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Research Article

PRELIMINARY REPORT OF DIATOMS FROM SIVASAGAR DISTRICT OF ASSAM

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ABSTRACT
Present paper deals with morpho-taxonomic account of some diatom species found in the Sivasagar District,Assam.Sixteen species of nine genus were identified from different ponds,lakes,rivers of the district.Of these *Gomphonema* and *Navicula* are two common genus followed by *Cymbella* and *Pinnularia.* All these species are reported for the first time from this district.

Key Words: *Diatom, Algae, Sivasagar, Taxonomy*

INTRODUCTION

Diatoms are microscopic one-celled or colonial members of the algal division or phylum Bacillariophyta, of the class Bacillariophyceae, having cell walls of silica consisting of two interlocking symmetrical valves called frustules. They are universally distributed in all types of aquatic environment with others being endemic to specific regions (Potapova and Charles, 2002).Diatoms are very sensitive to changes in the salt content of water and can be used as indicator of the degree of salinity. Diatoms are especially good indicators of the environmental integrity of lotic ecosystems because they are common in most streams and provide the primary food source for many invertebrates and some juvenile fishes that reside in these systems (Dixit *et al*., 1992; Lowe and Pan, 1996; Stevenson and Pan, 1999). They multiply rapidly, maintaining a dynamic population of varying size depending on the prevailing environmental conditions. Diatoms are the most species rich group of algae with tens of thousands of species (Mann, 1999). Round, (1993) states that there are currently over 260 genera of living diatoms with over 100,000 species. Many investigators have used various diatom metrics to determine environmental conditions in streams including discharge and hydraulic fluctuations (Duncan and Blinn, 1989 ; Biggs and Hicky, 1994; Benenati *et al*. 1998), light (Duncan and Blinn, 1989; Hardwick *et al*., 1992), temperature (Squires *et al*., 1979, Blinn *et al*., 1989), salinity (Blinn and Bailey, 2001), nutrients (Patrick, 1977; Van Dam *et al*. 1994; Hill *et al*., 2000; Blinn and Bailey, 2001),

Information regarding algal flora of Assam (India) are limited and reference can be mentioned from Parukutty, (1939); Bordoloi, (1974); Devi, (1981); Talukdar,(1997); Chaudhury (2004). Diatoms of Assam earlier recorded by Biswas, (1936) from Loktak lake Manipur,Assam(before separation)

Study Area

Sivasagar district of Assam is located in the south bank of river Brahmaputra with total area of 2668 sq km lies between $94^0 15'$-$95^0 45'$ E longitude and $26^0 45'$- $27^0 15'$ N latitude. The district is in the temperate region with the tropical monsoon climate and experiences heavy rainfall and high humidity. Winter lasts from late October to first part of the March the climate is cool, humid with relative humidity above 86%, and average temperature 25^0-32^0 C in summer and 8^0-10^0C in winter. The peak of monsoon is during June-July. Spring and autumn with moderate temperature and modest rainfall are the most comfortable seasons.

In the present paper eighteen taxa of diatom belonging to nine genera have been described. All these taxa are reported for the first time from this area.

MATERIALS AND METHODS

Ten samples were collected from different localities and fixed in 4% formaline solution during the year 2009-2010. Samples were collected at one month's interval. Slides were prepared following the method of Petrick and Reimer (1966). Photographs were taken with the help of trinocular microscope (Genee Vision) with photographic attachment. Taxonomic identification was made by consulting various publications and monographs like Venkataraman,(1939); Gandhi, (1956,1999); Smith, (1950) etc.

Systematic Description

Cymbella gracilis Ehr

Vertical grooves running in the shell near the surface of the ventral margin nearly straight. Radial striation is just a slight edge to backward radiation. A small central area which is considered one obscure release. Shell surface in the form of an elongated, crescent, reunited and nearly straight. Length 5.9-8.5.µm, breadth 5.6-8µm Striation 10 to 14 in 10µm. (Fig-1)

Figure 1: *Cymbella gracilis* Ehr

Figure 2*: Cymbella reinhadtii* Hust

Cymbella reinhadtii Hust.

