

## Epiphytic Cyanobacteria Linked On *Molluscs* In Palk Strait, Tamilnadu, India

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**Abstract:** Coastal ecosystems are integral part of ocean and provide numerous benefits to human beings directly or indirectly. An inventory was carried out to study the epiphytic cyan bacteria on mollusc, their taxa and distributions. Samples were studied in the laboratory and identified. A total number of 17 genera belonging to chlorophyceae in *Actinastrum* (1), *Ankistrodesmus* (1), *Arthrodesmus* (1), *Botryococcus* (1), *Chaetophorous* (1), *Chlorella* (1), *Chlorococcum* (1), *Dactylococcus* (1), *Hydrodictyon* (2), *Oedogonium* (1), *Oocytis* (1), *Scendesmus* (1), *Spirogyra* (1), *Ulothrix* (1), *Volvex* (1), *Westella* (1) and *Xanthidium* (1) are recorded in Thondi Coastal region, Bay of Bengal, India.

**Key words:** Epiphytic Cyanobacteria • Chlorophyceae • Mollusc

### INTRODUCTION

Epiphytic cyanobacteria are microscopically small, unicellular organisms, some of these form colonies and reach size visible to naked eye as minute green particles. The marine system includes the coastal, mangroves, estuaries and salt pans etc. The coastal ecosystem is differentiated into various types of planktons (free floating), benthos (attached to sediments) or epiphytic algae (on stones, sand, mud, rock of reservoir and other hard substratum like *molluscs* cells etc). Studies on epiphytic cyanobacteria for over a century were on understanding their structure and reproduction and several treatises [1-3] and monographs were published for several groups of algae with details on the occurrence and distribution with reference to diverse habitats [4-10]. Description of taxa have been restricted to generic level with diagnostic keys serving the means of identification of the species and also to identify the major families of blue green algae in South Indian rice field [11]. Algae form assemblage of chlorophyllous organisms occurring in wide variety of fresh water and marine ecosystem in India [12]. The ecology of marine cyan bacteria from the Indian region was studied by many workers [4, 13-22].

Present investigation focus to understand to identify the epiphytic cyan bacteria on *molluscs* and their occurrence, taxonomy, morphology and general biology

of the species. We obtained basic biological subsequences involving the epiphytic algae of the marine cyan bacteria and contribute to a better understanding of its distribution and occurrence in the Thondi coastal region, Palk Strait, Bay of Bengal.

### MATERIALS AND METHODS

**Study Area:** Thondi (Lat. 9°45'N and Long. 79°3'E) is situated 40 km south of Manelmalakudi and 45 km north of Devipattinam. Thondi was popular as the historical Port. Here, the coastal region was muddy and swampy in nature. This coastal region was polluted by bulk quantity of domestic and agricultural wastes. Anthropogenic inputs including fecal contamination also very high in this area.

**Collection Methods:** Random sampling method has been applied in the algal collection procedure. *Molluscs* (Bivalves and Gastropods) samples were collected from Thondi coastal region. Collections were carried out during the month of May 2011. The different types of epiphytic cyanobacteria forms were collected on the Mollusc only. If not immediately examined samples were preserved in a 4 % formaldehyde-seawater solution. To remove epiphytes, mollusc surfaces were scraped in filtered seawater and debris removed under a dissecting

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microscope. Samples were then examined microscopically as mount slides using a LABOMED microscope with attached to SANYO CCD camera.

## RESULTS

### *Actinastrum gracillimum* GM Smith

**Description:** Colonies of 4 or 8 cells radiating from a common centre. Cells elongated cylindrical tapering slightly too abruptly truncate ends and 7-10 times as long as broad. Chloroplast single, parietal and laminate and with or without a pyrenoid, cells 1.7-3  $\mu\text{m}$  broad, 14-21  $\mu\text{m}$  long; colonies 30-45  $\mu\text{m}$  in diameter (Plate-I A).

### *Ankistrodesmus fulcaltus* (Corda) Ralfs

**Description:** Cells aciculate to narrow fusiform with the ends tapering to acute apices, usually in fasciculate bundles of 2-4-8 or more, rarely solitary, Chloroplast single, parietal and usually without pyrenoids. Cells long 50  $\mu\text{m}$ , breadth 8  $\mu\text{m}$  (Plate-I B).

### *Arthrodesmus curvatus* Turner

**Description:** Cell solitary, small and as long as broad, bilaterally symmetrical in front view, median constriction pronounced with widely open to linear sinus, semi cells generally triangular, rarely elliptic subtrapezi form or sub rectangular with a simple, straight or curved, spines on lateral angles, top-view usually elliptic rarely triangular, each semi cell with an axile chloroplast. Cells 31-44  $\mu\text{m}$  long and 37-44  $\mu\text{m}$  breathe with spine and isthmus 8-13  $\mu\text{m}$  broad (Plate-I C).

