ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 07, Issue, 07, pp.14103-14108, July, 2017

ORIGINAL RESEARCH ARTICLE

Open Access

STUDY OF DIATOM FLORA FOR THE SITE IDENTIFICATION OF YAMUNA RIVER AT DELHI

[1]Dr. Mishra, M.K. and [2]Shailesh Kumar

[1]Asst. Professor Deptt. of Forensic Science, SHUATS, Allahabad, U.P India
[2]M. Sc, Student, of Forensic Science, SHUATS, Allahabad, U.P India

ARTICLE INFO

Article History:

Received 27th April, 2017
Received in revised form
19th May, 2017
Accepted 26th June, 2017
Published online 31st July, 2017

Keywords:

Diatoms, Micro-organism,
Unicellular Plants,
Drowning, Fresh water.

Corresponding author:

ABSTRACT

In forensic science, analysis of diatom is a valuable tool used in diagnosis of drowning and Dumping cases. Diatoms are unicellular plants or micro-organism used in forensic science for differentiating anti-mortem from Post-mortem in drowning. Diatoms belongs to Bacillarophyceasae division of the family chrysophyta is a microscopic unicellular plants. In this study, the fresh water (Yamuna River) samples are collected in the different region of Delhi city and an attempt was made to create data of diatoms seen in the Yamuna river water bodies. The diatoms are deposited in to the kidney, liver and stomach content, At the time of drowning the inhalation of water cause the entry of diatoms in to the blood stream and alveolar system. It is intended that the result of the study of diatoms in Yamuna river water bodies would help the site identification which help to expert in proving their result related to the drowning cases in court laws.

Citation: Dr. Mishra, M.K. and Shailesh Kumar. 2017. "Study of diatom flora for the site identification of yamuna river at Delhi", *International Journal of Development Research*, 7, (07), 14103-14108.

INTRODUCTION

The diatoms (algae) are photosynthetic, unicellular eukaryotic cell which is found in all aquatic environment system like River, pond, lake, dam, reservoir etc. Diatoms are non-motile and are able only limited movemen t along the substrate by secretion of mucilaginous material along with a channel-like called raphe. They possesses vegetative cell body and the cell wall encased in a rigid silicon dioxide shell, referred to as a frustules and organic material that coat the valve and girdle of the diatoms and the frustules can vary greatly in shape which can be symmetrical or asymmetrical. The frustules consist of two valves in which the larger, older valve of the frustules is known as epitheca and the smaller, younger valve of the frustules is known as hypotheca and the girdle is made up of one or several connective bands of epicingulum and hypocingulum, Frustules can vary greatly in shape which can be symmetrical or asymmetrical. The girdle is made up of one or several connective bands of epicingulum and hypocingulum.

Septa are partitions that are form with in the valves. The pinnate diatoms contain a raphe which is mainly for the movement of the diatoms. The raphe is a space that actually separates the valves, Morphologically diatoms appear light yellow in color due to presence of photosynthetic plastids and they vary in size around 20-200 micron .Basically diatom are classified in two 2 order that is central and penales. In forensic science, analysis of diatom is a valuable tool used in diagnosis of suspected drowning and dumping cases. Study of Diatoms can lead not only to direct determination of the cause of death, but also can help pinpoint the site identification of the probable site of drowning, Variation in diatom diversity at different sites is very helpful during investigation of the corpse which were obtained from the water bodies. The diagnosis of drowning by diatom analysis should be considered positive when number of diatoms is above a minimal established limit; 20 diatoms/ 100 µl of pellet (obtained from 10 g of lung samples) and 50 diatoms. From other organs (Ludes *et al*., 1996) and further matching of diatoms from sample except sample. Bone marrow and drowning site can strengthen this

supportive evidence and a positive conclusion can be drawn whether person was living or not when drowned.

MATERIALS AND METHODS

Collection of Water Sample: 2 water samples were collected from each selected site, total 12 water samples were collected from 6 site of Yamuna River at Delhi for the study of diatoms flora, before collection of water, plastic bottles or containers were cleaned with plenty of same water media at least 2-3 times. After cleansing of bottle by the plenty of same water, the samples containing diatoms were collected in amount of 500-1000 ml in bottle from the selected sites of Yamuna River at Delhi and the bottles were tightly fitted with cap and labeled with location of sampling sites along with Date and Month.

