Plant Archives Vol. 20 Supplement 1, 2020 pp. 1853-1858 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

NOTES ON FRESH WATER DIATOMS FROM SAWAI MADHOPUR-PART-III, RAJASTHAN, INDIA

Lakhpat Meena

Department of Botany, S.C.R.S. Government College, Sawai Madhoopur (Rajasthan) India.

Abstract

The diatoms are group of photo-assimilate microalgae and are cosmopolitan in their distribution. This is the first report of diatom flora from eastern part of Rajasthan and also part of series investigation of microalgae from Eastern Rajasthan and 28 diatoms species have been identified and characterized.

Key words : Lakes, stream, valves, frustules, phytoplankton.

Introduction

The fresh water algae are found in all habitats with great diversity. The diatoms are major part of freshwater algae and major contributors of oxygen evolving organisms. Therefore, enlisting of diatoms not only contributed as data, but also future hope for scientific community for further research. The research project is carried out in the Sawaimadhopur district of Rajasthan. The district is situated in the western part of the Rajasthan and the rainfall is moderate. It cover area 5042.99.99 sq km and situated in between North longitudinal 25°-45' to 26°-41' and in between 75°-59' to 77°-0 East longitude. The temperature ranges from 4° to 45°C with average rainfall 873.40 mm. The district has rolling hills of Aravalli and Vindhyas ranges. The town founded in 1765 AD was named after its founder Sawai Madho Singh-I of Jaipur. Today Sawai Madhopur is known for Ranthambhor, a wildlife reserve and a place of historical importance. In recent years a number of workers attempted to study the algae of different parts of Rajasthan, but the study of diatoms has been has been neglected aspect since long type.

Materials and methods

The samples were collected from various stations during 2015-2016 for the taxonomic enumeration of diatoms. At each stations the planktons was collected with no. 25 mesh plankton or directly with other objects by scraping of rocks, from aquatic submerged objects like plant twing and every site as well as possible. The various samples were oxidized by using concentrated HCl for five minutes and then repeatedly washing and decanted. Repeat it with concentrated H_2SO_4 and if oxidation was incomplete few drops of perchloric acid were employed to facilitate this process. Samples were repeatedly washing and decanted at each steps. Then samples was spread on slide and mount with high refractive index medium Nephrax for microscopic investigations. Cleaned frustules were examined for their morphological investigations.

The numbers of transapical raphe (Pennate diatoms) were counted from middle of the valve towards the apex. Much carefulness was taken during the drawing of scaled diagram by using camera Lucida.

Study area

The study is carried out in the Sawaimadhopur district of Rajasthan. The district is situated in the western part of the Rajasthan and the rainfall is moderate. It cover area 5042.99.99 sq km and situated in between North longitudinal 25°-45' to 26°-41' and in between 75°-59' to 77°-0 East longitude. The temperature ranges from 4° to 45°C with average rainfall 873.40 mm. The district has rolling hills of Aravalli and Vindhyas ranges. Sawai Madhopur is known for Ranthambhor, a Wildlife reserve and a place of historical importance. The district is divided in to eight tehsils namely1. Sawai madhopur; 2. Khandar, 3. Chauth ka Barwara 4. Gangapur city. 5. Bonli; 6.

