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# Freshwater bryozoans of Korea-observations on living colonies and three new records

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We performed a taxonomic study on Korean freshwater bryozoans with the materials collected from 70 localities during 2014 to 2016. A total of 14 Korean freshwater bryozoans are reported through this study. Among them, three Plumatellids, *Plumatella fungosa* (Pallas, 1768), *P. repens* (Linnaeus, 1758), and *P. reticulata* Wood, 1988, are newly added to the Korean fauna. Three species were redescribed with only their statoblasts: *Lophopodella carteri*, *Plumatella rugosa*, and *Stephanosella hina* (Seo, 1998; 2005; Chae *et al*., 2016). Their colonies were found in Korea for the first time in this study. Since *Fredericella sultana*, *Hyalinella punctata*, and *Plumatella casmiana* were reported from Korea (Toriumi, 1941), neither statoblast nor colony has been found, but we observed them. Living colonies of six species were photographed in the field. Furthermore, the statoblasts of nine species, including three species new to the Korean fauna, were also documented using scanning electron microscopy.

Keywords: Korean freshwater bryozoans, new records from Korea, *Plumatella*, *Plumatella fungosa*, *Plumatella repens*, *Plumatella reticulata*

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## Introduction

To date, 15 species of freshwater bryozoans have been reported in Korea (Toriumi, 1941; Seo, 1998; 2005; Jung *et al*., 2017; Chae *et al*., 2017), consisting of 12 phylactolaemates and three gymnolaemates. They are as follows: *Asajirella gelatinosa*, *Lophopodella carteri*, *Fredericella indica*, *F. sultana*, *Gelatinella toanensis*, *Hyalinella punctata*, *Plumatella casmiana*, *Pl. emarginata*, *Pl. mukaii*, *Pl. rugosa*, *Pectinatella magnifica*, *Stephanella hina*, *Victorella pavida*, *Paludicella articulata*, and *Hislopia prolixa*. Of 15 species, *F. sultana*, *Hy. punctata*, *Pl. casmiana*, and *G. toanensis* were not found as neither colony nor statoblast from Korea yet since Toriumi (1941). No colonies have yet to be found from Korean freshwater of *L. carteri*, *F. indica*, *P. rugosa*, and *S. hina*.

This study clarifies the diversity of the Korean freshwater bryozoans by providing distributional data, brief redescriptions, and photographs of three species new to the Korean fauna. Additionally, the living colonies and statoblasts of aforementioned six species found in this study are shown with their photographs herein.

## Materials and Methods

The materials examined in the present study were collected from 70 localities of natural and artificial reservoirs, rivers, wetlands, and ponds in Korea from 2014 to 2016 (Fig. 1). The freshwater bryozoan colonies and statoblasts (sessoblast and floatoblast) attached to substrata such as rocks, water caltrop, plastic bottles, plastic bags, and wood. These items were collected on the shore of the sampling locality with a lot of sediment. In addition, scuba diving was used to collect the colonies and statoblasts from Sejong Weir, Gongju Weir, Bakje Weir, and Daecheong Reservoir. The floatoblasts on the water surface were collected using a net. Most specimens, including colonies and statoblasts, were preserved in 95% alcohol. When living colonies were sometimes found, they were kept alive and transported to the laboratory for the microscopical study.

