Biodiversity of fresh water algae from Guindy campus of Chennai, India

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Abstract
The present work deals with the 35 fresh water algal samples and description of 62 taxa of biodiversity of fresh water algae from University of Madras Guindy campus of Chennai. Collections of 35 fresh water algal samples were carried out during the month of December 2010 to April 2011. Samples were examined in the laboratory and identified. The following algae were present: Chlorococcum (1), Elakatothrix (1), Chlorella (1), Palmelloccocus (1), Tetradron (1), Polyedriopsis (1), Chodatella (1), Oocystis (2), Coelastrum (1), Scenedesmus quadricauda (Turpin) Breb. var. longispina (Chodat) G. M. Smith, Scenedesmus (3), Microspora (1), Rhizoclonium (1), Trentiphila (2), Closterium (1), Cosmarium (5) of Chlorophyceae, Cyclotella (1), Fragilaria (2), Achnanthes (1), Amphora (1), Navicula (5), Pinnularia (1), Hantzschia (1) and Nitzschia (1) of Bacillariophyceae and Microcystis (1), Chroococcus (3) Chroococcidiopsis (1), Gloecapsa (2), Gloeocapsopsis (1), Aphanotheace (1), Chlorogloea (2), Oscillatoria (3), Phormidium (3), Lyngbya (3), Microcoleus (1), Microchaete tenera (1), Calothrix (1), Camptylonema (1) and Hapalosiphon (1) of Cyanophyceae were recorded. Algae are described with photographs.

Keywords: Biodiversity, Bacillariophyceae, Chlorophyceae, Cyanophycaeae, Fresh water algae

INTRODUCTION
Biodiversity is the level of variation in life forms within a specified ecosystem. The algal diversity is determined by the level of richness of species and their functional importance in the processes they mediate. Algae occur in waters of low salinity (as low as 10ppm) called freshwater. Fresh-water algae, also called phytoplankton, vary in shape and color, and are found in a large range of habitats. The freshwater ecosystem is of lotic and lentic types, lotic include streams, canals, waterfalls, rivers and rivulets. The lentic system includes the pools, puddles, ponds, reservoirs, lakes and the agricultural fields like paddy fields. The freshwater ecosystem is differentiated into various types of planktons (free floating), benthons (attached to sediments) or epiphytic algae (on stones, sand, mud and rock of reservoir and lakes). Studies on algae for over a century were on understanding their structure and reproduction and several treatises (Smith, 1920; Fritsch, 1935; Prescott, 1951) and monographs were published for several groups of algae with details on the occurrence and distribution with reference to diverse habitats (Desikachary, 1959; Randhawa, 1959; Pal et al. 1962; Ramanathan, 1964 and Philipose, 1967). 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 (Anand, 1989). Algae form assemblage of chlorphyllous organisms occurring in wide variety of aquatic and terrestrial ecosystem in India (Anand, 1998). Manual of fresh water algae of Tamil Nadu is based on studies conducted on different types of lotic and lentic water bodies (Mahendrapurmal & Anand, 2008). The taxonomic groups of fresh water algal ecosystem in Anamalai hills of Tamil Nadu have also been studied (Sankaran, 2009). Depending on the seasons, the algae appear and disappear (Arulmurugan et al. 2010). So, seasonal variation in combination with ecosystem variation results in biodiversity of algal species.

MATERIALS AND METHODS
Study Area (Fig. 1)
The area of study is the campus of University of Madras located at Guindy. Guindy is located in the South-Western part of the city. Guindy is home to many important landmarks in the city and the most famous amongst them is the Guindy National Park - the only National Park that is located opposite to an university campus (Latitude 13.007° and Longitude 80.236°).

Algal samples 35 were collected from different habitats of Guindy campus (Chennai), collection of samples were carried out during the month of December 2010 to May 2011. Random sampling method has been applied in the algal collection procedure. The water, soil is productive and climates are best suited for different class of algae viz. Cyanophyceae, Chlorophyceae and Bacillariophyceae. Collection of Desmides and Diatoms were made after (Williamson, 1999) method, by single a bulb pipette attached to 25 cm of plastic tube which was used to suck up the detritus and grit from selected aquatic habitats. After an initial examination of the living samples, the coarser material was removed by filtration through a mesh net. The algal samples were preserved in 4% formalin (aqueous solution of formaldehyde). Bacillariophycean forms were studied after cleaning the method called “Mixgen” (Prasad & Singh, 1996). Cyanophycean forms were stained by Iodine. Glycerine was used for mounting the material. The centric organism has been photographed using a LABOMED microscope with attached SANYO ccd camera (Arulmurugan et al. 2010).

