

DIATOM SPECIES OF BRAHMSAROVAR IN DISTRICT KURUKSHETRA, HARYANA (INDIA)

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ABSTRACT

Diatom analysis is a valuable tool in forensic science and it is useful in diagnosis in drowning cases. In the present study an attempt has been made to characterize diatom flora existing in Braham Sarovar Lake in Haryana. Haryana is located in the northern plain of India making it very hot in summers and extremely cold in winters. Haryana extends between 27°39'N to 35°55'N latitudes and 74°36'E longitudes and located in north-western part of India. Diatom plays an important role in establishing the death due to drowning. In present study, 24 number of species namely, *Achanthes*, *Brachysira*, *Cyclotella*, *Cymbella*, *Frustulia*, *Melosira*, *Navicula*, *Rhoicosphenia*, *Synedra*, *Tabularia* etc. were observed. Study of seasonal and site specific diatoms at different site may help in indicating time of drowning along with the location of drowning which would be helpful for the scientific forensic investigation of drowning cases.

KEYWORDS: Diatom, Centrifugation, Microscopy, Pond

INTRODUCTION

Diatoms are single celled predominantly microscopic algae which consist of two halves which fit one inside the other to make up cell frustules. Diatoms are aquatic unicellular species. Diatoms are found in fresh water, in soil, in oceans and on dump surfaces. Diatoms can form colonies in shape of filaments or ribbon (e.g. *Fragilaria*), fan (e.g. *Meridion*), zigzag (e.g. *Tabellaria*) or star (e.g. *Asterionella*). Diatoms have bilateral symmetry. Diatom cells are enclosed within a cell wall made up of silicon. Diatoms generally range in size from 2 to 200 micrometer. Reproduction in diatoms is primarily asexual by binary fission, with each daughter cell receiving one of parent cell's two frustules. There are estimated 20000 to 2 million species of diatoms on the earth. Diatoms use the pigment a and c to collect energy from sun through photosynthesis. They also contain the accessory pigment fucoxanthin and beta-carotene, which give them characteristic golden colour. Diatoms are important bio fuel for aquatic food web.

Widespread distribution of diatoms in Haryana will make diatoms an important forensic marker of drowning. Diatoms have a great forensic significance in drowning and other crime case involving water bodies. The study of diatoms will enable the medico legal investigation of human corpse in water and their manner of death. Unlike most homicidal attack, post-mortem finding in homicidal and accidental drowning is indistinguishable. Diatoms test not only determine the manner of death but also tell the drowning during various times of the year. Climatic conditions significantly help in quantitative and qualitative distribution of diatoms in water bodies. Some local environmental factor including mineral content, temperature, soil, water stratification, pH and pollution linkage can bring notable variation in diversity of diatoms.

MATERIAL AND METHODS

Study Area

Brahma sarovar (29°90'N to 76°83'E) is a fresh water body where history, legends and beauty coincide with each other. It is situated in Thanesar city of district Kurukshetra, in the state of Haryana, India. It is 1800 feet long and 1400 feet broad. Kurukshetra is probably most famous religious site in India and one of the most ancient places of pilgrimage in the world. Water sample were collected from the study site (from November 2014 to June 2015). Water sample were fixed with both Lugol's iodine (1%W/V) and 3% formaldehyde and stored in dark for 24 hours until further analyzed. The supernatant water was discarded and the sedimented diatoms were collected centrifuged at 4000 rpm for 8 minutes in 10 ml of centrifuge tube. The supernatant discarded and residue put on microscopic glass slides. Slides were prepared with following methods, Petrick and Reimers (1996).The slide put on hot warm plate at 50°C. Finally Figure showing the Brahmsarovar Lake in Kurukshetra. Slides were mounted with DPX.