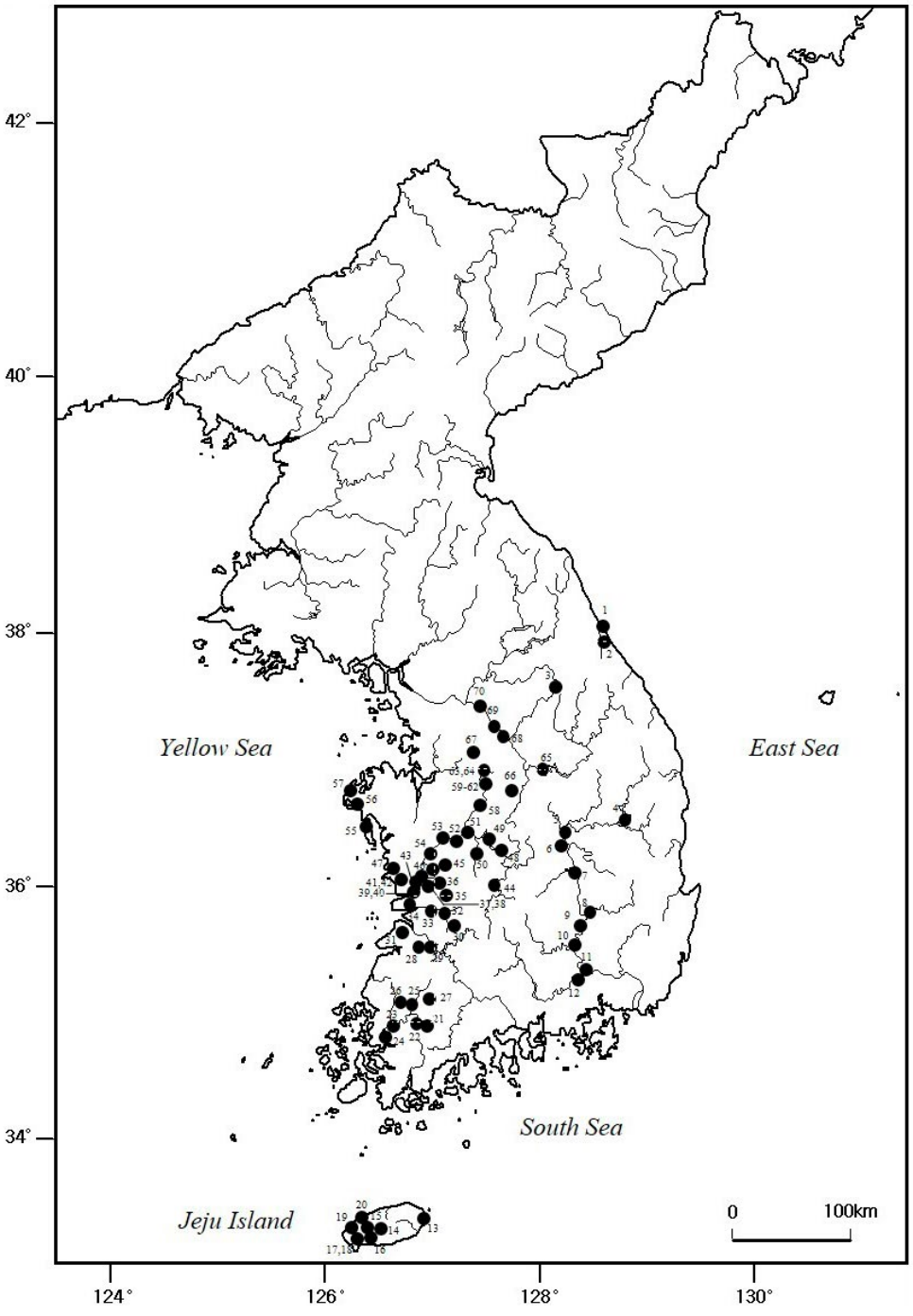



**Fig. 1.** Map showing the sampling localities from 2014 to 2016. 1, Hyangho Reservoir; 2, Sunpo Wetland; 3, Maok Reservoir; 4, Banbyeon Stream; 5, Sangju Weir; 6, Nakdan Weir; 7, Chilgok Weir; 8, Samunjin Bridge; 9, Dalseong Weir; 10, Hapcheon-Changnyeong Weir; 11, Changnyeong-Haman Weir; 12, Namji Bridge; 13, Ojori Pond; 14, Wonmul Pond; 15, Geumoreum; 16, Sasaengi Pond; 17, Suwori Pond; 18, Bungurut Pond; 19, Yongsu Reservoir; 20, Susan Reservoir; 21, Songhyeon Reservoir; 22, Jogang Reservoir; 23, Juksan Weir; 24, Yeongsan River; 25, Seungchon Weir; 26, Cheongam Pond; 27, Gwangju Reservoir; 28, Dongrim Reservoir; 29, Aedang Reservoir; 30, Andeok Reservoir; 31, Chongho Reservoir; 32, Mangyeong Stream; 33, Mangyeong River; 34, Daewi Reservoir; 35, Wonsu Reservoir; 36, Geumma Reservoir; 37, Dochon Reservoir; 38, Sungrim Reservoir; 39, Seoji Reservoir; 40, Geumgang Estuary; 41, Heungrim Reservoir; 42, Bongseon Reservoir; 43, Ungpo Bridge; 44, Mujigae Bridge; 45, Tapjeong Reservoir; 46, Hwangsan Bridge; 47, Juhang Reservoir; 48, Bocheong Stream; 49, Daecheong Reservoir; 50, Gap Stream; 51, Sejong Weir; 52, Daegyo Stream; 53, Gongju Weir; 54, Bakje Weir; 55, Changgi Reservoir; 56, Suryong Reservoir; 57, Malli Reservoir; 58, Jakcheon Reservoir; 59, Nongdari Stone Bridge; 60, Chopyeong Reservoir; 61, Baekgok Stream; 62, Miho Stream; 63, Baekgok Reservoir; 64, Daetgol Reservoir; 65, Chungju Reservoir; 66, Mungwang Reservoir; 67, Gwanghyewon Reservoir; 68, Gangcheon Weir; 69, Yeoju Weir; 70, Ipo Weir.

For identification, the external features of zooids and statoblasts were observed under a stereomicroscope (Stemi SV6, Carl Zeiss, Germany), and statoblasts were coated with gold in an ion sputter coater, prior to examination with a mini scanning electron microscope (SEM) (SNE-3200M, SEC, Korea) at 15 kV accelerating voltage. Measurements were made on SEM images using Image J.

## Systematics

Single asterisk (*) indicates the species that are newly added to the Korean bryozoan fauna.

Class Phylactolaemata Allman, 1856
Order Plumatellida Allman, 1856
Family Lophopodidae Rogick, 1935
Genus *Asajirella* Oda and Mukai, 1989

**1. *Asajirella gelatinosa* (Oka, 1891)** 아사지로이끼벌레

**Material examined.** Mujigae Bridge, 15 September 2014; Daecheong Reservoir, 17 September 2014; Chopyeong Reservoir, 6 October 2014; Andeok Reservoir, 29 May 2015; Seoji Reservoir, 2 July 2015; Seungchon Weir, 10 October 2015; Daegyo Stream, 18 October 2015; Chungju Reservoir, 2 November 2015; Gwanghyewon Reservoir, 4 April 2016; Daetgol Reservoir, 6 April 2016; Baekgok Stream, 22 September 2016; Sejong Weir, 8 June 2016; Maok Reservoir, 16 August 2016; Hyangho Reservoir, 17 August 2016; Sunpo Wetland, 18 August 2016; Bongseon Reservoir, 11 October 2016.
**Substratum.** Wood, water grass and rock.
**Remarks.** *Asajirella gelatinosa* was found not only in freshwater, but also in a brackish environment, Hyangho Reservoir with high values of salinity and conductivity (salinity: 8.56 ppt and conductivity: 14,878 μS/cm). The Hyangho Reservoir is influenced by the East Sea nearby because it is located next to Hyangho Beach. Only *Victorella pavida*, which is known to occur in a brackish water (Wood and Okamura, 2005), was reported in this reservoir so far (Jung *et al*., 2017). Since there was no previous report of *A. gelatinosa* occurring in brackish environment, this species needs consist monitoring in brackish waters.
**Distribution.** Korea, Japan, Taiwan, Thailand, India, Ceylon, Panama, Indonesia, and West Java.

Genus *Lophopodella* Rousselet, 1904

**2. *Lophopodella carteri* (Hyatt, 1866) (Fig. 2)**
총담이끼벌레

**Material examined.** Sejong Weir, 23 September 2014; Baekgok Reservoir, 30 September 2016.
**Substratum.** Wood.
**Remarks.** In Korea, this species has been reported with only floatoblasts by Seo (1998; 2005; 2011), because no colony was ever found from Korean freshwater. We fortunately collected only one colony attached to some wood at Sejong Weir. Young colony with only 9 zooids is about 2 mm in diameter, very small, transparent, soft, and gelatinous (Fig. 2A). Short tubular zooids are arranged concentrically and have up to 70–85 tentacles. It was easy to identify the species by its characteristic spines at both sides of the floatoblast (Fig. 2B) taken out of the colony.
**Distribution.** Korea, Japan, China, Taiwan, Myanmar, India, Java, Israel, Australia, North America, and Africa.