**RESULTS**

**Chlorophyceae**

**Chlorococcum humicola** (Naegeli) Rabenhorst (Pl.1, Fig. 1)

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.

Collected from: Guindy campus near Mens hostel – Cemented old water tank (Date: 11.02.2011, Voucher No GCHMT-1)

Occurrence: C.f. Tamil Nadu (M.Perumal&Anand,2008) and Kerala (Arulmurugan et al. 2010).

**Elakatothrix gelatinosa** Wille

Colonies free –floating, elongate fusiform to irregular with the long axes of cells parallel to the long axis of the colony. Colonies usually with 1-16-32, rarely up to 50 cells. Cells usually in pairs, spindel – shaped with one pole rooted and the other pointed, the rounded end of a pair of cells being in opposition. Cells in single – celled colonies with both ends uniformly attenuated. Chromatophore single, parietal, covering the entire length of the wall and with a pyrenoid. Cells 2.5-6 µm broad, 11 - 30 µ long. Colonies 10 - 30 µm, broad, 70-160 µm long.

Collection from: Anna University ground – stagnant water in cemented tank (Date:11.01.2011, Voucher No. AUMEMO - 01).

Occurrence: C.f. India (Philipose, 1967). First reported in Indian region.

**Chlorella vulgaris** Beijerinck (Pl.1, Fig. 3)

Alga free living. Cells usually solitary or in small colonies, spherical and with a thin cell membrane. Chloroplast parietal, cub – shaped and with a pyrenoid which is sometimes indistinct. Cells usually 5 -10 µ in diameter.

Collected from: In front of the Anna University VC office - Moisture cement wall (Date 12.12.2010, Voucher No. AU-22)


**Palmellococcus saccharophilus** (Krueger) Chodat (Pl.1, Fig. 4)

Cells ellipsoid, ovoid or rarely spherical, bean shaped or pear-shaped. Cell membrane thin, colorless and slimy. Chromatophore in the form of a flate and devoid of a pyrenoid.

Collected from: Guindy campus near Nuclear physics department – Guava tree(Psidium gujava) (Date : 11.02.2011, Voucher No. GCG-01)


**Tetraedron muticum** (A. Braun) Hansgirg (Pl.1, Fig. 5)

Cells small, flat and triangular with the sides slightly concave angles broadly rounded or truncate. Cell wall smooth. Cells 6-30 µ in diameter.

Collected from: Guindy campus near Mens hostel – Cemented old water tank (Date: 11.02.2011, Voucher No GCHMT-1)


**Polyedriopsis spinulosa** (Schimidle) Schimidle (Pl.1, Fig. 6)

Cells solitary, tetragonal to cruciate with 4-5 angles. Sides of usually concave. Cells without spines 12-25 µ in diameter spines 21-40µ long.

Collected from: Anna university ground – Stagnant water in cemented tank (Date:11.01.2011, Voucher No. AUMEMO - 01).


**Chodatella longiseta** (Lemmermann) Printz (Pl.1, Fig. 7)

Células solitárias, elipticas, 11,0-14,0 µm compr.,5,5-8,0 µm larg.; pólos levemente atenuados. Cada pólo com 3 a 5 setas, longas, levemente fl exuosas, afi landogradualmente em direção ao ápice, 38,0-46,0 µm compr. Chloroplasto parietal, pirenóide não observado.

Collected from: Anna University ground – stagnant water in cemented tank (Date:11.01.2011, Voucher No. AUMEMO - 01).

Occurrence: Brasil (Luciano Luna Rodrigues et al. 2010). First reported in Indian region.

**Oocystis echalocystiformis** lyengar (Pl.1, Fig. 8)

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 autosporas formed inside the distended mother cells wall. Adult cells 7-9,1um broad, 18-24um long. Young cells 5.5um broad and16um long.

Collected from: Guindy campus near Mens hostel – Cemented old water tank (Date:11.02.2011, Voucher No GCHMT-1)

**Oocystis pusilla** Hansgirg var. *maior* Skuja (Pl.1, Fig. 9)

Cells elongate-ellipsoid with the ends truncate to rounded and sometimes with a slight median inflation. Solitary or as 2-4 autospores inside the old mother cell wall. Cell membrane thin and without polar thickenings. Cells much larger than in the type, measuring 6.8-11µ in breadth and 11-23µ in length. Chromatophores apparently without pyrenoid.

