

Algofloristic Studies of the of Palghar District of Maharashtra, India

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Abstract:

The paper presents the results of studies on species composition of algae in the freshwater bodies of Shirgaon Fort, Palghar district, Maharashtra (Western Ghat). In different reservoirs 26 species of algae belonging to class Cyanophyceae and Chlorophyceae were recorded.. Cyanophyceae is represented by 2 genera, 6 species and 1 forma and Chlorophyceae is represented by 8 genera, 20 species 5 varieties and 1 forma.

Key Words: Cyanophyceae, Chlorophyceae, Shirgaon Fort, Palghar, Maharashtra

Introduction:

Microalgae, a large and diverse group of unicellular photo- and heterotrophic organisms, have significant potential for production of a vast array of valuable products for diverse industries. Microalgae use solar energy, nutrients, and carbon dioxide (CO₂) to produce proteins, starch, lipids, and other biomolecules (Dixon and Wilken 2018). The knowledge on the abundance, composition and seasonal succession of the same is a prerequisite for the successful management of an aquatic ecosystem. Apart from primary production, phytoplankton plays an important role as food for herbivorous animal and act as biological indicator of water quality in pollution studies. The communities of phytoplankton especially the different species of diatoms are also used as an indicator of water pollution (1996). While microalgae has demonstrated potential as an alternative and sustainable biomass source for biofuels and bioproducts, techno-economic assessments have repeatedly concluded that microalgae-derived fuels, animal feed inputs, and bulk chemicals cannot currently compete with market prices (Benemann 2013; Chauton *et al.* 2015).

The present study is undertaken with an objective to understand the presence of the types of algae during pre and post monsoon periods.

Study Area

The fort of Shirgaon (Coordinates: 19°41'46"N 72°42'48"E) is 5 km North of Mahim in Palghar District, Maharashtra. In 1739 Marathas won this fort along with the forts of Dahanu, Kelve and Tarapur. It belonged to Portuguese before Marathas. Afterwards in 1818 Britishers captured it like the other forts. Shirgaon fort is well fortified and the walls are good condition. There are many hidden caves within the walls of the fort.

MATERIALS AND METHODS:

Algal samples were collected, by random sampling method. Samples collection were made between November 2016 to January 2017 by using planktonic mesh net. The samples were preserved in 4% formalin (aqueous solution of formaldehyde) and brought to the laboratory, Department of Botany, Thakur College. Slides were prepared by staining with Eosin stain for Cyanophycean algae; for Chlorophycean staining done with Iodine and mounted in Glycerin. Detailed studies were made by examining specimens under microscope with photo-micrographic attachment.

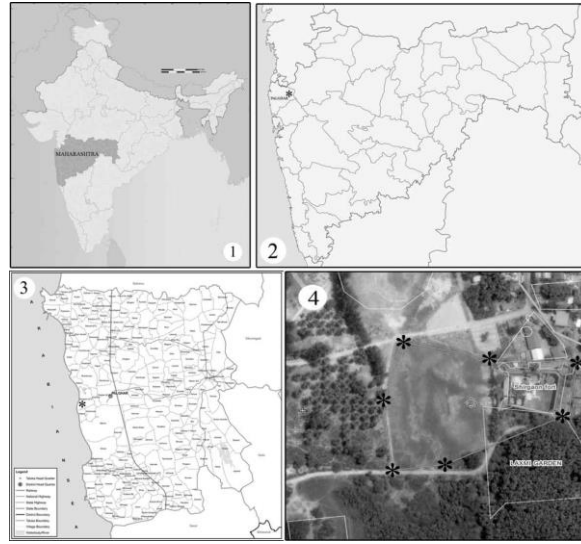


Fig. 1. Map of India .2 . Map of Maharashtra Fig. 3. Map of Palghar District Fig. 4. Shirgaon Fort (Actual Place of collection which is mark by *) (Coordinates: 19°41'46"N 72°42'48"E).

RESULT & DISCUSSION

The species identification has been done after Prescott (1951), Komarek and Fott, (1952), Tiffany and Britton (1952), Desikachary (1959), Scott and Prescott (1961), Hortobagyi, (1973), Prasad and Misra (1992) and Prasad and Srivastava (1992). All collections are from Shirgaon Fort, Palghar.

Microcystis viridis Lemm.

Desikachary, T.V. (1959) (Pl. 18, Fig. 1-6, Pg. 87-88)

cells 3-7 \square in diam., spherical with gas-vacuoles. (Pl. 1 Fig. 1)

Collection No. MAH/PAL/02; Date No. 25 Aug 2017.

Oscillatoria irrigua (Kutz) Gomont

Desikachary, T.V. (1959) (Pl. 42, Fig. 7-9, Pg. 224)

Filaments, 6-11 \square broad, apex, slightly attenuated, subcapitate, straight; cells quadrate to half as long as broad, 4-11 \square long; apical cell convex, with an evident thickened outer wall. (Pl. 1, Fig. 2)

Collection No. MAH/PAL/01; Date No. 25 Nov 2017.

