

PLANKTON IN RIVER GANGA

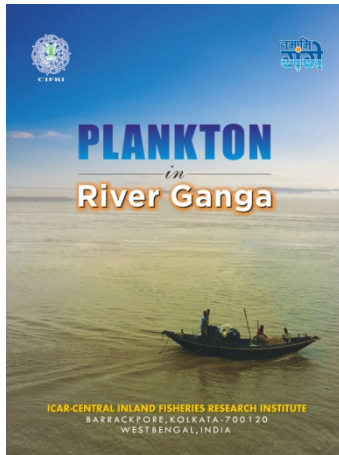
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FOREWORD

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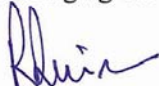


FOREWORD

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन,
नदी विकास और गंगा संरक्षण विभाग
GOVERNMENT OF INDIA
MINISTRY OF JAL SHAKTI
DEPARTMENT OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION

River Ganga which is endowed with thousands of aquatic floral and faunal organisms and by itself it supports the great ecosystem. Planktons are one of the major key organisms which balance the ecological hierarchy and ecosystem. Planktons are important food for many of the aquatic organisms, such as fish and molluscs. But with the advancement in society and increasing rate of pollution severe indicative changes have been recorded in their density and diversity. Although the study of plankton diversity of the river has long been of great interest of research, there is little literature available on this aspect. Bringing out a comprehensive document on the list of plankton species by the ICAR-CIFRI through the project *Assessment of fish and fisheries of the Ganga River system for developing suitable conservation and restoration plan*” funded by the Government of India under “Namami Gange mission” would be very useful.

The present book “Plankton in River Ganga” containing images of all the recorded planktons, taxonomical description, habitat description and its distribution status is unique in itself. It also contains detailed information about the freshwater and brackish water distribution of plankton. I am sure that this book will be helpful for environmentalists, researchers, students, ecologists and managers of water bodies. I congratulate the authors and the entire project team for bringing out this book.


Rajiv Ranjan Mishra



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FOREWORD

River Ganga, the largest and most important river in India, originates in the Himalayas and flows down to the Gangetic plains before draining into the Bay of Bengal, forming the world's largest delta, the Sunderbans. It supports diverse species of aquatic flora and fauna which plays a vital role in defining its productivity. However, due to pollution, over-exploitation, habitat degradation and reduction in water levels, the aquatic biodiversity of the river Ganga is in perils, thus affecting its productivity.

The productivity of the aquatic system mainly depends on its plankton population. Plankton occupy the base levels of aquatic food chains and are one of the major natural food items for most of the finfish and shellfish larvae and adults. They are also reliable bio-indicators of water quality. In this direction, the effort of the ICAR-Central Inland Fisheries Research Institute (CIFRI), Barrackpore towards the assessment of plankton biodiversity of the river Ganga through a project on 'Assessment of Fish and Fisheries of the Ganga River System for Developing Suitable Conservation and Restoration Plan' under the 'Namami Gange Programme' from 2016 onwards is quite significant.

The studies of the project are lucidly composed in the book 'Plankton in River Ganga', which contains images of plankton, their morphological description and distribution in different stretches of the river Ganga. I sincerely believe the book will be of immense help to the students, fisheries professionals and policymakers. I congratulate the authors and the project team for coming out with this important document.



(J. K. Jena)





PREFACE



The mighty River Ganga is believed to be the most sacred and holy River for the whole country which flows the total approximate length of 2,550 km covering five important states of India (Uttarakhand, Uttar Pradesh, Jharkhand, Bihar & West Bengal). It is an important drinking and irrigation source for 43% of the country's population and is also a major livelihood source for thousands of nearby residents. The river traverses through three different eco-regions of India (upper stretch, middle stretch, lower stretch) and thus, sustaining a heterogeneous assemblage of aquatic flora and fauna. Microflora and fauna are considered the most dynamic component of aquatic habitat. Temporal and special variations of assemblage and abundance patterns of plankton are widely varied. These microscopic organisms' diversely vary in size i.e. 0.2 μ m to more than 500 μ m. To know about the actual status of the planktonic life of the Rive Ganga systematic identification is necessary. It is cumbersome to identify this minute organism without a proper pictorial guide.

The book "Plankton in River Ganga" is a pictorial guide of all the recorded plankton (Phytoplankton and Zooplankton) are present. This book also provides a taxonomical classification of the recorded plankton (131 genera, belonging to 24 classes and 11 phyla) and their distribution throughout the stretches of River Ganga. It also contains information about freshwater and brackish water plankton. All the plankton samples were collected from selected sites based on the physical and physiological characteristics of the river. Environmental factors significantly influencing plankton diversity/abundance were determined using advanced statistical tools.

The financial grants were received from the Ministry of Jal Shakti Department Of Water Resources, River Development & Ganga Rejuvenation for the study, which was started on 7th July 2016. The book will be helpful to the researchers, students and all the stakeholders of the river for a better understanding of the riverine ecosystem.

Date : 10-01-2021

Place : Barrackpore



B. K. Das

Director



ACKNOWLEDGEMENT

The authors are thankful to National Mission For Clean Ganga (NMCG), Ministry of Jal Shakti, Department of water resources, River Development and Ganga Rejuvenation, Government of India (Project No. T-17/2014-15/526/NMCG-Fish and Fisheries), New Delhi for their financial assistance to ICAR- Central Inland Fisheries Research Institute (CIFRI), Barrackpore, Kolkata, West Bengal for the project entitled “Assessment of fish and fisheries of the Ganga River system for developing suitable conservation and restoration plan”. The authors are also thankful to CIFRI team of NMCG project of its regional centre at Prayagraj, Uttar Pradesh for their efforts. The author also extends their gratitude towards Suman Kumari, Soma Das Sarkar for their guidance and Malay Naskar for statistical analysis. Thanks are also due to the local fishers, who incorporated their full support.

Authors



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माँ गंगा स्तोत्रम् ॥

देवि सुरेश्वरि भगवति गङ्गे
त्रिभुवनतारिणि तरलतरङ्गे ।
शङ्करमौलिविहारिणि विमले
मम मतिरास्तां तव पदकमले ॥ १ ॥

भागीरथि सुखदायिनि मातस्तव
जलमहिमा निगमे ख्यातः ।
नाहं जाने तव महिमानं
पाहि कृपामयि मामज्ञानम् ॥ २ ॥

हरिपदपाद्यतरङ्गिणि गङ्गे
हिमविधुमुक्ताधवलतरङ्गे ।
दूरीकुरु मम दुष्कृतिभारं
कुरु कृपया भवसागरपारम् ॥ ३ ॥

तव जलममलं येन निपीतं,
परमपदं खलु तेन गृहीतम् ।
मातर्गङ्गे त्वयि यो भक्तः
किल तं द्रष्टुं न यमः शक्तः ॥ ४ ॥

पतितोद्धारिणि जाह्ववि गङ्गे
खण्डितगिरिवरमण्डितभङ्गे ।
भीष्मजननि हे मुनिवरकन्ये,
पतितनिवारिणि त्रिभुवनधन्ये ॥ ५ ॥

कल्पलतामिव फलदां लोके,
प्रणमति यस्त्वां न पतति शोके ।
पारावारविहारिणि गङ्गे
विमुखयुवतिकृततरलापाङ्गे ॥ ६ ॥

तव चेन्मातः स्रोतःस्नातः
पुनरपि जठरे सोऽपि न जातः ।
नरकनिवारिणि जाह्ववि गङ्गे
कलुषविनाशिनि महिमोत्तुङ्गे ॥ ७ ॥

पुनरसदङ्गे पुण्यतरङ्गे
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इन्द्रमुकुटमणिराजितचरणे
सुखदे शुभदे भृत्यशरण्ये ॥ ८ ॥

रोगं शोकं तापं पापं
हर मे भगवति कुमतिकलापम् ।
त्रिभुवनसारे वसुधाहारे
त्वमसि गतिर्मम खलु संसारे ॥ ९ ॥

अलकानन्दे परमानन्दे
कुरु करुणामयि कातरवन्द्ये ।
तव तटनिकटे यस्य निवासः
खलु वैकुण्ठे तस्य निवासः ॥ १० ॥

वरमिह नीरे कमठो मीनः
किं वा तीरे शरटः क्षीणः ।
अथवा श्वपचो मलिनो दीनस्तव
न हि दूरे नृपतिकुलीनः ॥ ११ ॥

भो भुवनेश्वरि पुण्ये धन्ये
देवि द्रवमयि मुनिवरकन्ये ।
गङ्गास्तवमिमममलं नित्यं
पठति नरो यः स जयति सत्यम् ॥ १२ ॥

येषां हृदये गङ्गाभक्तिस्तेषां
भवति सदा सुखमुक्तिः ।
मधुराकान्तापज्झटिकाभिः
परमानन्दकलितललिताभिः ॥ १३ ॥

गङ्गास्तोत्रमिदं भवसारं
वाञ्छितफलदं विमलं सारम् ।
शङ्करसेवकशङ्कररचितं पठति
सुखी स्तव इति च समाप्तः ॥ १४ ॥

देवि सुरेश्वरि भगवति गङ्गे
त्रिभुवनतारिणि तरलतरङ्गे ।
शङ्करमौलिविहारिणि विमले
मम मतिरास्तां तव पदकमले ॥

INTRODUCTION

River Ganga is the largest in India and the fifth-largest in the world. The Ganga is 2525 km long and its basin covers nearly 26% of the total geographical area of the country (Ganga river Basin Plan). The river traverses through three different eco-regions of India and thus, sustaining a heterogeneous assemblage of aquatic microflora and fauna. River Ganga originates from the Gangotri glacier at Gomukh after that river flows about 220 km in the south. Before entering Haridwar, the river cuts at Shiwalik hills. Then, it flows a distance of 2290 km in the Indo-Gangetic plains in the states of Uttar Pradesh, Bihar, Jharkhand, and West Bengal. After entering West Bengal, the flow of the river Ganga is regulated through the Farakka barrage. The main channel flows into Bangladesh as the river Padma and meets with the Brahmaputra. Below the barrage, the feeder canal meets with the Bhagirathi river, which flows through Berhampur and Katwa, and then flows about 150 km and joins with Hooghly estuary at Nabadwip. The river Hooghly flows through Calcutta and Diamond Harbour after that it meets with the Bay of Bengal in the East. Bhagirathi-Hooghly is one of the major distributaries, which forms the biggest marshy delta in the world, called Sunderban (2340 km²). The river Ganga has many tributaries in its course through the plains. The Ganga basin covers an area of about 8,61,404 km² and expanding over 11 states, along with its tributaries and distributaries. Most of the North Indian tributaries like Ghagra, Gandak, Ram Ganga, Gomti, Kosi, and Sarda flowing from the lower Himalayan passes through the Terrain low-lands before streaming into the main Ganga, while the major southern tributaries joining Ganga are the Chambal, Yamuna, Subarnarekha, and Sone (Ganga river Basin Plan). The biodiversity of the river Ganga is marked as one of the important factors for socio-economic development along the river. It has been estimated that the river produces 89.5% of the total carp seed production for the country (Behera, 2002). Adding to this fact of immense biodiversity, the hydrological parameters also acts as an influencing factor for the riverine health and its ecosystem.

The sites of the present study were covered almost 2525 Kilometers of which the stretch of the Indian state of Uttarakhand, Uttar Pradesh, Bihar, and West Bengal and was divided into three different zones viz., Upper stretch, Middle stretch, and Lower stretch. All the sites that have been selected are based on the physical characteristics of water (flow velocity, salinity, tidal flux, etc.), soil, and altitude.





PLANKTON

Plankton are diverse collection of the aquatic organism which drifts with the help of water current and is a well-known biological indicator. Phytoplankton occupies the base position in the ecological food pyramid because of its autotrophic mode of nutrition. Phytoplankton are considered as the wealth of a healthy aquatic ecosystem, as they are an integral part of the aquatic food chain (Tas and Gonulal 2007; Saravanakumar et al. 2008). Among all the photosynthetic organisms, phytoplankton contributes 40% as it is a natural feed for fishes (Schmidt 2000). Plankton and other aquatic organisms are well-known for their role in monitoring the health status of any water bodies (Boyd 1998). Due to their short life-cycle, they are vibrantly influenced by the environmental factor. Phytoplankton can be used to determine the trophic status of the waterbody (Meena et al. 2019). The biomass and community structure of phytoplankton are found lower in the river as compared to lentic waters. The density and dimensional distribution of zooplankton narrate the biotic and abiotic factors of the water body (Marneffe et al. 1998). Among the zooplankton group, Rotifers are an important component and can influence the microbial food web of several trophic levels (Arndt, 1993).

Study reports of 1995-96 revealed that phytoplankton contribution was comparatively higher than that of zooplankton from Tehri to Farrukhabad. The contribution of zooplankton varies from 0 to 16.6%. Among phytoplankton, the dominant group was Bacillariophyceae (83.4% to 100%), followed by Chlorophyceae and Cyanophyceae. The dominant groups among zooplankton were Copepods, Cladoceras, Rotifers, and Protozoa.

Several studies on plankton communities and their dynamics along river Ganga (Kanpur–Bhagalpur stretch) have been studied by many workers viz, Ray et al. (1966), Pahwa and Mehrotra (1966), Khan et al.(1996), Bilgrami and Dutta Munshi (1979), etc. According to reports, major groups contributing to phytoplankton were Bacillariophyceae (*Amphora* sp., *Asterionella* sp., *Cyclotella* sp., *Cymbella* sp., *Diatoma* sp., *Fragilaria* sp., *Gomphonema* sp., *Gyrosigma* sp., *Navicula* sp., *Nitzschia* sp., *Pleurosigma* sp., *Pinnularia* sp., *Synedra* sp.), Chlorophyceae (*Actinastrum* sp., *Ankistrodesmus* sp., *Chlorella* sp., *Closterium* sp., *Denticula* sp., *Desmidium* sp., *Eudorina* sp., *Hydrodictyon* sp., *Mougeotia* sp., *Pediastrum* sp., *Scenedesmus* sp., *Spirogyra* sp.), Cyanophyceae (*Anabaena* sp., *Lyngbya* sp., *Merismopoedia* sp., *Microcystis* sp., *Nostoc* sp., *Oscillatoria* sp., *Phormidium* sp.). Among zooplankton, copepods, cladocerans, rotifers, and protozoans were the major groups. The



maximum abundance of plankton in terms of quality and quantity was observed in the stretch between Kanpur and Prayagraj. Among phytoplankton, the dominant group was Bacillariophyceae, followed by Chlorophyceae and Cyanophyceae. A sharp dominance of phytoplankton was observed over the entire stretch with the highest percentage of Bacillariophyceae, Chlorophyceae, and Cyanophyceae in order of their abundance. In total plankton population, 70.98 to 89.22% and 10.78 to 29.02% by numbers were contributed by phyto and zooplankton, respectively. On the whole 18 taxa under phytoplankton and 11 taxa under zooplankton were encountered in the stretch between Kanpur and Allahabad.

Study reports of Hooghly-Matlah estuary, by Datta et al. (1954) surmised 105 phytoplankton species which comprised 72 species of diatoms (Bacillariophyceae), 18 species of green algae (Chlorophyceae), 9 species of blue-green algae (Cyanophyceae), 3 species of dinoflagellates (Dinophyceae), and 3 euglenoid species was found during 1991-1995. From the report of Shetty et al. (1961), it was found that 106 phytoplankton species during the study period, comprising of 50 species of diatoms, 30 species of green algae, 18 species of blue-green algae, and 8 taxa belonging to flagellates. Later on, Sinha et al. (1996) highlighted the shift in plankton community distribution in Hooghly estuary due to altered ecological conditions, owing to the freshwater release from Farakka Barrage. After that, several workers have studied the plankton dynamics in the estuary *viz.* (Dey et al., 1991, 1994; Banerjee and Santra, 2001; Mukhopadhyay and Pal, 2002; Sarkar and Naskar, 2002; Biswas et al., 2004; Choudhury and Pal, 2008, 2010, 2012; Manna et al., 2010; Akhand et al., 2012, Roshit et al. 2018). The most updated assessment on the phytoplankton community structure of the Hooghly-Matlah estuarine system (including Sundarbans) recorded 378 species of phytoplankton taxa, belonging to 196 genera and 109 families, based on the field studies at bibliographic sources (Roshith et.al, 2018)

During the study period (2016-2020), a total of 131 genera, belonging to 24 classes and 11 phyla were recorded from the twenty stations of different stretches of river Ganga. A total of 95 genera of phytoplankton, belonging to 13 classes and 7 phyla were found. The phyla are Bacillariophyta, Chlorophyta, Cyanophyta, Dinophyta, Xanthophyta, Zygnematophyta, and Euglenophyta. A total of 36 genera belonging to 11 classes and 4 phyla were recorded from zooplankton are Rotifera, Arthropoda, Ciliophora, and Amoebozoa. A few groups like fish eggs, larvae, nematodes, etc. could not be identified on species level. In all the stretches, the contribution of phytoplankton was found high as compared to zooplankton. Bacillariophyceae (26 genera), Coscinodiscophyceae (4 genera), Mediophyceae (6 genera),



Dinophyceae (2 genus), Ulvophyceae (2 genera), Chlorophyceae (20 genera), Trebouxiophyceae (6 genera), Zygnematophyceae (8 genera), Xanthophyceae (4 genera), Synurophyceae (1 genus), Euglenophyceae (4 genera), Cyanophyceae (12 genera) were recorded. Among zooplankton Rotifera (13 genera), Arthropoda (8 genera), Ciliophora (11 genera), Amoebozoa (4 genera) were recorded.

In the upper stretch, Bacillariophyceae (19 genera), Coscinodiscophyceae (2 genera), Mediophyceae (2 genera), Ulvophyceae (2 genera) Chlorophyceae (13 genera), Trebouxiophyceae (5 genera), Zygnematophyceae (5 genera), Xanthophyceae (3 genera), Synurophyceae (1 genus), Euglenophyceae (3 genera), Cyanophyceae (9 genera) were recorded. Among zooplankton Rotifera (7 genera), Arthropoda (2 genera), Ciliophora (10 genera), Amoebozoa (2 genera) were recorded.

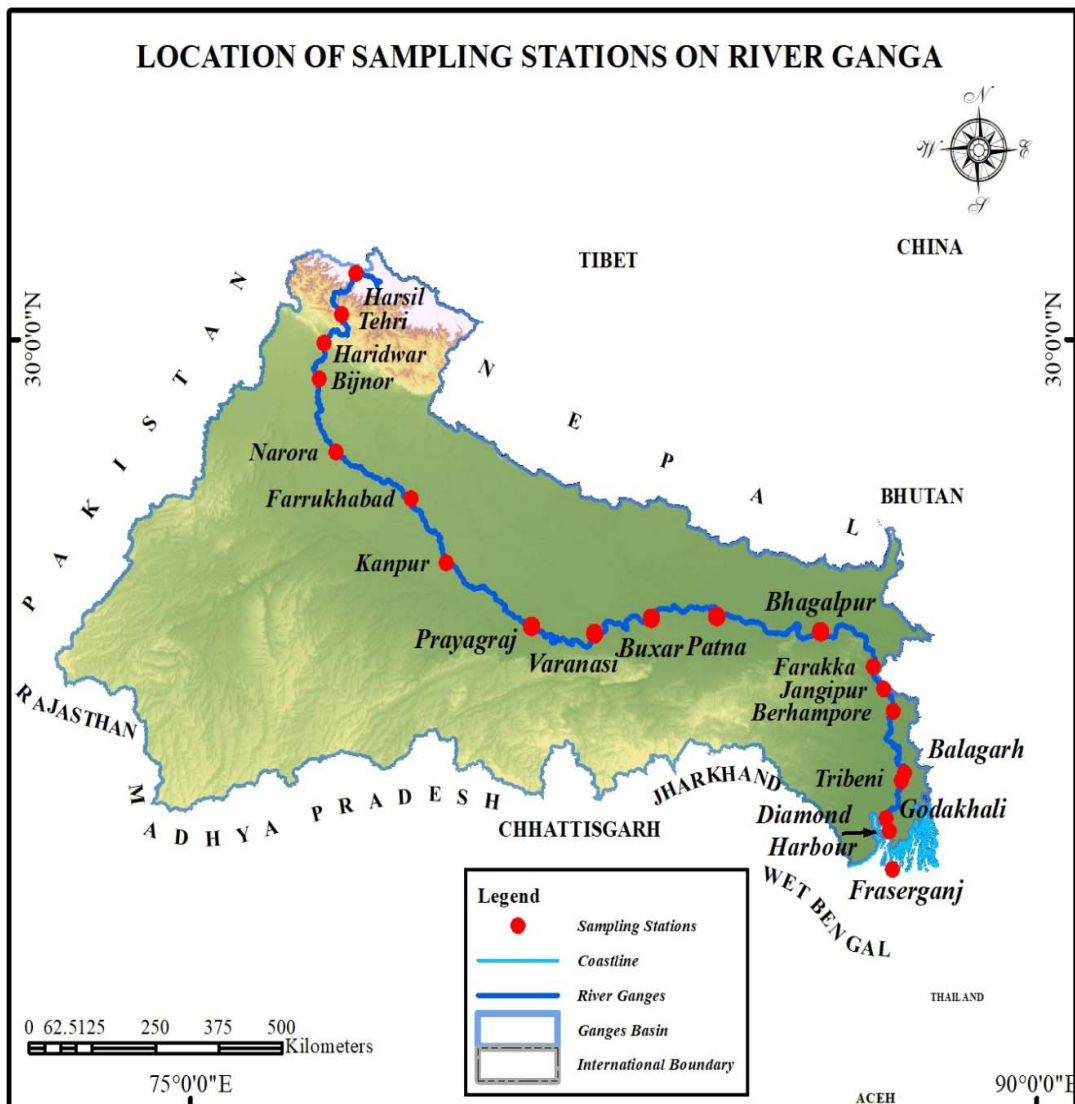
In the middle stretch, Bacillariophyceae (23 genera), Coscinodiscophyceae (3 genera), Mediophyceae (2 genera), Dinophyceae (1 genus), Ulvophyceae (1 genus), Chlorophyceae (20 genera), Trebouxiophyceae (6 genera), Zygnematophyceae (8 genera), Xanthophyceae (3 genera), Euglenophyceae (4 genera), Cyanophyceae (12 genera) were recorded. Among zooplankton Rotifera (13 genera), Arthropoda (8 genera), Ciliophora (4 genera), Amoebozoa (3 genera) were recorded.

In the lower stretch, Bacillariophyceae (17 genera), Coscinodiscophyceae (4 genera), Mediophyceae (5 genera), Dinophyceae (1 genus), Noctilucophyceae (1 genus), Ulvophyceae (2 genera) Chlorophyceae (13 genera), Trebouxiophyceae (5 genera), Zygnematophyceae (5 genera), Synurophyceae (1 genus), Euglenophyceae (3 genera), Cyanophyceae (9 genera) were recorded. Among zooplankton, Rotifera (6 genera), Arthropoda (7 genera), Ciliophora (3 genera), Amoebozoa (2 genera) were recorded.

For a detailed study on plankton along with different ecological parameters of Ganga river system the Ministry of Jal Shakti Department of Water Resources, River Development & Ganga Rejuvenation has financially supported ICAR-CIFRI. under the project entitled “*Assessment of fish and fisheries of the Ganga River system for developing suitable conservation and restoration plan*”. Since plankton have been linked with riverine fish and fisheries therefore it is required to assess the plankton diversity across the river.



GIS LOCATION OF SAMPLING STATION



The sites covered were almost 2525 Kilometers of which the stretch of the Indian state of Uttarakhand, Uttar Pradesh, Bihar, and West Bengal and was divided into three different zones viz., Upper stretch, Middle stretch, and Lower stretch. All the sites that have been selected are based on the physical characteristics of water (flow velocity, salinity, tidal flux, etc.), soil, and altitude.



SAMPLING STATION



20 Sampling stations are

- 1. Harshil**
- 2. Tehri**
- 3. Haridwar**
- 4. Bijnor**
- 5. Narora**
- 6. Farukhabad**
- 7. Kanpur**
- 8. Prayagraj**
- 9. Varanasi**
- 10. Buxar**

11. Patna

12. Bhagalpur

13. Farakka

14. Jangipur

15. Berhampore

16. Balagarh

17. Tribeni

18. Godakhali

19. D.harbor

20. Fraserganj



SAMPLE COLLECTION AND PRESERVATION



- A total of 100 litres of river water was filtered through the net of very fine mesh size (20 μ m).
- Plankton samples were collected in dry polyethylene containers using 4% buffered formalin as a preservative.
- The identification was made by following the ICBN and some handbooks.
- For valid and updated names Algae Base (Guiry and Guiry 2018) was followed.
- Samples were examined by employing Trinocular microscope (40x and 60x magnification; Model No.-Zeiss scopeA1).
- The density was recorded as a number of planktons in unit litre⁻¹.

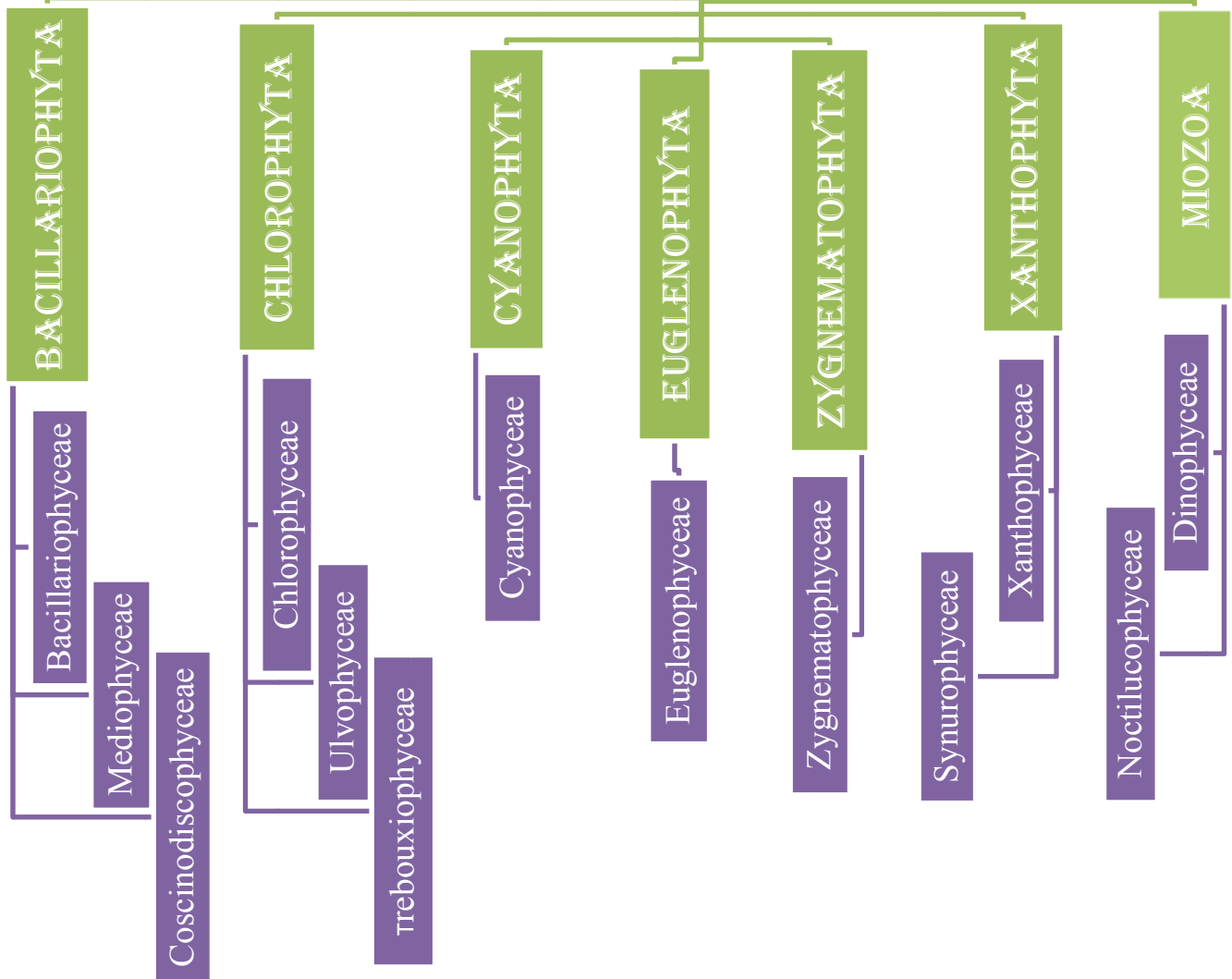


ECOLOGICAL PARAMETERS ANALYSIS



PLANKTON

PHYTOPLANKTON



PHYTOPLANKTON



Bacillariophyta



Bacillariophyta

(Yellow-brown algae)

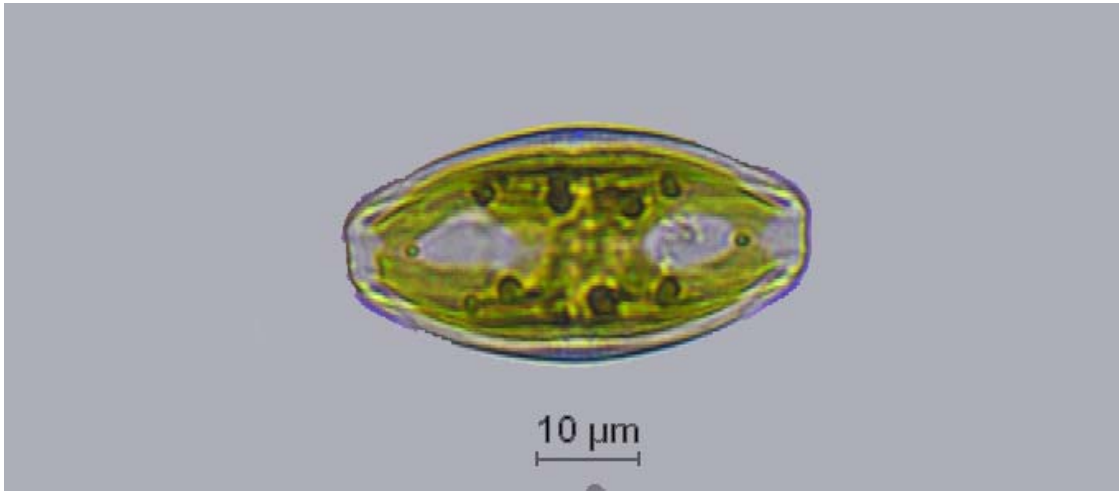
General Identifying Characters:

- Diatoms are generally non-flagellate unicellular, simple colonies or chains of cells.
- These are found in a wide environment i.e. both marine and freshwater.
- Cells have a thick ornamented cell wall, which is made up of silica.
- Cell walls are known as frustules, have two halves, which are called valves.
- The outer half is called epitheca and the inner half is called hypotheca.
- Cell walls may contain several spines, bristles.
- Diatoms are of two types based on cell shape and frustule morphology one is centric and another is pinnate.
- The centric diatoms are discoid or cylindrical while pinnate diatoms are elongated in shape.
- It has one major structure, which is associated with locomotion i.e. raphe.
- Diatoms forms bloom in the water body during spring and early summer.

- ✚ Total 36 genera belonging to 3 classes and 28 families were recorded during study period.
- ✚ Class:- Bacillariophyceae (26 genera), Coscinodiscophyceae (4 genera), Mediophyceae (6 genera).



***Amphora* sp. (Ehrenberg ex Kutzing, 1844)**



Class: Bacillariophyceae

Order: Thalassiophysales

Family: Catenulaceae

Genus: *Amphora* sp.

Identifying feature:

- ❖ The cells are seen biconvex in girdle view.
- ❖ Valves are dorsiventral.
- ❖ H- Shaped chloroplast is present with a central bridge that is flanked by two droplets.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Highly positive correlation was found with Turbidity.



	Absent
	Present

**Station wise Distribution:
Upper stretch**

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

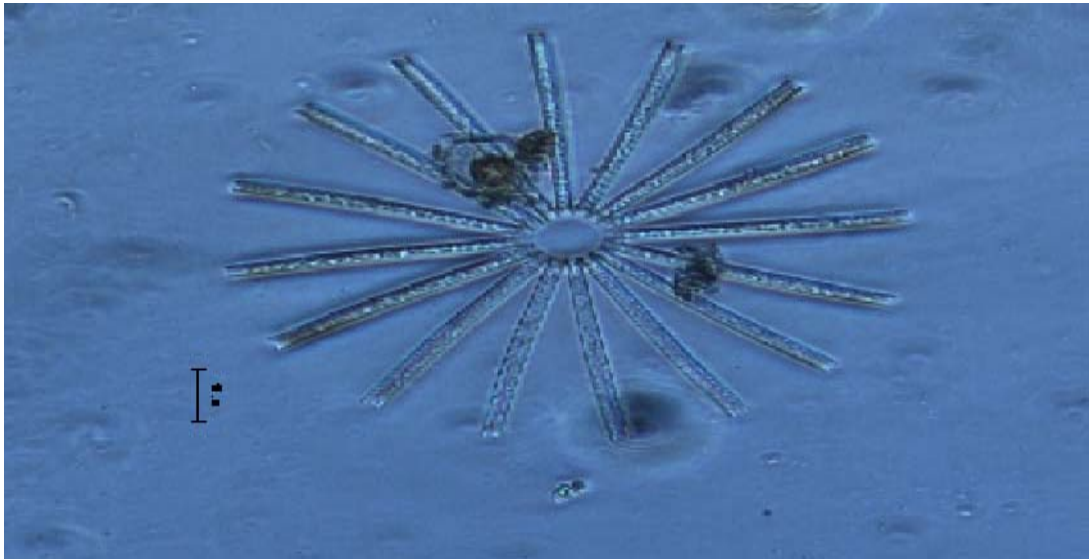
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	10	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	7	3	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF - Phytoplankton was not found at that time of sampling.



Asterionella sp. (Hassall, 1850)



Class: Bacillariophyceae

Order: Bacillariophyceae

Family: Tabellariaceae

Genus: *Asterionella* sp.

Identifying feature:

- ❖ Cells are elongated, which are joined to form stellate colonies.
- ❖ The basal portion of cells is slightly wider than the apical pole in the girdle view.
- ❖ Cells have many small plate-like plastids.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with BOD, Chloride and Total Nitrogen.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varonasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

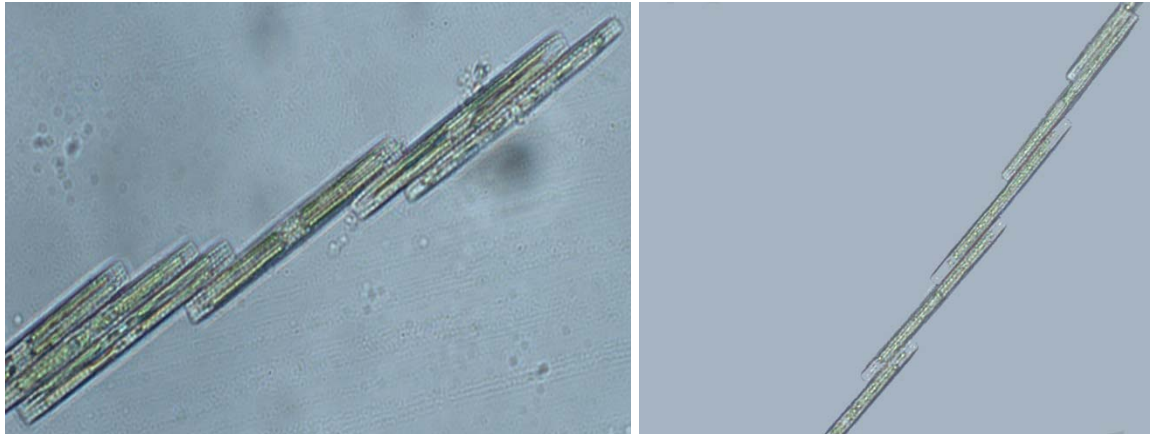
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	30	NF	NF	NF
Tehri	15	130	NF	180
Haridwar	73	NF	NF	NF
Bijnor	110	330	5	NF
Narora	335	135	NF	NF
Farrukhabad	40	600	NF	NF
Kanpur	20	4130	NF	NF
Prayagraj	100	110	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	7	3	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	5	3	10	NF
D. Harbor	2	NF	NF	1
Fraserganj	1	2	7	3

- ⚡ The density was recorded as a number of planktons in unit litre⁻¹.
- ⚡ The annual average of four seasons are shown in the table.
- ⚡ NF - Phytoplankton was not found at that time of sampling.



***Bacillaria* sp. (J.F.Gmelin, 1791)**



Class: Bacillariophyceae

Order: Bacillariales

Family: Bacillariaceae

Genus: *Bacillaria* sp.

Identifying feature:

- ❖ Cells are attached with each other by their raphe slits to form colonies.
- ❖ The central nucleus bears two plate-like plastids on each side.

Habitat: Mainly Brackish water but sometimes fresh water

Major Ecological Parameters: Highly positive correlation was found with Carbonate, Ca^{++} , Mg^{++} , Salinity and Specific conductivity.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	480

- ⚡ The density was recorded as a number of planktons in unit litre⁻¹.
- ⚡ The annual average of four seasons are shown in the table.
- ⚡ NF - Phytoplankton was not found at that time of sampling.



***Caloneis* sp. (Cleve, 1894)**



Class: Bacillariophyceae

Order: Naviculales

Family: Naviculaceae

Genus: *Caloneis* sp.