Collected from: Guindy campus near Mens hostel – cemented old water tank (Date:11.02.2011, Voucher No GCHMT-1)

Occurrence: C.f. India (Philpose, 1967), First reported in Indian region.

**Coelastrum microporum** Nägeli (Pl.1, Fig. 10)

Colonies more or less spherical and of 8-16-32-64 (usually 16-34) cells with small intercellular spaces. Cells spherical to ovoid, enclosed by delicate gelatinous sheath interconnected by almost imperceptible gelatinous processes. Cells with sheath 4-27 µ in diameter. Colonies 20-90 µ in diameter.

Collected from: Anna University ground – Stagnant water in cemented old water tank (Date:11.02.2011, Voucher No GCHMT-1)


**Scenedesmus quadricauda** (Turpin) Breb. var. *longispina* (Chodat) G. M. Smith (Pl.1, Fig. 11)

Colonies usually 2-4 celled, rarely 8 celled. Cells ovoid to cylindrical with the cells narrow than in the spines proportionately longer, compared to the length of the cells. Internal cells sometimes with short delicate spine from some of their poles. Cells 2.5 µ broad, 8-15.3 µ long. Spine 7.5-15 µ long.

Collected from: Anna University ground – Stagnant water in cemented old water tank (Date:11.02.2011, Voucher No. AUMEMO-01).


**Scenedesmus quadricauda** (Turp.) Breb. var. *quadrispina* (Chodat) G. M. Smith (Pl.1, Fig. 12)

Colonies usually 2-4 celled. Cells broadly ovoid and about twice as long as broad. Poles of terminal cells with a single short recurved spine. Cells 3.5-8.5 µ broad, 8.5-15-19 µ long spine, 2.5-5.5µ long.

Collected from: Anna University ground – Stagnant water in cemented tank (Date:11.01.2011, Voucher No. AUMEMO-01).


**Scenedesmus quadricauda** (Turp.) Breb. var. *westii* G. M. Smith (Pl.1, Fig. 13)

Colonies usually four to eight celled. Cells 4.5-9-13 µ broad,10-22-29 µ long. Spines 10.6-16.7 µ long.

Collected from: Anna University ground – stagnant water in cemented tank (Date:11.01.2011, Voucher No. AUMEMO-01).

Occurrence: C.f. India (Philpose, 1967)

**Microspora willeana** Lagerheim (Pl.1, Fig. 14)

Filamentous unbranched, uniseriate, thick, slightly constricted at cross wall; cells quadrate or slightly cylindrical, cell wall thin, H shaped chloroplast not prominent; chloroplast perforated plate; covering only margin of side walls; pyrenoids absent; akinetes spherical and light brown arranged in series.

Collected from: Slow running water in water tank of CASB building – attached in a cement wall and wood (Date: 25.4.2011, Voucher No. GCASB-1)

Occurrence: Asia (Ramanathan, 1964) and Uttaranchal (GUPTA, 2005)

**Rhizoclonium hieroglyphicum** (C. A. Ag.) Kutz. (Pl.1, Fig. 15)

Filaments long wiry, unbranched, unconstrasted at septa; cells long, cylindrical with 2-3 8 µm, thick stratified walls, multinucleate; chloroplast parietal rediculate with several pyrenoids; rhizoids primary, long and colourless, formed from the direct prolongation of the lower and of filaments.

Collected from: Near Guindy campus biophysics department – Stagnant water tank (Date: 22.4.2011, Voucher No. GC CAS BIO PHY -1)

Occurrence: Andaman and Nicobar Islands (Prasad & Misra, 1984)

**Trentipohlia tenuis** (Zell. De Toni (Pl.1, Fig. 16)

Epilithic and epiphytic, stratum thick, consisting of minute, closely packed tufts, dark green to orange colored when fresh, grayish to orange when dry: filaments nearly straight or flexuous, those of higher order divaricates, distinctly constricted at cross wall; cells elongate ellipsoidal on short sub-cylindrical, often asymmetric in primary and secondary filaments,5.5-7 µm broad,8-16.5 µm long: cell wall1-1.5 µ thick very rough or outer surface: sporangia sparsely present in terminal or lateral position, sub-spherical to ovoid, mostly sessile,8.5 µm broad,10.5-13 µm long.

