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New Record of Two Freshwater Bryozoan Species (Phylactolaemata) from Kagzipura Reservoir, Aurangabad, Maharashtra, India

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Abstract: A reassessment of the freshwater Bryozoa (Phylactolaemata) has been carried out for two years at Kagzipura lake, 40 km northwest of Aurangabad, Maharashtra, India. Collected samples were primarily identified on the basis of their colony morphology and statoblast features under light microscope, and species identification was confirmed on the basis of Scanning Electron Microscopic Images (SEM) of statoblast and standard keys of freshwater Bryozoa. In the present study we are reporting two bryozoan species first time at Kagzipura lake which were not reported earlier at this region. So this paper has updated the bryozoan diversity of Kagzipura lake with two more species i.e. *Hyalinella lendenfeldi* (Ridley, 1886) and *Plumatella bombayensis* Annandale, 1908. The present study also provided brief descriptions of these species, including images taken with light microscope and Scanning Electron Microscope.

Keywords: Bryozoa, Phylactolaemata, Kagzipura Lake, Statoblast

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Introduction

Bryozoans are small benthic aquatic invertebrates, also known as Polyzoa, Ectoprocta and moss animals. They form colonies of genetically identical zooids on submerged surfaces (Massard and Geimer, 2008), such as wood, rock, plastic, glass, rubber, macrophytes, metal plates, molluscan shells. etc. (Swami *et al.*, 2016). Phylactolaemata is the class of bryozoans occurring exclusively in freshwater and distributed widely and abundantly (Smith and Wood, 1995). These freshwater bryozoans produce a dormant encapsulated bud called as

statoblast, which is a key structure of bryozoan taxonomy (Wood, 1998). Surface features of statoblast can be studied with the help of scanning electron microscopic (SEM) images (Wood and Lore, 2005).

A reassessment is useful to update the species diversity, to clarify the status of previously described species, to add undocumented characters and to compare described species (Smith, 1995). In a previous assessment of Kagzipura lake (Swami *et al.*, 2016), four bryozoan species were described: *Rumarcanela vorstmani*

(Toriumi, 1952), (synonymised as *Plumatella vorstmani* by WoRMS Taxon list), *Plumatella casmiana* (Oka, 1907), *Lophopodella carteri* (Hyatt, 1866), and *Swarupella divina* Wood *et al.*, 2006.

The present study has updated the bryozoan fauna of Kagzipura lake by adding two species i.e. *Hyalinella lendenfeldi* (Ridley, 1886) and *Plumatella bombayensis* Annandale, 1908, which was not reported in the earlier study of Kagzipura lake, Aurangabad, Maharashtra, India.

Materials and Methods

The samples were collected twice each month from June 2018 to June 2020 from the Kagzipura reservoir, 40 km NW of Aurangabad, Maharashtra (19°58'16"N & 75°12'31"E), India. The plankton sample was collected in labeled sample bottle with the help of 40 mm plankton net which is made up of bolten silk (No. 25) to capture the free floating statoblasts. Different sample bottles were labeled, cleaned and filled with the field water and submerged substratum such as rocks, wood, plastics, glass etc. bearing colonies of bryozoans and statoblasts were collected in these bottles. Both samples were taken to the laboratory. Samples were examined under dissecting microscope and photographs were taken by using the eye piece camera. Primary identification of bryozoan species was done on the basis of structure of colony and surface structure of statoblast. The colony and statoblast were kept in aquarium for further growth and germination and some statoblasts were stored as it is in a small labeled vial for future analysis. The preserved statoblasts were cleaned and valves of statoblasts were separated by heating it with few drops of 1M Potassium hydroxide in a spoon for 30-40 sec. These statoblasts were rinsed in distilled water and were mounted on an aluminum stub, sputtered with gold, and examined with FESEM (FEI Nova NanoSEM 450). Dimensions of statoblasts were captured in SEM images. Species were identified using keys described by Annandale (1911), Lacourt (1968), Rao (1992), and Wood (2006, 2010).

Results

(1) *Hyalinella lendenfeldi* (Ridley, 1886)

Taxonomy:

Class: Phylactolaemata Allman, 1856

Family: Plumatellidae Allman, 1856

Genus: *Hyalinella* Julian, 1885

Species: *Hyalinella lendenfeldi* (Ridley, 1886).

