



## **New Report of the Occurrence of Four Chlorophycean Algal Species from West Bengal, India**

**Nilu Halder and Sankar Narayan Sinha\***

Department of Botany, University of Kalyani, Kalyani-741235, West Bengal, India

Corresponding author email: [sinhasn62@yahoo.co.in](mailto:sinhasn62@yahoo.co.in)

### **Abstract**

The present communication deals with the new reports of the occurrence of four Chlorophycean algal species and it is an outcome of taxonomic investigation of the algal flora of the class Chlorophyceae in Hooghly district, West Bengal. Four Chlorophycean algal taxa namely *Characium nasutum* Rabenh., *Characium ambiguum* Herm. ex Rabenh., *Oedogonium globosum* Nordst. and *Cosmarium undulatum* var. *minutum* Wittr. under the two orders Chlorococcales and Conjugales of Chlorophyceae were morpho-taxonomically described and reported their occurrence for the first time from West Bengal, India. All these taxa except *Oedogonium globosum* Nordst. were microscopic.

**Key words:** New report, Chlorophyceae, fresh water algae, West Bengal, India

### **Introduction**

The state of West Bengal is located between 21° 38' -27° 10' N and 85° 50' -89° 50' E and one of the biodiversity rich states of flora in India (Talukdar, 2013, Biswas *et al.*, 2015). The lower Indo-Gangetic basin consists of the fertile hub for various types of flora and fauna (Biswas *et al.*, 2014). The Hooghly district (20°01'- 23°30' N and 87°30' – 80°30'E ) is an integral part of this basin and situated in a central position of this state which is enriched with numerous water bodies, wetlands, forest and fertile agricultural lands. Climatic condition is one of the most important factors for the growth of algal population and also for other vegetations. The district occupies typical tropical monsoon and thus, supports the magnificent reserve of plant resources. The air temperature of this district ranges from 14°C to 35°C and the average annual rainfall is 1500 mm.

The contribution to the investigation of Chlorophycean algal flora in West Bengal had been carried out by several authors since 19<sup>th</sup> century. Martens (1870, 1871), Turner (1892), Hirn (1900), West and West (1907), Brühl and Biswas (1922), Carter (1926), Das (1961), Sarma (1973,86), Pal and Santra (1984,89 and 93), Kargupta (1987,1989), Santra (1990), Kargupta and Keshri (2006), Keshri (2007,2009, 2010a, b) and Sahoo *et al.*(2014) were made some important contribution in the field of algal taxonomy on this group from this region.

In the present report, four Chlorophycean algal taxa which were collected from different fresh water ecosystems of Hooghly district in West Bengal were morpho-taxonomically described with author citation, habitat, collection number, date of collection and ecological significance. The presence of congenial climatic condition and varieties of aquatic bodies might be support the growth of those algal floras in West Bengal.

However, the local plant resources as well as algal populations in this state are now facing some threats due to increasing rate of human population, higher density, human settlements in rural and urban area, rapid agricultural activities and ongoing industrial activities. In spite of having rich algal flora, limited information is available regarding current algal status, counts and conservation of algal flora in this region. Considering all the above perspectives, the present study was undertaken. The main objectives of the work were to explore the biodiversity of different algal groups, making algal data bases and reporting the occurrence of new algal species from this state.

### **Material and Methods**

Algal specimens had been collected in sterilized glass containers from ponds, moats and canals of different places *viz.* Khamargachi (23°.05'N, 88°.43'E), Kamarkundu (22°.83'N, 88°.20'E), Chinsurah (22°.90'N and 88°.39'E), Madhusudanpur (23°.01'N and 88°.40'E) and Tribeni (22°.99'N and 88°.40'E) 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. Identification of algal taxa were accomplished with the help of authentic literatures *viz.* Prescott (1962), Randhawa (1959), Philipose (1967), Prasad and Misra (1992) and, Kant and Gupta (1998).

### **Results and Discussion**

A total number of four Chlorophycean taxa namely *Characium nasutum* Rabenh., *Characium ambiguum* Herm. ex Rabenh., *Oedogonium globosum* Nordst. and *Cosmarium undulatum* var. *minutum* Wittr. belonging to the order Chlorococcales and Conjugales of Chlorophyceae had been morpho-taxonomically described for the first time from West Bengal, India. Each currently accepted names had been provided with its author (s) name.