Family Fredericellidae Hyatt, 1868
Genus *Fredericella* Gervais, 1838

**3. *Fredericella sultana* (Blumenbach, 1779) (Fig. 3)**
둥근총담이끼벌레

**Material examined.** Mangyeong Stream, 34.1585°N, 126.7689°E, 6 September 2016.

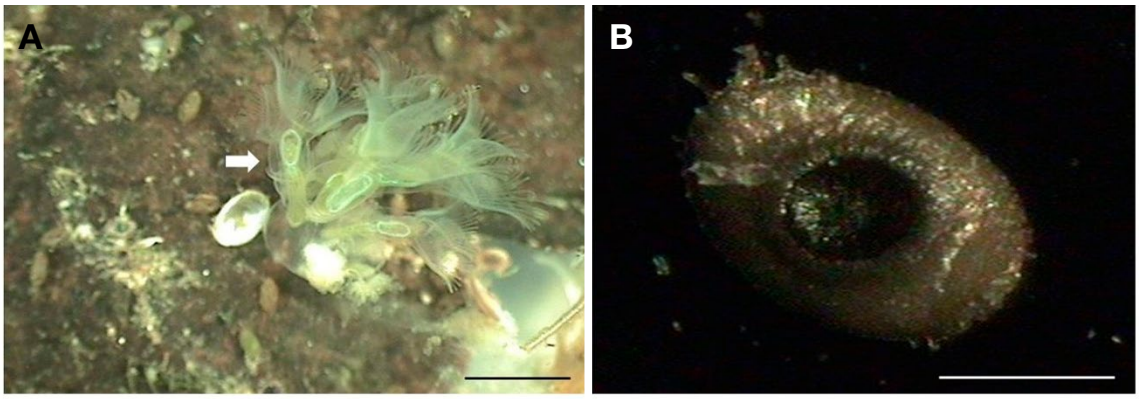



**Fig. 2.** *Lophopodella carteri* (Hyatt, 1866). A, Colony (white arrow); B, Floatoblast. Scale bars: A = 3 mm, B = 500 μm.

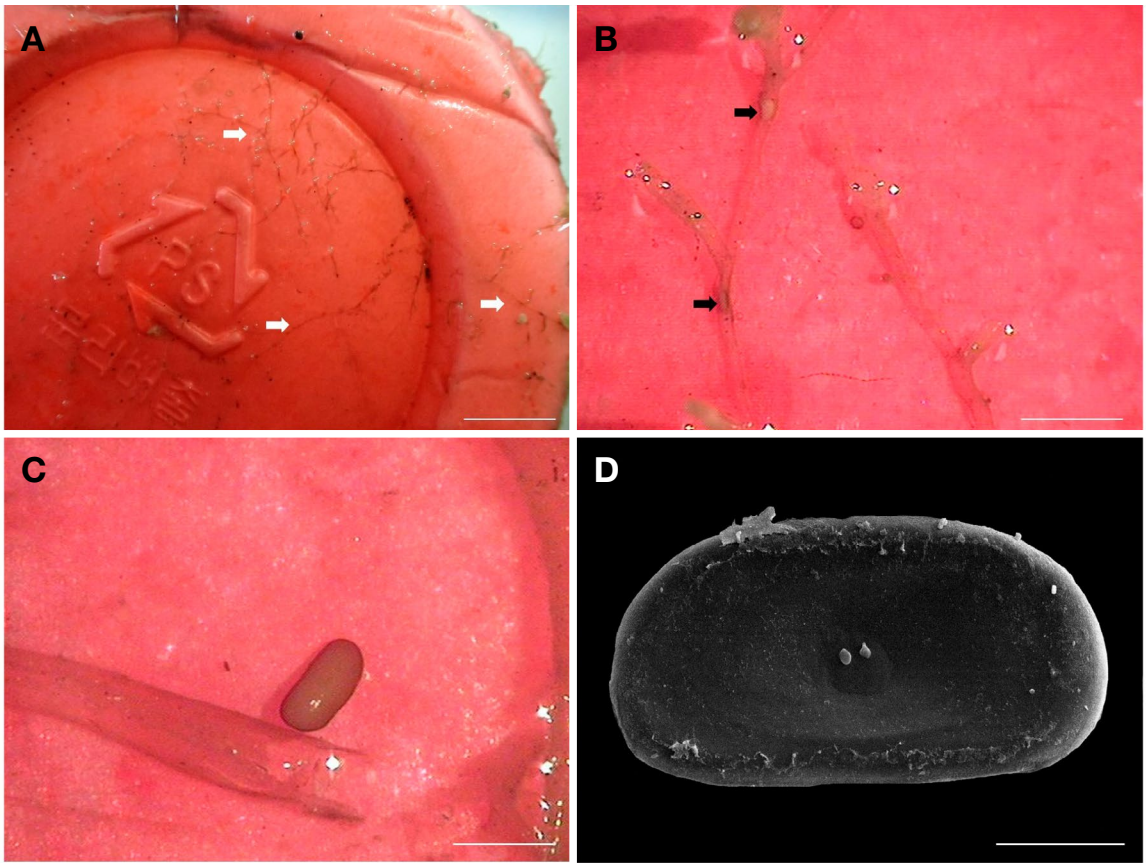



**Fig. 3.** *Fredericella sultana* (Blumenbach, 1779). A, Colonies (white arrows); B, Piptoblasts (black arrows), within colony; C, D, Piptoblast. Scale bars: A = 1 cm, B = 1 mm, C = 300 μm, D = 100 μm.

**Substratum.** Plastic bottle.
**Remarks.** *Fredericella sultana* was reported for the first time in Korea by Toriumi (1941). Since then, neither colony nor statoblast was found from Korean freshwater until 2016. Thus, this species was redescribed based on the literature in encyclopedia on bryozoans from Korea (Seo, 2005). Finally, both colony and piptoblast were found in this study. Colony is slender, fragile, freely branched, and transparent to light brownish in color (Fig. 3A, B). Zooid is shaped slender tubules and upright from the substratum and its ectocyst is weakly chitinized (Fig. 3B, C). Piptoblast within the colony is broadly oval or round with smooth surface and has no annulus. Long sides of piptoblast are nearly straight, parallel with rounded ends and 175.8–179.7 μm long and 321.4–367.5 μm wide in size. Its length/width ratio is about 1.9 (Fig. 3D).

In Korea, there are only two species of the genus *Fredericella*, *F. indica* and *F. sultana*. The surface of the piptoblast of *F. sultana* is smooth, whereas one of *F. indica* is strongly reticulate.
**Distribution.** Korea, Japan, Australia, New Zealand, Britain, Ireland, and Europe.

Family Plumatellidae Allman, 1856
Genus *Hyalinella* Jullien, 1885

**4. *Hyalinella punctata* (Hancock, 1850) (Fig. 4)**
점유리이끼벌레

**Material examined.** Sejong Weir, 23 September 2014.
**Substratum.** Rope and paddlewheel.
**Remarks.** The colonies and floatoblasts of *Hyalinella punctata* attached to the rope and paddlewheel were obtained from Sejong Weir, since Toriumi (1941) reported from Korea. Colonies are sparsely branching tubule-shaped, thick-walled, transparent near white, gelatinous, smooth and resilient (Fig. 4A). Zooids are slightly upright from the branch attached to the substratum and have 41–46 tentacles (Fig. 4B). Floatoblasts are lengthy oval (270–420 μm long and 0.22–0.31 μm wide) with dark brown to black fenestra covered with fine tubercles. Young floatoblasts in zooid are white (Fig. 4C). *H. punctata* is known to have only floatoblast of statoblast.