Author for correspondence : lmeenak@gmail.com

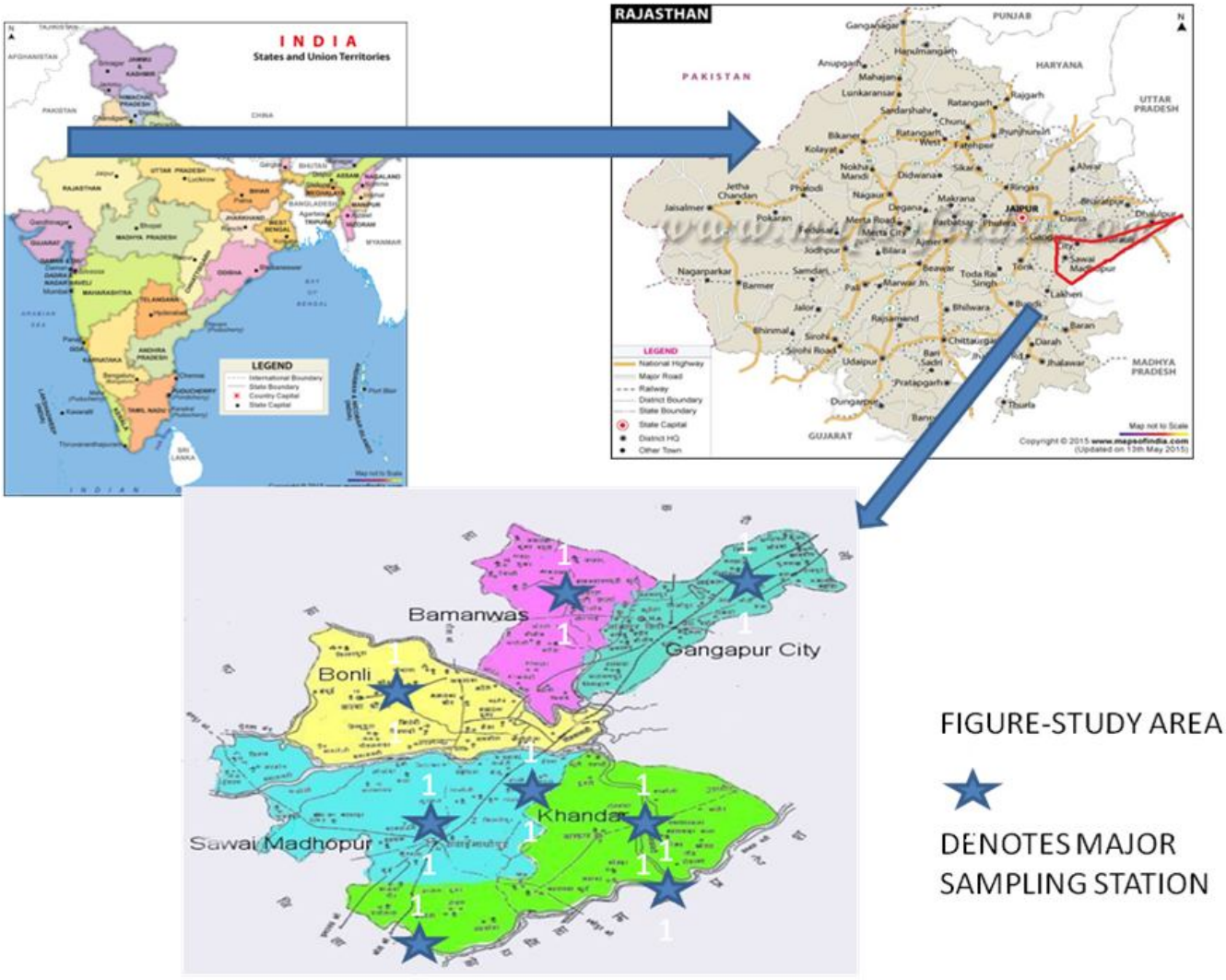

Fig. 1 : Study area.

Bamanwas; 7. Vazirpur; 8 Malarna Dungar. The area has many freshwater ponds, Dams and lakes. The perennial river Chambal in the Khandar tehsil is natural boundary between Rajasthan and Madhyapradesh. The samples were collected from all possible sites of sawai madhopur district as shown in fig. 1.

Results and Discussion

In present systematic diatoms taxa classification of Hustedt, 1930, 1930-1962 has as far as possible been used. The halobian and pH spectra are as per works of Neils Foged (N.F.), Boye Petersen (B.P.), Max Muller (M.M.), Ruth Patrick (R.P.) and Nygaard. The P^H relation divided in to three categories acidophilous (5.5-6.5) circumneutral (6.5-7.5) and Alkaliphilous (7.6-8.9). The identification was done by works of Neils Foged (1959, 64, 66, 71, 73, 75, 77, 78, 79), Sreenivasan and Duthie (1973), Hendey (1964), Gandhi (1959, 61, 62, 67.). In present abbreviations were used as below Hust. for Hustedt, Parag for H.&M. Perallago (1897-1908), AS for A. Schmidt's Atlas (1874-1959). Foged for Neils Foged. Ab. For Average. L-Lengh; W-width; S-longitudinal striae; Sr. radial striae; Pl- Plate; F-figure or figures; P^H-I = Acidophilous; P^H-II = Circumneutral; P^H-III =Alkaliphilous; P^H-IV = not recorded;

***Eunotia* Eherenberg**

Eunotia similis (Hust-. 1937-39, p. 165; 12: 5-8. AS 382: 11-24. Cleve-Euler 1953, II. p. 106, fig. 438)

L. 28.0; W.4.0; S. 14; **F.8**; P^H –II

Oligohalophilous. Circumeutral, Distribution - Sunda Islands, Sweden, New Zealand.

