

Note on *Ankistrodesmus* Corda and *Kirchneriella* Schmidle in Hooghly, West Bengal, India

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To cite this article:

Halder, N. Note on *Ankistrodesmus* Corda and *Kirchneriella* Schmidle in Hooghly, West Bengal, India. *Mesop. environ. j.*, 2016, Vol. 2, No.2, pp. 40-46.

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Abstract

The present communication was dealt with morpho-taxonomic descriptions of two Chlorophycean algal Species namely *Ankistrodesmus densus* Korshikov and *Kirchneriella lunaris* (Kirch.) Möebius, belonging to the two separate genera *Ankistrodesmus* Corda and *Kirchneriella* Schmidle. They are included in the order Chlorococcales of class Chlorophyceae. These species were grown in association with other coccoid green algal members and explored from two aquatic ecosystems viz. pond and river in Hooghly district, West Bengal, India. Both are formed colonies of aggregation of green cells. In the former species, colony of elongated acicular cells with pointed ends was observed while, the later showed colony of lunate cells with rounded ends. They prefer to grow from late monsoon to winter season. These two taxa are being reported as new records from this area. The limnological study revealed that they can tolerate fluctuation of temperature and turbidity in water bodies. Moderately alkaline water and total alkalinity values affect their occurrences. In addition to these, inorganic nitrate-nitrogen and phosphate availability in aquatic bodies help their growth.

Keywords: Taxonomy, *Ankistrodesmus* Corda, *Kirchneriella* Schmidle, West Bengal, India.

Introduction

Hooghly district (20°30'32"-23°1'20" N, 87°30'20"-80°30'15"E) is situated on the West bank of the river Ganga (Hooghly) under Indo-Gangetic plains which is enriched with different types of water bodies such as rivers, ponds, moats, floodplain wetlands and rice fields that support the luxuriant growth of various types of algae [1, 2]. The average annual rainfall is 1500 mm [3]and near Ca 80% rainfall received during the monsoon. Algae are ecologically very important phycoflora because they considered as the basic component of the aquatic food chain and they are also act as a primary producers. Besides these, they provide oxygen and nutrients to the aquatic fauna that are necessary for their survival [4]

The thallus of *Ankistrodesmus* Corda is colonial, rarely solitary, microscopic and fasciculate; cells forming clumps or loose to dense fascicles, parallel or sometimes spirally arranged around each other. Cells are fusiform, longer than wide, may be straight, curved or sigmoid throughout their length and with gradually or abruptly tapering ends. Reproduction takes place by formation of 2-16 autospores. On the other hand, the thallus of *Kirchneriella* Schmidle is similarly colonial and microscopic. Colony consists of up to 64 cells of lunar or crescent-shaped; cells bluntly pointed, strongly curved and irregularly arranged or in groups of 4-16. Reproduction takes place by formation of 4-8 autospores.

These two genera are commonly found in numerous tropical aquatic bodies, primarily those with rich in higher nutrient content. Taxonomic studies of these above said species are scanty for West Bengal though few taxonomical studies on Chlorococcales members were made by earlier [5, 6, 7]. As, all types of algae have ecological importance to sustainability the aquatic ecosystems [8] considering this fact, the present work had been undertaken. This study was aimed to identify the taxa belonging to the order Chlorococcales of the class Chlorophyceae and contribute to the knowledge of Chlorophyceae from this area.

Materials and methods

Algal samples were collected in plastic and glass containers from different sites viz. pond at Khamargachi (23.05°N, 88.25°E) and Hooghly river at Kalichar ghat (23.12°N, 88.42°E) of Hooghly district (**Fig.1**). A detailed morphotaxonomic study was made by examining specimens under Olympus microscope (Model-CH20i) for determination of species. Samples were preserved in 40% formalin. Identifications of taxa accomplished with the help of authentic literatures [9, 10, 11, 12, 13, 14]. The pH and temperature of the water bodies were determined at the sites immediately after collection with the help of portable pH meter (Model No. PP9046 Philips, India) and Zeal's mercury thermometers (UK).The other limnological parameters such as nitrate-nitrogen (NO₃-N), phosphate (PO₄³⁻), dissolved oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand (COD), turbidity and total alkalinity of waters were estimated by UV-VIS Spectrophotometry (CECIL CE- 7200) following the standard method [15].

