

FRESHWATER SEDIMENT DIATOMS (BACILLARIOPHYCEAE) NEWLY RECORDED FROM SIRAJGANJ, BANGLADESH

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Abstract

A total of 11 diatom taxa have been newly recorded and illustrated from the sediments of Joysagar and Sitlai Beel in the district of Sirajganj, Bangladesh. These are *Frustulia rhomboides* (Ehr.) de Toni, *Diploneis smithii* (de Breb.) Cl., *Stauroneis pygmaea* Krieger, *S. schroederi* Hust., *Navicula bicontracta* Oestrup, *N. gottlandica* Grun., *N. neoventricosa* Hust., *Caloneis ventricosa* (Ehr.) Meister var. *minuta* (Grun.) Mills, *Pinnularia acuminata* W. Smith, *P. acrosphaeria* de Breb. and *Nitzschia tryblionella* Hantzsch var. *subsalina* Grun. (syn. *Nitzschia tryblionella* Hantzsch var. *debilis* (Arnott) A. Meyer).

Introduction

Benthic algal communities are important primary producers in shallow lakes (Hickman 1971). Anderson (1995) commented that lake sediments can be used as natural documents of perturbation histories i.e. acidification and eutrophication of lakes. Diatom is an effective biological indicator and give background data for natural variability (Dixit *et al.* 1991).

In Bangladesh, from the diatom families Cymbellaceae and Naviculaceae so far 85 taxa have been reported from different habitats (Ahmed *et al.* 2009). These include deepwater rice-field flora (Aziz and Ara 2000, Whitton *et al.* 1988), river plankton (Islam and Haroon 1975), seeping sandstones hill caves (Aziz and Yasmin 1997) and freshwater, saltmarsh and littoral sandy zones of an offshore island namely, Moheshkhali (Islam and Aziz 1979). The seasonality and diversity of sediment diatoms from the two wetlands namely, Joysagar and Sitlai Beel in the district of Sirajganj, northern part of Bangladesh have been studied by Nahar *et al.* (2010). The present research is a continued effort on sediment diatoms of the same areas and has been found to have many diatoms not reported earlier.

Materials and Methods

Detailed description of the study sites together with the collection numbers, methods of collecting sediment samples in the field as well as their subsequent processing in the laboratory have been given in Nahar and Khondker (2009) and Nahar *et al.* (2010). The study sites Joysagar (a huge man made, over 200 year old pond) and Sitlai Beel (natural water body) are situated between 24° 28' 40" - 24° 28' 50" E and 89° 25' 24" - 89° 25' 42" N in the district of Sirajganj, Bangladesh. During monsoon, the maximum water depth of Joysagar and Sitlai Beel were 2.40 and 2.13 m, respectively.

Results and Discussion

A total of 11 species of Bacillariophyceae have been identified in the present study as new records for Bangladesh. An illustrated account of those taxa are given and discussed.

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Order: Naviculalis Family: Naviculaceae**Genus: Frustulia Ag.**

1. **Frustulia rhomboides** (Ehr.) de Toni **(Fig. 1)**
 (Germain 1981, Pl. 51, Figs 2 - 3; Hustedt 1930, 220, Fig. 324)
 Valves rhombic-lanceolate with more or less broadly rounded poles, 47.2 - 165.5 μm long and 16-30 μm broad; striae are very uniformly transverse, intersected by longitudinal hyaline lines, 10 - 20 striae in 10 μm .
 Sitlai Beel, Coll. No. 12, 02.05.1997.

Genus: Diploneis Ehr.

