



ALGOLOGY

BIODIVERSITY OF FRESH WATER ALGAE FROM TEMPLE TANKS OF KERALA

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Abstract

Algal samples were collected from 37 temple-tanks in Palakkad and Thrissur district in Kerala. Collections were carried out during the month of March 2008 and May 2009. Samples were studied in the laboratory and identified. The following algae were present *Pandorina cylindricum*, *Chlorococcum humicola*, *Botryococcus braunii*, *Chlorella vulgaris*, *Golenkinia radiata*, *Tetraedron octaedricum* (Reinsch) Hansgirg Var. *spinsum*, *Ankistrodesmus fulcatus*, *Ankistrodesmus spiralis*, *Westella linearis*, *Selenastrum minutum*, *Kirchneriella lunaris*, *Pediastrum simplex* Meyen var. *duodenarium*, *P. simplex* Meyen var. *simplex*, *P. duplex*, *P. duplex* Meyen var. *genuinum*, *P. duplex* Meyen var. *reticulatum*, *P. tetras*, *P. tetras* (Ehrenberg) Ralfs var. *excisum*, *P. tetras* (Ehrenberg) Ralfs var. *tetraodon*, *Coelastrum microporum*, *Crucigenia tetrapedia*, *Tetrastrum heteracanthum*, *Scenedesmus acuminatus*, *S. armatus*, *S. denticulatus*, *S. longus* Meyen var. *naegeli*, *S. opoliensis*, *S. perforatus* Lemm. var. *major*, *S. quadricauda* (Turpin) Brebisson var. *maximum*, *S. quadricauda* (Turpin) Brebisson var. *quadrispina*, *Netrium elongatum*, *Spirogyra hyalina*, *Closterium decorum*, *Closterium setaceum*, *Cosmarium impressulum*, *C. portianum* Arc. var. *nephroides*, *Staurastrum spiniceps* Krieg var. *trifidum* (Chlorophyceae), *Cyclotella magneghiniana*, *Melosira granulata*, *Fragillaria brevistriata*, *Synedra dorsiventralis*, *Navicula radiosa*, *Cymbella kolbei*, *C. tumescens*, *Pinnularia abanjensis*, *Gomphonema lanceolatum*, *Amphora coffeaformis* (Bacillariophyceae), *Euglena proxima*, *Phacus leuronectes* (Euglenophyceae), *Microcystis robusta*, *M. viridis*, *M. wesenbergii*, *Chroococcus indicus*, *Merismopedia punctata*, *Hydrococcus rivularis*, *Spirulina gigantea*, *Oscillatoria chalybea*, *Phormidium aerugineo-coeruleum*, *Lyngbya lutea*, *Anabaena sphaerica*, *Westiellopsis prolifica* (Cyanophyceae). Algae are described with photographs.

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

Introduction

The diversity and rarity of indigenous fresh water biota depends upon the habitat. Biodiversity in this context means the full expression of the natural components of the ecosystem that were present before widespread habitat modification, harvest of native species, and introduction of exotic species, whether by accidental or intentional means. Species richness, genetic diversity and unmodified indigenous communities are all components of biodiversity. Algae are microscopically small, unicellular organisms, some of these form colonies and reach size visible to naked eye as minute green particles. The organisms are finely dispersed through out the water and may cause considerable turbidity showing the maximum algal bloom. The freshwater ecosystem is of lotic and lentic types, lotic include streams, canals, water falls, 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), epiphytic algae (on stones, sand, mud and rock of reservoir and lakes). Depending on the seasons the algae appears

and disappears. Temple tanks are wells or reservoirs built as part of the temple complex in Indian temples. Bathing in the sacred waters of these tanks is thought to cure disease and maladies.

Materials and Methods

Study area

The Southern State of Kerala has much to offer in terms of its temple tradition. Kerala temple architecture is unique, and it is in harmony with the natural resources and the climatic conditions of the region. Elephants are an integral part of several of the festivities. A colorful calendar of festivals and strict worship protocols are associated with the hundreds of temples that line the landscape of Kerala.

Palakkad (1) (Altitude midland 76.2 m to 76.2 m above MSL, highland 914 m to 2133 m MSL.) is a thickly forested district of Kerala. It is close to the Tamil Nadu border. It lies at the foot of the colossal western gats with only midland and highland areas only. Temple tank is a lentic water system. There is always intense sunlight so algal growth is found to be

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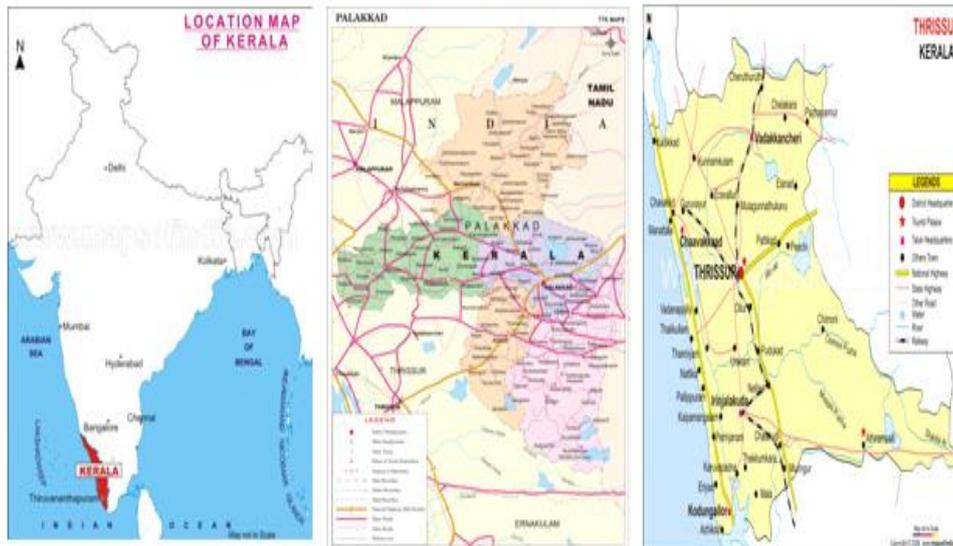
abundant. Palakkad is blessed with several temples most of which are accompanied with ponds.

Thrissur (2) (10°31' Longitude: 76°13' Height above MSL: 22.25m) district and famous all over India for its centuries old Sri Krishna temple, is still remaining obstreperously and obstinately orthodox in its ritualistic religiosity.

Random sampling method has been applied in the algal collection procedure. Algal samples were collected from 37 temple tanks of Palakkad and Thrissur districts in Kerala. Collection was carried out during the month of March 2008 and May 2009. The different types of algal forms were collected from lentic environment only. The soil is productive and climate are best suited for different class of algae viz. Cyanophyceae, Chlorophyceae, Bacillariophyceae and Euglenophyceae. Collection of

Desmides and Diatoms were made after Willianson (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 by the method called "Mixgen" (Prasad and Singh, 1996). Cyanophycean forms were stained by Methylene blue where Chlorophycean 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.

Fresh water algae in Kerala at Palakkad and Thrissur Districts



Results and Discussion

Chlorophyceae

Pandorina cylindricum, M. O. P. Iyengar, (Pl. 1, Fig. 1)

Colonies cylindrical rounded end, 16 celled arranged in alternating tiers of 4 cells each, cells compactly arranged 90 µm.

Occurrence: Tamil Nadu Iyengar and Desikachary, 1981; Mahendrapurumal and Anand, 2008.

Collected from: Meenkulathi Amman temple - Palakkad, Parthasarathy temple - Thrissur Kerala.

Chlorococcum humicola, (Näegeli) Rabenhorst, (Pl. 1, Fig. 2)

Cells spherical, solitary or number of cells crowded together to form a stratum. Chloroplast a

hallow sphere with natural notch and a single pyrenoid. Cells 40 µm.