Extraction and Isolation of the Diatoms: For the extraction and isolation and of diatom from water sample, firstly we added 2-3 drops of 2% formalin solution in bottles containing water sample to prevent growth of diatoms and left it for overnight or 4 hours for settlement. Next day discard the half water without shaking it and then shake it rigorously and pour it in to 500ml of beaker. Added lugol's iodine solution 1-2 drops and covered the beaker with brown paper and left over night for sedimentation. Now added 4-5 drop of Conc.HNO3 (laboratory reagent) in beaker containing water sample, they oxidize the organic matter present in the water diatom cell wall is resistant in nature. Next day is transferred in the tarson tubes and centrifuged it at 1500rpm for 10 mints, discard the supernatant to get the pellet, now again 2-3 time centrifuged the water sample to get maximum pellets in tarson tube Ludes *et al*., (1996). The pellets were transferred it on to the microscopic slide and left it for dry on the hot plate for few minutes and cover it with cover slip than observed it under compound microscope at 10X 45X and 100X magnification, Taylor *et al*,(2007). The same steps were repeated for all water sample for morphological examination of diatoms.

Microscopic examination: For microscopic examination, Pellets were remove from the bottom of the tarson tubes by the help of dropper and spread the pellet on the microscopic slide and kept it on the hot plate for 1-2 minutes for drying now put the cover slip on the microscopic slide, Now finally observed the microscopic slide carefully under compound microscope at 10X, 45X and 100X magnification, the whole process were repeated for all the samples of Yamuna River for the examination and identifications of diatoms.

Identification of Diatoms: After collection, extraction and isolation of diatoms of 6 sites samples of Yamuna river at Delhi, Various diatoms were identified by using standard online database of U.S. (Diatom of America). The Diatoms were identified on the basis of their morphology characteristics features like raphe, striae, cell and Shapes.

RESULTS

In collected water samples from the Yamuna River after extraction it was examine under microscope and identified 33 genera and one unknown species were also found in Yamuna River at Delhi. As the table shows that 33 genera of diatom were identified out of which 10 genera found from Sonia Vihar Ghat, Pusta-4(S1), 11 genera from Sonia Vihar Ghat, Pusta-3(S2), 9 genera from Sonia Vihar Ghat, Pusta-2(S3), 8 genera Sonia Vihar Ghat, Pusta-1(S4), 14 genera from Nanaksar, pusta-0 (S5) and 16 genera Wazirabad, Sur Ghat(S6), In collected water sample from the Yamuna River after extraction and isolation it was examine under microscope and identified 11 genera of diatoms which are commonly found in each selected site of Yamuna River at Delhi.

Table 3.1. Diatom genera identified from the site of "Sonia Vihar Ghat, Pusta-4" in month of January 2017

S.No	Diatom Genera
1A.	
01	*Navicula*
02	*Stephanocyclus*
03	*Brachsira Vitrea*
04	*Nitzschia exili*
05	*Achnanthes*
06	*Stenopterobia*
07	*Haslea*
08	*Bacillaria Paradoxa*
09	*Neviculoid*
10	*Cymbella Amphicephela*

Table 3.2. Diatom genera identified from the site of "Sonia Vihar Ghat, Pusta-3" in month of January 2017

S.No.	Diatom Genera
2B	
01	*Amphora*
02	*Cyclotella Distinguenda*
03	*Synendra*
04	*Brachsysira vitrea*
05	*Suriella elegans*
06	*Fragilariforma nitzsciodes*
07	*Stenopterobia*
08	*Cyclotella rosii*
09	*Brachsysira zellensis*
10	*Anomoeoneis*
11	*Fragilaria crotonesis*
12	*Stauronies bovbjergii*
13	*Achnanthes*

Table 3.3. Diatom genera identified from the site of "Sonia Vihar Ghat Pusta-2" in month of January 2017

S.No.	Diatom Genera
3C	
01	*Adlafia*
02	*Cyclostephanos dubius*
03	*Nitzschia palea*
04	*Synedra sp.*
05	*Fragilariforma nitzsciodes*
06	*Pinnulerria*
07	*Pinnulrria gabba*
08	*Surirella Elegans*
09	*Stauroforma*
10	*Synedra*
11	*Gomphonema*

Table 3.4. Diatom genera identified from the site of "Sonia Vihar Ghat, Pusta-2" in month of January 2017

S.No.	Diatom Genera
4D.	
01	*Tabularia*
02	*Diatoma vulgaris*
03	*Cocconies*
04	*Fragileria*
05	*Adlafia*
06	*Cyclostephanos*
07	*Brachysira Vitrea*
08	*Cocconies sp.*
09	*Stauroneis Kingstoni*

Table 3.5. Diatom genera identified from the site of "Nanaksar, Pusta-0 in month of January 2017