Collected from: Guindy campus near Nuclear Physics department – Guava tree (Psidium guajava) (Date: 11.02.2011, Voucher No. GCG-01)

Occurrence: Andaman and Nicobar Islands (Prasad & Misra, 1984, 1992)

**Tretetohlia torulosa** Wildeman (Pl.1, Fig. 17)

Epiphytic, stratum, thin, flexus, consisting of small compact tufts or spreading in the form of soft cushion, yellowish-green to dark orange when dry, vegetative filaments torulose and branched, distinctly constricted at cross- wall; cells ellipsoid or sub- spherical in centre of filaments, 14.5-17 µm broad, 2-34.5 µm long; cell wall thin and smooth; sporangia spherical to ovoid, usually lateral or terminal, rarely intercalary, 18-21.5 µm broad, 21-26.5 µm long.

Collected from: Near Anna University check post - Cemented wall (Date: 12. 12. 2010, Voucher No. AU-20)


**Closterium pritchadianum** Arch. (Pl.1, Fig. 18)

Cells medium size or large, finely curved to more or less,7-14 times longer than broad ,outer margin straight or slightly concave, cells gradually attenuated to narrow, truncate and faintly recurved apices: cell wall striated, strions composed of fine punctate, punctuations more prominent in longer specimens; chloroplast with
Cosmarium amoenum Breb. Var. maius Kamat (Pl.1, Fig. 19)

Cells of medium size, twice as long as broad, slightly constricted sinus broad and acute-angled; semi cells rounded-ovate, margin with 23-30 undulations; cell wall with granules arranged in indistinct vertical rows.

Cosmarium angulosum Breb. (Pl.1, Fig. 20)

Cells 1.2-1.5 times longer than broad, deeply constricted in the middle; sinus linear; semi cells sub quadrate to sub rectangular, lateral margins smooth, straight and parallel, apex straight to slightly retuse, basal angles almost rectangular, apical angles obliquely truncated; semi cells in apical view elliptic, in lateral view elliptic-oblong; chloroplast with 1 pyrenoid.

Cosmarium medioglabrum Turn. (Pl.1, Fig. 21)

Cells very small, slightly longer than broad, deeply constricted, sinus narrow and open outwards; semi cells sub-hexagonal, angles sub-rotunda, sides faintly converging to slightly narrowed and truncate apex, margin with 14-16 slight undulations; cell wall finely punctate; each semi cell with an axils chloroplast, containing one pyrenoid.

Cosmarium moniliformae (Turb.) Ralfs (Pl.1, Fig. 22)

Cells, 23.25-35.68 µm long, 13.27-20.26 µm broad; margin entire; semi circular or sub circular; isthmus, 7.36-9.47 µm broad; constriction deep; sinus open; wall smooth; chloroplast axils, in each semi cell; pyrenoides 2.

Cosmarium psuedogranatum Nordst. (Pl.1, Fig. 23)

Cells of medium size, about 1.5 times longer than broad, slightly constricted, sinus broad and shallow; semi cells semi elliptic with circular outline: cell wall finely punctate: top-view sub-circular, each semi cells with 2 axils chloroplast, each containing one pyrenoid.

Bacillariophyceae

Cyclotella maneghiniana Kuetz. (Pl.1, Fig. 24)

Frustules discoid in valve view, rectangular and undulated in girdle view, margin view well defined, coarsely striated and the striae wedge-shaped. The central portion at first straight appears to be quite smooth, but under very high magnifications show extremely fine radially arranged punctae as figured by Van Heurck (op. cit., pl. 22, fig. 656). Cells 20 µm.

Fragilaria breviisteriata Grun f. elongate G.Venkataraman (Pl. 1, Fig. 25)


Fragilaria vaucheriae Kutz. (Pl. 2, Fig. 1)

Frustules typically linked at the valve face to form chains. Valve to linear to linear- lanceolate in outline narrow towards rotate poles. Striae are parallel, sometimes becoming slightly radiate towards the poles.

Achnanthes inflata (Kutz.) Grun. (Pl. 2, Fig. 2)

Valves linear with two strong concave undulations forming gibbous centre and two long broadly rounded ends; hypo valve with thin, straight median raphae with distinct central noudles; axial area narrow gradually widening towards centre; central area broad, staurid reaching the sides; striae coarse, punctate, radial in the middle becoming concolvergent towards apices; epivalve with linear, narrow, eccentrically placed marginal psuedo raphae; striae coarsely punctate parallel in the middle but at apices slightly curved and radial.

