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Identification of Fresh water Algae from Godavari River, Nanded, Maharashtra, India

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Abstract

As we have decided to know the study of few phytoplanktonic genera and the virtuous population of mainly twenty-four genera of phytoplankton namely *Oedogonium, Ankistrodesmus, Chlamydomonas, Hydrodictyon, Carteria, Pandorina, Volvox, Stauroneis, Diatoms, Diadesmis, Frustulia, Didymosphenia, Navicula, Spirogyra, Closterium, Zygnema, Cosmarium, Fragilariforma, Fragilaria, Anabaena, Oscillatoria, Ulothrix, Chlorella* and *Euglena* observed in the main stream of the Godavari River. However, as per my objectives of studies we have identified this plankton by selected standard method. The genera belonging to Chlorophyceae class are main in selected Godavari River main stream throughout the study period of (2019-2020). As we were decided to know the study of few planktonic species and my observation are that there are upright populations of different plankton in the river main stream. However, as per objectives of study the plankton were observed by qualitative (Identification) method. My observation showed that, variety of freshwater plankton was found in the selected samples.

Plankton is a diverse group of organisms found in great abundance in both marine and limnetic habitats. Though some are weakly motile and most are carried with the drift of water currents. Phytoplankton is photosynthetic and primary producers in aquatic food webs. They are also integral to processes of nutrient cycling within the community. Zooplankton is heterotrophic and like phytoplankton, is an important food source for many other aquatic organisms. Because of these factors, changes in plankton populations can have considerable effects elsewhere in the food web.

The phytoplankton are microscopic organisms that live in aquatic environments, both salty and fresh. Among biotic community's phytoplankton having the first stage in trophic level by virtue of their capacity to fix environmental gradient energy into biological energy through photosynthesis. The plankton plays a role in regulation of the two important atmospheric gaseous levels of oxygen and

carbon dioxide. Apart from primary production phytoplankton also play an important role in bio-geo chemical cycles. Phytoplankton occurs as unicellular, colonial, or filamentous forms. Many are photosynthetic and grazed upon by zooplankton and other aquatic organisms.

Phytoplankton play vital role in the biosynthesis of organic matter in aquatic ecosystems, which directly or indirectly serve all the living organisms of a water body as food. In fisheries, the information of plankton population in relation to environmental factors is of considerable importance. The overall aim of this study is to gain better understanding of algal biodiversity and its status in the water as investigation part is an important focus issue. This study lays emphasis on to identify the algal biodiversity water, identify the plankton species from Godavari River as it is a baseline of aquatic food chain. The investigation is on continuation and examination of unidentified species. In spite of these intelligences, a comprehensive account of algal flora of this region is still lacking.

Godavari river is also called as Dakshin Ganga. It is the largest river in India after Ganga River and has historical and cultural importance. Godavari river originates from Trimbakeshwar Hill, in Nashik District, Maharashtra and Travels near about 500 km distance. In Maharashtra, two dams on the Godavari River are build one is the Jaikwadi at Paithan in Aurangabad District and another is Vishnupuri dam at Nanded. It is necessary to develop a floristic chart and data base of the present-day freshwater macro algal flora of Godavari River and surroundings.

Study area :

For the present study the path of Godavari River in the Nanded district is selected. The stretch of Godavari River from Rahati to Sangam which is about 150 km in length is taken for present investigations. To see the impact of the city as well as of the other locations on the quality of river water this stretch of the river is chosen. (Fig. 1) Nanded district is situated in the Godavari basin. Towards the north-western side Parbhani district and Hingoli districts are located and towards southwest side of Nanded, Latur district is located while Yeotmal district is located towards northern side of the Nanded District. The state of Andhra Pradesh lies to the east and Karnataka state to the southern side of the Nanded District. The study area is bounded by latitude 18o15' to 19o55' N and 77o7' to 78o15' E longitude. The Nanded district covers an area of 10528.00 sq.km. It contributes 3.42 % area of Maharashtra state. Among the 38 districts in the state, it ranks 14th in its area.

Sampling and Phytoplankton analysis :

Filamentous algae were collected from mass growth by hand. The collected samples were observed fresh by preparing wet mounts within 48 hrs. Then the samples were further preserved in 4% formaldehyde solution separately for detailed study APHA,[2], Trivedi and Goel[13]. Bacillariophycean forms were studied after cleaning the frustules using acid digestion technique recommended by Taylor *et al*.[12]. Identification of algal forms was done with the help of standard keys using monograph and relevant available literature viz. Prescott[10], Edmondson[6], Palmer[8], Anand[1] & Perumal[9]. Quantitative estimation of phytoplankton was found out by employing

Sedgewick-Rafter counting cell. Species identification was done employing Nikon E200 light microscope using standard identification keys[4].

