

NEW RECORD OF PLANKTONIC DIATOMS FROM THE SUNDARBAN MANGROVE FORESTS, BANGLADESH

ABDUL AZIZ* AND MASHRURA RAHMAN

Department of Botany, University of Dhaka, Dhaka-1000, Bangladesh

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Abstract

Botanical expedition to the Sundarban Mangrove Forests in the Bangladesh part revealed the presence of 14 diatom taxa not recorded so far from Bangladesh territory. The taxa are *Amphiprora alata* Kütz., *Chaetoceros pendulus* Karsten, *Chaetoceros socialis* Lauder, *Cyclotella comta* (Ehr.) Kütz. *Thalassionema nitzschioides* (Grun.) Meresch, *Thalassiosira rotula* Meunier, *Thalassiosira weisflogii* Grun., *Lioloma delicatula* (Cupp) Hasle, *Navicula brekkaensis* Petersen *fa*, *Nitzschia inconspicua* Grun. *fa*, *Nitzschia romana* Grun., *Surirella fastuosa* var. *recedens* (Schm.) Cl. Besides these, unidentified species of *Chaetoceros* sp. and an unidentified centric diatom have been recorded. These newly recorded taxa are described and illustrated.

Introduction

The estuaries of Sundarban Mangrove Forests (SMF) is important for fisheries sector. It is contributing about 0.36 M US\$/year in the revenue earnings of Bangladesh. This sector of fisheries is supported by phytoplankton, which enter into the food chain. But no information is available on the phytoplankton of the SMF in the Bangladesh part (Karim 1994). The only record of attached and terrestrial algae from SMF was by Islam (1973). Aziz (2005) recorded brackish water diatoms from Rupsha River near Khulna Launch Ghat situated about 100 km north of SMF. The present study was thus undertaken to record the diversity of phytoplankton within the SMF of Bangladesh. A total of 36 taxa were recorded (Aziz *et al.* 2011) of which 15 diatom taxa reported in this paper do not fit systematically with the diatoms of the Bay of Bengal (Aziz and Islam 1979, Islam and Aziz 1975, 1980), Karnaphuli River estuary (Islam and Aziz 1977) and coasts of Moheshkhali Island (Islam and Aziz 1979) and those reported in Ahmed *et al.* (2009).

Materials and Methods

A total of 65 phytoplankton samples from 8 locations were collected between 25 and 29 March, 2010 from four Ranges covering about 70% of the Sundarban Mangrove Forests (Table 1). From each site, five samples were collected during high and or low tides by passing 22 litre water for each sample, through 40 µm mesh plankton net. The final volume of the sample was 20 ml and preserved in Lugol's solution.

Table 1. Collection sites, sample numbers, Ranges, latitude and longitude, etc. of the sites.

Date of collections	Site nos. & names	Sample nos.	Time of collections	Ranges	Lat. & long. of sites
25.03.2010	1. Passar R.	1-5	low tide	Nalianala (Khulna)	21° 27' 03" N 89° 35' 29" E
26.03.2010	2. Sela R. near Tambulbunia F.S.	6-10	high & low tides	Chandpai	22° 15' 43" N 89° 43' 59" E
26.03.2010	3. Harmal R., Tek	11-15	low tide	Chandpai-Sarankhola border	22° 01' 36" N 89° 43' 59" E
27.03.2010	4. Betmara R. Kotka F.S.	16-25	high & low tides	Sarankhola	22° 15' 43" N 89° 41' 50" E

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*E-mail: <dr.aziz.botany@gmail.com>.

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28.03.2010	5. Conjoint of Hansharaj & Mardat R.	26-30	high & low tides	Nalianala	22° 04' 31" N 89° 28' 07" E
28.03.2010	6. Near conjoint of Bal & Arpangasia R.	36-45	high & low tides	Nalianala-Burigoalini border	21° 59' 07" N 89° 20' 48" E
29.03.2010	7. Bishandirkhal, east of Shipsa R.	46-50	low tide	Nalianala	22° 05' 49" N 88° 32' 22" E
29.03.2010	8. Shipsa R. near Chailabogi F.S.	51-55	low tide	Nalianala	22° 11' 27" N 89° 29' 01" E
29.03.2010	9. Kalabogi R. near Aila heat area	56-60	low tide	Nalianala	22° 20' 51" N 88° 29' 07" E

Identification of phytoplankton taxa were made following Ahmed *et al.* (2009), Cupp (1943), Germain (1981) and Subrahmanyam (1946).