Valves only slightly semilanceolate almost lanceolate,dorsal and ventral side convex, apices very slightly rostrate and rounded,axial area narrow widening into a small rhombic central area, Raphe slightly undulate, striae radiate. Length 80µm, width 26µm,striae 8-9 in 10µm. (Fig-2)

Fragilaria capucina Desmaz.

Cells united into long chains, valves linear with pseudoraphe and rectangular elliptical central area, more or less maidenly constricted, transverse striations fine. Length 34µm, breadth 3-4µm, striation 15 in 10µ. (Fig-3)

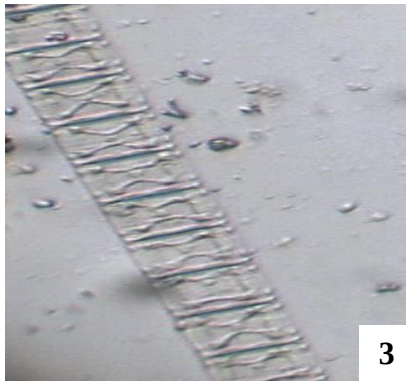

Figure 3: *Fragilaria capucina* Desmaz

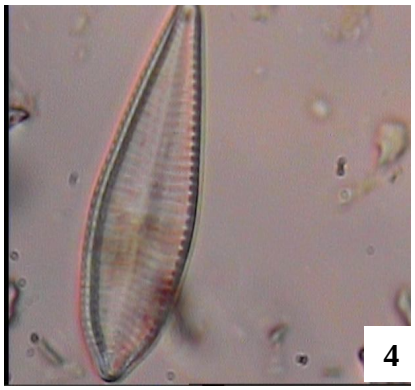

Figure 4: *Gomphonema augur* Ehr Ver *genuinum* Mayer

Gomphonema augur Ehr Ver genuinum Mayer Valves broadly ovate-clevate with apiculate rounded apex and strongly attenuated base, 26-32µ long and 8.5µ broad. Raphae thin and straight. Axial area narrow, central area unilateral, large with an isolated stigma on the opposite side. Striae 12-16 in 10µ, slightly radial, indistinctly punctuate and closely set on the ends (Fig-4).

Gomphonema subtile Ehr.

Valves 30-46µ long and 5-6µ broad, narrowly lanceolate cleavate, delicate with slightly capitate broadly rounded apex and gradually attenuated produced rounded base. Raphe thin and straight. Axial area narrow, central area unilateral with an isolated stigma. Striae 12-14 in 10µ, indistinctly punctuate (Fig-5).

Figure 5: *Gomphonema subtile* Ehr

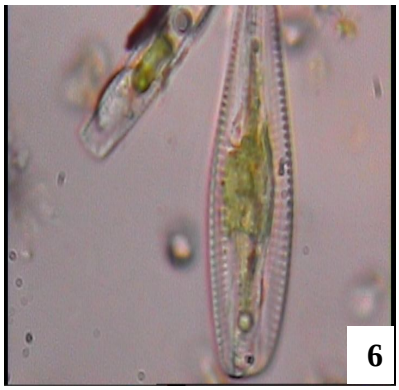

Figure 6: *Gomphonema truncatumr* Ehr

Gomphonema truncatum Ehr.

Valves asymmetrical to transapical axis (heteropolar), symmetrical to apical axis. Cells wedge shaped in girdle view with pseudosepta visible. Apices broadly rounded to broadly sub capitate at the head pole and more narrowly rounded at the tail pole. Raphe often slightly sinuous. A single stigma is present on one side of the central area. Striae coarse, radiate and often visibly punctuate. Length 13-75µ,breadth 7-17µ,striae 9-12 in 10µ (Fig-6).

Mastogloia braunii Grunow

Valves 55-76µ long and 15-18.5µ broad, striae 18-20 in 10µ. Valves elliptic, lanceolate. Axial area narrow, central area big, rectangular. The two narrow longitudinal horns together with the central area form a 'H' shaped figure. Striations transverse in the middle, radial towards the ends, punctuate fine but distinct. Loculi bigger in the middle, swallen in the ends (Fig-7).