Occurrence: c.f. Tamil Nadu, [Anand, 1998; Mahendrapurumal and Anand, 2008].

Collected from: Sivan temple - Palakkad, Kerala.

Botryococcus braunii Kützing (Pl. 1, Fig. 3)

Colonies free floating and of irregular shape, without conspicuous gelatinous envelop but completely enclosed by a tough, hyaline, orange-coloured or dark membrane that is produced into irregular wrinkles, fold of spines. Colonies often united in compound net like aggregates by means of long delicate mucilaginous projection from the colonial envelop. Cells ovoid to ellipsoid and arranged radially at the periphery of the colony, the individual cells being invested by inner layer of fatty substances and an outer layer of pectin. Chromatophore yellowish green to grass green, single, parietal, cup-shaped, laminate or reticulate and with a

pyrenoid. Simple colonies up to long 80 µm, breadth 50 µm and compound colonies up to 1.5 mm.

Occurrence: Tamil Nadu and Orissa [Philipose, 1957]; Andaman and Nicobar [Prasad and Srivastava, 1992].

Collected from: Ayyappan temple - Palakkad, Kerala.

Chlorella vulgaris Beijering (Pl. 1, Fig. 4)

Algae free living, cells usually solitary or in small colonies, spherical and with a thin cell membrane. Chloroplast parietal, cup shaped and with a pyrenoid which is sometimes indistinct. Cells usually 25 µm.

Occurrence: c.f. Tamil Nadu [Mahendrapurumal and Anand, 2008].

Collected from: Bhavathi amman temple, Pallipuram temple, Puzhikkal temple, Kannikaparamaswari temple - Palakkad, Gruvaiyurappan temple - Thrissur - Kerala.

Golenkinia radiata Chodat (Pl. 1, Fig. 5)

Cells usually solitary, rarely in 4 celled colonies, spherical, with the entire cell wall

covered by a number of (usually ten) long bristles. Chloroplast cup shaped and with a pyrenoid. Cells 45 µm long.

Occurrence: Orissa [Philipose, 1967].

Collected from: Vettaikkara amman temple - Palakkad, Kerala.

Tetraedron octaedricum (Reinsch) Hansgirg var. ***spinosum*** (Reinsch) W. et G.S. West (Pl. 1, Fig. 6)

Cells octagonal with eight lateral planes. Angles rounded and obtuse each with spine. Cells 35 µm.

Occurrence: Orissa [Philipose, 1967].

Collected from: Perugampoo temple - Palakkad, Kerala.

Ankistrodesmus fulcatus (Chodat) Ralfs (Pl. 1, Fig. 7)

Cells acicular to narrowly 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 µm, breadth 8 µm.

Occurrence: c.f. Tamil Nadu (Mahendrapurumal and Anand, 2008).

Collected from: Sri Meenashi sunderesar temple, Uthanthara Sivavishnu temple - Palakkad, Koodalmanickam temple - Thrissur, Kerala.

Ankistrodesmus spiralis (Turner) Lemmermann (Pl. 1, Fig. 8)

Cells acicular with acute apices; in colonies of usually 4-8-16, rarely two, cells spirally twisted round one another in the median region, but free at the ends

chloroplast single without pyrenoid. Cells long 50 µm, breadth 5-15 µm.

Occurrence: Assam [Carter, 1926].

Collected from: Edavanur temple, Durgadevi temple, Edavanur temple, Puzhikkal temple - Palakkad, Thiruvambadi amman temple - Thrissur.

Westella linearis G. M. Smith (Pl. 1, Fig. 9)

An irregularly shaped colony of about 40 spherical cells arranged in a linear series of 4, cells 20 µm.

Occurrence: Tamil Nadu [Mahendrapurumal and Anand, 2008].

Collected from: Uthukulakkarai temple, Chakkandara temple, Perumal temple - Palakkad, Vadakkunathan temple - Thrissur, Kerala.

Selenastrum minutum (Näegeli) Collins, (Pl. 1, Fig. 10)

Cells crescent-shaped, usually uniformly and plump with pointed ends, solitary or rarely, united in colonies. Cells 30 µm.

Occurrence: Orissa, [Philipose, 1967].

Collected from: Poonthozhikulam temple, Sri Meenachi amman temple - Palakkad, Manivur Sivan temple - Thrissur, Kerala.

Kirchneriella lunaris (Kirchner) Moebius (Pl. 1, Fig. 11)

Colonies spherical to ellipsoidal with an outer gelatinous envelope. Cells irregularly arranged with in envelope in the group of four or eight, flattened and crescent shaped with pointed ends and about twice as long as broad. Chloroplast nearly filling the cells and with a single pyrenoid. Cells long 15 µm, breadth 10 µm.

Occurrence: Maharashtra [Gonzalves and Joshi, 1946], Assam, Orissa, Hyderabad, Bangalore, Kerala, Bihar and Tamil Nadu [Kachroo, 1959].

Collected from: Thravanad pond - Palakkad, Bhavathi (Kannaki) temple - Thrissur, Kerala

Pediastrum simplex Meyen var. ***duodenarium*** (Bailey) Rabenh (Pl. 1, Fig. 12)

Different from the type in having large inter cellular spaces or a single central space with the cells arranged in a ring at the periphery. Inner space of marginal cells concave, outer face prolonged in to a single delicately tapering process. Side of marginal cells also concave or nearly straight. Interior cells similar to marginal cells but with shorter processes. Cell wall smooth or finely punctuate. Colonies of 4-8-16-32-64-128 (usually 8-16-32) cells. Cells 50 µm.

Occurrence: c.f. Orissa [Philipose, 1967].

Collected from: Sulthankottai Anjanayar temple, Kannikaparamaswari temple, Knassari temple, Kamankulam temple, Chakkandara temple, Noorni Ayyappan temple - Palakkad, Koodalmanickam temple,

Bhavathi (Kannaki) temple, Vadakkunathan temple – Thrissur, Kerala.

Pediastrum simplex Meyen var. ***simplex*** Komárek (Pl. 1, Fig. 13)

Coenobia circular, 8-16 celled coenobia up to 100 µm, large inter cellular space or a central space with the cell arranged in a ring at the periphery, inner side of marginal cells concave, outer surface prolonged into a single delicately tapering process, side of marginal cells with shorter process, cell wall smooth; chloroplast single and parietal.

Occurrence: Orissa [Jena and Adhikary, 2007].

Collected from: Malpuzha dam Ayyappan temple, Meenkulathi amman temple, Ayyappan temple, Vettaikkara amman temple, Perugampoo temple, Edavanur temple, Uthukulakkarai temple, Poonthozhikulam temple - Palakkad, Vadakkunathan temple, Koodalmanickam temple, Parthasarathy temple, Gruvaiyurappan temple- Thrissur, Kerala

Pediastrum duplex Meyen (Pl. 1, Fig. 14)

Colonies usually of 16-32, sometimes of 4, 8, 64, or 128 cells small lens shaped perforations between cells. Inner cells quadrate to angular and not in contact at the central of the side wall. Inner side of marginal cells, outer side produced into two short truncate processes. Cells 30 µm.

Occurrence: c.f. Tamil Nadu [Mahendrapurumal and Anand, 2008].

Collected from: Thravanad pond, Meenkulathi amman temple, Sivan temple, Bhavathi amman temple, Sri Krishnan temple, Durgadevi temple, Kannikaparamaswari temple-Palakkad, Gruvaiyurappan temple, Parthasarathy temple, Manivur Sivan temple - Thrissur, Kerala.

