

Documentation of corticolous algae from Kuvempu University campus, Shankaraghatta, Shimoga

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Abstract

Tree bark samples were collected from Kuvempu University, located in the eastern parts of Western Ghats, India. The total area of the campus is 230 acres. It is on the 75.56°E longitude and 13.92°N latitude. The nearest meteorological station is at Bhadra River Project. The temperature ranges between 20° to 30°C, the average rainfall is 140 cm. The relative humidity ranges between 60 to 100% and the campus is covered by dry deciduous to semi evergreen forest. The present investigation aims to document diverse algal forms collected from tree barks of different collection sites of the Kuvempu University campus. A total of 11 species were recorded during the study. The dominant cyanobacterial taxa were *Chroococcus* (2) followed by *Gloeothece* (1), *Lyngbya* (1), *Oscillatoria* (1), *Phormidium* (1), *Scytonema* (1), *Homeothrix* (1), *Aphanothece* (1), *Myxosarcina* (1) and *Calothrix* (1).

Key words: Corticolous algae, Diversity, Enumeration, Kuvempu University campus.

Introduction

Studies on taxonomy and ecology of aerophytic algae were conducted in temperate regions with great emphasis on those occurring on soil, buildings and monuments (Harload and Schlichting, 1975; Metting, 1981; Rindi and Guiry, 2003; López-Bautista *et al.*, 2006). Many aspects of corticolous algae such as habitats, ecology and taxonomy are still lagging behind. Hence, the present investigation was carried out to document the corticolous algae from Kuvempu University campus.

Materials and Methods

Sampling of corticolous algae

Regular field visits were made to study the occurrence of subaerial algal flora occurring on bark surface. During the survey, observations and collections were done randomly from different sites of Kuvempu University campus. Corticolous algae were collected from the tree barks, (Plate-1: Figs. 1-3). All samples were collected in sterile polythene bags using clean sampling bottles, forceps, brush, petridish, scalpel etc. and brought to the laboratory for further analysis.

Micrometry, Photomicrography and Identification

The collected samples were kept in small volume (5 ml) of water in petridish. Three slides are prepared from each sample and observed under microscope and micro photographed with the help of Mayo Binocular Compound Microscope with Sony cyber shot DSC-WS10 camera attached. Identification was done by using standard books and literatures (Desikachary 1959, Neustupa and Skaloud 2008, 2010).



Plate1 (Figs 1-6): collection of Corticolous algae from Kuvempu University campus, Shimoga, Karnataka; 1-3: Greenish and blackish mat growth on tree barks; 4-6: Soaking collected bark samples in petri plates with 5 ml of distilled water.

Results

A total of 11 algal taxa were recorded from present study and are described.

1. *Chroococcus minor* (Kutzing.) Nageli (Pl. 2, Fig. 9)

(Desikachary 1959, P.105, Pl.24, Fig.1)

Thallus slimy gelatinous, dirty blue green; cells spherical. 3-4 μ in diameter. Singly or in pairs, sheath colourless, very thin.

Habitat: Blackish patch on tree bark surface. Place of collection: Kuvempu University. Date of collection 22.8.2014.

2. *C. tenax* (Kirchner.) Hieronymus (Pl.2, Fig. 2)

(Desikachary 1959, P.103, Pl.26, Fig.7, 16)

Cells are spherical in groups of 2, blue green colour, with sheath 10 μ m diameter, sheath colourless with distinctly lamellated.

Habitat: blackish patch on tree bark surface. Place of collection: Kuvempu University. Date of collection 22.8.2014.

3. *Gloeothece rupestris* (Lyngbye) Bornet (Pl. 2, Fig. 3)

(Desikachary 1959, P.127, Pl.25, Fig.4)

Cells ellipsoidal, with envelope 12 μ broad, blue green, envelopes colorless

Habitat: Dark green patch on tree bark surface. Place of collection: Kuvempu University. Date of collection 22.8.2014.

4. *Aphanothece stagnina* (Sprengel) A.Braun (Pl.2, Fig.1)

(Desikachary 1959, P.137, Pl.21, Fig.10)

Thallus ellipsoidal, blue green, cells are ovoid, 4 μ broad, densely arranged, without individual envelope, homogeneous mucilage.

Habitat: Dark green patch on tree bark surface. Place of collection: Kuvempu University. Date of collection 22.8.2014.