Results and Discussion

A total of 14 phytoplankton taxa namely, *Amphiprora alata* Kütz., *Chaetoceros pendulus* Karsten, *Chaetoceros socialis* Lauder, *Chaetoceros* sp., *Cyclotella comta* (Ehr.) Kütz. *Thalassionema nitzschioides* (Grun.) Meresch, *Thalassiosira rotula* Meunier, *Thalassiosira weisflogii* Grun., *Lioloma delicatula* (Cupp) Hasle, *Navicula brekkaensis* Petersen fa., *Nitzschia inconspicua* Grun. fa, *Nitzschia romana* Grun., *Surirella fastuosa* var. *recedens* (Schm.) Cl. and an unidentified centric diatom, were found for the first time in the SMF of Bangladesh territory. These taxa were not recorded from SMF of Indian part (Chaudhuri and Choudhury 1994). An illustrated account and taxonomy of these newly recorded taxa have been provided and discussed in this paper.

Class: Bacillariophyceae Order: Centrales Family: Skeletonemaceae

Genus: *Thalassiosira* Cl.

1. *Thalassiosira rotula* Meunier (Fig. 1)

(Cupp 1943, 49, fig. 12)

Cells disc-shaped, valves flat, 25.4 µm in diameter. Valve processes a central spine. Areolae very fine, indistinct.

The taxon was recorded from Betmara R., during high and low tides near Katka, Sarankhola Range.

2. *Thalassiosira weisflogii* Grun. (Fig. 2)

(Germain 1981, 42, pl.10, fig.14-16)

Valves circular, flat, 20.32 µm in diameter, areolae coarse in the margin, much smaller towards center, irregular rows. Marginal and central zones not clearly distinguishable.

Notes: The material may be confused with *Cyclotella* spp.

The taxon was recorded from Harmal R. during low tide, Chandpai-Sarankhola Range border; confluence of Mordat and Hangsharaj R. during high and low tide and Bal R. during low tide, Burigoalini-Nalianala Range border.

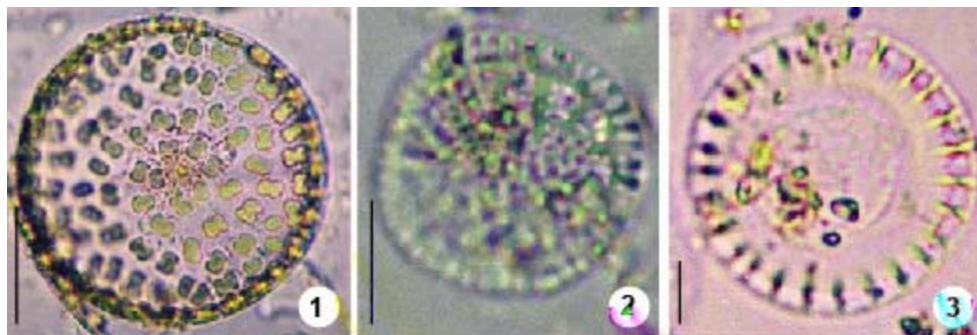
Genus: *Cyclotella* (Kütz.) Breb.

3. *Cyclotella comta* (Ehr.) Kütz. (Fig. 3)

(Germain 1981, 32, pl. 8, figs 1-7)

Valve disc-shaped, margins with radiate striae in the inter-marginal zone, apparently cellular, giving appearance of spines, central portion of valve distinct, punctate; valves 47.8 µm in diameter.

The taxon was recorded from Harmal R. during low tide, Chandpai-Sarankhola Range border; Betmara R., during high tide near Katka, Sarankhola Range; confluence of Mordat and Hangsharaj R. during high and low tide and Bal R. during low tide, Burigoalini-Nalianala Range border.



Figs 1 - 3. 1. *Thalassiosira rotula* Meunier, valve view. 2. *T. weisflogii* Grun., valve view. 3. *Cyclotella comta* (Ehr.) Kütz. Bars = 20 μ m.

Family: Chaetoceraceae Genus: *Chaetoceros* Ehr.

4. *Chaetoceros pendulus* Karsten (Fig. 4)
(Cupp 1943, 114, fig. 69)

Cells solitary, 9-18 μ m width; valves unlike, upper one with deep depression in the center, lower with projecting corners. Chaete smooth, very long, sloping diagonally outwards from upper valve then running in large sweeping curve. Chaete of lower valve strongly bent backwardly, proceed almost parallel. Chromatophores many, small, short-cylindrical, also distributed far out in the chaete.