Pediastrum duplex Meyen var. ***genuinum*** (A. Braawn) Hansgirg (Pl. 1, Fig. 15)

Colonies 4-8-16-32 celled with stout process which are straight are slightly curved. Cell membrane smooth punctuate. Cells 6-8µm.

Occurrence: Maharashtra [Gonzalves and Joshi, 1946, Manipur Bruhl et Biswas, 1926].

Collected from: Pallipuram temple-Palakkad, Gruvaiyurappan temple- Thrissur, Kerala.

Pediastrum duplex Meyen var. ***reticulatum*** Lagerheim (Pl. 1, Fig. 16)

Cells more or less H-shaped with sides of processes of marginal cells nearly parallel. Intercellular spaces large and oval. Colonies 80 µm.

Occurrence: Tamil Nadu [Iyengar et Venkataraman, 1951].

Collected from: Sri Krishnan temple- Palakkad, Kerala.

Pediastrum tetras (Ehrenberg) Ralfs (Pl. 1, Fig. 17)

Colonies rectangular, oval or circular of 4-8-16 (-32) cells with out intercellular spaces. Marginal cells divided into two lobes by a deep linear to cuneate incision on the outer side reaching to the middle of the cells. Each cell truncate, slightly emarginate, or further divided into two lobes. Inner cells 4-6 sided with a single linear incision. Cells size 30 µm.

Occurrence: c.f. Tamil Nadu [Mahendrapurumal and Anand, 2008].

Collected from: Uthanthara Sivavishnu temple - Palakkad, Thiruvambadi amman temple- Thrissur, Kerala.

Pediastrum tetras (Ehrenberg) Ralfs var. ***excisum*** (Rabenh) Hansgirg (Pl. 1, Fig. 18)

Differs from the type in the lobes more or deeply concave cells size 15µm.

Occurrence: Kerala [Philipose, 1967].

Collected from: Chakkandara temple, Emoor Bhavathi amman temple – Palakkad, Parthasarathy temple - Thrissur, Kerala.

Pediastrum tetras (Ehrenberg) Ralfs var. ***tetraodon*** (Corda) Hansgirg (Pl. 1, Fig. 19)

Colonies 4-8-16 celled. Incision of cells deeply with the lobes adjacent to the incision of the marginal cells very pronounced. Cells 20µm.

Occurrence: Uttar Pradesh [Singh, 1959].

Collected from: Parthasarathy temple, Gruvaiyurappan temple- Thrissur, Knassari temple – Palakkad, Kerala.

Coelastrum microporum Näegeli (Pl. 1, Fig. 20)

Colonies more or less spherical to ovoid enclosed by delicate gelatinous sheath and inter connected by almost imperceptible gelatinous process. Cells with sheath 4-27 µm, colonies 45 µm.

Occurrence: c.f. Tamil Nadu [Anand, 1998; Mahendrapurumal and Anand, 2008].

Collected from: Vadakkunathan temple - Thrissur, Meenkulathi amman temple- Palakkad, Kerala.

Crucigenia tetrapedia (Kirchener) W et G. S. West (Pl. 1, Fig. 21)

Colonies 4-celled or joined in 16 or more celled multiple colonies. Four celled colonies quadrate with a minute rectangular space at the centre. Cells flattened and triangular with rounded ends. Outer sides of cells always concave. Cells 4.5-9.5 µm. Four-celled colonies 15 µm.

Occurrence: c.f. Tamil Nadu [Anand, 1998; Mahendrapurumal and Anand, 2008].

Collected from: Uthanthara Sivavishnu temple, Pallipuram temple - Palakkad, Kerala.

Tedrastrum heteracanthum (Nordest) Chodat (Pl. 1, Fig. 22)

Colonies 4-celled and flat with the cells quarterly arranged. Cells nearly heart shaped (triangular with the outer face slightly concave, rarely convex) with a long and short seta from the outer surface. Seta straight or curved. Chloroplast parietal and usually with a pyrenoid. Cells 35 µm .

Occurrence: Orissa [Philipose, 1967].

Collected from: Sivan temple- Palakkad, Kerala.

Scenedesmus acuminatus (Lagerhheim) Chodat (Pl. 1, Fig. 23)

Colonies curved and of four to eight (usually four) fusiform cells with sharp pointed ends. All the cells in a colony lunate or interior cells forming a flat plate and the other cells lunate and at an angle to the plane of the interior cells; rarely, all the cells in the same plane. Cell wall smooth and without teeth or spines. Cells l 25 µm, breadth 15 µm.

Occurrence: Assam [Biswas, 1934].

Collected from: Meenkulathi amman temple, Vettaikkara amman temple, Sri Meenashi sunderesar temple, Uthukulakkarai temple, Sulthankottai Anjanayar temple, Sri Krishnan temple, Durgadevi temple- Palakkad, Vadakkunathan temple - Thrissur, Kerala.

Scenedesmus armatus (Chodat) G.M. Smith var. **bicaudatus** (Guglielmetti) Chodat .

(Pl. 1, Fig. 24)

Colonies two to four celled. Differs from the type in having a long spine from one of the poles of the terminal cells only, the spines of the two terminal cells alternating with each other. Longitudinal ribs usually seen only in the terminal cells. Cells size length, 30 µm, breadth 20 µm.

Occurrence: Orissa, Andhra Pradesh, Kerala [Philipose, 1967].

Collected from: Thravanad pond- Palakkad, Thiruvambadi amman temple- Thrissur Kerala.

Scenedesmus denticulatus Lagerheim (Pl. 1, Fig. 25)

Colonies usually four-celled with the cells arranged in a cruciate to sub alternate manner. Cells ovoid-oblong to ellipsoid with 1-4 (usually 2) teeth from each pole. Teeth sometimes absent from one end of the inner cells. Cell membrane somewhat thick. Cells l, 80 µm, breadth 60 µm.

Occurrence: c.f. Tamil Nadu [Mahendrapurumal and Anand, 2008].

Collected from: Knassari temple, Chakkandara temple – Palakkad, Gruvaiyurappan temple- Thrissur, Kerala.

Scenedesmus longus Meyen var. **naegeli** (Brebisson) G.M. Smith (Pl. 1, Fig. 26)

Colonies two-four-eight celled. Cells more or less oblong to cylindrical to subpyriform with rounded ends and arranged in a linear or sub linear series. Terminal cells with a long recurved spine from the other pole. Internal cells with a short, straight or slightly curved spine usually from one pole only, but sometimes with rudiments of spines from the other pole also. Cells length 30 µm, breadth 20 µm.

Occurrence: West Bengal, Orissa, Madhya Pradesh and Andhra Pradesh [Bruhl and Biswas, 1922].

Collected from: Sulthankottai Anjanayar temple, Noorni Ayyappan temple –Palakkad, Kerala.

Scenedesmus opoliensis P. Richter (Pl. 1, Fig. 27)

Colonies two – four celled with cylindrical to subfusiform cells arranged in a linear series. Adjacent cells in contact only along about a third of their l,. Internal cells tumid in the median region and attenuated towards the ends. Terminal cells often narrower and sub rectangular. Poles of all cells with a long, sometimes ending in one or two very short spine. Poles of terminal cells with a long, more or less recurved spine. Cells size l, 40 µm, breadth 20 µm.

Occurrence: Orissa, Madhya Pradesh, Andhra Pradesh and Tamil Nadu [Philipose, 1967].

Collected from: Malapuzha Ayyappan temple- Palakkad, Kerala

Scenedesmus perforatus Lemmermann var. **major** (Turner) M.T. Philipose (Pl. 1, Fig. 28)

Colonies four-eight celled, much larger than in the type, and sometimes with a long spine from the poles of some of the internal cells. Pyrenoids one (or three ?) in each cells. Cells long 50 µm, breadth 20 µm.