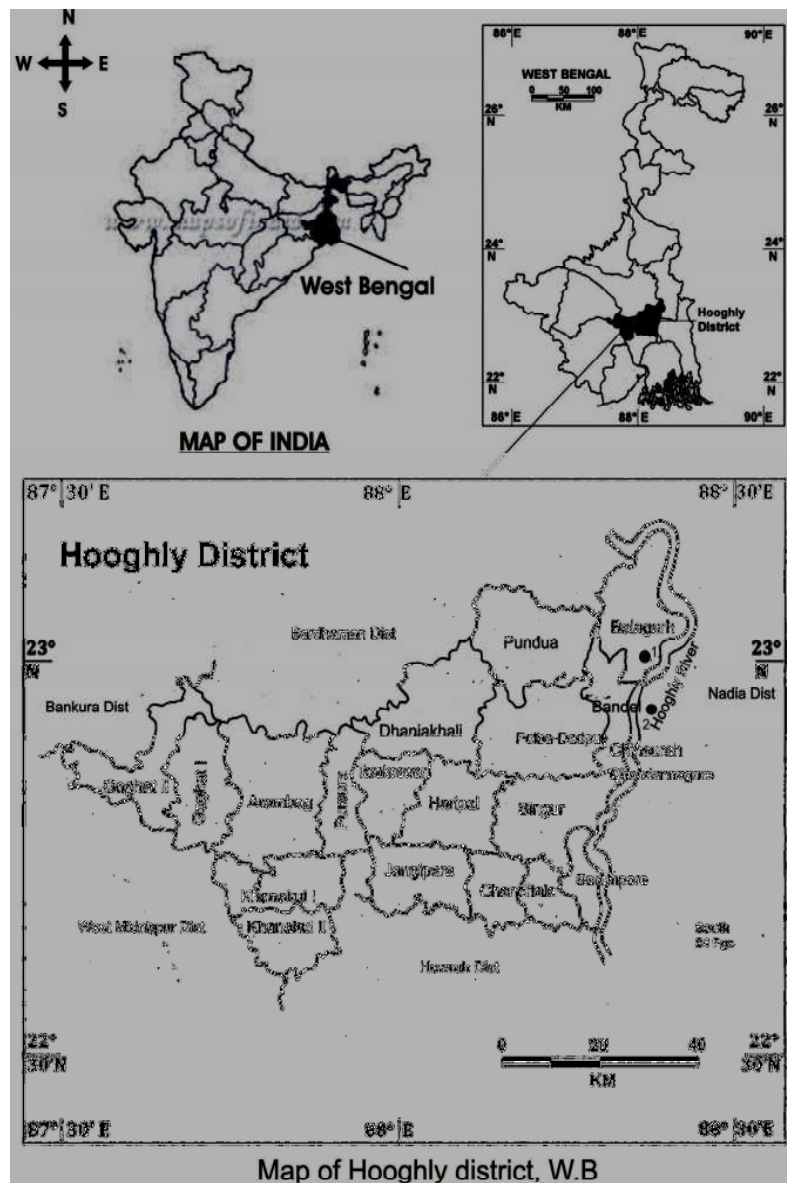


Fig.1: ● indicated collection sites (1&2)

Results and discussions

Two Chlorococcalean species, *Ankistrodesmus densus* Korshikov and *Kirchneriella lunaris* (Kirch.) Möebius, are belonging to the division Chlorophyta under the class chlorophyceae. These taxa included in the order Chlorococcales of the family Oocystaceae. *Ankistrodesmus densus* Korshikov belongs to the genus *Ankistrodesmus* Corda while other taxon is included under the genus *Kirchneriella* Schmidle. Both are important phytoplanktons of Chlorophyceae which were collected from Hooghly district in West

Bengal, India. These two taxa had been taxonomically described with ecological note, threats and significance for the first time. Each currently accepted name had been provided with its author(s) name.

Morphotaxonomic Enumeration

Key to the genera

1a. Cells acicular to fusiform; mucilaginous envelope absent----- *Ankistrodesmus* Corda

1b. Cells lunar-shaped; strongly curved; mucilaginous envelope present--*Kirchneriella* Schmidle

Order: Chlorococcales

Family: Selenastraceae

Genus: *Ankistrodesmus* Corda

Species: *Ankistrodesmus densus* Kors. (pl. 1, fig. 1)

[16] 300, fig. 262; [13] 92, fig. 26-28; [14] 425, fig. 2b.

Description: Thallus colonial; colonial sheath absent; colony fasciculate or clustered of 16 or more densely grouped of cells; cells 18 to 40 times longer than broad, fusiform, curved or sigmoid throughout their length, gradually tapering towards the apex, superimposed on each other; cell 40.0 to 55.0 µm long and 1.5 to 3.0 µm broad; chloroplast single and parietal without pyrenoids.

Habitat: Pond water at Khamargachi.

Collection No: 685; **dated:** 26.08.10

Threats: Loss and damage of habitats and water pollution.

Significance: Primary producer and component of aquatic food chain freshwater ecosystems.

Order: Chlorococcales

Family: Selenastraceae

Genus: *Kirchneriella* Schmidle

Species: *Kirchneriella lunaris* (Kirch.) Möb. (pl. 1, fig. 2)

[17] 18, 331; [18] 114; [9] 141, pl.34, fig.4; [10] 258, pl.58, fig.2; [11] 222, fig.131; [12] 40, fig.130; [8] 93, fig. 35-36.

Raphidium convolutum var. *lunaris* Kirchner

Description: Colony consists of numerous lunar or crescent- shaped cells; cells bluntly pointed and strongly curved; irregularly arranged in groups of 4-16 cells within a very close gelatinous envelope;

chloroplast covering convex wall; colony up to 55.0 µm in diameter; cells 3.5 to 9.5 µm long and 4.5 to 6.5 µm broad.