5. *Myxosarcina spectabilis* Geitler (Pl.2, Fig. 4)

(Desikachary 1959, P.178, Pl.30, Fig.1-5 & Pl.31, Fig.17-22)

Cells in three dimensional colonies, 10 μ broad, sheath thin, individual sheath is not present, blue green.

Habitat: Blackish patch on tree bark surface. Place of collection: Kuvempu University. Date of collection 22.8.2014.

6. *Lyngbya mesotricha* Skuja (Pl.2, Fig. 6)

(Desikachary 1959, P.282, Pl.50, Fig.1, 2)

Filaments erect and less curved, fixed to the basal portion, sheath thin, colorless, trichomes 2.5 μ broad, cross walls are marked with large granules on either side, not constricted at the cross walls, blue green, homogeneous, no calyptra.

Habitat: Dark green patch on tree bark surface. Place of collection: Kuvempu University. Date of collection 22.8.2014

7. *Phormidium ambiguum* Gomont. (Pl.2, Fig. 7)

(Desikachary 1959, P.266, Pl.44, Fig.16 & Pl.45, Fig.5-8)

Thallus more expanded, bright blue green, filaments flexuous, variously entangled, trichomes constricted at the cross walls, 4 μ broad, slightly granulated at the cross walls, calyptra absent.

Habitat: Dark green patch on tree bark surface. Place of collection: Kuvempu University. Date of collection 22.8.2014.

8. *Oscillatoria* sp. (Pl.2, Fig. 8)

(Desikachary 1959, P.198)

Trichome single, forming flat, spongy, free swimming thallus, sheath absent, rarely thin sheath, end of the trichome distinctly marked, hormogones formed by the division of trichomes.

Habitat: blackish patch on tree bark surface. Place of collection: Kuvempu University. Date of collection 22.8.2014.

9. *Scytonema pseudopunctatum* Skuja (Pl.2, Fig.11)

(Desikachary 1959, P.469, Pl.96)

Thallus pulvinate, filaments partially prostrate, erect, less densely inter twined, 25 μ broad, false branched, yellowish lamellation, heterocyst cylindrical with rounded ends.

Habitat: Blue green patch on tree bark surface. Place of collection: Kuvempu University. Date of collection 22.8.2014.

10. *Calothrix fusca* Bornet & Flahault (Pl.2, Fig. 10)

(Desikachary 1959, P.527, Pl.107, Fig.10)

Filaments single, 200-300 μ height, 10 μ broad, sheath colorless, cells discoid, shorter than broad, basal heterocyst, smaller than the basal cell of the trichome.

Habitat: Blackish patch on tree bark surface. Place of collection: Kuvempu University. Date of collection 22.8.2014.

11. *Homoeothrix hansgirgi* (Schmidle) Lemmermann (Pl.2, Fig.5)

(Desikachary 1959, P.521, Pl.106, Fig.4 & Pl.112, Fig.4)

Filaments many, unbranched, erect, 4 μ broad, sheath thin, colourless, trichome ending in short hair like, cells are short.

Habitat: Dark green patch on tree bark surface. Place of collection: Kuvempu University. Date of collection 22.8.2014.

Discussion

A total of 11 taxa were recorded from Kuvempu University campus from randomly selected tree barks (Plate2). The results from this study showed that the most important inhabitants of the tree bark are cyanobacteria forming a blackish biofilms on tree trunks. The blackish and dark green patches were noticed or observed on the surface of bark samples. The above patches are characteristic features of aerophilic algae of tropical forests. The observation is in accordance with Biswas (1932) who studied aerophilous algae of Calcutta and he described the different colours exhibited from aerophilous algae. Eg: Orange red colour by *Trentepohlia* species.