Occurrence: West Bengal [Bruhl and Biswas, 1922, Philipose, 1967].

Collected from: Malapuzha Ayyappan temple- Palakkad, Gruvaiyurappan temple, Parthasarathy temple, Thiruvambadi amman temple- Thrissur, Kerala.

Scenedesmus quadricauda (Turpin) Brebisson var. **maximum** W&G.S. West (Pl. 1, Fig. 29)

Colonies usually four celled, rarely eight celled. Colonies and cells much larger than in the type. Cells size long 50 µm, breadth 60 µm.

Occurrence: Orissa and Kerala [Philipose, 1967].

Collected from: Bhavathi (Kannaki) temple, Parthasarathy temple, Gruvaiyurappan temple- Thrissur, Vettaikkara amman temple, Meenkulathi amman temple, Edavanur temple, Puzhikkal temple, Sri Meenachi amman temple, Durgadevi temple, Sri Krishnan temple, Uthukulakkarai temple – Palakkad, Kerala.

Scenedesmus quadricauda (Turpin) Breisson var. **quadrispina** (Chodat) G. M. Smith (Pl. 1, Fig. 30 -)

Colonies usually 2-4 celled. Cells broadly ovoid and about twice as long as broad. Poles of terminal cells with single short curved spine. Cells long 30 µm, breadth 25 µm.

Occurrence: Orissa, Madya Pradesh, Andhra Pradesh [Philipose, 1967].

Collected from: Parthasarathy temple, Gruvaiyurappan temple, Koodalmanickam temple, Vadakkunathan temple, Thiruvambadi amman temple- Thrissur, Puzhikkal temple, Poonthozhikulam temple, Perugampoo temple- Palakkad, Kerala

Plate -1

1) *Pandorina cylindricum* Iyengar, 90 µm, 2) *Chlorococcum humicola* (Näegeli) Rabenhorst, 40 µm, 3) *Botryococcus braunii* Kützing, length 80µm, breadth 50 µm, 4) *Chlorella vulgaris* Beijerinck 25 µm, 5) *Golenkinia radiata* Chodat, 45 µm, 6) *Tetraedron octaedricum* (Reinsch) Hansgirg Var. *Spinosum* (Reinsch) W.et G. S. West 35 µm, 7) *Ankistrodesmus fulcatus* (Chodat) (long 50um, breadth 8um), 8) *A. spiralis* (Turner) Lemmermann length 50 µm, breadth 5-15 µm, 9) *Westella linearis* G.M.Smith, 20 µm 10) *Selenastrum minutum* (Näegeli) Collins, 30 µm 11) *Kirchneriella lunari* (Kirchner) Moebius, length 15 µm, breadth10 µm, 12) *Pediastrum simplex* Meyen var. *duodenarium* (Bailey) Rabenhorst, 50 µm, 13) *P. simplex* Meyen var. *simplex* Komárek, 100 µm, 14) *P. duplex* Mayen. (30um), 15) *P. duplex* Meyen Var. *genuinum* (A. Braun) Hansgirg, 40 µm, 16) *P. duplex* Meyen var. *reticulatum* Lagerheim (80 µm), 17) *P. tetras* (Ehrenberg) Ralfs 30 µm, 18) *P. tetras* (Ehrenberg) Ralfs var. *excisum*, 15 µm, 19) *P. tetras* (Ehrenberg) Ralfs var. *tetraodon* (Corda) Hansgirg, 20 µm, 20) *Coelastrum microporum* Näegeli, 45 µm 21) *Crucigenia tetrapedia* (Kirchner) W et G. S. West 15 µm 22) *Tetrastrum heteracanthum* (Nordest) Chodat 35 µm, 23) *Scenedesmus acuminatus* (Lagerheim) Chodat length 25 µm, breadth 15 µm, 24) *S. armatus* (Chodat) G.M. Smith var. *bicaudatus* (Guglielmotti) Chodat, length 30 µm, breadth 20 µm, 25) *S. denticulatus* Lagerheim length 80 µm, breadth 60 µm, 26) *S. longus* Meyen var. Näegeli (Breisson) G.M. Smith, length 30 µm, breadth 20 µm, 27) *S. opoliensis* P. Richter length 40 µm, breadth 20 µm, 28) *S. perforatus* Lemmermann var. *major* (Turner) M.T. Philipose 29) *S. quadricauda* (Turpin) Breisson var. *maximum* W & G.S. West, length 50 µm, breadth 60 µm, 30) *S. quadricauda* (Turpin) Breisson var. *quadrispina*, length 30 µm, breadth 25 µm.



Netrium elongatum M.V.N.Panikkar (Pl. 2, Fig. 1)

Cells cylindrical both ends similar, long 130 µm, breadth 20 µm.

Occurrence: Kerala (M.V. N. Panikkar, 2007).

Collected from: Durgadevi temple - Palakkad, Kerala.

Spirogyra hyalina Cleve (Pl. 2, Fig. 2)

Conjugation lateral of scalariform, tube formed by both gametangia; fertile cells cylindrical, or slightly inflated, more or less pointed, 45-60-130 µm; median spore wall brown, smooth; aplanospores similar, some what smaller.

Occurrence: Widely distributed in India [Randhawa 1959].

Collected from: Edavanur temple - Palakkad, Kerala.

Closterium decorum Brebisson (Pl. 2, Fig. 3)

Cells fairly large, 16-18 times longer than broad, moderately curved with 54-57 degrees of arc, median portion somewhat straight broadly tumid, cells gradually attenuated towards the truncately rounded apices; cell wall finely straightened; chloroplast rigid with an axial row of 10-14 pyrenoides. long 350 µm, breadth 50 µm

Occurrence: c.f. Tamil Nadu [Anand, 1998; Mahendrapurumal and Anand, 2008].

Collected from: Ayyappan temple, Sri Krishnan temple, Pallipuram temple, Eموor Bhavathi amman temple - Palakkad, Gruvaiyurappan temple, Vadakkunathan temple, Manivur Sivan temple - Thrissur, Kerala.

Closterium setaceum Ehrenberg (Pl. 2, Fig. 4)

Cells elongate, sometimes straight, gradually tapering towards the poles, unconstricted, cell wall smooth, chloroplast one in each semi cells. Cells size long 50 µm, breadth 6 µm.

Occurrence: Kerala [Panikkar, 2007].

Collected from: Vadakkunathan temple, Manivur Sivan temple - Thrissur, Kamankulam temple, Noorni Ayyappan temple - Palakkad, Kerala,

Cosmarium impressulum Elving (Pl. 2, Fig. 5)

Unicellular, variable in shape; a constriction at the center of the cell body; mostly longer than wide; flattened each semi cell hemispherical, spherical, ellipsoidal, rectangular, pyramidal, kidney-shape; no apical indentation. Cells long 20 µm, breadth 15 µm.

Occurrence: c.f. Tamil Nadu [Mahendrapurumal and Anand, 2008].

Collected from: Kannikaparamaswari temple - Palakkad, Kerala

Cosmarium portianum Arc. var. ***nepbroideum*** Witter (Pl. 2, Fig. 6)

Cells small, about 1.3 times longer than broad, deeply constricted, sinus gradually opening from a rounded extremity, isthmus slightly elongated; semicells subreniform and granulate, granules rounded and evenly disposed indistinct vertical series, about 24-29 visible at the margin of each semicells; each semicells axile chloroplast and pyrenoid. Cells long 35 µm, breadth 20 µm.

Occurrence: Andaman and Nicobar [Prasad and Srivastava, 1992].

Collected from: Puzhikkal temple - Palakkad, Parthasarathy temple - Thrissur, Kerala.