Source:- Protist
Information Server
1995-2018

Identifying feature:

- ❖ The shapes of valves are mainly linear to lanceolate and apices cuneate to rounded or valve lanceolate with bluntly rostrate to subcapitate apices.
- ❖ The former has a single plastid having a narrow bridge across the centre of the cell.
- ❖ The latter has two plastids along the girdle sides associated with each plate.
- ❖ Striae are usually, faint, alveolar in construction.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Highly positive correlation was found with Total Dissolved Solid.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad




Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

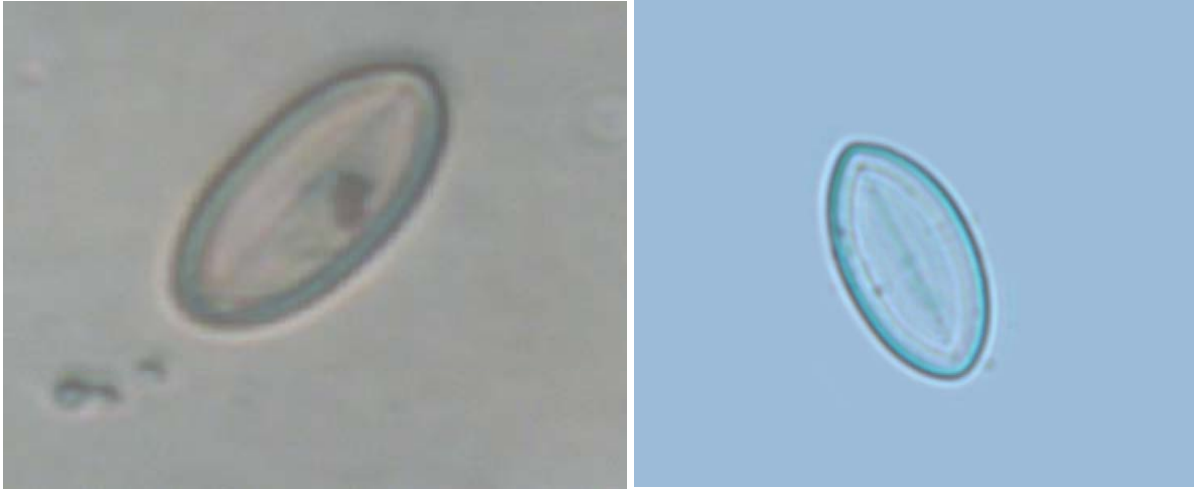
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	10	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

-  The density was recorded as a number of planktons in unit litre⁻¹.
-  The annual average of four seasons are shown in the table.
-  NF - Phytoplankton was not found at that time of sampling.



Cocconeis sp. (Ehrenberg, 1835)



Class: Bacillariophyceae

Order: Cocconeidales

Family: Cocconeidaceae

Genus: *Cocconeis* sp.

Identifying feature:

- ❖ Usually, cells are slightly curved in girdle view.
- ❖ Generally, Valves are slightly elliptical.
- ❖ A single C-shaped chloroplast is present.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with BOD, Chloride and Total Dissolved Solid.



	Absent
	Present

**Station wise Distribution:
Upper stretch**

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

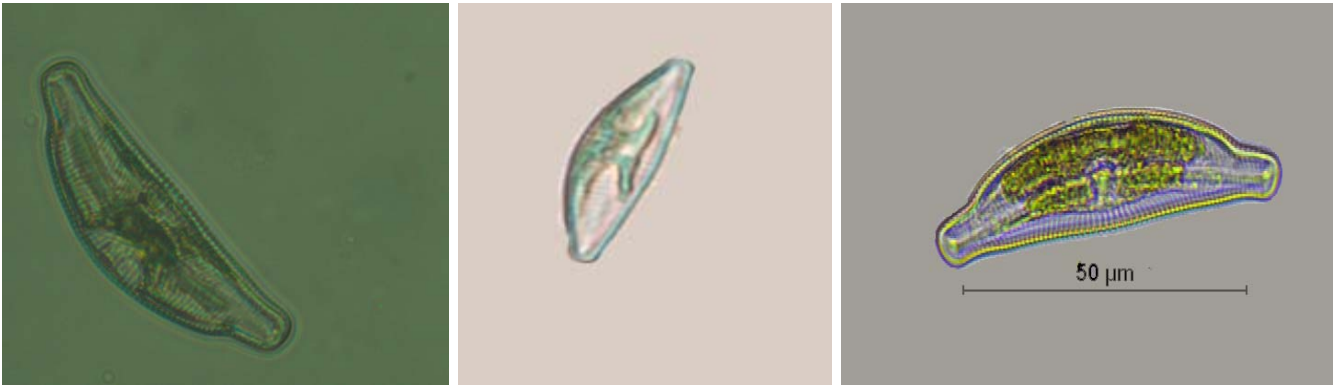
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	10	NF
Bijnor	NF	5	5	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	40	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	50	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF - Phytoplankton was not found at that time of sampling.



Cymbella sp. (Agardh, 1830)



Class: Bacillariophyceae

Order: Cymbellales

Family: Cymbellaceae

Genus: *Cymbella* sp.

Identifying feature:

- ❖ Valves have dorsi-ventral symmetry.
- ❖ The shape of the dorsal margin is more convex than the ventral margin.
- ❖ The ventral margin may be straight or concave.
- ❖ A single chloroplast is present.

Habitat: Freshwater

Major Ecological Parameter: Highly positive correlation was found with Dissolved Oxygen.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

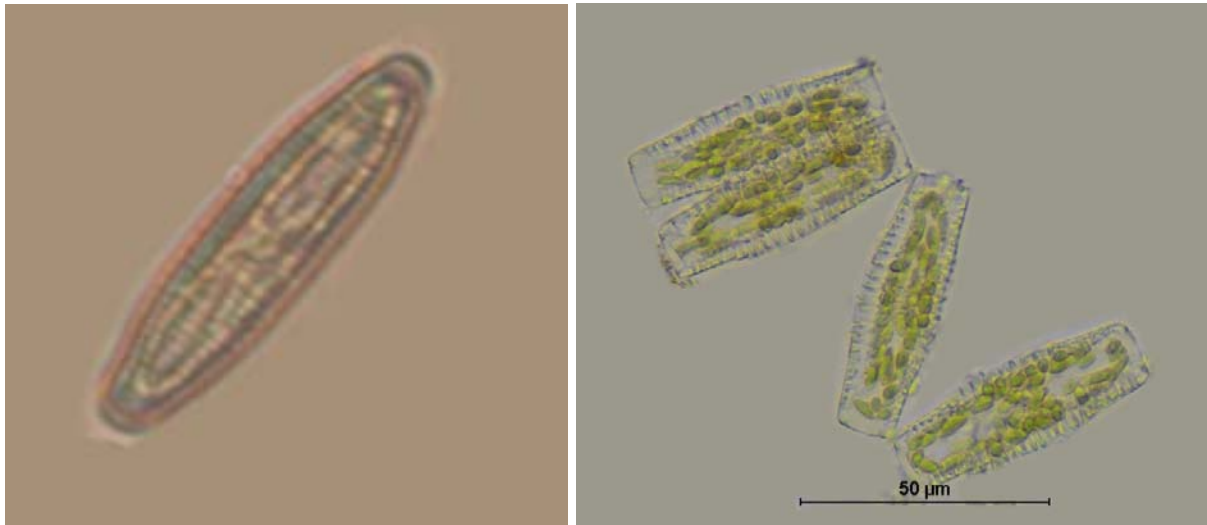
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	40	20	20	30
Tehri	40	40	25	NF
Haridwar	25	120	55	40
Bijnor	55	55	95	NF
Narora	80	NF	45	NF
Farrukhabad	NF	NF	40	60
Kanpur	NF	35	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	35	NF	NF	NF
Buxar	5	NF	NF	NF
Patna	NF	5	3	NF
Bhagalpur	NF	1	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	4	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Diatoma* sp. (Bory de St. Vincent, 1824)**



Class: Bacillariophyceae

Order: Tabellariales

Family: Tabellariaceae

Genus: *Diatoma* sp.

Identifying feature:

- ❖ Cells are joined to form long ribbon-like, or stellate, zig-zag colonies.
- ❖ Plastids are small, bacilliary, plate-like or discoid.
- ❖ 12-15 plastids are present per cell.
- ❖ Valves are elliptical to elongate.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with Dissolved Oxygen and Transperancy.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

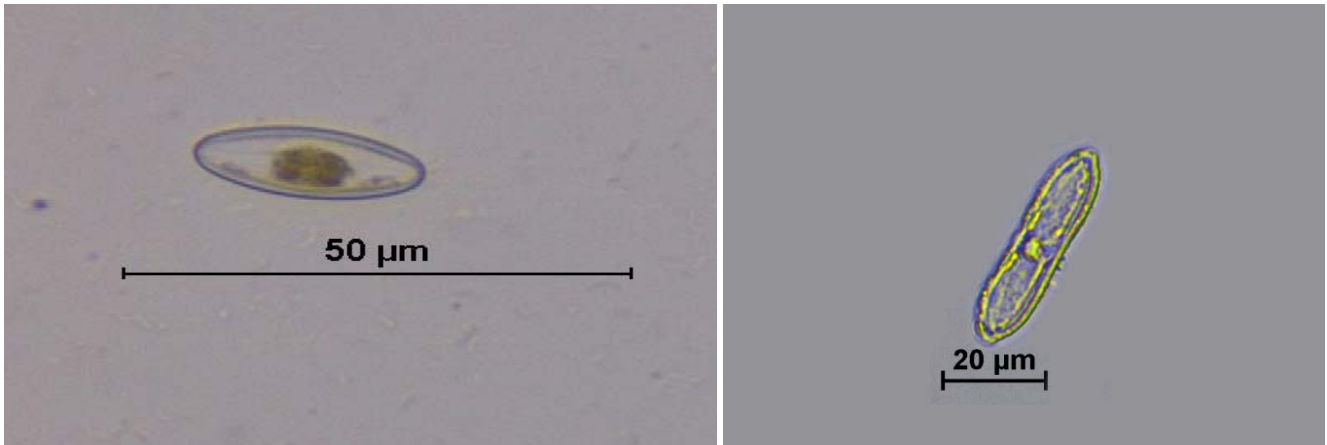
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	40
Tehri	NF	NF	35	40
Haridwar	55	NF	30	NF
Bijnor	45	NF	25	NF
Narora	10	75	NF	20
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	5	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	20	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Diploneis sp. (Ehrenberg ex Cleve, 1894)



Class: Bacillariophyceae

Order: Naviculales

Family: Diploneidaceae

Genus: *Diploneis* sp.

Identifying feature:

- ❖ Cells have mainly elliptical valves with very blunt apices.
- ❖ Two plastids are present on each side of the apical plane.
- ❖ Sometimes cells carry a central pyrenoid and highly lobed margins below the valve faces or simple plates that are lying opposite to each other near the valve apices.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Highly positive correlation was found with Total Alkalinity.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

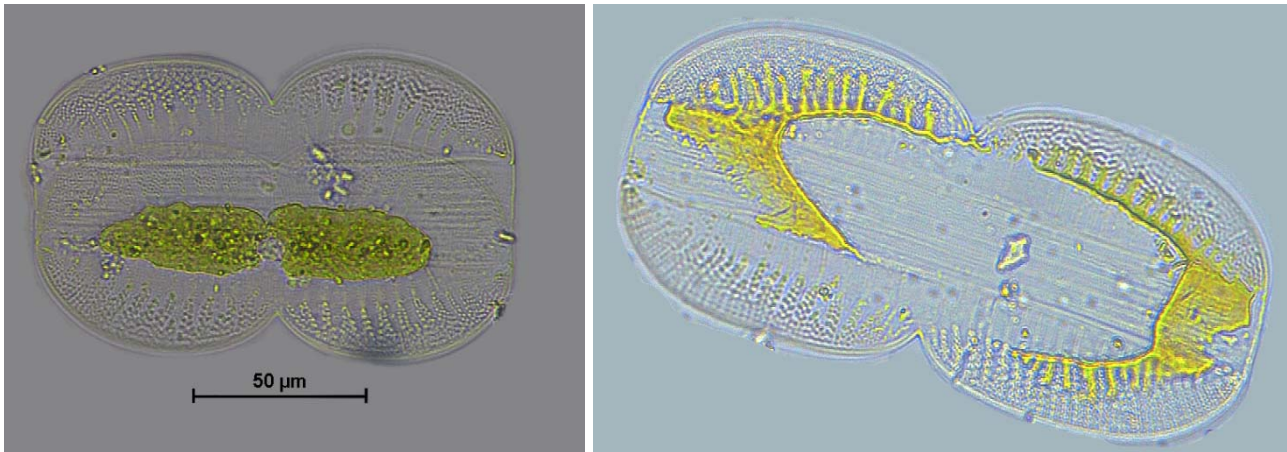
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	2	8	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	2	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Entomoneis sp. (Ehrenberg, 1845)



Class: Bacillariophyceae

Order: Surirellales

Family: Entomoneidaceae

Genus: *Entomoneis* sp.

Identifying feature:

- ❖ The shape of cells is seen lanceolate in the valve view and dumb-bell shaped in girdle view.
- ❖ One plastid is present, which is an axial plate-like structure, having a constriction at the centre.

Habitat: Brackish water

Major Ecological Parameters: Highly positive correlation was found with Total Hardness, Water Velocity, and Total Alkalinity.



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad




Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	8	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	2	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	5	NF
D. Harbour	NF	1	1	1
Fraserganj	NF	3	3	NF

 The density was recorded as a number of planktons in unit litre⁻¹.
 The annual average of four seasons are shown in the table.
 NF – Phytoplankton was not found at that time of sampling.



***Epithemia* sp. (Brebisson, 1838)**



Source:- Protist Information Server 1995-2018

Class: Bacillariophyceae

Order: Rhopalodiales

Family: Rhopalodiaceae

Genus: *Epithemia* sp.

Identifying feature:

- ❖ Cells are solitary and dorsi-ventral, normally laying in girdle view.
- ❖ Single plastid is lying along the ventral side of the girdle.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Highly positive correlation was found with Total Dissolved Solid.



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad




Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	65	NF	NF	NF
Haridwar	NF	30	NF	NF
Bijnor	NF	NF	5	NF
Narora	15	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	180	NF	NF	NF
Buxar	NF	NF	8	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

 The density was recorded as a number of planktons in unit litre⁻¹.
 The annual average of four seasons are shown in the table.
 NF – Phytoplankton was not found at that time of sampling.



Eunotia sp. (Ehrenberg, 1837)



Class: Bacillariophyceae

Order: Eunotiales

Family: Eunotiaceae

Genus: *Eunotia* sp.

Identifying feature:

- ❖ Various shaped valves (dorsiventral to lunate) are present.
- ❖ In girdle view, cells look as rectangular.
- ❖ Sometimes, cell has an undulate dorsal margin.
- ❖ Cell has two elongated plastids that are lying on the ventral side and extending towards the valve faces.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with Transparency, Dissolved Oxygen and Total Phosphate.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	50	10	30
Tehri	NF	35	20	NF
Haridwar	10	20	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	10	NF	NF	NF
Prayagraj	5	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

† The density was recorded as a number of planktons in unit litre⁻¹.
 ‡ The annual average of four seasons are shown in the table.
 † NF – Phytoplankton was not found at that time of sampling.



***Fragilaria* sp. (Lyngbye, 1819)**



Class: Bacillariophyceae

Order: Fragilariales

Family: Fragilariaceae

Genus: *Fragilaria* sp.

Identifying feature:

- ❖ Cells are joined to form ribbon-like colonies.
- ❖ In the girdle view, cells look like oblong at center.
- ❖ Cells have two plate-shaped plastids.
- ❖ Valves are variously shaped like linear, linear-lanceolate, or elliptical.
- ❖ Spines are present surrounding the mantle-face junction.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Highly positive correlation was found with Dissolved Oxygen.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	10	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	155	25	NF	NF
Bijnor	135	100	140	NF
Narora	25	105	15	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	15	NF	55	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	10	190	NF
Buxar	7	8	32	NF
Patna	23	12	180	NF
Bhagalpur	12	4	NF	NF
Farakka	35	NF	75	NF
Jangipur	31	3	184	NF
Berhampore	39	3	434	NF
Balagarh	6	NF	176	NF
Tribeni	25	NF	889	NF
Godakhali	13	1	16	10
D. Harbour	3	NF	20	25
Fraserganj	3	2	3	NF

⚡ The density was recorded as a number of planktons in unit litre⁻¹.

⚡ The annual average of four seasons are shown in the table.

⚡ NF – Phytoplankton was not found at that time of sampling.



***Frustulia* sp. (Rabenhorst, 1853)**



Class: Bacillariophyceae

Order: Naviculales

Family: Amphipleuraceae

Genus: *Frustulia* sp.

Identifying feature:

- ❖ Cells have two plate-like plastids, each containing a central pyrenoid.
- ❖ Valves are lanceolate to rhomboidal in shape but sometimes possess slightly capitate apices.
- ❖ Raphe slits are flanked by siliceous ribs.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Variable parameters are required for the genus.



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Varanasi	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

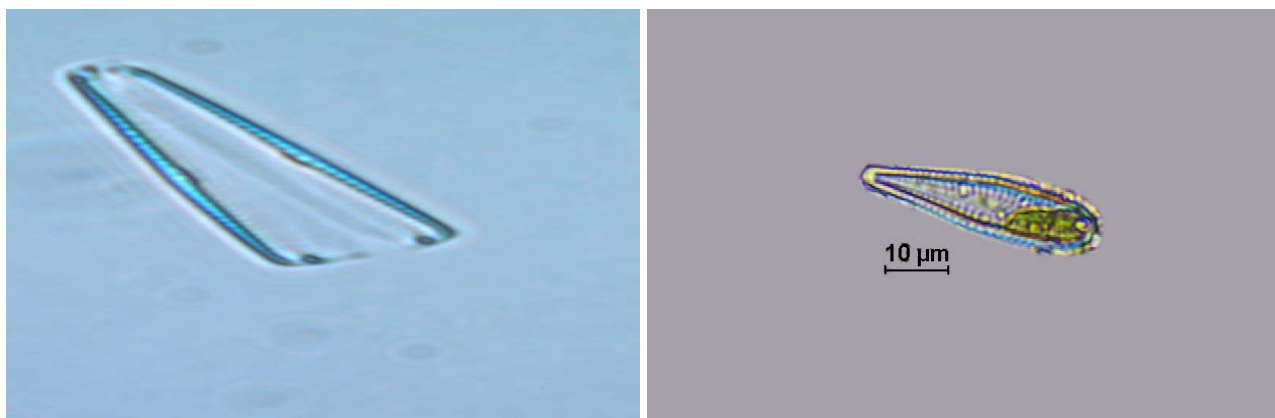
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	110	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	15	NF	NF	NF
Varanasi	20	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	10	5	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Gomphonema* sp. (Ehrenberg, 1832)**



Class: Bacillariophyceae

Order: Cymbellales

Family: Gomphonemataceae

Genus: *Gomphonema* sp.

Identifying feature:

- ❖ In the valve view, cells look as heteropolar and in the girdle view wedge-shaped.
- ❖ Valve apices are various shaped i.e. protracted or capitates.
- ❖ A single plastid is present which is warped in valve faces.

Habitat: Freshwater

Major Ecological Parameter: Highly positive correlation was found with Dissolved Oxygen.



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

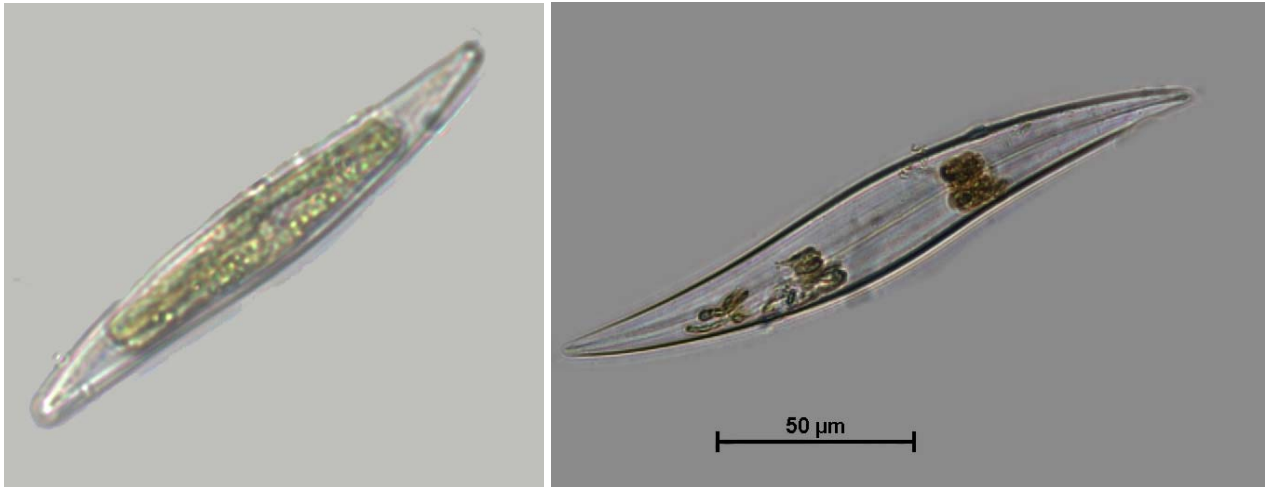
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	50	90	10	20
Tehri	25	45	25	NF
Haridwar	100	30	30	60
Bijnor	NF	40	60	50
Narora	100	NF	135	NF
Farrukhabad	NF	100	120	NF
Kanpur	10	NF	10	NF
Prayagraj	NF	20	NF	NF
Varanasi	NF	10	NF	NF
Buxar	10	25	NF	NF
Patna	10	12	2	NF
Bhagalpur	10	NF	1	NF
Farakka	25	10	NF	NF
Jangipur	15	5	NF	NF
Berhampore	10	NF	15	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Gyrosigma sp. (Hassall, 1845)



Class: Bacillariophyceae

Order: Naviculales

Family: Naviculaceae

Genus: *Gyrosigma* sp.

Identifying feature:

- ❖ The shapes of valves are linear to lanceolate-sigmoid, the girdle look narrowly rectangular.
- ❖ The pat of raphe is sigmoid.
- ❖ Cells have two plates like chloroplast which are lying at each side of girdle.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Carbonate, Ca^{++} , Mg^{++} , Total Hardness and Specific Conductivity.



**Station wise Distribution:
Upper stretch**

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	5	NF	NF
Bijnor	NF	50	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	2	NF	2	NF
Patna	NF	10	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	2	14
Tribeni	NF	10	NF	NF
Godakhali	NF	NF	5	10
D. Harbour	6	1	5	15
Fraserganj	17	5	9	35

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Meridion sp. (Agardh, 1824)



Class: Bacillariophyceae

Order: Tabellariales

Family: Tabellariaceae

Genus: *Meridion* sp.

Identifying feature:

- ❖ Cells are joined to form fan-shaped colonies and cells attached by their valve face.
- ❖ Across the valves ribs are prominent.
- ❖ Plastids are irregularly arranged and lying along the valve face.
- ❖ Plastids are discoid and numerous (8-12).

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with BOD and Total Dissolved Solid.



**Station wise Distribution:
Upper stretch**

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

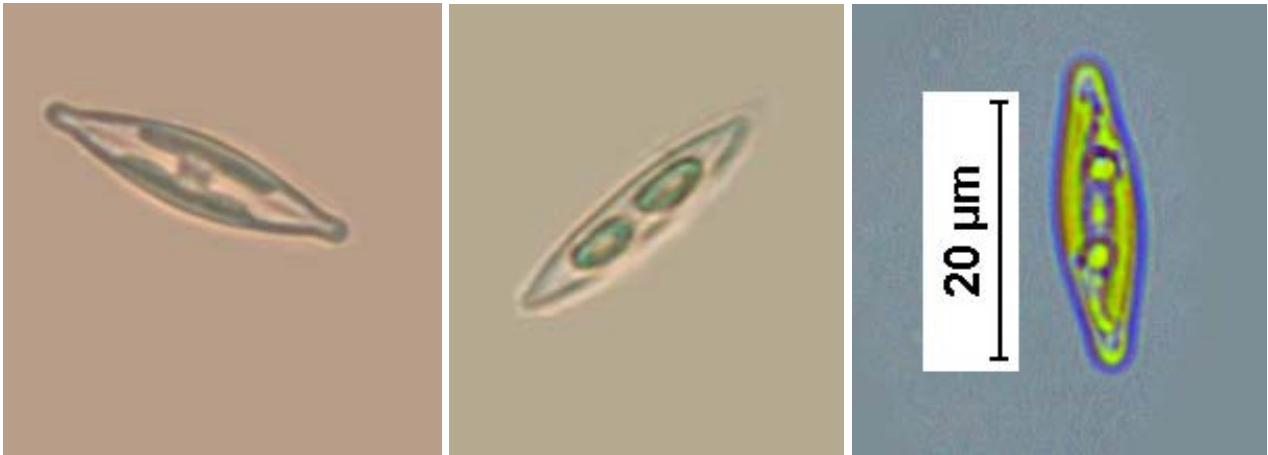
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	40	20	30
Tehri	65	30	60	20
Haridwar	95	65	NF	NF
Bijnor	145	20	40	NF
Narora	60	10	5	NF
Farrukhabad	70	60	NF	NF
Kanpur	110	40	45	NF
Prayagraj	230	200	NF	NF
Varanasi	150	30	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Navicula* sp. (Bory de St. Vincent, 1822)**



Class: Bacillariophyceae

Order: Naviculales

Family: Naviculaceae

Genus: *Navicula* sp.

Identifying feature:

- ❖ Cells have two plates like chloroplast which are present at either side of the girdle.
- ❖ Valves are variably shaped like linear to broadly lanceolate, or elliptic-lanceolate.
- ❖ Sometimes Valves have variously protracted or subcapitate apices.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Silicate, and Total Dissolved Solid.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	20	NF
Tehri	30	20	145	80
Haridwar	265	130	135	90
Bijnor	219	NF	20	110
Narora	10	30	NF	120
Farrukhabad	80	50	60	30
Kanpur	190	115	55	NF
Prayagraj	270	90	NF	NF
Varanasi	70	35	60	100
Buxar	10	65	1265	NF
Patna	3	15	272	NF
Bhagalpur	NF	89	3353	NF
Farakka	9	24	1	NF
Jangipur	NF	9	50	NF
Berhampore	7	15	7	NF
Balagarh	NF	12	10	NF
Tribeni	NF	14	154	NF
Godakhali	NF	11	20	NF
D. Harbour	NF	12	10	NF
Fraserganj	NF	45	10	NF

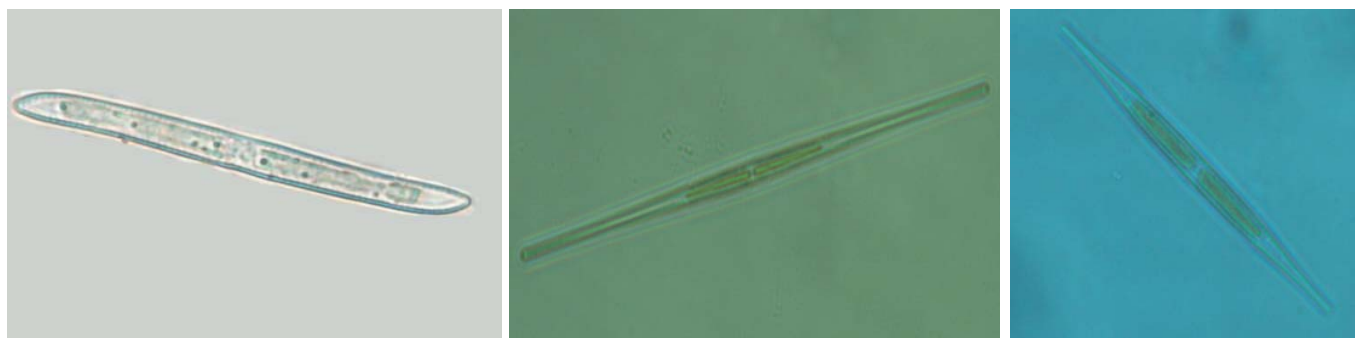
✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



Nitzschia sp. (Hassall, 1845)



Class: Bacillariophyceae

Order: Bacillariales

Family: Bacillariaceae

Genus: *Nitzschia* sp.

Identifying feature:

- ❖ Cells are often narrowly linear in shape along acute apices. But sometimes, it is sigmoid.
- ❖ Two plastids are arranged before and after in the cell.
- ❖ The raphe slits are often on a keel near one valve margin, which is subtended by a series of ribs.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Dissolved Oxygen, BOD, Chloride, Nitrite and Specific Conductivity.



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	20	20	NF
Haridwar	10	NF	135	20
Bijnor	NF	NF	75	60
Narora	NF	5	65	180
Farrukhabad	80	NF	130	20
Kanpur	120	150	NF	70
Prayagraj	95	175	40	140
Varanasi	NF	190	70	NF
Buxar	NF	1	5	NF
Patna	32	5	76	NF
Bhagalpur	1	NF	7	NF
Farakka	16	NF	1	NF
Jangipur	NF	1	NF	NF
Berhampore	NF	4	4	NF
Balagarh	5	7	9	NF
Tribeni	27	NF	32	NF
Godakhali	18	5	17	NF
D. Harbour	NF	19	NF	NF
Fraserganj	2	4	3	NF

✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



***Pinnularia* sp. (Ehrenberg, 1835)**



Class: Bacillariophyceae

Order: Naviculales

Family: Pinnulariaceae

Genus: *Pinnularia* sp.

Identifying feature:

- ❖ Usually, cells have two plate-like plastids, both the plastids are present in each side of the girdle.
- ❖ Some cells may have a single pyrenoid at the center of each chloroplast plate.
- ❖ The margins move under the valve face and variously lobed.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Highly positive correlation was found with Total Solid.



**Station wise Distribution:
Upper stretch**

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

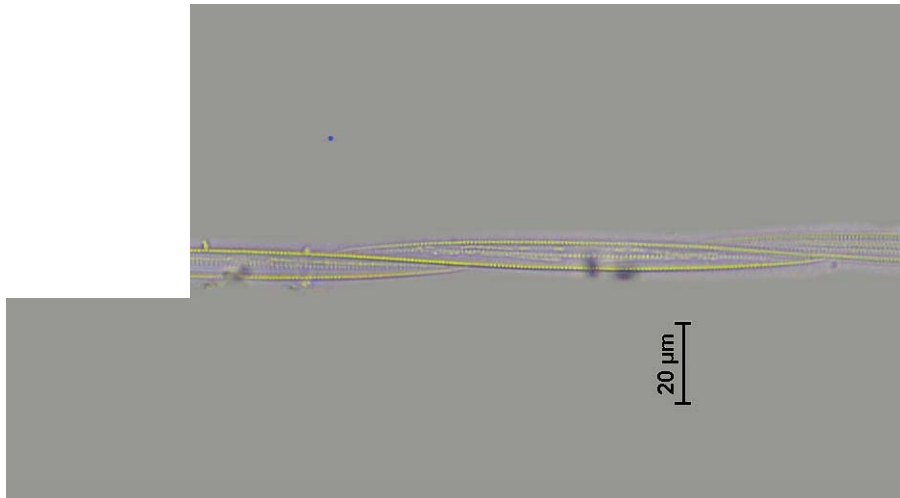
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	40	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	30	NF
Narora	20	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	10	NF	NF	NF
Prayagraj	35	NF	NF	NF
Varanasi	5	NF	NF	NF
Buxar	NF	6	NF	NF
Patna	NF	6	17	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	9	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	15	4	NF

- ⚡ The density was recorded as a number of planktons in unit litre⁻¹.
- ⚡ The annual average of four seasons are shown in the table.
- ⚡ NF – Phytoplankton was not found at that time of sampling.



Pseudonitzschia sp. (Peragallo, 1900)



Class: Bacillariophyceae

Order: Bacillariales

Family: Bacillariaceae

Genus: *Pseudo-nitzschia* sp.

Identifying feature:

- ❖ Cells are narrow and fusiform and joined in a stepped chain with overlapping valve end.
- ❖ Cell contains two plates like chloroplast and situated along the girdle.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Highly positive correlation was found with Total Dissolved Solid.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	10	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	1	1	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	5	1	NF	NF
Tribeni	NF	1	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

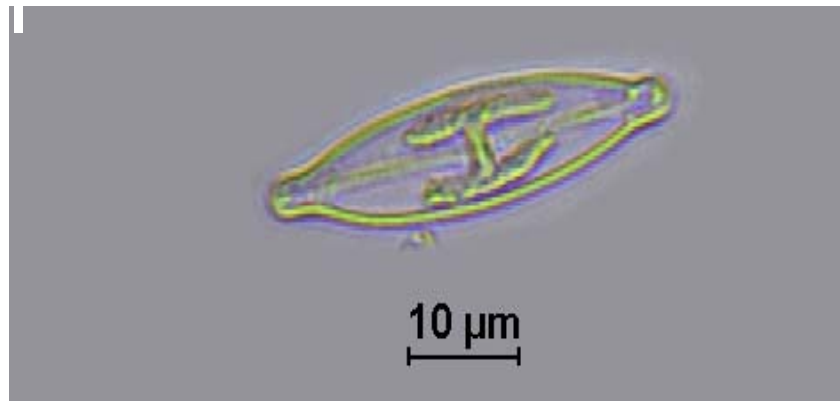
✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



***Stauroneis* sp. (Ehrenberg, 1843)**



Class: Bacillariophyceae

Order: Naviculales

Family: Stauroneidaceae

Genus: *Stauroneis* sp.

Identifying feature:

- ❖ Cells are solitary having two plastids, which are lying along the girdle sides and elongating under the valves.
- ❖ Each plastid contains one or many pyrenoids.
- ❖ Valves are linear to lanceolate shape.
- ❖ Striae are interrupted across the center of the valve to form a hyaline but sometimes thickened.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Highly positive correlation was found with Specific Conductivity.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

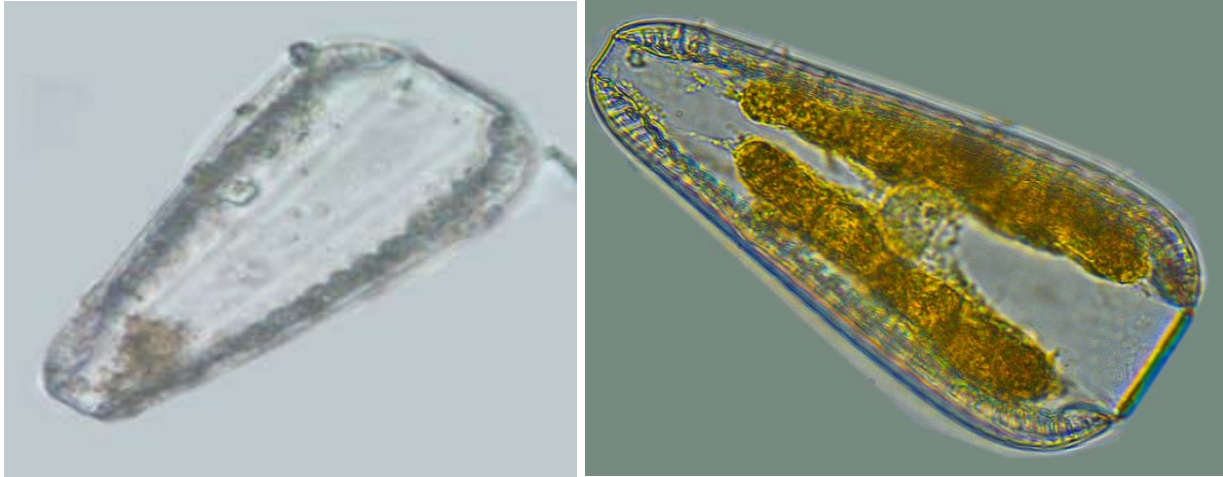
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	80
Bijnor	NF	20	NF	NF
Narora	NF	5	15	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Surirella sp. (Turpin, 1828)



Class: Bacillariophyceae

Order: Surirellales

Family: Surirellaceae

Genus: *Surirella* sp.

Identifying feature:

- ❖ Cells are heteropolar in the valve having girdle view.
- ❖ Sometimes cells have raised wings around the margins.
- ❖ A large lobed plastid plate is present under either of the valve face, which is linked by a narrow isthmus near one pole.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Silicate, Turbidity and Depth.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

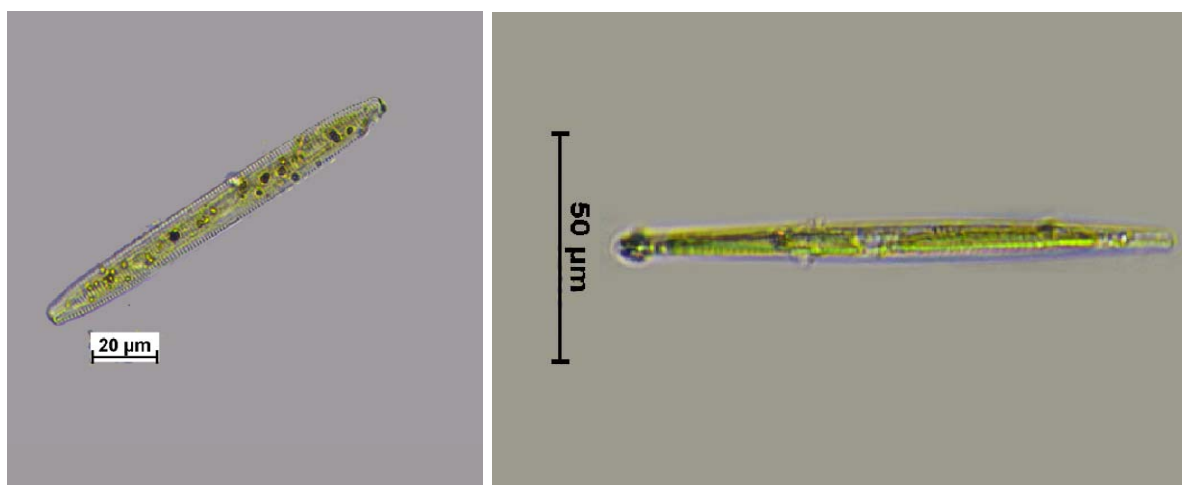
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	3	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	1	NF	2	NF
Balagarh	1	NF	NF	NF
Tribeni	1	2	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	2	NF	NF

- ⚡ The density was recorded as a number of planktons in unit litre⁻¹.
- ⚡ The annual average of four seasons are shown in the table.
- ⚡ NF – Phytoplankton was not found at that time of sampling.



