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Research article

Morpho-taxonomy of *Hydrodictyon reticulatum* (L.) Lagerheim and *Pediastrum tetras* var. *tetraodon* (Corda) Hansgirg, Hooghly, West Bengal, India

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Abstract: The present paper was communicated with the morpho-taxonomic descriptions of two freshwater members *viz. Hydrodictyon reticulatum* (L.) Lagerheim and *Pediastrum tetras* var. *tetraodon* (Corda) Hansgirg belonging to the family Hydrodictyaceae of the class Chlorophyceae. The two taxa were collected from aquatic ecosystems in Hooghly district, West Bengal, India. The limnological characteristics of the water bodies where they occurred were recorded. The above stated taxa were new taxonomic reports from this district and *Pediastrum tetras* var. *tetraodon* (Corda) Hansgirg was new report from West Bengal, India.

Keywords: Morpho-taxonomy - New report - Hydrodictyaceae - Limnology - West Bengal.

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INTRODUCTION

Algae are photoautotroph, replenish oxygen content in water, dominant primary producer and contribute much to the productivity of freshwater ecosystems. On the other hand, physico-chemical parameters affect the composition and diversity of algal flora in aquatic bodies. Therefore, morpho-taxonomic study for documentation of algae and assessment of water quality are of utmost importance in taxonomic and ecological investigation.

Hydrodictyon reticulatum known as "water net" is widely distributed in Asia, North Africa, Europe, America and New Zealand. This alga is characteristic of the northern warm-temperate zone (Pocock 1960). It is a macroscopic, free-floating and filamentous green alga that forms a closed, pentagonal or hexagonal net of coenocytic cells in water bodies. At maturity, the alga turns into slightly yellowish colour and the coenocytic cells are detached from each other or the coenobium is disintegrated and can form vegetative daughter nets. Whereas, the genus *Pediastrum* was established by Meyen in 1829 and it is an interesting coenobial chlorococcalean algal genus which grows commonly as planktonic form or in periphytic association (grows on submerged plants or other water logged objects) of freshwater habitats. This is a microscopic green alga and occurs commonly in natural freshwater bodies like ponds, lakes, moats, rivers and other aquatic reservoirs. This alga was found generally in post monsoon season in the district Hooghly, West Bengal. It should be mentionable that after the publication of the monograph "*Chlorococcales*" by Philipose (1967), several authors added many algal taxa in the order Chlorococcales from the Indian sub-continent. Singh (1973), Patel & George (1982), Pal & Santra (1984), Sharma *et al*. (1985), Pal *et al*. (1986), Banerjee & Santra (2001), Jena & Adhikary (2007), Mallick & Keshri (2008, 2009) and Sau & Gupta (2008), Kumar *et al*. (2012), Rai & Misra (2012) and Keshri & Mallick (2013) were some contributors who had worked earlier on the taxonomy of these algae.

MATERIALS AND METHODS

The algae had been collected in glass containers from different places *viz.* Tribeni (N 22°99' E 88°40'), Chinsurah (N 22°90' E 88°39'), Khamargachi (N 23°05' E 88°43'), Dumurdaha (N 23°03' E 88°43'), Magra (N 23°12' E 88°28'), Kamarkundu (N 23°83' E 88°20') and Hooghly river at Kalichar Ghat (N 23°03' E 88°26') of Hooghly district, West Bengal. Detailed study was made by examining specimens under Olympus microscope (Model-CH20i) for identification of species. Samples were preserved in 4% formalin. Identifications of these

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taxa were accomplished with the help of authentic literatures *viz.* Phlipose (1967), Singh (1973), Coffey& Miller (1988), Sharma *et al*. (1985), Kumar *et al*. (2012) and Rai & Misra (2012).The pH and temperature of the water bodies were determined at the site 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 (NO_3-N), phosphate (PO_4^{3-}), dissolved oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids (TDS)and sulphate (SO_4^{2-}) of waters were estimated by UV-VIS Spectrophotometry (CECIL CE- 7200) following the standard method (APHA 2005). All the physico-chemical parameters in ecological notes are expressed in mg/l except pH and temperature.

RESULTS AND DISCUSSION

A total number of two algal species *viz. Hydrodictyon reticulatum* (L.) Lagerheim & *Pediastrum tetras* var. *tetraodon* (Corda) Hansgirg under the genera *Hydrodictyon* Roth and *Pediastrum* Meyen of the family Hydrodictyaceae belonging to the order Chlorococcales of the class Chlorophyceae were recorded for the first time from different aquatic ecosystems in Hooghly district of West Bengal, India. Each currently accepted name has been provided with its author (s) name. They were described below:

Morpho-taxonomic description

1. *Hydrodictyon reticulatum* (L.) Lagerheim in K. Svenska.Vetenskakad. Förhandl. 40: 71, 1883; Biswas, Rec. Bot. Surv. India 15 (1): 68. Pl. 3. fig. 29, 1949; Philipose, Chlorococcales 134. fig.48, 1967; Coffey & Miller, New Zealand Journal of Botany, 26: 319.figs. 2-5, 1988; Anand, Indian freshwater microalgae 32.fig. 90, 1998; Kant & Gupta, Algal Flora of Ladakh 81.pl.19. fig. 6, 1998. **(Figs. 1 A-B)**

Conferva reticulate L. 1753; *Hydrodictyon utriculatum* Roth 1800.

