Antropora tincta* (Hastings, 1930), *Chaperia acanthia* (Lamouroux, 1825), *Bugula dentata* (Lamouroux, 1816), *Beania discodermiae* (Ortmann, 1890), *Amastigia rudis* (Busk, 1852), *Caberea boryi* (Audouin, 1826), *Caberea lata* Busk, 1852, *Scrupocellaria maderensis* Busk, 1860, *Tricellaria occidentalis* (Trask, 1857), *Steginoporella magnilabris* (Busk, 1854), *Thalamoporella lioticha* (Ortmann, 1890), *Cellaria punctata* (Busk, 1852), *Integripelta meta* Seo and Min, 2009, *Celleporaria aperta* (Hincks, 1882), *Celleporaria wakayamensis* (Okada and Mawatari, 1938), *Parasmittina contraria* Seo, 1993, *Parasmittina crosslandi* (Hastings, 1930), *Smittoidea pacifica* Soule and Soule, 1973, *Smittoidea prolifica* Osburn, 1952, *Metroperiella montferrandii* (Audouin, 1826), *Watersipora subtorquata* (d'Orbigny, 1852), *Schizoporella unicornis* (Johnston, 1847), *Calyptotheca wasinensis* (Waters, 1909), *Fenestrulina malusii* (Audouin, 1826), *Onchoporella selenoides* Ortmann, 1890, *Crepidacantha poissonii* (Audouin, 1826) and *Celleporina porosissima* (Okada, 1923). This study aims to redescribe three bryozoan species new to Gageodo Island, Korea with measurements of zooid, orifice, avicularia and ovicell.

Materials and Methods

Specimens were collected from the Gageodo Island in Korea. Collecting the specimens was done from various habitats such as rocky bottom, shells and other substrata in subtidal zone. They were preserved directly in 4% formalin or in 80% alcohol after collection. Specimens were photographed with a Nikon-D100 digital camera. Selected areas of the specimens were detached, dried in a Cressington-108 critical-point dryer, mounted with double-sided adhesive tape on aluminium SEM stubs, coated with gold in an ion-sputter coater (Hitachi E-1010), and examined under a scanning electron microscope (Hitachi-S 3000N at 25 kV accelerating voltage). The examined specimens were deposited in the National Institute of Biological Resources (NIBR), Incheon, Korea.

Systematic Accounts

Phylum Bryozoa Ehrenberg, 1831

Class Gymnolaemata Allman, 1856

Order Cheilostomata Busk, 1852

Family Chorizoporidae Vigneaux, 1949

Colony encrusting, translucent, unilaminar, fragile. Frontal wall of zooid imperforate centrally. Orifice D-shaped, spines lacking. Avicularia variable in shape. Pore-chambers tubular. Ovicell closed by zooidal operculum.

Genus *Chorizopora* Hincks, 1879

Colony encrusting. Orifice semicircular, closed by operculum. Frontal wall thin, imperforate. Avicularia variable in shape, small. Ovicell hyperstomial, prominent, closed by zooidal operculum. Interzooidal communication via tubular extensions of the pore-chambers. Small kenozooids present.

Type species: *Flustra brongniartii* Audouin, 1826

1. *Chorizopora brongniartii* (Audouin, 1826) (Fig. 1)

Flustra brongniartii Audouin, 1826: 240.

Chorizopora brongniartii Harmer, 1957: 948; Powell, 1967: 252; Hayward and Ryland 1979: 240-241, Figures 103; Gordon, 1984: 113, pl. 44, fig. C; Tilbrook *et al*. 2001: 64, Figure 8C; Tilbrook 2006: 102, Figure 17B-D; Dick *et al*. 2006: 2217-2218, Figure 7C, D.

Material examined. NIBRIV0000325940, Gaerinyeo Island, Gageodo Island, 13 Aug. 1998 by SCUBA diving from 18-23 m in depth.

Description. Colony encrusting, forming thin and broad incrustation on substratum, translucent, unilaminar, fragile. Zooids oval, flat or slightly convex, pores between zooids. Adjacent zooids linked by short tubules. Frontal wall smooth, hyaline, imperforate, fine transverse grained, with conical frontal umbo. Orifice semicircular, D-shaped, larger in ovicellate zooids. Avicularia interzooidal, small and round, or triangular, linked to adjacent zooids by communication tubes. Ovicell prominent, hyperstomial, smooth, imperforate, associated with an avicularium on its top.