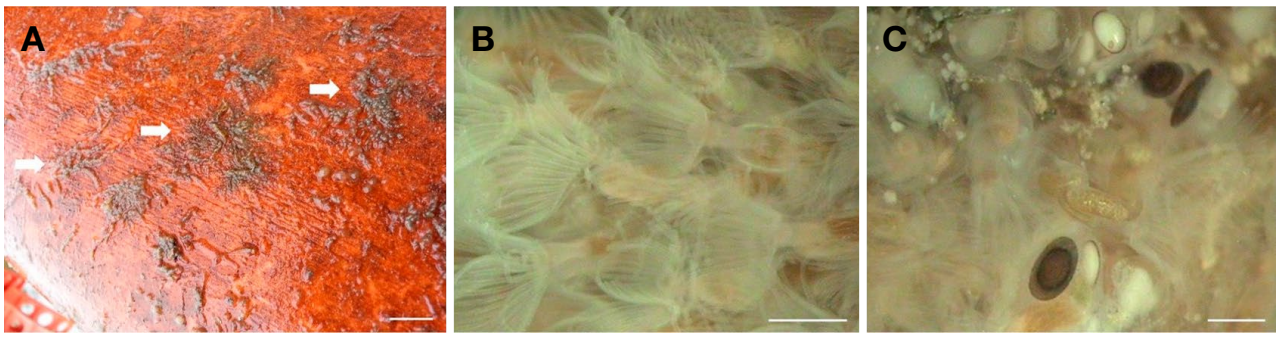



**Fig. 4.** *Hyalinella punctata* (Hancock, 1850). A, Habitat, paddlewheel (white arrows: colonies); B, Tentacles; C, Floatoblast, young floatoblast in zooid. Scale bars: A = 2 cm, B = 500 μm, C = 300 μm.

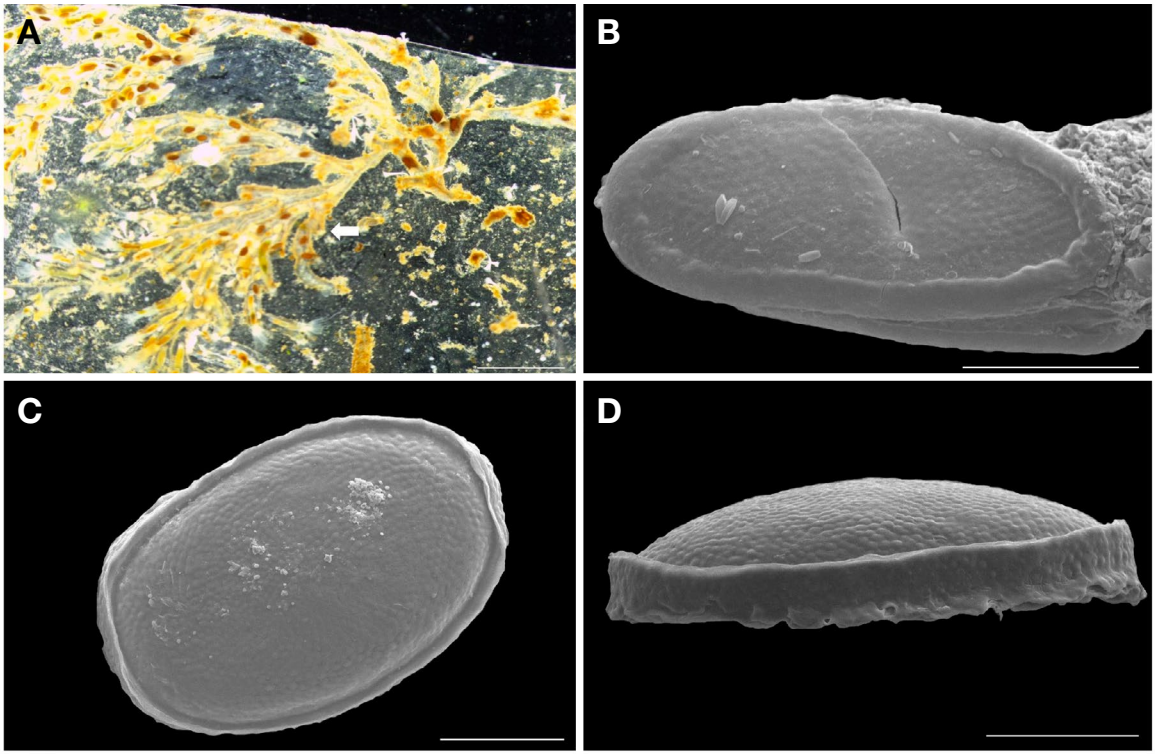



**Fig. 5.** *Plumatella casmiana* Oka, 1907. A, Colony (white arrow); B, Leptoblast; C, Dorsal view, Sessoblast; D, Lateral view, sessoblast. Scale bars: A = 2 mm, B–D = 100 μm.

**Distribution.** Korea, Japan, Taiwan, Australia, Africa, Europe, North and South America.

Genus *Plumatella* Lamarck, 1816

**5. *Plumatella casmiana* Oka, 1907 (Fig. 5)**
카스미깃털이끼벌레

**Material examined.** Dongrim Reservoir, 10 July 2015; Chopyeong Reservoir, 2 August 2016; Baekgok Reservoir, 30 September 2016.

**Substratum.** Wood and plastic.

**Remarks.** We collected the colony and two different statoblasts, leptoblasts, and sessoblasts, for the first time since Toriumi (1941) reported from the Korea. Colony is light brown to sandish in color, short branched and entirely attached to substratum (Fig. 5A). Leptoblast unique to *Pl. casmiana* (Wood and Okamura, 2005) is elliptical, 288–320 μm long and 124–155 μm wide, with length/width ratio of about 2.2 (Fig. 5B), lacks the internal capsule, and has shallow tubercles on the surface and narrow annulus. Sessoblast is tuberculated weakly on the surface,