Occurrence: Tamil Nadu (Venkataraman, 1939, Mahendraperumal & Anand, 2008), Andaman and Nicobar Islands (Prasad & Misra, 1984), Uttaranchal (Gupta, 2005) and Kerala (Arulmurugan et al. 2010).


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Collected from: Guindy campus near Mens hostel – Cemented old water tank (Date:11. 02. 2011, Voucher No GCHMT-1)

Cosmarium psuedogranatum Nordst. (Pl.1, Fig. 23)

Cells of medium size, about 1.5 times longer than broad, slightly constricted, sinus broad and shallow; semi cells semi elliptic with circular outline: cell wall finely punctate: top-view sub-circular, each semi cells with 2 axils chloroplast, each containing one pyrenoid.

Collected from: Guindy campus near Mens hostel – Cemented old water tank (Date:11. 02. 2011, Voucher No GCHMT-1)

Occurrence: Andaman and Nicobar Islands (Prasad & Misra, 1984, 1992)
Amphora coffeaformis Ag. var. africana Fritsch and Rich (Pl. 2, Fig. 3)

Valves arcuate on the dorsal margin and straight on the ventral margin. The ends of pronouncedly capitate and slightly but outwards. The dorsal side bears slightly divergent punctate striae; the ventral side structure less. Length 25-37 µ, breadth 4.5-7 µ, striae 17-19 µ.

Collected from: Near Anna University VC office –Moisture wall (Date: 12.12. 2010, Vaucher No.22)

Occurrence: Tamil Nadu (Venkataraman, 1939), Andaman and Nicobar Islands (Prasad & Misra, 1984)

Navicula fluens Hust. (Pl. 2, Fig. 5)

Valves small, elliptical lanceolate with rounded ends, raphe thin, straight, median: axial area very narrow, linear, central area somewhat elliptical; striae fine, lineate, slightly radiate through the valve.

Collected from: Near Anna University VC office –Moisture wall (Date:12.12 2010, Voucher No.22)


Navicula halophila (Grun.) Cleve f. subcaptata Ostrup. (Pl. 2, Fig. 6)

Valves, lanceolate with distinctly constricted highly produced rounded ends; raphe thin straight, median, with distinct closely placed central nodules; axial area narrow, central area moderately broad; striae fine, lineate, parallel throughout the valve.

Collected from: Guindy campus near Mens hostel – Cemented old water tank (Date: 11.02.2011, Voucher No GCHMT-1)

Occurrence: Andaman and Nicobar Islands (Prasad & Misra, 1984)
Navicula rostellum W. Smith (Pl. 2, Fig. 7)
Valves linear-lanceolate with constricted, produced ends, lineate and radial in the middle and convergent at the ends.
Collected from: Guindy campus near Mens hostel – Cemented old water tank (Date: 11.02.2011, Voucher No GCHMT-1)
Occurrence: Tamil Nadu (Mahendraperumal & Anand, 2008)

Navicula twoutiensis Cholnoky (Pl. 2, Fig. 8)
Cells solitary and free floating, valves elongate, usually attenuated towards capitates rounded, outline commonly triundulated.
Collected from: Guindy campus near Mens hostel – cemented old water tank (Date: 11.02.2011, Voucher No GCHMT-1)
Occurrence: Tamil Nadu (Mahendraperumal & Anand, 2008)

Pinnularia interruptra W. Smith f. subcapitata Fritsch (Pl. 2, Fig. 9)
Sides of the valve straight and parallel. Striation interrupted at the centre of the valve. Ends not very markedly capitates. Length 26.7-36 µ, breadth 5-7 µ, Striae 10-11 in 10 µ.
Collected from: Near Anna university VC office–Moisture wall (Date: 12.12.2010, Vaucher No.22)
Occurrence: Tamil Nadu (Venkataraman, 1939).

