A Study on Morphological Structure of Diatom in Different Water Bodies of Chennai City– A NEW APPROACH

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Abstract - This study focuses on the morphological characteristics of diatoms found in Chennai's numerous bodies of water, including rivers, lakes, and coastal waters. they are one of the most abundant single-celled photosynthetic algae, contributing to about 40% of total marine primary production. diatoms are important primary producers and bioindicators of water quality because of their unique silica-based architecture. By analysing the diverse shapes of diatoms, this study aims to understand how their morphology differs in different aquatic environments. In this review, we first introduced the role of diatoms in forensic evidence and it might help clarify how diatoms are used in forensics, to determine the time and location of death in drowning cases. The study finally advances our understanding of diatom ecology and its role in Chennai's aquatic ecosystems.
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***Key Words*:** Diatom, morphology, photosynthetic algae, Chennai, drowning, bioindicators

1. INTRODUCTION

Diatoms are single-celled photosynthetic eukaryotes, one of the most crucial climate modulators for their contribution to carbon dioxide absorption and the biological pump of carbon. The group of diatoms is composed of at least 100,000 different species(1) the word "diatom" is derived from Greek words, meaning cut in two, which refers to their cell wall feature. The traditional classification of diatoms is exclusively based on morphological

characteristics of the frustule Diatoms are unique microalgae containing silica and having distinct geometrical shapes. They are unicellular, eukaryotic and photosynthetic organisms. Their cell size ranges between

2-200um. They occur in the wet or moist places where photosynthesis is possible, diatoms are either planktonic (free-floating) or benthic in nature. They occur either in solitary cells or in colonies, which can take the shape of ribbons, fans, zigzags or stars .the morphological study of diatoms in different water bodies of Chennai aims to explore the diversity, structure, and ecological significance of these microscopic algae across various aquatic environments. Diatoms are essential components of aquatic ecosystems, playing a crucial role in primary production, nutrient cycling, and serving as bioindicators of water quality. By examining their morphological characteristics in different water bodies, such as rivers, lakes, and coastal waters**.**

2. METHODOLOGY

2.1 Aim

To study the morphological structure of diatom in different different water bodies of chennai city.

2.2 Ethical consideration

This study involves the collection of diatom samples from various water bodies in Chennai and does not include human or animal subjects, thus posing minimal ethical concerns. Sampling was done responsibly, with minimal environmental impact . All data were used solely for academic purposes, following proper scientific and environmental guidelines to ensure integrity and sustainability throughout the research process. Materials and Methods

2.3 Sample criteria

Water samples containing diatoms were collected from selected freshwater and brackish water bodies across different regions of Chennai. Sites were chosen based on varying pollution levels, urban influence, and accessibility. Sampling was conducted during the same season to reduce temporal variation. Only samples with visible algal presence and suitable for microscopic analysis were included. Locations with restricted access or unsafe conditions were excluded.

2.4 Sample collection

Water samples were collected from selected water bodies across Chennai using sterilized plastic containers. Approximately 100 ml of surface water was collected from each site, focusing on areas with visible algal growth. Samples were taken during daylight hours and stored in clean, labeled bottles. To preserve the diatoms for morphological analysis,it kept in a dark place to prevent extra growth or formation of extra microrganism. The collected samples were transported to the laboratory in cool conditions and analyzed within 48 hours.

3. RESULT

3.1 location of water bodies

Water samples was collected from different water bodies in Chennai city and their morphology was identified and image was captured from the light microscope. the detailed analysis is pasted below