A typical conical shaped plankton net is used for sampling of plankton which is highly selective method (Verlecar and Desai, 2004). Mix well the given water sample by slightly shaking. Take a drop of water on a clean slide place the cover slips on it or with the help of zero-point brush take the material and put it on the slide. Now cover it with the cover slip. Adjust the microscope observe under 10X. Now turn the lens towards under high-power using oil emmersion object if required. Identify and note down the characteristics.

The availability of good number of Phytoplankton are the indicators of the healthy aquatic ecosystem of the Godavari River. (Fig. 3). But increasing the load of anthropogenic activities in the surrounding area of the Godavari River are decreasing in the numbers. All together 24 taxa of phytoplankton were found during the study period. Out of which seven taxa belong to Chlorophyceae, six to Bacillariophyceae, four to *Zygnematophyceae,* two to *Cyanophyceae,* two to *Flagillariophyceae,* one to *Ulvophyceae, Trebouxiphyceae* and *Euglenoideae*.

Chlorophyceae: Chlorophyceae formed the largest group of phytoplankton contributing 29.16 % to the total population. The class Chlorophyceae included genera *Oedogonium, Ankistrodesmus, Chlamydomonas, Hydrodictyon, Carteria, Pandorina* and *Volvox.* It is remarkable that Chlorophyceae is the most abundant class in selected dam throughout the study period.

Zygnematophyceae: The class contributed 16.66 % of total phytoplankton forming the third largest class of phytoplan-kton. This class contains genera *Spirogyra, Closterium, Zygnema and Cosmarium* (Table-1).

Bacillariophyceae : This group was formed the second largest group of phytoplankton with average contribution of 25 % to the total phytoplankton types. It included genera *Stauroneis, Diatoms, Diadesmis, Diadesmis, Didymosphenia and Navicula.*

Cyanophyceae: The class accounted for a contribution of 8.33 % to the total phytoplankton. *Anabaena* and *Oscillatoria* are the genera found in water samples.

Flagillariophyceae: The class contributed value *i. e.* 8.33 % of total phytoplankton. This class involved the genera *Fragilariforma* and *Fragilaria.*

Ulvophyceae: This group showing average contribution of 4.16 % to the total phytoplankton types. The Ulvophyceae class showed genus *Ulothrix.*

Trebouxiphyceae: This group showing normal contribution of 4.16 % to the total phytoplankton types. The class Trebouxiphyceae showed genus *Chlorella.*

Euglenoideae: This group contributes 4.16% to the total phytoplankton production and was represented by *Euglena.* On the basis of their abundance their occurrence classified as dominant, Sub-dominant, frequent and rare. About ten taxa of zooplankton were found during the study period.

Monogononta: Among all observed zooplankton these formed the largest group of zooplankton contributing 30 % to the total zooplankton types. The Monogononta class

includes genera *Brachionus, Keratella* and *Filinia.*

Branchiopoda: Among all observed zooplankton these formed the largest group of zooplankton contributing 30 % to the total zooplankton types. Daphnia, Moina and Bosmina are the genera belonging to class Brachiopoda.

Maxillopoda: The class contributed 20 % of total zooplankton. The genera belonging to Maxillopoda are Cyclops and Diaptomus.

Ostracoda: Among total zooplankton population this group showing average contribution of 10 %. The class Ostracoda showed genus *Cypris.*

Ciliatea: Among total zooplankton population this group showing average

Table-1. The occurrence of phytoplankton from Godavari River water from Nanded city

Sr. No.	Phytoplankton	Occurrence
1	*Oedogonium*	Dominant
2	*Ankistrodesmus*	Dominant
3	*Chlamydomonas*	Dominant
4	*Hydrodictyon*	Dominant
5	*Carteria*	Sub-dominant
6	*Pandorina*	Frequent
7	*Volvox*	Dominant
8	*Stauroneis*	Dominant
9	*Diatoma*	Dominant
10	*Diadesmis*	Rare
11	*Frustulia*	Dominant
12	*Didymosphenia*	Rare
13	*Navicula*	Dominant
14	*Spirogyra*	Dominant
15	*Closterium*	Dominant
16	*Zygnema*	Frequent
17	*Cosmarium*	Dominant
18	*Fragilariforma*	Dominant
19	*Fragilaria*	Frequent
20	*Anabaena*	Sub-dominant
21	*Oscillatoria*	Frequent
22	*Ulothrix*	Rare
23	*Chlorella*	Dominant
24	*Euglena*	Dominant