Hantzschia amphioxys (Ehr.) Grun. (Pl. 2, Fig. 10)
Valves freely accuate, linear dorsal side convex, ventral side somewhat concave with distinct depression in the middle; ends broadly produced and bluntly rounded; keel punctate coarse distinct, slightly elongated median two somewhat placed distantly, rudiments of nodules present below the depression of ventral valve; striae fine, lineate parallel throughout the valve.
Collected from: Near Anna university VC office–Moisture wall (Date: 12.12.2010, Vaucher No.22)
Occurrence: Andaman and Nicobar Islands (Prasad & Misra, 1984)

Nitzschia obtusa W. Smith var. scalpelliformis Grun. (Pl. 2, Fig. 11)
Frustules broad, linear with ends obliquely truncate. Keel fairly large inflexed in the middle region. The two median keel punctate distant. Striation punctae fine and linear. Cells length 89-112 µ, breadth 10-12 µ, Keel punctae6-8 in 10 µ, striae 26-27 in 10 µ.
Collected from: Guindy campus near Mens hostel – cemented old water tank (Date: 11.02.2011, Voucher No GCHMT-1)
Occurrence: Tamil Nadu (Venkataraman, 1939)

Cyanophyceae
Microcystis elongata Desikachary (Pl.2, Fig. 12)
Colony elongate, sometimes clathrate, up to 1mm. in length. constricted colonial mucilage distinct, occasionally lamelated, hyaline, refractive; cells often closely arranged, grouping absent, arrangement on uniform, 3.9-5.2 µ broad, gas vacuole present.
Collected from: Anna University ground – stagnant water in cemented tank (Date: 11.02.2011, Voucher No. GCCM-01 )
Occurrence: C.f. India (Desikachary, 1959)

Chroococcus minutus (Kutz.) Nageli (Pl. 2, Fig. 14)
Cells spherical or oblong, single or in groups of 2-4, light-blue green, with sheath 6-15 µ diam., and without sheath 4-10 µ diam., colonies 10-13 X15-20 µ; sheath not lamellated, colorless.
Collected from: Guindy campus near Xerox center epiphytic algae-Mangifera (Mangifera indica) (Date: 11.02.2011, Voucher No GCM-01)
Occurrence: C.f. India (Desikachary, 1959)

Gloeocapsa crepidium Thuret (Pl. 2, Fig. 18)
The gelatinous, oliveaceous, when dried bakish, gelatinous soft; cells in groups of 2-4, rarely more, colonies spherical or oval,
12-14µ diam, closely arranged in spherical regions and loosely arranged in the middle cells without sheath 4-8 µ diam.; with thin yellowish to brownish sheath in the outer regions and colorless or different in the sheaths inside, sheath un lamellated; often with nonocyst formation 2.5-3.5µ diam.

Collected from: Guindy campus near central Library epiphytic algae-Polyalthia (Polyalthia longifolia) (Date: 11.02.2011, Voucher No. GCP-01)

Occurrence: C.f. India (Desikachary, 1959)

**Gleocapsopsis chroococcides** (Novacek) J. Komerk (Pl. 2, Fig. 19)

Cells more or less spherical, latter irregular or rounded polyedrical, agglomerated in to irregular packets, diffrently large , with own muclaginous, limited firm, lamellated or not lamellated and colored, usually not very wide envelopes which sometimes more or less copy the cell shape; group of cells unified together by the common muclaginous sheath. Cells with-blue green, usually homogeneous content. Sheath colored, yellow-brown or orange – redish up to violet. Cells 6.5-8.5 µ diam.

Collected from: Guindy campus near Xerox center epiphytic algae-Tamarind tree (Tamarindus indica) (Date: 11.02.2011, Voucher No. GCT-01)

Occurrence: C.f. Mexico (Komarek & Anagnostidis, 1998)

**Aphanotheace staginina** (Spreng.) A. Br. (Pl. 2, Fig. 20)

Thallus gelatinous, spherical, ellipsoidal, up to many cm. in diam. Pale blue-green, dull brown or brownish, in the inside often with calcareous crystals; cells oblong, more or less ovoid or cylindrical, 3-6.5 µ broad, 4.5-11 µ long, more or less blue green, densely or sparsely arranged, generally densely in the peripheral region of the colony and sparsely in the inside of the colony, without individual envelop, homogeneous muclagium.

Collected from: Guindy campus near Xerox center epiphytic algae-Mangifera indica (Mangifera indica) and Jambul tree (Syzygium cumini) (Date : 11.02.2011, Voucher No. GMCX-01)

Occurrence: C.f. India (Desikachary, 1959)

**Chlorogloea fritschii** Mitra (Pl. 2, Fig. 21)

Thallus a deep blue green crust of indefinite size, composed of rounded or irregular cells packet; cells arranged in vertical and horizontal rows, rounded or angular, without evident muclagious envelop, with pale blue-green, granular contents, usually 6-816-50µ diam.(4-12 µ), single or in groups of two or more cells separating for propagation; endospore naked, spherical 4-9 µ diam., formed singly within the cell and libarated by the rupture of the membrane, on germination forming a uni seriate filament of 3-12 cells which divide in three direction to produced packets.