S.no	Location of water bodies	Diatom morphology
1.	Marina Beach	6
2.	Golden Beach	5
3.	Gandhi Beach	4
4.	Foreshore Estate Beach	5
5.	Patinapakkam beach	3
6.	Mouth of Adyar	5
7.	Kumara Beach. Appa Kumar Beach.	2
8.	Thiruvanmiyur Beach	4
9.	Thiruvalluvar Nagar Beach	5
10.	RTO Beach	5
11.	Neelangarai Beach	6
12.	Blue Beach	9
13.	Vettuvankeni Olive Beach	8
14.	Injambakkam Beach	3
15.	Golden Beach	5
16.	ECR Beach	4
17.	Akkarai Beach	6
18.	Side Beach	5
19.	Copper Beach	4
20.	Chembarambakkam Lake	3
21.	Velachery Lake	8
22.	Korattur Lake	5
23.	Retteri Lake	2
24.	Porur Lake	4
25.	Chitlapakkam Lake	3
26.	Ayanambakkam Tank	1
27.	Pulicat Lake	8
28.	Madurantakam Lake	5
29.	Veeranam Lake	4
30.	Ambattur Lake	2
31.	Adambakkam Lake	3
32.	Madambakkam Lake	4
33.	Kaliveli Lake	5
34.	Maduravoyal	6
35.	Allapakam lake	2
36.	Metro water lake	3
37.	Adayar lake	4
38.	Nanmanagalam lake	5
39.	Periya eri	3
40.	Cooum (golden George bridge)	1
41.	Cooum (mogapair)	4
42.	Cooum(backside Thai Moogambigai Polytechnic College)	2
43.	Cooum(Dr. M.G.R. Educational And Research Institute)	5
44.	Naduvankarai eri	5
45.	Tower park	4
46.	Chetpet eco park	3
47.	Cooum (near adithanar road)	1
48.	N4 Beach	5
49.	Ariyalur pond	2