### **Morphotaxonomic Description**

1. *Characium nasutum* Rabenh.in Zweineue Characien. Hedwigia 1: 85,

fig. 1, 1855. (**Plate 1A, Figure 1; Plate 1B, Figure 1**)

Brunnthaler, "Protococcales" in A.Pascher's Die Süßwasserflora Deutschlands, österreichs Und der Schweiz, Heft 5, Chlorophyceae 2, 78, fig.15, 1915.

Singh, An investigation into the algal flora of paddy fields of the United Provinces 9: 55-77, 1939.

Philipose, Chlorococcales 82, fig. 6, 1967.

**Description:** Plant epiphytic on filamentous algae, solitary, unicellular, attached to epiphytes at one end by basal pad; stalk absent; cells lanceolate, uninucleate, slightly oblique, 42.2-49.8 µm long and 19.3-20.2 µm broad; cell apices sharp and pointed, 4.1-6.4 µm long, 2.2-3.1 µm broad; chloroplast one, parietal and band-shaped; pyrenoids five to six.

**Habitat:** Canal water at Khamargachi (epiphytic on *Spirogyra*).

**Collection No.:** 1169; **Dated:** 02.11.11

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

2. *Characium ambiguum* Herm. ex Rabenh. (**Plate 1A, Figure 2; Plate 1B, Figure 2**)

Hermann ex Rabenhorst, Ueber die bei Neudamm aufgefundenen Arten des Genus *Characium* Von Dr. Hermann in Rabenhorst 26, pl. 7, figs. 9a-b, 1863.

Rabenhorst, Flora Europea Algarum Aquae Dulcis et Sub-marinae 86-87, 1868.

Brunnthaler, "Protococcales" in A. Pascher's Die Süßwasserflora Deutschlands, österreichs Und der Schweiz, Heft 5, Chlorophyceae 2, 79, fig.17, 1915.

**Description:** Plant epiphytic on filamentous algae, green, solitary and unicellular; cells lance-shaped and gradually narrower to a sharp point anteriorly and having fine stipe without an attaching disc posteriorly; cells 24.2 µm long and 4.5 µm broad; chloroplast one, parietal, and band-shaped.

**Habitat:** Pond water at Kamarkundu (epiphyte on a filamentous alga *Oedogonium*).

**Collection No.:** 640; **Dated:** 18.04.10

**Ecological Significance:** Primary producer and a constituent of aquatic food chain of freshwater bodies.

3. *Oedogonium globosum* Nordst. in Minneskr. Fys. Sällsk. Lund. 7: 20, pl. 2,

fig. 16, 1878. (**Plate 1A, Figure 3; Plate 1B, Figure 3**)

Hirn., Acta. Soc. Sci.fenn. 27: 94, pl. 5, fig.30, 1900.

Gonzalves, Oedogoniales 166, fig.9, 29a, 1981.

Prasad and Misra, Freshwater algal Fl. Andaman and Nicobar Islands 69, pl. 11. fig. 12, 1992.

**Description:** Thallus aquatic, free floating, macrandrous homothallic, grass-green, unbranched and filamentous; basal cell elongated; terminal cell seti-form; vegetative cells cylindrical, 46.7 to 82.5 µm long and 10.8 to 12.9 µm broad; cell wall smooth; chloroplast reticulate, nucleus one; pyrenoids four to eight; oogonia solitary, globose, opening by poriferous superior pore, 36.2 to 42.6 µm long and 36.2 to 40.2 µm broad; oospore globose, smooth and filling the oogonium; 28.2 to 40.1 µm long and 30.2 to 37.1 µm broad; spore wall thick; antheridia five and seriate, sub-epigynous, 4.4 to 7.3 µm long and 10.2 to 11.1 µm broad.

**Habitat:** Pond water at Chinsurah; moat water at Madhusudanpur and canal water at Khamargachi.

**Collection No:** 390, 709; **Dated:** 20.12.06, 01.10.10

**Ecological Significance:** Primary producer and a component of aquatic food chain.

4. *Cosmarium undulatum* var. *minutum* Wittr. in Nova Acta R. Soc. Sc. Upsal. Ser.3, 1869. (**Plate 1A, Figure 4; Plate 1B, Figure 4**)

Suxena and Venkateswarlu, Desmids from Kashmir 7(1-2): 182, figs. 45a-b.1968.