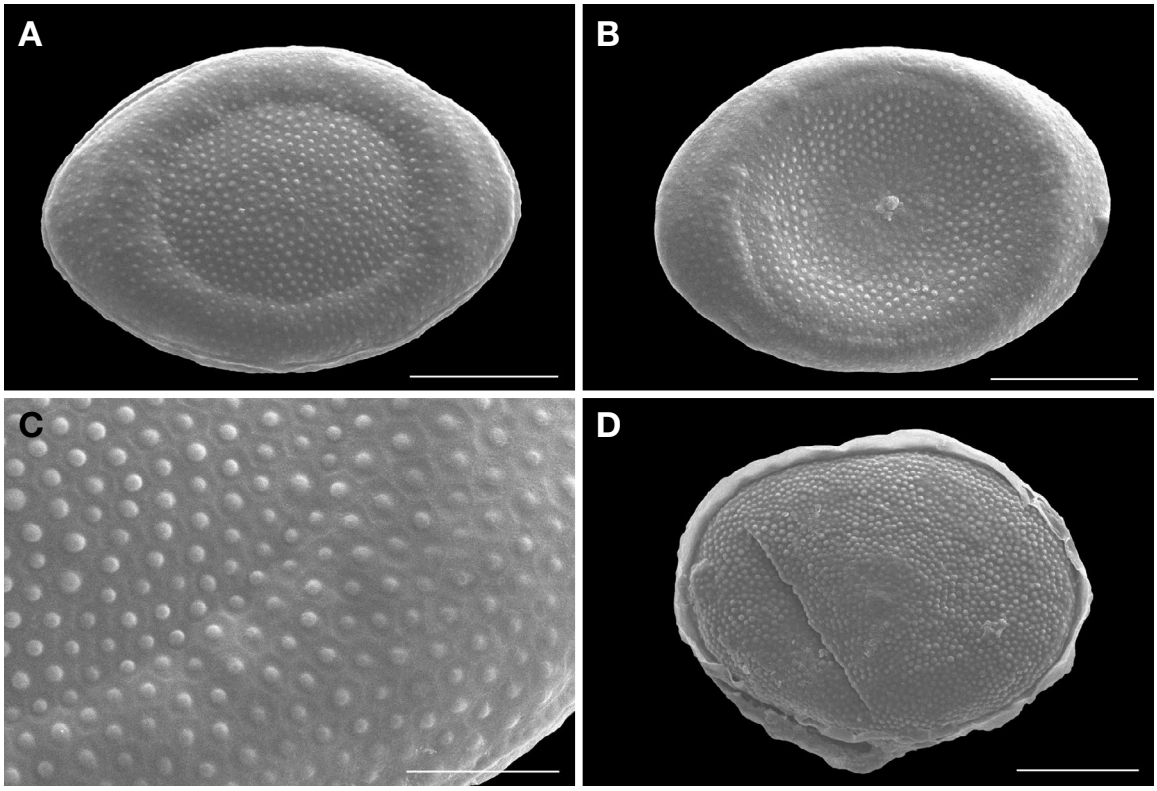



**Fig. 6.** *Plumatella fungosa* (Pallas, 1768). A, Dorsal view, flatoblast; B, Ventral view, flatoblast; C, Annulus and fenestra in detail; D, Sessoblast. Scale bars: A, B, D = 100 μm, C = 30 μm.

but nearly smooth. It is 341–345 μm long and 234–241 μm wide, with length/width ratio of about 1.4 and narrow and smooth annulus (Fig. 5C, D).
**Distribution.** Korea and Cosmopolitan.

**6. *Plumatella emarginata* Allman, 1844**
톱니깃털이끼벌레

**Material examined.** Baekgok Stream, 22 September 2016.
**Substratum.** Plastic bag.
**Distribution.** Korea and worldwide.

***7. *Plumatella fungosa* (Pallas, 1768) (Fig. 6)**
곰팡이깃털이끼벌레 (신칭)

*Tubularia fungosa* Pallas, 1768: 565–572.
*Plumatella fungosa* Massard and Geimer, 1991a: 246, Pl. 1, fig. 2; 1991b: 152, figs. 3–6; Wood and Okamura, 2005: 57, 86–88, figs. 27, 28, 50, 51; Hirose and Mawatari, 2011b: 13, fig. 5B.

**Material examined.** Baekgok Stream, 22 September 2016; NIBRIV0000777398, NIBRIV0000777399, Sejong Weir, 8 June 2016; Sunpo Wetland, 18 August 2016.
**Substratum.** Wood.

**Description.** Floatoblast oval to elliptical, laterally asymmetrical, 296–344 μm long by 211–266 μm wide, length/width ratio of about 1.3. Dorsal fenestra almost round, relatively small, 156–164 μm long by 123–152 μm wide (Fig. 6A). Ventral fenestra larger, oval, almost circular, often with a central prominence, 199–239 μm long by 164–201 μm wide (Fig. 6B). Surface of dorsal, ventral, and annulus uniformly tuberculate and reticulate (Fig. 6C). Ventral strongly convex and dorsal almost flat. Sessoblasts oval, completely covered with uniform tubercles, annulus narrow and smooth, 338.2 μm long by 263.15 μm wide, fenestra 311.51 μm long by 233.38 μm wide, annulus 12.54–16.31 μm (Fig. 6D).
**Remarks.** *Plumatella fungosa* was easily confused with both *Pl. repens* and *Pl. rugosa* before SEM was used for the observation of statoblast. Wood and Okamura (2005) provided with major morphological differences between the statoblasts of the three species for their identification. Also, the reticulation and tuberculation on the fenestra and annulus of the statoblast are different from those of *Pl. repens* and *Pl. rugosa*.
**Distribution.** Korea, Japan, and Europe.