The taxon was recorded from Betmara R., during high tide near Katka, Sarankhola Range; confluence of Mordat and Hangsharaj R. during high and low tide.

5. *Chaetoceros socialis* Lauder (Fig. 5)
(Subrahmanyam 1946, 143, figs 251)

Frustules 10-12 μ m width, chaete 4, delicate, curved. Two from corner of each valve, 8-10 elipsoidal chromatophores. Colony 3-4 celled with chaete being arranged in a more or less same direction.

The taxon was recorded from Passar R. in the outskirts of SMF near Chandpai Range.

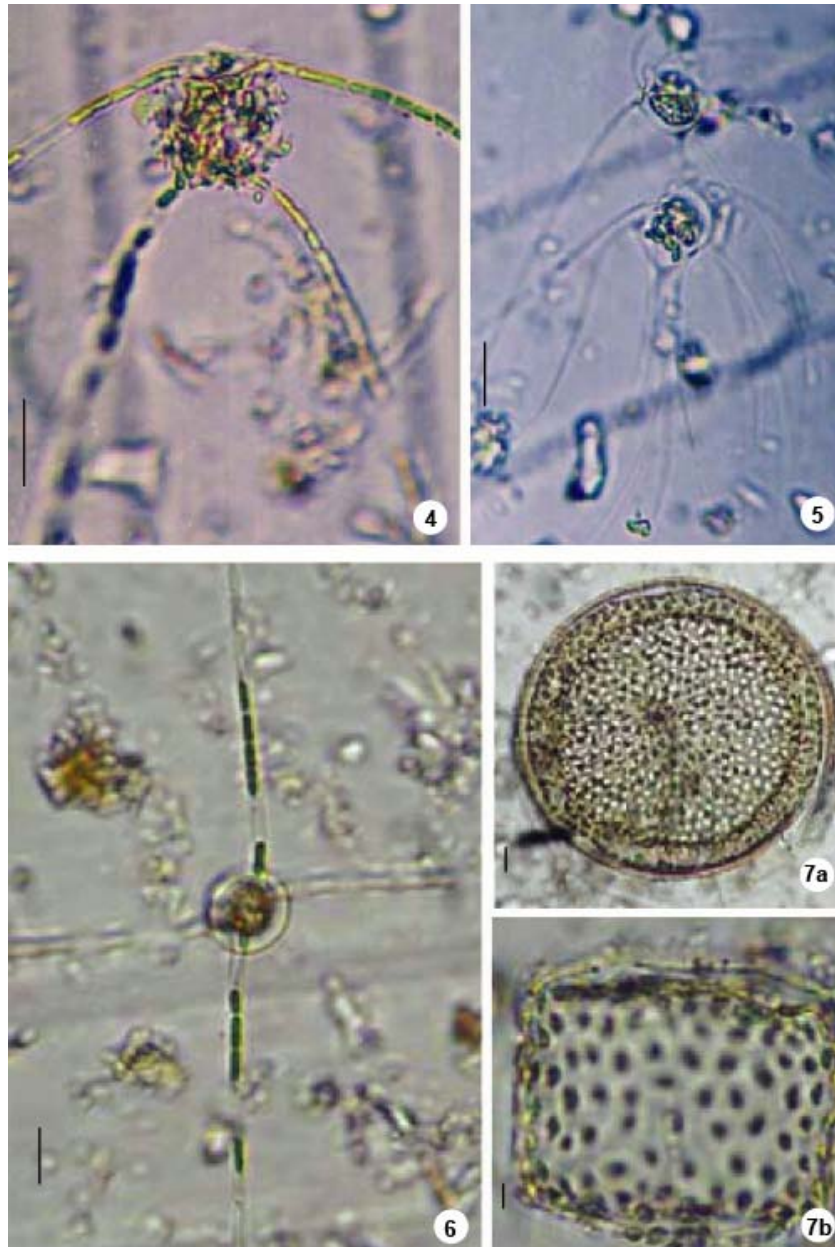
6. *Chaetoceros* sp. (Fig. 6)

Valves almost circular, producing 2 straight chaete in opposite directions. Chaete of one valve disposed at right angle to chaete of other valve. Chaete with several short, rod-like plastids.

The taxon was recorded from Sela R. during high tide, Chandpai Range; confluence of Mordat and Hangsharaj R. during high tide, Nalianala Range.

7. Unidentified centric diatom (Figs 7a-b)

Cells disc-shaped, valves convex, depressed at center, covering about 1/3 surface. Plastids discoid, 2.54-3.30 μ m in diameter, scattered. Valves 116.84 μ m in diameter.