Plant macroscopic, grass green; free floating, saccate reticulum, colonial; colonies reticulate; 6 cells adjoined together end to end walls repeatedly forming hexagonal mesh and whole structure of the alga appears as cylindrical net; net may vary in size; cells coenocytic, elongate, cylindrical, 51.2–54.8 µm long, 9.1–10.8µm broad; cell wall smooth, double layered; chloroplast reticulate; pyrenoids many; asexual reproduction by auto colony formation.

Habitat: Ponds water at Tribeni and Chinsurah; canal water at Khamargachi, moat water at Dumurdaha and rice fields in Magra.

Collection No: 138, 808; **Dated:** 20.03.06, 03.01.11

Ecological Notes: Grows as weed & forming net in pond at Tribeni; water temperature: 20ºC; pH: 7.6; NO_3-N: 0.17; PO_4^{3-}: 0.20; DO: 8.0; BOD: 7.2; COD: 68.0; TDS: 124.0; SO_4^{2-}: 7.0

Significance: Good source of nutrients in rice fields after decomposition; provides shelter to aquatic zooplanktons and used as food by grass carp fishes when grows in ponds.

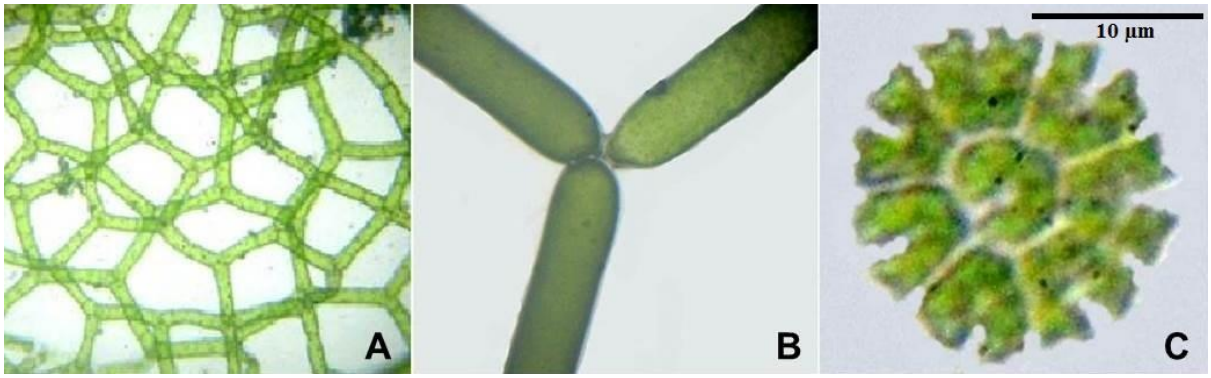

Figure 1. A-B, *Hydrodictyon reticulatum* (L.) Lagerheim; **C,** *Pediastrum tetras* var. *tetraodon* (Corda) Hansgirg

2. *Pediastrum tetras* var. *tetraodon* (Corda) Hansgirg in Prodr. Alg. Böhmen 1: 112, 1888; Phlipose, Chlorococcales pl. 129.figs. 45 d, e, g, 1967; Kumar, Seth and Suseela, Phykos 42 (2): 38, fig. 18, 2012; Rai and Misra, Our Nature 10: 172-173, fig. 4, 2012. **(Fig. 1C)**

Euastrum tetraodon Corda 1839.

Planktonic, colonial; colony entire, discoid to slightly rectangular of 8 cells; cells more or less straight; peripheral cells crenate or angular, outer margins of peripheral cells with deep incision and pronounced

projections; cell wall smooth; diameter of 8 celled colony 32.0–34.0 µm; inner cell also with straight sides but one margin deeply incised; lateral margins of peripheral cells adjoined along their length; vegetative cells 7.2–14.0 µm long, 2.4–13.0 µm broad.

Habitat: Pond water at Kamarkundu, canal water at Khamargachi and Hooghly River water.

Collection No: 349, 1194; **Dated:** 15.07.06, 25.11.11

Ecological Notes: Planktonic in a canal at Khamargachi; water temperature: 23ºC; pH: 7.5; NO_3-N: 0.10; PO_4^{3-}: 0.18; DO: 6.6; BOD: 3.8; COD: 90.0; TDS: 72.0; SO_4^{2-}: 6.0

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

Documentation of species and varieties as new records or their recollection from a particular habitat have a significant importance from the taxonomical point of view in the floristic study of algal flora (Bajpai *et al*. 2013; Singh *et al.* 2014; Srivastava *et al.* 2014; Halder 2015). In the present study, two freshwater green algal members of the family Hydrodictyaceae under the class Chlorophyceae had been morpho-taxonomically described first time from Hooghly district, West Bengal, India. Among them, *Pediastrum tetras* var. *tetraodon* (Corda) Hansgirg was the new report from this state. The results of the analyses of physico-chemical characteristics of studied water bodies were indicated that water was alkaline (pH: 7.5–7.6), although the range of pH of different water bodies was reported from 5.5–7.0 in Bankura district by Mallick & Keshri (2009) which was slightly lower than the present investigation. The values of the different physico-chemical parameters like NO_3-N, PO_4^{3-}, DO, BOD, COD, TDS and SO_4^{2-} were found within the permissible limit prescribed by WHO (2011) and favoured algal growth in these studied water bodies. The morpho-taxonomic study and documentation of algal species or new records will explore algal biodiversity of an area and physico-chemical characterization of water will reveal water quality status in respect of pollution and species evenness (E) of a particular aquatic body. Moreover, such kind of work will provide baseline information and sufficient knowledge for the future studies on algal taxonomy and freshwater ecology.

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