

UNICELLULAR AND COLONIAL CHLOROPHYCEAN ALGAL TAXA FROM JAMMU AND ADJOINING AREAS

Yash Paul and V.K. Anand

Aquatic Ecological Laboratory, Department of Botany, University of Jammu, Jammu-180006.

Email: *paulyash23@yahoo.com*

Abstract: Present communication deals morpho-taxonomic description of 30 taxa belonging to class – Chlorophyceae. Study was undertaken in district Jammu of Jammu and Kashmir from 2008-2009 with an aim to explore the diversity of this class. During the study period samples were collected from different aquatic habitats of the study area. These 30 taxa belong to 2 orders, 7 families, 11 genera, 27 species and 4 varieties.

Key words: Chlorophyceae, taxa, fresh water, Jammu.

INTRODUCTION

A lot of information is available on occurrence and distribution of chlorophyceae from various parts of India (Brul and Biswas 1926; Philipose 1967; Ahmad 1967; Suxena and Venkateswaralu 1968; Chadha and Pandey 1978; Patel and Isabella 1980; Cramer 1983; Pandey and Pandey 1983; Rawla and Rattan 1989; Patel and Daniel 1990; Prasad and Misra 1992; Habib 1998; Habib and Chaturvedi 2005; Santra and Pal 2006; Shakuntala *et al.*, 2006; Misra *et al.*, 2007; Shukla *et al.*, 2007; Tiwari and Chauhan 2007). As far as Jammu Province is concerned, it is totally unexplored except for a few stray references (Anand 1975, Anand 1988). It is an attempt to collect the information about the diversity of this class.

Province Jammu, the winter capital of J&K State is situated at a longitude 74° to 76° 15'E , latitude 30°30' to 32°15' N and 304.8 to 3658.5 m above the mean sea level. This region has been bestowed with numerous lotic and lentic water bodies situated at different altitudes. These water bodies harbor a great deal of algal diversity. Overall, sub-tropical climate is prevalent in the study area.

MATERIALS AND METHODS

Collections of samples were made during 2008-09 from different habitats such as ponds pools, ditches, streams etc. Random sampling technique has been applied in the algal collection procedure. The algal samples were preserved in 4% formalin. Detailed studies were made by examining specimens under a Nikon Labophot microscope E 400. Identification of the taxa was done by using relevant literature i.e., "The structure and reproduction of the algae" Fritsch (1961), "The algae of Illinois" Tiffany and Britton (1952), "Chlorococcales" Phillipose (1967) and "Fresh water algal flora of Andaman and Nicobar Islands. Vol. II" Prasad and Misra (1992).

Systematic Description

Order: Chlorococcales

Family: Micractiniaceae

Genus: *Micractinium* Fresenius

***Micractinium pusillum* Fresenius**

Colonies tetrahedric, with 16 cells arranged in groups of four, each group quadrate. Cells spherical with one or more (2-5) long hyaline setae from their outer surface. Cells 8 µ in diameter. Setae usually up to 26 µ long and 1.2 µ broad at the base (Fig.1).

Family: Hydrodictyaceae

Sub-family: Hydrodictyoideae

Genus: *Hydrodictyon* Roth

***Hydrodictyon reticulatum* (Linn.) Lagerheim**

Colonies reticulate, meshes pentagonal or hexagonal cells elongate-cylindrical. Cells 25 µ broad and 98 µ long. Net up to 20 cm long (Fig.2).

Genus : *Pediastrum* Meyen

***Pediastrum duplex* Meyen**

Cells 21.5 µ in diameter, colonies 16 celled and 78 µ in diameter. Inner cells quadrate to angular and not in contact at the central portion of the side walls. Inner side of marginal cells concave, outer side produced into two short truncate processes (Fig.3).

***P. duplex* var. *genuinum* (A. Brun) Hansgirg.**

Cells 11.2 µ in diameter, colonies 32 celled and 60 µ in diameter. Marginal cells with stout processes which are straight (Fig.4).

***P. ovatum* (Ehr.) A. Braun.**

Cells 18.3 µ broad and 30µ long, colonies 16 celled and 100 µ in diameter. The outer sides of peripheral and often central cells convex. Cell wall ornamented (Fig.5).

***P. simplex* Meyen.**

Cells 10.7 μ broad, 22.6 μ long. Colonies circular and 32 celled. Inner side of marginal cells nearly straight, outer side produced into a gradually tapering process, sides concave. Inner cells polygonal (Fig.6).