**8. *Plumatella mukaii* Wood, 2001** 무카이깃털이끼벌레

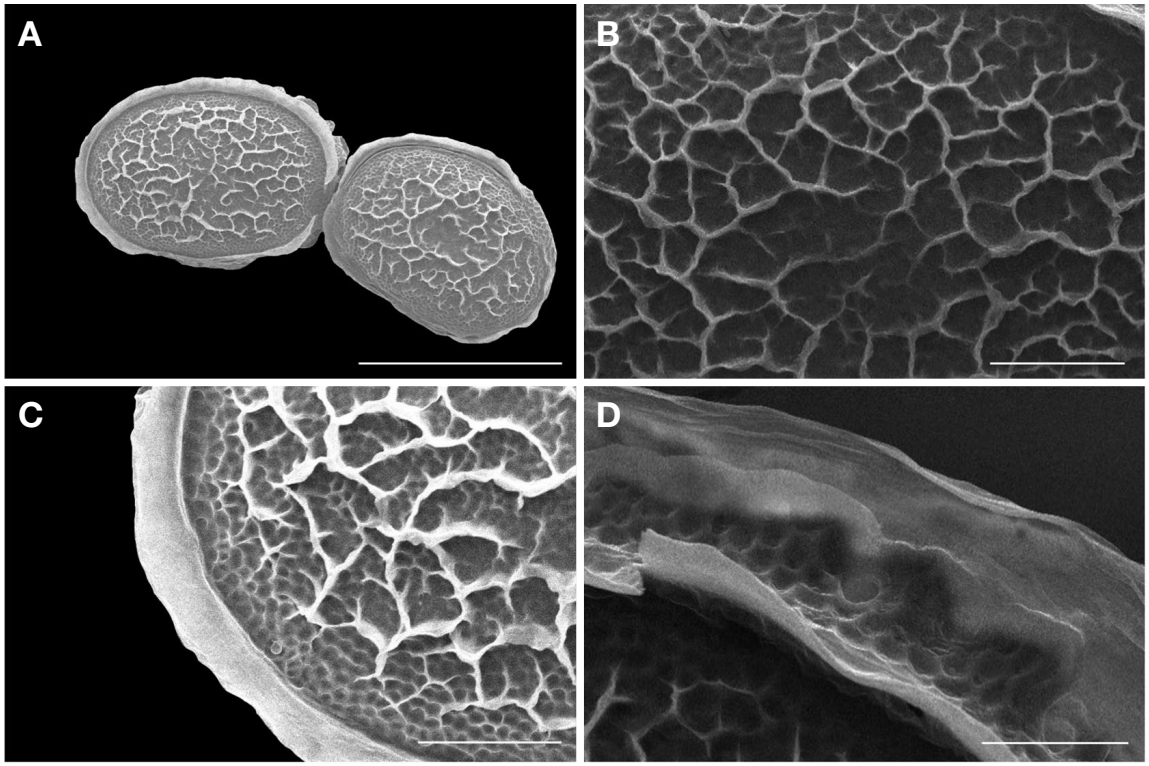



**Fig. 7.** *Plumatella reticulata* Wood 1988. A, Sessoblasts; B, Reticulated irregular ridges on the frontal fenestra of A; C, Annulus; D, Lateral wall, sessoblast. Scale bars: A = 100 μm, B, C = 50 μm, D = 30 μm.

**Material examined.** Changgi Reservoir, 25 October 2015; Dochon Reservoir, 14 May 2016.
**Substratum.** Plastic (styrofoam).
**Distribution.** Korea, Japan, Indonesia, and Chile.

***9. *Plumatella reticulata* Wood, 1988 (Fig. 7)**
그물깃털이끼벌레 (신칭)

*Plumatella reticulata* Wood, 1988: 102, figs. A–E; Massard *et al*., 1992: 203, figs. 2–7; Wood and Okamura, 2005: 49, 84, fig. 19.

**Material examined.** Yeoju Weir, 10 June 2016; NIBRIV0000777400, NIBRIV0000777401, Gongju Weir, 8 June 2016.
**Substratum.** Wood.
**Description.** Sessoblasts round to oval, 287 μm long by 201 μm wide, dark reticulated irregular ridges on frontal fenestra (Fig. 7A, B). Annulus smooth, on upper side (Fig. 7C). Lateral wall reticulation (Fig. 7D).
**Remarks.** Only sessoblasts without colony were found in this study. The sessoblast of this species is unique in shape in having dark reticulated irregular ridges on the frontal fenestra.
**Distribution.** Korea, Japan, North America, Israel, and Australia.

***10. *Plumatella repens* (Linnaeus, 1758) (Fig. 8)**
기는깃털이끼벌레 (신칭)

*Tubipora repens* Linnaeus, 1758: 790.
*Plumatella repens*; Wood *et al*., 1998: 642, figs. 7, 11; Wood and Okamura, 2005: 59, 89, figs. 29b, 30, 31, 52; Hirose and Mawatari, 2011a: 7, fig. 2E.

**Material examined.** NIBRIV0000909399, Daewi Reservoir, 19 May 2016; Chopyong Reservoir, 2 August 2016.
**Substratum.** Unknown.
**Description.** Floatoblast oval, brown, prominence on both sides, 284 μm long by 207 μm wide, with length/width ratio of about 1.4. Ventral fenestra of almost circular, 122 μm long by 108 μm wide, covered with rounded tubercles on reticulation (Fig. 8A, B). Annulus smooth (Fig. 8C, D).
**Remarks.** This species is reported from Korea for the first time. Only floatoblasts were found. The shape of statoblasts is essential for identification (Wood and Okamura, 2005). Notably, *Pl. fungosa* and *P. rugosa* may have been misidentified as *Pl. repens*, because their statoblasts look similar to each other. The annulus of three species is distinguished with each other by SEM photography only. *Plumatella repens* is distinguished from both *Pl. fungosa* and *Pl. rugosa* by having a smooth annulus.