Habitat: Hooghly River.

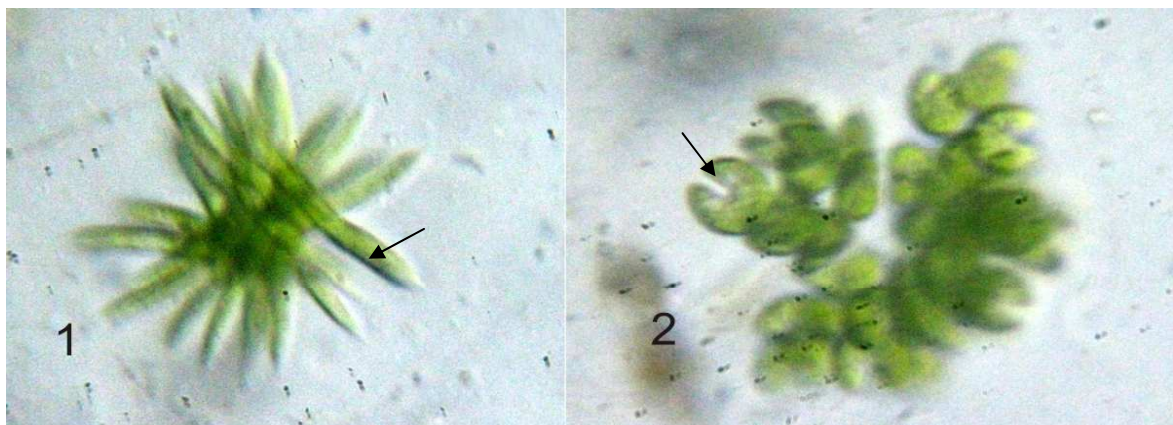
Collection No: 605; **dated:** 16.12.09

Threats: Loss and damage of habitats and water pollution.

Significance: Primary producer and component of aquatic food chain in freshwater ecosystems.

Table 1: Physicochemical characteristics of water bodies at the time of algal collections (Mean±SE)

| Collection sites | Physicochemical parameters | | | | | | | | |
|---------------------|----------------------------|----------|-----------|------------|------------|--------------------------------------|--------------------------------------|-------------------------|------------------|
| | Temp. (°C) | pH | DO (mg/l) | BOD (mg/l) | COD (mg/l) | NO ₃ ⁻ N(mg/l) | PO ₄ ³⁻ (mg/l) | Total alkalinity (mg/l) | Turbidity (mg/l) |
| Pond at Khamargachi | 28° ±0.2 | 7.5±0.05 | 6.6±0.1 | 4.4±0.2 | 120.0±5.5 | 0.30±0.05 | 0.34±0.05 | 128±1.1 | 16±1.0 |
| Hooghly river | 19°±0.3 | 7.3±0.04 | 7.0±0.2 | 4.0±0.1 | 110.0±3.7 | 0.45±0.1 | 0.42±0.05 | 114±0.6 | 32±2.0 |



20µm

Plate (1): figs.1-2: 1. *Ankistrodesmus densus* Kors., 2. *Kirchneriella lunaris* (Kirch.) Möb.

The above said algae had been classified on the basis of classification system proposed by the algologist, Smith [19]. These two algal taxa had been collected from lentic and lotic water bodies during late monsoon and winter in West Bengal, India. Both the genera are planktonic, consist of clustered of vegetative cells and bright green in colour. *Ankistrodesmus densus* Kors. contained acicular-shaped cells with acute apices whereas, *Kirchneriella lunaris* (Kirch.) Möb. exhibited lunar-shaped cells.

The results of analysis of environmental parameters or limnological parameters at the time of algal sample collections had been given in table-[1]. The temperature was fluctuated between 19°C and 28°C. So, they can tolerate fluctuation of temperature. Water was found alkaline and the values were 7.3 to 7.5. It indicated that these algal taxa prefer to grow in alkaline type of water. DO value was observed above 6.0 mg/l which was a good sign of water health and it also suggested that these water bodies could be utilized as fishery purposes, agricultural activities and domestic uses. Higher level of DO in these aquatic ecosystems could be due to greater aeration or photosynthetic activities. The results of BOD and COD contents of the water bodies indicated some organic load in water bodies but still they were productive. It was noted that NO₃-N: PO₄³⁻ ratios were favourable for their occurrence and growth in the studied aquatic bodies. Total alkalinity values in these sites, ranged from 114.0-128.0 mg/l and turbidity value in the river Ganga was comparatively higher might be due to addition of much silts, muddy soil particles or other suspended electrolytes in this lotic water body. Turbidity is influenced by the amount of total dissolved solids in the water [20]. Same finding was observed in the present work during limnological study. As the diversity of algae in aquatic ecosystems, is influenced by the physical- chemical and biological properties of the water [21] therefore, this type of investigation is very impressive to make correlations between algae and the influencing environmental factors and to assess interactive roles of algal populations within the aquatic bodies. Some algae are bioindicator for the assessment of water quality [4]. So, the presence of these algal taxa in water bodies could be used to evaluate moderate level water pollution.

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