50.	Kadapakam panchayat lake	3

3.2 :diatom in different water bodies

Fig1: Marina Beach

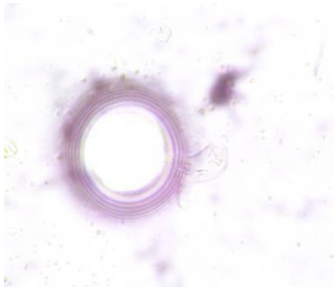


Fig 2: Golden Beach

Fig 3: Gandhi Beach

Fig 4: Foreshore Estate Beach

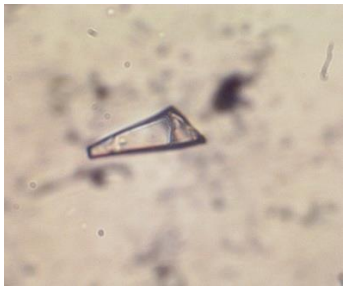


Fig 5: Patinapakkam beach

Fig 6: Mouth of Adyar

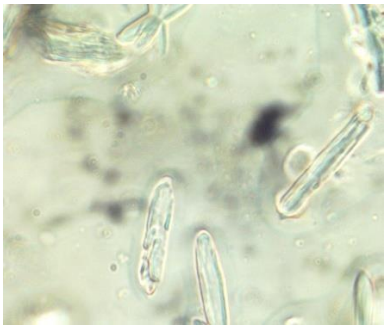


Fig 7: Kumara Beach. Appa Kumar Beach

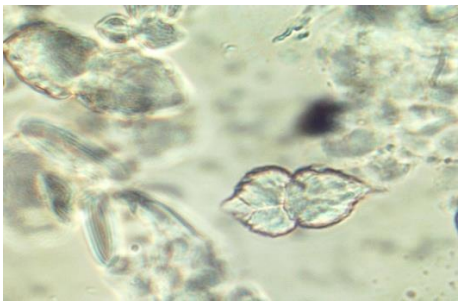


Fig 8 : Thiruvanmiyur Beach

Fig 9: Thiruvalluvar Nagar Beach

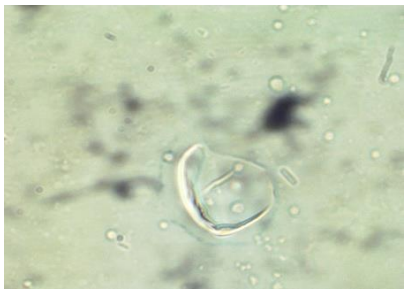


Fig 10: RTO Beach