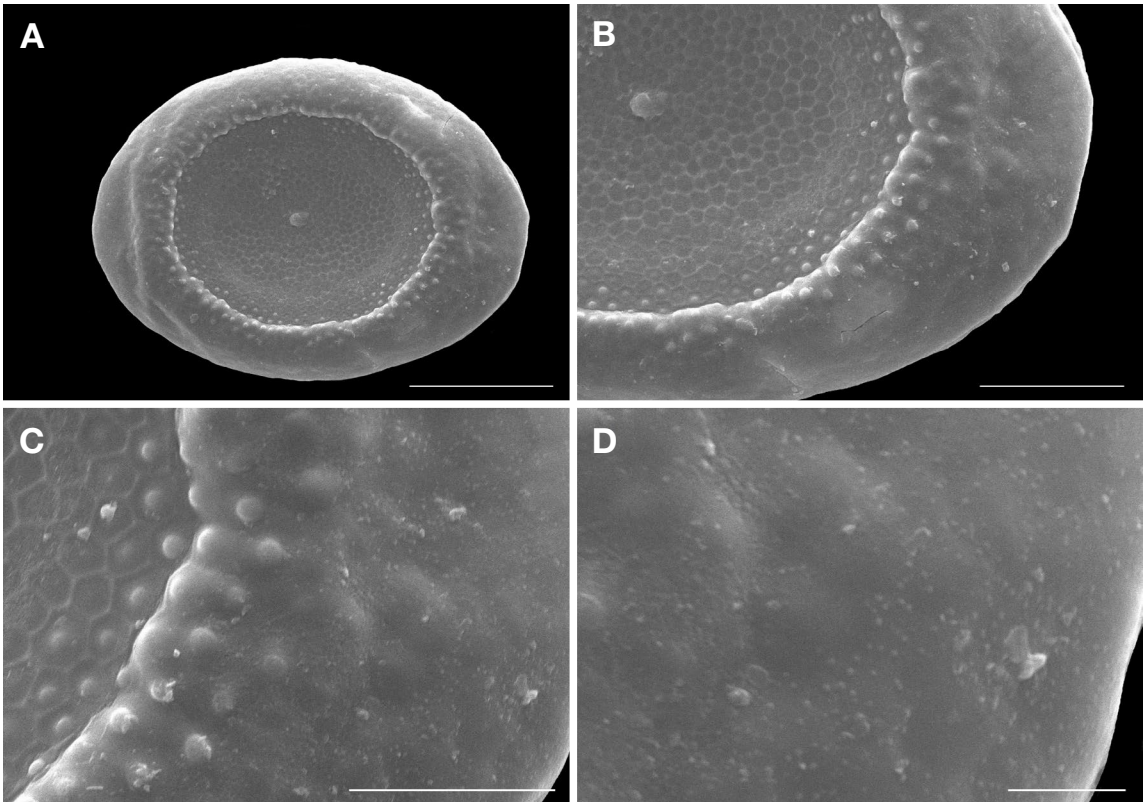



**Fig. 8.** *Plumatella repens* (Linnaeus, 1758). A, Ventral, flatoblast; B, C, Enlarged view of the annulus and fenestra in A; D, Annulus. Scale bars: A = 100 μm, B = 50 μm, C, D = 10 μm.

**Distribution.** Korea and *Plumatella repens* is common, and broadly distributed worldwide (Hirose and Mawatari, 2011a).

### 11. *Plumatella rugosa* Wood, Wood, Geimer and Massard, 1988 (Fig. 9) 주름깃털이끼벌레

**Material examined.** Gongju Weir, 26 May 2015; Chongho Reservoir, 2 May 2016; Malli Reservoir, 3 June 2016; Chopyong Reservoir, 2 August 2016; Bongseon Reservoir, 11 October 2016.
**Substratum.** Wood.
**Remarks.** Chae *et al*. (2017) reported *Pl. rugosa* with only floatoblast without the colony. In this study, we obtained colonies which are light brown to dark brown in color including both long and short branches. The colony is firmly attached to the substratum, such as wood, but raised at their tips (Fig. 9A). The flostoblast is also shown here (Fig. 9B–D).
**Distribution.** Korea, Japan, Italy, North America, and New Zealand.

Genus *Stephanella* Oka, 1908

### 12. *Stephanella hina* Oka, 1908 (Fig. 10) 왕관이끼벌레

**Material examined.** Andeok Reservoir, 29 May 2015; Changgi Reservoir, 25 October 2015; Sungrim Reservoir, 9 April 2016; Daewi Reservoir, 19 May 2016; Chopyong Reservoir, 2 August 2016.
**Substratum.** Rope.
**Remarks.** *Stephanella hina* is known as a species that is not easy to find a colony (Hirose and Mawatari, 2011b). Instead, this species has rounded floatoblast unique in its shape, which is observed only in this species of all the freshwater bryozoans. Only in the Andeok Reservoir, a small colony with many rounded floatoblasts inside was collected (Fig. 10A, B). The transparent tubular zooids are embedded in the delicate gelatinous colony (Fig. 10A).
**Distribution.** Korea, Japan, and North America.

Family Pectinatellidae Lacourt, 1968
Genus *Pectinatella* Leidy, 1851

### 13. *Pectinatella magnifica* (Leidy, 1851) 큰빗이끼벌레

**Material examined.** Sejong Weir, 13 July 2014; Gongju Weir, 13 July 2014; Andek Reservoir, 29 July 2014;

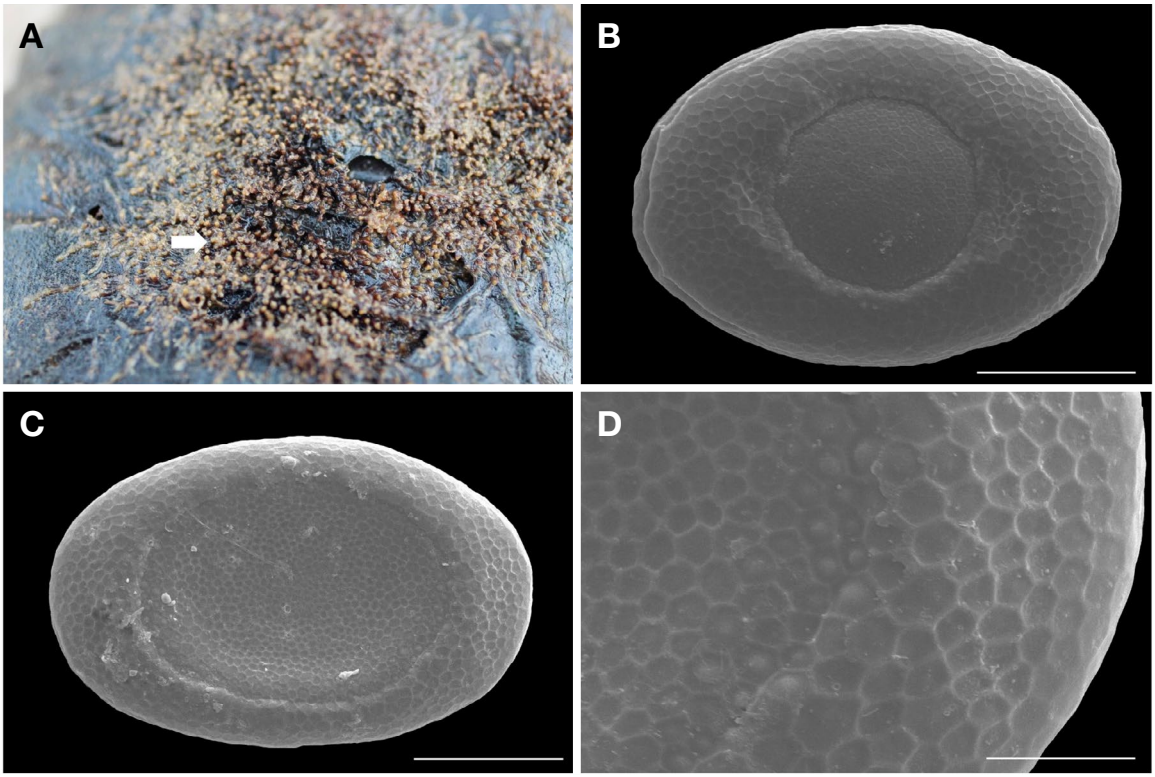



**Fig. 9.** *Plumatella rugosa* Wood, Wood, Geimer and Massard, 1988. A, Colony (white arrow); B, Dorsal view, flatoblast; C, Ventral view, flatoblast; D, Enlarged view of the annulus and fenestra in C. Scale bars: B, C = 100 μm, D = 30 μm.