Description: Floatoblasts of this species were found only once in February 2019 and these were the only kind of statoblast produced by *Hyalinella lendenfeldi* (Ridley, 1886) (Hirose and Mawatari, 2007). The floatoblast was rectangular with parallel sides and rounded ends; it was significantly bigger than the floatoblasts of other plumatellid species. Overall length of ventral side of floatoblast was 492.4 µm and width was about 270.7 µm and that of dorsal side was 470.8 µm length and 268.8 µm in width. The ventral fenestra was almost twice the size of dorsal fenestra (Fig. 1 B). Ventral valve was convex and measured about 238.1 µm in length and 183.1 µm in width wherein dorsal valve was roughly flat or concave with dimension of 156.5 µm length and 107.2 µm width. Dorsal fenestra was covered by round tubercles. Annulus was larger as compared to fenestra (Fig. 1A).

Remarks: This species was firstly named *Lophopus lendenfeldi* by Ridley (1886). On the basis of tubular colony with soft, gelatinous ectocyst, and lack of sessoblasts, Rousselet (1904) specified it as *Hyalinella*. *H. lendenfeldi* was moved to the genus *Austrolella* by Annandale (1910), who also included another species, *A. indica*. However, it is difficult to distinguish this genus from *Hyalinella* (Wood, 1998). On the other hand, the colony morphology of *H. lendenfeldi* and *Gelatinella toanensis* (Hozawa and Toriumi, 1940) described from East Asia was quite similar; however, the floatoblast of *G. toanensis* is much larger and has a spine on the ventral fenestra, unlike *H. lendenfeldi*. Furthermore, whereas *H. lendenfeldi* does not generate sessoblasts,

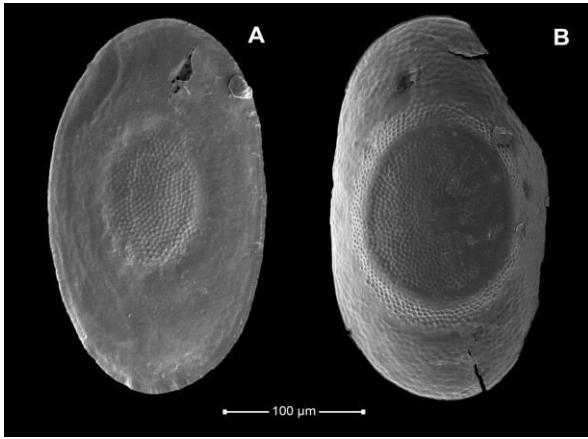


Fig. 1: SEM images of floatoblast of *Hyalinella lendenfeldi* (Ridley). (A) Dorsal valve; (B) Ventral valve.

G. toanensis does. *H. lendenfeldi* also resembles with *Hyalinella punctata* (Hancock, 1850), which is exclusively found in North America and Europe. The buoyancy of floatoblast and shallowly concave dorsal valve of *H. lendenfeldi* are the characters which distinguish it from *H. punctata* (Wood *et al.*, 2006).

Distribution in India: This species has been reported only from Maharashtra i.e. from Wan and Yeldari dam in Beed and Parbhani (Mokashe and Harkal, 2019).

(2) *Plumatella bombayensis* (Annandale, 1908)

Taxonomy:

Class: Phylactolaemata Allman, 1856

Family: Plumatellidae Allman, 1856

Genus: *Plumatella* Lamarck, 1816

Species: *Plumatella bombayensis* Annandale, 1908.

Description: Two different types of colony morphology have been observed wherein its appearance varies greatly depending on water temperature, velocity, turbidity, and potentially other variables (Wood *et al.*, 2006). The colony shown in Figures 2A and 2 B was dark brown in color comprising long branches which grow across the substratum, becoming free at the ends. No central line (raphe) was observed on the colony. The colony shown in Figures 2C and 2D was crowded and had a bushy appearance. It was covered with sediment particles. The branches

were erect due to overcrowding and appeared as a honey comb. The statoblast (floatoblast) was elongated, the sides of floatoblast were parallel to each other having the overall length about 364.8 μm which was more than twice of its width i.e. 178.1 μm . The overall length and width of dorsal valve was 353.4 μm and 175.5 μm , respectively. Both the valves were convex. The dorsal fenestra was small as compared to ventral fenestra; without tuberculation (Fig. 3A) and measured about 135.3 μm in length and 126.4 μm in width. The ventral fenestra had a conspicuous, lattice-like reticulation having dimension of 196.6 μm in length and 160.4 μm in width (Fig. 3B).