Staurostrum spiniceps Krieg var. ***trifidum*** Scott & Prescott (Pl. 2, Fig. 7)

Cells variable in size usually longer than broad bilaterally symmetrical in front view, generally with acute sinus and narrow isthmus, semi cells cylindrical, ellipsoid triangular hexagonal, top view usually triangular or 4-8 angular, each semi cell usually with an axial chloroplast one pyrenoid. Long 120 µm, breadth 60 µm.

Occurrence: Kerala [M. V. N. Panikkar, 2007].

Collected from: Bhavathi amman temple - Palakkad, Vadakkunathan temple - Thrissur, Kerala.

Bacillariophyceae

Cylotella megnethiniana Kützing (Pl. 2, Fig. 8)

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.

Occurrence: c.f. Tamil Nadu [Anand, 1998; Mahendrapurumal and Anand, 2008].

Collected from: Edavanur temple, Bhavathi amman temple, Uthukulakkarai temple, Sulthankottai Anjanayar temple, Knassari temple, Kannikaparamaswari temple, Sri Meenashi sunderesar temple - Palakkad, Koodalmanickam temple, Gruvaiyurappan temple, Thiruvambadi amman temple - Thrissur Kerala.

Melosira granulata (Ehrenberg) Ralfs (Pl. 2, Fig. 9)

Frustules cylindrical, robust and stiff detached filaments. Mantle portions cylindrical, disc flat. Small pseudo sulcus present. Sulcus somewhat shallow. Neck firely big. Mantle line straight, parallel mantle surface punctuate, puncta coarse in more or less spiral rows. The outer shell always coarsely punctuate, their puncta rows being parallel. The same cells have spines

projecting outside as well as inside the cells. Cells long 10 μm , breadth 10 μm

Occurrence: c.f. Tamil Nadu [Anand, 1998; Mahendrapuram and Anand, 2008].

Collected from: Meenkulathi amman temple, Perugampoo temple, Uthukulakkarai temple, Durgadevi temple, Knassari temple - Palakkad, Parthasarathy temple, Gruvaiyurappan temple, Koodalmanickam temple, Vadakkunathan temple, Manivur Sivan temple – Thirissur, Kerala.

Fragilaria brevistriata Grun. f. **elongata** G.Venkataraman (Pl. 2, Fig. 10)

Frustule in gridle view linear, rectangular, forming small bands. Valves linear, lanceolate with rounded ends. Striae very short and marginal. Cells l, 110 μm , breadth 5 μm .

Occurrence: Tamil Nadu [Venkataraman, 1939].

Collected from: Sri Meenakshi amman temple - Palakkad, Manivur Sivan temple – Thirissur, Kerala.

Synedra dorsiventralis O. Muller (Pl. 2, Fig. 11)

Valves solitary, linear with parallel and sharply attenuated wedge shaped rounded ends; pseudo-raphe narrow linear, central area, broad, having distinct linear striae on one of the side of the valves; striae thick lineate parallel but towards apices strongly radiate. Cells long 40 μm , breadth 10 μm .

Occurrence: c.f. Tamil Nadu [Anand, 1998; Mahendrapuram and Anand, 2008].

Collected from: Gruvaiyurappan temple- Thirissur, Kerala.

Navicula radiosa Kützing (Pl. 2, Fig. 12)

Valves linear-lanceolate, gradually attenuated towards rounded ends; raphe thin, straight, median, with distinct close set, unilaterally bent central nodule; axial area linear, central area broad, somewhat elliptical; striae coarse lineate, curved and slightly radiate in the middle becoming convergent towards the poles. long 40 μm , breadth 25 μm .

Occurrence: c.f. Tamil Nadu [Anand, 1998; Mahendrapuram and Anand, 2008].

Collected from: Kamankulam temple, Edavanur temple, Bhavathi amman temple, Uthukulakkarai temple, Sulthankottai Anjanayar temple, Knassari temple, Kannikaparamaswari temple, Sri Meenashi sunderesar temple- Palakkad, Koodalmanickam temple, Gruvaiyurappan temple, Thiruvambadi amman temple - Thirissur Kerala.

Cymbella kolbei Hustedt (Pl. 2, Fig. 13)

Valves small asymmetrical, broadly lanceolate with dorsal and ventral margins curved; ends faintly constricted on the dorsal side, slightly produced and rounded; raphe thin, distinct curved, somewhat centric; axial area somewhat elliptical, having single isolate

puncta on ventral side, striae lineate, slightly curved in the middle, radiate throughout the valve.

Collected from: Uttar Pradesh [Prasad et al., 1981], Andaman [Prasad and Srivastava, 1982a].

Occurrence: Malapuzha Ayyappan temple, Meenkulathi amman temple, Sivan temple, Ayyappan temple, Bhavathi amman temple, Vettaikkara amman temple, Perugampoo temple- Palakkad, Gruvaiyurappan temple, Thiruvambadi amman temple, Sri Krishna temple -Thirissur Kerala.

Cymbella tumescens A. Cleve (Pl. 2, Fig.14)

Cells solitary, gelatinous mass, intercalary band absent in valve view asymmetrical longitudinally lunate rhombic or naviculoid, dorsal surface convex. Axile areas narrow gradually widening towards center, raphe thin, ex-centric usually placed towards ventral side with well defined nodules. Cells long 40 μm , breadth 10 μm .

Occurrence: Kerala [M. V. N. Panikkar, 2007].

Collected from: Sri Krishna temple -Thirissur, Kerala.

Pinnularia abanjensis (Pant.) Ross (Pl. 2, Fig. 15)

Valves elliptical- lanceolate, with dorsal and ventral margin convex; end constricted on the dorsal side, produced and rounded; raphe thick, eccentric, undulate with central nodules bent ventrally; terminal fissures turned dorsally; axial area linear, narrow gradually widening towards centre. Cells long 60 μm , breadth 10 μm .

Occurrence: Andaman and Nicobar [Prasad and Srivastava, 1992]; Tamil Nadu [Mahendrapuram and Anand, 2008].

Collected from: Manivur Sivan temple - Thirissur, Vettaikkara amman temple, Perugampoo temple- Palakkad, Kerala.

Gomphonema lanceolatum Ehrenberg (Pl. 2, Fig. 16)

Valves linear-lanceolate with attenuated rounded ends; raphe thin, straight, median central nodule bent unilaterally, terminal fissures curved forming question mark; axial area narrow, linear-lanceolate; central area broad, somewhat rectangular, unilateral, having an isolated punctae on opposite side; striae coarsely punctuate radiate and parallel, median short striae widely placed. Cells long 80 μm , breadth 15 μm .

Occurrence: c.f. Tamil Nadu [Mahendrapuram and Anand, 2008].

Collected from: Noorni Ayyappan temple – Palakkad, Kerala.

Amphora coffeaformis Agardh (Pl. 2, Fig. 17)

Frustules in gridle view elliptic lanceolate, truncate. Valves arcuate on the dorsal margin and straight or slightly concave on the ventral margin. End of the

valves slightly protracted and capitate. Striae delicate. Cells long 40 µm, breadth 20 µm.

Occurrence: Tamil Nadu [Venkataraman, 1939].

Collected from: Kannikaparamaswari temple- Palakkad, Kerala.

Euglenophyceae

Euglena proxima Dengeard (Pl. 2, Fig. 18)

Cells metabolic, fusiform, narrowed posteriorly to a blunt tip, periplast spirally striated; chloroplast numerous, irregularly shaped discs, paramylon bodies numerous small rod scattered through out the cells; Cells 50 µm.

Occurrence: Orissa [Radha et al., 2006; Tamil Nadu Mahendrapurumal and Anand, 2008].

Collected from: Sri Meenashi sunderesar temple- Palakkad, Kerala.