***P. simplex* var. *duodenarium* (Bailey) Rabenhorst.**

Cells 23.1 μ broad and 42.3 μ long. Colonies 32 celled and 148 μ in diameter. Inner face of marginal cells concave, outer face prolonged into a single delicately tapering process. Interior cells similar to marginal cells but with shorter processes (Fig.7).

***P. tetras* var. *tetradon* (Corda) Hansgirg.**

Cells 10.5 μ in diameter. Colonies circular, 16 celled without intercellular spaces and 34 μ in diameter. Incision of cells deep with the lobes adjacent to the incision of the marginal cells very pronounced (Fig.8).

Sub-family: Tetradronoideae

Genus : *Tetraedron* Kuetzing***Tetraedron minimum* forma *apiculatum* (Reinsch) De Toni**

Cell 12 μ in diameter. Cells small and quadrangular with the sides concave and angles rounded. Cell wall smooth. Cells with a very short fine papilla from each angle (Fig. 9).

Family: Oocystaceae

Sub-family: Oocystoideae

Genus : *Oocystis* Naegeli***Oocystis elliptica* W. West.**

Colonies 4 celled with the narrow envelope. Cells 11.9 μ broad, 23 μ long. Cells elongate-ellipsoid, about 2 (-2¹/₄) times as long as broad and with broadly rounded ends. (Fig.12).

Family: Selenastraceae

Genus : *Ankistrodesmus* Corda***Ankistrodesmus convolutus* Corda**

Cells 3.4 μ broad, 14.9 μ long. Solitary or in groups of 2-4 cells. Cells strongly curved or twisted with the ends pointed, rarely blunt and stumpy (Fig.10).

***A. falcatus* (Corda) Ralfs**

Cells 2.8 μ broad, 42 μ long. Cells acicular to narrowly fusiform with the ends tapering to acute apices, in fasciculate bundle of 4 (Fig.11).

Family: Coelastraceae

Genus : *Coelastrum* Naegeli***Coelastrum microsporum* Naegeli**

Colonies more or less spherical and of 16 celled with small intercellular spaces. Cells spherical to ovoid. Cells 21.4 μ in diameter. Colonies 50 μ in diameter (Fig.13).

Family: Scenedesmaceae

Sub-family: Scenedesmoideae

Genus : *Scenedesmus* Meyen***Scenedesmus bijugatus* (Turnip) Kuetzing**

Colonies flat of 4 celled arranged in a single linear series. Cells oblong-ellipsoid to ovoid with the ends broadly rounded. Cells 7.6 μ broad, 21.1 μ long (Fig.14).

***S. dimorphus* (Turpin) Kuetzing**

Colonies 8 celled with the cells arranged in a subalternating series. Outer cells of the colony slightly lunate and the apices of the cells being attenuated. Cells 8.2 μ broad, 27.4 μ long (Fig.15).

***S. incrassatulus* Bohlin**

Colonies 4 celled. Cells in a linear series, fusiform, curved with the outer side convex and the inner side more or less straight or slightly concave. Ends of cells stumpy and with apical nodules. Cells 9.3 μ broad, 23.7 μ long (Fig.16).

***S. obliquus* (Turpin) Kuetzing**

Colonies of 4 celled, erect cells arranged in a linear series and cells 5.4 μ broad, 18.5 μ long. Cells fusiform with acute ends. Outer side of terminal cell concave. Cell wall smooth and without terminal teeth or spines (Fig.17).

***S. quadricauda* (Turpin) Brebisson.**

Colonies 4 celled. Cells oblong-cylindrical with rounded ends and arranged in a linear series. Poles of terminal cells with a long curved spine. Cells 9.1 μ broad, 19.7 μ long. Spines 12 μ long (Fig.18).

***S. quadricauda* var. *maximum* W.et G.S.West**

Colonies 4 celled. Cells oblong cylindrical with rounded ends and arranged in a linear series. Terminal cells with a single long curved spine from each pole. Cells 10 μ broad, 26.6 μ long. Spines 18.3 μ long (Fig.19).

Order: Zygnematales

Family: Desmidiaceae

Genus : *Closterium* Nitzsch***Closterium lunula* (Mueller) Nitzsch**

Cells 68 X 560 μ (apices 12 μ wide) stout, about 8 times longer than wide, almost straight; margins convex, apices truncate, rounded; cell wall smooth; chloroplast with 7 ridges, pyrenoids numerous and scattered (Fig.20).