Fig 11: Neelangarai Beach

Fig 12: Blue Beach

Fig 13: Vettuvankeni Olive Beach

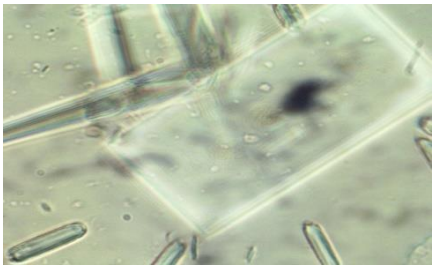


Fig 14: Injambakkam Beach

Fig 15: Golden Beach

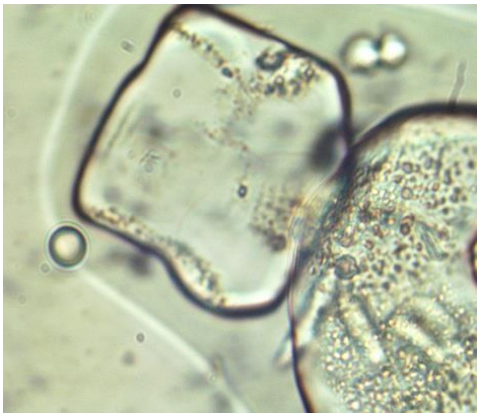


Fig 16: ECR Beach

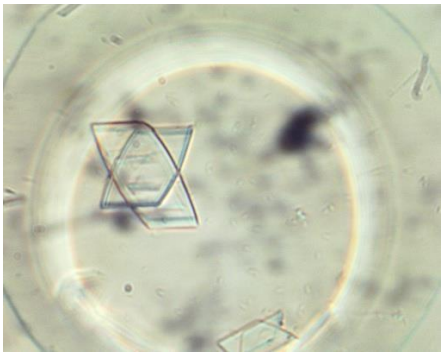


Fig 17: Akkarai Beach

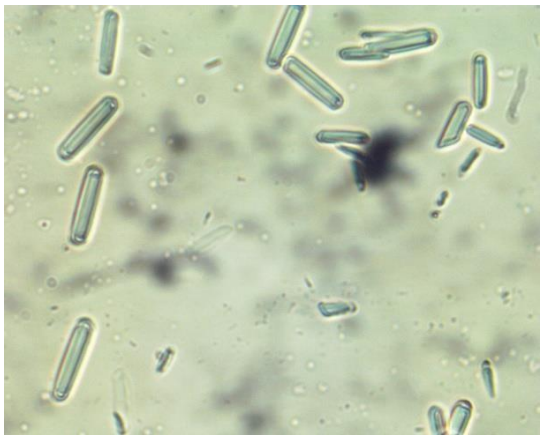


Fig 18: Copper Beach

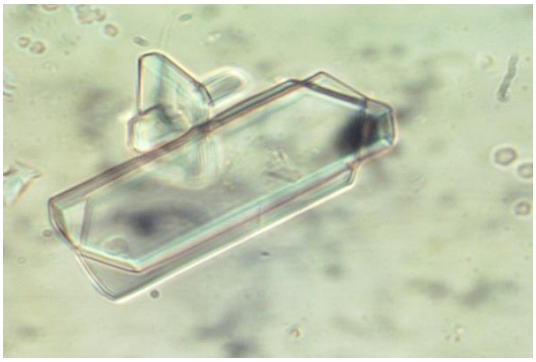


Fig 19: Chembarambakkam Lake

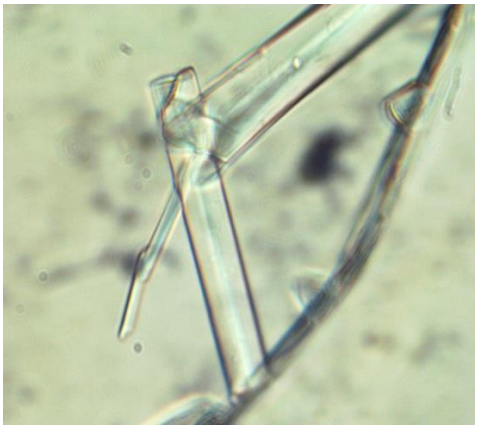


Fig 20: Side Beach

Fig 21: Velachery Lake

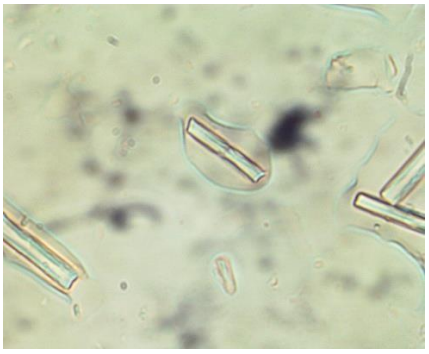