Zooid ····· 387-478 × 215-267 μm
Orifice ····· 83-87 × 118-130 μm
Avicularia ····· 87-111 × 45-58 μm
Ovicell ····· 188-201 × 168-174 μm

Distribution. Korea, China, Philippines, Vanuatu, New Zealand, Galapagos Islands, Hawaii, British, Mediterranean Sea, Myanmar, Sri Lanka, South Africa. Red Sea.

Remarks. This species is apparently almost cosmopolitan, distributed through all the world's seas, except for polar waters (Hayward and Ryland, 1979). Korean spec-

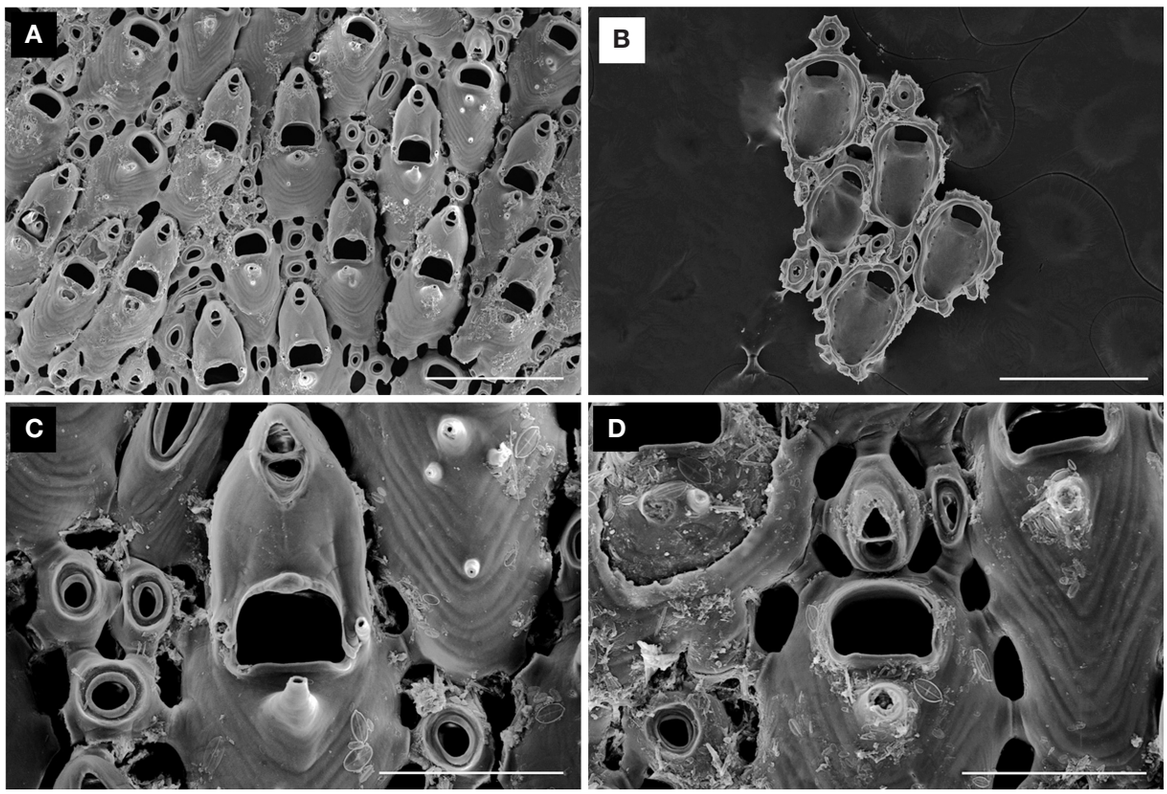

Fig. 1. *Chorizopora brongniartii* (Audouin, 1826). A, zooidal arrangement; B, basal view of zooids; C, orifice, avicularia of ovicell; D, orifice and avicularia. Scale bars: A, B. 500 μm. C, D. 200 μm.