Synedra sp. (Ehrenberg, 1830)



Class: Bacillariophyceae

Order: Fragilariales

Family: Fragilariaceae

Genus: *Synedra* sp.

Identifying feature:

- ❖ Generally, cells are free-living but sometimes attached to a pad of mucilage to form a radiate colony.
- ❖ Cells possess two plastids that are lying against the girdles and overlapping slightly onto the valves.
- ❖ Usually, valves are linear, sometimes capitate, or centrally inflated.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Dissolved Oxygen, BOD, Free CO₂, Chloride, Total Dissolved Solid.



**Station wise Distribution:
Upper stretch**

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	20	NF	NF
Tehri	85	70	150	40
Haridwar	1070	565	50	95
Bijnor	80	80	250	NF
Narora	20	45	115	NF
Farrukhabad	220	200	310	40
Kanpur	80	565	315	110
Prayagraj	73	235	240	100
Varanasi	50	215	300	NF
Buxar	NF	3	4	NF
Patna	5	32	35	NF
Bhagalpur	NF	4	40	NF
Farakka	9	NF	16	NF
Jangipur	4	37	NF	NF
Berhampore	1	4	94	NF
Balagarh	14	NF	112	NF
Tribeni	NF	2	197	NF
Godakhali	2	15	17	NF
D. Harbour	2	28	10	NF
Fraserganj	2	3	2	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Tabellaria* sp. (Ehrenberg ex Kutzing, 1844)**



Class: Bacillariophyceae

Order: Tabellariales

Family: Tabellariaceae

Genus: *Tabellaria* sp.

Identifying feature:

- ❖ Cells are connected with each other in a long zig-zag manner to form partially linear or stellate colonies by forming mucilage pads.
- ❖ Plastids are short stripe-like present between the septa.
- ❖ Usually, valves are elongate, slightly capitate, and equally or more inflated in the central region.
- ❖ Sometimes the septa are extended to almost half the length of a cell.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with BOD, Chloride and Total-N.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	50	40	NF
Tehri	35	20	500	115
Haridwar	35	120	190	50
Bijnor	143	400	235	NF
Narora	73	195	135	NF
Farrukhabad	455	1000	320	NF
Kanpur	NF	756	3025	NF
Prayagraj	40	160	280	NF
Varanasi	40	20	90	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Tryblionella sp. (Smith, 1853)



Class: Bacillariophyceae

Order: Bacillariales

Family: Bacillariaceae

Genus: *Tryblionella* sp.

Identifying feature:

- ❖ The shapes of valves are linear to lanceolate; sometimes at the center a constriction is present.
- ❖ Cells have two plastids which are present one on each side of the central cytoplasm.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Turbidity, Free CO₂, Nitrate and Total Dissolved Solid.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

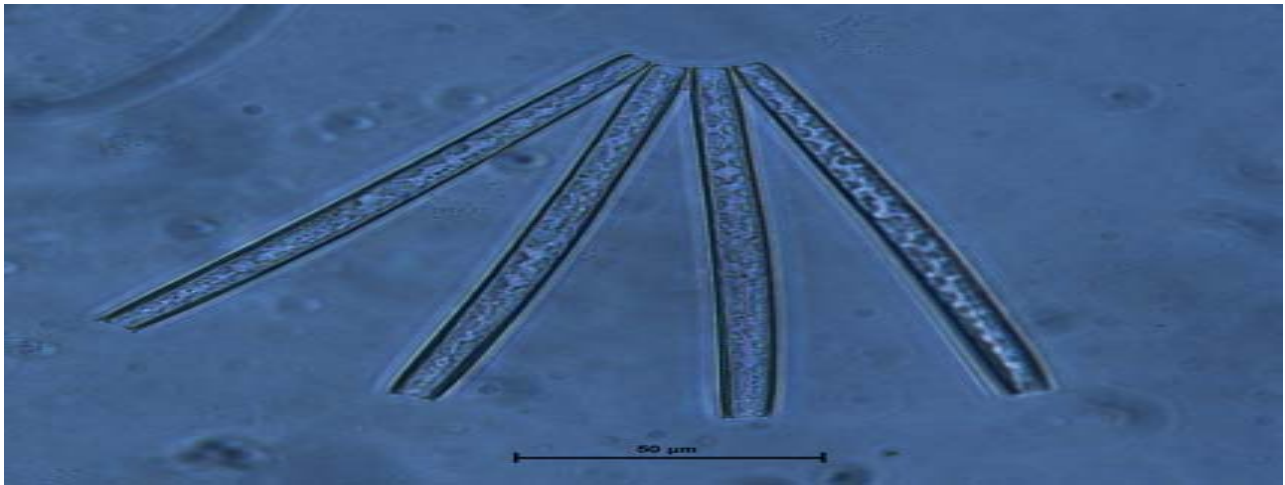
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	50	25	NF	NF
Tehri	8	15	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	30	NF	NF	NF
Varanasi	NF	NF	10	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	3	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Thalassionema* sp. (Grunow ex Mereschkowsky, 1902)**



Class: Bacillariophyceae

Order: Bacillariales

Family: Bacillariaceae

Genus: *Thalassionema* sp.

Identifying feature:

- ❖ Frustules are long and needle-shaped, which are united to form a zigzag colony.
- ❖ Valves are furnished with marginal areolae.

Habitat: Brackish water

Major Ecological Parameters: Highly positive correlation was found with Ca^{++} , Mg^{++} , Total Hardness and Salinity.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad




Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

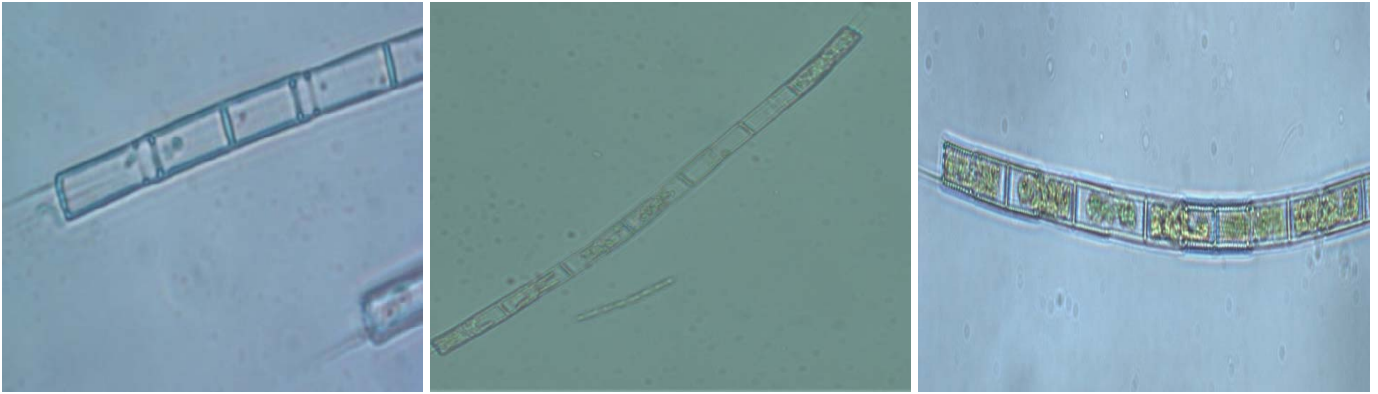
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	3	NF	6	NF

 The density was recorded as a number of planktons in unit litre⁻¹.
 The annual average of four seasons are shown in the table.
 NF – Phytoplankton was not found at that time of sampling.



Aulacoseira sp. (Thwaites, 1848)



Class: Coscinodiscophyceae

Order: Aulacoseirales

Family: Aulacoseiraceae

Genus: *Aulacoseira* sp.

Identifying feature:

- ❖ The cells are tightly connected to form long filaments.
- ❖ Cell wall having rows of dots and a ring of spines, present at end of the cell.
- ❖ The deep valve mantle forms right-angled junction with the valve face. Valves are striate.
- ❖ Small disc or plates-like chloroplasts are present.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Depth and Dissolved Oxygen.



Station wise Distribution:
Upper stretch

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	30	NF
Tehri	NF	120	90	NF
Haridwar	70	190	280	20
Bijnor	NF	165	570	NF
Narora	30	155	705	600
Farrukhabad	965	730	3480	600
Kanpur	545	1165	2510	800
Prayagraj	513	800	1580	1000
Varanasi	610	700	1250	2000
Buxar	165	170	2808	NF
Patna	65	42	3574	NF
Bhagalpur	42	228	818	NF
Farakka	190	23	555	20
Jangipur	22	235	1229	NF
Berhampore	185	440	11569	20
Balagarh	86	18	45362	28
Tribeni	50	168	25023	NF
Godakhali	19	67	450	NF
D. Harbour	25	NF	48	10
Fraserganj	NF	7	45	NF

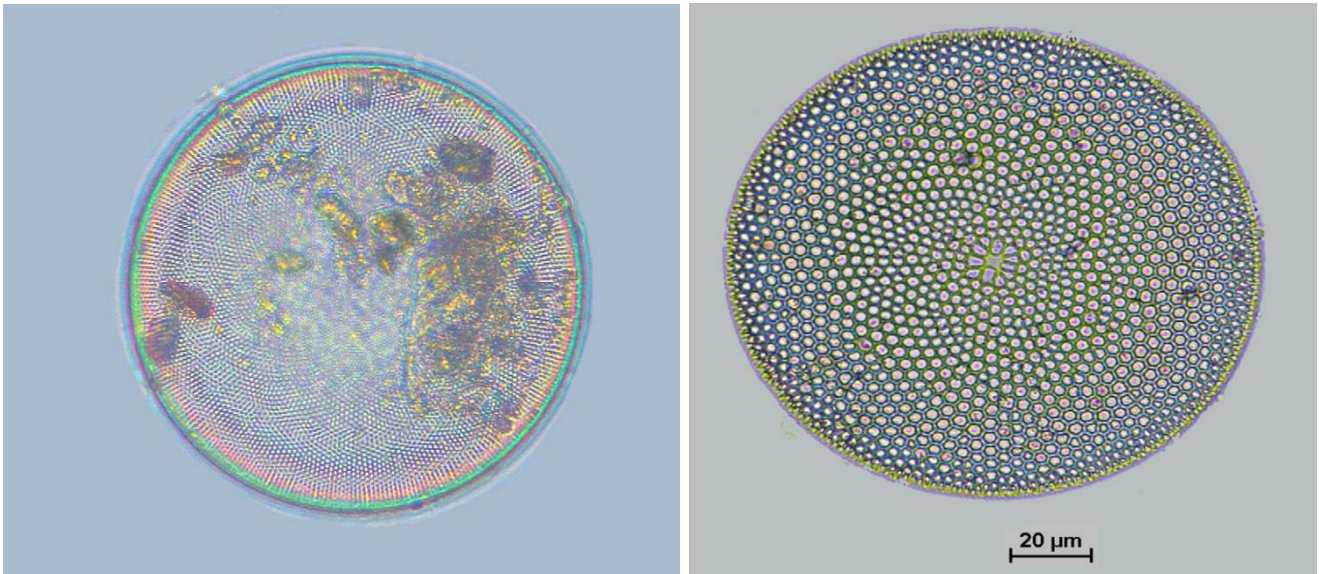
✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



Coscinodiscus sp. (Ehrenberg, 1839)



Class: Coscinodiscophyceae

Order: Coscinodiscales

Family: Coscinodiscaceae

Genus: *Coscinodiscus* sp.

Identifying feature:

- ❖ Areola shows a radial pattern, originates from the center to the margin
- ❖ Many chloroplasts are present.
- ❖ The chloroplast is disc-shaped.
- ❖ The central area may or may not be hyaline.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Water temperature, Depth, Velocity, Turbidity, Total Hardness and Salinity.



**Station wise Distribution:
Upper stretch**

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	3	1	NF
Jangipur	NF	2	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	20	4	NF
Tribeni	2	NF	1	NF
Godakhali	264	112	107	NF
D. Harbour	140	198	136	8870
Fraserganj	184	88	51	185

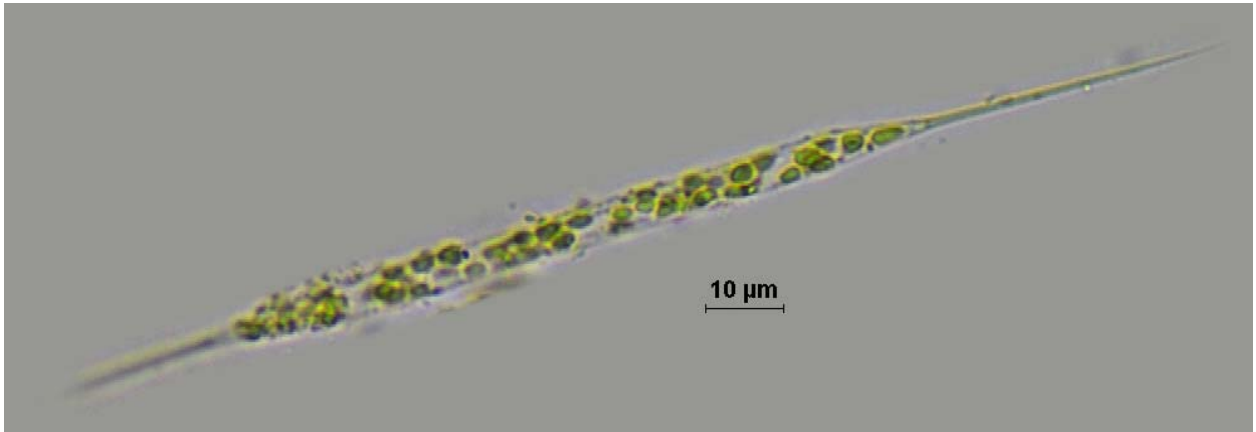
✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



***Rhizosolenia* sp. (Brightwell, 1858)**



Class: Coscinodiscophyceae

Order: Rhizosoleniales

Family: Rhizosoleniaceae

Genus: *Rhizosolenia* sp.

Identifying feature:

- ❖ The cell is of cylindrical shape and the size of the cell varies short to very long, straight, or curved.
- ❖ Cells are solitary or in a long chain.
- ❖ Apex terminates into a pointed process.
- ❖ Many plate-like plastids are present.

Habitat: Brackish water

Major Ecological Parameters: Highly positive correlation was found with Total Hardness and Salinity.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	1	2	5	2

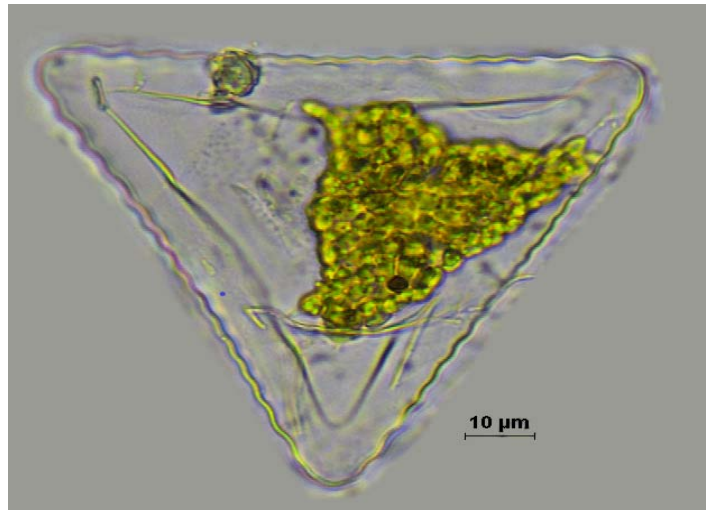
✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



***Triceratium* sp. (Ehrenberg, 1839)**



Class: Coscinodiscophyceae

Order: Triceratiales

Family: Triceratiaceae

Genus: *Triceratium* sp.

Identifying feature:

- ❖ Valves are triangular or square in shape.
- ❖ Valves are ornamented having simple or branched spines.
- ❖ Areolae are loculate.

Habitat: Brackish water

Major Ecological Parameters: Highly positive correlation was found with Salinity and Total Hardness.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

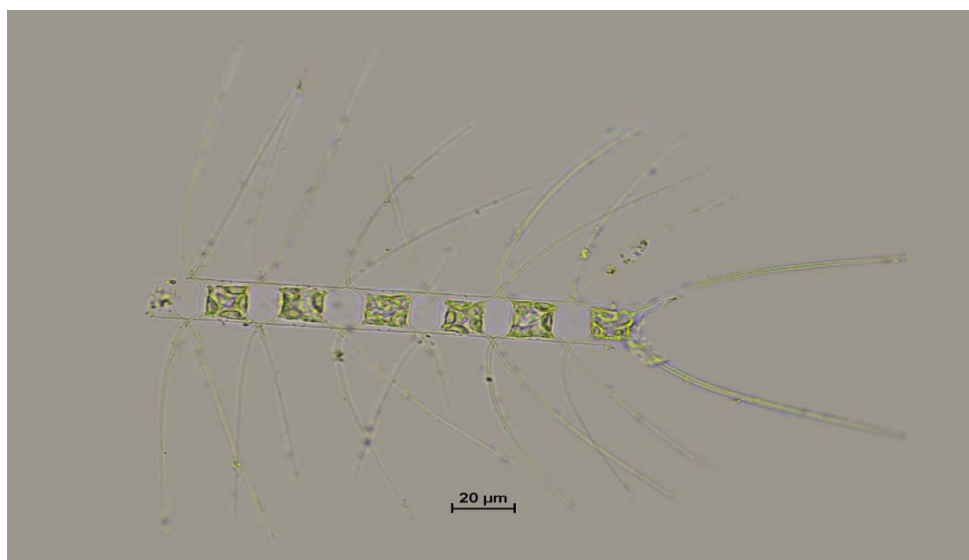
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	1	NF	NF
Fraserganj	NF	NF	1	NF

- ⚡ The density was recorded as a number of planktons in unit litre⁻¹.
- ⚡ The annual average of four seasons are shown in the table.
- ⚡ NF – Phytoplankton was not found at that time of sampling.



***Chaetoceros* sp. (Ehernberg, 18844)**



Class: Mediophyceae

Order: Chaetocerotales

Family: Chaetocerotaceae

Genus: *Chaetoceros* sp.

Identifying feature:

- ❖ Cells are solitary or in a short-chains.
- ❖ In girdle view, cell looks rectangular while elliptical in the valve view.
- ❖ Cells are jointed by the fusion of setae produced from the valve.
- ❖ Chloroplasts are scattered in cells and its number varies.

Habitat: Brackish water

Major Ecological Parameters: Highly positive correlation was found with Total Alkalinity, Total Hardness and Salinity.



**Station wise Distribution:
Upper stretch**

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	1	NF
Fraserganj	7	1	30	25

⚡ The density was recorded as a number of planktons in unit litre⁻¹.

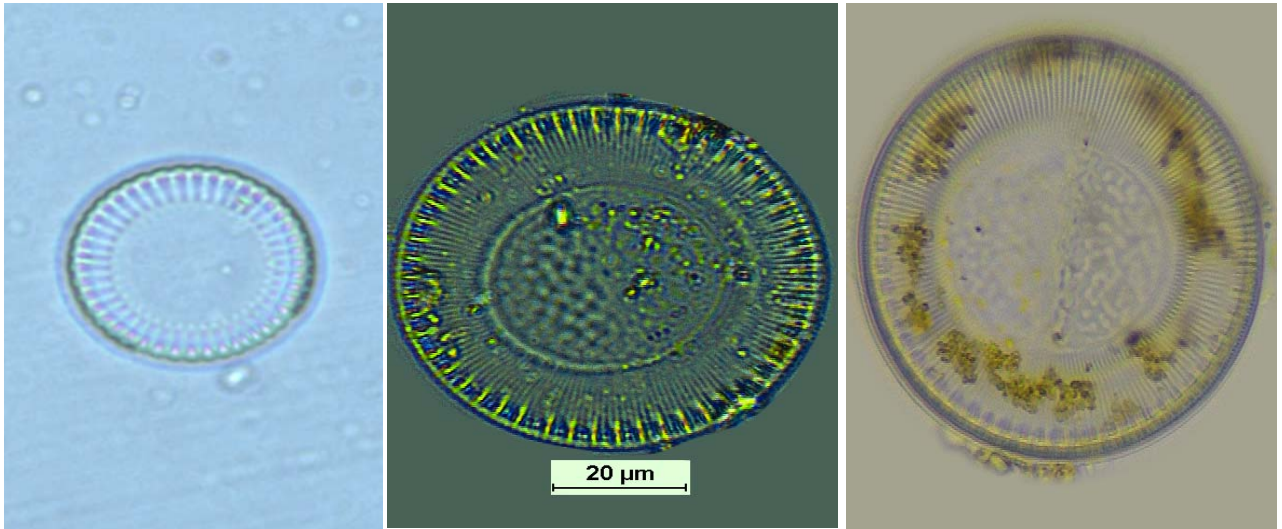
⚡ The annual average of four seasons are shown in the table.

⚡ NF – Phytoplankton was not found at that time of sampling.

⚡



Cyclotella sp. (Brébisson, 1838)



Class: Mediophyceae

Order: Stephanodiscales

Family: Stephanodiscaceae

Genus: *Cyclotella* sp.

Identifying feature:

- ❖ Generally, cells are solitary but sometime it may be attached in chains by mucilaginous threads.
- ❖ Cells are short and disc-shaped having circular-shaped valves with a slightly undulate surface.
- ❖ Radiating areolae are present surrounding the central region of valves.
- ❖ Numerous discoid shaped chloroplasts are usually arranged around the margin.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Dissolved Oxygen, and Total Alkalinity.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

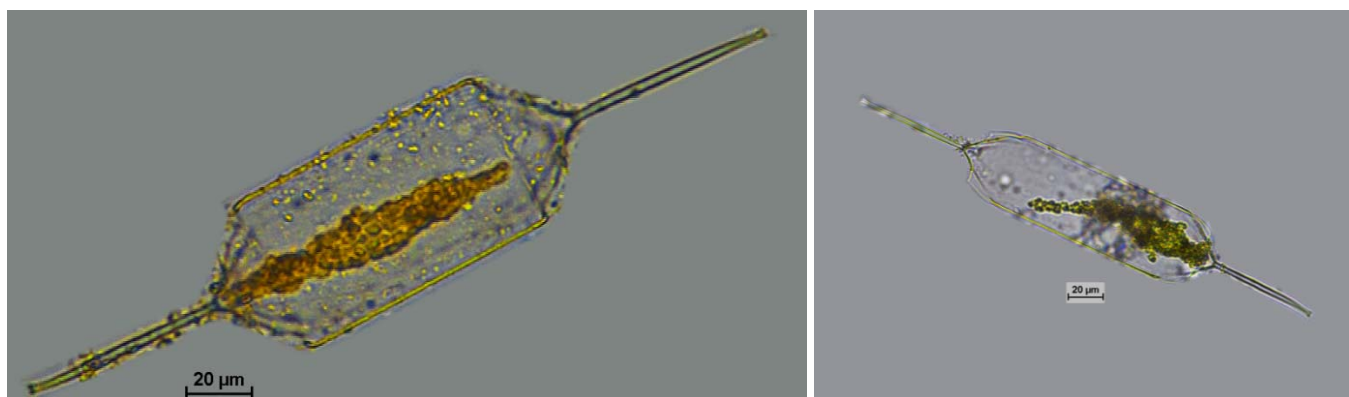
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	10	30
Tehri	NF	15	25	NF
Haridwar	845	115	65	NF
Bijnor	15	50	20	NF
Narora	35	15	35	NF
Farrukhabad	40	NF	NF	NF
Kanpur	120	245	NF	NF
Prayagraj	20	215	50	NF
Varanasi	NF	10	40	NF
Buxar	5	137	1166	NF
Patna	4	32	153	NF
Bhagalpur	5	12	95	NF
Farakka	NF	3	29	60
Jangipur	NF	1	156	NF
Berhampore	2	5	1004	NF
Balagarh	20	50	1023	NF
Tribeni	2	3	3	NF
Godakhali	6	11	133	NF
D. Harbour	2	51	60	NF
Fraserganj	3	5	17	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Ditylum sp. (J.W.Bailey, 1861)



Class: Mediophyceae

Order: Lithodesmiales

Family: Lithodesmiaceae

Genus: *Ditylum* sp.

Identifying feature:

- ❖ Cells are elongated in girdle view.
- ❖ Marginal ridge is prominent and often flanked.
- ❖ It has no defined elevations at valve corners.

Habitat: Brackish water

Major Ecological Parameters: Highly positive correlation was found with Water Velocity, Total Hardness, and Salinity.



	Absent
	Present

**Station wise Distribution:
Upper stretch**

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

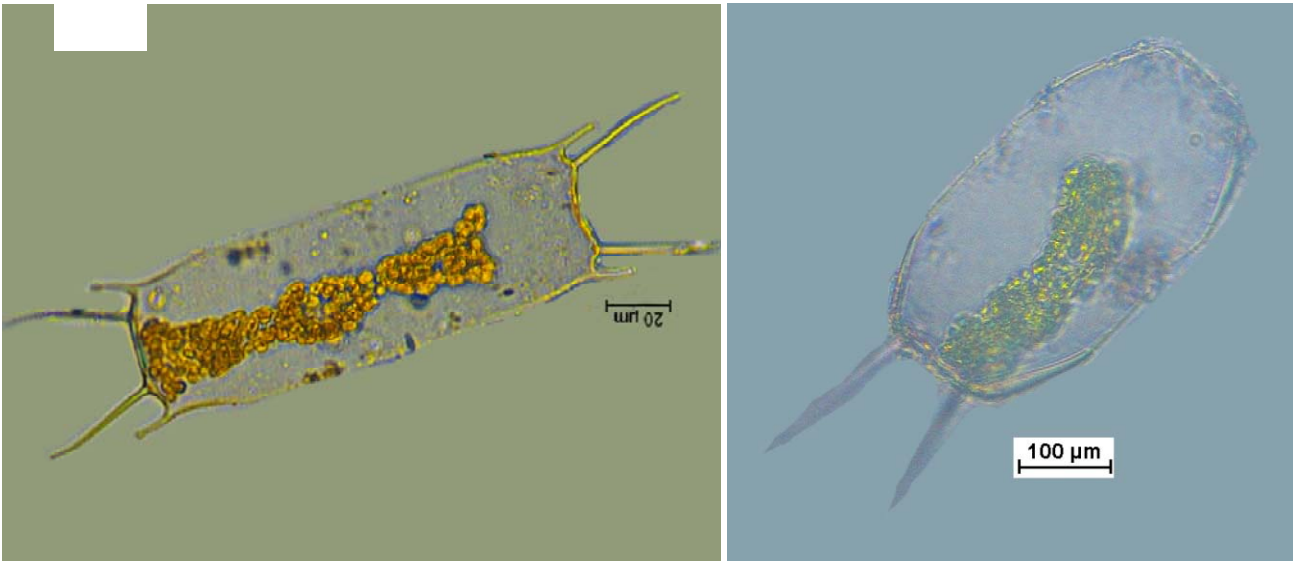
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	77	4	2	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Odontella sp. (C. Agardh)



Class: Mediophyceae

Order: Eupodiscales

Family: Odontellaceae

Genus: *Odontella* sp.

Identifying feature:

- ❖ In the girdle view, cell looks oblong. The shape of the valves is elliptical or lanceolate.
- ❖ Each pole having short horns.
- ❖ Cells are either straight or in zig-zag chains.
- ❖ Many chloroplasts are present.

Habitat: Brackish water

Major Ecological Parameters: Highly positive correlation was found with Total Hardness and Salinity.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

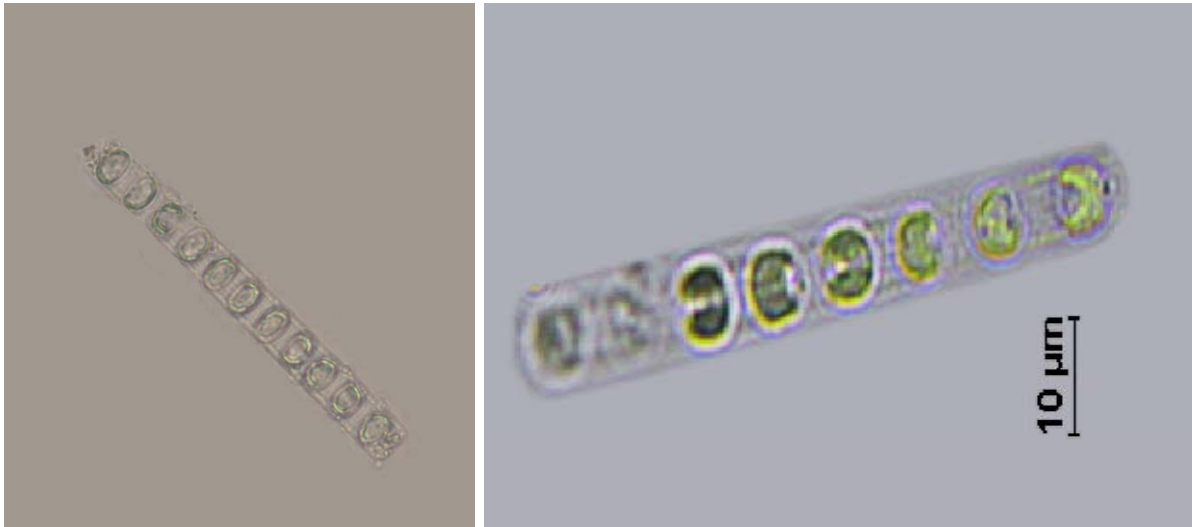
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	30	13	17	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Skeletonema sp. (Greville, 1865)



Class: Mediophyceae

Order: Thalassiosirales

Family: Skeletonemataceae

Genus: *Skeletonema* sp.

Identifying feature:

- ❖ Cells are beads like which are joined by marginal spines.
- ❖ The structure of the plastid is disc-like or cup-shaped.
- ❖ A small number of plastid present per cell.

Habitat: Brackish water

Major Ecological Parameters: Highly positive correlation was found with Total Hardness and Salinity.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	2	NF	9	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Stephanodiscus* sp. (Ehrenberg, 1845)**



Class: Mediophyceae

Source:- sciencephotolibrary

Order: Stephanodiscales

Family: Stephanodiscaceae

Genus: *Stephanodiscus* sp.

Identifying feature:

- ❖ A discoid or barrel-shaped cell possesses delicate threads radiating from around the edge of the valve.
- ❖ A ring of spines is present surrounding the edge of the valve.
- ❖ Many discoid plastids are present surrounding the periphery of the cell.

Habitat: Freshwater and Brackish water

Major Ecological Parameter : Highly positive correlation was found with Free CO₂.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	200	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	10	NF	NF	NF
Farrukhabad	NF	NF	NF	30
Kanpur	30	NF	NF	NF
Prayagraj	95	10	NF	NF
Varanasi	NF	80	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Chlorophyta



Chlorophyta

(Green algae)

General Identifying Characters:

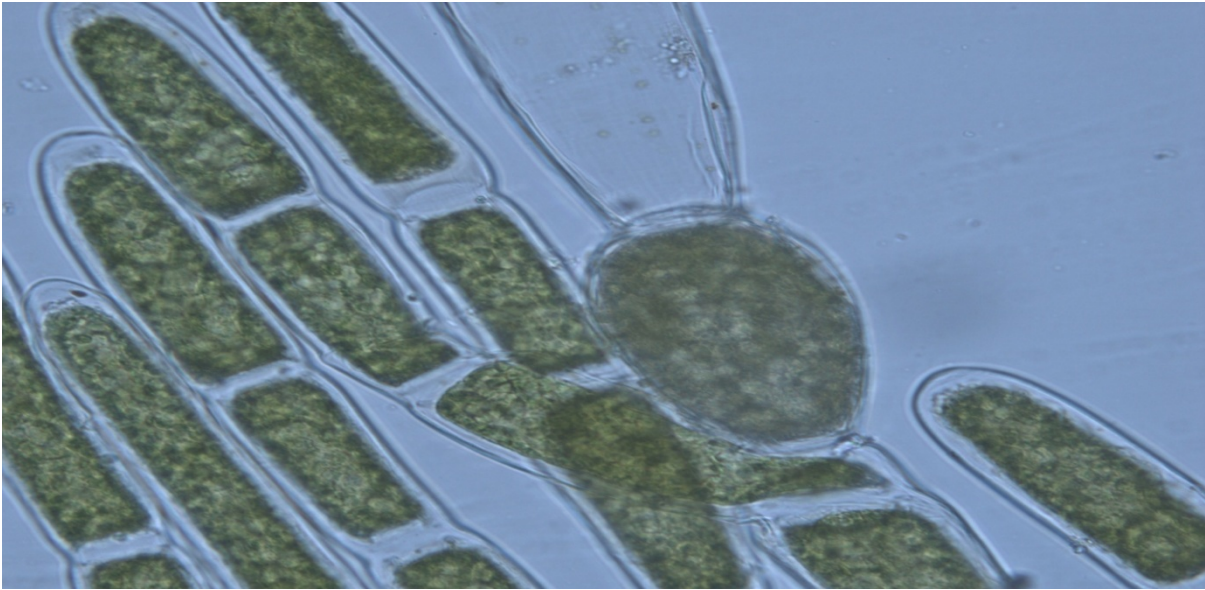
- The genera of groups are mostly green in color because of the presence of a photosynthetic pigment namely chlorophyll a and chlorophyll b.
- The members of the group can carry out the process of photosynthesis and starch is the reserved photosynthetic material, which is stored in pyrenoid.
- It is thallus like structure that can be unicellular, multicellular, colonial, and filamentous.
- Cells have a cell wall, which is made up of cellulose.
- Some members of the group bear flagella. The number of flagella varies from two or numerous. The length of flagella are of equal length but rarely varies.
- Some genera are coenocytes which means the cells have no transverse cell wall so, their nuclei are scattered.
- Green algae are ecologically very important as they are the major producer of the aquatic eco-system.

✚ Total 28 genera belonging to 3 classes and 14 families were recorded during study period.

✚ Class:- Ulvophyceae (2 genera), Chlorophyceae (20 genera), Trebouxiophyceae (6 genera).



***Cladophora* sp. (Kützing, 1843)**



Class: Ulvophyceae

Order: Cladophorales

Family: Cladophoraceae

Genus: *Cladophora* sp.

Identifying feature:

- ❖ Cells are cylindrical or slightly swollen in shape and elongated with a strong wall.
- ❖ Cells are 20-80µm in wide.
- ❖ It is filamentous with small branches.
- ❖ The chloroplast is distributed as net-like throughout the cell with many pyrenoids.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Highly positive correlation was found with BOD.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad




Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

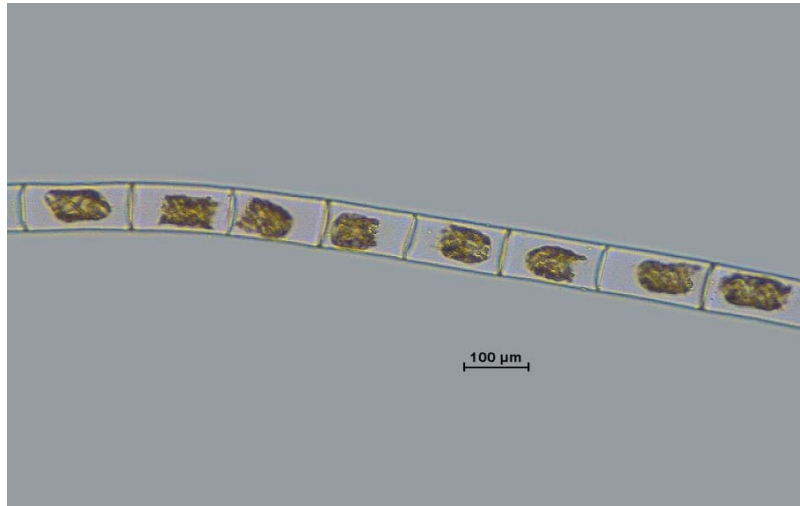
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	25	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	5	NF	90
Berhampore	10	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

 The density was recorded as a number of planktons in unit litre⁻¹.
 The annual average of four seasons are shown in the table.
 NF – Phytoplankton was not found at that time of sampling.



***Ulothrix* sp. (Kutzing,1833)**



Class: Ulvophyceae

Order: Ulotrichales

Family: Ulotrichaceae

Genus: *Ulothrix* sp.

Identifying feature:

- ❖ Cells are cylindrical with thickened cell walls, which are jointed to form unbranched filaments.
- ❖ Most the species contain a holdfast, which develops from the basal cells.
- ❖ Cells have a single chloroplast.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with pH, Dissolved Oxygen, BOD, and Carbonate.



**Station wise Distribution:
Upper stretch**

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	10	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	65	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	20	130	NF	NF
Varanasi	NF	40	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	15	NF
Farakka	1	NF	NF	20
Jangipur	NF	NF	NF	NF
Berhampore	4	NF	11	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	6	1	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	2	NF

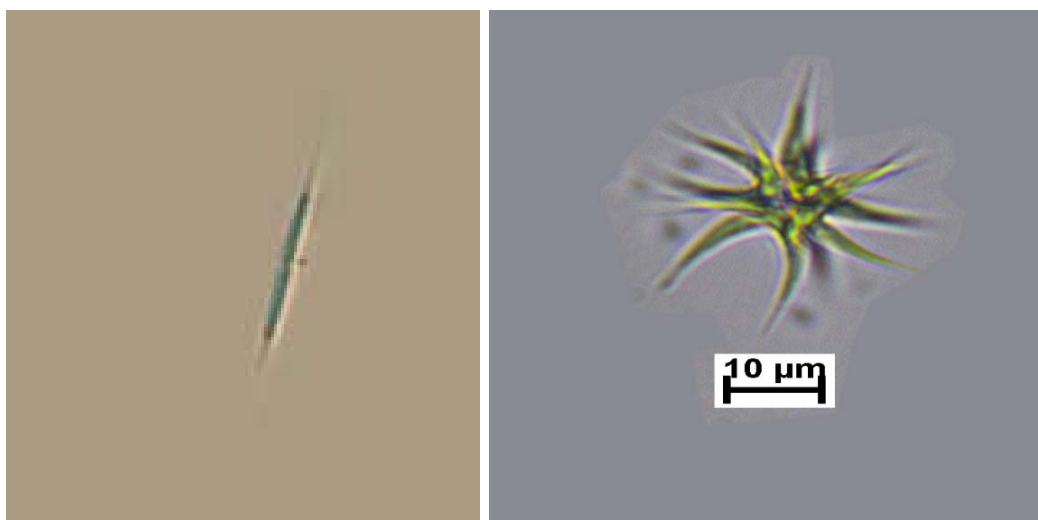
✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



Ankistrodesmus sp. (Corda, 1838)



Class: Chlorophyceae

Order: Sphaeropleales

Family: Selenastraceae

Genus: *Ankistrodesmus* sp.

