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A Preliminary Account of Diatom Flora of Vivekanand Sarovar (Burha Talab), Raipur, Chhattisgarh

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ABSTRACT : The Present Communication gives an account of 18 forms of diatom belonging to 09 genera, collected from Vivekanand Sarovar (Burha Talab) the largest pond within the Raipur city. For the observation of diatoms the sample were centrifuged and deposit portion were digested with acid $\text{HNO}_3 + \text{HCl}$ (3:1) till the small amount was remain in the beaker. After digestion it were washed thoroughly by distilled water and centrifuged again. The lower deposited parts were observed by binocular microscope and photographed by with image capturing system. Most commonly found genera are; Cyclotella, Cymbella, Fragilaria, Gomphonema Melosira, Navicula, Nitzschia Pinnularia and Synedra. But, Navicula and Syendra were found in the most of the sampling site.

KEYWORDS: Algae, Diatom, Drowning, Fresh water, Raipur.

I. INTRODUCTION

Water is the most precious gift of nature, it is essential to all life forms on the earth. It is therefore important that adequate supplies of water be maintained to sustain life. Development of water supplies should however, be undertaken in such way as to preserve the hydrological balance and the biological functions of our ecosystems.

Algae are eukaryotic organisms that have no roots, stems, leaves or flowers. Algae are multi-cellular or unicellular. They are simple and largely aquatic organisms with special feature of chlorophyll-bearing. Algae are important for water ecosystems, At least a half of the total carbon dioxide fixation on earth is carried out by algae through photosynthesis. They occur in a variety of other habitats: moist stones, soils and wood. The form and size of algae is highly variable.

Diatoms (Division: Bacillariophyceae) are microscopic unicellular or colonial algae that range in size from approximately 5 μm to 500 μm . They occur in the body of the water as plankton or on the bottom where they may be attached to plants or rocks or sand particles, or may be free living and able to move between particles of the substratum. Individually, diatoms are invisible to the naked eye, but large concentrations can often be seen as brown or golden-brown discoloration on, for example, the surface of rocks, sand or mud. Diatoms grow as single cells, or form simple filaments/colonies. They form the base of aquatic food webs in marine and fresh water habitats. They have silicious cell wall and contain chlorophyll and ditomins a brown pigment. Diatoms secrete hard silicious outer box like skeleton called *frustule*. This resists heat, acid digestion and putrefaction.



II. RELATED WORK

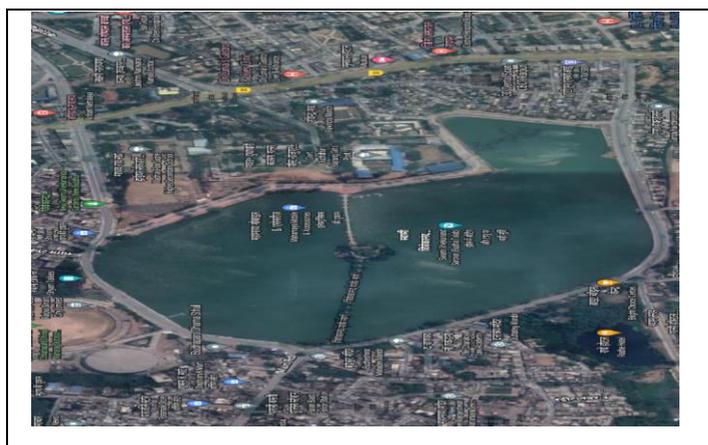
Gandhi [2] collected freshwater diatoms from Sagar in the Mysore state during a botanical excursion 74 diatoms have been recorded representing 16 genera. 109 taxa representing 15 genera of the freshwater diatoms have been recorded for the first time from different places in Vidarbha region of Maharashtra state was done by Sarode & Kamat [3][4] and reported *Eunotia* & *Navicula* to be dominant genera of this region. As many as seventy six forms of diatoms were recorded *Synedra ulna*, *Nitzschia amphibian*, *N. palea* and *N. obtusa* were more widely distributed forms this group. Each of them was recorded from four of the sites Sinha [5].