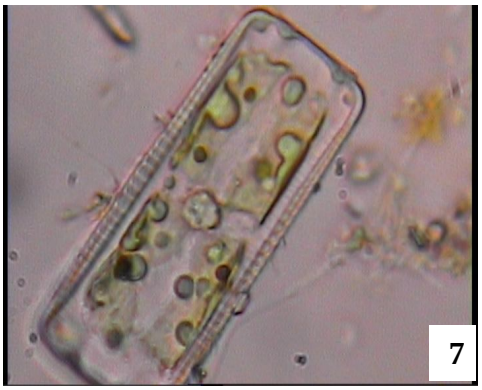

Figure 7: *Mastogloia braunii* Grunow

Figure 8: *Navicula cryptocephala* Kuetz

Navicula cryptocephala Kuetz Valves 22-27µ long and 6-6.3µ broad, striae 14-17 in 10µ, radial in the middle and convergent towards ends, faintly lineate. (Fig-8)
Navicula product W.Smith Valves elliptical, abruptly contracted towards the produced extremities, striae faint 42 in 10µ (Fig-9)
Navicula simplex Krasske Valves 25.2-28µ long and 7.6-8µ broad, lanceolate, sides convex, ends constricted, distinctly rostrate, subcapitate, rounded. Raphe thin and straight with central pores slightly distant. Axial area very narrow, linear; central area moderately wide roundish or elliptical in long axis.Striae about 17-18 in 10µ, moderately radial in the middle and convergent towards ends, indistinctly lineolate (Fig-10)

Figure 9: *Navicula producta*W.Smith

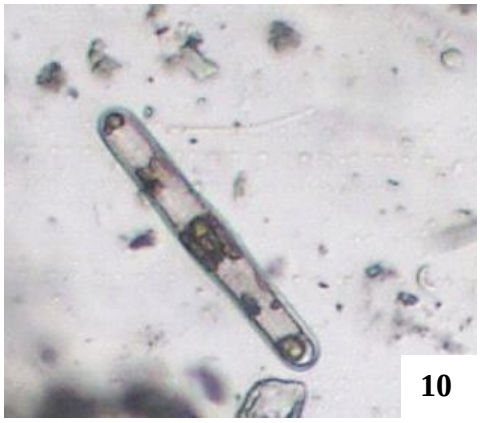

Figure 10: *Navicula simplex* Krasske

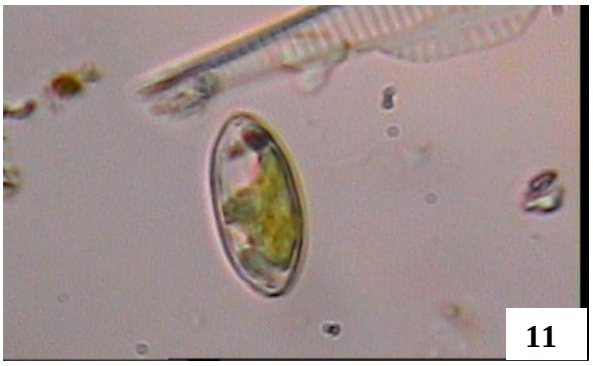

Figure 11: *Nitzschia obtusa* W.Smith

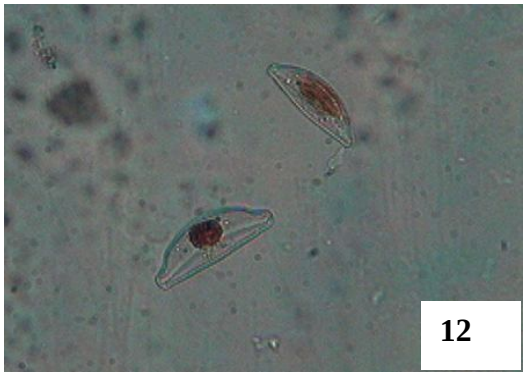

Figure 12: *Nitzschia palea* (Kutz) W.Smith

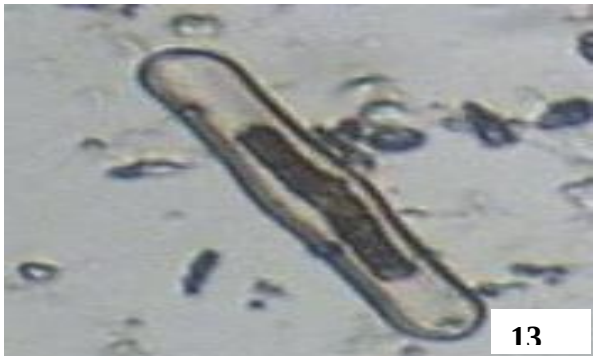

Figure 13: *Pinnularia acrosphaeria* (Breb)