Identifying feature:

- ❖ Cells are distinctly curved and needle - shaped.
- ❖ Usually, cells are present in clusters or irregular bundles.
- ❖ Cells have a thin, parietal plate - like chloroplast.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with BOD, and Chloride.



	Absent
	Present

**Station wise Distribution:
Upper stretch**

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

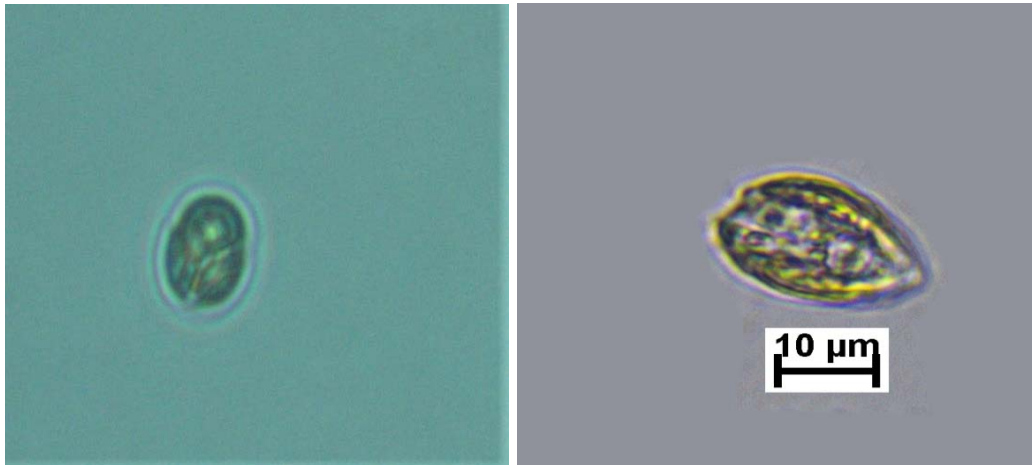
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	10	NF	NF	NF
Haridwar	20	25	NF	NF
Bijnor	53	135	35	60
Narora	50	1165	85	NF
Farrukhabad	82	2120	130	150
Kanpur	70	350	175	200
Prayagraj	50	675	350	150
Varanasi	NF	60	700	210
Buxar	NF	15	NF	NF
Patna	NF	10	25	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	30	NF
Berhampore	15	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Chlamydomonas sp. (Ehrenberg 1835)



Class: Chlorophyceae

Order: Chlamydomonadales

Family: Chlamydomonadaceae

Genus: *Chlamydomonas* sp.

Identifying feature:

- ❖ Cells are without hyaline.
- ❖ Cells have large and cup-shaped chloroplast.
- ❖ Cells have two flagella, which are coming from the anterior side of the cell.
- ❖ It also possesses distinct eye-spot.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Highly positive correlation was found with Total Dissolved Solid.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

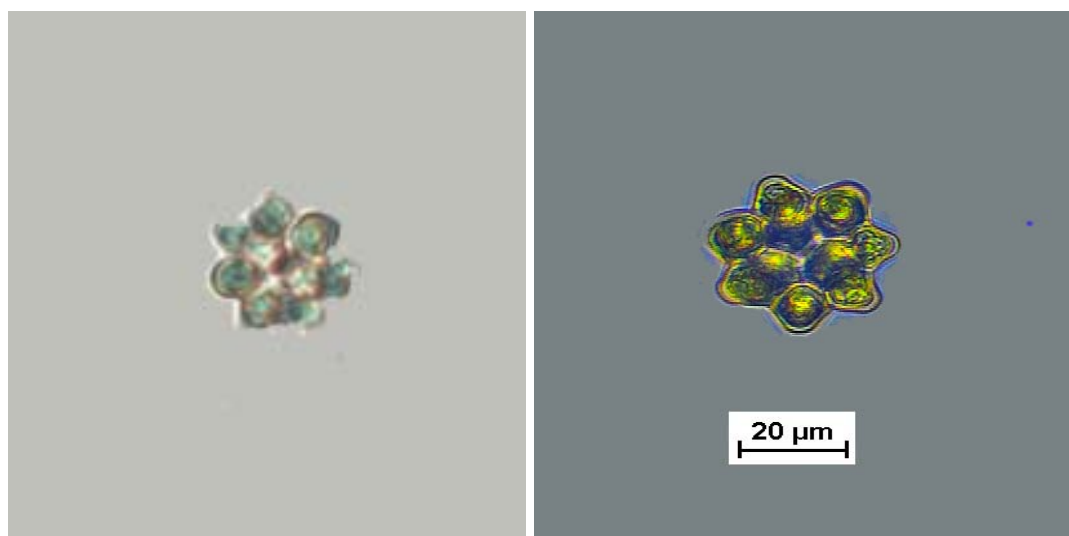
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	20	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	80	NF	NF	NF
Varanasi	50	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Coelastrum sp. (Nägeli, 1849)



Class: Chlorophyceae

Order: Sphaeropleales

Family: Scenedesmaceae

Genus: *Coelastrum* sp.

Identifying feature:

- ❖ The shape of colonies is spherical and each colony consists of up to 64 closely packed cells.
- ❖ The shape of the cells is spherical and diameter 8-30µm.
- ❖ A single parietal chloroplast is present.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Bicarbonate and Total Alkalinity.



**Station wise Distribution:
Upper stretch**

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

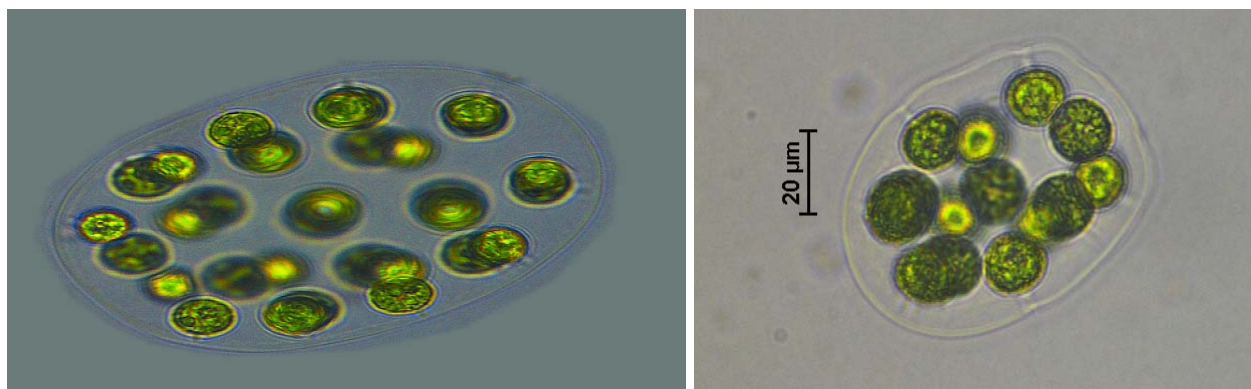
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	15	NF	NF
Narora	10	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	10	15	140	NF
Prayagraj	NF	180	NF	20
Varanasi	10	20	NF	NF
Buxar	NF	13	20	NF
Patna	NF	5	30	NF
Bhagalpur	NF	12	514	NF
Farakka	13	1	30	NF
Jangipur	1	NF	1	10
Berhampore	NF	NF	119	NF
Balagarh	NF	NF	15	559
Tribeni	NF	5	275	100
Godakhali	NF	1	6	350
D. Harbour	NF	5	NF	10
Fraserganj	NF	NF	3	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Eudorina sp. (Ehrenberg 1832)



Class: Chlorophyceae

Order: Chlamydomonadales

Family: Volvocaceae

Genus: *Eudorina* sp.

Identifying feature:

- ❖ The shape of the colony is ovate, obovoid, and globose in some cases.
- ❖ Each colony contains 16 to 64 cells, which are not compactly packed within a gelatinous envelope.
- ❖ Cells are biflagellate. Flagella emerge from the anterior beaks of the cell.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with Bicarbonate, Total Alkalinity, and Free CO₂.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

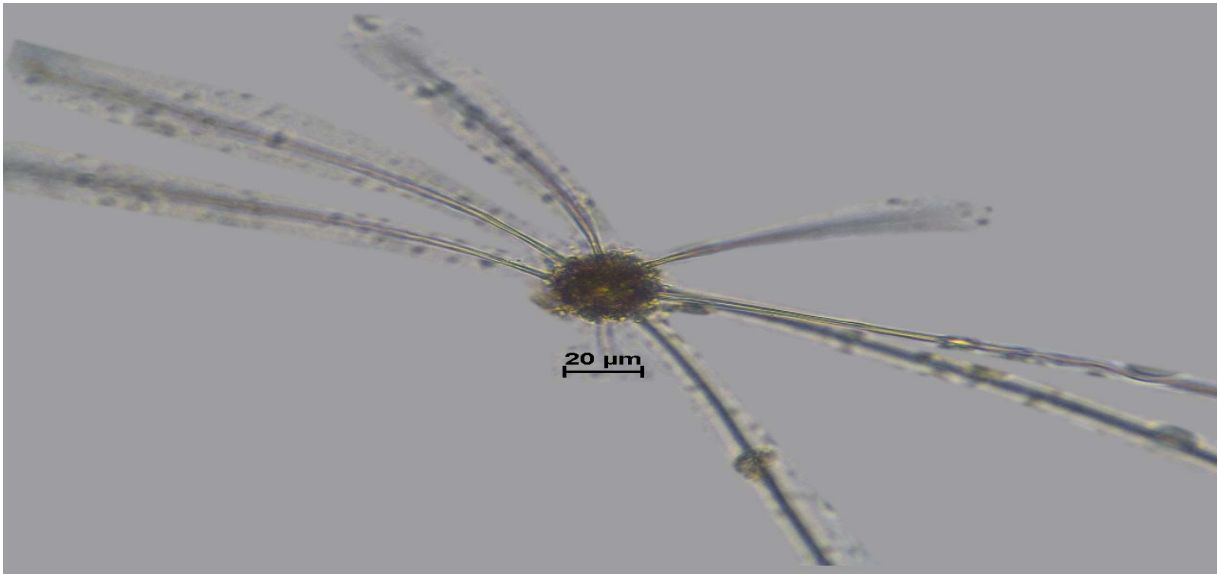
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	12	NF	NF
Patna	NF	3	NF	NF
Bhagalpur	NF	8	224	NF
Farakka	NF	21	2	NF
Jangipur	NF	1	5	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	3	NF
Tribeni	NF	8	11	NF
Godakhali	NF	NF	5	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ⚡ The density was recorded as a number of planktons in unit litre⁻¹.
- ⚡ The annual average of four seasons are shown in the table.
- ⚡ NF – Phytoplankton was not found at that time of sampling.



***Golenkinia* sp. (Chodat, 1894)**



Class: Chlorophyceae

Order: Sphaeropleales

Family: Neochloridaceae

Genus: *Golenkinia* sp.

Identifying feature:

- ❖ Spherical shaped cells, usually found solitary, but sometimes cells create a false colony by enclosing through a thin mucilaginous envelope.
- ❖ Many spines are emerging out from cell walls, which are found across the surrounding of cell.
- ❖ Cells have a single chloroplast with a pyrenoid.
- ❖ The diameter of cell varies from 5-21 μ m. having spine is 24-45 μ m.

Habitat: Freshwater

Major Ecological Parameter: Highly positive correlation was found with Depth.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	1	NF	NF
D. Harbour	NF	3	NF	NF
Fraserganj	NF	NF	NF	NF

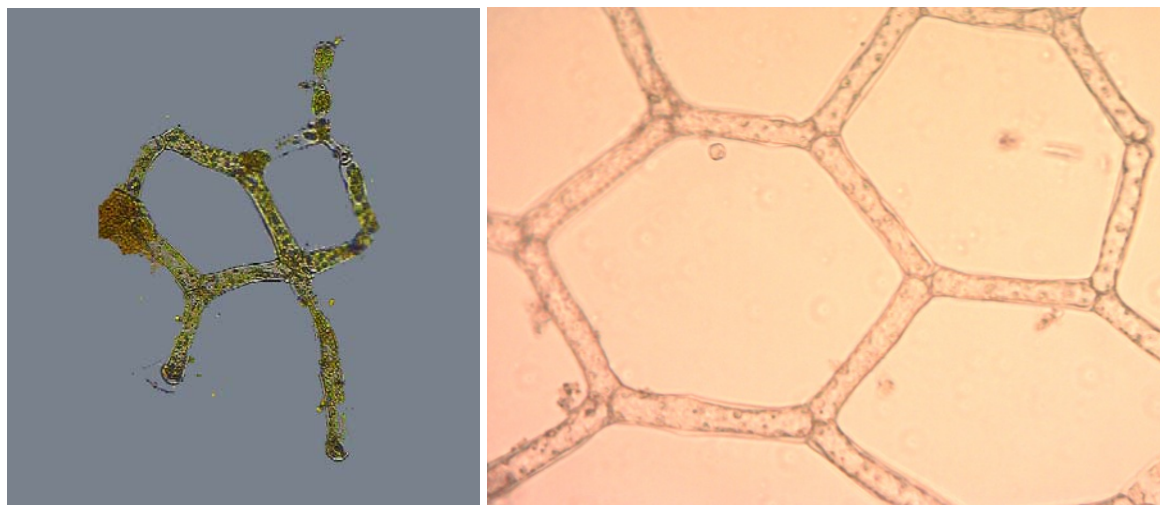
⚡ The density was recorded as a number of planktons in unit litre⁻¹.

⚡ The annual average of four seasons are shown in the table.

⚡ NF – Phytoplankton was not found at that time of sampling.



Hydrodictyon sp. (Roth, 1797)



Class: Chlorophyceae

Order: Sphaeropleales

Family: Hydrodictyaceae

Genus: *Hydrodictyon* sp.

Identifying feature:

- ❖ Cylindrical cells are jointed to form branched filaments and these branched filaments are formed a net-like structure.
- ❖ The lengths of adult cells are of several millimetres.
- ❖ Each of the cells bears a chloroplast having single a pyrenoid.

Habitat: Freshwater

Major Ecological Parameter: Highly positive correlation was found with Transparency.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	5	NF
Haridwar	NF	5	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	10	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	4	NF
Bhagalpur	NF	5	5	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	1	NF	NF
Berhampore	NF	1	NF	NF
Balagarh	NF	1	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Kirchneriella* sp. (Schmidle, 1893)**



Class: Chlorophyceae

Order: Sphaeropleales

Family: Selenastraceae

Genus: *Kirchneriella* sp.

Identifying feature:

- ❖ Cells are lunate shaped.
- ❖ Cells are irregularly arranged in a colony and its number can be up to 32.
- ❖ The colonies are enclosed by the mucilaginous sheath.
- ❖ Cells have a single chloroplast.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with pH, Dissolved Oxygen, Total Dissolved Solid.



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

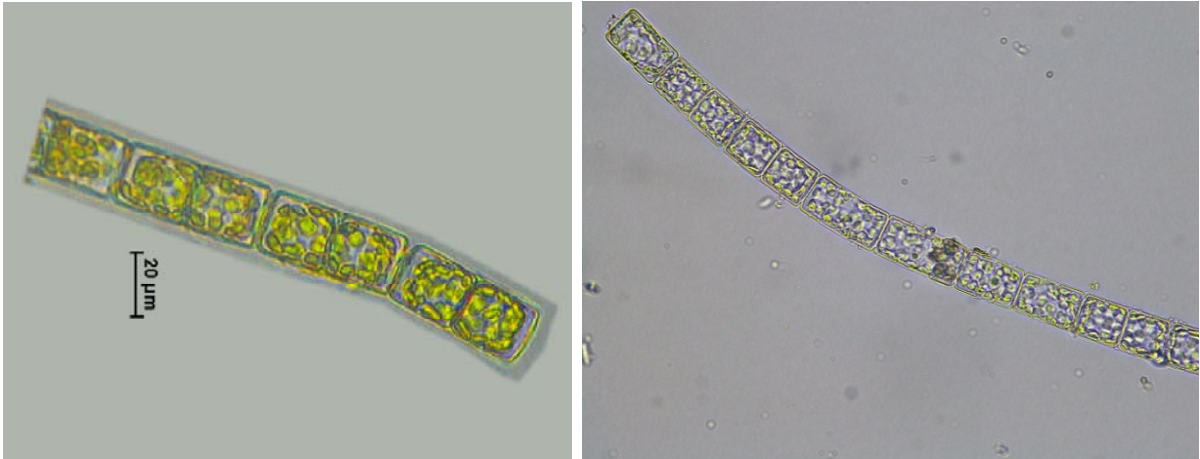
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	20
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	30	NF
Narora	70	NF	NF	NF
Farrukhabad	150	NF	NF	NF
Kanpur	45	NF	NF	NF
Prayagraj	30	130	160	NF
Varanasi	140	60	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Microspora sp. (Thuret, 1850)



Class: Chlorophyceae

Order: Sphaeropleales

Family: Microsporaceae

Genus: *Microspora* sp.

Identifying feature:

- ❖ Cells are cylindrical with the thickened cell wall, united to form unbranched filaments.
- ❖ Sometimes filaments contain a holdplast.
- ❖ Cells are 5-30µm in diameter.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Variable parameters are required for the genus.



**Station wise Distribution:
Upper stretch**

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

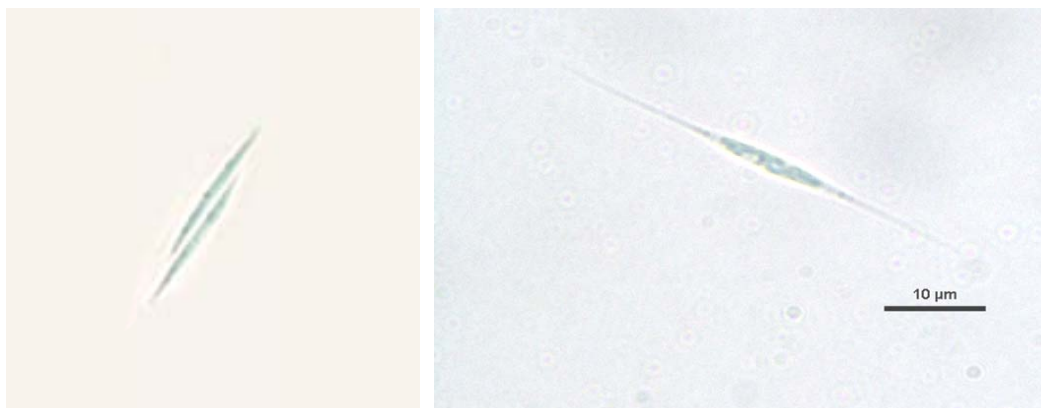
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	95	40	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	200	20	NF	NF
Kanpur	30	NF	NF	NF
Prayagraj	30	NF	NF	NF
Varanasi	40	NF	NF	NF
Buxar	3	5	378	NF
Patna	NF	7	1	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	20	NF
Jangipur	NF	3	76	NF
Berhampore	2	5	50	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	124	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	6	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Monoraphidium* sp. (Komárková-Legnerová, 1969)**



Class: Chlorophyceae

Order: Sphaeropleales

Family: Selenastraceae

Genus: *Monoraphidium* sp.

Identifying feature:

- ❖ Cells are unicellular and have no mucilaginous envelope around them.
- ❖ The structure of the cells varies from straight to lunate to sigmoid or helically twisted with an elongated end.
- ❖ The chloroplast is single and parietal.

Habitat: Freshwater

Major Ecological Parameters: Variable parameters are required for the genus.



	Absent
	Present

**Station wise Distribution:
Upper stretch**

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	5	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	10	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Protococcus* sp. (C.Agardh, 1824)**



Class: Chlorophyceae

Order: Chlamydomonadales

Family: Chlamydomonadaceae

Genus: *Protococcus* sp.

Identifying feature:

- ❖ Cells are mostly unicellular and globose in structure.
- ❖ Cells contain chloroplast.

Habitat: Freshwater

Major Ecological Parameter: Highly positive correlation was found with BOD.



**Station wise Distribution:
Upper stretch**

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	30	NF	NF	10
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	35	NF	NF
Farrukhabad	130	70	NF	NF
Kanpur	175	90	240	NF
Prayagraj	195	175	NF	NF
Varanasi	180	15	60	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

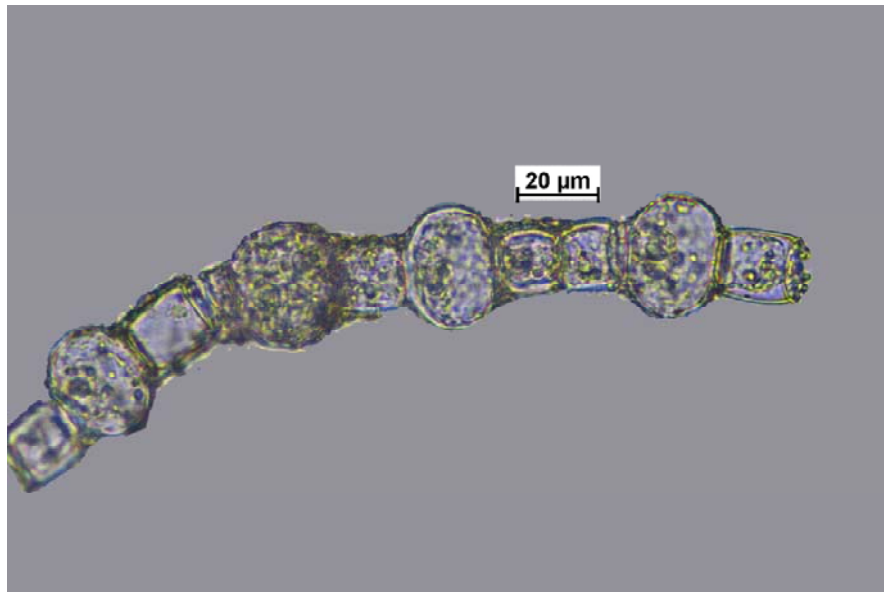
✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



***Oedogonium* sp. (Link ex Hirn, 1900)**



Class: Chlorophyceae

Order: Oedogoniales

Family: Oedogoniaceae

Genus: *Oedogonium* sp.

Identifying feature:

- ❖ Cells are cylindrical with the firm cell wall, jointed to form unbranched filaments.
- ❖ In some species, a ring-like transverse line was found at the swollen part of filaments.
- ❖ Cells are 10-40µm wide.

Habitat: Freshwater

Major Ecological Parameter: Highly positive correlation was found with Transparency.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

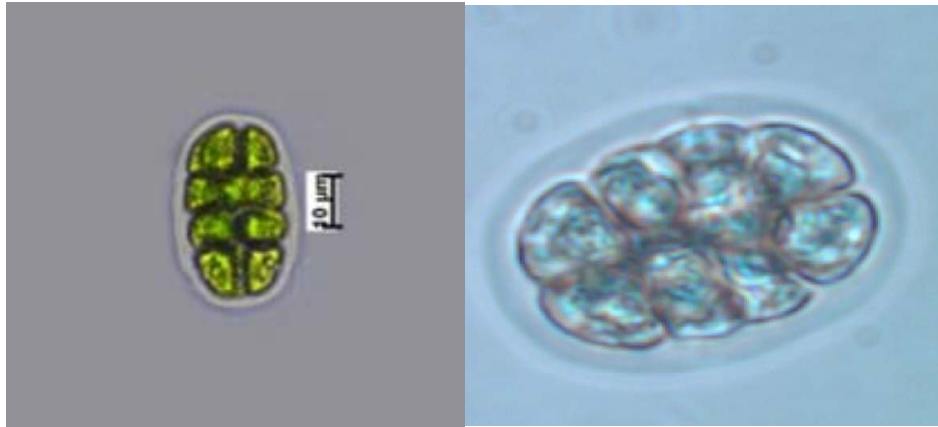
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	20	NF	NF	80
Haridwar	NF	25	NF	NF
Bijnor	NF	NF	NF	NF
Narora	15	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	50	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	5	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Pandorina sp. (Bory, 1824)



Class: Chlorophyceae

Order: Chlamydomonadales

Family: Volvocaceae

Genus: *Pandorina* sp.

Identifying feature:

- ❖ Cells are ovate or ovoid and compactly arranged to form a colony, which is enclosed by gelatinous envelope.
- ❖ Each colony contains 8 to 32 cells.
- ❖ Chloroplasts are cup-shaped.
- ❖ Cells have flagellum which emerges from the mucilaginous sheath.
- ❖ Each cell is 8-20µm long.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with Transparency, Free Co₂, and Depth.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

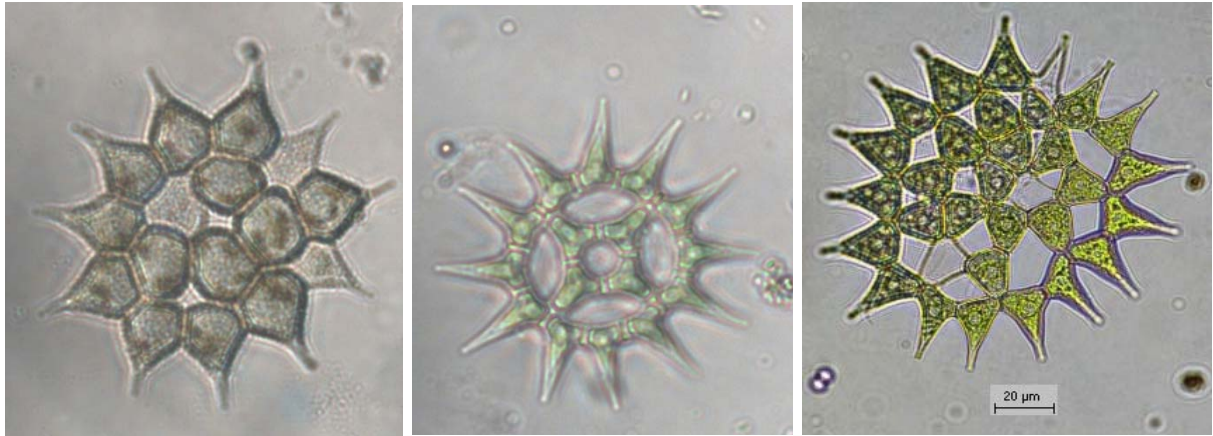
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	12	NF
Farakka	NF	20	50	400
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ⚡ The density was recorded as a number of planktons in unit litre⁻¹.
- ⚡ The annual average of four seasons are shown in the table.
- ⚡ NF – Phytoplankton was not found at that time of sampling.



Pediastrum sp. (Meyen, 1829)



Class: Chlorophyceae

Order: Sphaeropleales

Family: Hydrodictyaceae

Genus: *Pediastrum* sp.

Identifying feature:

- ❖ The shape of the colony is flat circular and are plate-like in some cases.
- ❖ Cells of the peripheral region have one or two lobes.
- ❖ The shapes of cells of the inner region are quite different from the cells of peripheral.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Highly positive correlation was found with Total Alkalinity.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

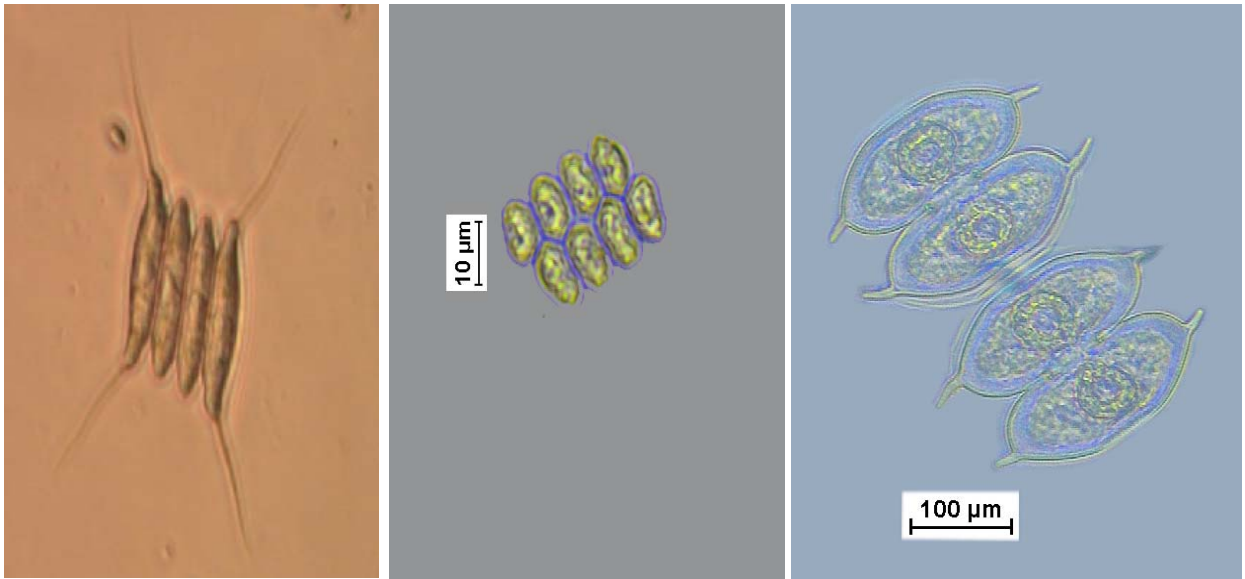
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	45	NF	NF	NF
Narora	NF	5	85	30
Farrukhabad	95	140	210	10
Kanpur	35	215	140	NF
Prayagraj	200	200	NF	NF
Varanasi	45	180	30	NF
Buxar	8	934	363	NF
Patna	5	72	107	NF
Bhagalpur	8	4713	59	NF
Farakka	NF	8	13	560
Jangipur	6	30	5	200
Berhampore	6	5	20	NF
Balagarh	2	16	6	NF
Tribeni	1	8	29	120
Godakhali	6	8	6	700
D. Harbour	NF	NF	NF	NF
Fraserganj	3	NF	2	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Scenedesmus sp. (Meyen, 1829)



Class: Chlorophyceae

Order: Sphaeropleales

Family: Scenedesmaceae

Genus: *Scenedesmus* sp.

Identifying feature:

- ❖ Shape of the Cells are cylindrical, ovoid, fusiform, crescent-shaped or oblong.
- ❖ Usually, cells are lying side by side in a single series but sometimes it forms alternating rows by containing 2-32 cells.
- ❖ Each cell has a single parietal plate-like chloroplast.

Habitat: Freshwater and Brackishwater

Major Ecological Parameters: Highly positive correlation was found with pH, BOD, and Chloride.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	10	NF	NF	NF
Tehri	45	10	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	20	NF	NF	NF
Narora	45	NF	NF	NF
Farrukhabad	NF	60	130	NF
Kanpur	245	125	NF	30
Prayagraj	95	2670	205	50
Varanasi	120	115	20	160
Buxar	NF	20	36	NF
Patna	2	1	174	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	4	10
Berhampore	NF	2	30	NF
Balagarh	NF	1	49	NF
Tribeni	NF	NF	33	20
Godakhali	NF	NF	3	140
D. Harbour	NF	NF	1	45
Fraserganj	NF	NF	1	NF

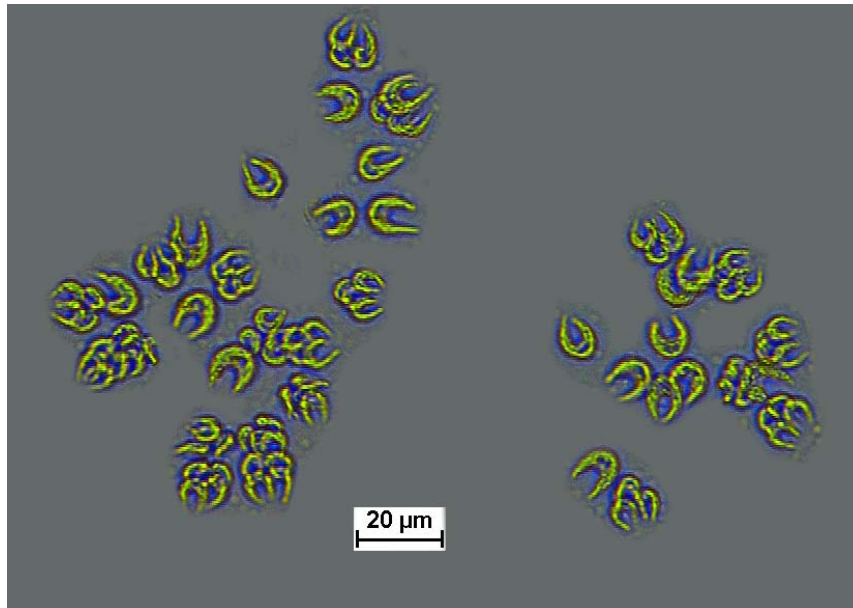
✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



Selenastrum sp. (Reinsch, 1867)



Class: Chlorophyceae

Order: Sphaeropleales

Family: Selenastraceae

Genus: *Selenastrum* sp.

Identifying feature:

- ❖ Cells are curved, or sickle - shaped.
- ❖ Cells are often found in gathering without any gelatinous envelope.
- ❖ Each cell has a parietal chloroplast usually with a pyrenoid.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Highly positive correlation was found with pH .



Station wise Distribution:
Upper stretch

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

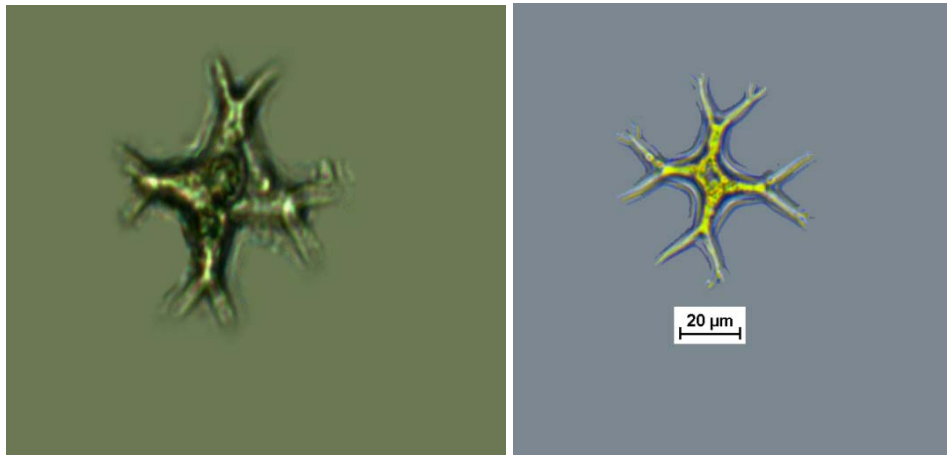
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	60	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	10	NF	NF	NF
Buxar	NF	NF	55	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	1	NF
Godakhali	NF	NF	125	NF
D. Harbour	NF	NF	5	NF
Fraserganj	NF	NF	NF	NF

- ⚡ The density was recorded as a number of planktons in unit litre⁻¹.
- ⚡ The annual average of four seasons are shown in the table.
- ⚡ NF – Phytoplankton was not found at that time of sampling.



***Tetraedron* sp. (Kützing, 1845)**



Class: Chlorophyceae

Order: Sphaeropleales

Family: Hydrodictyaceae

Genus: *Tetraedron* sp.

Identifying feature:

- ❖ Cells are angular pyramidal, triangular, or polygonal in shape with a short spine.
- ❖ Cells have parietal discs or plates like chloroplast.

Habitat: Freshwater

Major Ecological Parameter: Variable parameters are required for the genus.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	1	1
Patna	NF	NF	3	NF
Bhagalpur	NF	1	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

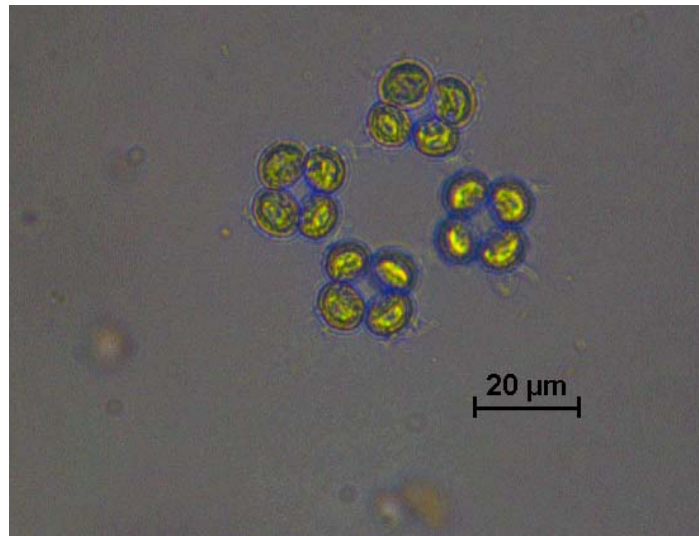
✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



***Tetrastrum* sp. (Chodat, 1895)**



Class: Chlorophyceae

Order: Sphaeropleales

Family: Scenedesmaceae

Genus: *Tetrastrum* sp.