Figs 4 - 7. 4. *Chaetoceros pendulus* Karsten a solitary cell. 5. *C. socialis* Lauder, a colony of about 5 cells. 6. *Chaetoceros* sp., valve view of a frustule. 7a-b. Unidentified centric diatom, valve (a) and girdle (b) views. Bars: 10 μ m, except 7a-b = 20 μ m.

Notes: The valve surface seen in girdle view resembled strongly with *Lauderia* or *Thalassiosira* but bristles or spines absent.

The taxon was recorded from confluence of Mordat R. and Hangsharaj R. during high tide, Nalianala Range.

Order: Pennales Family: Fragilariaceae Genus: *Thalassionema* Grun.**8. *Thalassionema nitzschioides* (Grun.) Meresch (Figs 8a-b)**

(Subrahmanyam 1946, 167, figs 344-346; Cupp 1943, 182, fig.133)

Cells united to each other by small gelatinous cushion; Girdle view narrow linear in median region with gradual narrowing up to both ends, valves narrow linear with parallel sides, blunt rounded ends, costae present. Frustules 38-40 μm long, 4-5 μm diameter.

The taxon was recorded from Sela R. during high tide, Chandpai Range; confluence of Mordat and Hangsharaj R. during high tide, Nalianala Range; Harmal R. during low tide, Chandpai-Sarankhola Range border; Betmara R., during low tide near Katka, Sarankhola Range.

Genus: *Lioloma* Hasle**9. *Lioloma delicatula* (Cupp) Hasle (Figs 9a-b)**Synonym: *Thalassiothrix delicatula* Cupp 1943, 188, fig. 181

(Algaebase.org, 26 April, 2002)

Cells 1120-1920 μm long, slightly bent. One end bluntly pointed, widest point 1-2 μm , nearly same width until about one-third the length of cell from head end, then become slightly narrower, 1.5-2 μm in diameter. Striae 20-24 in 10 μm .

The taxon was recorded from Sela R. during high and low tides, Chandpai Range; confluence of Mordat and Hangsharaj R. during high and low tides, Nalianala Range; Bal R. during low tide, Burigoalini-Nalianala Range border; Brisindri Khal, during low tide, Nalianala Range.

Family: Naviculaceae Genus: *Navicula* Bory**10. *Navicula brekkaensis* Petersen *fa***

(Germain 1981, 224, pl. 84, figs 11-15)

Valves lanceolate to elongated almost parallel margin in mid region, tip roundish. Frustules 50-70 μm long, 7-8 μm broad. Striae 10 to 12 in 10 μm , chromatophores two, laminate.

Notes: The description and the frustule structure slightly varied from that of Germain (1981, 224, pl. 84, Figs13-15) and thus the present materials is identified as a forma of this species has been considered.

The taxon was recorded from all locations except ; Brisindri Khal.

11. *Amphiprora alata* Kütz. (Figs 12a-b)

(Germain 1981, 134, pl. 50, fig.3-4)

Cells strongly constricted, 60.96 μm long, 17.78 μm broad towards end in girdle. Keel with hyline margin, 13-14 in 10 μm . Striae curved, divergent from central nodule, 12-14 in 10 μm .

The taxon was recorded from confluence of Mordat and Hangsharaj R. during low tide, Nalianala Range.