Figure 14: *Pinnularia stauroptera* (Grun) Cleve

Nitzschia obtusa W. Smith
Valves 126-200µ long and7.6-9µ broad, keel punctae about 6-7 in 10µ, striae about 28-30 in10µ, fine but distinct. (Fig-11) *Nitzschia palea* (Kutz) W. Smith
Valves41-45µ long and 4.7µ broad, keel very excentric, keel punctuate 9-13 in 10µ, small and very irregularly set. Striae about 38 in 10µ, fine but distinct. (Fig-12)
Pinnularia acrosphaeria (Breb) W.Smith
Valves 52.2-57µ broad, linear with distinctly swallowed middle part and poles. Striae about 10-12 in 10µ, slightly radial in the middle and a few convergent towards extreme ends. (Fig-13)
Pinnularia stauroptera (Grun) Cleve
Valves 60-70µ long and 9-10µ broad, linear, inconspicuously triundulate with ends constricted and broadly cupitate rounded. Raphethin, slightly wavy with unilaterally bent central pores and curved terminal fissures. Axial area narrow, linear, central area large, rhomboid and reaching the sides. Striae 9-11 in 10µ, coarse, radial in the middle and convergent at the ends. (Fig-14)

Figure 15: *Pinnularia virids* (Nitz)Ehr

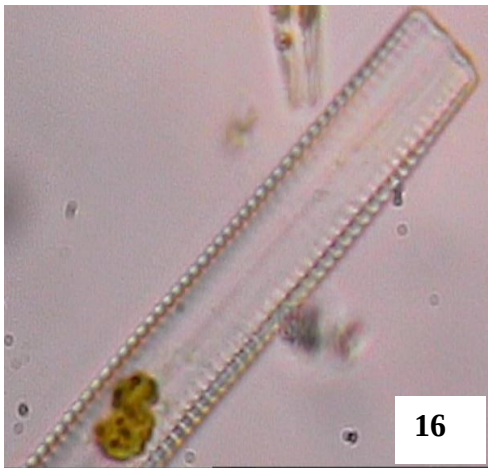

Figure 16: *Synedra ulna* (Nitz)Ehr

Pinnularia virids (Nitz) Ehr
Parallel sided valves, rounded ends, narrow axial row slightly wide in the middle. Striae clear, slightly radial in the middle, 8in 10µ. Valves 120.0-144.0µ long and 20µ broad (Fig-15)
*Synedra ulna (*Nitz) Ehr
Frustule in girdle view linear with broad ends; valves linear, lanceolate with tapering ends; pseudoraphe narrow, axial, central area varying, valve surface with coarse striae. Length of valve 70-300µ, breadh 10-10.5µ girdle width 12µ, transverse striae 6-9 in 10µ (Fig-16)

Conclusions
From ten samples containing diatom, collected from different parts of Sivasagar district of Assam, 9 genera and 16 species of diatoms were recorded.Some others could not be identified to the species level. Diatoms collected from this district were not earlier recorded. Therefore the Present diatom study appear to be new records from this district

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REFERENCES

Benenati EP, JP Shannon and DW Blinn (1998). Desiccation and recolonization of phytobenthos in a regulated desert river: Colorado River at Lees Ferry, Arizona, USA. *Regulated Rivers* **14**(6**)** 519-532.

Biggs BJF and CW Hickey (1994). Periphyton responses to a hydraulic gradient in a regulated river in New Zealand *Freshwater Biology* **32**(1) 49-59.

Biswas K (1936). Common diatoms of the Loktak Lake, Manipur, Assam. *Journal of Asiatic Society Bengal* **2**(2) 171–175

Blinn DW Truitt R and Pickart A (1989). Response of epiphytic diatom communities in the tailwaters of Glen Canyon Dam, Arizona, to elevated temperature. *Regulated Rivers* **4**(1) 91-96.