Identifying feature:

- ❖ Cells are angular and 3-7 µm in wide.
- ❖ Colonies usually contain 4 cells. Sometimes it is found solitary.
- ❖ The spines are very fine and short.
- ❖ Cells have a cup-shaped chloroplast.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with BOD, Chloride and Total Nitrogen.



	Absent
	Present

**Station wise Distribution:
Upper stretch**

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

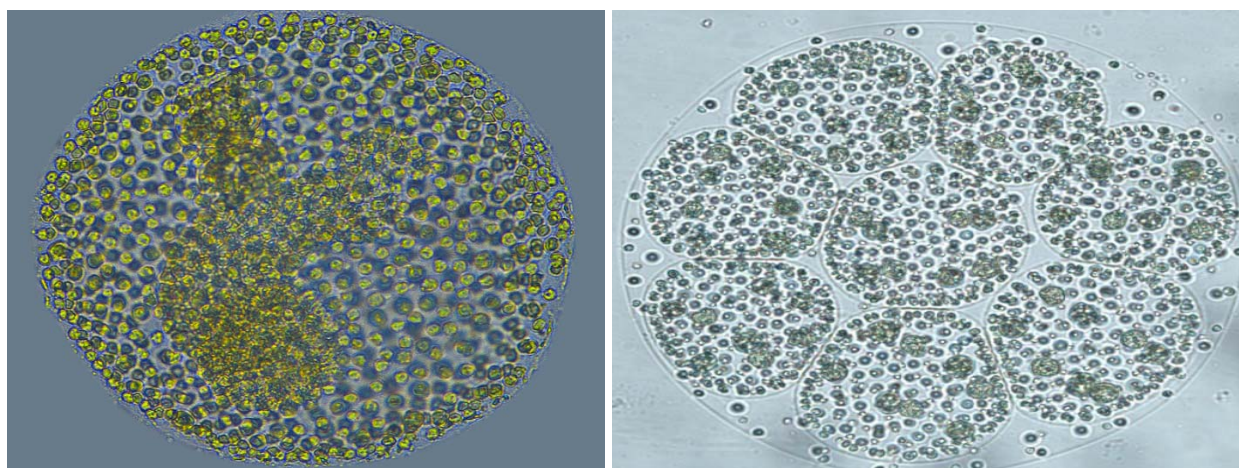
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	30	33	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Volvox* sp. (Linnaeus, 1758)**



Class: Chlorophyceae

Order: Chlamydomonadales

Family: Volvocaceae

Genus: *Volvox* sp.

Identifying feature:

- ❖ The shape of the colony is spherical and ovate in some cases.
- ❖ Five hundred to several thousand spherical cells are interconnected through mucilaginous strands to form a colony.
- ❖ Cells are biflagellate, which are arranged at the periphery of a gelatinous sheath of a colony.

Habitat: Freshwater

Major Ecological Parameter: Highly positive correlation was found with Bicarbonate.



**Station wise Distribution:
Upper stretch**

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

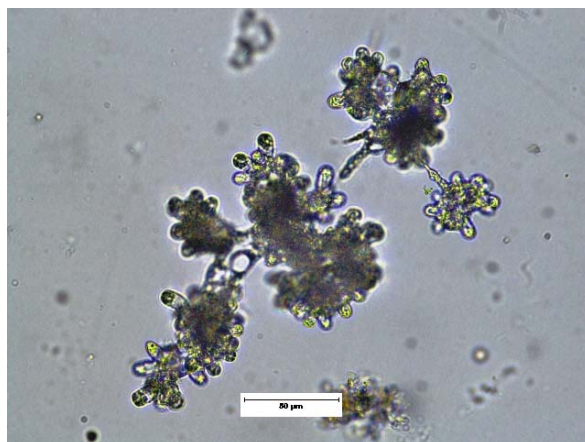
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	10	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	1	NF	NF
Bhagalpur	NF	3	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	1	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Westella* sp. (De Wildeman, 1897)**



Class: Chlorophyceae

Order: Sphaeropleales

Family: Scenedesmaceae

Genus: *Westella* sp.

Identifying feature:

- ❖ Each colony consists of 30 to 100 spherical cells.
- ❖ The diameter of the cell is 3-9 µm.
- ❖ Cells are loosely attached to the mother cell.
- ❖ Single chloroplast which is cup - shaped.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with BOD, and Chloride.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

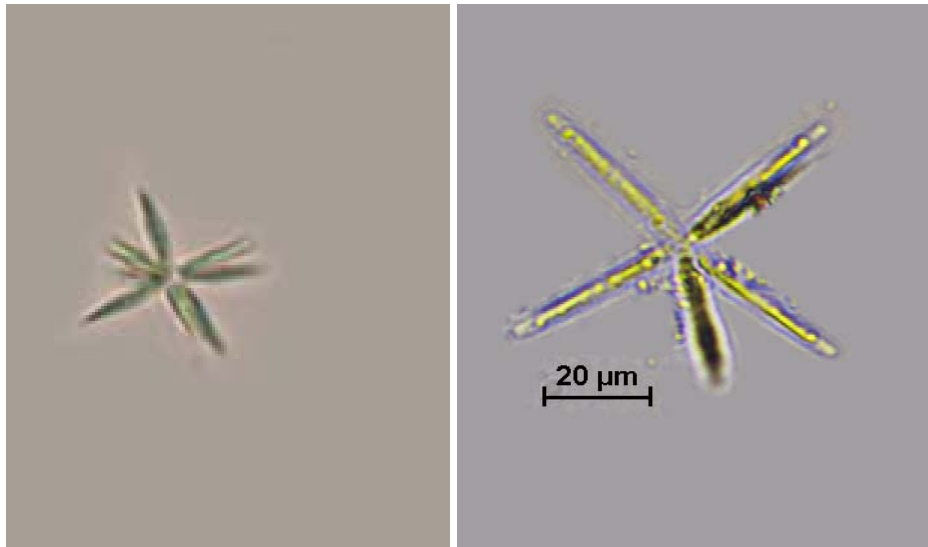
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	10	NF
Farrukhabad	10	NF	40	NF
Kanpur	NF	45	NF	NF
Prayagraj	10	NF	NF	NF
Varanasi	10	NF	10	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ⚡ The density was recorded as a number of planktons in unit litre⁻¹.
- ⚡ The annual average of four seasons are shown in the table.
- ⚡ NF – Phytoplankton was not found at that time of sampling.



Actinastrum sp. (Lagerheim, 1882)



Class: Trebouxiophyceae

Order: Chlorellales

Family: Chlorellaceae

Genus: *Actinastrum* sp.

Identifying feature:

- ❖ Cells are elongated and cigar-shaped and colonies are star-shaped.
- ❖ Each colony has 4 to 16 cells, which are jointed at one end with each other at a common centre.
- ❖ Each cell contain a single chloroplast

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with Dissolved Oxygen, BOD, Carbonate, Total Alkalinity, Chloride, and Total Dissolved Solid, Chloride .



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	10	NF
Bijnor	NF	NF	NF	NF
Narora	NF	5	10	NF
Farrukhabad	270	40	70	30
Kanpur	25	75	80	80
Prayagraj	30	65	70	200
Varanasi	120	NF	120	60
Buxar	NF	NF	NF	NF
Patna	NF	NF	56	NF
Bhagalpur	NF	NF	7	NF
Farakka	NF	NF	3	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	36	NF
Balagarh	NF	NF	260	NF
Tribeni	NF	NF	68	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

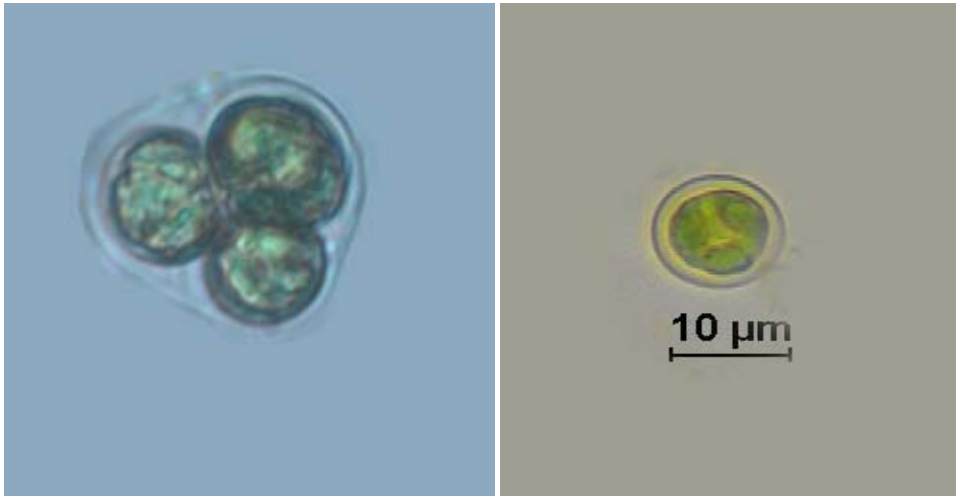
✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



***Chlorella* sp. (Beyerinck [Beijerinck], 1890)**



Class: Trebouxiophyceae

Order: Chlorellales

Family: Chlorellaceae

Genus: *Chlorella* sp.

Identifying feature:

- ❖ The shape of the cells is spherical to sub-spherical.
- ❖ The diameter of the cell is 2-10µm.
- ❖ Cells have a cup-like or plate-like chloroplast.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with Specific conductivity, pH, Dissolved Oxygen, BOD, Total Alkalinity, and Chloride.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	600	NF
Farrukhabad	NF	100	200	200
Kanpur	70	305	NF	400
Prayagraj	5	1130	300	100
Varanasi	NF	190	50	NF
Buxar	NF	NF	10	NF
Patna	NF	NF	12	NF
Bhagalpur	NF	NF	320	NF
Farakka	NF	NF	1	30
Jangipur	NF	NF	16	NF
Berhampore	NF	NF	185	NF
Balagarh	NF	NF	20	NF
Tribeni	NF	NF	2	100
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



Crucigenia sp. (Morren, 1830)



Class: Trebouxiophyceae

Order: Trebouxiophyceae ordo incertae sedis

Family: Trebouxiophyceae

Genus: *Crucigenia* sp.

Identifying feature:

- ❖ Usually, each colony consists of 4 cells and cells are attached with each other through a thin mucilaginous sheath.
- ❖ The cells are arranged in cross by forming a gap at the center.
- ❖ The cells are oval or triangular.
- ❖ Cells consist of parietal chloroplasts.

Habitat: Freshwater and Semi saline

Major Ecological Parameter: Highly positive correlation was found with Nitrate.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	110	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	15	NF	NF
Varanasi	63	NF	30	NF
Buxar	NF	5	NF	NF
Patna	8	NF	11	NF
Bhagalpur	NF	5	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	1	NF	NF
Berhampore	NF	NF	1	NF
Balagarh	NF	2	NF	NF
Tribeni	NF	NF	2	NF
Godakhali	NF	4	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

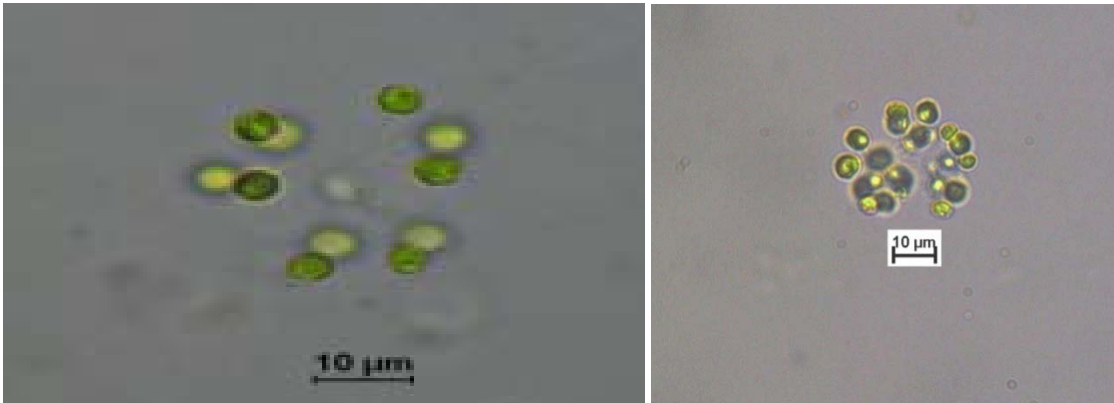
✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



Dictyosphaerium sp. (Nägeli, 1849)



Class: Trebouxiophyceae

Order: Chlorellales

Family: Chlorellaceae

Genus: *Dictyosphaerium* sp.

Identifying feature:

- ❖ Cells are spherical, ovoid, or ellipsoidal in shape and diameter varies 3-10µm.
- ❖ Cells are connected to each other by fine, branching strands that comes from a common center.
- ❖ Cells have one or two cup-shaped chloroplasts.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with Ca^{++} , Mg^{++} , Turbidity, and Total Dissolved Solid.



**Station wise Distribution:
Upper stretch**

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

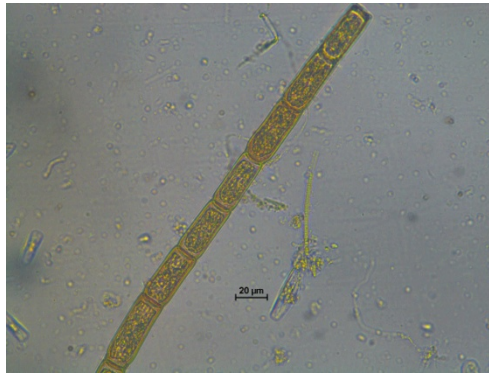
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	4	12	NF
Patna	1	NF	5	NF
Bhagalpur	NF	3	36	NF
Farakka	NF	1	NF	NF
Jangipur	NF	1	NF	NF
Berhampore	NF	NF	1	NF
Balagarh	NF	NF	1	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Hormidium sp. (Kützing, 1843)



Class: Trebouxiophyceae

Order: Prasiolales

Family: Prasiolaceae

Genus: *Hormidium* sp.

Identifying feature:

- ❖ Cells are cylindrical, in shape which is jointed to form unbranched filaments.
- ❖ Filaments have no basal portion.
- ❖ Chloroplast contains long or oval pyrenoid.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with Free CO₂, and Total Dissolved Solid.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

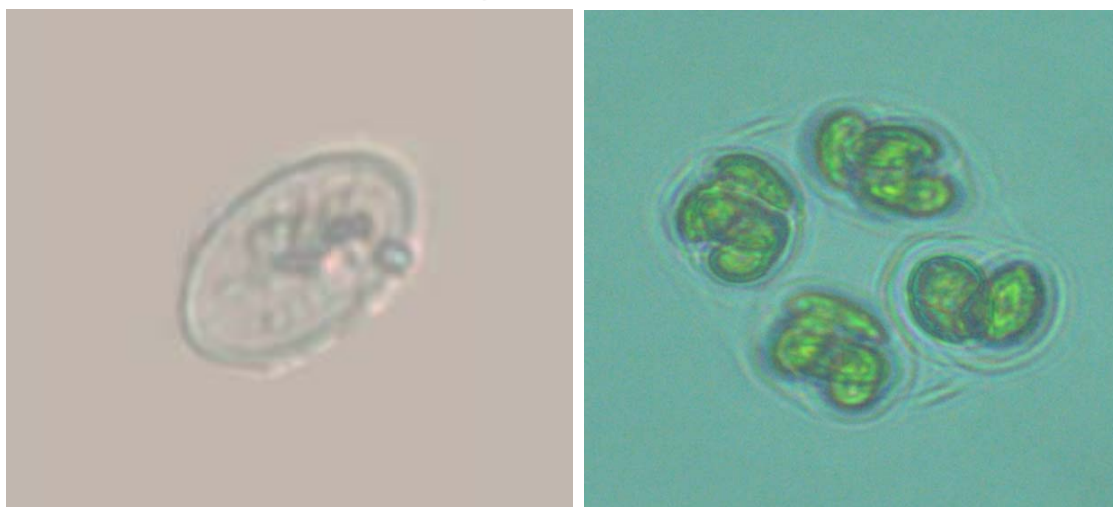
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	15	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	30	NF	NF	NF
Farrukhabad	50	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	40	NF	NF	NF
Varanasi	30	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	10	NF	20	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Oocystis* sp. (Nägeli ex A.Braun, 1855)**



Class: Trebouxiophyceae

Order: Chlorellales

Family: Oocystaceae

Genus: *Oocystis* sp.

Identifying feature:

- ❖ Cells are ovoid or egg-shaped.
- ❖ Sometimes it forms colony, which contain 2-16 cells and is enclosed by the mother cell wall.
- ❖ The number and shape of the chloroplast is varied in cells.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Total Hardness, Total Alkalinity, BOD, and Chloride.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	50	30
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	55	NF	NF	NF
Farrukhabad	20	NF	NF	NF
Kanpur	NF	75	NF	NF
Prayagraj	NF	235	NF	NF
Varanasi	15	NF	NF	NF
Buxar	NF	21	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	15	NF	NF
Farakka	NF	NF	10	NF
Jangipur	NF	NF	11	NF
Berhampore	NF	NF	25	NF
Balagarh	NF	NF	20	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

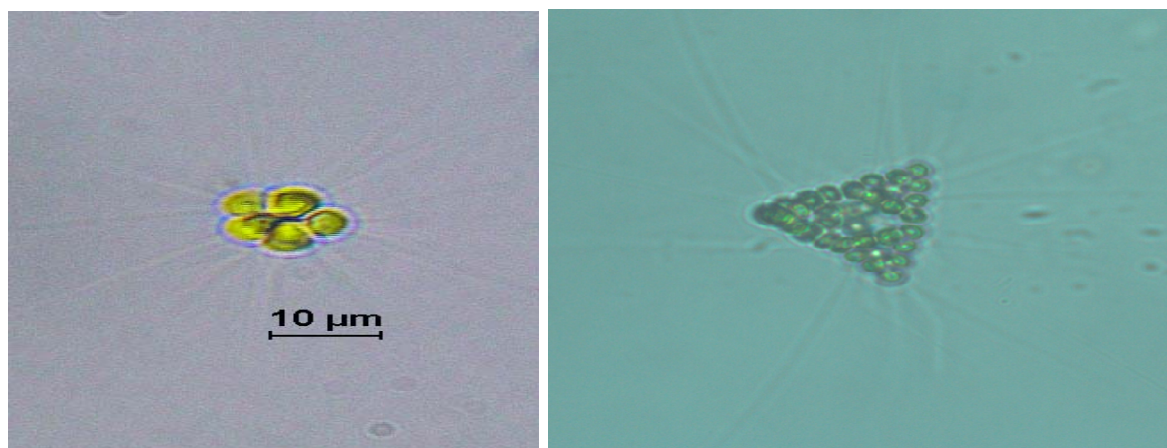
✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



***Micratinium* sp. (Fresenius, 1858)**



Class: Trebouxiophyceae

Order: Chlorellales

Family: Chlorellaceae

Genus: *Micratinium* sp.

Identifying feature:

- ❖ Cells are spherical.
- ❖ Usually, colonies contain 4 cells, sometimes more than 4 and less than 16 cells contain.
- ❖ Long spines (1-5) are protruding out from the cells.
- ❖ Cells have parietal chloroplasts.

Habitat: Freshwater

Major Ecological Parameter: Highly positive correlation was found with Carbonate.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	80	NF
Patna	NF	NF	12	NF
Bhagalpur	NF	3	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	76	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	64	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Cyanophyta



Cyanophyta

(Blue-green algae)

General Identifying Characters:

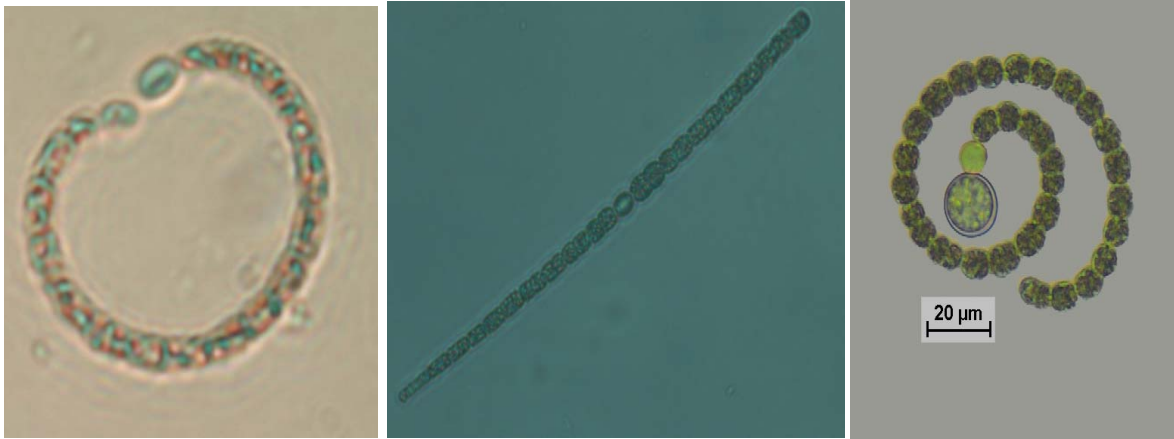
- Genera are unicellular, colonial, or filamentous.
- Prokaryotic cells are ovoid or circular. Some have true branching and others have false branching.
- Plastid and pyrenoid are absent.
- It bears photosynthetic pigment i.e. phycobilin and phycocyanin. Some species bears gas vacuole, which helps in buoyancy.
- Colonies are mostly surrounded by a gelatinous sheath. Some of the genera bear heterocysts and akinetes.
- They can fix nitrogen due to the presence of heterocyst. The group is found in both polluted and unpolluted water.
- The groups Cyanophyceae are prokaryotic organisms having features to conduct photosynthesis within its cell by using carbon dioxide.
- The group triggers rapid growth and produces harmful toxins, chemicals that emphasize the negative impact on the aquatic water body.

✚ Total 12 genera belonging to 1 class and 11 families were recorded during study period.

✚ Class:- Cyanophyceae (12 genera)



Anabaena sp. (Bory ex Bornet & Flahault, 1886)



Class: Cyanophyceae

Order: Nostocales

Family: Nostocaceae

Genus: *Anabaena* sp.

Identifying feature:

- ❖ Trichomes have barrel-shaped or cylindrical cells.
- ❖ Numerous heterocysts are present and commonly intercalary.
- ❖ Spores are single or arranged in series.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with pH, BOD, and Chloride.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	75	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	40	10	NF
Kanpur	NF	75	NF	NF
Prayagraj	30	830	NF	NF
Varanasi	125	65	30	NF
Buxar	21	13	300	NF
Patna	NF	2	NF	NF
Bhagalpur	NF	NF	20	NF
Farakka	NF	NF	4	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	3	2	NF
Balagarh	NF	NF	14	NF
Tribeni	NF	NF	9	NF
Godakhali	2	NF	20	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Aphanizomenon sp. (A.Morren ex É.Bornet & C.Flahault, 1886 '1888')



Class: Cyanophyceae

Order: Nostocales

Family: Aphanizomenonaceae

Genus: *Aphanizomenon* sp.

Identifying feature:

- ❖ It is filamentous and united to form fusiform or plate-like bundles and flakes of parallel trichome.
- ❖ Trichomes are attenuated at both ends with rectangular cells.
- ❖ Cell walls are constricted.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with BOD, Chloride, Total Nitrogen, and Total Dissolved Solid.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

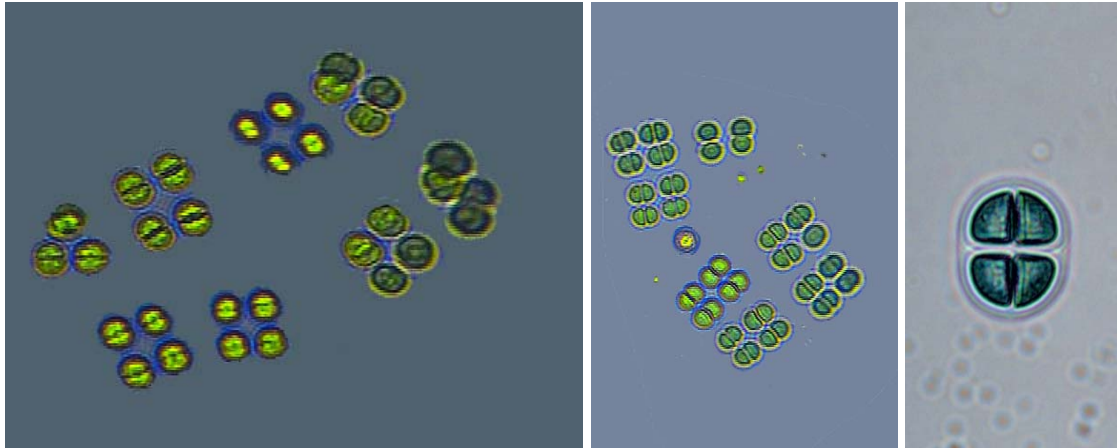
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	20	NF	NF	NF
Tehri	10	15	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	15	NF	NF	NF
Prayagraj	30	20	NF	NF
Varanasi	NF	180	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Chroococcus sp. (Nägeli, 1849)



Class: Cyanophyceae

Order: Chroococcales

Family: Chroococcaceae

Genus: *Chroococcus* sp.

Identifying feature:

- ❖ It is unicellular or colonial, which contains 2-32 spherical, hemispherical, or ovate cells.
- ❖ Each cell has a distinct sheath.

Habitat: Freshwater and Brackishwater

Major Ecological Parameters: Highly positive correlation was found with Water temperature, and Silicate.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	60	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	14	10	NF
Patna	NF	10	26	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	20	NF
Tribeni	NF	30	60	NF
Godakhali	NF	NF	10	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	10	NF

✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



***Coelosphaerium* sp. (Nägeli, 1849)**



Class: Cyanophyceae

Source-protest.hosei.ac.jp

Order: Synechococcales

Family: Coelosphaeriaceae

Genus: *Coelosphaerium* sp.

Identifying feature:

- ❖ Spherical or subpyriform cells are arranged in a globular ovate or irregularly shaped colony.
- ❖ Cells contain homogenous, numerous, refractive, pseudovacuoles.
- ❖ Colonial envelope has either homogeneous or radiating gelatinous fibrils.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with BOD, Chloride, Nitrate, and Silicate.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	5	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

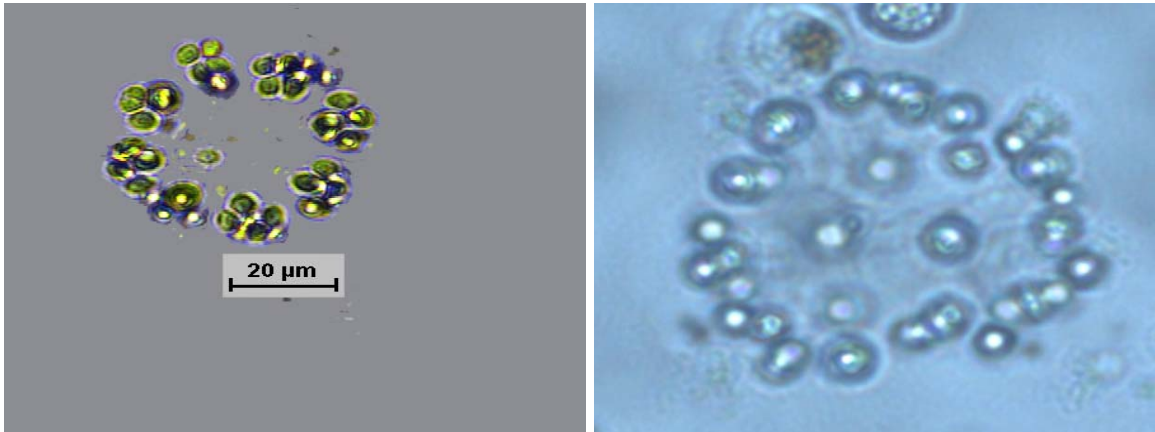
✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



Gomphosphaeria sp. (Kützing, 1836)



Class: Cyanophyceae

Order: Chroococcales

Family: Gomphosphaeriaceae

Genus: *Gomphosphaeria* sp.

Identifying feature:

- ❖ The shape of the cell pear to sub-spherical and the colony is globose or ovate.
- ❖ Cells are arranged singly or in pair at the ends of gelatinous strands which radiate from a common center.
- ❖ Each cell has a distinct gelatinous envelope and usually present in clusters.
- ❖ Cells are 1.5-12 µm wide and 2-16 µm long.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Water Temperature, and Silicate.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

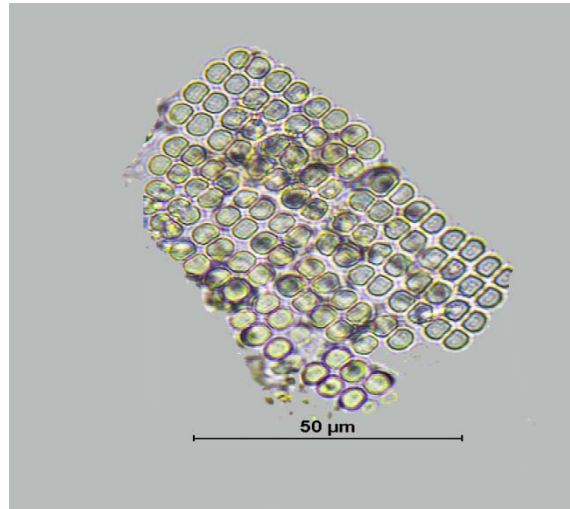
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	10	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	50	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ⚡ The density was recorded as a number of planktons in unit litre⁻¹.
- ⚡ The annual average of four seasons are shown in the table.
- ⚡ NF – Phytoplankton was not found at that time of sampling.



***Merismopedia* sp. (Meyen, 1839)**



Class: Cyanophyceae

Order: Synechococcales

Family: Merismopediaceae

Genus: *Merismopedia* sp.

Identifying feature:

- ❖ Cells are Ovate or globose in shape, which is compactly or loosely arranged in rows both transversely and longitudinally.
- ❖ Usually, group of four cells are arranged in rows.
- ❖ The shape of the colony is a plate or rectangular like and enclosed within mucilage.
- ❖ The sheath of the individual cells is inconspicuous.

Habitat: Freshwater and Brackishwater

Major Ecological Parameters: Highly positive correlation was found with pH, BOD, Chloride.



	Absent
	Present

**Station wise Distribution:
Upper stretch**

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

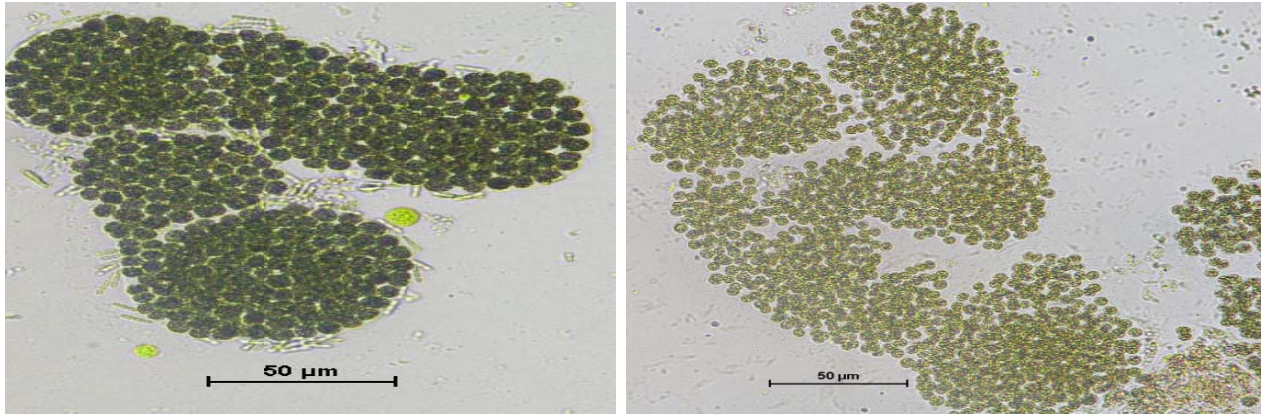
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	25	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	105	15	NF
Prayagraj	230	300	NF	NF
Varanasi	90	30	200	NF
Buxar	NF	10	15	NF
Patna	NF	NF	16	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	12	NF
Jangipur	NF	10	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	12	NF
Tribeni	NF	NF	20	NF
Godakhali	NF	NF	10	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Microcystis sp. (Lemmermann, 1907)



Class: Cyanophyceae

Order: Chroococcales

Family: Microcystaceae

Genus: *Microcystis* sp.

Identifying feature:

- ❖ Numerous spherical cells are irregularly arranged within a mucilaginous sheath.
- ❖ The shape and size of the colonies are not definite.
- ❖ Cells are closely arranged in the colony.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Water Temperature, Silicate and Specific Conductivity.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	170	NF	20	NF
Kanpur	40	105	NF	NF
Prayagraj	85	NF	NF	NF
Varanasi	200	100	170	NF
Buxar	401	2270	8508	NF
Patna	48	61	2333	NF
Bhagalpur	141	1023	15802	NF
Farakka	68	12	32	210
Jangipur	NF	46	50	720
Berhampore	38	45	32	NF
Balagarh	33	2	1205	105
Tribeni	NF	40	233	270
Godakhali	27	35	20	NF
D. Harbour	12	1	NF	NF
Fraserganj	2	NF	NF	NF

⚡ The density was recorded as a number of planktons in unit litre⁻¹.

⚡ The annual average of four seasons are shown in the table.

⚡ NF – Phytoplankton was not found at that time of sampling.



***Nodularia* sp. (Mertens ex Bornet & Flahault, 1886)**



Class: Cyanophyceae

Order: Nostocales

Family: Aphanizomenonaceae

Genus: *Nodularia* sp.

Identifying feature:

- ❖ Trichomes contain short and disc-shaped cells.
- ❖ Cross walls are constricted and uniformly broad.
- ❖ Heterocyst is commonly intercalary.
- ❖ Spores are globose shape which is single or arrange in series.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Nitrate, Chloride, and BOD.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad




Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

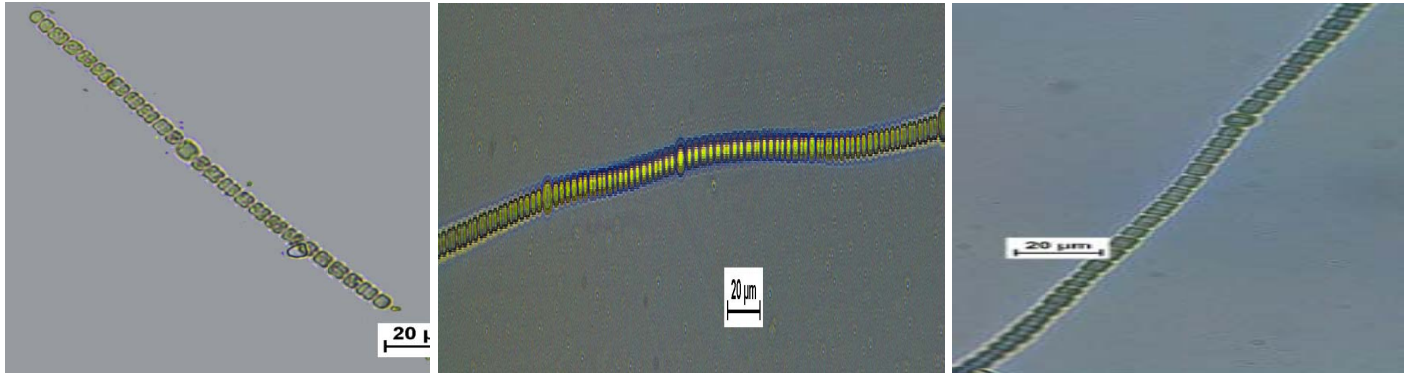
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	20	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

-  The density was recorded as a number of planktons in unit litre⁻¹.
-  The annual average of four seasons are shown in the table.
-  NF – Phytoplankton was not found at that time of sampling.



***Nostoc* sp. (Vaucher ex Bornet & Flahault, 1886)**



Class: Cyanophyceae

Order: Nostocales

Family: Nostocaceae

Genus: *Nostoc* sp.

Identifying feature:

- ❖ Trichome contains globose and bead-like, barrel shaped, or cylindrical cells without basal-distal differentiation.
- ❖ Heterocyst frequently present.
- ❖ Spores are solitary or in series.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with BOD, and pH.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

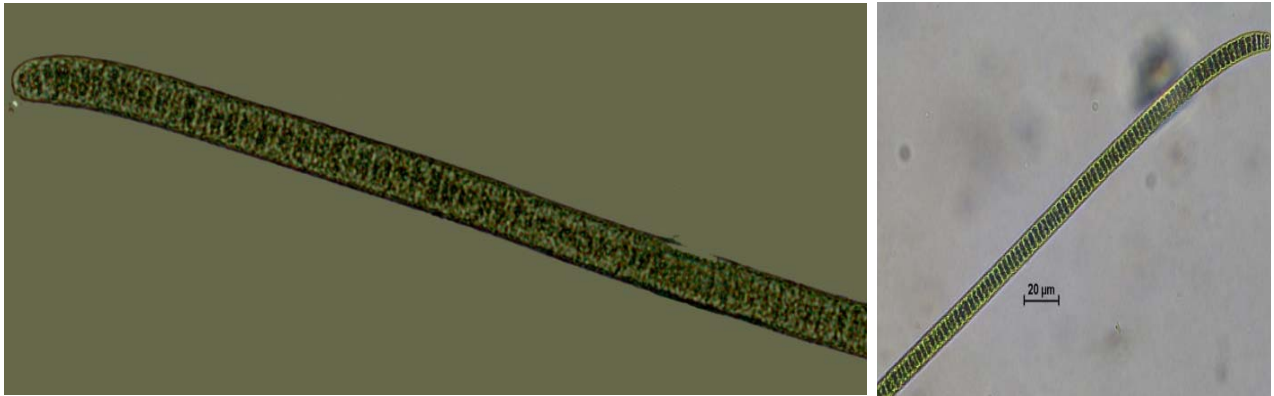
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	50	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	35	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	15	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	10	NF	NF
Buxar	NF	13	NF	NF
Patna	NF	NF	5	NF
Bhagalpur	NF	12	NF	NF
Farakka	NF	NF	3	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	3	4	NF	NF
Tribeni	NF	NF	4	NF
Godakhali	NF	5	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	1	2	NF

+ The density was recorded as a number of planktons in unit litre⁻¹.
 + The annual average of four seasons are shown in the table.
 + NF – Phytoplankton was not found at that time of sampling.