Fig 22: Korattur Lake

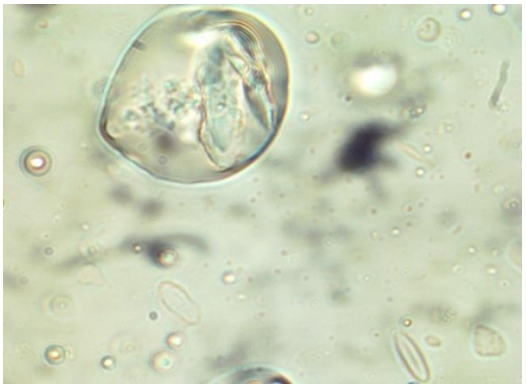


Fig 23: Retteri Lake

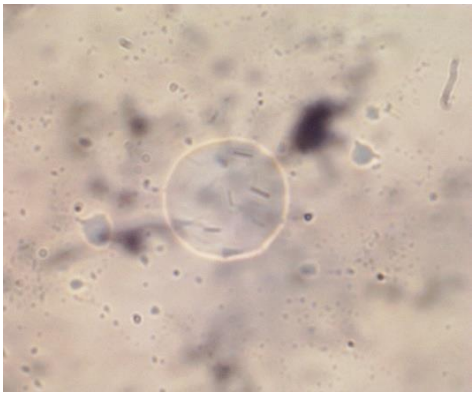


Fig 24: Porur Lake

Fig 25: Chitlapakkam Lake

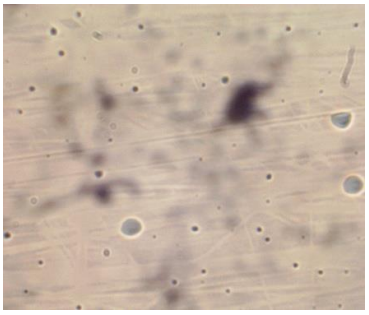


Fig 26: Pulicat Lake

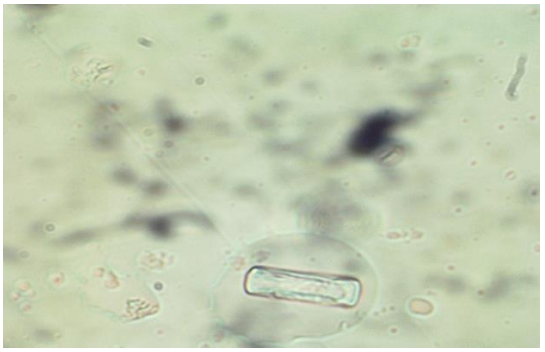


Fig 27: Ayanambakkam Tank

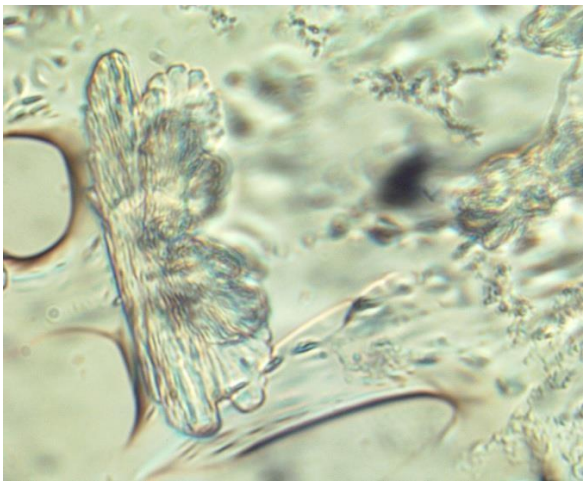


Fig 28: Madurantakam Lake

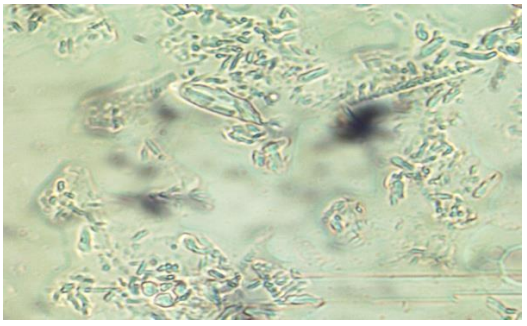


Fig 29: Veeranam Lake

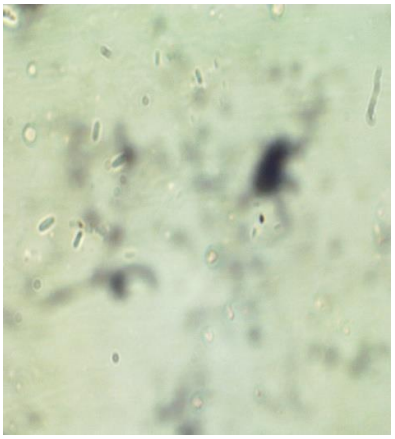


Fig 30: Ambattur Lake

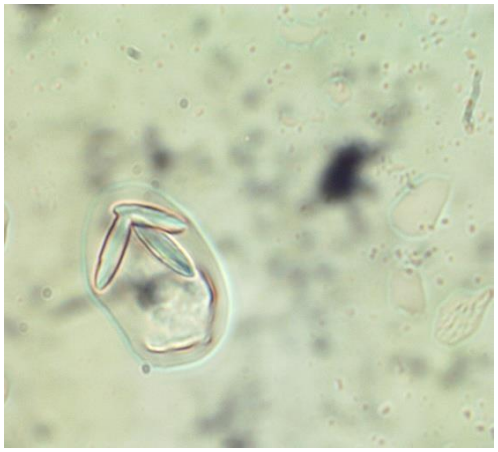