Phacus pleuronectes (O. Mueller) Dujardin (Pl. 2, Fig. 19)

50 µm, short posterior prolongation slightly curved, a prominent ridge on the convex side, longitudinally striated one circular paramylon (paramylum), body near center flagellum as long as cell body.

Occurrence: Maharashtra [Jawale et al., 2003]; Tamil Nadu [Mahendrapurumal and Anand, 2008].

Collected from: Koodalmanickam temple - Thrissur, Kerala.

Cyanophyceae

Microcystis robusta (Clark) Nygaard (Pl. 2, Fig. 20)

Colonies at first round, later irregularly elongate and clathrate; sheath distinct, later gelatinizing; cells 190 µm, spherical, without gas-vacuoles.

Occurrence: West Bengal [Biswas, 1927; Banerji, 1936; Tamil Nadu Ganapathi, 1940].

Collected from: Malapuzha Ayyappan temple, Sri Meenachi amman temple, Uthanthara Sivavishnu temple- Palakkad, Vadakkunathan temple, Thiruvambadi amman temple, Manivur Sivan temple – Thirissu, Kerala

Microcystis viridis (A. Braun) Lemmerman (Pl. 2, Fig. 21)

Colonies round or rectangular, consisting of a large number of partial or daughter colonies surrounded by a common mucilaginous sheath, margins of colonies mucilage definite and highly refractive; cells 3 µm, spherical with gas-vacuoles.

Occurrence: West Bengal [Banerji, 1936].

Collected from: Malapuzha Ayyappan temple, Sivan temple, Bhavathi amman temple, Perugampoo temple, Edavanur temple - Palakkad, Sivan temple – Thirissu Kerala.

Microcystis wesenbergii Komarak (Pl. 2, Fig. 22)

Colonies clathrate, cells compactly arranged; cells oval and spherical, colonies long 40 µm, breadth 15 µm.

Occurrence: Kerala [Panikkar, 2007].

Collected from: Gruvaiyurappan temple, Sivan temple – Thirissu Sri Meenakshi amman temple, Uthanthara Sivavishnu temple- Palakkad, Kerala.

Chroococcus indicus Zeller (Pl. 2, Fig. 23)

The thallus gellatinous, thin, a pale brownish; cells single, oblong to sub spherical, long 70 µm, breadth 55 µm, greenish, sheath hyaline, conspicuous, content granular.

Occurrence: India [Desikachary 1959].

Collected from: Sri Krishna temple –Palakkad, Kerala.

Merismopedia punctata Meyen (Pl. 2, Fig. 24)

Colonies small, 4-64 cells, about long 45 µm, breadth 20 µm cells not closely packed, spherical or ovoid, pale blue green.

Occurrence: c.f. Tamil Nadu [Mahendrapurumal and Anand, 2008].

Collected from: Kanni amman temple, Meenkulathi amman temple, Sivan temple, Ayyappan temple, Bhavathi amman temple, Vettaikkara amman temple, Perugampoo temple, Sri Meenashi sunderesar temple, Edavanur temple, Poonthozhikulam temple, Sulthankottai Anjanayar temple, Sri Krishnan temple, Durgadevi temple, Kannikaparamaswari temple, Knassari temple, Sri Meenachi amman temple – Palakkad, Sri Krishna temple, Gruvaiyurappan temple –Thrissur, Kerala.

Hydrococcus rivularis Kützing (Pl. 2, Fig. 25)

Thallus made up of more or less creeping, nematoparenchymatous, radially arranged filaments, with elongated often curved end cells; later with distinctly radially arranged erect filaments and forming a microscopic hemispherical, lobed, hard thallus up to 30 µm, blue green, dark brown, violet; cells 2-4 µm broad, seldom broader, as long as broad, somewhat longer with more or less gelatinous, colour less sheath, special envelop present, cells closely arranged and polygonally adpressed, in the inside more or less isolated rounded blue greens, dirty greens or dirty violet; erect filaments dichotomously or trichotomously branched; often with calcium crystals in the inside of the thallus.

Occurrence: TamilNadu [Frémy, 1942].

Collected from: Koodalmanickam temple – Thrissur, Kerala

Spirulina gigantea Schimidle (Pl. 2, Fig. 26)

Trichome 40 um long, breadth 4 µm, deep blue green, regularly spirally coiled, at the end conical attenuated, spirals 11-16 µm.

Occurrence: Tamil Nadu [Mahendrapurumal and Anand, 2008].

Collected from: Perumal temple –Palakkad, Kerala.

Oscillatoria chalybea (Martens) Gomont (Pl. 2, Fig. 27)

Thallus dark blue green; trichome straight or lightly or irregularly spirally coiled, slightly constricted at the cross walls, attenuated, at the apex and somewhat bent, broad, blue greens; cells as long as broad, rarely as long as broad, septa not granulated, end cell wall obtuse, not capitate, without calyptra, long 40 μm breadth 5 μm .

Occurrence: *c.f.* [Desikachary, 1959].

Collected from: Kollankode Sivan, templeKanni amman temple, Emoor Bhavathi amman temple, Noorni Ayyappan temple, Uthanthara Sivavishnu temple, Knassari temple, Malpuzha dam Ayyappan temple, Sulthankottai Anjanayar temple –Palakkad, Sri Krishna temple Bhavathi (Kannaki) temple, Koodalmanickam temple- Thrissur, Kerala.

Phormidium aerugineo - coeruleum (Gomont) Anag. and Gom. (Pl. 2, Fig. 28)

Filaments many forming a gelatinous sheath present, more or less from, apices often

attenuated, straight or bent, never regularly spirally coiled, apical cells in many species with calyptra. Cells long 40 μm , breadth 4 μm .

Occurrence: Manipur [Adhikary, 2008].

Collected from: Kanni amman temple, Perumal temple, Chakkandara temple, Pallipuram temple- Palakkad, Bhavathi (Kannaki) temple- Thrissur, Kerala.

Lyngbya lutea (Agardh) Gomont (Pl. 2, Fig.29)

Thallus some what gelatinous, leathery, yellowish brown to olive-green, when dry often dark violet; filaments coiled and densely entangled; sheath colorless, smooth at first thin, but later up to 3 μ thick and lamellated, colored violet by chloro zinc iodine;

trichome is not constricted at the cross-wall, not attenuated at the end, 2.5-6 μ broad, olive-green, cross-walls granulated; cells quadrate to 1/3 times as long; end cells with rounded calyptra. Cells long 100 μm , breadth 10 μm .

Occurrence: Uttar Pradesh [Rao, C. B., 1937; Delhi Rao, C. B., 1940].

Collected from: Sulthankottai Anjanayar temple, Meenkulathi amman temple, Sivan temple, Ayyappan temple, Bhavathi amman temple, Vettaikkara amman temple, Perugampoo temple- Palakkad, Gruvaiyurappan temple, Thiruvambadi amman temple, Sri Krishna temple-Thrissur Kerala.Kerala.

Anabaena sphaerica Born.et Flah (Pl. 2, Fig. 30)

Thallus floccose, blue green; trichome moniliform, straight, arranged parallel, broad; with an indistinct mucilaginous sheath; cells spherical to short barrel-shaped; end rounded; heterocysts subspherical to oval, long 5 μm , breadth 40 μm , one to few together, epispore smooth, yellowish brown.

Occurrence: *c.f.* Tamil Nadu [Desikachary 1959; Anand, 1989; Andaman and Nicobar Prasad and Srivastava, 1992]. Collected from: Kannika parameswari temple-Palakkad, Kerala.