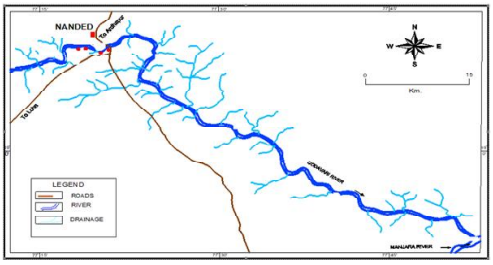


Fig. 1: Display the sampling locations in the Godavari River of Nanded City, Maharashtra.

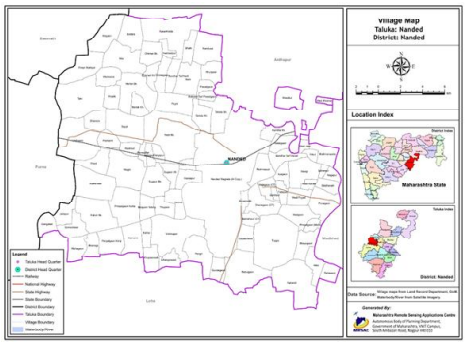
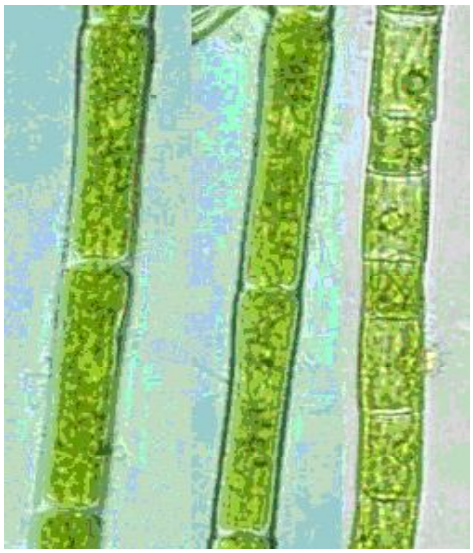
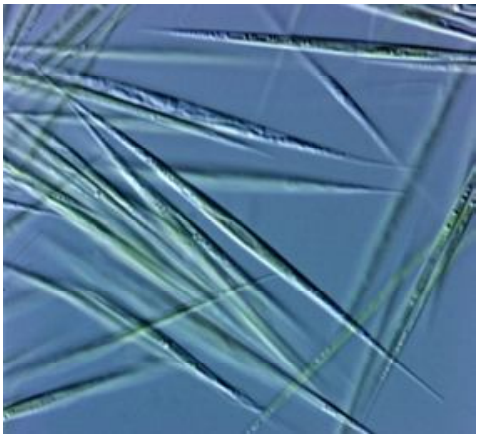


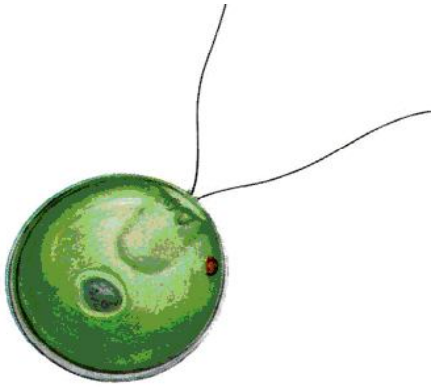
Fig. 2: Showing location of Nanded taluka in Nanded district, Maharashtra, India.