Mangyeong River, 9 August 2014; Bakje Weir, 10 August 2014; Daecheong Reservoir, 16 August 2014; Ungpo Bridge, 30 September 2014; Hwangsan Bridge, 30 September 2014; Geumgang Estuary, 30 September 2014; Gap Stream, 15 October 2014; Tapjeong Reservoir, 2 November 2014: 26 June 2015; Heungrim Reservoir, 21 April 2015; Wonsu Reservoir, 23 April 2015; Yeongsan River, 3 June 2015; Sangju Weir, 17 June 2015; Banbyeon Stream, 17 June 2015; Nakdan Weir, 17 June 2015; Chilgok Weir, 17 June 2015; Dalseong Weir, 17 June 2015; Samunjin Bridge, 17 June 2015; Hapcheon-Changnyeong Weir, 18 June 2015; Namji Bridge, 18 June 2015; Changnyeong-Haman Weir, 18 June 2015; Geumma Reservoir, 27 June 2015; Aedang Reservoir, 10 July 2015; Gwangju Reservoir, 28 October 2015; Seungchon Weir, 10 August 2015; Juksan Weir, 10 August 2015; Songhyeon Reservoir, 2 August 2015; Juhang Reservoir, 28 September 2015; Sungrim Reservoir, 28 September 2015; Jakcheon Reservoir, 29, October 2015; Bocheong Stream, 3 November 2015; Gangcheon Weir, 18 March 2016; Ipo Weir, 19 March 2016; Suryong Reservoir, 3 June 2016; Gwanghyewon Reservoir, 9 June 2016; Jogang Reservoir, 21 August 2016; Cheongam Pond, 21 August 2016; Chopyong Reservoir, 2 August 2016; Yeoju Weir, 3 August 2016; Miho Stream, 4 August 2016; Bongseon Reservoir, 11 October 2016; Mungwang Reservoir, 6 November 2016.

**Substratum.** Wood, stone, rope and man-made structures.

**Remarks.** Since *Pectinatella magnifica* was first reported in Korea by Seo (1998), this species has spread widely and became the most common species on the mainland of Korea now.

**Distribution.** Korea and Cosmopolitan.

Class Gymnolaemata Allman, 1856
Order Ctenostomata Busk, 1852
Family Hislopiidae Jullien, 1885
Genus *Hislopia* Carter, 1858

### 14. *Hislopia prolixa* Hirose and Mawatari, 2011
긴히슬롭이끼벌레

*Hislopia prolixa* Hirose and Mawatari, 2011b: 19, figs. 8–11; Jung *et al*., 2017: 39, figs. 2, 3.

**Material examined.** Nongdari Stone Bridge, 28 July 2017.

**Substratum.** Stone and plastic bottles.

**Remarks.** All synonyms except Hislopia prolixa in Jung *et al*. (2017) should be deleted (mistake by the authors).

**Distribution.** Korea and Japan.

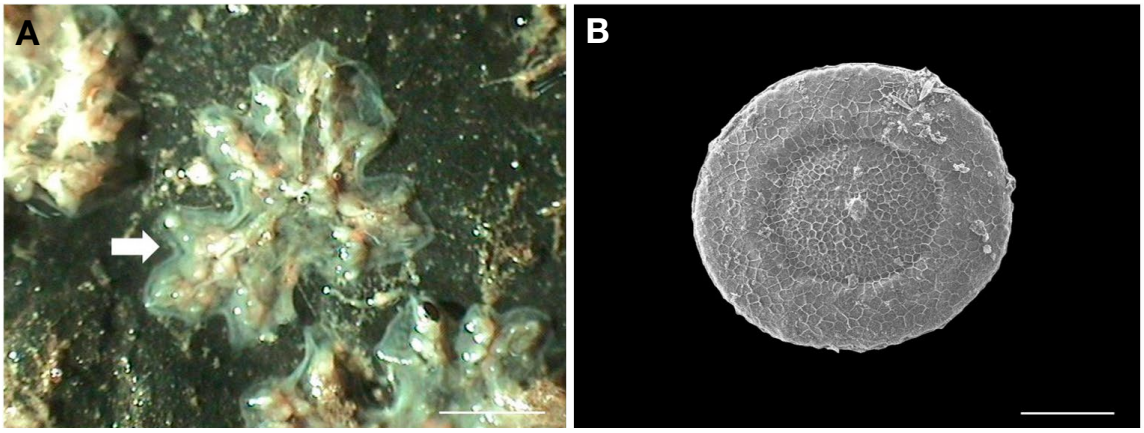



**Fig. 10.** *Stephanella hina* Oka, 1908. A, Colony (white arrow); B, Dorsal view, floatoblast. Scale bars: A = 3 mm; B = 100 μm.

## Discussion

Among 14 Korean freshwater bryozoans reported in this study, three Plumatellids, *Pl. fungosa* (Pallas, 1768), *Pl. repens* (Linnaeus, 1758), and *Pl. reticulata* Wood, 1988, are newly added to the Korean fauna. Accordingly, Korean freshwater bryozoans include a total of 18 species, including 15 phylactolaemates and three gymnolaemates. In addition, six species, *L. carteri* (Hyatt, 1866), *F. sultana* Blumenbach, 1779, *Hy. punctata* (Hancock, 1850), *Pl. casmiana* Oka, 1907, *Pl. rugosa* Wood, Wood, Geimer and Massard, 1988, and *S. hina* Oka, 1908, are remarked with their colonies found in the present study. The statoblasts of *F. sultana* and *Pl. casmiana* were observed herein as well.

In this study, colonies of *A. gelatinosa* were observed in the Hyangho Reservoir of Gangwon-do, which represent brackish environments, and is also where the brackish species *Victorella pavida* was reported by Jung *et al*. (2017). The authors described the environment of these as follows (Jung *et al*., 2017): "Hyangho is practically adjacent to the East Sea and the high values for salinity and conductivity demonstrate the marine influence". Depending on the growth of the colonies, it is expected to live in brackish environments, but since there is no report from brackish water in other countries, additional monitoring and research are needed.

Of 18 Korean freshwater bryozoans, *Pl. toanensis* (Hôzawa and Toriumi, 1940) is the only species which was not found from Korean freshwater as either colony or statoblast since 10 species were reported by Toriumi (1941). Thus, this species needs be synonymized into *Gelatinosa toanensis* (Toriumi, 1955; Mukai, 1982). *Gelatinella toanensis* (Hôzawa and Toriumi, 1940) was regarded as highly restricted in their distribution with *S. hina*, *Internectella bulgarica*, and *Hy. orbisperma* (Wood, 2002).

## Conflicts of Interest

The author of this paper has no affiliation with any interests and is solely responsible for the paper.

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