***Oscillatoria* sp. (Vaucher ex Gomont, 1892)**



Class: Cyanophyceae

Order: Oscillatoriales

Family: Oscillatoriaceae

Genus: *Oscillatoria* sp.

Identifying feature:

- ❖ It is filamentous, elongated, straight or twisted and entangled without a sheath.
- ❖ The apical cell is smoothly rounded or swollen and capitates, sometimes with a distinct sheath – like a membrane, the calyptras.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Highly positive correlation was found with Free CO₂ .



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	40	NF	NF	NF
Tehri	NF	NF	30	NF
Haridwar	25	NF	30	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	55	NF	NF	NF
Kanpur	NF	NF	20	NF
Prayagraj	80	20	90	NF
Varanasi	NF	20	50	NF
Buxar	25	12	18	NF
Patna	5	3	NF	NF
Bhagalpur	7	116	40	NF
Farakka	21	3	8	NF
Jangipur	NF	16	NF	NF
Berhampore	35	17	2	NF
Balagarh	20	NF	9	14
Tribeni	10	9	4	NF
Godakhali	19	2	NF	NF
D. Harbour	28	3	12	NF
Fraserganj	6	10	NF	NF

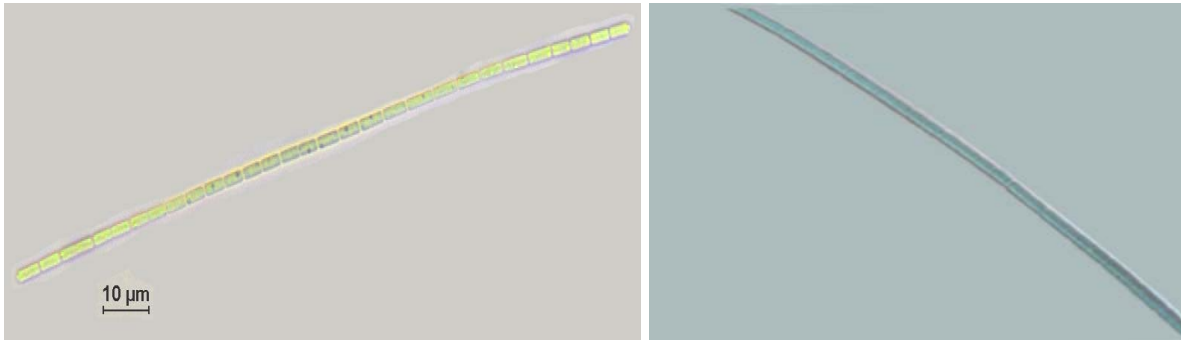
✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



***Phormidium* sp. (Kützing ex Gomont, 1892)**



Class: Cyanophyceae

Order: Oscillatoriales

Family: Oscillatoriaceae

Genus: *Phormidium* sp.

Identifying feature:

- ❖ Trichomes are cylindrical sometimes tapering slightly towards the end.
- ❖ Cells are shorter than wide, may be constricted at cross-walls.
- ❖ Apices of trichome are attenuated, straight or bent, never regularly coiled capitates or not capitates, sometimes with calyptras.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Nitrate, BOD, and Chloride.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

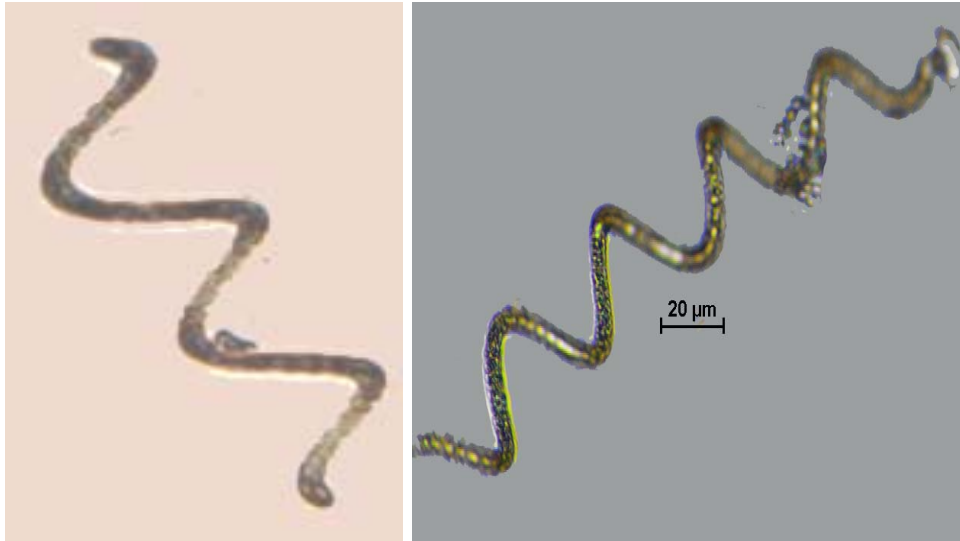
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	20	10	NF
Tehri	NF	60	30	170
Haridwar	NF	55	15	130
Bijnor	NF	10	NF	NF
Narora	100	10	135	NF
Farrukhabad	90	90	90	NF
Kanpur	NF	65	43	NF
Prayagraj	80	390	30	NF
Varanasi	95	100	20	50
Buxar	NF	16	7	NF
Patna	15	7	14	NF
Bhagalpur	NF	7	10	NF
Farakka	NF	NF	11	NF
Jangipur	22	NF	12	NF
Berhampore	2	NF	5	NF
Balagarh	NF	2	14	NF
Tribeni	NF	10	NF	NF
Godakhali	NF	NF	1	NF
D. Harbour	NF	10	6	5
Fraserganj	NF	7	6	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Spirulina* sp. (Turpin ex Gomont, 1892)**



Class: Cyanophyceae

Order: Spirulinales

Family: Spirulinaceae

Genus: *Spirulina* sp.

Identifying feature:

- ❖ Trichome is unicellular, spirally coiled, and cylindrical without tapering toward the apices.
- ❖ The Cross wall of cells is not distinct.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Chloride and pH.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	30	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	30	NF
Varanasi	NF	50	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	3	NF	NF	NF
Balagarh	2	NF	NF	NF
Tribeni	NF	NF	1	NF
Godakhali	1	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Xanthophyta



Xanthophyta

(Yellow-green algae)

General Identifying Characters:

- The genera of this group are unicellular, colonial, or filamentous.
- These are simple genera and mostly free-floating. The members are yellow-green color due to the presence of carotenoids (beta-carotene).
- Chlorophyll-b is absent. Pyrenoids are absent.
- Cell walls are composed of pectin or pectic acid.
- Filaments are broken into H-shaped. Generally, flagella are unequal in length (heterokont).
- Cells have two or more discoid shapes and green to yellowish-green in color.
- Sometimes cells bear eyespot. Members are present abundantly both in the lotic and lentic systems.

✚ Total 5 genera belonging to one class and 5 families were recorded during study period.

✚ Class:- Xanthophyceae (4 genera), Synurophyceae (1 genus).



***Botrydium* sp. (Wallroth, 1815)**



Class: Xanthophyceae

Source:- Baker, A.L. et al. 2012

Order: Botrydiales

Family: Botrydiaceae

Genus: *Botrydium* sp.

Identifying feature:

- ❖ Generally, cells are present in cluster.
- ❖ Cells are small, sac-like and globose at the areal part.
- ❖ Cells 1-2 mm in diameter.
- ❖ Cells have thin cytoplasm at its periphery and multiple nuclei and discoid plastid.

Habitat: Freshwater

Major Ecological Parameter: Parameters couldnot be analysed as it is found only once in the entire sampling.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

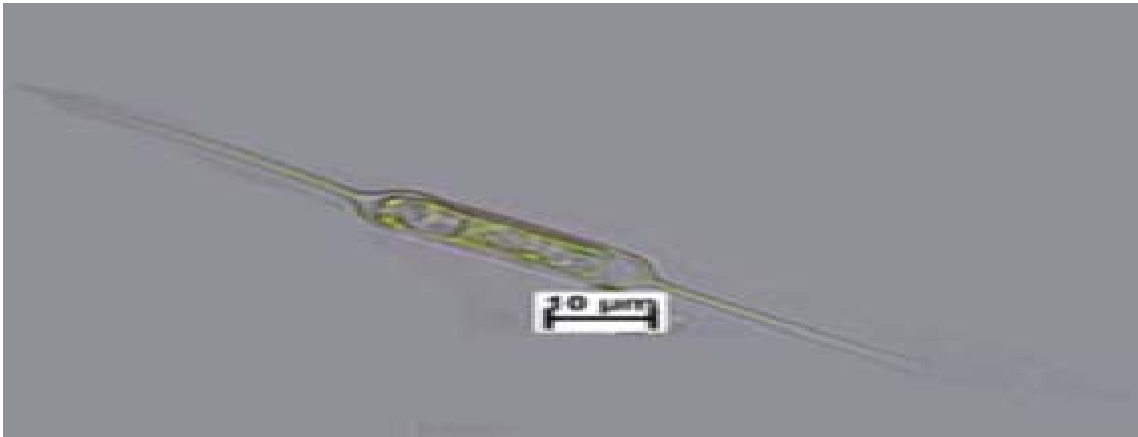
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	30	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Centrtractus sp. (Lemmermann, 1900)



Class: Xanthophyceae

Order: Mischococcales

Family: Centrtractaceae

Genus: *Centrtractus* sp.

Identifying feature:

- ❖ Cells are cylindrical in shape and vary in lengths.
- ❖ Cells contain two extended spines at both ends.
- ❖ Having two overlapping wall halves.
- ❖ Cells have parietal or reticulate chloroplasts.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with Ca^{++} , Mg^{++} , Total Hardness, and Total Solid.



	Absent
	Present

**Station wise Distribution:
Upper stretch**

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

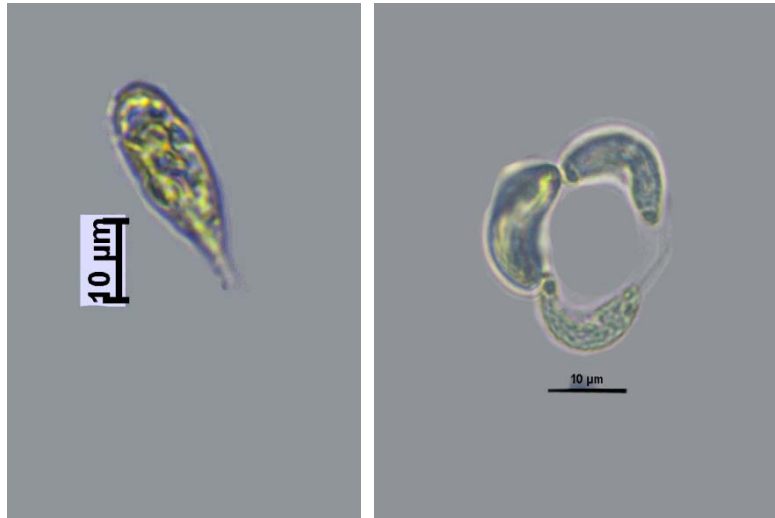
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	10	4	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Ophiocytium sp. (Nägeli, 1849)



Class: Xanthophyceae

Order: Mischococcales

Family: Ophiocytaceae

Genus: *Ophiocytium* sp.

Identifying feature:

- ❖ Cells are cylindrical and are having 2-27 µm width.
- ❖ Cells may or may not contain spine.
- ❖ The cells form unbranched filaments.
- ❖ Chloroplasts are single to numerous and various shapes.
- ❖ Pyrenoid is absent.

Habitat: Freshwater

Major Ecological Parameter: Highly positive correlation was found with Total Dissolved Solid.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	5	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	5	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	2	5	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ⚡ The density was recorded as a number of planktons in unit litre⁻¹.
- ⚡ The annual average of four seasons are shown in the table.
- ⚡ NF – Phytoplankton was not found at that time of sampling.



***Tribonema* sp. (Derbès & Solier, 1851)**



Class: Xanthophyceae

Order: Tribonematales

Family: Tribonemataceae

Genus: *Tribonema* sp.

Identifying feature:

- ❖ Cylindrical shaped cells are joined end to end and form unbranched filaments.
- ❖ Cell walls are broken into H shape.
- ❖ Cells have numerous rings or plate-shaped chloroplasts.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with BOD, and Total Dissolved Solid.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

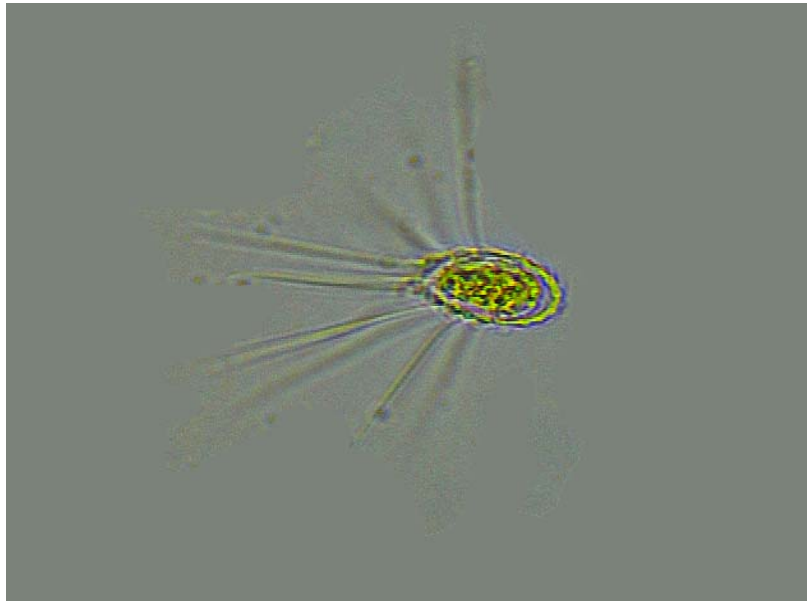
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	15	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	45	15	25	NF
Farrukhabad	430	60	NF	NF
Kanpur	520	120	NF	NF
Prayagraj	140	45	50	NF
Varanasi	678	120	70	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Mallomonas* sp. (Perty, 1852)**



Class: Synurophyceae

Order: Synurales

Family: Mallomonadaceae

Genus: *Mallomonas* sp.

Identifying feature:

- ❖ Cells are elongated oval-shaped with numerous having long bristles or spines.
- ❖ At the apical part of the cell single flagellum is present.
- ❖ Cells are 8-100 μm long and up to 30 μm wide.

Habitat: Freshwater

Major Ecological Parameter: Highly positive correlation was found with Transparency.



Station wise Distribution:

Upper stretch

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	30	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	20	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



Euglenophyta



Euglenophyta

General Identifying Characters:

- Genera of the group are mostly unicellular with colonial morphology.
- A total of 40 genera are recorded in world-wide.
- Most of the members are recorded in freshwater.
- The shape of the cells is elongated and spindles-shaped with numerous chloroplasts, with varied, shaped i.e. star, plate, and ribbon-shape.
- One-third of the genera can carry the photosynthesis process.
- Cells have flagella, which are emergent from the flask-shaped depression on the anterior side. An eye-spot is present.
- The pellicle is flexible in some genera while in others it is rigid.

✚ Total 4 genera belonging to one class and 2 families were recorded during study period.

✚ Class:- Euglenophyceae (4 genera).



Euglena sp. (Ehrenberg, 1830)



Class: Euglenophyceae

Order: Euglenida

Family: Euglenidae

Genus: *Euglena* sp.

Identifying feature:

- ❖ Cells are elongated but sometimes spindle-shaped.
- ❖ It's posterior end is pointed and anterior end is narrow.
- ❖ Cells have a single flagellum, which comes from the apical part.
- ❖ Chloroplasts are variable in shapes such as ovoid disc - shaped, ribbon - like bands, or star - shaped plates.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Chloride, Nitrate, and BOD.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

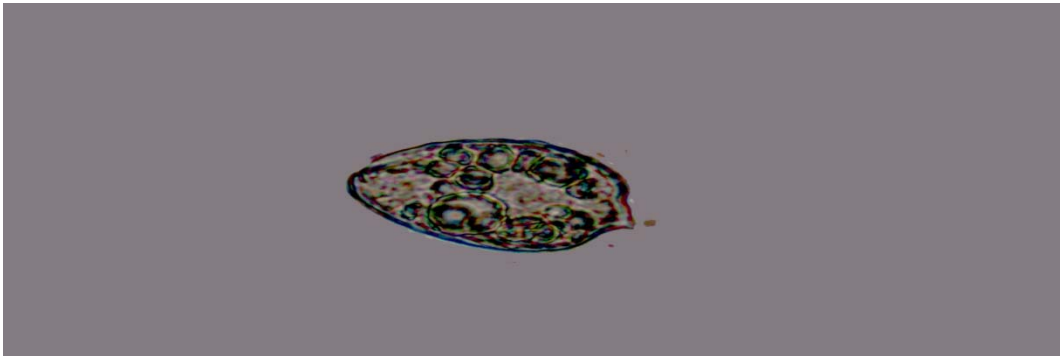
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	5	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	5	NF	NF
Narora	10	NF	NF	NF
Farrukhabad	40	NF	NF	NF
Kanpur	20	30	NF	20
Prayagraj	20	160	NF	50
Varanasi	45	50	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	2	NF
Farakka	NF	NF	5	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	4	NF
Tribeni	NF	2	NF	NF
Godakhali	1	NF	9	NF
D. Harbour	NF	NF	17	NF
Fraserganj	NF	NF	9	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Lepocinclis sp. (Perty, 1849)



Class: Euglenophyceae

Order: Euglenida

Family: Phacidae

Genus: *Lepocinclis* sp.

Identifying feature:

- ❖ Cells are spherical to spindle-shaped sometime with a tapering tail.
- ❖ The posterior end is pointed.
- ❖ Chloroplasts are parietal disc-shaped.
- ❖ Two eyespot and annular-shaped paramylum granules and single flagellum are present in the cell.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Highly positive correlation was found with Nitrate.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

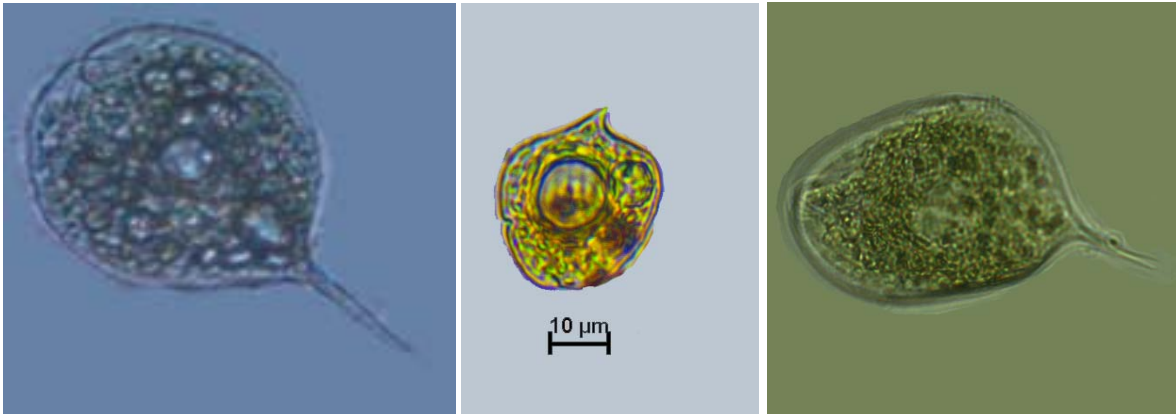
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	10	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	20	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	15	NF	NF
Prayagraj	25	2	NF	200
Varanasi	30	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	2	2	NF
D. Harbour	NF	1	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Phacus sp. (Dujardin, 1841)



Class: Euglenophyceae

Order: Euglenida

Family: Phacidae

Genus: *Phacus* sp.

Identifying feature:

- ❖ Cells are flattened (leaf-like) or sometimes twisted in shape.
- ❖ The anterior part of the cell wider and pointed at the posterior side.
- ❖ Flagellum comes from the anterior part of the cell.
- ❖ Cells have many ovoid and disc-shaped chloroplast

Habitat: Freshwater

Major Ecological Parameter: Highly positive correlation was found with Free CO₂.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	35	30	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	10	NF	NF
Prayagraj	10	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	6	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	12	NF	NF
Farakka	NF	NF	2	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	4	NF
Balagarh	1	NF	NF	NF
Tribeni	NF	NF	2	NF
Godakhali	NF	NF	3	NF
D. Harbour	NF	NF	4	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Trachelomonas sp. (Ehrenberg, 1835)



Class: Euglenophyceae

Order: Euglenida

Family: Euglenidae

Genus: *Trachelomonas* sp.

Identifying feature:

- ❖ Each cell of the trachelomonas is enclosed by a varied shaped and size lorica with an opening for the flagellum.
- ❖ The surface of the lorica may be smooth, granulated, or spiny.
- ❖ Cells bear a red eyespot and two or many disc-shaped chloroplasts.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with Nitrate_N and BOD.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	3	1	NF
Patna	NF	NF	1	NF
Bhagalpur	NF	5	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



Dinophyta



Dinophyta

(Dinoflagellates)

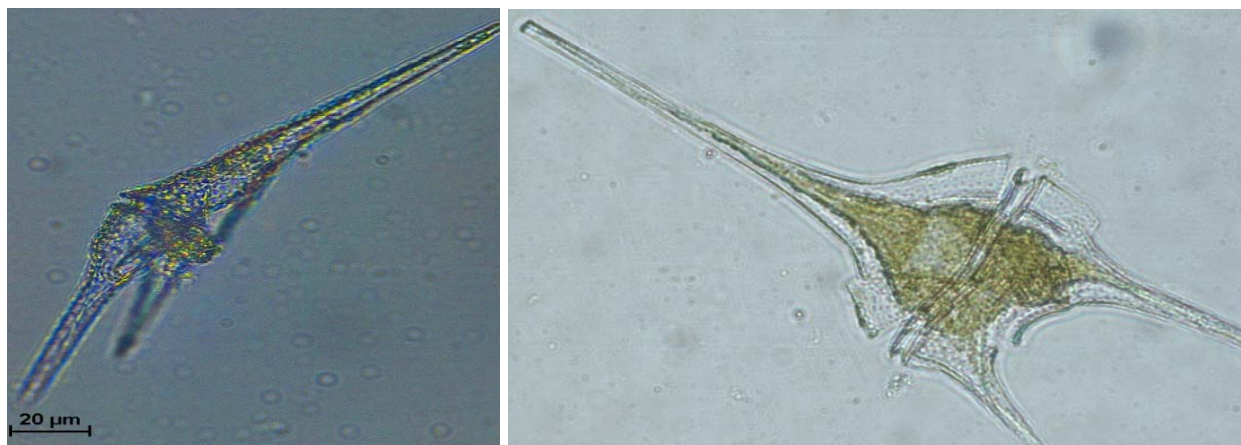
General Identifying Characters:

- These are unicellular or colonial.
- Dinoflagellates have chlorophyll-a and c and golden or olive-brown in color.
- The shape of the chloroplast is plate-like.
- Cells have flagella.
- A specific arrangement and shape of many plates are covered throughout the cell surface.
- Some species bear several horns.
- Cells have a dorsoventral division into epitheca and hypotheca.
- Dinoflagellates come from Greek word dineo which means ‘to whirl’.

- ✚ Total 2 genera belonging to two classes and two families were recorded during study period.
- ✚ Class:- Dinophyceae (1 genus), Noctiluiphyceae (1 genus)



Ceratium sp. (F.Schrank, 1793)



Class: Dinophyceae

Order: Peridinales

Family: Ceratiaceae

Genus: *Ceratium* sp.

Identifying feature:

- ❖ Cells are fusiform having one anterior and two or three posterior horns.
- ❖ A narrow transverse furrow is present around the middle of the cell. Cells have two flagella
- ❖ A specific arrangement and shape of many plates are covered throughout the cell surface. Chloroplast are numerous and discoid shaped

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Carbonate, Ca^{++} , Mg^{++} , Total Hardness, and Salinity.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

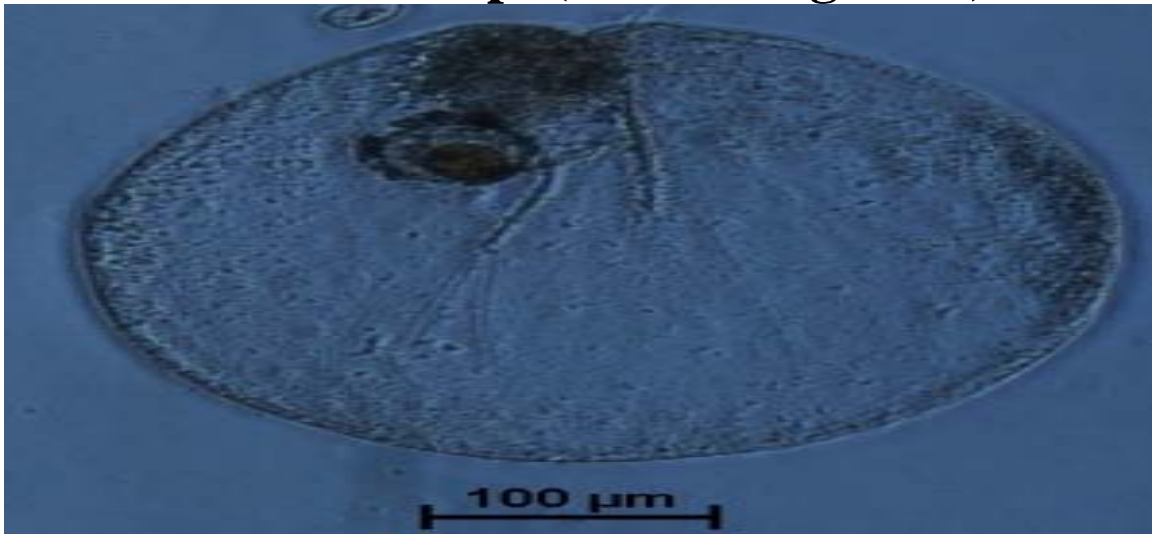
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	2	NF	5
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	1	10

- ⚡ The density was recorded as a number of planktons in unit litre⁻¹.
- ⚡ The annual average of four seasons are shown in the table.
- ⚡ NF – Phytoplankton was not found at that time of sampling.



Noctiluca sp. (Ehrenberg 1834)



Class: Noctiluciphyceae

Order: Noctilucales

Family: Noctilucaceae

Genus: *Noctiluca* sp.

Identifying feature:

- ❖ It is a dinoflagellate.
- ❖ The cell is inflated and subspherical in shape.
- ❖ A deep and wide groove is present on the ventral side.
- ❖ The flagellum and tentacles are small.
- ❖ Tentacles are prominent and move posteriorly.

Habitat: Brakish water

Major Ecological Parameters: Highly positive correlation was found with Depth, Total Alkalinity, and Salinity.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	2	4	NF
Fraserganj	63	NF	2	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Zygnematophyta



Zygnematophyta

General Identifying Characters:

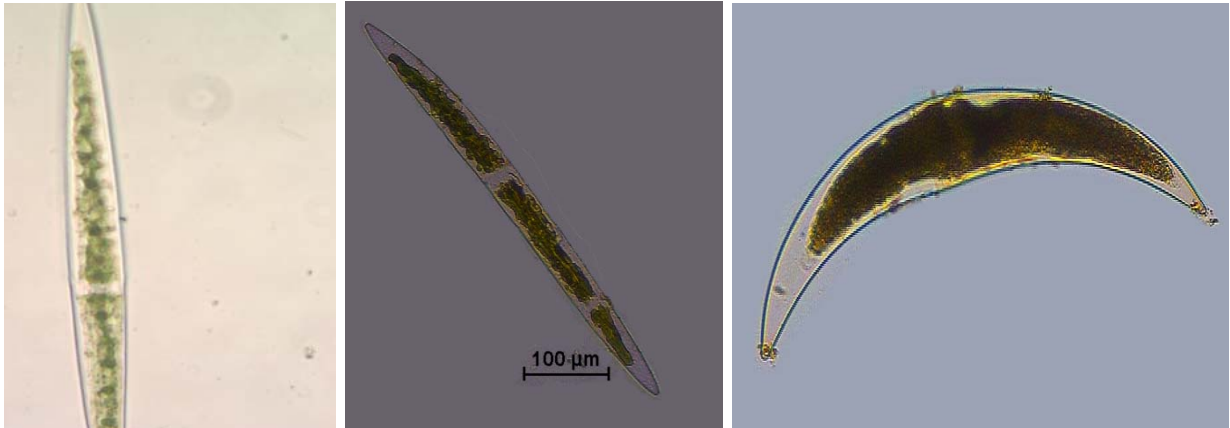
- The members of Zygnematophyta are one of the most diverse green algae, with a variation in thallus types (filaments, unicellular, colonies).
- Cell walls have one to several layers, with various degrees of ornamentation due to the presence of large lobes spines, granules.
- Approximately 4,000 species are recorded World-wide.
- The group has no flagella at all stages of the life cycle.
- Abundantly found in freshwater, these are common in ponds, lakes, and streams, in surface mats, or as phytoplankton or benthic growths.
- Under this group, spirogyra and various unicellular desmids are included.
- The conjugating green algae are important as ecological indicator species and for the ecological services they provide.

✚ Total 8 genera belonging to one class and three families were recorded during study period.

✚ Class:- Zygnematophyceae (8 genera)



***Closterium* sp. (Nitzsch ex Ralfs, 1848)**



Class: Zygnematophyceae

Order: Desmidiiales

Family: Desmidiaceae

Genus: *Closterium* sp.

Identifying feature:

- ❖ It is unicellular.
- ❖ Cells are elongated or curved with the tapering end.
- ❖ Cells look like bow and sickle-shaped.
- ❖ Cells are divided into two halves without any constriction.
- ❖ Cells have two chloroplasts at each half.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Total Dissolved Solid.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	10	5	NF	NF
Prayagraj	20	30	NF	10
Varanasi	40	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	1	NF	1	NF
Bhagalpur	10	10	NF	NF
Farakka	4	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	2	NF	4	NF
Balagarh	6	NF	NF	21
Tribeni	NF	NF	NF	NF
Godakhali	6	NF	9	NF
D. Harbour	2	NF	NF	NF
Fraserganj	3	1	NF	NF

🚩 The density was recorded as a number of planktons in unit litre⁻¹.

🚩 The annual average of four seasons are shown in the table.

🚩 NF – Phytoplankton was not found at that time of sampling.



Cosmarium sp. (Corda ex Ralfs, 1848)



Class: Zygnematophyceae

Order: Desmidiiales

Family: Desmidiaceae

Genus: *Cosmarium* sp.

Identifying feature:

- ❖ Cells are ovoid or rounded in shape.
- ❖ Sometimes cells are moderately flattened.
- ❖ Cells are divided into semi cells by median groove or isthmus, which present at the center.
- ❖ The size and shape of semi-cells are varied i.e sub-elliptic, oblong, and rarely circular in some cases.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Highly positive correlation was found with Transparency.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	30	NF	10	40
Haridwar	NF	60	NF	NF
Bijnor	NF	25	NF	NF
Narora	20	NF	NF	NF
Farrukhabad	30	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	20	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	9	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	1	NF	NF
Godakhali	NF	NF	3	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	1	NF

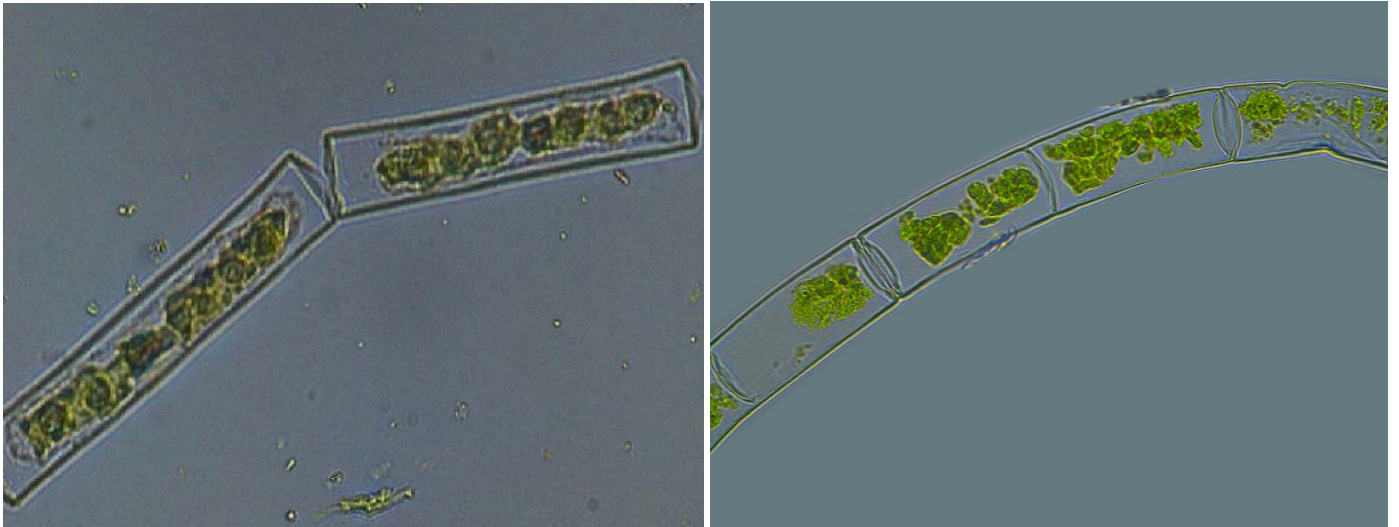
✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



Mougeotia sp. (C.Agardh, 1824)



Class: Zygnematophyceae

Order: Zygnematales

Family: Zygnemataceae

Genus: *Mougeotia* sp.

Identifying feature:

- ❖ Cells are cylindrical and united to form unbranched filaments.
- ❖ Usually, rod-like single chloroplast is present in each cell.
- ❖ Pyrenoids are arranged in one axial row or scattered throughout the chloroplast.

Habitat: Freshwater

Major Ecological Parameter: Highly positive correlation was found with pH, Carbonate, and Bicarbonate.



Station wise Distribution:
Upper stretch

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	10	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	5	NF	NF
Prayagraj	NF	10	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	6	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	10	NF	NF
Jangipur	NF	4	12	NF
Berhampore	NF	4	NF	NF
Balagarh	NF	20	NF	NF
Tribeni	NF	2	6	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



***Penium* sp. (Brébisson ex Ralfs, 1848)**



Class: Zygnematophyceae

Order: Desmidiiales

Family: Peniaceae

Genus: *Penium* sp.

Identifying feature:

- ❖ It is unicellular. Cells are cylindrical.
- ❖ Cells are divided into two halves and each half contains a single chloroplast with numerous pyrenoids.
- ❖ Sometime near the trunked apices, a small median constriction is found.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with BOD, and Chloride.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	60	NF
Prayagraj	NF	5	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Sirogonium sp. (Kützing, 1843)



Source- Baker, A.L. et al. 2012.

Class: Zygnematophyceae

Order: Zygnematales

Family: Zygnemataceae

Genus: *Sirogonium* sp.

Identifying feature:

- ❖ Filaments are slender, unbranched, and made up of cells that have smooth and even septa.
- ❖ The number of chloroplasts varies from 1 to 16 and the shape is parietal nearly straight ribbon.

Habitat: Freshwater

Major Ecological Parameter: Highly positive correlation was found with Transparency.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	10	NF	NF
Tehri	300	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	15	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

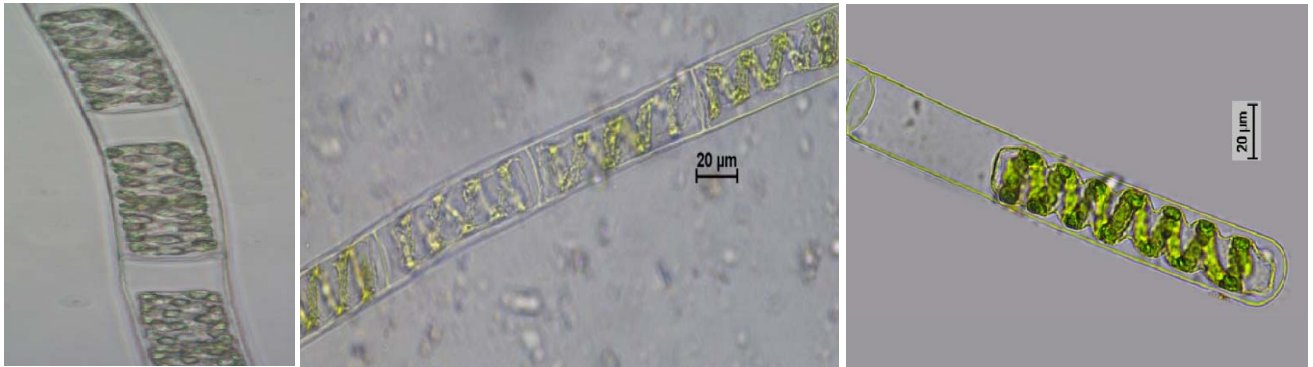
✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



Spirogyra sp. (Link, 1820)



Class: Zygnematophyceae

Order: Zygnematales

Family: Zygnemataceae

Genus: *Zygnema* sp.