Collected from: Guindy campus near Biophysics department epiphytic algae-Mangifera indica (Mangifera indica) (Date: 11.02.2011, Voucher No. GCM-01)
Occurrence: C.f. India (Desikachary, 1959).

Chlorogloea microcystiodes Geltier (Pl. 2, Fig. 22)

Thaluss thin, gelatinous, forming a slightly lobed dull green to brownish crust mostly hemi spherical or larger thaluss made up of by the union of a number of daughter colonies; cells spherical or ellipsoidal, mostly very closely arranged and polygonal in erect or radial row of branched or more or less indistinct rows, generally without a distinct individual sheath; colonial mucilage colorless, or yellowish to brownish only in peripheral parts; cells 2-3.8 µ diam., blue-green, olive-green or yellowish; nonocystes formed in somewhat broader cells by repeated division, 1.5-2 µ diam.

Collected from: Guindy campus near Biophysics department epiphytic algae-Mangifera (Mangifera indica) and Mahua tree (Maduca longifolia) (Date: 11.02.2011, Voucher No. GCM BLX-01)

Occurrence: C.f. India (Desikachary, 1959)

Oscillatoria cortiana Meneghini ex Gomont (Pl. 2, Fig. 23)

Thalluss dull blue green; trichome straight, slightly constricted at the joints, 5.5-8 µ broad, gradually tapering at the ends, bent, not capitate, blue green; cells as long as broad or longer than broad, 5.4-8.2 µ long at the ends up to 14 µ long, septa not granulated; cells obtuse, without calyptra.

Collected from: Guindy campus near Theoretical Physics department - Moisture soil (Date: 12.12.2010, Voucher No.ACT-10).

Occurrence: C.f. India (Desikachary, 1959)

Oscillatoria calcuttensis Biswas (Pl. 2, Fig. 24)

Thalluss leathery brown; trichomes parallel straight, not constricted at the cross wall, 2 µ broad, at the end briefly attenuated, curved or bend; cells 2-5 times as long as broad, 6-10 µ long, cross – wall 3 granules, blue-green, end cell conical, pointed, not capitate.

Collected from: Guindy campus near Theoretical Physics department - Moisture soil (Date: 12.12.2010, Voucher No.ACT-10).

Occurrence: C.f. India (Desikachary, 1959) and Tamil Nadu (Mahendraperumal& Anand, 2008).

Oscillatoria proboscidea Gomont (Pl. 2, Fig. 25)

Thalluss dull green to dark blue-green; trichome more or less straight, not constricted at cross- wall,12-15 µ broad, at the ends distinctly blue-green; cells 1/3-1/6 times as long as broad,2-4 ; cells 1/3-1/6 times as long as long, not granulated at the cross- wall; end-cells flatly rounded, capitate, with slightly thickened membrane.

Collected from: Guindy campus near Mens hostel, Theoretical Physics department soil and epiphytic on – Mahua tree (Maduca longifolia) (Date: 11.02.2011, Voucher No. GCBLX-01)

Occurrence: C.f. India (Desikachary, 1959)

Oscillatoria raoi De Toni (Pl. 3, Fig. 1)

Plant mass thin, membranous, firm, pale blue- green to pale bluish violet; trichome straight, usually of uniform thickness, and only rarely slightly tapering at the ends, without constrictions at the joints, 5.2-6 µ broad, septa indistinct, but with distinct granules closely arranged on either side; cells 2.5-6 µ (average 5 µ) long, with homogenous contents, end cells rounded rarely conical, sometimes with constrictions at the septum, not capitate, without many calyptra.

Collected from: Guindy campus near Biophysics department epiphytic algae-Mangifera (Mangifera indica) and Polyalthia (Polyalthia longifolia) (Date: 11.02.2011, Voucher No.
GCMP-01) Occurrence: C.f. India (Desikachary, 1959)

Lyngbya dendrobia Bhrul et Biswas (Pl. 3, Fig. 6)

Stratum more or less expanded, compact, thin, minutely and densely tomentose; filaments long and flexible; closely interwoven, with sheath 10-11 µ thick; sheath usually hin, 1-1.5 µ thick, smooth, hyaline, usually colorless, more rarely when old brownish and very moderately stratified; trichomes 9-10 µ broad as long as, 4-6 long; contents of various shades of brown, uniformly and densely granular; dissepiments conspicuous, not marked by granules.

