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CYANOBACTERIAL DIVERSITY IN CHANDO, AN OXBOW LAKE OF RIVER MANORMA, BASTI (U.P.) INDIA.

ANURADHA SHUKLA* AND J.P. SHUKLA

P.G. Deptt. of Zoology, M.L.K.P.G. College, Balrampur, (U.P.)
**P.G. Deptt. of Zoology, S. Kisan P.G. College, Basti,. (U.P.)*

ABSTRACT

Blue green algae are prokaryotic in nature and belong to the class cyanophyceae or myxophyceae. Since these are prokaryotic in nature like bacteria hence, these are called as Cyanobacteria, though they are regarded as potential nuisance In aquatic bodies and also risk for human health. However, they play a major role in atmospheric nitrogen fixation. Present study has been undertaken to record the cyanobacterial population diversity from Chando, an oxbow lake of river Manorma, Basti (U.P.). Preliminary survey reveals the presence of members of order nostocales and chlorococoales of class myxophyceae. The survey reveals the presence of 07 species in Chando lake. The description structure and prevalence status has been discussed in this paper.

Key Words : Cyanophyceae, Chlorococales, Nostocales, Chando lake, Manorma river.

ANURADHA SHUKLA
P.G. Deptt. of Zoology, M.L.K.P.G College, Balrampur (U.P.)

**Corresponding author*

INTRODUCATION

Natural condition of aquatic body is helpful in propagation of aquaculture. The overall condition or picture of aquatic ecosystems is determined by the interaction of all its physical, chemical and biological components. Ecological assessment considering all components of the ecosystem assist in arriving at appropriate conservation stage and restoration methods towards the conservation management and sustainable use of natural aquatic resources. Radiant energy fixed both by phytoplankton and aquatic vegetations constitute the major source of energy in the food web of any aquatic ecosystem and are regarded as biological wealth of water for fishes. The real picture of productivity of any aquatic system may be judged by phytoplankton biomass. The biomass population fluctuates depending upon the hydrological regime, pollutional load and saprobiotic condition of the water. Phytoplankton in an aquatic body are dependent on various interrelated abiotic and biotic factors. Blue green algae belong to class myxophyceae or cyanophyceae and are well known nitrogen fixers in the natural aquatic bodies. Sporadic studies have been made on the planktonic forms of algae including blue green algae called Cyanobacteria in India in general and eastern (U.P.) in particular (Prasad and Mishra,1992; Prasad and Srivastava, 1992;Verma *et al.*,1996, 2000 Mishra *et al.,* 2001, 2002; Shukla *et al,* 2012 a,b). At global level, algal desmids in different regions have been studied by Brook, 2001; Dingley 2001 2002;Coesel, 2002; Prakash *et al*; 2005. District Basti is situated in the north east region of Tarai and Bhabhar belt in (U.P.). It is surrounded by Gorakhpur in east, Gonda in the west, Siddhartha Nagar adjacent to Nepal in the north and Faizabad in the south. Chando lake is a large oxbow lake of river Manorma and about 12 Km. away from city headquarter and10 Km. south east from national highway no.27 south to bhadurpur block near Nagar toTanda road. It is wetland area of about 650 hectares and may increase upto 800 hectares during rainy season. Since, no study has been yet undertaken to record the cyanophyceae members (blue green algae) or cyanobacteria in aquatic bodies of eastern (U.P.) in general and chando lake of Basti in particular, hence, present study has been undertaken to record the diversity in the members of Cyanophyceae.