### *Botryococcus braunii* Kützing

**Description:** Colonies free floating and of irregular shape, without conspicuous gelatinous envelop but completely enclosed by a tough, hyaline, orange-coloured and fold of spines. Cells ovoid to ellipsoid and arranged radially at the periphery of the colony. Simple colonies up to long 80  $\mu\text{m}$ , breadth 50  $\mu\text{m}$  and compound colonies up to 1.5 mm (Plate-I D).

### *Chaetophorous attenuate* Hazen

**Description:** Plants coastal water branched filamentous arising from less developed prostrate cells and enclosed in a macroscopic tough mucilaginous envelope of a definite shape. Thallus globose, discrete, firm gelatinous, usually less than 30 mm in radius, epiphytic on aquatic vegetaiaon. Chloroplast laminar parietal, pyrenoids 5-9  $\mu\text{m}$  and length 15-25  $\mu\text{m}$  (Plate-I E).

### *Chlorella vulgaris* Beijerinck

**Description:** Algae free living, cells usually solitary or in small colonies, spherical and with a thin cell membrane. Chloroplast parietal, cup shped and with a pyrenoid which is sometimes indistinct, cells usually 5-10  $\mu\text{m}$  in diameter (Plate-I F).

### *Chlorococcum humcola* (Naegeli) Rabenhorst:

**Description:** Cells spherical, solitary or a number of cells crowded together to form a stratum, Chloroplast a narrow sphere with lateral notch and a single pyrenoid, Cells 7  $\mu\text{m}$  breath and 11  $\mu\text{m}$  lengths (Plate-I G).

### *Dactylococcus infusionism* Nägeli

**Description:** Cells fusiform, solitary or attached pole to pole to form false branched filamentous or chains, Chloroplast parietal, sometimes with an indistinct pyrenoid, Cells 2.5  $\mu\text{m}$  broad and 9  $\mu\text{m}$  long (Plate-I H).

### *Hydrodictyon reticulatum* L. Lagerheim

**Description:** Colonies reticulate meshes pentagonal or hexagonal, Cells elongate-cylindrical. Cell wall two layered. Cells up to 250  $\mu\text{m}$  broad and up to 1.5cm long, Nets up to 20cm long (Plate-I I).

### *Hydrodictyon* Sp Roth

**Description:** Macroscopic, free-floating, closed cylindrical or flattened single layered, net like colonies of several hundred to many thousand cells which are cylindrical coenocytes with large central vacuole. Reticulation of colony 3-12 (generally 5-6) sided. Chloroplast parietal and with a single pyrenoid in young cells but different with a number of pyrenoids in old cells (Plate-I J).

### *Oedogonium capilliforme* Kütz

**Description:** Filament single unbranched, vegetative cells uninucleate-cylindric or sometime capitellate, basal cell with holdfast, vegetative cell, except the basal one capable of division oogonia and antheridia produced by the direct division of vegetative cells (Plate-I K).

### *Oocystis* sp WH

**Description:** Cells oblong – ellipsoid with broadly rounded ends, Cell membrane thin and without polar thickening. Chloroplast 2-4-8, parietal and disc shaped each with minute pyrenoid. Reproduction by 2-4-8 auto spores formed inside the distended mother cells wall, Adult cells 7-9.1um broad, 18-24um long, Young cells 5.5  $\mu\text{m}$  broad and 16  $\mu\text{m}$  long (Plate-I L).