S.No.	Diatom Genera
5E	
01	*Fragilaria crotonensis*
02	*Fragilaria crotonensis*
03	*Stauronies angustilancea*
04	*Craspedostauros*
05	*Fragilaria intermedia*
06	*Melosera*
07	*Synedra favinis*
08	*Stauronies bovbjergii*
09	*Cyclotella meneghiniana*
10	*Distrionella*
11	*Pinnularia*
12	*Achnanthes sp.*
13	*Fragilaria crotonensis*
14	*Cymbella Lanceolata*
15	*Fragilariforma nitzsciodes*
16	*Eunotia alpine*
17	*Un identified*
18	*Spirulina*

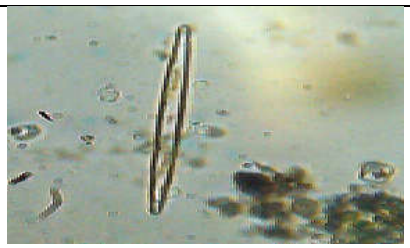
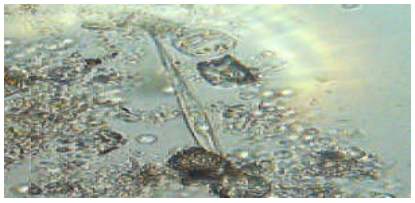
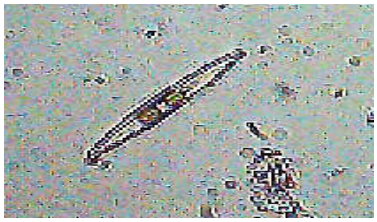
Table 3.6. Diatom genera identified from the site of "Wazirabad, Sur Ghat" in month of January 2017

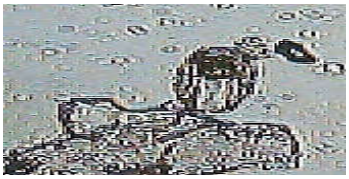
S.No.	Diatom Genera
6F	
01	*Cymatopleura*
02	*Craticula Subminuscle*
03	*Nitzschia palea*
04	*Nitzschia elegans*
05	*Nitzschia elegans*
06	*Surrilla*
07	*Melosera*
08	*Adlafia*
09	*Melosera*
10	*Brachsira Vitrea*
11	*Stauronies angustilancea*
12	*Navicula cuspidate*
13	*Bacileria*
14	*Melosera*
15	*Gyrosigma*
16	*Synedra favinis*
17	*Stenopterobia*
18	*Amphora rugosa*
19	*Eunotia alpine*
20	*Cyclotella meneghiniana*
21	*Surirella iowensis*
22	*Frickea*
23	*Gyrosigma kutzingii*
24	*Nitzschia linearis*

Table 7. Common diatom genera found in Yamuna River, at Delhi

S.No.	Diatom Genera
01	*Brachysira*
02	*Nitzschia*
03	*Stenoperobia*
04	*Cymbella*
05	*Cyclotella*
06	*Synendra*
07	*Surriella*
08	*Fragilaria*
09	*Fragilariforma*

Table 8. Show that 19 specific diatoms genera were found at the sites of Yamuna River in the month of January

Site-1 **Sonia Vihar Ghat, Pusta-4**	**1a) Haslea** **1b) Stenopterobia**	 
Site-2 **Sonia Vihar Ghat, Pusta-3**	**2a) Amphora,** **2b) Anomoeoneis**	 
Site-3 **Sonia Vihar Ghat, Pusta-2**	**2a) Amphora** **2b) Anomoeoneis**	 
Site-4 **Sonia Vihar Ghat, Pusta-1**	**4a) Diatoma vulgaris** **4b) Stauroneis Kingstoni**	 

Nanaksar, pusta-0	***5a) Stauronies angustilancea***	
	5b) Craspedostauros	
	5c) Distrionella	
	5d) Cymbella Lanceolata	
	5e) Unidentified	
Site-5 **Wazirabad, Sur Ghat**	**6b) Craticula Subminuscle**	
	6c) Gyrosigma	
	6d) Frickea	
	6e) Gyrosigma kutzingii	
	6f) Surirella iowensis	
	6g) Amphora rugosa	