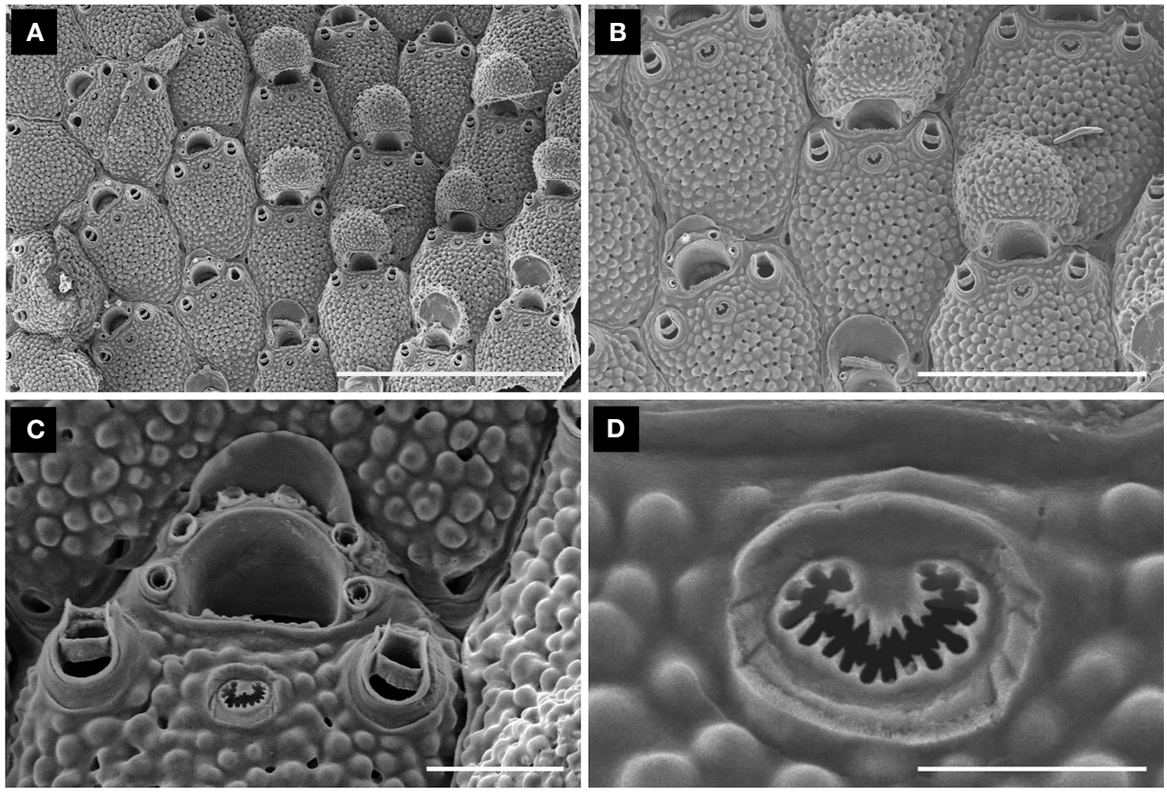

Fig. 2. *Microporella marsupiata* (Busk, 1860). A, zooidal arrangement; B, ovicell; C, orifice, spines and avicularia; D, ascopore. Scale bars: A. 1 mm. B. 100 μm. C. 200 μm. D. 50 μm.

imen is mostly similar to New Zealand's one (Gordon, 1984). However, the latter has no spines except on ancestrula, whereas the former has occasionally a pair of spines. Besides a few of small papillae are shown on the frontal wall of some zooids in Korean specimen.

Family Microporellidae Hincks, 1879
Genus *Microporella* Hincks, 1877

2. *Microporella marsupiata* (Busk, 1860) (Fig. 2)
Lepralia marsupiata Busk, 1860: 284.
Microporella coronata: Marcus, 1938: 235.
Microporella marsupiata: Hayward and Ryland, 1979: 220; Gordon, 1984: 102-103, pl. 39, figs. B, C.

Material examined. NIBRIV0000325938, Gaerinyeo Island, Gageodo Island, 13 Aug. 1998 by SCUBA diving from 18-23 m in depth.
Description. Colony encrusting. Zooid hexagonal, distinct, granular with numerous small pores. Orifice semicircular, wider than long and proximal rim with minutely saw-toothed. Oral spines 5-7, dark-brown chitinous bases. Ascopore crescentic and toothed. Avicularia usually paired, with ascopore at level, directed obliquely distally, round proximally, bluntly triagular distally, crossbar complete. Ovicell prominent, granular, and associated with a pair of oral spines.