Systematic survey of the algae and testacea of Kerala state has been made by Suxena et al. [10] and 119 taxa had been described along with their records of distribution in India. Suxena [8] described 157 species as algae including 79 taxa of diatoms collected like Bagaltituies, Kodaikanal hill. Siver et al.[11] worked on a case and that there was no significant difference in the ratios of three species of the diatom *Eunotia* between all samples examined. These findings further supported the idea that all of the samples originated from a common, if not the same, locality.

Presence of diatoms in bone marrow, lungs, liver, spleen, kidney, and brain tissue led to the development of the diatom test. This test became a direct screening test for the diagnosis of drowning. The presence of aquatic diatoms in a cadaver had long been held by many workers to be a clear indicator of death by drowning Pollanen [12] Peabody[1].

III. METHODOLOGY

Raipur is one of the largest and oldest city of Chhattisgarh states. City is situated at 21°14'14"N. Longitude 81°38'05"E and 260 meters above the mean sea level. Vivekananda Sarovar also known as Burha Talab is an old lake situated in the center of the city. The major attraction of this lake is the 37 ft high statue of Swami Vivekananda that is installed here. The statue is made of bronze and is in sitting position. Swami Vivekanand used to bathe here during his stay in Raipur so this pond is also known as Vivekananda Sarovar.



100ml water sample of each site were collected. The collected water samples were preserved in 4% formalin. 85ml of each water sample was decanted off; retaining 15ml of sample including the sediment were centrifuged for 5 min. at 5000 rpm. Settled part of the sample were mixed with concentrated acids in the ratio of (HNO₃+ HCl; 3:1) and digested over hot plate for 2-3 hour's at 50°C and allow to cool. After digestion the dried diatoms were diluted with distilled water. Sediment treatment and slide preparation followed the method by Peabody[1]. Observation make binocular microscope (Leica) and photographed by with image capturing system. Diatoms were identified with the help of available literature including, Gandhi [2] Sarode & Kamat[3] [4], Sinha [5], Sirmour *et al*[6] , Sirmour & Naik[7], Suxena[8] [9], Rai [13] .



IV. EXPERIMENTAL RESULTS

In the present communication, only 18 fresh water diatoms species belong with 09 different genera include *Cyclotella*, *Cymbella*, *Fragilaria*, *Gomphonema*, *Melosira*, *Navicula*, *Nitzschia*, *Pinnularia* and *Synedra* have been described.