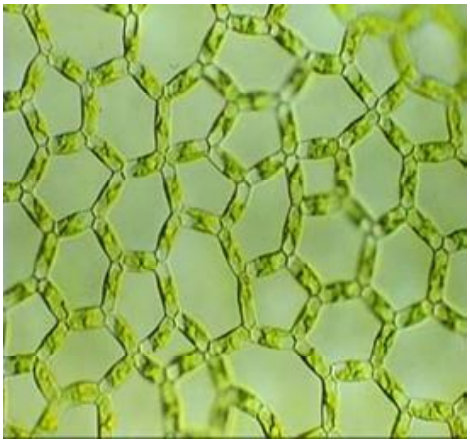
(a) *Oedogonium*



(b) *Ankistrodesmus*

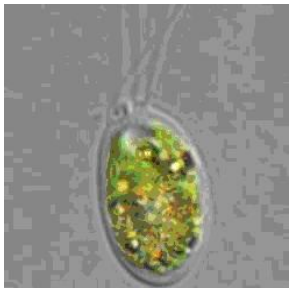


(c) *Chlamydomonas*

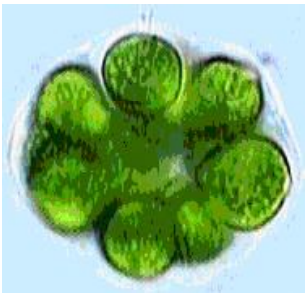


(d) *Hydrodictyon*

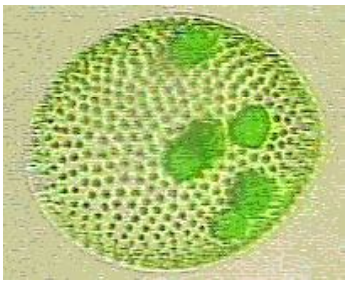
Fig. 3: Phytoplankton genera observed and identified from Godavari River [a-x]