Blinn DW and PCE Bailey(2001). Land-use influence on stream water quality and diatom communities in Victoria, Australia:response to secondary salinization. *Hydrobiologia* **466**(1-3**)** 231-244.

Bordoloi RPM (1974) studies on algae flora of Assam, Gauhati University, Guwahati India (PhD Thesis).

ChaudhuryK (2004). Taxonomy and ecology of tea garden soil algae of Assam with special influence to pesticide toxicity. Gauhati University, Guwahati, India.

Devi P (1981). Taxonomical and ecological studies on Algal flora of Darrang District, Assam,Gauhati University, Guwahati, India.(Ph.D Thesis)

Dixit SS JP, Smol JC Kingston and DF Charles (1992). Diatoms: powerful indicators of environmental change. *Environmental Science and Technology* **26** 21-33.

Duncan SW and DW Blinn (1989). Importance of physical variables on the seasonal dynamics of epilithic algae in a highly shaded canyon stream. *Journal of Phycology* **25**(3) 455-461.

Fritsch FE(1961). The structure and the reproduction of Algae Vol ll University Press Cambridge.

Gandhi HP (1956). A contribution to the knowledge of fresh water Diatomaceae of South Western India 1. Fresh water Diatom of Dharwar,*The journal of the Indian Botanical Society,* **35**(2) 194-209

Gandhi HP(1999). Fresh Water Diatoms of Central Gujarat, Bishen Sing Mahendra Pal Singh,Dehra Dun. 324.

Hardwick G, DW Blinn and HD Usher (1992). Epiphytic diatoms on *Cladophora glomerata* in the Colorado River: longitudinal and vertical distribution in a regulate driver. *Southwestern Naturalist* **37**(2) 148-156.

Lowe RL and Y Pan (1996). Benthic algal communities as biological monitors. *in*: *Algal Ecology*: *Freshwater BenthicEcosystems*. Academic Press. New York. 705-739.

Parukutty PR (1939). Collection of Algae from Assam. Proceeding of. Indian Academy of Science. **IX B**(5) 229-235.

Patrick R and CW Reimer (1966). The diatoms of the United States, exclusive of Alaska and Hawaii.Monograph of the Academy of Natural Sciences, Philadelphia, **13**(I) 688.

Squires LE SR Rushforth and JD Brotherson (1979). Algal response to a thermal effluent: Study of a power station on the Provo River, Utah, USA. *Hydrobiologia* **63**(1) 17-32.

Stevenson RJ and Y Pan (1999). Assessing environmental conditions in rivers and streams with diatoms, *in*: *The Diatoms: Applications for the Environmental and Earth Sciences*.edited by Stoermer, E.F. and J.P. Smol (Cambridge University Press, New York) 11-40.

Mann DG (1999). The species concept in diatoms. *Phycologia***, 38** (3) 437-495.

Petrick R and Reimer C W (1966). The Diatoms of United States exclusive of Alaska and Hawaii, Monograph of Academy of Natural Science Philadelphia.

Potapova MG and Charles DF (2002). Benthic diatoms in USA rivers: distributions along speciation and environmental gradients. *Journal of Biogeography* **29**(2) 167-187.

Round FE (1993). A review and methods for the use of epilithic diatoms for detecting and monitoring changes in river water quality: methods for the examination of water and associated materials. London: HMSO Publications.

Smith GM (1950) The fresh water algae of the United States; McGraw Hill Book Co,New York,719.
Squires LE, SR Rushforth and JD Brotherson (1979). Algal response to a thermal effluent: Study of a power station on the Provo River, Utah, USA. *Hydrobiologia* **63**(1) 17-32.
Talukdar R (1997). A taxonomic and ecological survey of blue green algae of Kamrup District Assam,Gauhati University, Guwahati, India (Ph.D Thesis).
Van Dam HA Mertens and J Sinkeldam (1994). A coded checklist and ecological indicator Values of freshwater diatoms from the Netherlands. Netherlands *Journal of Aquatic Ecology **28***(1) 117-133.
Venkataraman G(1939). A systemic account of some South Indian Diatoms. *Proceeding of .Indian Acad.Science* **10**(6) 293-336.