Fig 31: Adambakkam Lake

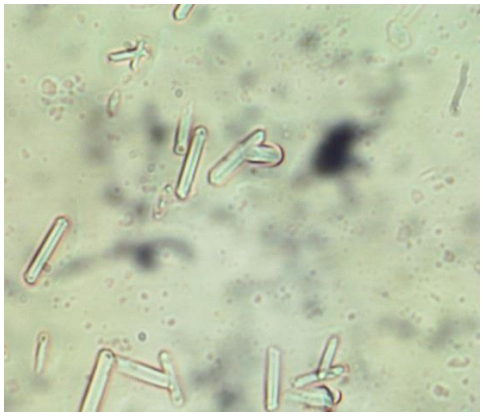


Fig 32: Madambakkam Lake

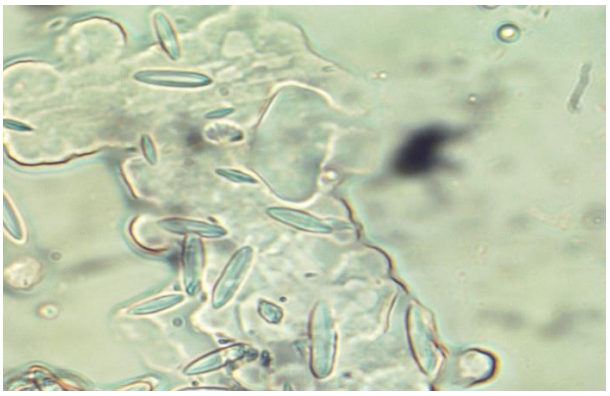


Fig 33: Kaliveli Lake

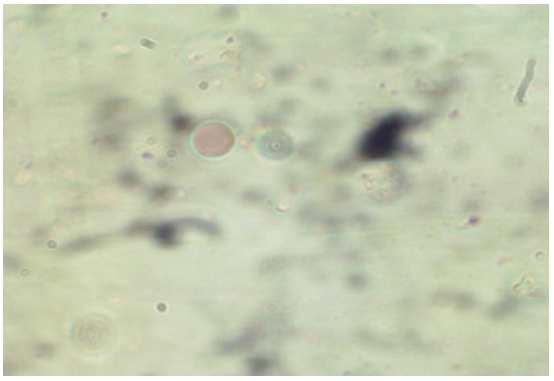


Fig 34: Maduravoyal

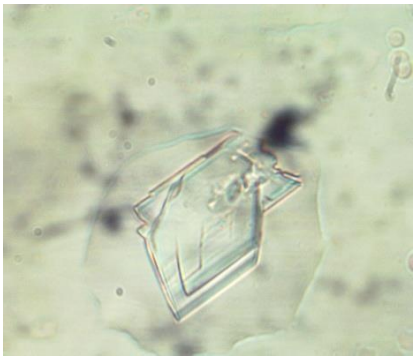


Fig 35: Allapakam lake

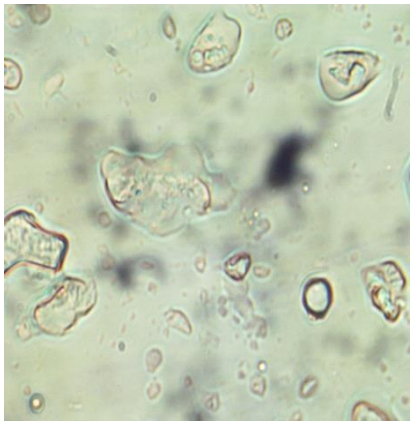


Fig 36: Adayar lake

Fig 37: Nanmanagalam lake

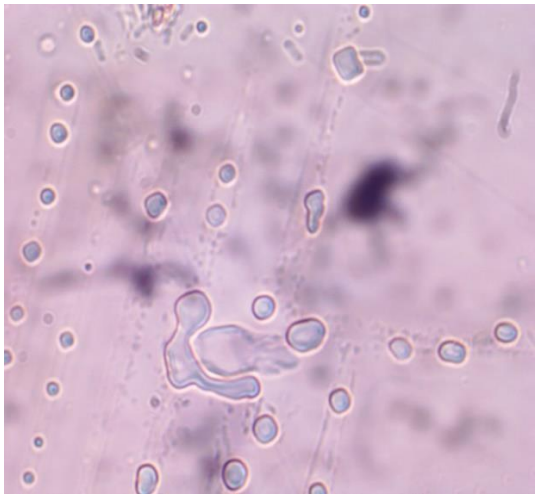


Fig 38: Periya eri

Fig 39 : Cooum (golden George bridge)

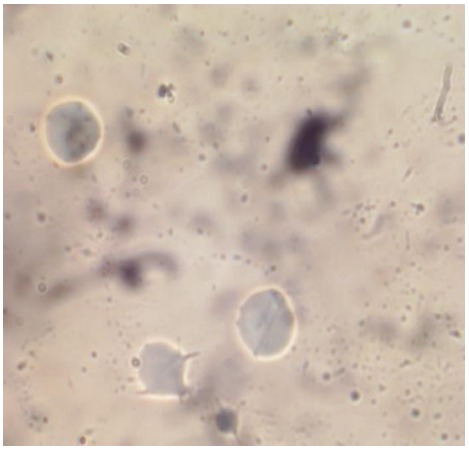


Fig 40: Cooum (mogapair)