(e) *Carteria*

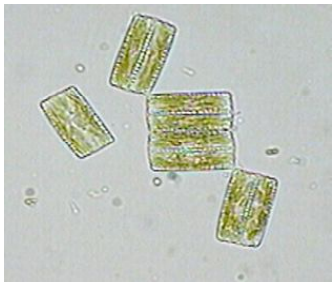


(f) *Pandorina*

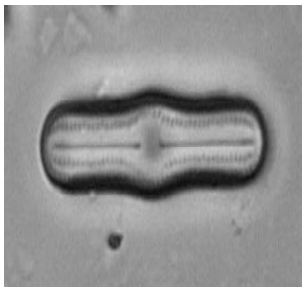


(g) *Volvox*

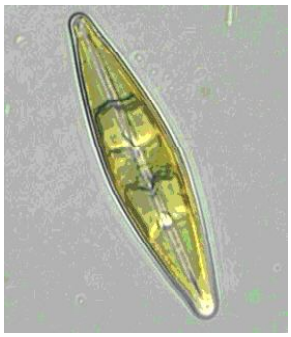
(h) *Stauroneis*



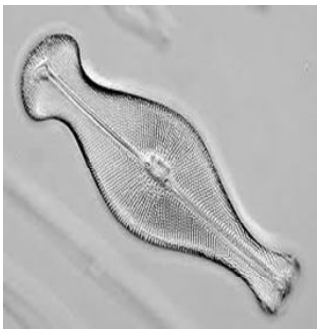
(i) *Diatoma*



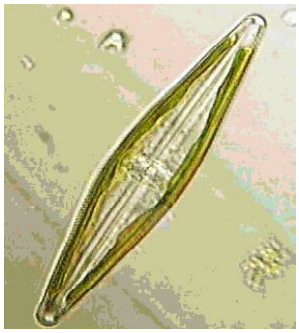
(j) *Diadesmis*



(k) *Frustulia*



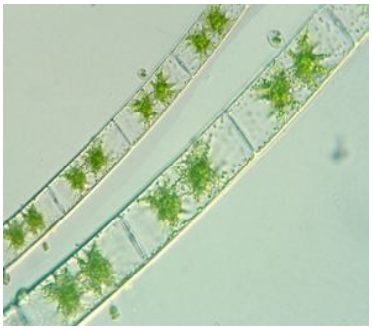
(l) *Didymosphenia*



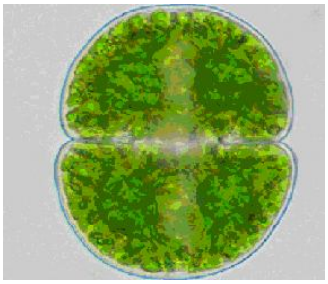
(m) *Navicula*

(n) *Spirogyra*

(o) *Closterium*

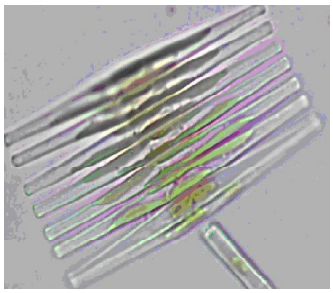


(p) *Zygnema*

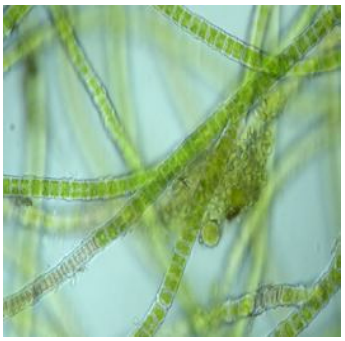


(q) *Cosmarium*

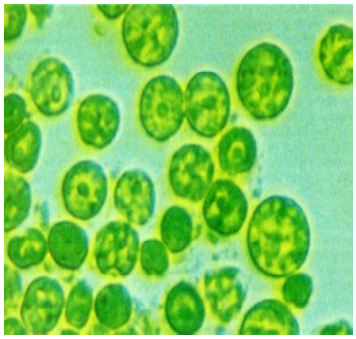
(r) *Fragilarioforma*



(s) *Fragilaria*

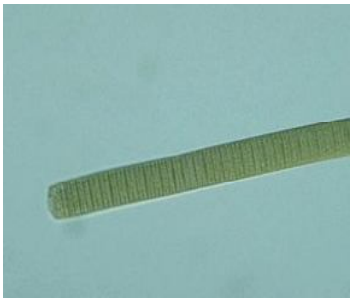


(t) *Ulothrix*

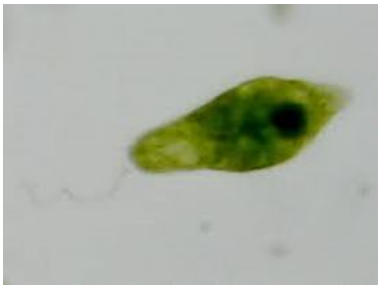


(u) *Chlorella*

(v) *Anabaena*



(w) *Oscillatoria*



(x) *Euglena*

contribution of 10 % and it represented by genus *Paramecium*. The zooplankton taxa from class Monogononta and Brachiopoda showing more contribution among total zooplankton.

Chlorophyll is the major green algae of freshwater green algae. These include the most unique species and many of the species found in the palm trees of the ecosystem (1980). It can be seen in a wide range of floating water, including lakes and rivers. *Spirogyra* is believed to be the location of the Bold & Wynne River[3]. From May 1999 to June 2000, phytoplankton from his Faizabad lake in his Girija Kund on Lake McBala in India grew into cyanobacteria (cyanobacteria).

The chronological distribution of the Yukon era showed the growth characteristics of Cyanobacteriaceae> Bacillusceae> Chlorophyceae Dwivedi and Pandey[5]. The moon was also modeled at the location of Lake Cipririna. A medium-sized phytoplankton was discovered in Gore's donor in his bay in March 2007. They have identified 26 different phytoplankton species / genes, most of which are associated with the diatom Ravi and other diatoms. (2009): In 2005, a climate study on the Mutapune River in India found blue-green diatoms during his remote monitoring of fluctuating algae and the like.

In 1999 Niger he compared his Fittplancaton community in the Delta and reported that they had lower cell densities in the dry summer than green algae. The diversity and composition of seaweed off Niger is different from the peak of the Yakubu era[15]. Pulle and Khan[11] studied phytoplankton during the human-to-human transition of the Isapur dam from 1998 to 1999. A medium-sized phytoplankton, Ravi Lil (2009), was discovered in March 2007 in his Donna Pola Bay in Goa.

He pointed out that 26 different species / families of phytoplankton and the majority are siliceous algae. Yannawar *et al*.,[16] studied the top ten phytoplankton species observed in the Saharkand Nandi waterfall, Maharashtra, namely Hydrodictyon (Network), *Oedogonium, Anabaena, Oscillatoria, Spirogyra, Zygnema,* Diatoms, *Chlorella* and *Clostridium*. Similar results are observed by Patel *et al*., (2012) as Phytonic diversity of Jalgaon district, Maharashtra, India.

The availability of good number of Phytoplankton are the indicators of the healthy aquatic ecosystem of the Godavari River. But increasing the load of anthropogenic activities in the surrounding area of the Godavari River are the main reason to the decreasing the numbers of the genera respectively. The genera belonging to Chlorophyceae class are main in selected Godavari River main stream throughout the study period of (2019-2020). However, as per objectives of study the plankton observed by qualitative (Identification) method. My observation showed that, variety of freshwater plankton was found in the selected samples.

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