MATERIALS AND METHODS

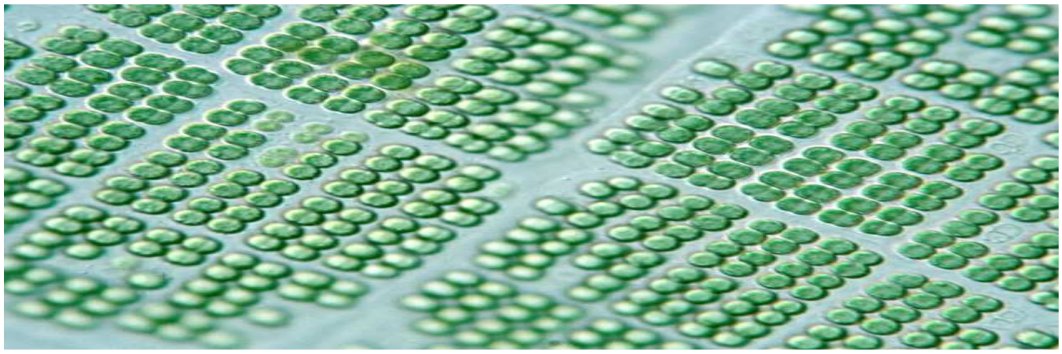
For qualitative analysis of cyanobacteria, observations were made from June 2010 – May 2012 from different sampling points of vast Chando, an oxbow lake of river Manorma Basti. Collections were made with the aid of planktonic mesh net. Blue green algae samples were prepared by staining with iodine and mounted in glycerin. Further, detailed study of members of blue green algae belonging to (class myxophyceae or cyanophyceae) was done under Nikon labophoto IInd microscope E-400 with H-IIIrd photomicrography attachment. Further enlarged view of different members of cyanophyceae were done using trinocular research microscope with computer screen connection. Occurrence of any blue green alga several times reveals maximum prevalence denoted by (+++) and gradually of declining in prevalence denoted by (++) and (+) respectively.

RESULTS AND DISCUSSION

The systematic description of the members of class Cyanophycea and their respective orders found in Chando lake covering an area of about 650 hectares are as follows –

1.Order- Chlorococcales
Genus - ***Merismopedia glauca (Ehr.)***
Salient Features

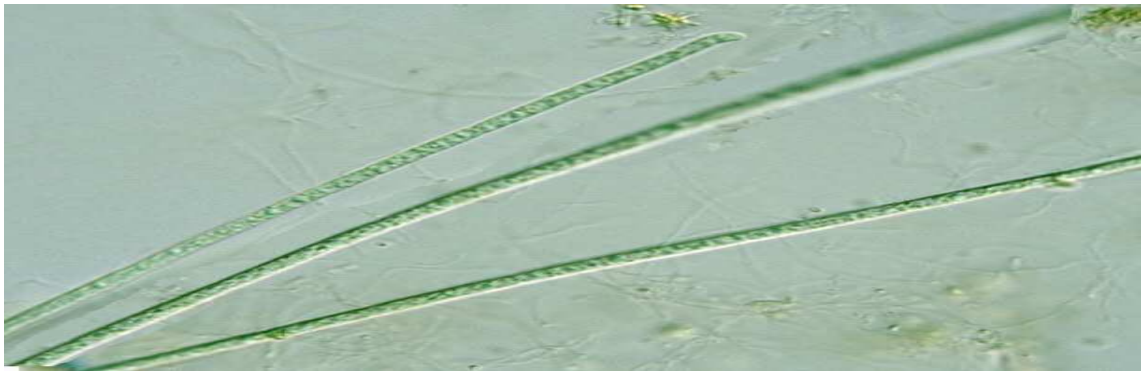
- Colony light blue green
- Shape roughly rectangular with slightly sinuate crenate margins.
- Cells ovate or hemispherical usually present in multiples of four.
- Cells diameter 2-3 µm arranged to form quadrangular colonies.
- Cell content homogenous without granules.
- Cell wall smooth and thick.
- Each cell having distinct gas vacuole.
- **Locality** : Pokharni, south west near Jasaipur.