Eunotia serpentina var. *transilvanica* (Pant.) Hust. (AS 274 : 6-8. Foged 1978, p. 61; 10 : 5, 4)

L.40.0-60.0; W.10.0; S. 9-11; **F.15**; P^H –III

Oligohalobolous (indifferent). pH - Alkaliphilous. Previously recorded from Hungary (Fossil), E. Australia,

Table 1 : Comparative characteristics of illustrated diatom species.

S. no.	Name of diatom species	Length (µm)	Width (µm)	Number of Striae per 10 µm	pH range	Distribution	Figure no.	Earlier Taxonomic
1.	*Synedra laevigata* Grun.	60.0-80.0	.6.0-7.0	30-35	III	Cosmopolitan	1,2	Hust. (1930-66), Foged 1975)
2	*Eunotia bigibba* Kütz.	45	12	11	I	Cosmopolitan	7	Hust. (1930-66)
3	*Eunotia exigua* (Breb.) Kabh.	21-30	4-5	-	III	Cosmopolitan	3	Hust. (1930-66), Foged (1978)
4	*Eunotia faba* (Ehr.) Grun.	14	6	-	III	Cosmopolitan	4	Hust. (1930-66), Foged (1978)
5	*Eunotia faba* (Ehr.) Grun. fo. *rhomboide* a. Foged	35	7	12	III	Cosmopolitan	9	Foged (1972, 1978)
6	*Eunotia lineolata* Hust.	90	5	10-12	III	America, Africa, Asia, New Zealands	10	Hust. (1949, 1937-39)
7	*Eunotia lunaris* var. *elgantoides* A.Cleve.	38	4	17	III	Cosmopolitan	5	Sreenivasa and Duthie (1973)
8	*Eunotia monodon* Ehr.	60	11-12	9	III	Cosmopolitan.	11	Hust. (1930-66)
9	*Eunotia monodon* var. *major* (W. Smith) Hust.	120	11	10	I	Cosmopolitan.	12	Hust. (1930-66), Foged (1978)
10	*Eunotia pectinalis* (Dillw Kütz) Rabh	60-95	6-8	10-12	IV	Cosmopolitan.	13-14	Hust. (1930-66), Foged (1978)

New Zealand but not reported from Indian subcontinent.

Eunotia trigibba Hust. (AS 286 : 16-18. Foged 1978, p. 61; 10 : 11, 12).

L. 20.0-40.0; W.89.0; S. 10; **F .16**; P^H –III

Acidophilous (N.F.) Previously recorded from America, S. Africa, Australia, New Zealand

***Cocconeis* Ehrenberg**

Cocconeis pseudodiruptoides (Foged 1975. P. 18, pl. XI, figs 8, 9)

L. 24.4; W. 13.0; S. 15-16; **F.18, 19**; P^H –III

Cocconeis thumensis A. mayer. (Hust. 1930-66, II p. 346. Foged 1977 p 15; 15 : 11, 12, 15)

L. 12.3; W. 9.4; **F.17**; P^H –III

Alkaliphilous. Previously reported from New Zealand, Europe and N. America

***Achnanthes* Bory**

Achnanthes coarctata (Bréb) Grun. (Hust. 1930-66, II, p. 419, fig. 872 a-e. Foged, 1978, p. 24; 15 : 12 a, b).

L. 9.0; W.39.0; **F.20**; P^H –II

Oligohalophilous (indifferent). Circumeutral. Cosmopolitan.

Achnanthes hungarica Grun. (Hust. 1930-66, II, p. 383, fig. 829. AS 414: 6-15, ROSS, 1963. p. 84, fig. 32-37. Foged 1978, p. 26: 14: 18 a, b)

L. 25.0-32.0; W.7.0-8.0; S. 19-20; **F.21, 22**; P^H –III

Oligohalobolous (indifferent), Alkaliphilous. Cosmopolitan.

Achnanthes lanceolata var. *genuina* May. (A. Cleve, in K.V.A. Handl. 4 : 5, p. 25, fig. 527 a-c)

L.20.0-35.0; W.7.0-8.0; S. 15-18; **F .23, 24**; P^H –III

Oligohalobolous(Indifferent), Alkaliphilous.

Achnanthes lapponica var. *fennica* A.cl (A. Cleve in K.V.A. Handl, 4 : 5, p. 23, fig. 520 c-h)

L.25.0-30.0; W.8.0-10.0; **F.25, 26**; P^H –I

Halophilous, Acidophilous (N. F.).