Westiellopsis prolifica Janet (Pl. 2, Fig. 31)

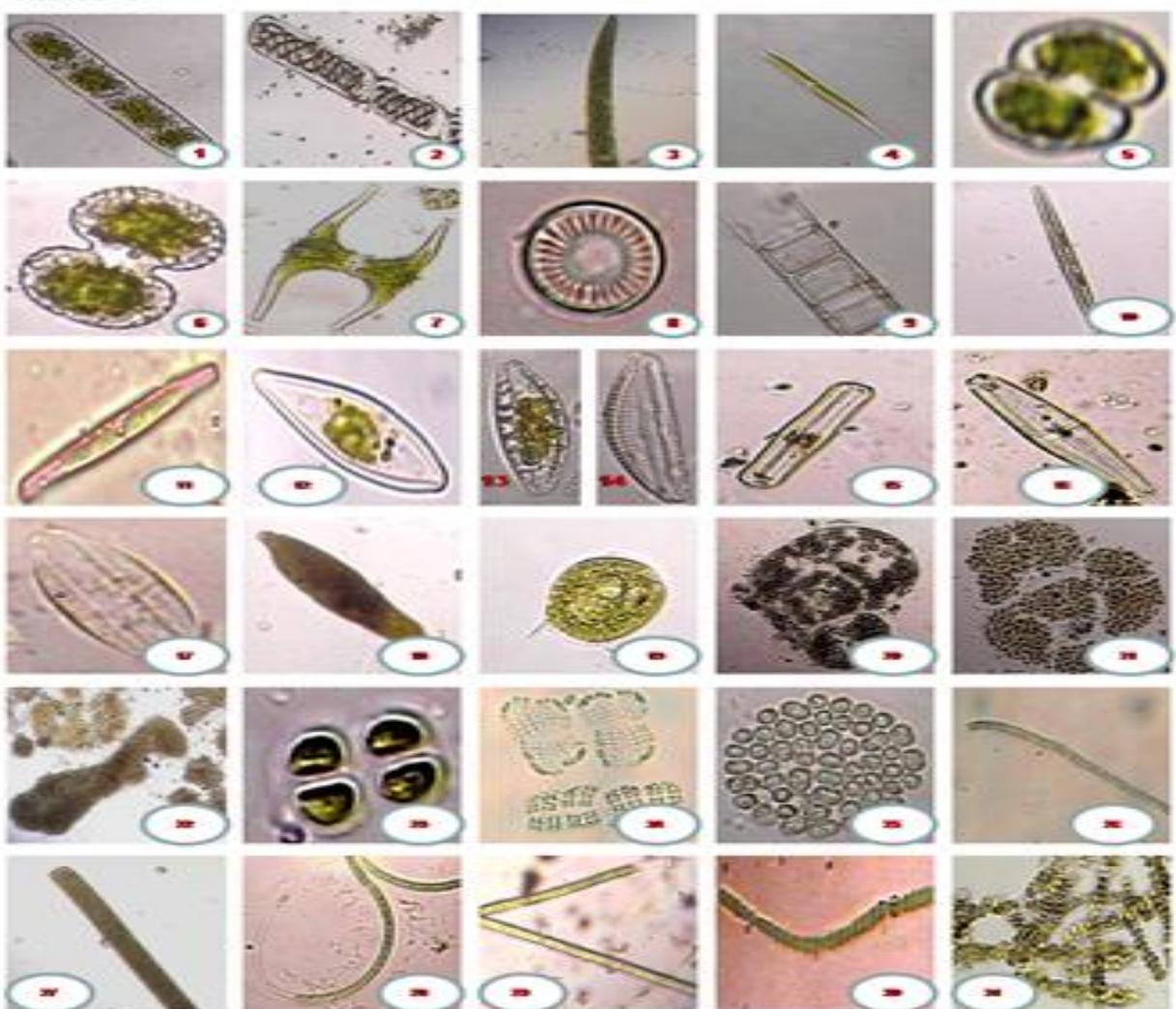
Main filaments torulose, with short barrel shaped cells, broad, or slightly longer, branch filaments thinner and elongate, non-constricted at the cross-wall, with elongate cylindrical, cells, long 8 μm , breadth 40 μm , gonidia formed single in each cell of the pseudohormocysts.

Occurrence: *c.f.* Tamil Nadu [Anand, 1998; Mahendrapurumal and Anand, 2008].

Collected from: Vadakkunathan temple, Gruvaiyurappan temple-Thrissur, Kanni amman temple-Palakkad, Kerala.

Plate-2

Chlorophyceae: 1) *Netrium elongatum* M.V.N. Panikkar Length 130 μm , breadth 20 μm , 2) *Spirogyra hyalina* Cleve, length 300 μm , breadth 20 μm 3) *Closterium decorum* Brebisson, length 350 μm , breadth 50 μm , 4) *C. setaceum* Ehrenberg (long 50 μm , breadth 6 μm), 5) *Cosmarium portianum* Arc. var. *nephroideum* Witter 35 μm length, breadth 20 μm , 6) *C. impressulum*, length 20 μm , breadth 15 μm , 7) *Staurastrum princeps* Krieg var. *trifidum* Scott & Prescott length 120 μm , breadth 60 μm , Bacillariophyceae: 8) *Cylotella magneghiniana* Kützing 20 μm , 9) *Melosira granulata* (Ehrenberg) Ralfs length 10 μm , breadth 10 μm , 10) *Fragillaria brevistriata* Grun. f. *elongata* G. Venkataraman, length 110 μm , breadth 5 μm , 11) *Synedra dorsiventralis* O. Muller, length 40 μm , breadth 10 μm , 12) *Navicula radiosa* Kützing, length 40 μm , breadth 25 μm , 13) *Cymbella kolbei* Hustedt length 35 μm , breadth 25 μm , 14) *C. tumescens* A.Cleve, length 40 μm , breadth 10 μm , 15) *Pinnularia abanjensis* (Pant.) Ross, length 60 μm , breadth 10 μm , 16) *Gomphonema lanceolium* Ehrenberg, length 80 μm , breadth 15 μm , 17) *Amphora coffeaformis* Agardh 40 μm , Euglenophyceae: 18) *Euglena proxima* Dengeard, 50 μm , 19) *Phacus leuronectes* (O. Mueller) Dujardin, 50 μm , Cyanophyceae: 20) *Microcystis robusta* (Clark) Nygaard 190 μm , 21) *M. viridis* (A. Braun) Lemmerman, 3 μm , 22) *M. wesenbergii* Komarak, length 40 μm , breadth 15 μm , 23) *Chroococcus indicus* Zeller, length 70 μm , breadth 55 μm , 24) *Merismopedia punctata* Meyen length 45 μm , breadth 20 μm , 25) *Hydrococcus rivularis* Kützing Thallus 30 μm , cells 2-4 μm , 26) *Spirulina gigantea* Schimidle length 40 μm , breadth 4 μm , 27) *Oscillatoria chalybea* (Martens) Gomont, length 40 μm , breadth 5 μm 28) *Phormidium coeruleum* (Gomont) Anag. and Gom., length 40 μm , breadth 4 μm 29) *Lynbya lutea* (Agardh) Gomont length 100 μm , breadth 10 μm , 30) *Anabaena sphaerica* Born.et, length 5 μm , breadth 40 μm , 31) *Westeillopsis prolifica* Janet, Length 8 μm , breadth 40 μm .



A total number of genera 41, and species 61 belonging to Chlorophyceae (Genus 20, Species 37), Bacillariophyceae (Genus 9, Species 10),

Euglenophyceae (Genus 2, Species 2) and Cyanophyceae (Genus 10, Species 12) were recorded from temple tanks of Kerala (Table 1).