- **Prevelance** : (+)
- **Collection number and date** : CL/1 (27/06/2010)

2. Order – NOSTOCALES
Genus – ***Oscillatoria chlorina (Kauetz Ex. Gomant)***
Salient Features

- Trichomes short, solitary, yellowish green, somewhat straight, not tapering at apex.
- Cells 4.5 – 5.5 µm in diameter.
- Some cells are quadrate and some are shorter and broad



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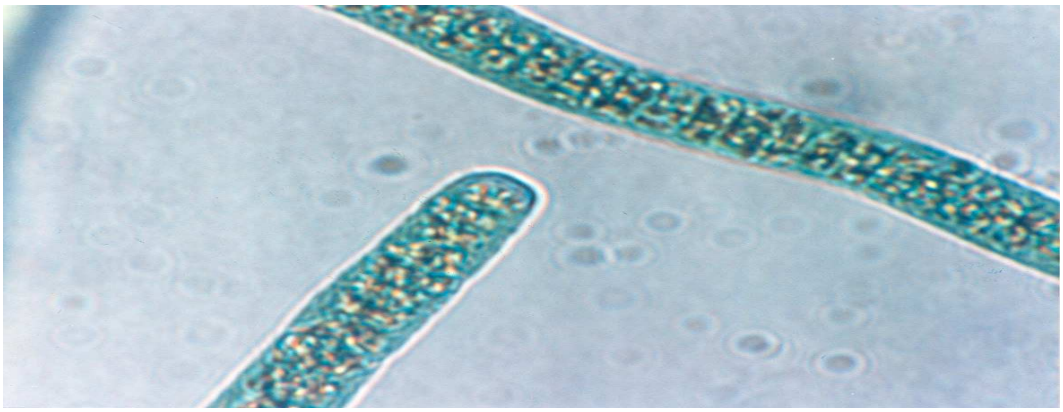
- 3.5 – 5 µm long cells content yellowish, greenish homogenous without granules and gas vacuoles.
- Cell wall thick and smooth.
- **Prevalence :** (+++)
- **Locality :** Chando lake near Nagar Bazar.
- **Collection no. & Date :** CL/2 (27/06/2010)

Genus – *Oscillatoria terebriformes (Ag. Ex. Gomont)*

Salient Features

- Trichomes thin, aggregated forming light blue green thallus and straight.
- Cells 3.0-5.4 µm in diameter, quadrate or longer than broad. Cell content blue green, homogenous, without granules and gas vacuoles.
- Ends rounded or obtusely rounded, not capitate. Calyptra absent
- Cell wall thick and smooth



- **Locality :** Chando pond near Pokharni.
- **Collection no. & Date :** CL/3 (09/10/2010)
- **Prevalence :** (+ +)

Genus – *Oscillatoria princeps (Voucher Ex. Gomnt)*

Salient Features

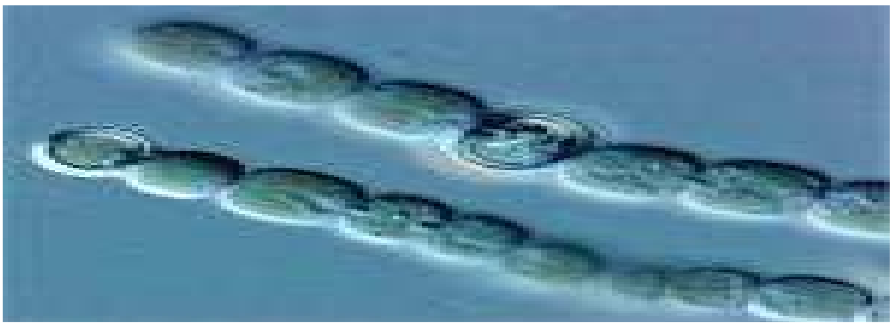
- Trichomes solitary or loosely entangled to form brownish green floating masses.

- Almost straight or slightly curved at apex, rigid, very slightly tapering toward the apices, not constricted at the cross walls.
- Calls 19.0-40.5 µm long and its contents olive blue green, homogenous, gas vacuoles may or may not be present.
- If granules are present, distributed irregularly through out the cells and the cells are with or without wavy margins.
- Cell wall thick and smooth.
- **Prevalence :** (+++)
- **Locality :** Chando lake near village Phulvariya.
- **Collection no. & Date** : CL/4 (10/10/2010)

Genus – *Cylindro spermum musicola (Kuetz. Ex. Born. Flah)*

Salient Features

- Filaments entangled in mucilaginous expanse
- Forming blue green patches.
- Trichomes 4-.0-6.0 µm in diameter.
- Cells distinctly constricted at the cross wall somewhat quadrate or cylindrical. 4.0 – 8.5 µm long,
- Cell contents olive green, homogenous without granules and gas vacuoles.