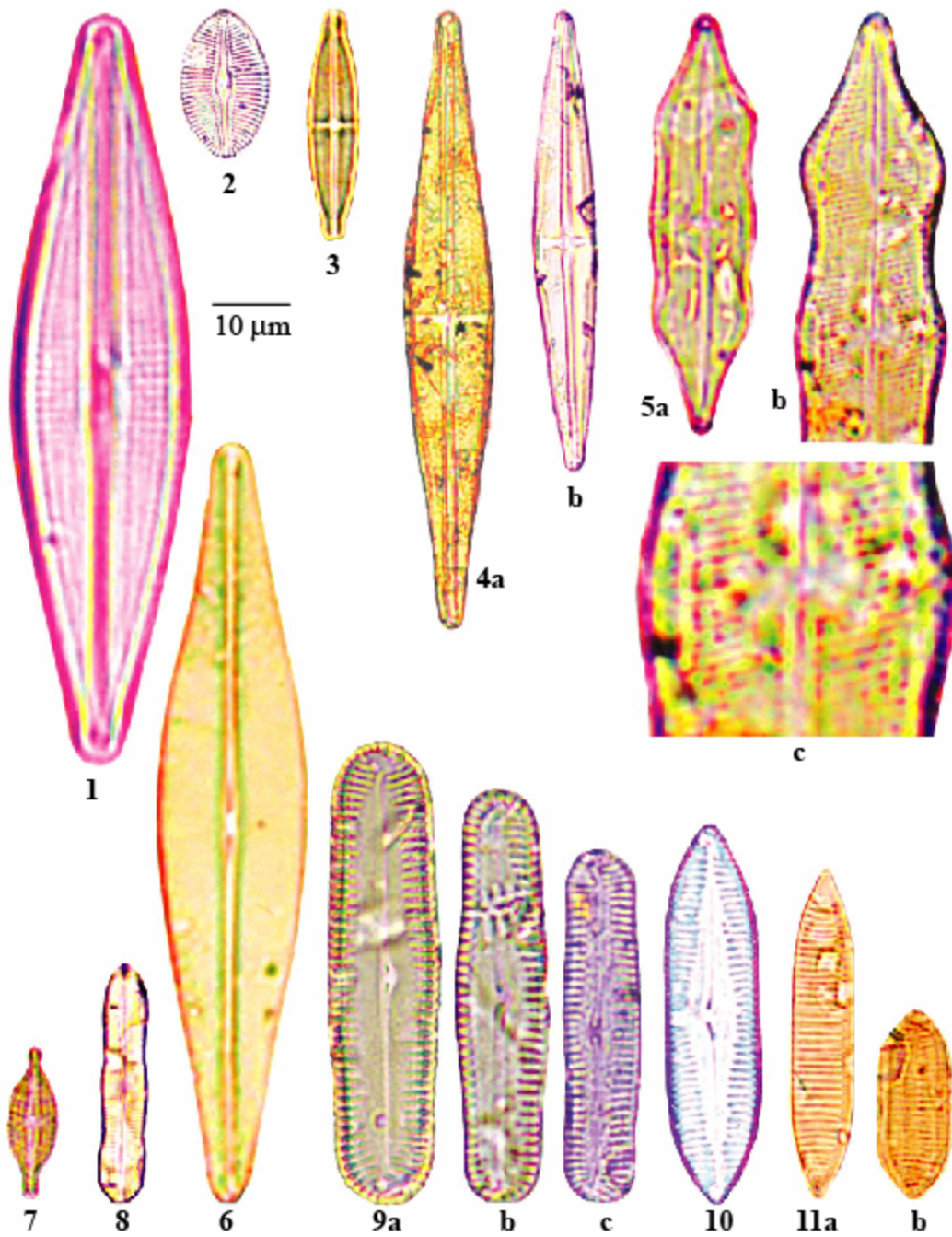
2. **Diploneis smithii** (de Breb.) Cl. **(Fig. 2)**
 (Germain 1981, Pl. 56, Figs 1 - 3, Hustedt 1930, p. 253, Fig. 402, Lichti-Federovich 1980, 406, Pl. 4, Fig.14)
 Valves ellipsoidal with widely rounded poles, side more or less strongly convex 22.3 - 39.7 μm long and 15.2 - 23.8 μm broad, ribs 5 - 11 in 10 μm , central nodule less developed.
 The valve shape is similar to *D. ovalis* (Hilse) Cl. but the punctations are different near the axial region of *Diploneis smithii* (de Breb.) Cl.
 Sitlai Beel, Coll. No. 08, 25.11.1996.

Genus: Stauroneis Ehr.

3. **Stauroneis pygmaea** Krieger **(Fig. 3)**
 (Germain 1981, Pl. 60, Fig. 25; Hustedt 1930, 257, Fig. 40)
 Valve sides slightly linear to convex, suddenly narrowed at the poles, capitate, 15 - 20 μm long and 4 - 5 μm broad; axial area moderately wide, linear; raphe straight thread like with round central nodule and flat polar nodules; striae are very fine, transverse, difficult to count, appears to have over 20 striae in 10 μm .
 Joysagar, Coll. No. 10, 07.02.1997.
4. **S. schroederi** Hust. **(Fig. 4)**
 (Hustedt 1930, 257, Fig. 410)
 Valves narrowly lanceolate, gradually narrowed from the middle towards poles, sharply rounded ends, 60 - 80 μm long and 16 - 20 μm broad; axial area narrow and linear; raphe straight with round polar nodules; striae very fine, parallel but slightly radiating centrally in the mid region, about 20 in 10 μm .
 Joysagar, Coll. No. 10, 07.02.1997.

Genus: Navicula Borey de St-Vincent

5. **N. bicontracta** Østrup. fa. **(Fig. 5)**
 (Hustedt 1930, 307, Fig. 549)
 Valves linear with two strong pericentral constrictions developing three undulating sides, ends sharply narrowed but long and conical, 45.5 - 62.0 μm long and 9.1 - 13.0 μm broad; axial area linear, very narrow excepting a wider laterally ellipsoidal unornamented area around the central nodule; raphe straight, visible central nodule short rod-like; striae parallel but obliquely placed all along the valve surface, 7 - 9 striae in 10 μm .



Figs 1-11. 1. *Frustulia rhomboides*, 2. *Diploneis smithii*, 3. *Stauroneis pygmaea*, 4a-b. *S. shroederi*, 5a-c. *Navicula bicontracta*; 6. *N. gottlandica*; 7. *N. neoventricosa*; 8. *Caloneis ventricosa* var. *minuta*; 9a-c. *Pinnularia acrosphaeria*, 10. *P. acuminata* and 11a-b. *Nitzschia tryblionella* var. *subsalina*.