Identifying feature:

- ❖ It is simple and unbranched filamentous algae, which consists of rows of an indefinite numbers of cylindrical cells.
- ❖ Various shape of the chloroplast is present like spiral or ribbon - shaped.
- ❖ Cells are generally more in length than in breadth.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Variable parameters are required for the genus.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

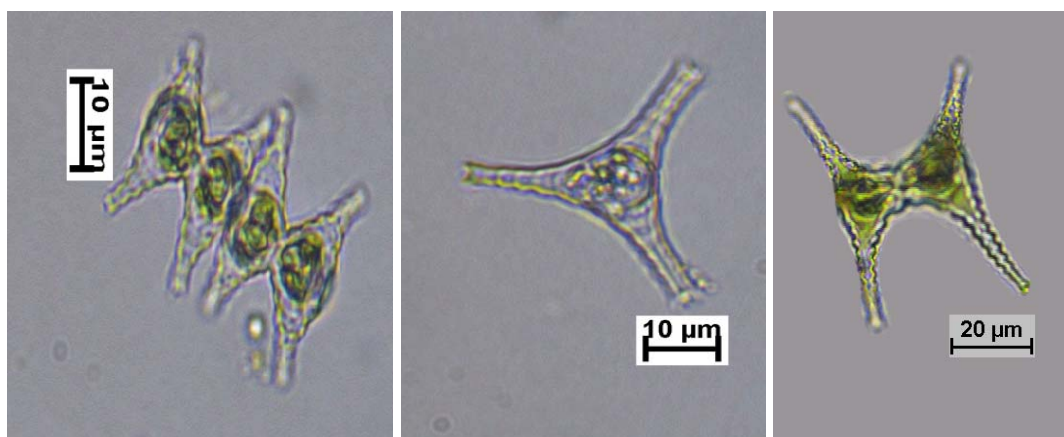
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	5	NF
Haridwar	NF	NF	40	NF
Bijnor	NF	20	95	40
Narora	NF	200	NF	NF
Farrukhabad	NF	80	NF	NF
Kanpur	NF	NF	55	NF
Prayagraj	NF	40	NF	NF
Varanasi	50	30	NF	NF
Buxar	14	8	4	NF
Patna	1	NF	1	NF
Bhagalpur	NF	10	NF	NF
Farakka	NF	5	NF	NF
Jangipur	9	8	8	NF
Berhampore	NF	11	2	NF
Balagarh	6	28	NF	NF
Tribeni	3	40	4	NF
Godakhali	NF	2	7	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Staurastrum sp. (Meyen ex Ralfs, 1848)



Class: Zygnematophyceae

Order: Desmidiiales

Family: Desmidiaceae

Genus: *Staurastrum* sp.

Identifying feature:

- ❖ Cells are divided into semi cells by median groove or isthmus, which present at the center.
- ❖ Various shapes of semi cell are present such as elliptic subcircular, subtriangular.
- ❖ The outer side of semi cell increased into long horns, which forms either short stumpy or short spines.
- ❖ The cell wall is ornamented with granules or spines.
- ❖ Each semi cell has lobed chloroplast with single or sometimes several pyrenoids.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Depends on variable ecological Parameters.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	15	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	40	NF	NF	NF
Farrukhabad	NF	20	NF	NF
Kanpur	10	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	5	NF	NF
Bhagalpur	NF	1	2	NF
Farakka	NF	9	1	NF
Jangipur	NF	2	NF	NF
Berhampore	5	NF	NF	NF
Balagarh	NF	3	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	1	10	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

⚡ The density was recorded as a number of planktons in unit litre⁻¹.

⚡ The annual average of four seasons are shown in the table.

⚡ NF – Phytoplankton was not found at that time of sampling.



***Zygnema* sp. (C.Agardh, 1817)**



Class: Zygnematophyceae

Order: Zygnematales

Family: Zygnemataceae

Genus: *Zygnema* sp.

Identifying feature:

- ❖ Cells are cylindrical and jointed to form unbranched filaments.
- ❖ Each cell has a star-shaped chloroplast, which is not connected with each other.
- ❖ Cells are 16-50 μm in diameter.

Habitat: Freshwater

Major Ecological Parameter: Highly positive correlation was found with pH.



Station wise Distribution:

Upper stretch

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

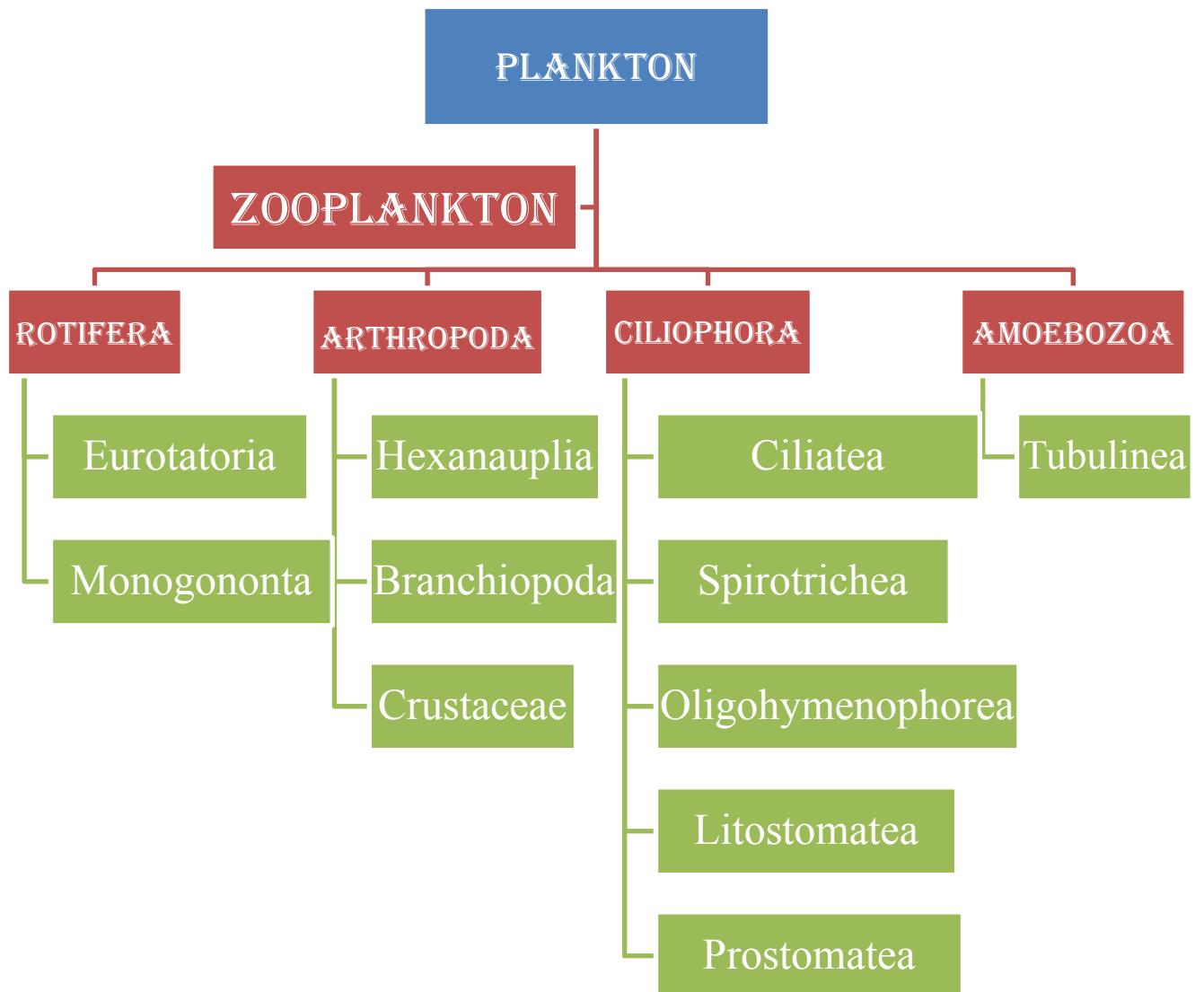
STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	20
Narora	10	10	NF	NF
Farrukhabad	NF	20	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	15	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.

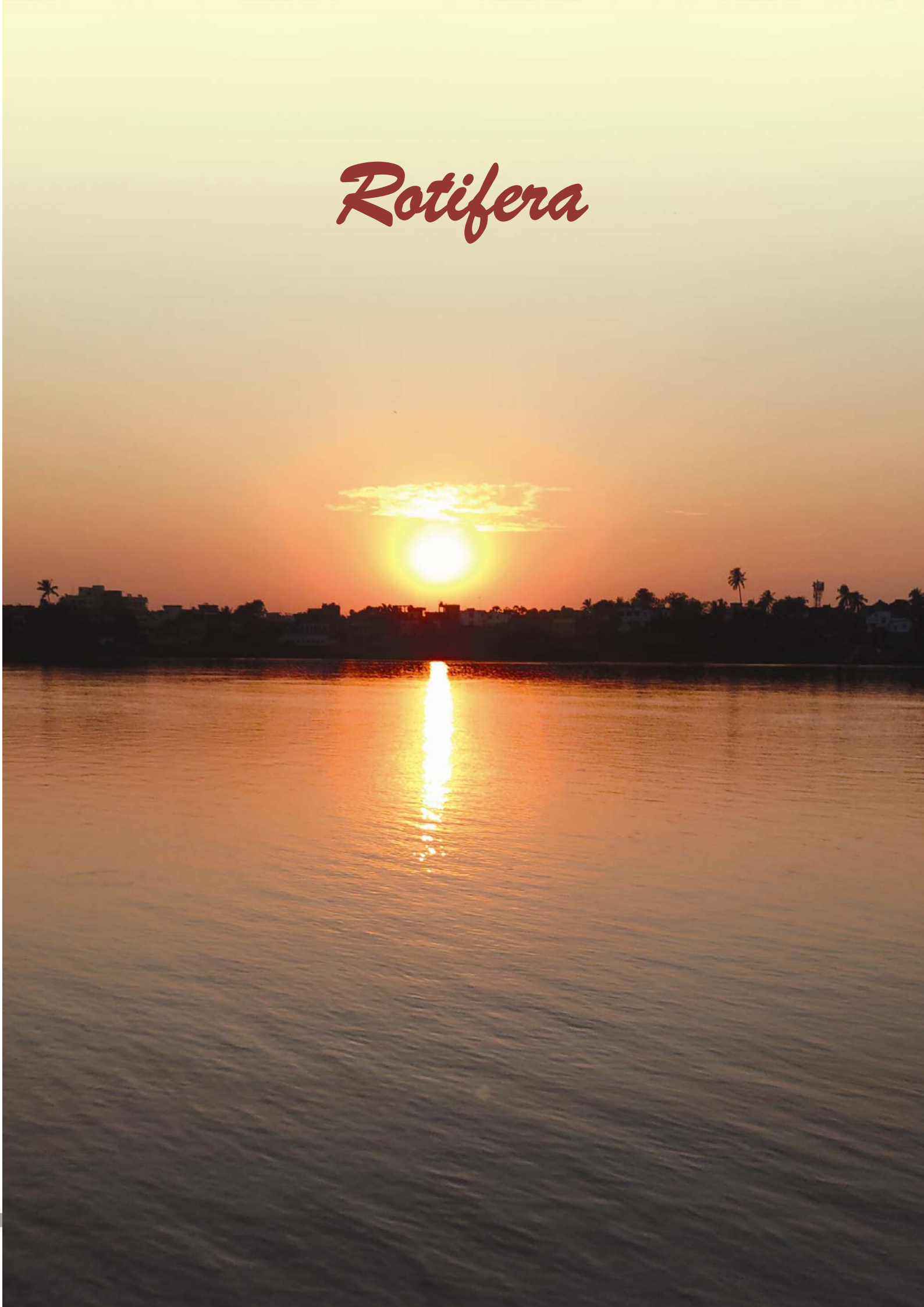




ZOOPLANKTON



Rotifera



Rotifera

General Identifying Characters:

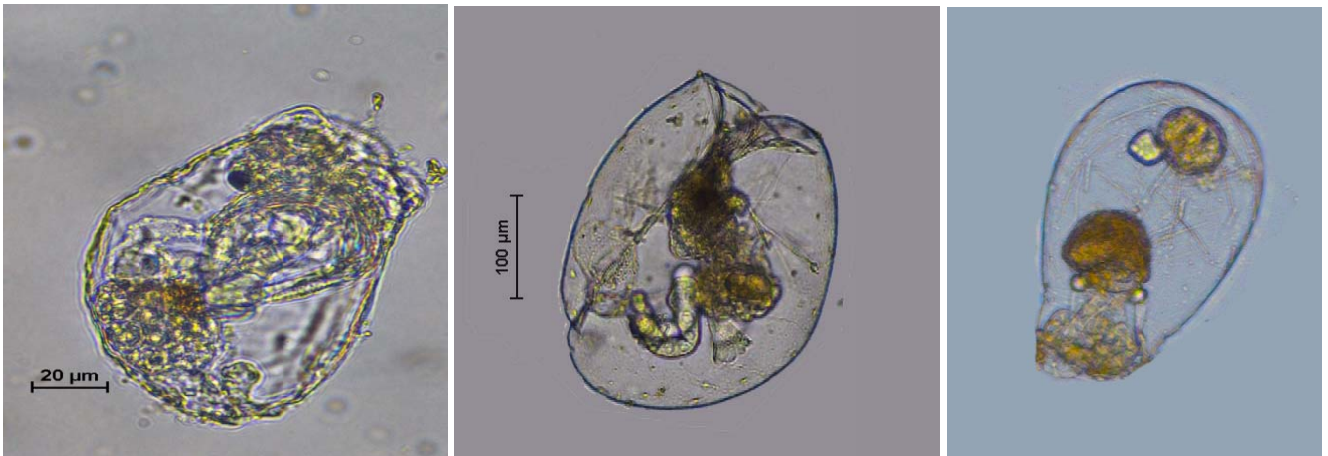
- It is microscopic organism with an unique feature is having ciliated corona.
- The cilia is used for movement as well as filter feeding.
- Rotifers are capable of tolerating a wide range of ecological condition.
- They can multiply asexually in good condition.
- They eat variety of food such as bacteria, detritus, other rotifer, algae and protozoa.
- Some rotifers species are regarded as eutrophication indicator i.e. Keratella and Trichocera (Karabin, 1985)
- Size generally varies between from 50 to 200 μ m.
- The body is divided into head (Corona), trunk (lorica and Pseudocoelom), and foot (no tail with attachment glands).

✚ Total 13 genera belonging to 2 classes and 10 families were recorded during study period.

✚ Class:- Monogononta (10 genera), Eurotatoria (3 genera)



Asplanchna sp. (Gosse, 1850)



Class : Monogononta

Order : Ploima

Family: Asplanchnidae

Genus: *Asplanchna* sp.

Identifying feature:

- ❖ The body is large and sac-like structure, without an anus.
- ❖ The foot is absent.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with Water Temperature, BOD, Chloride and Nitrate.



Station wise Distribution:

Upper stretch

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad




Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	10	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	20	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	20	NF	NF
Patna	NF	NF	10	NF
Bhagalpur	NF	5	50	NF
Farakka	NF	NF	NF	15
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

 The density was recorded as a number of planktons in unit litre⁻¹.
 The annual average of four seasons are shown in the table.
 NF – Phytoplankton was not found at that time of sampling.



***Brachionus* sp. (Pallas, 1766)**



Class : Monogononta

Order : Ploima

Family : Brachionidae

Genus : *Brachionus* sp.

Identifying feature:

- ❖ The body is compressed and consists of upper and lower plates with a strong cuticular outer covering called, lorica.
- ❖ Six distinct spines are projecting out from the anterior region, with intermediate spines being longer and rest being shorter.
- ❖ Egg pouches numbering in one or two may be present occasionally.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with BOD, Chloride and Nitrate.



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

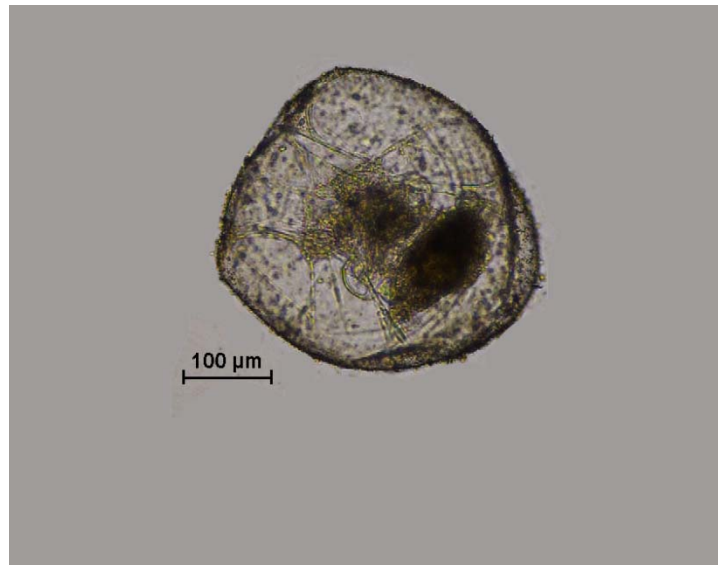
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	20	NF
Tehri	NF	90	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	380	80	150	NF
Farrukhabad	NF	510	12	NF
Kanpur	110	60	25	NF
Prayagraj	50	15	240	NF
Varanasi	35	656	5	NF
Buxar	18	82	21	NF
Patna	47	43	69	NF
Bhagalpur	4	12	36	NF
Farakka	67	51	3	NF
Jangipur	6	80	2	NF
Berhampore	14	26	1	NF
Balagarh	61	6	5	NF
Tribeni	NF	101	6	NF
Godakhali	NF	21	2	NF
D. Harbour	2	NF	3	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Chromogaster* sp. (Lauterborn, 1893)**



Class : Monogononta

Order : Ploima

Family : Gastropodidae

Genus : *Chromogaster* sp.

Identifying feature:

- ❖ The body is composed of two plates i.e. dorsal plate and ventral plate, which is fused laterally.
- ❖ Cilia are present throughout the body.
- ❖ One to three finger-like projections are present.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with BOD, Chloride and Nitrate.



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	20	NF	NF
Buxar	NF	NF	5	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

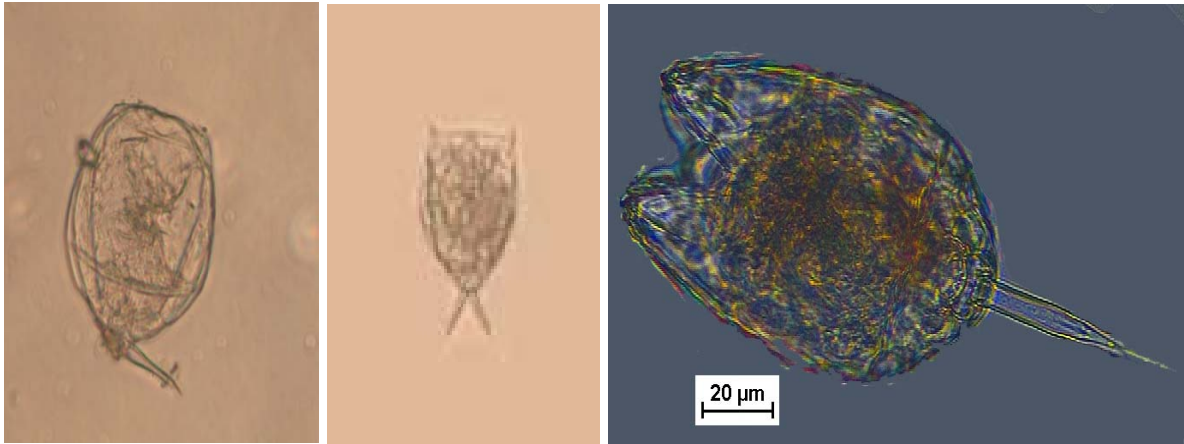
✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



Lecane sp. (Nitzsch, 1827)



Class : Monogononta

Order : Ploima

Family : Lecanidae

Genus : *Lecane* sp.

Identifying feature:

- ❖ The body is dorso-ventrally compressed, with retractile head.
- ❖ Dorsal and ventral plates are almost equal in size.
- ❖ The foot originates from a hole in the ventral plate.
- ❖ It has one toe which may be split towards the distal end.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Chloride and Total Dissolved Solid.

Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	50	NF	NF
Varanasi	NF	40	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	10	20	NF
Farakka	NF	5	NF	20
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



***Kellicottia* sp. (Ahlstrom, 1938)**



Source- Joe Connolly, Cornell University

Class: Monogononta

Order: Ploima

Family: Brachionidae

Genus: *Kellicottia* sp.

Identifying feature:

- ❖ The body has one long posterior spine.
- ❖ Anterior spines are four to six in number, out of these three are very long.
- ❖ Lorica is spinus and composed of two plates attached laterally.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with BOD, Chloride and Nitrate.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	60	NF	NF
Kanpur	NF	200	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	40	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



***Keratella* sp. (Bory de St Vincent, 1822)**



Class : Monogononta

Order : Ploima

Family : Brachionidae

Genus : *Keratella* sp.

Identifying feature:

- ❖ The body, indefinitely in shape.
- ❖ The outer covering or lorica is box-like, consisting of 2 plates closely joined at the sides. The dorsal side marked with polygonal facets, 4-6 spines on the anterior dorsal margin, while 1-2 on the posterior side.
- ❖ The foot is absent

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with Depth, Transparency.



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	90	45	50	NF
Farrukhabad	NF	60	NF	20
Kanpur	NF	20	NF	50
Prayagraj	11	NF	180	NF
Varanasi	NF	44	8	1
Buxar	NF	21	11	NF
Patna	26	5	18	NF
Bhagalpur	30	12	855	NF
Farakka	10	142	4	NF
Jangipur	5	192	28	4
Berhampore	1	NF	12	0
Balagarh	39	NF	13	8
Tribeni	NF	700	6	9
Godakhali	19	8	1	NF
D. Harbour	4	NF	NF	1
Fraserganj	NF	NF	NF	NF

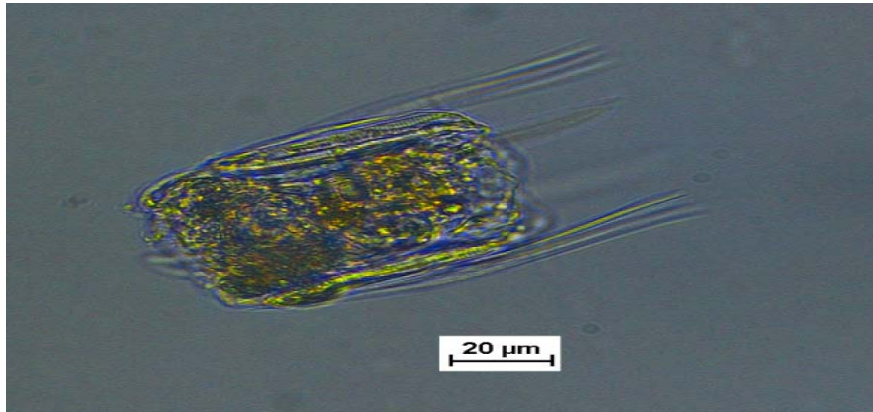
✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



***Polyarthra* sp. (Ehrenberg, 1834)**



Class : Monogononta

Order : Ploima

Family : Synchaetidae

Genus : *Notholca* sp.

Identifying feature:

- ❖ The body has circular appendages, which are flattened in shape.
- ❖ These appendages are jointed at the dorso-lateral and ventro-lateral side of the body near to the anterior end.
- ❖ It is mainly used for skipping and are twelve in number.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with Depth, Nitrate and Turbidity.



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	20	NF
Varanasi	1	4	NF	NF
Buxar	1	1	NF	NF
Patna	11	NF	5	NF
Bhagalpur	2	NF	31	NF
Farakka	NF	20	1	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	2	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	2	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Ploesoma* sp. (Herrick, 1885)**



Class : Monogononta

Order : Ploima

Family : Synchaetidae

Genus : *Ploesoma* sp.

Source- <http://cfb.unh.edu>

Identifying feature:

- ❖ The body is laterally flattened and the head protected by a shield.
- ❖ Ridges and grooves are present throughout the surface of lorica.
- ❖ The dorsal antenna is present on lorica.
- ❖ Corona having frontal flaps.
- ❖ The long and annulated foot is present with a foot- aperture.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with BOD, Chloride and Nitrate.



Station wise Distribution:

Upper stretch

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	30	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Notholca sp. (Gosse, 1886)



Class : Monogononta

Source- Michael Plewka

Order : Ploima

Family : Brachionidae

Genus : *Notholca* sp.

Identifying feature:

- ❖ The body has no foot.
- ❖ Lorica is stout.
- ❖ The anus is present.
- ❖ The surface of lorica is striated that follows the longitudinal pattern.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with Chloride and Total Dissolved Solid.



Station wise Distribution:
Upper stretch

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

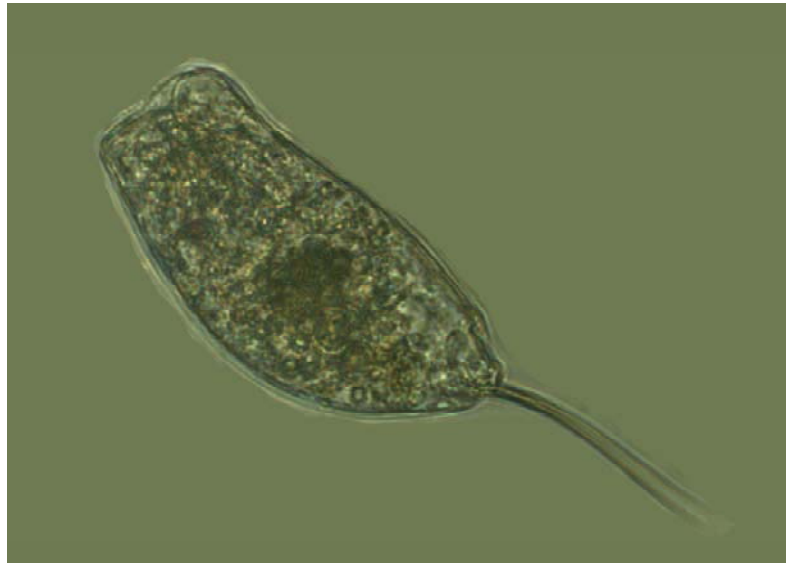
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	10	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	30	NF	NF
Prayagraj	NF	20	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	2	2	NF
Bhagalpur	NF	5	4	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Trichocera* sp. (Lamarck, 1801)**



Class : Monogononta

Order : Ploima

Family : Trichocercidae

Genus : *Trichocera* sp.

Identifying feature:

- ❖ The body is asymmetric, twisted in the segment of the helix.
- ❖ The body is transpicuous and small.
- ❖ Corona is convexicular in structure.
- ❖ A single long and thin foot, extending outward.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with Nitrate, Total Hardness, Total Alkalinity, Turbidity and Chloride.



Station wise Distribution:
Upper stretch

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

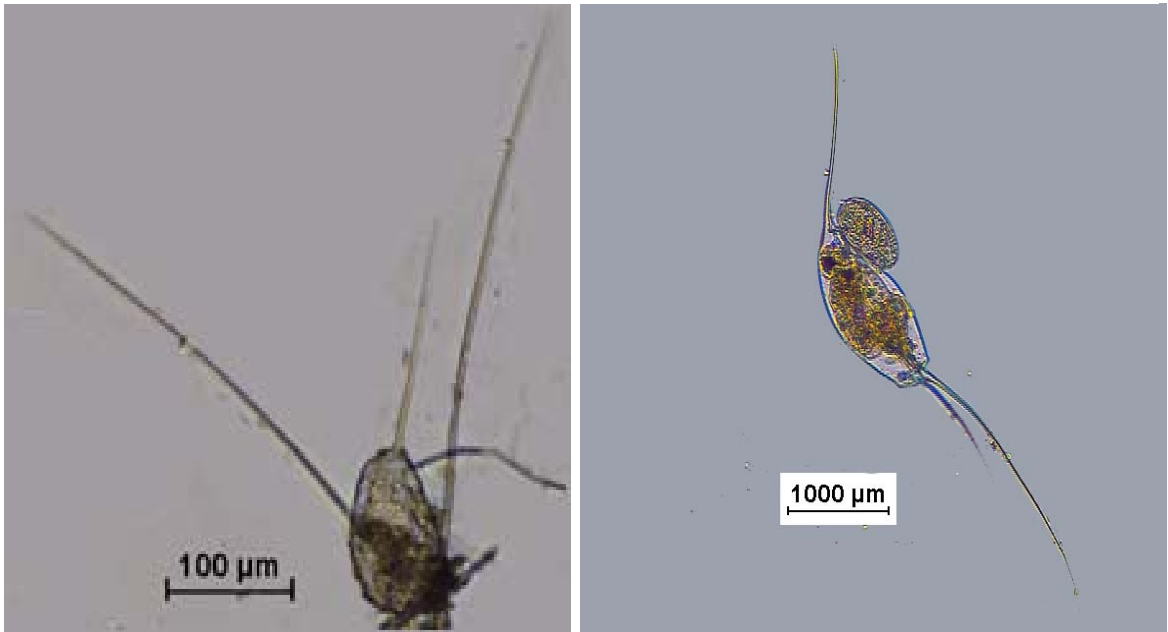
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	20	NF	20	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	10	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	10	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	50	NF
Farakka	NF	50	NF	NF
Jangipur	NF	90	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	10	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Filinia* sp. (Bory de St Vincent, 1824)**



Class : Eurotatoria

Order : Flosculariaceae

Family : Trochosphaeridae

Genus : *Filinia* sp.

Identifying feature:

- ❖ It is a free-floating organism.
- ❖ The body shape is indefinite, 2-3 movable appendages are set in form of extension of the cuticle.
- ❖ The foot is absent.

Habitat: Freshwater

Major Ecological Parameter: Highly positive correlation was found with Turbidity.



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	10	NF
Varanasi	NF	40	NF	NF
Buxar	2	NF	NF	NF
Patna	NF	20	7	NF
Bhagalpur	NF	30	10	NF
Farakka	NF	10	5	NF
Jangipur	NF	5	NF	30
Berhampore	NF	10	NF	NF
Balagarh	NF	10	20	NF
Tribeni	NF	30	10	NF
Godakhali	NF	2	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

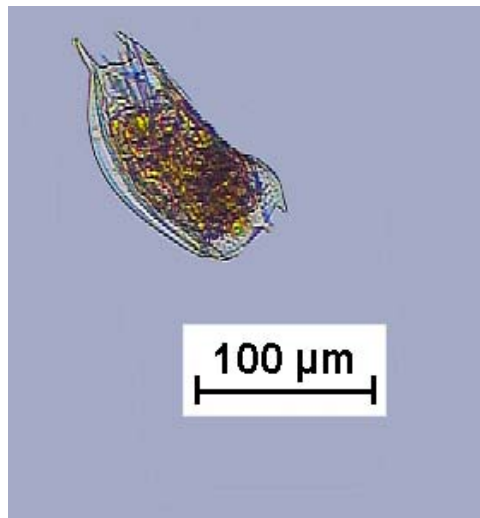
✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



***Mytilina* sp. (Bory de St.Vincent, 1826)**



Class : Eurotatoria

Order : Ploima

Family : Mytilinidae

Genus : *Mytilina* sp.

Identifying feature:

- ❖ The body shape is barrel-shaped.
- ❖ The foot is present, having two well-developed toes spines or spur are absent.

Habitat: Freshwater

Major Ecological Parameters: Highly positive correlation was found with pH, Dissolved Oxygen, BOD, Chloride, Nitrate and Total Dissolved Solid.



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

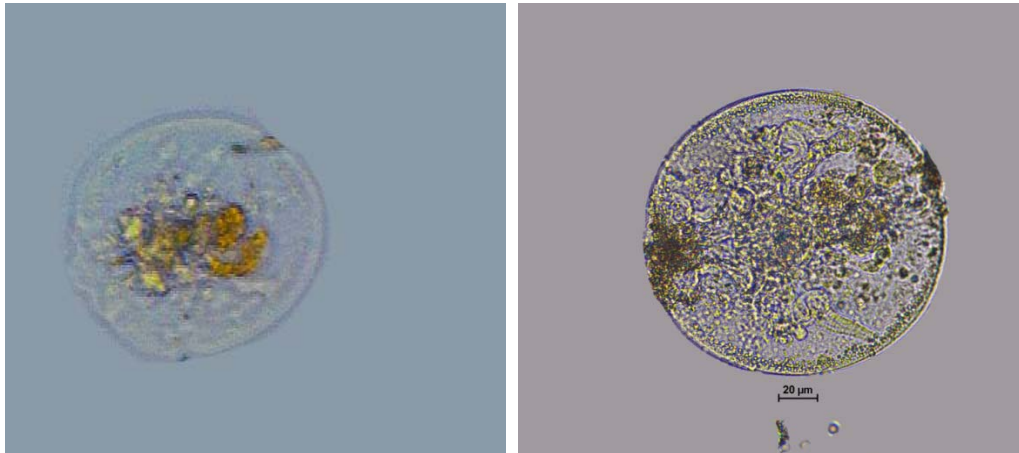
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	10	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Testudinella sp. (Bory de St Vincent, 1826)



Class : Eurotatoria

Order : Flosculariaceae

Family : Testudinellidae

Genus : *Testudinella* sp.

Identifying feature:

- ❖ A circular body which is dorso-ventrally flat.
- ❖ The corona is ciliated marginally.
- ❖ The foot is long retractile with a tuft of cilia at its tip.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with BOD, Chloride, Salinity and Nitrate.



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	10	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	30	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	2	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	3	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	2	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	5	NF
Fraserganj	NF	10	7	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Anthropoda



Arthropoda

The group include crustaceans, such as Copepoda, Cladocera. The most unique characteristics of crustacean is having two pairs of antenna.

- ✚ This phylum include 3 classes and 2 order.
- ✚ Class:- Crustaceae (3 genera), Branchiopoda (3 genera), Hexanauplia (2 genera).
- ✚ Order:- Cladocera(6 genera) and Copepoda(2 genera).



Cladocer



Cladocera

General Identifying Characters:

- It is shelled crustaceans and commonly known as the water flea.
- These are small crustaceans.
- Their size varies from 0.2 mm to 3.0 mm.
- The body has two valve carapace or outer shell, which cover most of the body.
- A compound eye is present on the head.
- It bears 4 to 6 trunk appendages.
- Antennules and setae are present.
- Rostrum and cervical sinus may be or may not be present.

✚ Total 6 genera belonging to 4 family were recorded during the study period.

✚ Family:- Bosminidae (1 genus), Chydoridae (2 genera), Daphniidae (2 genera), Sididae (1 genus),



***Bosmina* sp. (Baird, 1845)**



Class: Crustaceae

Order: Cladocera

Family: Bosminidae

Genus: *Bosmina* sp.

Identifying feature:

- ❖ The shape of the body is oval and rounded, and the size is short and high.
- ❖ Valves are present throughout the body and abdomen.
- ❖ Antennules are almost parallel to each other.
- ❖ The post-abdomen is quite quadrate in shape.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with BOD and Nitrate.



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	5	NF	NF
Varanasi	15	1	NF	NF
Buxar	NF	20	1	NF
Patna	13	520	1	NF
Bhagalpur	7	1	1	NF
Farakka	NF	59	11	6
Jangipur	NF	NF	99	NF
Berhampore	NF	NF	7	NF
Balagarh	NF	2	10	NF
Tribeni	NF	NF	2	NF
Godakhali	NF	NF	2	NF
D. Harbour	NF	NF	2	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Eurycercus sp. (Baird, 1843)



Class: Crustaceae

Order: Cladocera

Family: Chydoridae

Genus: *Eurycercus* sp.

Source- Center for Freshwater
Biology

Identifying feature:

- ❖ The anus is terminal.
- ❖ The Post-abdomen with a single row of over 80 denticles creating a saw-like appearance

Habitat: Freshwater and Brackishwater

Major Ecological Parameters: Highly positive correlation was found with pH, Dissolved Oxygen, Carbonate, and Chloride.



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	5	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ⚡ The density was recorded as a number of planktons in unit litre⁻¹.
- ⚡ The annual average of four seasons are shown in the table.
- ⚡ NF – Phytoplankton was not found at that time of sampling.



***Moina* sp. (Baird, 1850)**



Class: Crustaceae

Order: Cladocera

Family: Daphniidae

Genus: *Moina* sp.

Identifying feature:

- ❖ The head is large, thick, and round in the front.
- ❖ Sometimes, a deep depression is present above the eye.
- ❖ Antennules are long and freely movable.
- ❖ Post-abdomen extended into the conical post-anal part.
- ❖ Abdominal setae very long.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with BOD, Chloride and Nitrate.



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	20	60	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	50	NF	NF
Prayagraj	NF	20	NF	NF
Varanasi	NF	10	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	3	1	NF
Farakka	2	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	1	1	NF
Godakhali	NF	3	1	NF
D. Harbour	NF	5	NF	NF
Fraserganj	NF	NF	NF	NF

✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



***Daphnia* sp. (Muller, 1785)**



Class: Branchiopoda

Order: Cladocera

Family: Daphniidae

Genus: *Daphnia* sp.

Identifying feature:

- ❖ The body is laterally compressed and bivalve having a caudal spine.
- ❖ The head is rounded and bears compound eyes, paired and jointed antennae, and a beak-like rostrum.
- ❖ The trunk is segmented contain 4-5 appendages.
- ❖ The abdomen is without segmentation.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Nitrate, Total hardness, Total alkalinity, Turbidity and Chloride.



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	2	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	20	3	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	5	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	2	5	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

⚡ The density was recorded as a number of planktons in unit litre⁻¹.

⚡ The annual average of four seasons are shown in the table.

⚡ NF – Phytoplankton was not found at that time of sampling.



Diaphanosoma sp. (Fischer, 1850)



Class: Branchiopoda

Order: Diplostraca

Family: Sididae

Genus: *Diaphanosoma* sp.

Identifying feature:

- ❖ The body has rostrum, which is not a fornix or ocellus.
- ❖ Antennule is small truncated.
- ❖ At the dorsal side two antennae are jointed and at the ventral side three-antennae are jointed.
- ❖ Claws have three basal spines.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Total Alkalinity and Salinity.