Zooid	596-633 × 398-459 μm
Orifice	81-93 × 111-127 μm
Avicularia	69-75 × 43-53 μm
Ascopore	55-63 × 59-81 μm
Ovicell	186-202 × 269-308 μm

Distribution. Korea, New Zealand, Mediterranean Sea, SW English Channel, Madeira, Cape Verde Islands, Gulf of Guinea, Saint Helena.
Remarks. The zooids of Korean specimen are larger than in ones of New Zealand. In terms of numbers of oral spines, five is common in our specimen, whereas six to seven in New Zealand's one (Gordon, 1984).

Family Celleporidae Lamouroux, 1821
Genus *Celleporina* Gray, 1848

3. *Celleporina costazii* (Audouin, 1826) (Fig. 3)
Cellepora costazii Audouin, 1826: 237.
Celleporina costazii: Harmer, 1957: 901; Moyano, 1973:

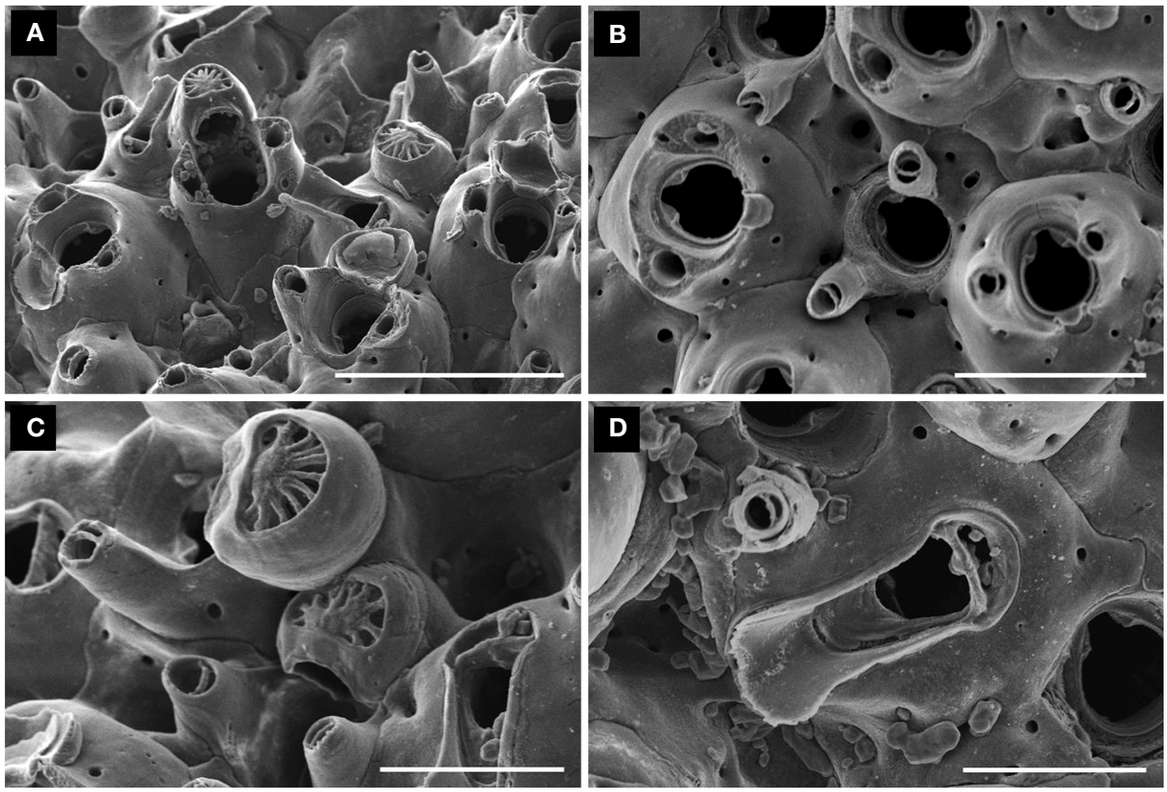

Fig. 3. *Celleporina costazii* (Audouin, 1826). A, zooidal arrangement; B, orifice and avicularia; C, ovicell; D, interzooidal avicularium. Scale bars: A. 500 μm. B. 300 μm. C, D. 200 μm.

13; Gordon, 1984: 114, pl. 45, fig. A.

Material examined. NIBRIV0000325939, Gaerinyeo Island, Gageodo Island, 13 Aug. 1998 by SCUBA diving from 18-23 m in depth.