DISCUSSION

In present study total 33 diatoms genera were identified at six different sites and one unidentified species found in month of January Yamuna River. In which 10 genera found at Sonia Vihar Ghat, Pusta-4(S1), 11 genera from Sonia Vihar Ghat, Pusta-3(S2), 9 genera from Sonia Vihar Ghat, Pusta-2(S3), 8 genera Sonia Vihar Ghat, Pusta-1(S4), 14 genera from Nanaksar, pusta-0 (S5) and 16 genera in Wazirabad, Sur Ghat(S6). Total 11 diatom genera were identified at all selected sites of Yamuna River at Delhi. The work performed in this thesis can be discussed as in accordance with the work performed earlier by the scientist Tyagi *et al*., (1985) and Ludes *et al*., (1996) conducted a water monitoring system and generated a data base of diatom species from various water bodies like pond, lakes and canals for diagnosis of suspected drowning cases, Tiwari *et al*.,(2006) who reported 20 diatom genera species in Allahabad locality, Garima *et al*.,(2013) reported 24 diatom species in Yamuna River, Allahabad. In present study diatoms flora from different sites of Yamuna River at Delhi, were identified to be used as indicator of drowning and dumping sites for crime investigation. It can also be helpful to recognize the site on the basis of morphological study of diatom flora, the site specific diatoms of Yamuna River at Delhi can play important role to recognize and identified the site in case of Drowning and Dumping. This work is very helpful for medico-legal. purposes such as in unclaimed body related to doubtful drowning and dumping cases as well as in site correlation and site identification of doubtful cases.

Summary

In this present study, 500 ml of water sample is collected from six different site of Yamuna River at Delhi, 2 water samples were collected from each selected site month of January 2017. Collected water sample from six dffrent site were treated for the digestion by using acid digestion method after that the sample were centrifuged to get peleets. The microscopic slides were prepared by spreading the thin layer of pellets on slide for the microscopic examinaton after laboratoy examination 33 genera were identified and one unknown species also found in month of January at in Yamuna River. In which 10 genera found from Sonia Vihar Ghat, Pusta-4(S1), 11 genera from Sonia Vihar Ghat, Pusta-3(S2), 9 genera from Sonia Vihar Ghat, Pusta-2(S3), 8 genera Sonia Vihar Ghat, Pusta-1(S4), 14 genera from Nanaksar, pusta-0 (S5) and 16 genera Wazirabad, Sur Ghat(S6). Total 11 diatoms of genera were identified at all selected sites of Yamuna River at Delhi. 12 water samples were collected from 6 Ghat of Yamuna River at Delhi, 2 samples were collected from each sites of Yamuna River after quantitative examination of water samples, 33 genera of diatom were identified and one unidentified diatom is also found, Diatoms were identified by the available data " standard online diatom database at U.S.(diatom of America)".

In this study 11common genera and 19 site specific diatoms genera are found in the water sample of 6 different sites of Yamuna River , The site specific diatoms species are Haslea, Stephanocyclus, *Amphora, Anomoeoneis, Stauroforma, Fragilariforma nitzsciodes, Diatoma vulgaris, Stauroneis Kingstoni, Stauronies angustilancea, Craspedostauros, Distrionella ,Cymbella Lanceolata, Unknown, Cymatopleura, Craticula Subminuscle, Gyrosigma, Frickea, Gyrosigma kutzingii, Surirella iowensis, Amphora rugosa* and the 11 common diatom genera are *Brachysira, Nitzschia, Stenoperobia*, *Cymbella, Cyclotella, Synendra, Surriella, Fragilariforma, Fragilaria, Stauronies and Adlafia.*

Conclusion

From this study it is concluded that the diversity of diatom at various sites of Yamuna River at Delhi, play very important role during investigation of the dead body which found from the water bodies. Diatom study is an essential tool for medico-legal purposes such as an unclaimed body found in water is related to doubt full drowning and dumping cases. According to this study it was concluded that, result obtained from the diatom study at Yamuna River in Delhi region can be used as a marker for solving number of cases happened in the particular locality of the study area for the site identification. It was also concluded that the diatom finding from the biological sample produces a lot of information about drowning, dumping and the site identification of the probable crime site.

REFERENCES

Garima Yadav, M.K. Mishra, A. K. Gupta, Shailesh, 2013. Identification of Site Specific Diatom at Yamuna River of Allahabad, Volume 8, Issue 2 (Nov. – Dec. 2013), PP 87-89.

Ludes, B., Coste, M., North, N., Doray, S., Tracqui, A.and Kintz, P. 1999. Diatom analysis in victim's tissues as an indicator of the site of drowning, Journal of Legal Medicine.112: 163–166.

Ludes, B., Coste, M., Tracqui, A. and Mangin, P. 1996. Contivuous River Monitoring of Diatoms in The Diagnosis of Drowning. Journal of Forensic Science. 41(3): 425-428.

Rajvinder Singh, Rajinder Singh, Mukesh Kumar Thakar, IIJFMT 3(3) 2005. Drowning Associated Diatoms, Department of Forensic Science, Punjabi University, Patiala-147002.

Round F.E., Crawford Norton R.M. Mann D.G. 1990. The diatoms, Biology and Morphology of the Genera. Cambridge University Press. 104, 25-32.

Tyagi, G.D., Dogra, T.D. and Dikshit, P.C. 1985. Diatoms of Delhi. *Journal of Forensic Medicine & Toxicology*. 2(3): 18-23.

****