Table: 1 List of fresh water algal taxa recorded from Palakkad and Thirussur temple tanks of Kerala from March 2008 and May 2009

S.No.	Name of the species	Palakkad		Thirussur	
		2008	2009	2008	2009
Chlorophyceae					
1.	<i>Pandorina cylindricum</i> , M.O.P. Iyengar	+	-	-	-
2.	<i>Chlorococcum humicola</i> , (Näegeli) Rabenhorst	+	+	+	+
3.	<i>Botryococcus braunii</i> Kützing	+	-	-	-
4.	<i>Chlorella vulgaris</i> Beijering	+	+	+	+
5.	<i>Golenkinia radiata</i> Chodat	-	+	-	-
6.	<i>Tetraedron octaedricum</i> (Reinsch) Hansgirg Var. <i>spinosum</i> (Reinsch) W. et G.S.West	-	+	-	-
7.	<i>Ankistrodesmus fulcatus</i> (Chodat) Ralfs	+	-	+	-
8.	<i>Ankistrodesmus spiralis</i> (Turner) Lemmermann	+	+	+	+
9.	<i>Westella linearis</i> G.M.Smith	+	+	+	+
10.	<i>Selenastrum minutum</i> (Näegeli) Collins	-	+	-	+
11.	<i>Kirchneriella lunaris</i> (Kirchner) Moebius	+	-	+	-
12.	<i>Pediastrum simplex</i> Meyen var. <i>duodenarium</i> (Bailey) Rabenh	+	+	+	+
13.	<i>Pediastrum simplex</i> Meyen var. <i>simplex</i> Komárek	+	+	+	+
14.	<i>Pediastrum duplex</i> Meyen	+	+	+	+
15.	<i>Pediastrum duplex</i> Meyen var. <i>genuinum</i> (A.Braun) Hansgirg	+	-	+	+
16.	<i>Pediastrum duplex</i> Meyen var. <i>reticulatum</i> Lagerheim	-	+	-	+
17.	<i>Pediastrum tetras</i> (Ehrenberg) Ralfs	+	+	+	+
18.	<i>Pediastrum tetras</i> (Ehrenberg) Ralfs var. <i>excisum</i> (Rabenh.) Hansgirg	-	+	-	+
19.	<i>Pediastrum tetras</i> (Ehrenberg) Ralfs var. <i>tetraodon</i> (Corda) Hansgirg	-	+	-	+
20.	<i>Coelastrum microporum</i> Näegeli	-	+	-	+
21.	<i>Crucigenia tetrapedia</i> (Kirchner) W et G.S.West	-	+	-	-
22.	<i>Tetrastrum heteracanthum</i> (Nordst) Chodat	-	+	-	-
23.	<i>Scenedesmus acuminatus</i> (Lagerheim) Chodat	+	+	+	+
24.	<i>Scenedesmus armatus</i> (Chodat) G.M. Smith var. <i>bicaudatus</i> (Guglielmetti) Chodat	-	+	-	+
25.	<i>Scenedesmus denticulatus</i> Lagerheim	-	+	-	+
26.	<i>Scenedesmus longus</i> Meyen var. <i>naegeli</i> (Brebisson) G.M. Smith	+	+	-	-
27.	<i>Scenedesmus opoliensis</i> P. Richter	+	+	-	-
28.	<i>Scenedesmus perforatus</i> Lemmermann var. <i>major</i> (Turner) M.T. Philipose	-	+	+	+
29.	<i>Scenedesmus quadricauda</i> (Turpin) Brebisson var. <i>maximum</i> W&G.S. West	+	+	+	+
30.	<i>Scenedesmus quadricauda</i> (Turpin) Brebisson. var. <i>quadrispina</i> (Chodat) G.M.Smith	+	+	+	+
31.	<i>Netrium elongatum</i> M.V.N.Panikkar	-	+	-	-
32.	<i>Spirogyra hyalina</i> Cleve	+	-	-	-
33.	<i>Closterium decorum</i> Brebisson.	+	+	+	+
34.	<i>Closterium setaceum</i> Ehrenberg	-	+	-	+
35.	<i>Cosmarium portianum</i> Arc. var. <i>nephroideum</i> Witter	-	+	-	+
36.	<i>Cosmarium impressulum</i> Elving	-	+	-	-
37.	<i>Staurastrum spiniceps</i> Krieg var. <i>trifidum</i> Scott & Prescott	-	+	-	+
Bacillariophyceae					
38.	<i>Cylotella megnethiniana</i> Kützing	+	+	+	+
39.	<i>Melosira granulata</i> (Ehrenberg) Ralfs	+	+	+	+
40.	<i>Fragilaria brevistriata</i> Grun. f. <i>elongata</i> G.Venkataraman	-	+	-	+
41.	<i>Synedra dorsiventralis</i> O. Muller	-	-	-	+
42.	<i>Navicula radiosa</i> Kützing	+	+	+	+
43.	<i>Cymbella kolbei</i> Hustedt	+	+	+	+
44.	<i>Cymbella tumescens</i> A. Cleve	-	-	-	+
45.	<i>Pinnularia abanjensis</i> (Pant.) Ross.	-	+	+	-
46.	<i>Gomphonema lanceolatum</i> Ehrenberg	+	+	-	-
47.	<i>Amphora coffeaformis</i> Agardh	-	-	+	-
48.	<i>Euglena proxima</i> Dengeard	-	+	-	-
49.	<i>Phacus leuronectes</i> (O. Muller) Dujardin	-	-	-	+
Cyanophyceae					
50.	<i>Microcystis robusta</i> (Clark) Nygaard	-	+	-	+

51.	<i>Microcystis viridis</i> (A. Braun)Lemmerman	—	+	—	+
52.	<i>Microcystis wesenbergii</i> Komarek	—	+	—	+
53.	<i>Chroococcus indicus</i> Zeller	+	+	+	+
54.	<i>Merismopedia punctata</i> Meyen	+	+	+	+
55.	<i>Hydrococcus rivularis</i> Kützing	—	—	—	+
56.	<i>Spirulina gigantea</i> Schmidle	+	+	—	—
57.	<i>Oscillatoria chalybea</i> (Martens) Gomont	+	+	+	+
58.	<i>Phormidium coeruleum</i> (Gomont) Anag.and Gom.	+	+	+	+
59.	<i>Lyngbya lutea</i> (Agardh)Gomont.	+	+	+	+
60.	<i>Anabaena sphaerica</i> Born.et Flah.	+	+	—	—
61.	<i>Westiellopsis prolifica</i> Janet	—	+	—	+

*(+) =Present, (-) =Absent

Maximum species occurrence of *Chlorococcum humicola*, *Chlorella vulgaris*, *Ankistrodesmus spiralis*, *Westella linearis*, *Pediastrum simplex* Meyen var. *duodenarium*, *P. simplex* Meyen var. *simplex*, *P. duplex*, *P. tetras*, *Scenedesmus acuminatus*, *S. quadricauda* (Turpin) Brebisson var. *maximum*, *S. quadricauda* (Turpin) Brebisson var. *quadrispina*, *Closterium decorum*, (Chlorophyceae) *Cyclotella magneghiniana*, *Melosira granulata*, *Cymbella kolbei*, *Navicula radiosa*, (Bacillariophyceae), *Chroococcus indicus*, *Merismopedia punctata*, *Oscillatoria chalybea*, *Phormidium aerugineo - coeruleum*, *Lyngbya lutea*, (Cynophyceae). Occurrence of filamentous green algae was very unusual in the temple ponds Vijaya Krekar, (2009).

Acknowledgement

The authors thank the **Ministry of Environment and Forests**, Govt. of India for financial assistance through the All India Coordinated Project on Taxonomy (**AICOPTAX**) of fresh water algae, No. J. 22018/72/04-CSC (TAX). We also thank **Prof. R. Rengasamy**, Director, CAS in Botany, University of Madras, Guindy Campus, Chennai, India for providing laboratory facilities.

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