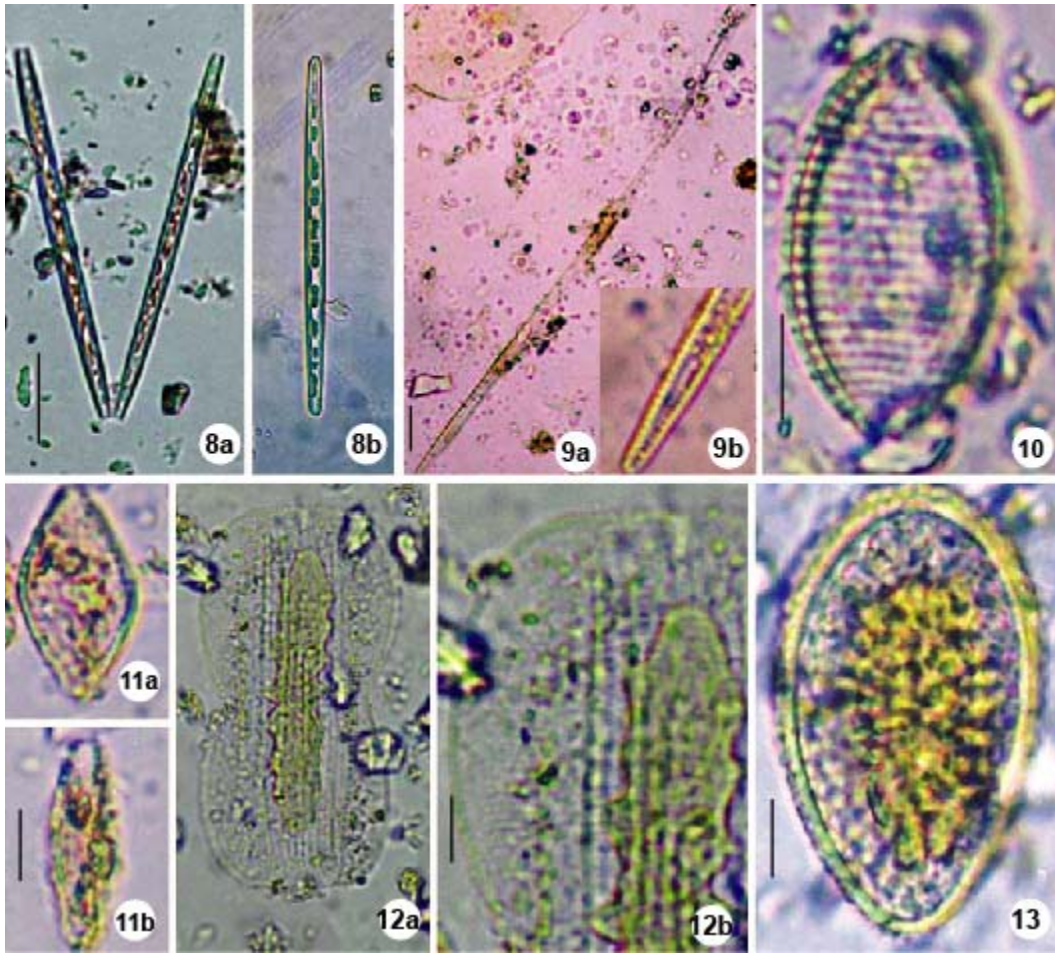
Family: Nitzschiaceae Genus: *Nitzschia* Hassall**12. *Nitzschia inconspicua* Grun. *fa* (Fig. 10)**

(Germain 1981, 356, pl. 135, fig. 7)

Frustules nearly ovate, valves 33.02 μm long, 19.68 μm broad. Striae transverse in median region, gradually convergent towards ends, 8-9 in 10 μm .

Notes: The present material is ovate, longer and with less striae in 10 μm than that described by Germain (1981, 356, pl. 134, figs 23-26).

The taxon was recorded from Bal R. during low tide, Burigoalini-Nalianala Range border.



Figs 8 - 13. 8a-b. *Thalassionema nitzschioides* (Grun.) Meresch, two celled colony (a) and a frustule in valve view (b). 9a-b. *Lioloma delicatula* (Cupp) Hasle, a whole frustule (a) with basal part enlarged showing striae (b, inset). 10. *Nitzschia inconspicua* Grun. *fa*, valve view. 11a-b. *N. romana* Grun. (a. valve view, b. girdle view). 12a-b. *Amphiprora alata* Kütz. a whole cell (a), a portion enlarged showing striae and punctae (b). 13. *Surirella fastuosa* var. *recedens* (Schm.) Cl., valve view. Bars = 10 μ m, except 9a Bar = 100 μ m.

13. *Nitzschia romana* Grun.

(Figs 11a-b)

(Germain 1981, 356, pl.135, fig.7)

Frustules rhomboid, valves 25-27 μ m long, 12-14 μ m broad, 14-15 striae in 10 μ m. Girdle view slightly sigmoid with rounded apex, 5.7-6.2 μ m broad.

The taxon was recorded from Bal R. during low tide, Burigoalini-Nalianala Range border.

Family: Surirellaceae Genus: *Surirella* Turpin**14. *Surirella fastuosa* var. *recendens* (Schm.) Cl. (Fig. 13)**

(Cupp 1943, 208, fig.160)

Frustules wedge-shaped, rounded at angles. Valves ovate. Costae or ribs about 3-4 in 10 µm, robust, dilated at margin. Central space lenceolate, narrower than type. Valve 55 µm long, 38 µm width.

The taxon was recorded from Sela R. during high and low tides and Chandpai Range and Betmara R., during low tide near Katka, Sarankhola Range.

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