Journal of Algal Biomass Utilization
J. Algal Biomass Utln. - Copyright © PHYCOSPECTRUM
ISSN: 2229 – 6905

Unusual habitat of algae

Gour Gopal Satpati, Nirupam Barman, Tania Chakraborty and Ruma Pal*

Phycology laboratory, Department of Botany, Centre of Advanced Study, University of Calcutta

35, B.C. Road, Kolkata-700019

*Corresponding author: Dr. Ruma Pal E-mail- rpalcu@rediffmail.com; Phone no- +919433116320

Abstract

In a recent survey of algal diversity from different habitat of Eastern India, 3 algal genera commonly occurring in aquatic habitat and in free living condition, viz. *Chlorococcum* and *Cladophora* of Chlorophyceae and *Euglena* of Euglenophyceae were recorded away from their usual habitat. *Chlorococcum* was found in endozoic condition within slug (mollusc without shell), *Euglena* in endophytic condition within the leaf of the pteridophytic genus *Selaginella* of Eastern Himalaya region and *Cladophora* was found to grow in terrestrial condition near the bank of the river Matla of the marine region of Sundarban mangrove forest of India.

Key words- Unusual habitat/ Endozoic/ Endophytic/ Sundarban/ Autotrophic/ Heterotrophic

Introduction

The algae are of widespread occurrence in moist situations as tree trunks, walls, wood, rocks and damp soil where they frequently occur as an extended stratum consisting of either a single species or a mixture of species. In addition to these there are some other algae growing on some unusual habitats. These algae includes those growing endophytic in other plants, leaf epiphytes, on molluscs, calcareous rocks, snow algae, thermal algae, epizoic algae and certain others (Smith, 1950). The habitats of algae are mainly classified into three categories viz. aerial habitats, aquatic habitats and unusual habitats. Aerial algae have been defined as algae that obtain their water wholly or in large part from moisture in the air. Strictly aerial algae are found on the bark and leaves of trees, on wood, stones, and rock and on soil surface. Most of these algae belong to the class Chlorophyceae. *Protococcus*, *Trentepohlia* and *Prasiola* are conspicuous members of the aerial flora (Smith, 1950). Aquatic algae are generally growing on floating waters, ponds, lakes, pools, ditches, bogs and swamps. The algae of running water are more diversified than those of any other aquatic habitats and include a larger percentage of species restricted to the particular habitat.The main algal classes of aquatic habitat are Chlorophyceae, Bacillariophyceae, Chrysophyceae,Euglenophyceae etc.Finally algae growing on unusual habitats are broadly classified into the following categories- cryophytes or snow algae, thermal algae, halophytic algae, lithophytes, epiphytes and symbiotic algae (Sambamurty, 2005). Some macroalgal habitat ecology was studied by Nyberg (2007). Smith (1950) reported some fresh water algae on different aquatic sources from the United States.

Material and methods

Algal samples were collected in free-living condition from the aquatic habitats of Eastern Himalaya and Sundarban. The specimens were divided into two parts, one part was preserved in 4% formalin (v/v) solution for voucher collection and microscopic study where as the other part was taken in a polythene bag for culture and cultivation in the laboratory. The samples preserved in formalin solution were taken for slide preparation using 20% glycerine (v/v). Digital photographs were taken in Carl Zeis Axiostar Plus microscope by Cannon Power Shot 500D Camera. Unialgal cultures were set up using Bold Basal Medium (Bold, 1942) to induce the reproductive structures for proper identification. The genera were identified using proper monographs (Smith, 1950; Prescott, 1976; Kargupta *et al*., 1992 and Krishnamurthy, 2000).

Results

Taxonomic description of the genera

1.*Chlorococcum infusionum* (Schrank) Menegh (Pl 1, Figs. 9-11)

Smith, 1950, p.224, fig. f & g.

New Habitat: Endozoic growth in molluscs, brackish water, Bakkhali, Sundarban, India (N 20° 01.935´, E 088° 80.955´).

Free living, unicellular, green, cells are solitary, sometimes embedded in a gelatinous matrix, striking variation in size shows between various cells when the alga grows in an expanded stratum. Young cells

are thin walled and spherical or somewhat compressed, old cells have thick walls that are often irregular in outline, the thickened portion of a wall are often distinctly stratified, young cells are 40-125 µm in diameter and mature cells are 150-210 µm in diameter, chloroplasts of young cells are parietal massive cups, completely filling the cell except for a small hyaline region at one side, they contain one pyrenoid, as a cell increases in size, the chloroplast usually becomes diffuse and contains several pyrenoids, the cells are uninucleate until shortly before reproduction.

2.*Cladophora nitellopsis* Boergesen (Pl 1, Figs. 4-8)

Boergesen, 1939, figs. 11-13; Dixit, 1970, p. 106; Nizamuddin & Begum, 1973, figs. 38-39; Krishnamurthy, 2000, p.146, fig. 21H.

New habitat: Marine, Hamanbere Island, Sundarban, India (N 22° 00.117´, E 088° 42.609´).

Filaments subdichotomous in the lower parts, alternately branched above, cells of main axis cylindrical, 125 µm in diameter and 180-250µm long, with thick cell walls up to 25 µm, branches in lower parts at long intervals but in upper parts, frequent, almost one branch from each cell, cells of branches 75 µm in diameter, 7-10 times as long, with cells 45 µm thick, 2-3 times as long.

3.*Euglena gracilis* Klebs (Pl 1, Figs. 1-3)

Smith, 1950, p.353; Prescott, 1982, p. 393, pl. 85, fig. 17.