Achnanthes microcephala (Kütz.) Grun. (A. Cleve, 1895, p. 188; Hendey 1951, p. 43. Hust., in Rabenhorst,

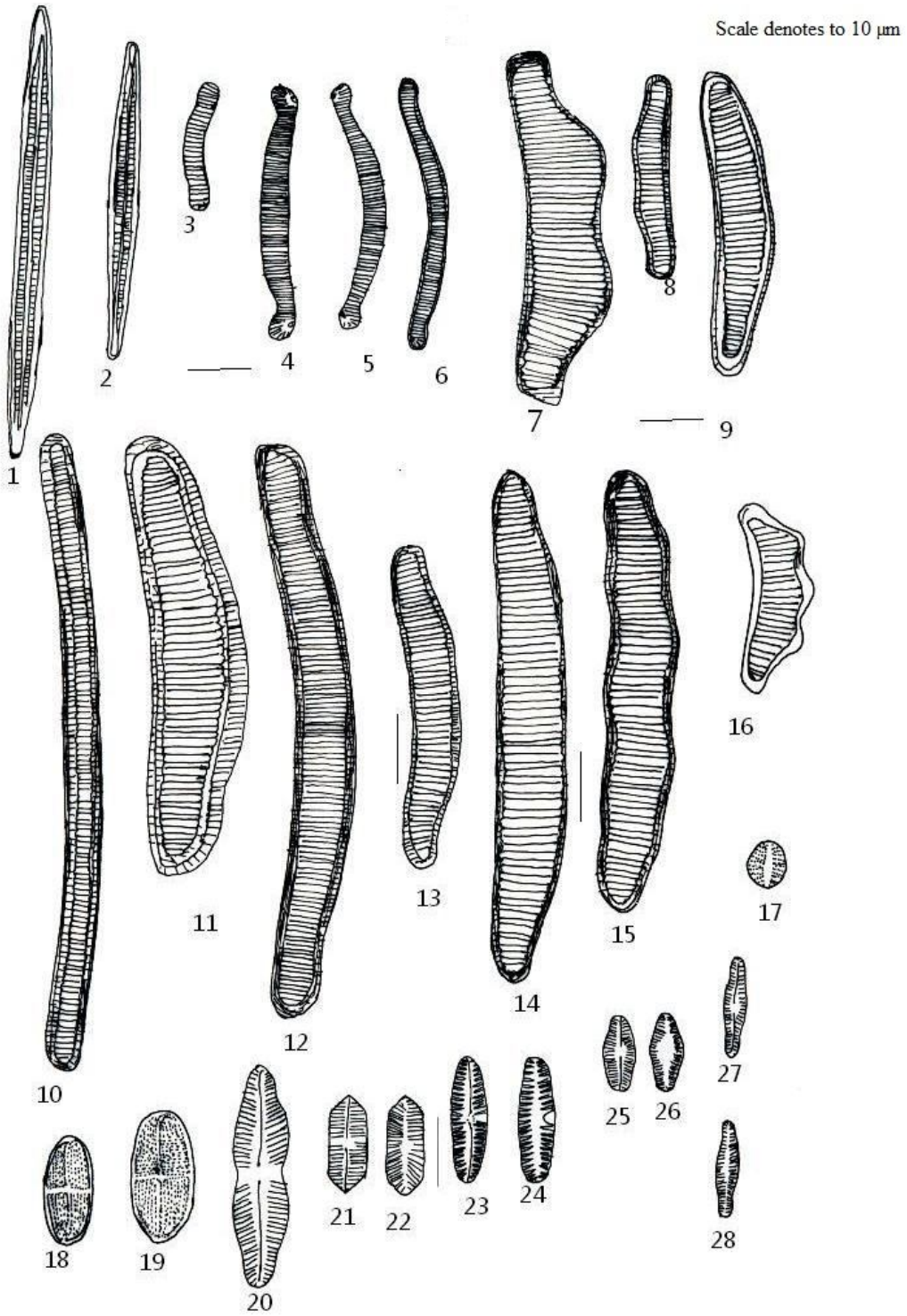

Plate 1 : *Synedra laevigata* Grun.; **2.** *Synedra laevigata* Grun.; **3.** *Eunotia exigua* (Bréb.) Grun.; **4.** *Eunotia faba* (Ehr.) Grun; **5.** *Eunotia lunaris* var. *elgantoides* A. Cleve.; **6.** *Eunotia pectinalis* (Dillw.) Rabh.; **7.** *Eunotia bigibba* Kütz; **8.** *Eunotia similis* Hust.; **9.** *Eunotia faba* (Ehr.) Grun. fo. rhomboidea Foged.; **10.** *Eunotia lineolata* Hust.; **11.** *Eunotia monodon* Ehr.; **12.** *Eunotia monodon* Ehr. var. *major* (W. Smith) Hust.; **13.** *Eunotia pectinalis* (Dillard ? Kütz) Rabh.; **14.** *Eunotia pectinalis* (Dillard ? Kütz) Rabh.; **15.** *Eunotia serpentina* Ehr. var. *transilvanica* (Pant.) Hust.; **16.** *Eunotia trigibba* Hust.; **17.** *Cocconeis thumensis* May.; **18.** *Cocconeis pseudodiruptoides* Foged.; **19.** *Cocconeis pseudodiruptoides* Foged.; **20.** *Achnanthes coarctata* (Bréb.) Grun.; **21.** *Achnanthes hungarica* Grun.; **22.** *Achnanthes hungarica* Grun.; **23.** *Achnanthes lanceolata* var. *genuin*a May.; **24.** *Achnanthes lanceolata* var. *genuin*a May.; **25.** *Achnanthes lapponica* var. *fennica* A. Cleve.; **26.** *Achnanthes lapponica* var. *fennica* A. Cleve.; **27.** *Achnanthes microcephala* (Kütz) Grun.; **28.** *Achnanthes microcephala* (Kütz) Grun.

p. 376, fig. 819)

Syn. *Achnanthidium microcephalum* Kützing, 1844, p. 75.

L. 20.0; W.5.0; S.30-32; **F.27, 28**; P^H –I

Halophobous (indifferent). pH - indifferent (N.F.).

***Synndra* Ehernberg**

Synedra laevigata Grun. (Hust. 1930-66, II, p. 213, fig 706, a-c. Foged 1975 p. 54, pl. X, figs. 8, 9)

L. 60.0-80.0; W.6.0-7.0; S. 30-35; **F.1, 2**; P^H –III.

pH- Alkaliphilous

***Eunotia* Ehr.**

Eunotia bigibba Kütz. (Hust. 1930-66, II. p. 282, fig. 747 a, b. AS 290: 9-16, 19)