Fig. 2: *Plumatella bombayensis* Annandale; (A and B) Colony with long branches attached on slipper and its microscopic view respectively, (C and D) Colony showing bushy appearance attached on bag and its microscopic view respectively.

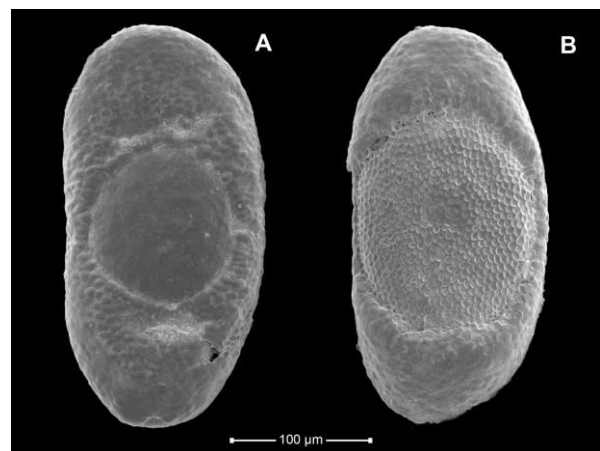


Fig. 3: SEM images of floatoblast of *Plumatella bombayensis* Annandale. (A) Dorsal valve; (B) Ventral valve.

Remarks: *P. bombayensis* was first described by Annandale (1908) from Igatpuri, India, about 100 km northwest of Mumbai. *P. bombayensis* was considered a synonym of *P. longigemmis* by Lacourt (1968). On the other hand *P. bombayensis* differs from *P. longigemmis* by having significantly broader annulus on the ventral valve, a smaller dorsal fenestra. Apart from that they have faint tubercles on dorsal fenestra and reticulation on ventral fenestra wherein *P. longigemmis* shows tuberculated fenestra on both the sides.

Distribution in India: This species is reported from only two states of India Himachal Pradesh and Maharashtra (Mokashe and Harkal, 2019). In Maharashtra it occurs in Igatpuri (Annandale, 1908) and Wan and Issapur dam in Beed and Nanded (Mokashe and Harkal, 2019).

Table 1: Statoblast dimensions (in micrometers), drawn from SEM images shown in Figures 1 and 3

Dimensions/Species	<i>H. lendenfeldi</i>	<i>P. bombayensis</i>
Overall length	492, 471	365, 353
Overall width	271, 269	178, 176
Dorsal fenestra length	157	135
Dorsal fenestra width	107	126
Ventral fenestra length	238	197
Ventral fenestra width	183	160

Discussion

In this study, we have encountered two species of bryozoa i.e. *Hyalinella lendenfeldi* and *Plumatella bombayensis* for the first time in Kagzipura Lake. We have also encountered four bryozoan species which are previously described at the same location including *Rumarcanela vorstmani* (Toriumi, 1952), (accepted as *Plumatella vorstmani* by WoRMS Taxon list), *Plumatella casmiana* (Oka, 1907), *Lophopodella carteri* (Hyatt, 1866), and *Swarupella divina*. Wood *et al.*, 2006.

For species identification in bryozoa, statoblasts play a key a role (Wood, 1998), however, slight differences in morphology of the

statoblasts were observed during the present study. According to Wood (2006), the dorsal fenestra of *Plumatella bombayensis* is lightly tuberculated but in present study no such tuberculation was seen on the dorsal fenestra. Instead it was plain without any microstructure. As per the description of *Hyalinella lendenfeldi* given by Hirose (2007), the fenestra of both the valve of statoblast was covered with round tubercles and faint tuberculation was present on annular region but in present study the ring of round tubercles was observed only on ventral fenestra and no such tubercle ring was found on dorsal side. Also the faint tuberculation was observed only on annular region of ventral side wherein the annular region of dorsal side was completely plain without tuberculation. The reason for these small variations in statoblast morphology of same species in different region is not known but it may be due to change in environmental condition as per the regions (Mukai *et al.*, 1990).

Apart from that, the present study has updated the bryozoan fauna of the Kagzipura Lake. The increase in number of species at particular region could be due to dispersal of statoblast of the bryozoan species from different area by the birds (Brown, 1933). However, increase in diversity is the indication of healthy ecosystem and in case of aquatic ecosystems, it is a measure to monitor the water quality of the specific reservoir. An occasional reassessment of the aquatic habitat is useful to check the current status of its species composition and to assess water quality. In addition, there is a need of reexamination of morphology of statoblasts and colony structure of reported bryozoan species of particular aquatic habitat to understand the changes within the species by time to time.

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