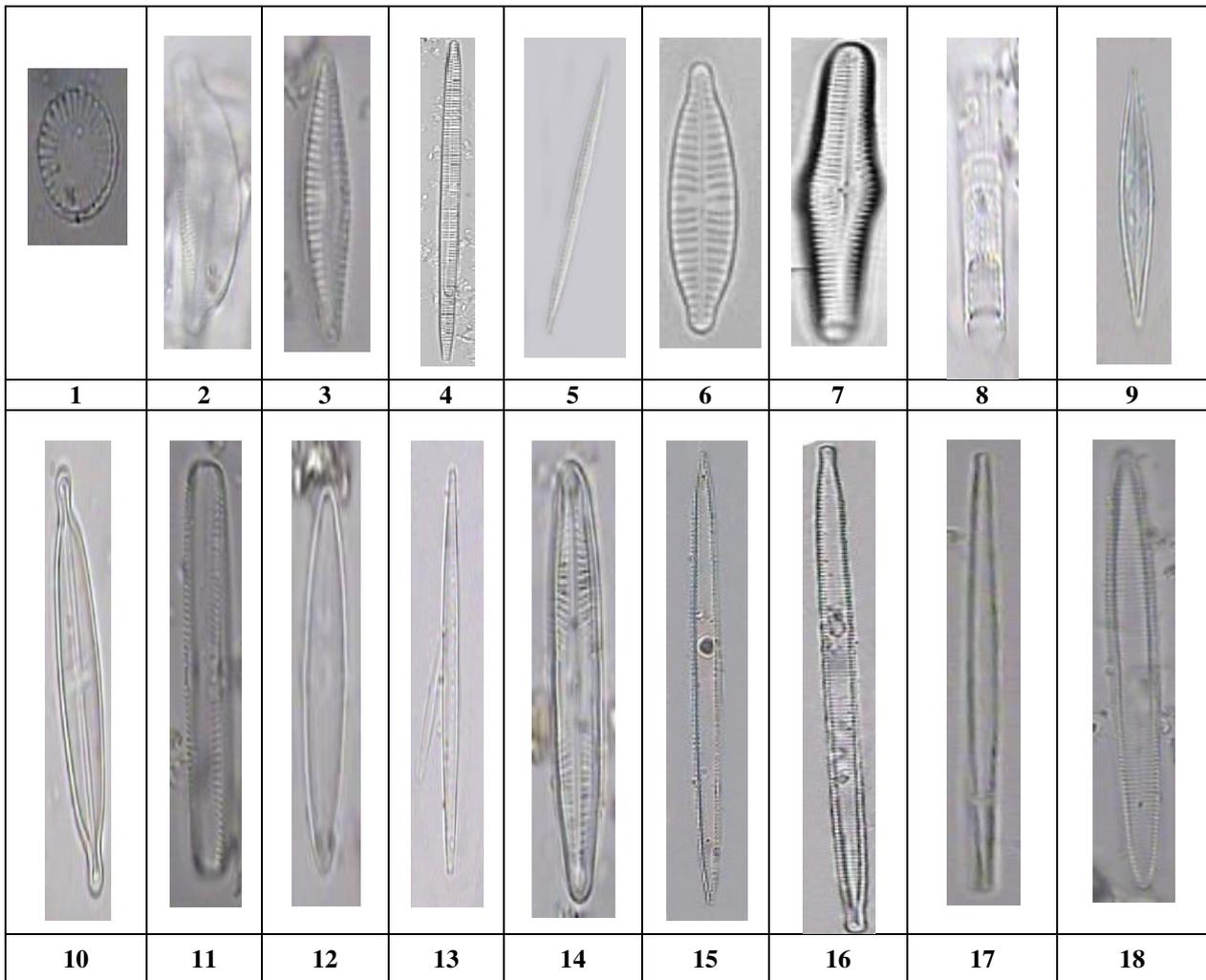
1. *Cyclotella meneghiniana* Kütz. (Figure 1)
Frustule rectangular in girdle view undulate valves, discoid with strong margins, 11-18 μm in diam. Striae 8-10 μm .
2. *Cymbella tumida* Bréb. (Figure 2)
Valves 50- 78 μm long, 13-17 μm broad, asymmetric and curved, broadly naviculoid and with rostrate poles, dorsal side convex, ventral side straight or slightly convex, raphe excentric, axial area narrow, central area large rounded with a ventrally placed prominent isolated dot, striae 9-17 in 10 μm , radiate and punctate.
3. *Cymbella turgid* Greg. (Figure 3)
Valves 20-69 μm long, 5-13 μm broad, lunate with strongly convex dorsal and almost straight often centrally gibbous ventral side, ends more or less acute, rounded, raphe strongly excentric, axial area moderate, linear, central area small ellipsoidal, striae 8-15 in 10 μm .
4. *Fragilaria intermedia* var. *robusta* Venkatraman (Figure 4)
Valves linear with parallel margins, striae absent in one side in the middle, 60- 119 μm long, 8-10 μm broad. Striae 9-10 in 10 μm .
5. *Fragilaria rumpens* (Kütz.) Carl var. *fragillariodes* (Grun.) A. Cl. (Figure 5)
Frustules in continuous chain, valves 27-42 μm long, 3-4 μm broad, linear lanceolated, striae 12-14 in 10 μm .
6. *Gomphonema lanceolatum* Ehr. forma *turris* (Ehr.) Hust. (Figure 6)
Valves 63-74 μm long, 11-12.2 μm broad, striae 9-10 in 10 μm .
7. *Gomphonema salinarum* Pant. (Figure 7)
Valves linear, more or less gibbous in the middle, with almost equally broad, rounded obtuse apex and basis. 56-59 μm long, 8-10 μm broad, striae 17-21 in 10 μm . Axial area narrow linear, suddenly dilated around the central nodule to an orbicular space.
8. *Melosira granulata* (Ehr.) Ralf. (Figure 8)
Frustules cylindrical united in chains, end cells with spines. Frustules 5.5 μm in diameter, semi cell 8-12 μm high. Rows of areoles 8-10 in 10 μm , spirally disposed.
9. *Navicula cryptocephala* Kütz (Figure 9)
Valves 17-36 μm long, 4-10 μm broad, lanceolated with rounded ends. Raphe thin and straight. Axial area very narrow, linear, central area elliptical, striae 12-17 in 10 μm , radial in the middle and convergent at the end, lineate.
10. *Navicula cuspidate* Kütz. var. *abigua* (Figure 10)
Length 84 μm , width 21 μm transverse, striae 19-21 in 10 μm .
11. *Navicula Pupula* Kütz var. *rectangularis* (Greg.) Cl. (Figure 11)