Figure 1

DIATOM IDENTIFICATION

Observe slide under the optimum 100X of microscope (LEICA-DMLB fitted with digital camera, Oil gel microscope).The diatom genera were identified using various publication and monographs like Venkataraman, (1939); Gandhi, (1956,1999); Smith,(1950); Dincamillus et.al.(2011); du Buf (2002); Pollanen (1998); Patrick and Reimer (1966 and 1975); Simonsen(1987).

DIATOMS CELL COUNT

Diatom cell count were determined using Sedgwick Rafter Chamber (Bernard, 1971) and were calculated using formula.

$$\text{Diatoms/ml (n)} = \frac{\text{Diatom counted} \times 1000}{\text{Grid cell}}$$

$$\text{Diatoms/liter (N)} = \frac{n \times v \times 1000}{V}$$

Where n= average number of diatom cells in 1ml of water sample

v = Volume of water sample concentration (ml)

V=volume of total water (liter)

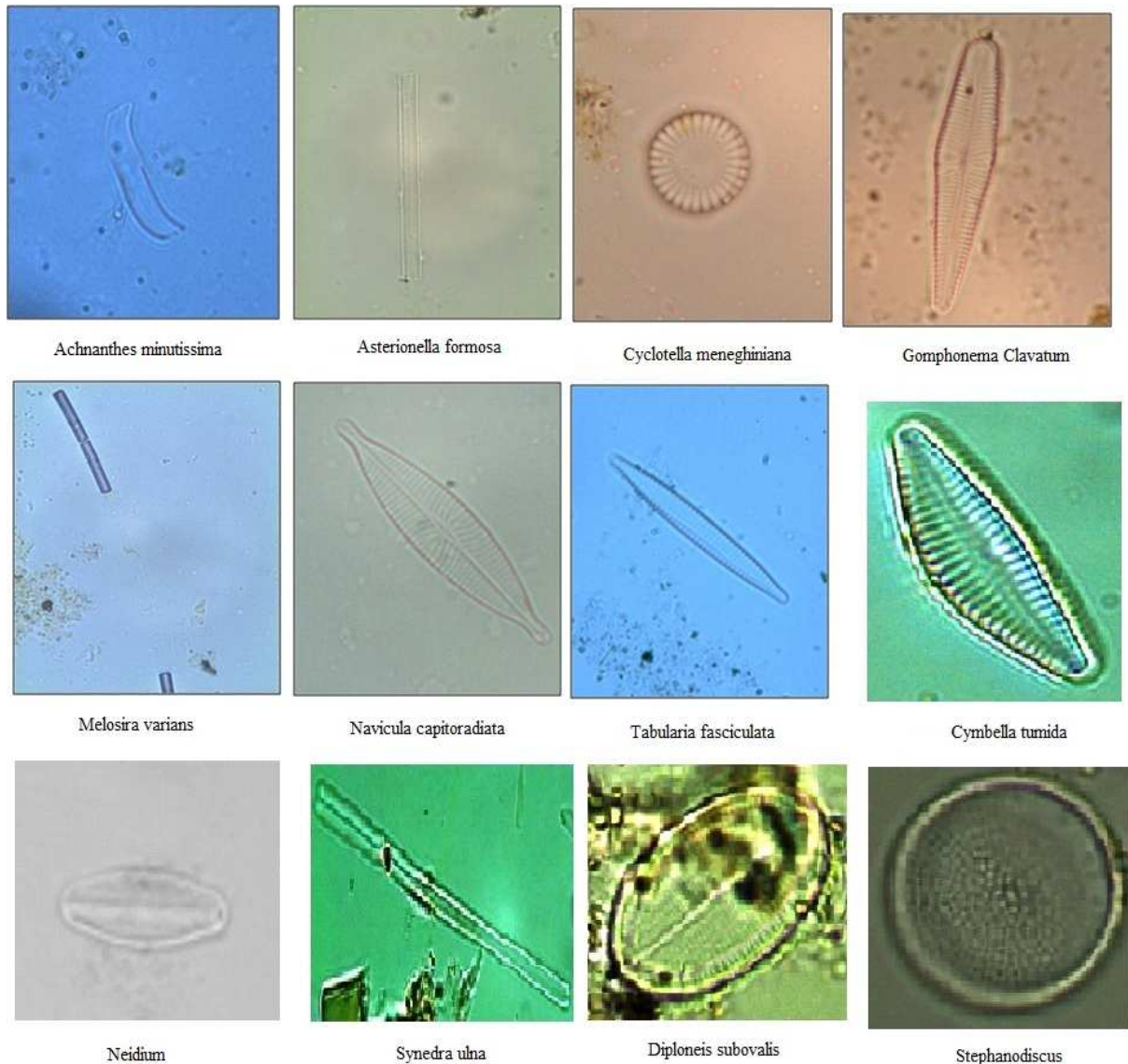


Figure 2

RESULTS AND DISCUSSIONS

This study concludes that diatoms attain maximum growth and number during winter season and gradually decline in summer to reach its minimum during rainy season (Philipose, 1960; Karikal, 1995). Similarly in our present study maximum growth of diatom species observed in winter season and gradually decreased in summer season.

Commonly occurring (dominating) diatoms, are defined as the diatoms found in large percentage than others, and mostly they were present in all seasons at all the sites. Least occurring diatoms were those which were generally present in all the seasons but their count was less than the dominating ones thus are site specific.