Collected from: Guindy campus near Biophysics department epiphytic algae- Mangifera tree (Mangifera indica) (Date: 11.02.2011, Voucher No. GCM-01)

Occurrence: C.f. India (Desikachary, 1959) and Tamil Nadu (Mahendraperumal & Anand, 2008).

Lyngbya lutea (Ag.) Gom. (Pl. 3, Fig. 7)

Thallus somewhat gelatinous, leathery, yellowish brown to olive green, when dry often dark violet; filaments coiled and densely entangled; sheath colorless, smooth at the first thin, but alter up to 3 µ thick and lamellated at the cross wall, not attenuated at the ends, 2.5-6 µ broad, olive green, cross-walls granulated; cells quadrate to 1/3 times long as broad, 1.5-5 µ long; end cells with rounded calyptra.

Collected from: Guindy campus near Mens hostel – Cemented old water tank (Date: 11.02.2011, Voucher No GCHMT-1)

Occurrence: C.f. India (Desikachary, 1959) and Kerala (Arulmurugan et al., 2010)

Microcoleus lacustris (Rabenh.) Farl. (Pl. 3, Fig. 8)

Thallus blackish blue-green, filament contorted, seldom branched, sheath colorless, slimy, not colored violet by chlor-zinc-iodide, sometimes gelatinizing, many trichomes in each; trichomes distinctly constricted at the cross-walls, 4-5 µ broad; cells cylindrical, 1-3 times as long as broad, 4-6 µ long, bright blue-green; end cell more or less rounded, conical, not capitulate.

Collected from: Guindy campus near Mens hostel– Moisture soil (Date: 11.02.2011, Voucher No GCHMT-1)

Occurrence: C.f. India (Desikachary, 1959)
hemi spherical, single or double, smaller than the basal cells of the trichome.

Collected from: Guindy campus near central Library epiphytic algae - Polyalthia tree (Polyalthia longifolia) (Date: 11.02.2011, Voucher No. GCP-01)
Occurrence: C.f. India (Desikachary, 1959) and Tamil Nadu (Mahendraperumal & Anand, 2008).

**Camptylonema indicum** Schimide (Pl. 3, Fig. 11)

Filaments mass brownish; filaments crescent shaped, in the middle portion 13.1-15.7 µ broad and in the erect portions(7.9-9.2) 9.2-11.1 µ broad; sheath lamellate yellowish brown; branching rare, true and false branches present, branches from erect portions; trichomes torulose in the prostrate region and 3.9-6.6 µ broad and 7.9-183 µ long in the erect portions; heterocyst intercalary, as broad as the trichomes, as long as broad or slightly longer; hormocyst formed epically consisting of 4-12 cells, with a thick lamellated brownish sheath.

Collected from: Guindy campus near central Library epiphytic algae - Polyalthia (Polyalthia longifolia) (Date: 11.02.2011, Voucher No. GCP-01)
Occurrence: C.f. India (Desikachary, 1959)

**Hapalosiphon welwitschii** W. et G. S. West (Pl. 3, Fig. 12)

Filaments single among other algae, somewhat flexuous, 5.5-7.5 µ broad; sheath very close, hardly visible, colorless; cells sub spherical or elongate, as long as broad or longer; lateral branches short, as broad as the main filament narrower, 3.5-5.7 µ broad, slightly attenuated at the ends; cells of the branches ½-3 time as long as broad; heterocyst rare, intercalary, quadrate rounded or cylindrical, 6 µ broad,6-8 µ long; spores sub-spherical or oblong, 5 µ broad 1-2 times as long as broad.

Collected from: Anna University ground – Stagnant water in cemented tank (Date:11.01.2011, Voucher No. AUMEMO - 01).
Occurrence: C.f. India (Desikachary, 1959) and Tamil Nadu (Mahendraperumal & Anand, 2008).

**DISCUSSION**

A total number of genera 39 and species 62 belonging to Chlorophyceae (Genus 16, Species 23) of Oocystis (2), Scenedesmus (3) and Desmids of Cosmarium (5) were dominant genus, Bacillariophyceae (Genus 8, Species 13) of Fragilaria (2) and Nivcula (5) were dominant genus and Cyanophyceae (Genus 15, Species 26) of Chroococcus (3), Gloecapsa (2), Chlorogloea (2), Oscillatoria (4), Phormidium (3) and Lyngbya (3) were dominant genus are recorded from Guindy campus of Chennai, India.

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