Notes: Parallel but obliquely striae placed all along the valve surface and slightly longer valve ends than the type appears to be unique features in this organism. Further study, needed to confirm its actual identity.

Sitlai Beel, Coll. No. 8, 25.08.1996.

6. ***N. gottlandica*** Grun. (Fig. 6)

(Germain 1981, 170 - 71, Pl. 63, Fig. 8; Hustedt 1930, 373, Fig. 690)

Valves medium to broadly lanceolate, with weak but gradually narrowed moderately rounded poles, 47.2 - 165.5 μm long and 16 - 30 μm broad; axial area very narrow; raphe visible only beside short rod-like central nodule; striae >18 in 10 μm .

Sitlai Beel, Coll. No. 06, 14.06.1996.

7. ***Navicula neoventricosa*** Hust. (Fig. 7)

(Foged 1976, Pl. 3, Fig. 16, Germain 1981, 210, Pl. 80, Figs 1 - 5, Lichti-Federovich 1980, 408, Pl. 5, Fig. 16, Wuthrich 1975, Pl. 22, Figs 406)

Valves broadly elliptical with capitate ends, 6.5 - 11.0 μm long and 3.5 - 3.8 μm broad; axial area moderately wide, linear up to the poles; raphe thread like and indistinct towards the poles but very distinct on both sides of round central nodule; striae radial, punctuate near the central nodule, 10 - 15 striae in 10 μm .

Sitlai Beel, Coll. No. 02, 20.09.1995.

Genus: Caloneis Cl.

8. ***Caloneis ventricosa*** (Ehr.) Meister var. ***minuta*** (Grun.) Mills (Fig. 8)

(Germain 1981, 236 - 38, Pl. 87, Fig. 1 - 18, Nakamura-Niiyama 1982, 242, Pl. 6, Fig. 14)

Valves linear with two slight pericentral constrictions developed a gibbous mid-region, ends sharply narrowed in to broadly conical ends, 28.0 μm long and 5.6 μm broad; raphe straight with undulating axial area; striae parallel to centrally radiating about 15 striae in 10 μm .

Sitlai Beel, Coll. No. 07, 21.08.1996.

Genus: Pinnularia Ehr.

9. ***Pinnularia acrosphaeria*** de Breb. (Fig. 9)

(Germain 1981, 256, Pl. 92, Figs 10 - 11, Hustedt 1930, 330, Fig. 610)

Valves linear to slightly swollen in the centre with broadly rounded ends, 27.3 - 70.0 μm long and 6.0 - 13.0 μm broad; axial area wide with fine raphe towards poles but in the centre both the ends curved on one side, striae parallel all through but from poles directed centrally, 7 - 9 striae in 10 μm .

Sitlai Beel, Coll. No. 07, 21. 08.1996.

10. ***P. acuminata*** W. Smith (Fig. 10)

(syn. *P. hemiptera* (Kütz.) Cl., Hustedt 1930, 329, Fig. 608)

(Germain 1981, 255, Pl. 92, Figs 1 - 8)

Valves with long linear sides produced in to sharply to moderately narrowed to a narrow conical ends, appearing spindle shape, 41.7 - 50.7 μm long and 11.7 - 12.3 μm broad; axial area

narrow at the poles, widest near the central nodule, raphe thread like towards poles but strong centrally with curved ends on one side; costae/ribs parallel, 7 - 9 in 10 μm . Valves of *P. pulchra* Østrup. (Nahar 2009, p. 160) are close to *P. acuminata* but costae are radial centrally and more or less parallel at poles.

Sitalai Beel, Coll. No. 2, 20. 09.1995.

Family: Nitzschiaceae; Genus: Nitzschia Hassal

11. Nitzschia tryblionella Hantzsch var. subsalina Grun. (Figs 11-12)

(syn. *Nitzschia tryblionella* Hantzsch var. *debilis* (Arnott) A. Meyer; Germain 1981, 234, Pl. 126, Figs 7 - 9; Hustedt 1930, 399 - 400, Fig. 759, (Germain 1981, 234 - 5, Pl. 126, Figs 1 - 3)

Valves linear and then sharply narrowed in to conical ends, about four times longer than broad with slightly bent ends, 45 (17.0 - 25.0) μm long and 11.0 - 15.0 μm broad, 5 - 9 striae in 10 μm .

Notes: *Nitzschia tryblionella* Hantzsch var. *debilis* (Arnott) A. Meyer described by Germain (1981, 234, Pl. 126, Figs 7 - 9) and Hustedt (1930, 399-400, Fig. 759) is similar to the var. *subsalina* in terms of valve ends and number of striae in 10 μm but much shorter length and wider diameter. Considering Pfitzer's law of diatom cell division the shorter form var. *debilis* (Arnott) A. Meyer has been kept as a synonym of longer form var. *subsalina* Grun.

Sitalai Beel, Coll. No. 9, 26.12.1996; Joysagar, Coll. No. 04, 23.4.1996.

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