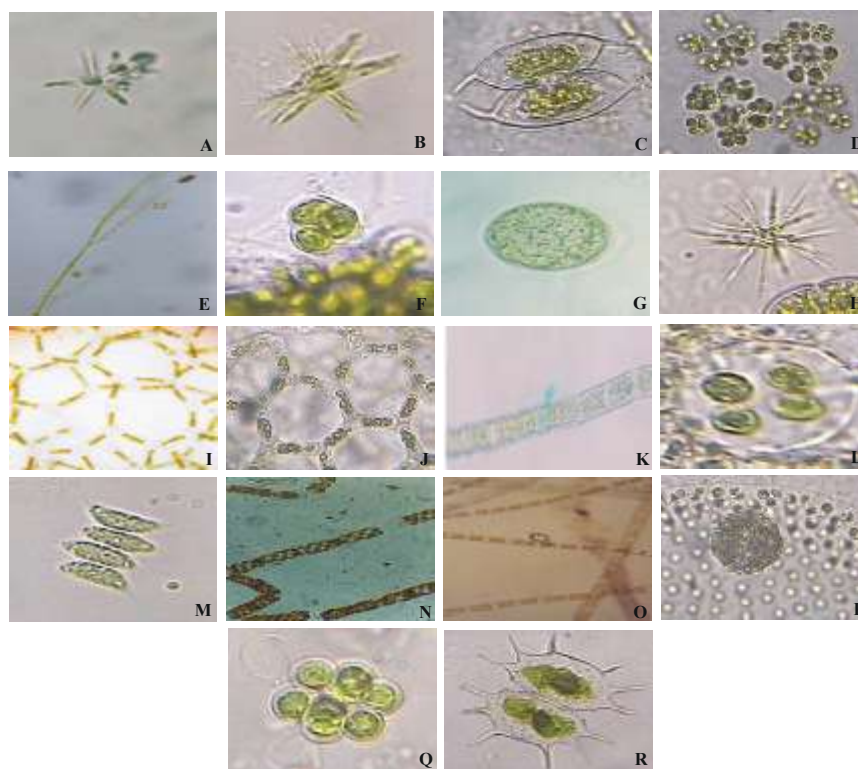


Plate 1: A, *Actinastrum gracillimum* GM Smith. B, *Ankistrodesmus falcatus* (Corda) Ralfs-1. C, *Arthrodesmus curvatus* Turner-1. D, *Botryococcus braunii* Kütz. E, *Chaetophora attenuata* Hazen. F, *Chlorella vulgaris* Beyerinck. G, *Chlorococcum humicola* (Naeg) Rabenhorst. H, *Dactylococcus infusionum* Nägeli. I, *Hydrodictyon reticulatum* L. Lagerheim. J, *Hydrodictyon* sp. K, *Oedogonium capilliforme* Kiitz. L, *Oocystis* sp WH. M, *Scenedesmus acutus* Meyen. N, *Spirogyra aequinoctialis* G.S.West. O, *Ulothrix variabilis* Kützing. P, *Volvox aureus* Ehr. Q, *Westella linearis* GM Smith. R, *Xanthidium antilopaeum* (Brébisson) Kützing.

#### ***Scenedesmus acutus* Meyen**

**Description:** Colonies 4-8 celled with the cells arranged in a linear or sub alternating series (eight celled colonies always in sub alternating series). Differ from s.obliquus in the outer cells of the colony being more or less lunate and the apices of the cells being attenuated. Cells length and width 3 µm (Plate-I M).

#### ***Spirogyra aequinoctialis* G.S. West**

**Description:** Filaments, cell cylindrical. The chloroplasts are 1-16, spirally arranged, parietal ribbon like bodies with numerous prominent pyrenoid, the nucleus in centrally situated in a protoplasmic strand, Conjugation scalar form or lateral (Plate-I N).

#### ***Ulothrix variabilis* Kützing**

**Description:** Filament unbranched, indefinitely long, not apically attenuated with special hold fast cell, Vegetative cell uninucleate, cylindrical, chloroplast one. Cells 22.5 µm breath and 12.4 µm length (Plate-I O).

#### ***Volvox aureus* Ehr**

**Description:** Colony spherical composed of from 500 to several thousand cells arranged at the periphery of a gelatinous sphere of homogeneous mucilage, each having 2 flagella of equal length (Plate-I P).

#### ***Westella linear* GM Smith**

**Description:** Colonies of irregular shape and of about 40-80 cells, Cells usually small, spherical and arranged in groups of four or eight. Chloroplast single, cup-shaped and with or without a pyrenoid, Cells 3-9 µm in diameter, Colonies 30-84 µm in diameter (Plate-I Q).

#### ***Xanthidium antilopaeum* (Brébisson) Kützing**

**Description:** Unicells loosely attached forming hyphae; cell body varied in shape, a constriction at the center in most species; cell walls consisting of two or more parts, with small pores and various ornaments. Cells 80µm (with spines), 47µm (without spines) and isthmus 11µm (Plate-I R).

## CONCLUSION

In the present investigation, a total number of 17 genera belonging to chlorophyceae in *Actinastrum* (1), *Ankistrodesmus* (1), *Arthrodesmus* (1), *Botryococcus* (1), *Chaetophorous* (1), *Chlorella* (1), *Chlorococcum* (1), *Dactylococcus* (1), *Hydrodictyon* (2), *Oedogonium* (1), *Oocytis* (1), *Scendesmus* (1), *Spirogyra* (1), *Ulothrix* (1), *Volvex* (1), *Westella* (1) and *Xanthidium* (1) are recorded in Thondi Coastal region, Bay of Bengal, India. An inventory was carried out to study the epiphytic cyan bacteria on molluscs, their taxa and distributions.

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