Valves linear with parallel side and broadly rounded ends, raphe thin and straight. Striae fine. Valves 30-41 μm long, 8.5-10 μm broad, striae 20-28 in 10 μm .
12. *Navicula vanhoeffenformis* Gandhi (Figure 12)
Valves 16.7-25.5 μm long, 4-6 μm broad, striae 13-16 in 10 μm . valves linear with parallel sides, ends wedge shaped and acute, raphes with curved terminal fissures.
13. *Nitzschia amphibian* Grun. (Figure 13)
Valves 14-43.3 μm long, 2-5.6 μm broad, linear to linear-lanceolate, with slightly constricted, shortly wedge-shaped acute rounded ends, Keel punctae 8-9 in 10 μm , striae 13-21 in 10 μm .
14. *Pinnularia* Sp. Ehr. (Figure 14)
24 μm long, 5 μm broad, striae 20-22 in 10 μm .
15. *Synedra affinis* Kütz. Var. *tabulata* (Figure 15)
Valves more longly lanceolate, striae more shortened. Length 27 μm long, 3 μm broad.
16. *Synedra rumpens* Kütz. (1844) (Figure 16)
Middle area with or without striae. Length 37-74 μm , breadth 3-4 μm , striae 16-20 in 10 μm .
17. *Synedra ulna* (Nitz.) (Figure 17)
Valves 98 μm long, 8 μm broad, linear to linear lanceolate and tapering at the poles; ends rounded, axial area linear, central area absent or present, striae 11-13 in 10 μm .



18. *Synedra ulna*(Nitz.) Ehr. var. *lanceolata* (Figure 18)

Valves narrowly linear, with apices more, valves 41µm long, 2-3 µm broad, striae 16-18 in 10 µm.

V IMAGES OF DIATOMS



V. CONCLUSION WITH FORENSIC IMPORTANCE

Forensic science is an area of applied science that uses physical evidence to piece together the events that occurred at suspected crime scenes. Freshwater ecology or limnology can be applied to a subset of forensic cases as suggested by Siver et al.[11] In particular, aquatic plants like algae and diatoms have been useful to link suspects to a crime scene or to establish that drowning occurred in freshwater, Sirmour & Naik[7]. When a person drowns in freshwater, diatoms are taken in along with water into the lungs. The diatoms are dispersed to the internal organs of the body.

In case of drowning, diatoms play a significant role to determine the cause of death. Due to the presence of siliceous skeleton, diatoms resist the decomposition. Therefore in case of putrefied and mutilated cadavers, where the histological, anatomical and chemical signs of drowning disappears, diatoms play an important role.



VII. ACKNOWLEDGEMENTS

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