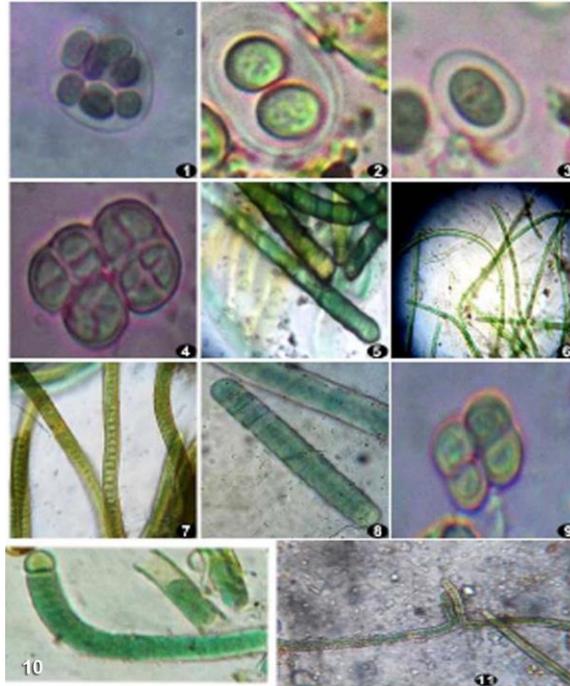


Plate 2 (Figs.1-11): 1.*Aphanothece stagnina*, 2. *Chroococcus tenax*, 3.*Gloeothece rupestris*, 4. *Myxosarcina spectabilis*, 5. *Homeothrix hansgirgi*, 6. *Lyngbya mesotricha*, 7. *Phormidium ambiguuum*, 8. *Oscillatoria* sp, 9. *Chroococcus minor*, 10.*Calothrix fusca*, 11.*Scytonema pseudopunctatum*. Figure 1-11 under 40 X

Among 11 taxa, five taxa are non-filamentous and six are filamentous. The taxa of *Chroococcus minor* (Pl. 2, Fig 9) has spherical cells, in groups of 4, blue green with yellowish margin, with sheath 10 μ diameter. Among 11 taxa, five are belongs to Chroococaceae (*Chroococcus minor*, *Chroococcus tenax*, *Gloeothece rupestris*, *Aphanothece stagnina* and *Myxosarcina spectabilis*). Among six filamentous taxa, three taxa comes under Oscillatoriaceae (*Oscillatoria* sp., *Lyngbya mesotricha*, *Phormidium ambiguuum*), two taxa are belongs to Rivulariaceae (*Homeothrix hansgirgi*, *Calothrix fusca*) and only one taxa *Scytonema pseudopuctatum* comes under Scytonemataceae. *Chroococcus* sp., were recorded to be dominant and rest of the taxa were recorded with the same number of taxa (Fig 1). These taxa receives moisture either solely from the atmosphere or a fairly steady source of water seeping through the moss mats.

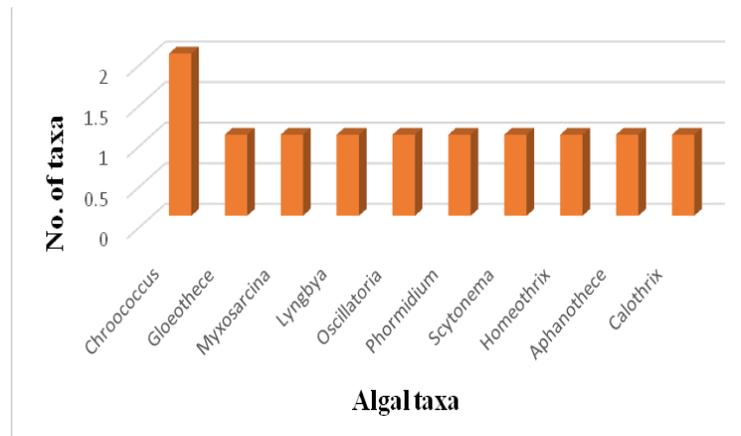


Fig. 1: Occurrence of algal taxa under different genera of the tree barks from Kuvempu University campus

So far similar works was also carried out on species richness dynamics of bark algae and cyanobacteria in rain forest mountainous habitats of south-East Asia (Neustupa and Skaloud, 2008, 2010). They discussed about closed and open type of forests samples and has proved that samples from open forests showed high diversity and species composition than closed forest samples. They also discussed about light factors for the growth of the subaerial algae. Other than Cyanophyceae, Chlorophyceae and Ulvophyceae were also recorded in tropical region. Among the green algae, members of *Trentepohliales* are the major components of terrestrial flora in the world living on tree trunks, rocks and leaves, and occurring at high abundance, and diversity in tropical regions (Neustupa and Skaloud, 2010).

The analysis of data revealed that there is a good distribution of corticolous algae may be due to the subtropical climate of the Kuvempu University campus.

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