Fig 41: Cooum(backside Thai Moogambigai college)

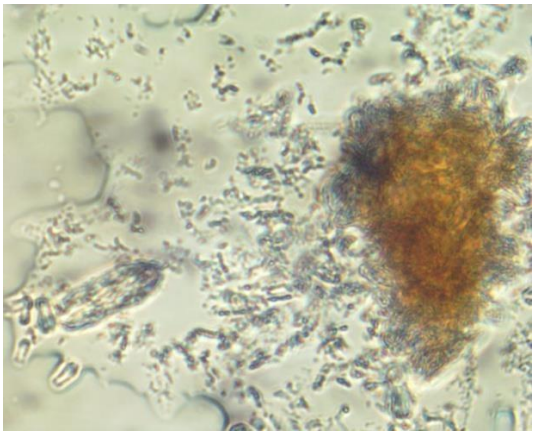


Fig 42: Cooum(Dr. M.G.R. college)

Fig 43: Naduvankarai eri

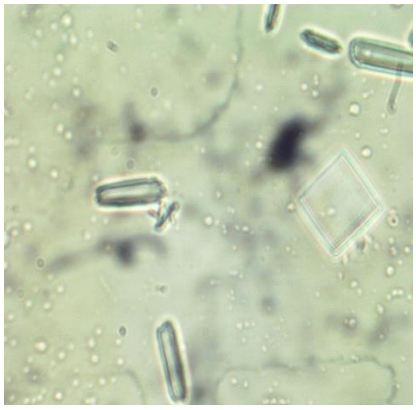


Fig 44: Tower park

Fig 45: Chetpet eco park

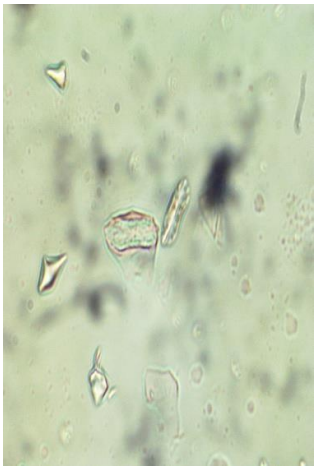


Fig 46: Cooum (near adithanar road)