Station wise Distribution:
Upper stretch

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

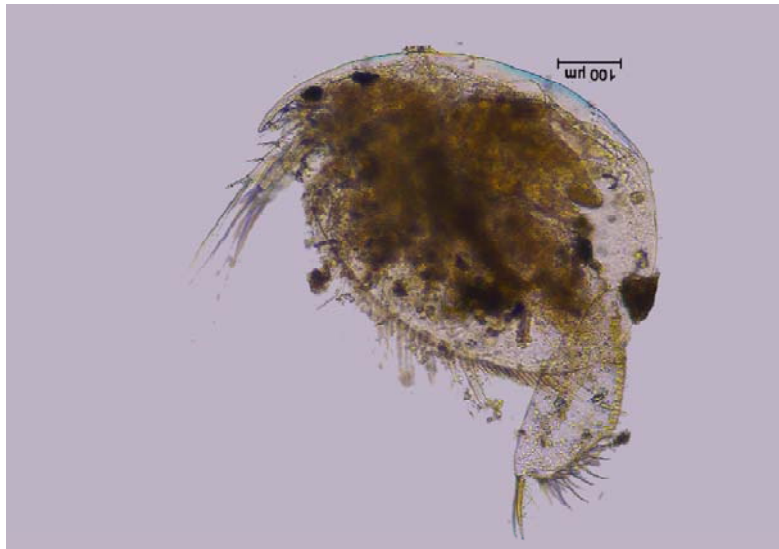
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	3	20	NF
Patna	NF	NF	14	NF
Bhagalpur	NF	40	321	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	7	NF	NF
Berhampore	NF	NF	1	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	1	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Leydigia sp. (Schoedler 1863)



Class: Branchiopoda

Family: Chydoridae

Genus: *Leydigia* sp.

Identifying feature:

- ❖ Usually, the body is oval shape. Much compressed without crest.
- ❖ The head small and extended.
- ❖ The post-abdomen is very large, semi-elliptical.
- ❖ The post-anal part is extended with many spines.
- ❖ Eyes are smaller than ocellus.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Carbonate, Mg^{++} , Total Hardness, and Salinity.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	4	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	15
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	3	NF	10	NF

✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



Copepoda



Copepoda

General Identifying Characters:

- The body is elongated and divided into head, abdomen, and thorax.
- Their size varies from 0.3 mm to 3.5 mm.
- A pair of appendages is present on each thoracic region while abdominal segment does not bear appendages.
- Most of the copepods bear a single median compound eye, generally red in color at the center of the head.
- The body has two pairs of antennae, the first pairs conspicuous and usually long with a variable number of segments.

✚ Total 2 genera belonging to 2 families were recorded during study period.

✚ Family:- Cyclopidae (1 genus), Diaptomidae (1 genus)



***Mesocyclops* sp. (G. O. Sars, 1914)**



Class: Hexanauplia

Order: Cyclopoida

Family: Cyclopidae

Genus: *Mesocyclops* sp.

Identifying feature:

- ❖ Body is slender and divided into anterior and posterior parts.
- ❖ Caudal rami relatively short ranging between 2.5 to 3.5 times as long as wide.
- ❖ Antennule are 17-segmented.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Highly positive correlation was found with Water Temperature.



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

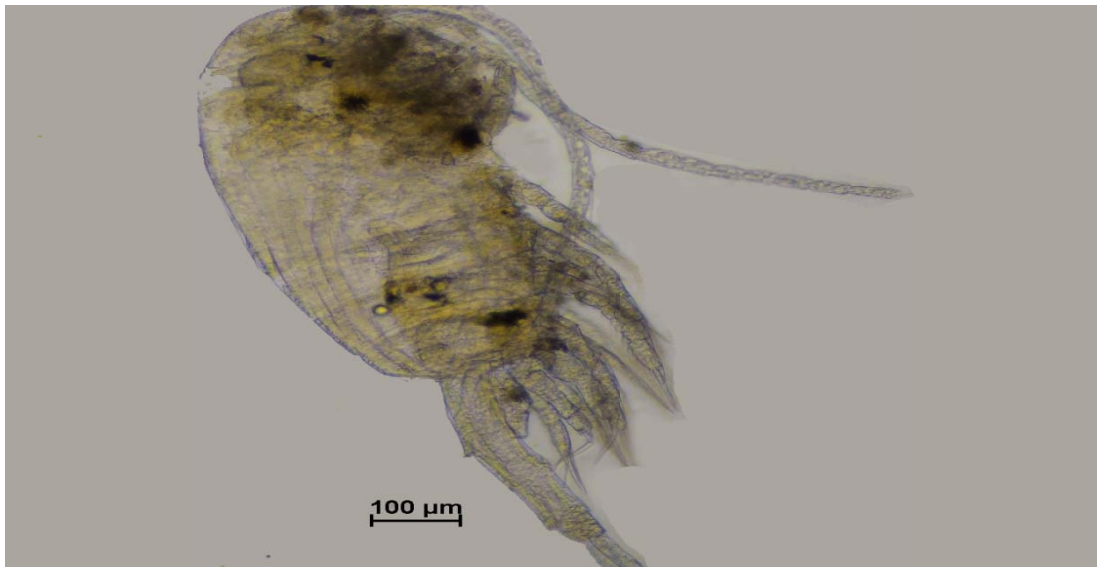
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	20	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	6	NF	NF
Patna	NF	2	4	NF
Bhagalpur	28	36	128	NF
Farakka	16	9	9	NF
Jangipur	34	NF	2	NF
Berhampore	1	1	NF	NF
Balagarh	6	6	NF	NF
Tribeni	5	4	NF	NF
Godakhali	NF	8	NF	NF
D. Harbour	4	15	1	NF
Fraserganj	NF	12	1	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Diaptomus sp. (Westwood, 1836)



Class: Hexanauplia

Order: Calanoida

Family: Diaptomidae

Genus: *Diaptomus* sp.

Identifying feature:

- ❖ It is a copepod with a single eyespot.
- ❖ The size and appearance are similar to cyclops.
- ❖ It has very long antennae and the length is almost equal to body length.

Habitat: Freshwater

Major Ecological Parameter: Highly positive correlation was found with Water Temperature.



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	4	20	NF
Patna	NF	100	4	NF
Bhagalpur	28	14	65	NF
Farakka	4	1	5	NF
Jangipur	NF	8	6	NF
Berhampore	NF	2	3	NF
Balagarh	1	6	7	NF
Tribeni	NF	3	3	NF
Godakhali	15	3	NF	NF
D. Harbour	13	NF	7	NF
Fraserganj	1	NF	12	NF

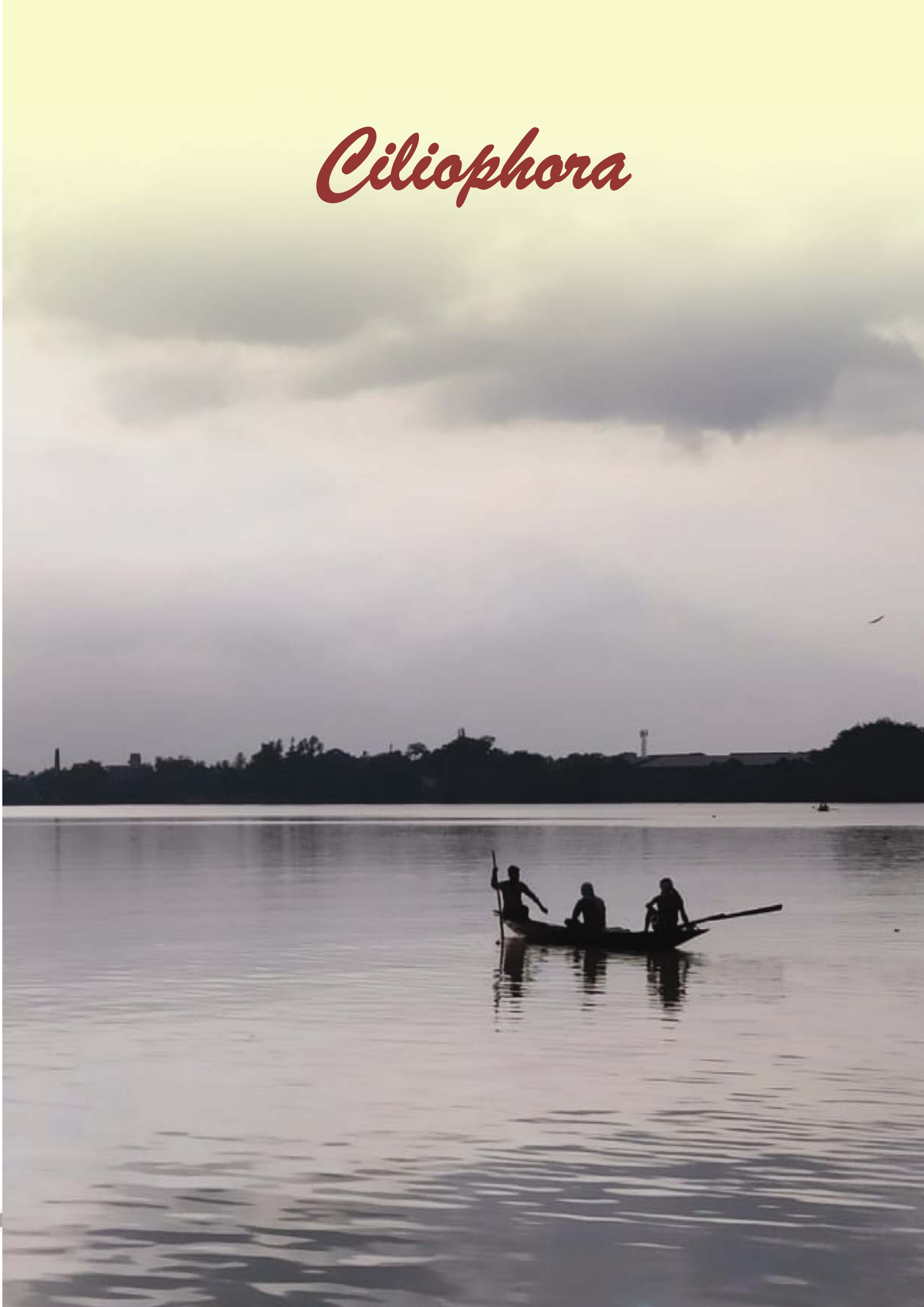
✚ The density was recorded as a number of planktons in unit litre⁻¹.

✚ The annual average of four seasons are shown in the table.

✚ NF – Phytoplankton was not found at that time of sampling.



Ciliophora



Ciliophora

General Identifying Characters:

- Protozoans are variable in shapes.
- The size ranges from 5-50 μm in diameter.
- Generally, they are naked but sometimes they have outer covering, which is known as pellicle.
- Some of the protozoan possesses two types of nuclei i.e. smaller micronuclei and larger macronuclei.
- They include amoebas, flagellates, ciliates, sporozoans, and many other forms. Cells have cilia and flagella, which are used for locomotion. According to their shape, they are classified into different groups;

Ciliates: Cells have hair-like projection called cilia, which are present surrounding the edge of protozoa. They can swim in the water by beating their cilia in a rhythmic pattern.

✚ Total 11 genera belonging to 5 classes and 11 families were recorded during study period.



Coleps sp. (Nitzsch, 1827)



Source : Protist.i.hosei.ac.jp

Class: Prostomatea

Order: Prostomatina

Family: Colepidae

Genus: *Coleps* sp.

Identifying feature:

- ❖ The body is barrel-shaped and small to medium in size, having a truncated anterior end and rounded posterior end.
- ❖ Posterior end possess spines. The Cuticular surface of the cell is divided into numerous symmetrical quadrangular facets.
- ❖ The mouth is apical and surrounded by cilia. Single contractile vacuoles are present.

Habitat: Freshwater and Brackish water

Major Ecological Parametesrs: Highly positive correlation was found with Specific Conductivity, Dissolved Oxygen, and Total Dissolved Solid.



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

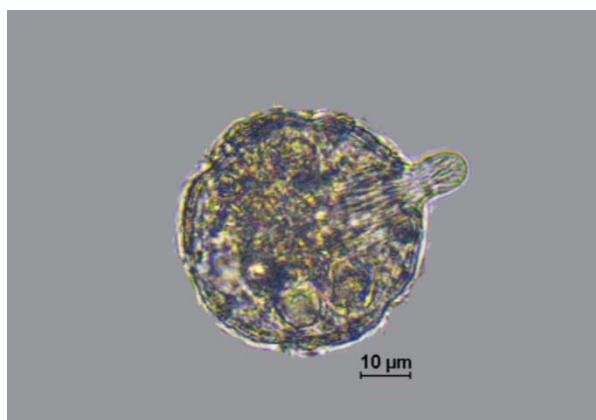
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	50	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ⚡ The density was recorded as a number of planktons in unit litre⁻¹.
- ⚡ The annual average of four seasons are shown in the table.
- ⚡ NF – Phytoplankton was not found at that time of sampling.



***Didinium* sp. (Stein, 1859)**



Class: Litostomatea

Order: Haptorida

Family: Didiniidae

Genus: *Didinium* sp.

Identifying feature:

- ❖ The shape of the body is large, oval and dorso-ventrally flattened, rounded posteriorly.
- ❖ Conical projection is present at the anterior side.
- ❖ The body surface possesses two ciliary girdles but no cilia are present.
- ❖ A single contractile vacuole is present. Macronucleus is horseshoe-shaped.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Parameters Could not be analysed as it is found twice in the entire sampling.



Station wise Distribution:
Upper stretch

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	40	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	2	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Epistylis* sp. (Ehrenberg, 1830)**



Class: Oligohymenophorea

Order: Sessilida

Family: Epistylidae

Genus: *Epistylis* sp.

Source-Corolina
Biological Supplyco/visuals
unlimited.inc/science photo library

Identifying feature:

- ❖ The body is vase-shaped and ciliated.
- ❖ It has an oral disc, collar, and a stalk.
- ❖ Each branch of the colony contains one individual at the end.
- ❖ Peristomial furrow is deep, which separates the disc border.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Highly positive correlation was found with Nitrate.



	Absent
	Present

Station wise Distribution:

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

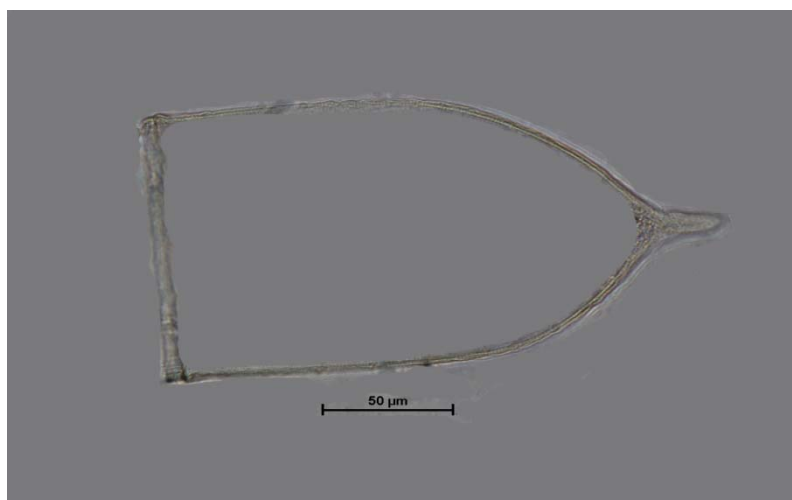
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	80	NF	NF	NF
Tehri	20	NF	NF	NF
Haridwar	110	250	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	5	NF	NF	NF
Varanasi	23	30	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Tintinids (Jorgensen, 1924)



Class: Spirotrichea

Order: Tintinnida

Family: Xystonellidae

Genus: *Tintinids* sp.

Identifying feature:

- ❖ The body is conical or trumpet-shaped.
- ❖ The body has loricae, with loose fitting variable shaped and size envelope.

Habitat: Brackish water

Major Ecological Parameters: Parameters could not be analysed as it is found only twice in the entire sampling.



Station wise Distribution:
Upper stretch

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	5	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	1	10	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Frontonia* sp. (Ehrenberg, 1838)**



Class: Oligohymenophorea

Order: Peniculida

Family: Frontoniidae

Genus: *Frontonia* sp.

Source- *Frontonia fusca*
(Quennerstedt 1869)

Identifying feature:

- ❖ The shape of the cell is ovoid or elongated.
- ❖ Several cilia and trichocysts are present surrounding the body.
- ❖ Near the anterior half of the cell, one small pear-shaped oral aperture is present.
- ❖ The mouth is supported by microtubular rods.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Highly positive correlation was found with Phosphate.



Station wise Distribution:
Upper stretch

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

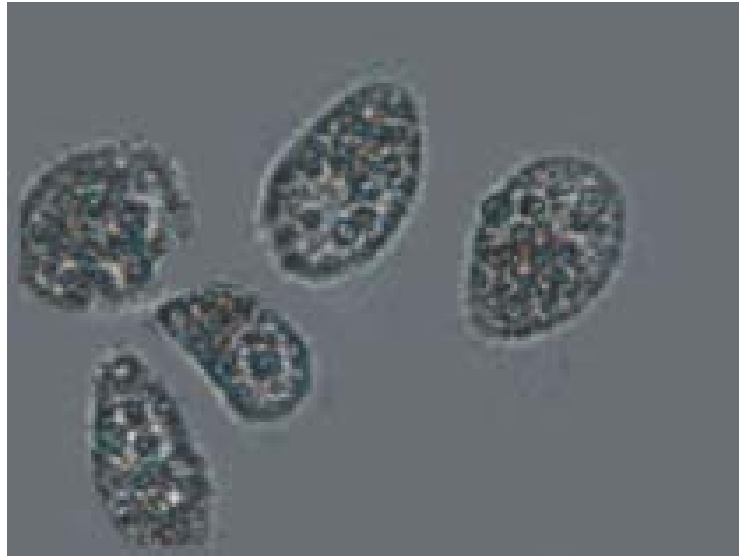
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	30	20	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ⚡ The density was recorded as a number of planktons in unit litre⁻¹.
- ⚡ The annual average of four seasons are shown in the table.
- ⚡ NF – Phytoplankton was not found at that time of sampling.



Paramecium sp. (Müller, 1773)



Class: Oligohymenophorea

Order: Peniculida

Family: Parameciidae

Genus: *Paramecium* sp.

Identifying feature:

- ❖ The body is elongated and slipper with numerous cilia throughout the body structure and is about 250 microns long.
- ❖ The posterior end is more pointed than the anterior one.
- ❖ Two contractile vacuoles are present.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Highly positive correlation was found with Total Dissolved Solid.



Station wise Distribution:

	Absent
	Present

Upper stretch

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

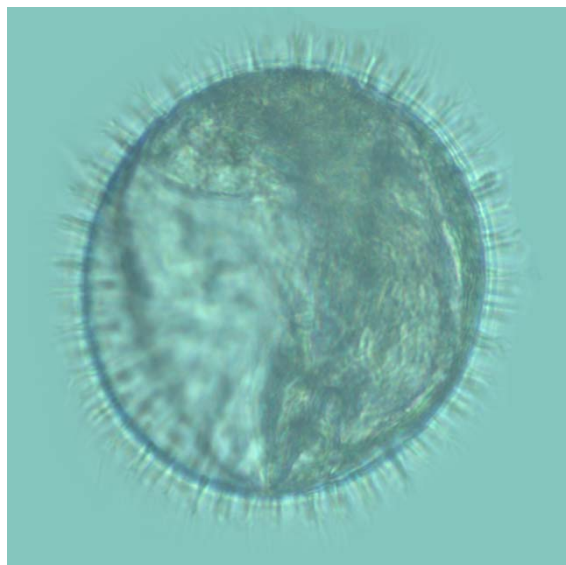
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	60	NF	NF	NF
Tehri	10	NF	NF	NF
Haridwar	100	70	60	NF
Bijnor	NF	NF	20	NF
Narora	20	NF	NF	NF
Farrukhabad	60	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	50	NF	NF	NF
Varanasi	80	NF	60	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ⚡ The density was recorded as a number of planktons in unit litre⁻¹.
- ⚡ The annual average of four seasons are shown in the table.
- ⚡ NF – Phytoplankton was not found at that time of sampling.



***Podophrya* sp. (Ehrenberg, 1838)**



Class: Ciliata

Order: Suctorida

Family: Podophryidae

Genus: *Podophrya* sp.

Identifying feature:

- ❖ The body is either spherical or subspherical in shape having a stalk.
- ❖ Several knobbed tentacles are emerged out of the body.
- ❖ Sometime contractile vacuoles are found.
- ❖ Near the center of body single oval-shaped macronucleus.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Parameters couldnot be analysed as it is found only once in the entire sampling.



Station wise Distribution:
Upper stretch

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	40	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Urostyla* sp. (Ehrenberg, 1830)**



Source- Protist Information Server
1995-2008

Class: Spirotrichea

Order: Urostylida

Family: Urostylidae

Genus: *Urostyla* sp.

Identifying feature:

- ❖ The body is oval, elongated, and dorso-ventrally flattened.
- ❖ Numerous cirri are present throughout the body.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Parameters couldnot be analysed as it is found only once in the entire sampling.



Station wise Distribution:
Upper stretch

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

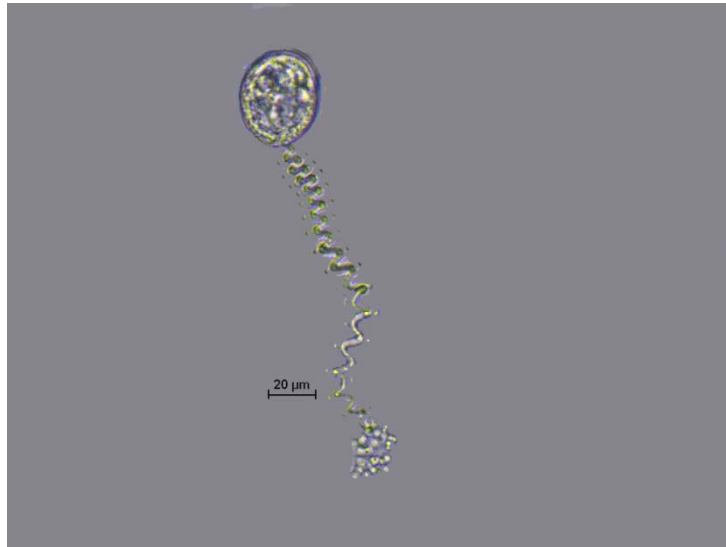
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	70	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Vorticella* sp. (Linnaeus, 1767)**



Class: Oligohymenophorea

Order: Sessilida

Family: Vorticellidae

Genus: *Vorticella* sp.

Identifying feature:

- ❖ The body is bell-shaped and ciliated and has an oral cavity and contractile stalk.
- ❖ The stalk is either branched or unbranched and has contractile myonemes.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Total Dissolved Solid, and Specific Conductivity.



Station wise Distribution:
Upper stretch

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	70	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	10	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	5	10	20
Jangipur	NF	2	NF	40
Berhampore	NF	30	NF	350
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	2	10
D. Harbour	NF	NF	NF	4
Fraserganj	NF	10	NF	10

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Zoothamnium* sp. (Bory de Saint-Vincent, 1826)**



Source- Protist Information Server
1995-2008

Class: Oligohymenophorea

Order: Sessilida

Family: Zoothamniidae

Genus: *Zoothamnium* sp.

Identifying feature:

- ❖ It is mainly branching colonial.
- ❖ Spherical cell with a stalk at its posterior side and attached to the main stalk.
- ❖ Two rows of numerous cilia are covered on the anterior side of the body.
- ❖ A small spherical oral aperture is present on the body.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Parameters couldnot be analysed as it is found only once in the entire sampling.



Station wise Distribution:
Upper stretch

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

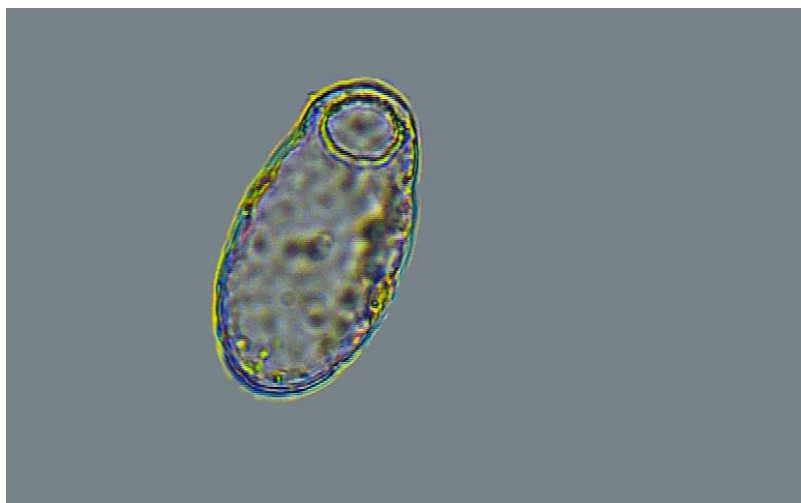
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	10	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ⚡ The density was recorded as a number of planktons in unit litre⁻¹.
- ⚡ The annual average of four seasons are shown in the table.
- ⚡ NF – Phytoplankton was not found at that time of sampling.



Trinema sp. (Dujardin, 1841)



Class: Imbricatea

Order: Euglyphida

Family: Euglyphidae

Genus: *Trinema* sp.

Identifying feature:

- ❖ The body is pouch-shaped with a rounded end.
- ❖ In the Ventral view, body is broad and oval shape and from the lateral view tapering towards the aperture.
- ❖ The body has two types of scales.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Parameters couldnot be analysed as it is found only once in the entire sampling.



Station wise Distribution:
Upper stretch

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	30	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	5	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Amoebozoa



Amoebozoa

General Identifying Characters:

- Amoebozoa is a major taxonomic group, containing about 2,400 described species of amoeboid protists, often possessing blunt, fingerlike, lobose pseudopods and tubular mitochondrial cristae.
- Several irregular projections come out from the cell, which are called pseudopods, which can be stretch out, bend and curved.

✚ Total 4 genera belonging to 1 class and 4 families were recorded during study period.



Amoeba sp. (Bory de St. Vincent, 1822)



Class: Tubulinea

Order: Euamoebida

Family: Amoebidae

Genus: *Amoeba* sp.

Source- Protist Information Server
1995-2008

Identifying feature:

- ❖ The body is granulated and has variable irregular shapes.
- ❖ The cell has a large nucleus and contractile vacuole.
- ❖ The body has lobopodia with hemispherical tips.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Parameters couldnot be analysed as it is found only once in the entire sampling.



**Station wise Distribution:
Upper stretch**

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

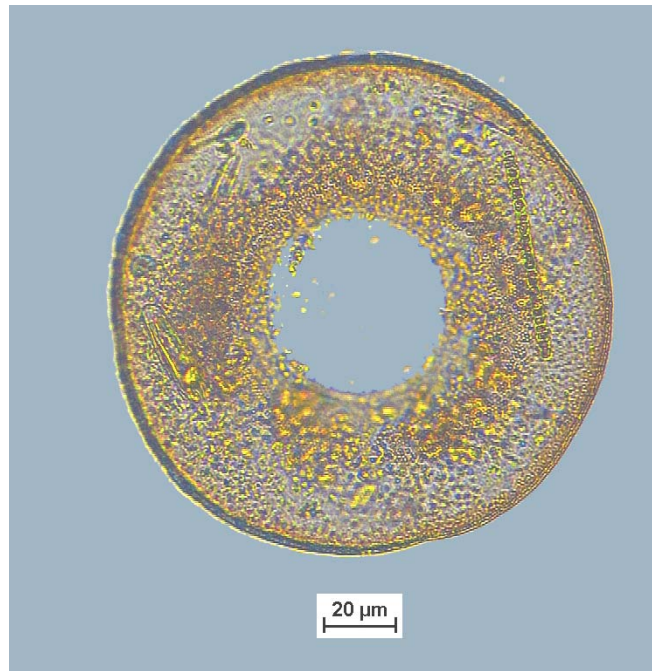
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	50	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



***Arcella* sp. (Ehrenberg, 1832)**



Class: Tubulinea

Order: Arcellinida

Family: Arcellidae

Genus: *Arcella* sp.

Identifying feature:

- ❖ The cell is circular or hemispherical shape.
- ❖ It has two or more nuclei, which are vesicular.
- ❖ Sometimes small pseudopodia are attached to the cell wall.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Highly positive correlation was found with Carbonate, Ca^{++} , Mg^{++} , Total Hardness, Salinity, and Total Solid.



**Station wise Distribution:
Upper stretch**

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad




Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

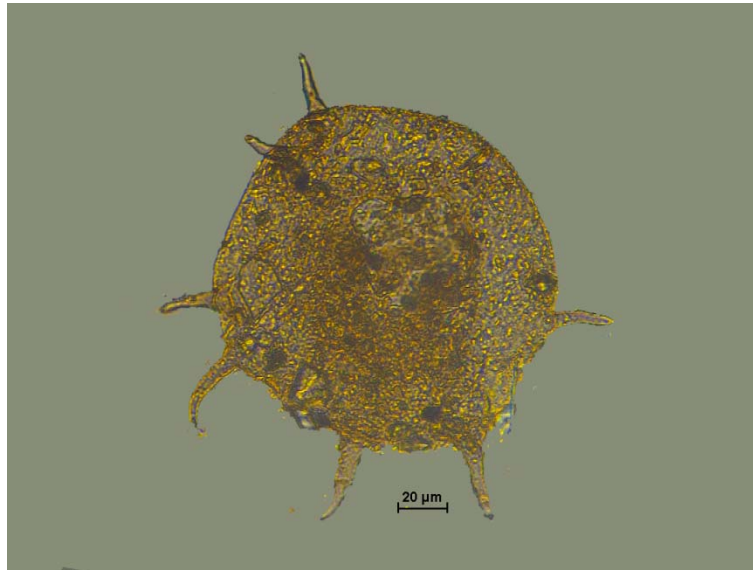
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	NF	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	2	NF	NF

 The density was recorded as a number of planktons in unit litre⁻¹.
 The annual average of four seasons are shown in the table.
 NF – Phytoplankton was not found at that time of sampling.



Centropyxis sp. (Stein, 1857)



Class: Tubulinea

Order: Arcellinida

Family: Centropyxidae

Genus: *Centropyxis* sp.

Identifying feature:

- ❖ The body is rounded in the dorsal side and flat in the ventral side.
- ❖ It is yellow or brown in color.
- ❖ At the lateral side, four to five spines are present.

Habitat: Freshwater and Brackish water

Major Ecological Parameter: Parameters couldnot be analysed as it is found only once in the entire sampling.



**Station wise Distribution:
Upper stretch**

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

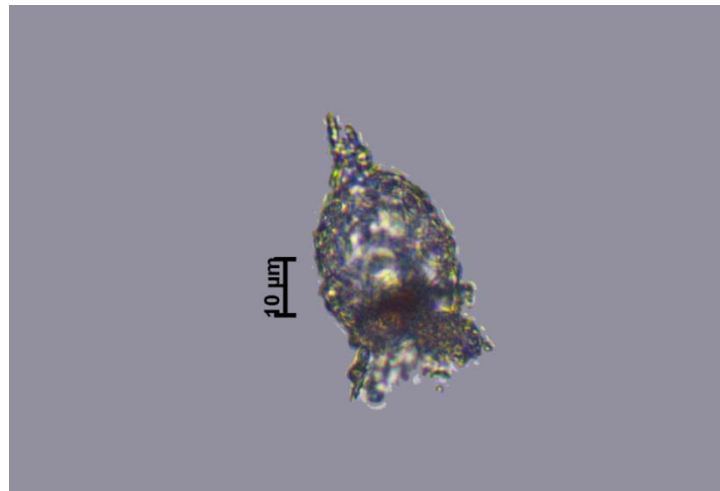
Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	NF	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	NF	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	2	NF	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	1	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	1	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



Diffflugia sp. (Leclerc, 1815)



Class: Tubulinea

Order: Arcellinida

Family: Diffflugidae

Genus: *Diffflugia* sp.

Identifying feature:

- ❖ The shape of the body is globular to elongate.
- ❖ Large spines are present at the margin.
- ❖ The posterior part is rounded.
- ❖ The body has a distinct and constricted neck.

Habitat: Freshwater and Brackish water

Major Ecological Parameters: Highly positive correlation was found with Specific Conductivity, Dissolved Oxygen, and Total Dissolved Solid.



Station wise Distribution:
Upper stretch

	Absent
	Present

Harshil	Tehri	Haridwar	Bijnor	Narora	Farrukhabad

Middle stretch

Kanpur	Prayagraj	Varanasi	Buxar	Patna	Bhagalpur	Farakka

Lower stretch

Jangipur	Berhampore	Balagarh	Tribeni	Godakhali	D. Harbour	Fraserganj

STATION	2017	2018	2019	2020
Harshil	NF	NF	NF	NF
Tehri	NF	NF	NF	NF
Haridwar	NF	20	NF	NF
Bijnor	NF	NF	NF	NF
Narora	NF	NF	NF	NF
Farrukhabad	NF	NF	NF	NF
Kanpur	NF	NF	NF	NF
Prayagraj	20	NF	NF	NF
Varanasi	NF	NF	NF	NF
Buxar	NF	5	1	NF
Patna	NF	NF	NF	NF
Bhagalpur	NF	NF	NF	NF
Farakka	NF	NF	NF	NF
Jangipur	NF	NF	NF	NF
Berhampore	NF	NF	NF	NF
Balagarh	NF	NF	NF	NF
Tribeni	NF	NF	NF	NF
Godakhali	NF	NF	NF	NF
D. Harbour	NF	NF	NF	NF
Fraserganj	NF	NF	NF	NF

- ✚ The density was recorded as a number of planktons in unit litre⁻¹.
- ✚ The annual average of four seasons are shown in the table.
- ✚ NF – Phytoplankton was not found at that time of sampling.



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Dr. Basanta Kumar Das, presently the Director, ICAR – Central Inland Fisheries Research Institute is a dynamic scientist who pursued his PhD in Aquaculture and Post Doc. in Molecular Immunology from Marine Lab, University of Aberdeen, Scotland. His specialization was primarily focused on Aquaculture and Fisheries, Fish Health Management, Molecular Immunology and Nanotechnology. A professional involvement of 26 years in fish disease treatment and diagnosis, Inland Cage Culture development and diversification, fish feed modulations and aquaculture practices have been performed by Dr B. K. Das. He has developed a Database for Reservoir Fisheries and Fish Disease Advisory App in Inland Fisheries, he has also commercialized four technologies. He has authored 200 research papers with more than 4000 citations, more than 30 books and numerous book chapters along with popular articles. He has been awarded with more than 10 awards/honours such as Dr. M. S. Swaminathan Award for Best Indian Fisheries Scientist, Krushak Bandhu and Krushaka – Ratna by Krushaka Samaj, Eminent Zoologist of the year Award from Zoological Society of India, Bodhgaya Fellow of International Society Environmental Protection (ISEP), Fellow of National Academy of Agricultural Science (NAAS), DBT Overseas Associateship 2005, Lal Bahadur Shastri Young Scientist Award (ICAR), Dr. Hiralal Choudhuri Annual Awards and a Life Member of Indian Science Congress Association (ISCA) and Member of Executive Committee, ISCA (2020-2021) as well. He has also initiated projects on Anti Microbial Resistance (AMR) in Fisheries, Ranching of Hilsa in the above Farakka Barrage and Fisheries Development in Kothia Maun of Bihar. River Ranching of Indigenous Carps and replenishment of fish stock in river Ganga is an initiative effort carried forward by National Mission for Clean Ganga under the guidance of Dr. B. K. Das.

Trupti Rani Mohanty, Young Professional – II.

Ms. Trupti Rani Mohanty is a young budding research scholar at ICAR – CIFRI under National Mission For Clean Ganga Project done Post Graduation in Botany having well versed knowledge of the ecological parameters of the river Ganga. Her domain of work potential is plankton and Periphytons of River Ganga. Precise identification and correlation with the ecological parameters have been established duly by her expertise.

Himanshu Sekhar Swain, Scientist

Mr. Himanshu Sekhar Swain is presently working as Scientist in ICAR- Central Inland Fisheries Research Institute, Barrackpore. He has completed his M.F.Sc. from College of Fisheries, KVAFSU, Mangalore and pursuing his PhD in Aquaculture from ICAR-CIFE Mumbai. He has experience of 10 years in the field of Aquaculture and Fisheries and professionally been involved in the various internal and externally funded projects of ICAR-CIFRI as Co-Principal Investigator. Along with all these involvements he has well versed knowledge of various fisheries activities such as Ex-Situ and In-Situ fish germplasm conservation, River Ranching,



Fish breeding and Enclosure culture. He has significant contribution and led the river ranching activity in river Ganga under National Mission for Clean Ganga program.

Nitish Kumar Tiwari, Young Professional – II

Mr. Nitish Kumar Tiwari has done his Masters in Zoology with specialization in Fish and Fisheries from Vinoba Bhave University. And presently working as a research scholar in ICAR-Central Inland Fisheries Research Institute, Barrackpore. He has been working in the field of Fish & Fisheries and involved in rigorous field sampling and analysis of different water and sediment samples related to different ecological habitat of planktons and fisheries associated flora and fauna.

Shreya Roy Young Professional – I

Ms. Shreya Roy has done her Masters in Marine Biology and Oceanography from Annamalai University. She is currently working as a research scholar at ICAR – CIFRI under National Mission For Clean Ganga Project. She is a dynamic worker with the capabilities of extensive tour and laboratory analysis with taxonomic identification.

Dr. Kalpana Srivastava, Chief Technical Officer

Dr. Kalpana Srivastava is presently working as Assistant Chief Technical Officer at Prayagraj centre of ICAR-CIFRI. She has completed her post graduation and PhD in Botany, Having 21 years of research experience. She is an author of 24 research papers in the various reputed journals. She also has 12 publications on fodder crop and cytogenetic. She has good working experience for working in river Ganga, its tributaries and associated wetlands since 2001 to till date.