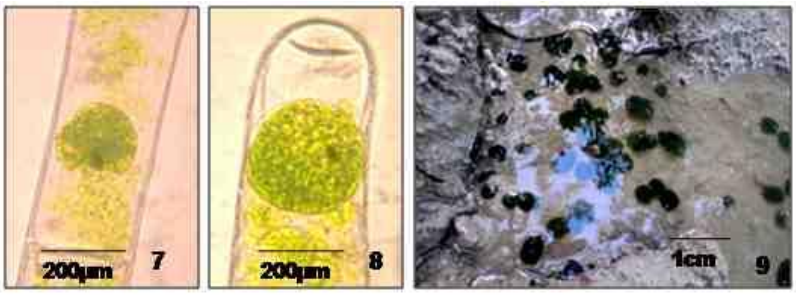
New habitat: Fresh water, endophytic in *Selaginella* leaf, Eastern Himalaya, India, (N 27° 03´, E 88° 19´).

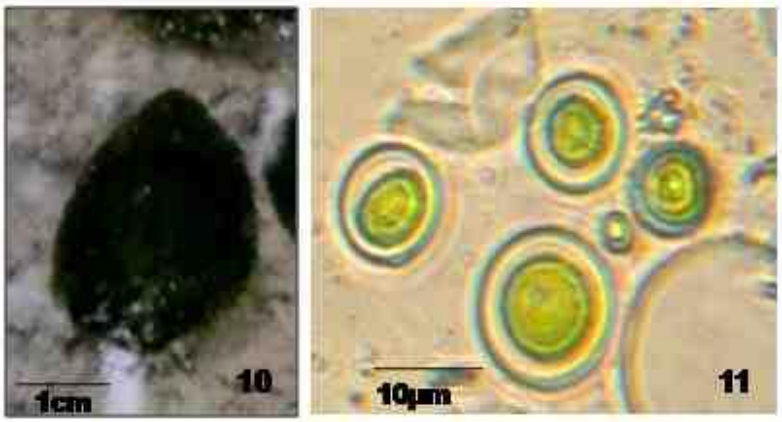
Unicellular, green, uniflagellate free swimming cells are continually changing in shape as they move through water, the cells are fusiform to acicular and with the posterior and more or less pointed, the single flagellum is bifurcate at its lower end and with a granular swelling at the point of branching, cells are 5-20 µm long and 3-15 µm broad and having an eyespot at the anterior end, the chloroplasts are numerous and discoid to band shaped, they may be with or without pyrenoids, division may take place while the cells are motile or after they have come to rest, division in the motile condition is longitudinal and begins at the anterior end.

Plate 1: Showing some unusual habitat of algae

Fig 1. *Euglena gracilis* in the leaf margin cells of *Selaginella sp* (20µm); Fig 2. *Euglena* cells growing endophytically within the stomata of *Selaginella* leaf (20µm); Fig 3. Isolated *Euglena* from *Selaginella* leaf in laboratory cultural condition (20µm)

Fig 4. *Cladophora nitellopsis* in the terrestrial zone of Hamanbere Island, Sundarban (2cm); Fig 5. Showing formation of grass like mat under simple microscope (2cm); Fig 6. Showing branching pattern under compound electron microscope (200µm)





Figs. 9-10. Showing endozoic condition of *Chlorococcum* in the body of slug (mollusc without cell), (1cm); Fig 11. Isolated *Chlorococcum* from the body of slug (10µm).

Discussion

Endophytic *Euglena* population became prominent within sterilized hyaline leaf tissue (Inoculum) of *Selaginella* sp, during the tissue culture processing (Pl 1; figs. 1 & 2). The *Cladophora* population formed a green mat like grass land (Pl 1; fig. 4), much above the sea level on Hamanbere Island (7 to 10 ft) of Sundarban delta. The inundation of algal bed is not very regular, except the spring tide and neap tide waters. The endophytic *Euglena* grew well both in autotrophic and heterotrophic media, though growth rate of endozoic *Chlorococcum* was very slow.

Acknowledgement

The authors are thankful to Prof. T. B. Jha for providing the *Selaginella* leaf for proper identification of the endophytic alga.

References

Clerck, O. D. & E. Coppejans 1997 Note on *Stochospermum* Kutz. (Dictyotales, Phaeophyta), Cryptogamie Algol. 18**(4)**: 337-341.

Kargupta, A. N. & P. Sharma 1992 The genus *Spirogyra* (Chlorophyceae; Zygnemaceae) in West Bengal, India. Bibliotheca phycologica, 91: 1-75.

Keshri, J. P. & G. A. Hazra 2009 Observations on the rare alga *Arnoldiella conchophila* V. Miller (Ulvophyceae, Cladophorales) from India, Cryptogamie Algol. 30**(3)**: 271-274.

Krishnamurthy, V. 2000 Algae of India and neighbouring Countries I. Chlorophycota- Oxford and IBH Publishing Co. Pvt. Ltd.

Nyberg, C. D. 2007 Introduced marine algae and habitat modifiers, their ecological role and significant attributes- Doctoral Thesis, Dept. of Marine Ecology, Gotebarg University.

Presscott, G. W. 1982 Algae of the Western Great Lakes area, 2nd ed- Wm Brown Co. Dubuque. Iowa.

Sambamurty, A. V. S. 2005 A textbook of Algae- I. K. International, p. 22.

Smith, G. M. 1950 The fresh water algae of United States- McGraw-Hill Book Company, INC, New York, London.