***C. libellula* Focke.**

Cells medium sized, fusiform, 231.2 X 27.3 μ (apices 12.7 μ wide), almost straight, margins slightly convex, cells gradually attenuated from middle towards obtusely

rounded apices; cell wall smooth; chloroplast with pyrenoides, arranged in a median series (Fig.21).

C. moniliferum (Bory) Ehrenberg.

Cells 50.2 X 296 μ (apices 10 μ wide), stout, about 6 times longer than wide; moderately curved, inner margin concave, slightly inflated in the middle; uniformly narrowed to the obtusely rounded apices; cell wall smooth (Fig.22).

Genus: Cosmariium Corda

Cosmariium awadhense Presad et. Mehrotra

Cells 20 X 25.6 μ , isthmus 7.3 μ , deeply constricted, sinus narrowly linear towards apex and slightly open outwards; semi-cells sub-semi circular, margins with 4-5 undulations, apex truncate; chloroplast axile with a single pyrenoid in each semi-cell (Fig.23).

C. botrytis Meneghini

Cells 81 X 106 μ , isthmus 24 μ wide, length about $\frac{1}{4}$ greater than wide, deeply constricted, sinus linear, with the apex slightly dilated and outer margin open; semi-cells truncate-pyramidal (Fig.24).

C. circulare Reinsch

Cells 87 X 94 μ , isthmus 27 μ wide, about as long as wide, circular in outline, deeply constricted, sinus narrowly linear and close; semi-cells semi-circular (Fig.25).

C. granatum Brebisson

Cells 22.4 X 38.7 μ , isthmus 8.1 μ wide, longer than wide, subrhomboid-elliptic, deeply constricted, sinus linear, slightly dilated at the apex; semi-cells truncate-pyramidal, basal angles rounded, sides slightly concave, subparallel at the base and converging toward the apex, upper angles obtuse; pyrenoid single, central (Fig.26).

C. javanicum Nordst.

Cells large 29.3 X 66.7 μ , isthmus 15.8 μ , deeply constricted, sinus narrow; semi-cells pyramidal with rounded angles; cell wall finally punctate (Fig.27).

C. pyrimidatum Breb.

Cells medium sized, 19.4 X 28.2 μ , deeply constricted, isthmus 6.3 μ , sinus narrow, dilated towards the apex; semi-cells truncate-pyramidal, basal angles rounded, sides convex, converging upwards to narrowly truncate and flattened apex; cell wall scrobiculate, chloroplast axile with two pyrenoids in each semi-cell (Fig.28).

Genus: Staurastrum Meyen

Staurastrum hexacerum (Ehr.) Wittr.

Cells small 21 X 22.3 μ deeply constricted, isthmus 6.3 μ , sinus open; semi-cells sub-triangular, tapering towards the