Rarely occurring diatoms are those which were observed only in particular season thus also known as seasonal diatom. The most commonly found diatom at this site was *Achnanthes*, *Asterionella*, *Aulacoseira*, *Cyclotella*, *Gomphonema*, *Navicula*, *Nitzschia*, *Synedra* and *Tabularia*. Seasonal diatom at this site was *Actinocyclus*, *Brachysira*, *Coscinodiscus*, *Cymbella*, *Frustulia*, *Gyrosigma*, *Hantzschia*, *Thalassionema*, *Thalassiosira* etc.

This table showing various types of diatom species in the study area:-

Table 1

Sr. No.	Diatom genera	Order	Shape	Size (μm)	
				Length	Width
1	<i>Achnanthes</i>	Pennale	Elliptical	8-16	4-6
2	<i>Actinocyclus</i>	Centrale	Circular	36-40	-
3	<i>Asterionella</i>	Pennale	Elongated	80-300	5-8
4	<i>Aulacoseira</i>	Centrale	Circular	45-50	-
5	<i>Brachysira</i>	Pennale	Elliptical	20-48	12-20
6	<i>Cocconeis</i>	Pennale	Oval	35-45	16-17
7	<i>Coscinodiscus</i>	Centrale	Circular	36-120	-
8	<i>Cyclotella</i>	Centrale	Circular	6-40	-
9	<i>Cymbella</i>	Pennale	Elliptical	20-200	5-50
10	<i>Frustulia</i>	Pennale	Elliptical	60-85	10-18
11	<i>Gomphonema</i>	Pennale	Elliptical	74-90	16-20
12	<i>Gyrosigma</i>	Pennale	Sigmoid	150-240	26-30
13	<i>Hantzschia</i>	Pennale	Elongate	80-120	18-22
14	<i>Melosira</i>	Centrale	Circular	23-25	-
15	<i>Navicula</i>	Pennale	Elliptical	10-60	5-16
16	<i>Neidium</i>	Pennale	Elliptical	40-50	12-20
17	<i>Pinnularia</i>	Pennale	Elliptical	20-250	8-18
18	<i>Placoneis</i>	Pennale	Elliptical	20-30	10-12
19	<i>Rhoicosphenia</i>	Pennale	Elliptical	16-46	8-10
20	<i>Stauroneis</i>	Pennale	Elliptical	40-75	14-20
21	<i>Synedra</i>	Pennale	Rod	93-150	7-9
22	<i>Tabularia</i>	Pennale	Elliptical	20-120	4-6
23	<i>Thalassionema</i>	Pennale	Elongate	20-66	2-4
24	<i>Thalassiosira</i>	Centrale	Circular	15-20	

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