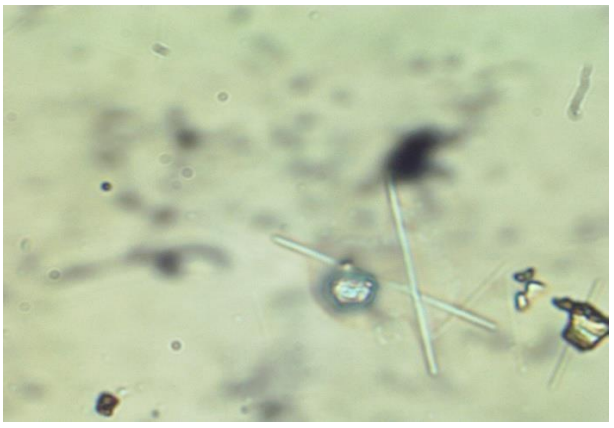


Fig 47: N4 Beach

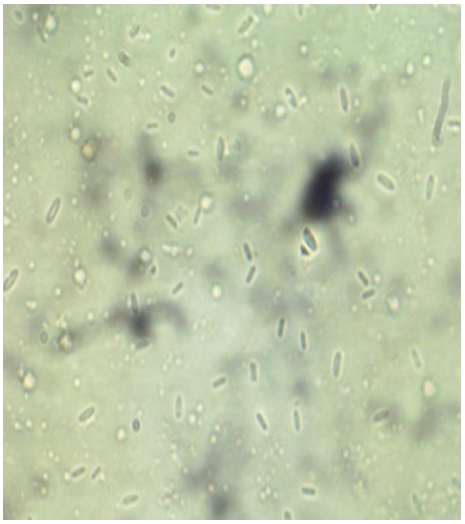


Fig 48: Ariyalur pond

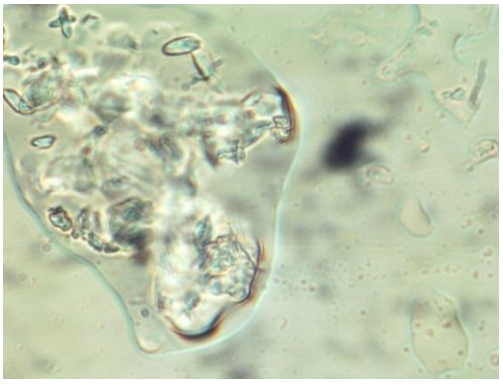


Fig 49: Kadapakam panchayat lake

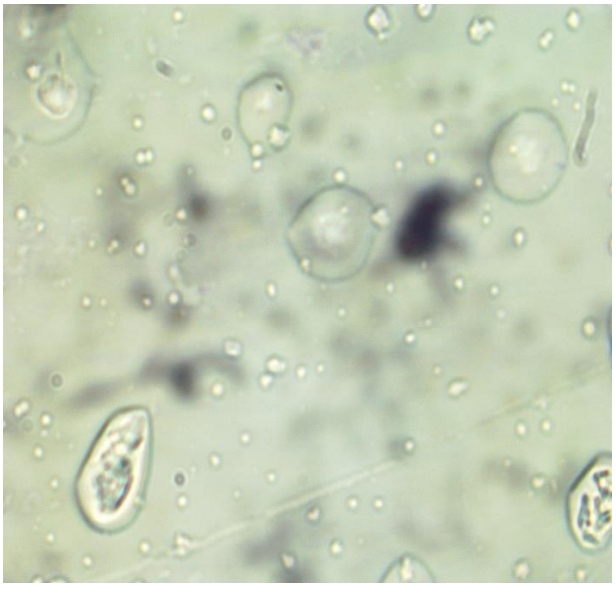
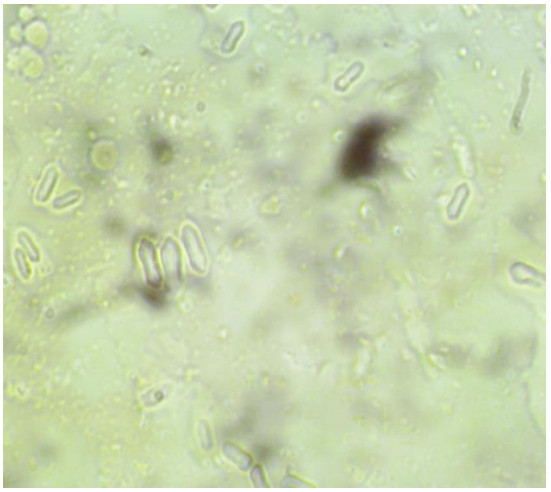


Fig 50: Metro water lake



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5. CONCLUSION

This study highlights the morphological diversity of diatoms across various water bodies in Chennai city and underscores their significant forensic relevance, particularly in drowning investigations. The analysis revealed that each water body harbors a unique assemblage of diatom species, influenced by environmental factors such as salinity, pollution levels, and ecological conditions. These variations in diatom morphology can serve as ecological fingerprints, enabling forensic experts to link a drowning site to the water source based on diatom profiles. The forensic application lies in the principle that diatoms, when aspirated into the lungs during drowning, can translocate into internal organs and remain preserved even after death. Matching these internal diatom profiles with samples from suspected drowning sites can provide critical evidence in confirming the location of drowning, distinguishing between ante-mortem and post-mortem immersion, and resolving complex medico-legal cases.

Thus, this study not only contributes to environmental and ecological understanding of diatom distribution in Chennai's aquatic systems but also reinforces the value of diatom analysis as a powerful tool in forensic science. Further development of a comprehensive diatom database for regional water bodies could enhance the precision and reliability of forensic investigations in the future.

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