**Description:** Planktonic; cells laterally compressed globose; 59.0 µm long, 43.0 µm broad; semicells broadly cordi-form with depressed poles; sinus deep, narrower, 14.5 µm broad; isthmus narrow and 10.4 µm broad; cell margin with regular undulations; cell top view lenticular; chloroplasts four and axial.

**Habitat:** Pond water at Tribeni.

**Collection No:** 567; **Dated:** 16.08.09

**Ecological Significance:** Primary producer and an important constituent of aquatic ecosystems.

### Conclusion

The present work will provide different valuable information of *Characium nasutum* Rabenh., *Characium ambiguum* Herm. ex Rabenh., *Oedogonium globosum* Nordst. and *Cosmarium undulatum* var. *minutum* Wittr. belonging to the order Chlorococcales and Conjugales of Chlorophyceae regarding author citation, habitat, phenology and ecological significance. These algal taxa could be utilized for the preparation of algal databases in future and detailed floristic account of Chlorophycean algal flora of West Bengal, India.

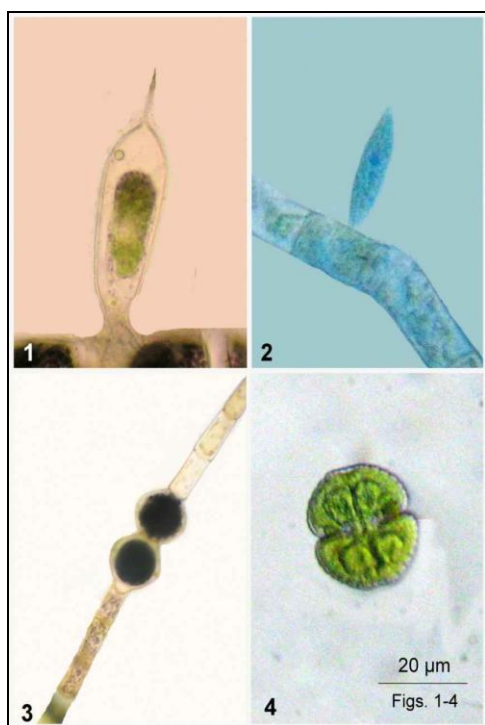


Plate 1A

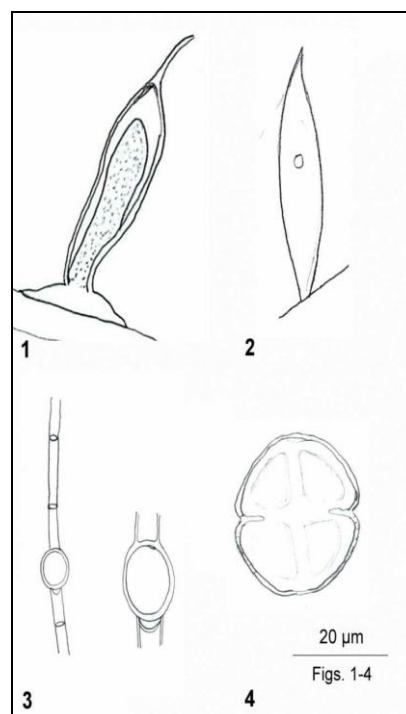


Plate 1 B

Plate 1A: Figs 1-4; 1. *Characium nasutum*, 2. *Characium ambiguum*, 3. *Oedogonium globosum*, 4. *Cosmarium undulatum* var. *minutum* Wittr. Plate 1B: Figs 1-4; 1. *Characium nasutum*, 2. *Characium ambiguum*, 3. *Oedogonium globosum*, 4. *Cosmarium undulatum* var. *minutum* Wittr.

#### Acknowledgements

The author is grateful to University of Kalyani for pursuing research work. The author is also grateful to Dr. R. K. Gupta, BSI, Howrah for his co-operations.