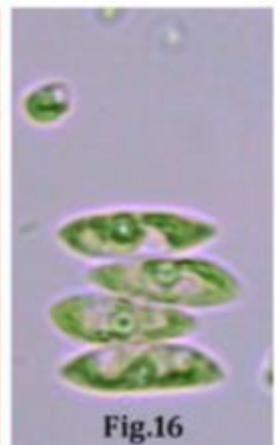
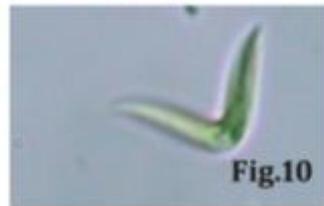
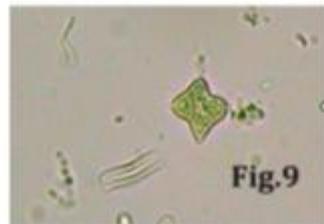
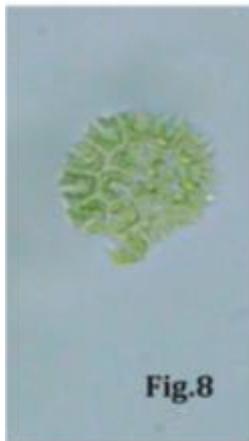
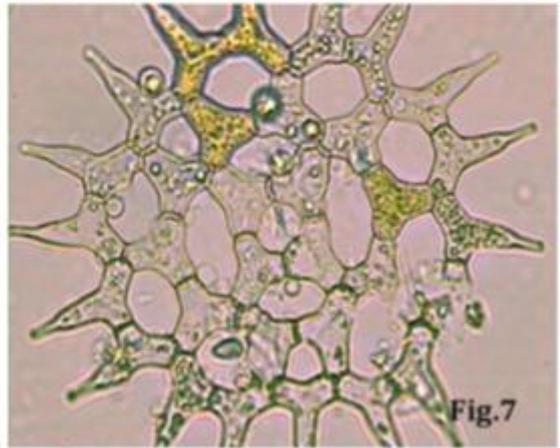
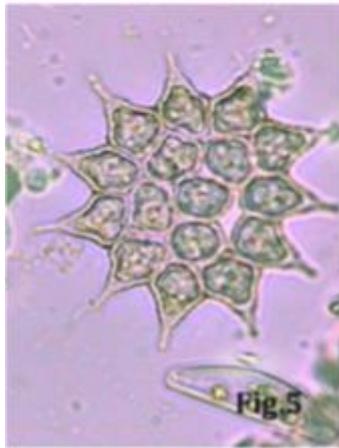
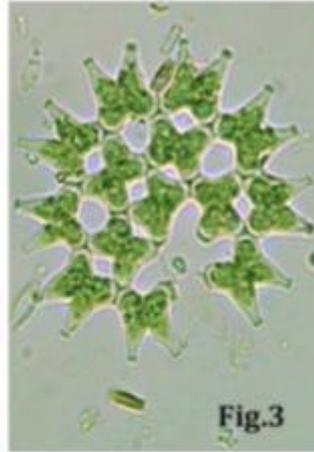
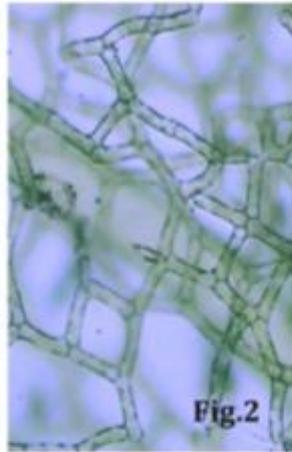
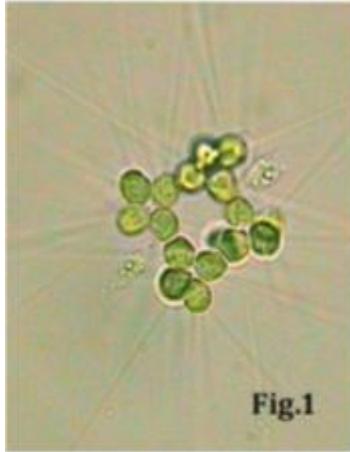
angles forming a very short processes ending in 3 spines; chloroplast with single pyrenoid in each semi-cell (Fig.29).

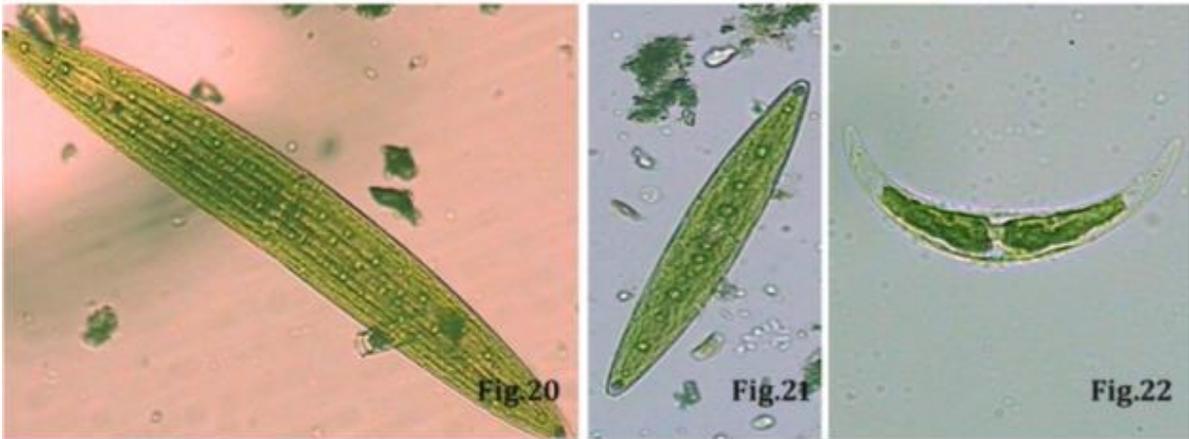
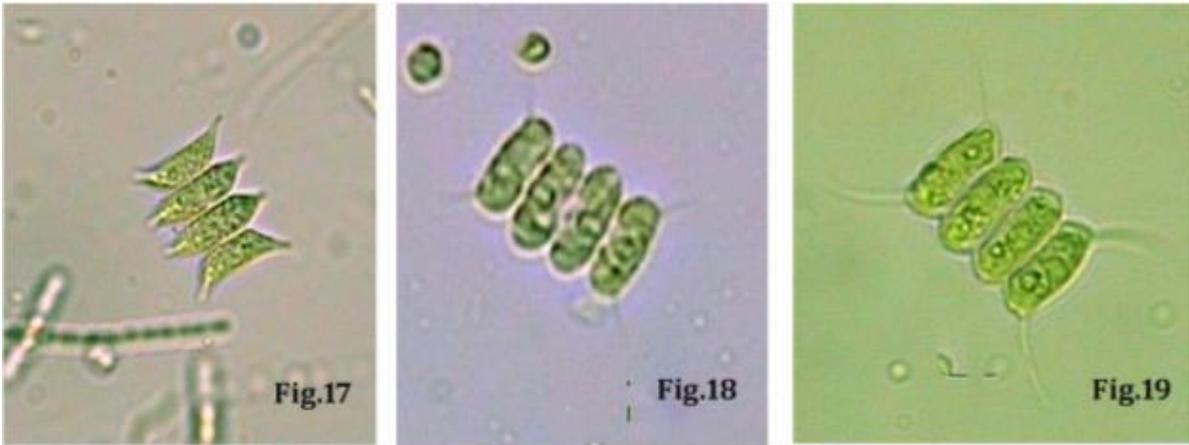
S. tetracerum Ralfs.