L.45.0; W.12.0; S. 11, 12; **F .7**; P^H –I.

Halophobous. Acidophilons. Cosmopolitan (not described as alkaliphilous except present work)

Eunotia exigua (Breb.) Kabh. (Hust. 1930-66. II, p. 285, fig. 751 a-r. As 297 : 87-92. Foged 1978, p. 57).

L. 21.0.0-30.0; W.4.0-5.0; **F.3**; P^H –III.

Halobolous. Acidophilons. Cosmopolitan (not described as alkaliphilons except present work)

Eunotia faba (Ehr.) Grun. (Hust. 1930-66, II, p. 301, fig. 767. AS 270 : 33-41. Foged 1978, p. 57)

L.14.0; W.6.0; **F .4**; P^H –III.

Eunotia. faba (Ehr.) Grun. fo. *rhomboide*a. Foged (Foged 1972, p. 62; D II: 5, 1978. p. 57; 12: 16)

L.35.0; W.7.0; S. 12; **F .9**; P^H –III

Oligohalobolous (indifferent), pH – Alkaliphilous

Eunotia lineolata Hust. (Hust. 1949, p. 73. 1937-39, p. 162. AS 293: 4-13)

L.90.0; W.5.0; S. 10-12; **F .10**; P^H –III

Oligohalobolous (Indifferent). pH - Alkaliphilous, previously recorded from America, Africa, Asia, New Zealand.

Eunotia lunaris var. *elgantoides* A.Cleve. (Sreenivasa & Duthie, 1973, p. 178, f.12)

L.38.0; W.4.0; S. 17; **F. 5**; P^H –III

Eunotia monodon Ehr. (Hust. 1930-66, II, p. 305, fig. 772, 772 a, b. AS 271 : 13, 14; 287 : 1; 381 : 1)

L.60.0; W.11.0-12.0; S. 9; **F .11**; P^H –III

Halophobous, Acidophilons, Cosmopolitan.

Eunotia monodon var. *major* (W. Smith) Hust. (Hust. 1930-66, II, p. 306, fig. 772 C, Foged 1978, p. 58)

L.120.0; W.11.0; S. 10; **F .12**; P^H –I

Halophobous, Acidophilous, presumly cosmopolitan.

Eunotia pectinalis (Dillw Kütz) Rabh (Hust. 1930-66, p. 296, fig. 763 a. AS 271:10, 11, 15. Foged 1978, p. 59; 12: 10)

L.60.0.0-95.0; W.6.0-8.0; S. 10, 12; **F .6, 13, 14**; P^H –IV.

Halophobous (indifferent), pH- not recorded. Cosmopolitan

Acknowledgement

The author is thankful to UGC, New Delhi for providing financial support during the tenure of research work.

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