#### References

- Biswas, S., Maiti, M., Bhandari, G., Batabyal, R., Patra, J., Bhuiya, A., Ojha, B., Halder, N. and Talukdar, D. 2015 Floral diversity and ecology in Kalyani area of Nadia district, West Bengal, India. *Plant Sci Today* **2**(1):38-42
- Biswas, S., Maity, M., Srimany, S., Chatterjee, S., Karmakar, T., Datta, R., Patra, J., Koley, M. and Talukdar, D. 2014 Compositions, distributions and status of economic plants among invasive floras of Uttarpara, West Bengal, India. *Int J Pharmacognosy* **1**(12):800-809
- Brühl, P. and Biswas, K. 1922 The algae of Bengal filter-beds. *J Dep Sci Cal Univ* **4**:1-17.
- Carter, N. 1926. Freshwater algae from India. *Rec Bot Sur India* **9**(4): 263-302
- Das, C.R. 1961 A new report on *Spirogyra regulosa* Iwanoff from Senchal lake, Darjeeling, India. *Bull Bot Surv India* **3**(3-4):389
- Hirn, K.E. 1900 Monographie Und Iconographic der Oedogoniaceen. *Acta Soc Sci fenn* **27**:1-394
- Kant, S. and Gupta, P. 1998 Algal flora of Ladakh. 1-341pp. Scientif Publ.
- Kargupta, A.N. and Keshri, J.P. 2006 New records of Chaetophorales (Chlorophyta) from West Bengal, India. *Geophytol* **3**(1-2):43-45
- Kargupta, A.N. 1987 New records of some members of Ulotrachales from West Bengal. *Phykos* **26**:47-52

- Kargupta, A.N. 1989 Indian Zygnemataceae. The genus *Mougeotia* from West Bengal, India. *Biojournal*, **1(1)**:97-105.
- Keshri, J.P. 2007 New additions to the Chaetophoralean algae of India. *J Econ Taxon Bot* **31(2)**:431-435
- Keshri, J.P. 2009 Contribution to our knowledge of fresh water green algae (Chaetophorales) of West Bengal. *Algal Studies* **131**:43-61
- Keshri, J.P. (2010a) Contribution to our knowledge of Ulotrichales (Chlorophyta) of West Bengal, India. *Algal Studies* **133**: 29-42
- Keshri, J.P. (2010b) Contribution to our knowledge of Coleochaetales (Chlorophyta) of West Bengal India. *Algal Studies* **133**: 29-42
- Martens, G.V. 1870. A 3rd list of Bengal algae. *Proc Asiatic Soc Beng* **39**:9-12
- Martens, G.V. 1871 A list of algae collected by Mr. S. Kürz. in Burma and adjacent islands. *J Asiatic Soc Beng* **40**:461-69
- Pal, T.K. and Santra, S.C. 1984 New additions to the algal flora of Murshidabad, West Bengal. *Phykos* **23(1-2)**:139-41
- Pal, U.C. and Santra, S.C. 1989 Desmids of Midnapore West Bengal- an eco floristic survey. *J Indian Bot Soc* **12**:42-50
- Pal, U.C. and Santra, S.C. 1993 Algal flora of Midnapore, III. Desmidaceae. *Phykos* **32(1-2)**:147-158
- Philipose, M.T. 1967 Chlorococcales -ICAR, New Delhi. 1-365 pp.
- Prasad, B.N. and Misra, P.K. 1992 Fresh water algal flora of Andaman and Nicobar Islands, Vol. II. B. Singh and M.P. Singh, Dehradun, India. 1-284 pp.
- Prescott, G.W. 1962 Algae of the Western Great Lakes area, Otto Koeltz. Sci Publ West Germany. 1-977 pp.
- Randhawa, M.S. 1959 Zygnemaceae -ICAR, New Delhi. 1-478 pp.
- Sahoo, S.K., Datta, B.K. and Sarma, P. 2014 New records of the genus *Oedogonium* (Oedogoniales; Chlorophyceae) from West Bengal, India. *Algal Studies* **144**:3-17
- Santra, S.C. 1990 Freshwater algae of West Bengal. *Perspective in phycology* Ed. VN Raja Rao: 189-194
- Sarma, P. 1973 Addition to the freshwater algae of New Zealand-1 A note on the species of *Vaucheria* from Great Barrier Island. *Tone* **19**:167-173
- Sarma, P. 1986 The fresh water Chaetophorales of New Zealand. *Nova Hedwigia* **58**:169
- Talukdar, D. 2013 Species richness and floral diversity around 'Teesta Barrage Project' in Jalpaiguri district of West Bengal, India with emphasis on invasive plants and indigenous uses. *Biol Medicine* **5**:1-14
- Turner, W.B. 1892 The fresh water algae of east India. Stockholm 1-187 pp.
- West, W. and West, G.S. 1907 Fresh water algae from Burma including a few from Bengal and Madras. *Ann Royal Bot Gardn Calcutta* **6**:175-260