Cells small as long as broad 23.8 X 25.9 μ , isthmus 6.3 μ , sinus broadly open; semi-cells quadrangular, upper lateral angles extended into upwardly diverging arms with crenate margins; chloroplast axile, pyrenoid one (Fig.30). Sterile 7.2 pH phosphate buffer solution and following sterile media were used in the detection and isolation of microbial communities.

Legends

- Fig.1 *Micractinium pusillum* Fresenius (400x)
 Fig.2 *Hydrodictyon reticulatum* (Linn.) Lagerh (100x)
 Fig.3 *Pediastrum duplex* Meyen (400x)
 Fig.4 *P. duplex var.genuinum* (A.Braun) Lagerheim (400x)
 Fig.5 *P. ovatum* (Ehr.)A.Braun (400x)
 Fig.6 *P. simplex* Meyen (100x)
 Fig.7 *P. simplex var. duodenarium* (Bailey) Rabenh (400x)
 Fig. 8 *P. tetras var. tetradon* (Corda) Hansgirg (1000x)
 Fig.9 *Tetraedron minimum* (A.Braun) Hansgirg (400x)
 Fig.10 *Ankistrodesmus convolutus* Corda (1000x)
 Fig.11 *A. falcatus* (Corda) Ralfs (400x)
 Fig.12 *Oocystis elliptica* W.West (400x)
 Fig.13 *Coelastrum microsporum* Naegeli (400x)
 Fig.14 *Scenedesmus bijugatus* (Turpin) Kuetz. (400x)
 Fig.15 *S. dimorphus* (Turpin) Kuetz. (400x)
 Fig.16 *S. incrassatulus* Bohlin (1000x)
 Fig.17 *S. obliquus* (Turpin) Kuetz. (400x)
 Fig.18 *S. quadricauda* (Turpin) Brebisson (1000x)
 Fig.19 *S. quadricauda var.maximum* W.et G.S.West. (1000x)
 Fig. 20 *Closterium lunula* (Mueller) Nitzsch (100x)
 Fig.21 *C. libellula* Focke. (100x)
 Fig.22 *C. moniliferum* (Bory) Ehrenberg. (400x)
 Fig.23 *Cosmariium awadhense* Presad et. Mehrotra (1000x)
 Fig.24 *C. botrytis* Meneghini (1000x)
 Fig.25 *C. circulare* Reinsch (1000x)
 Fig.26 *C. granatum* Brebisson (1000x)
 Fig.27 *C. javanicum* Nordst. (1000x)
 Fig.28 *C. pyrimidatum* Breb. (1000x)
 Fig.29 *Staurastrum hexacerum* (Ehr.) Wittr (1000x)
 Fig.30 *S. tetracerum* Ralfs. (1000x)





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