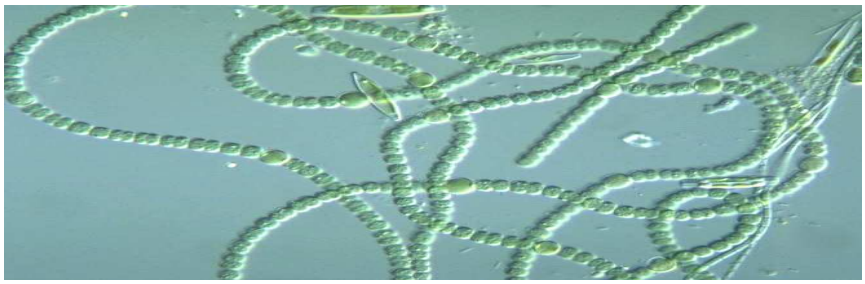


- Heterocyst terminal, unipored, oblong or obtusely conical.
- 5.0-7.5 µm broad, 5.5-9.5 µm long, akinetes avoid to ventricove eliptic, yellowish brown 11.0-17.0 µm broad, 18-21µm long.
- Cell wall thick and smooth.
- **Prevalence** : (++)
- **Locality :** Chando lake near village Jasaipur.
- **Collection no. and Date** : CL/5 (22/02/2011)

Genus – *Anabaena torulosa (Carm.)*

Salient Features

- Trichomes solitary or entangled in a thin, light brownish green mucilaginous mass.
- Almost straight or slightly bent, free floating.



- Cells 4.0- 4.5 µm in diameter, 5.0- 8.5 µm long barrel shaped or cylindrical often slightly constricted at center.
- Cells contain light blue green, homogenous without granules and gas vascular, end cells actually conical with rounded apices.
- Cell wall smooth, thick, heterocyst intercalary, bipolar, sub globular or ovoid.
- Spores brownish yellow, 7-9 µm broad and 11-19 µm long, sub cylindrical or elongate –ovate with rounded or flat ends.
- Epispore wall smooth, thick, pale brown in colour.
- **Locality** : Chando lake near village Katharjungle
- **Collection no. & Dated :** CL/06 (09/04/2012)
- **Prevalence :** (+++)

Chando an oxbow lake of river Manorma is interior of District headquarter and being no industrialization in this area, is unplluted, undisturbed representing sustainable lentic ecosystem. Reports reveal that the physico-chemical parameters deviate little in different seasons vig. Premansoon, Mansoon and Post mansoon; Shukla *et al* 2008, 2011 a, b,c ;Shukla and Shukla 2009; Shukla and Shukla2012 a,b,c. Blue green algae belong to class cyanophyceae and are prokaryotic, hence referred to as cyanobacteria.The high productivity of water bodies could be a source of many water quality problems obnoxious tastes and odour in water bodies. Cyanobacteria are the potential offenders. Cyanobacteria also produce a variety of toxins that may cause gastroenteritis, allergic reactions and hepatic disorder. On the other hand, they are indicator of productive potential of the lentic or lotic bodies. Since these act as nitrogen fixers. Though members are available on the anthropogenic toxic constituent (Shukla and Shukla 2011,2012e), however sporadic studies have been made on the diversity of biotoxin releasing prokaryotes i.e. cyanobacteria. Chando lake appears to be important for biotic diversity and our results provide an opportunity to investigate further the different algal forms occurring naturally in lentic and lotic waters. Limnological studies on diurnal variation of algal species may bring interesting results. Previous study made by Shukla and Shukla 2008, 2009, 2011 a, b, 2012 a, b, c; Shukla *et al;* 2011 a, b, 2012, a, b, on floristic variation and richness of algal species reveal that eastern part of U.P. in general and large lakes like Chando in particular appears to be very interesting and a comprehensive study on the overall algal composition of this area may reveal more interesting forms. In our observation, there is also prevalence of *Anabaena jyengarii,* however, due to disturbance in the preparation, it could not be firmly detected.

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