Description. Colony encrusting multi-layered, massive but not growing large. Zooid not distinct, crowded, smooth surface with a few small marginal pores. Orifice with deep U-shaped sinus, high peristome and a pair of lateral avicularia with horizontal, rounded rostrum, complete bar. Interzooidal avicularium large spatulate with crossbar complete. Ovicell semicircular, prominent and broad flat tabula of 11 radiation rips. No spine found.

Zooid ····· 520 × 250 μm
Orifice ····· 171 × 182 μm
Avicularia ····· 246-338 × 108-122 μm
Lateral avicularia ····· 54-62 × 42-47 μm
Ovicell ····· 137 × 150 μm

Distribution. Korea, New Zealand, Easter Island, Red Sea, Sri Lanka, Timor, Indonesia.

Remarks. The number of radiation rips are about 18-21 in the specimens of New Zealand (Gordon, 1984), whereas 11 in Korean specimen.

Acknowledgements

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References

Audouin, J.V. 1826. Explication Sommaire des planches de polypes de I'Egypte et de la syrie Description de I'Egypte, Histoire Naturella 1:225-244 (cited from Ryland and Hayward, 1979).

Busk, G. 1852. Catalogue of marine Polyzoa in the collection of the British Museum. I. Cheilostomata. Trustees of the British Museum, London. pp. 1-54.

Busk, G. 1860. Catalogue of the Polyzoa collected by J. Y. Johnson, Esq., at Madeira, in the years 1859 and 1860, with descriptions of the new species. Quarterly Journal of Microscopical Science 8:280-285 (cited from Harmer, 1957).

Dick, M.H., K.J. Tilbrook and S.F. Mawatari. 2007. Diversity

and taxonomy of rocky-intertidal Bryozoa on the Island of Hawaii, USA. Journal of Natural History 40(38):2197-2258.

Gong, Y.H. and J.E. Seo. 2004. A taxonomic study on fouling bryozoans from Korea. Underwater Science and Technology 5(1):11-16.

Gordon, D.P. 1984. The marine fauna of New Zealand: Bryozoa: Gymnolaemata from the Kermadec Ridge. New Zealand Oceanographic Institute Memoir 91:1-198.

Harmer, S.F. 1957. Polyzoa of the Siboga Expedition, part IV. Cheilostomata-Ascophora II. Siboga-Expeditie, 28d:641-1147, pls. 42-74.

Hayward, P.J. and J.S. Ryland. 1979. British ascophoran bryozoans. Academic Press. London, New York and San Francisco, pp. 1-312.

Hincks, T. 1877. On British Polyzoa Part II. Classification. Annals and Magazine of Natural History (4) 20:520-532.

Hincks, T. 1879. On the classification of the British Polyzoa. Annals and Magazine of Natural History (5) 3:153-164.

Hincks, T. 1889. The Polyzoa of the St. Lawrence, a study of Arctic forms. Annals and Magazine of Natural History (6) 3:424-433 (cited from Gordon, 1984).

Marcus, E. 1938. Bryozoarios marinhos brasileiros II. Boletim da Faculdade de filosofia, ciências e letras, Universidade di Sao Paolo, Zoologia 2:1-137.

Moyano, G, H.I. 1973. Briozoos marinos Chilenos I. Briozoos de la Islas de Pascua I. Gayana Zoologia 26:1-22.

Powell, N.A. 1967. Polyzoa (Bryozoa)-Ascophora from north New Zealand. Discovery Reports XXXIV:199-394.

Seo, J.E. and B.S. Min. 2009. A Faunistic Study on Cheilostomatous Bryozoans from the Shoreline of South Korea, with Two New Species. Korean Journal of Systematic Zoology 25(1):19-40.

Tilbrook, K.J. 2006. Cheilostomatous Bryozoa from the Solomon Islands. Santa Barbara Museum of Natural History Monographs 4(Studies in Biodiversity Number 3):1-386.

Tilbrook, K.J., P.J. Hayward and D.P. Gordon. 2001. Cheilostomatous Bryozoa from Vanuatu. Zoological Journal of the Linnean Society 131(1):35-109.

Vigneaux, M. 1949. Révision des Bryozoaires néogènes du Bassin d'Aquitaine et essai de classification. Mémoires de la Société Géologique de France, n.s. 28:1-153 (cited from Gordon, 1984).

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