Oscillatoria curviceps Ag. Ex Gomont

Desikachary, T.V. (1959) (Pl. 38, Fig. 2, Pg. 209)

Trichomes straight, bent at the end not constricted at the cross-walls, 10-17 \square broad, cells 1/3-1/6 as long as broad, 2-5 \square long. (Pl. 1, Fig. 3)

Collection No. MAH/PAL/03; Date No. 25 Aug 2017.

O. princeps Vaucher

Desikachary, T.V. (1959) (Pl. 37, Fig. 1, Pg.210)

Trichomes straight, 16-60 \square broad, commonly 25-50 \square , attenuated at the apices and bent; cells 1/11-1/4 as long as broad, 3.5-7 \square long; end-cells rounded. (Pl. 1, Fig. 4)

Collection No. MAH/PAL/01; Date No. 25 Dec 2017.

Oscillatoria limosa Ag.

Desikachary, T.V. (1959) (Pl. 42, Fig. 11, Pg. 206-207)

Trichomes 11-20 (-22) □ long; cells 1/3-1/6 as long as broad, 2-5 □ long, end-cells rounded. (Pl. 1, Fig. 5)

Collection No. MAH/PAL/02; Date No. 25 Jan 2017.

Oscillatoria subbrevis Schmidle f. *crassa* Dixit

Desikachary, T.V. (1959) (Pl. 37, Fig.2, Pg. 207)

Trichomes 12.5-20 □ broad, cells 2.5-3 □ long. (Pl. 1, Fig. 6)

Collection No. MAH/PAL/03; Date No. 25 Aug 2017.

Gloeocystis ampla Kuetzing

Tiffany, L.H. and Britton, M.E. (1952) (Pl.3, Fig. 23, Pg.21-22)

Cells 10-12 x 9-15 □, ovoid, enclosed in gelatinous sheath; colonies, usually fragmenting, up to 15mm in diameter. (Pl. 1, Fig. 7)

Collection No. MAH/PAL/04; Date No. 25 Aug 2017.

Pediastrum boryanum var. *longicorne* Raciborski

Tiffany, L.H. and Britton, M.E. (1952) (Pl.30, Fig. 297, Pg.110-112)

Cells up to 40 □ in diameter, with horns at end of processes 12-30 □ long. (Pl. 2, Fig. 2).

Collection No. MAH/PAL/05; Date No. 25 Dec 2017.

Pediastrum boryanum Meneghini

Tiffany, L.H. and Britton, M.E. (1952) (Pl.30, Fig. 297, Pg.110-112)

Cells 7-30 □ in diameter, outer half of marginal cells with 2 short processes ending in short spines; coenobia 4-256-celled, usually compact.(Pl. 2, Fig. 1)

Collection No. MAH/PAL/04; Date No. 25 Aug 2017

Kirchneriella obesa (W.West) Schmidle var. *major* (Bernard) G.M. Smith

Tiffany, L.H. and Britton, M.E. (1952) (Pl.31, Fig. 309, Pg.115-116)

Cells 3-5 x 8-21 □, inner sides curved; chromatophore nearly filling cell, with 1 pyrenoid. (Pl. 2, Fig. 3)

Collection No. MAH/PAL/04; Date No. 25 Sep 2017;

Closterium moniliferum Ehrenberg

Tiffany, L.H. and Britton, M.E. (1952) (Pl.52, Fig. 549, Pg.171-172)

Cells 30-68 x 188-420 □, stout, 6-8 times longer than wide, outer margin 100-130 degrees of arc, cell-wall smooth, colorless; pyrenoids 6-7 in a median series; (Pl. 2, Fig. 4)

Collection No. MAH/PAL/01; Date No. 25 Sep 2017;

Closterium diana Ehrenberg

Tiffany, L.H. and Britton, M.E. (1952) (Pl.52, Fig. 548, Pg.168-169)

Cells 16-36 x 103-380 □, usually 10-12 times longer than wide, strongly curved, outer margin about 107-130 degrees of arc, cell-wall smooth; pyrenoids 3-6 in a single series;. (Pl. 2, Fig. 5)

Collection No. MAH/PAL/03; Date No. 25 Nov 2017.

Closterium gracile var. *elongatum* W. and G. S. West

Tiffany, L.H. and Britton, M.E. (1952) (Pl.52, Fig. 557, Pg.175-176)

Cells 3-8 x 254-480 μ , 85-95 times longer than wide, apices obtusely rounded. (Pl. 2, Fig. 6)

Collection No. MAH/PAL/01; Date No. 25 Nov 2017.

Closterium acerosum var. *elongatum* Brebisson

Tiffany, L.H. and Britton, M.E. (1952) (Pl.52, Fig. 551, Pg.168-169)

Cells 28-54 x 325-790 μ , cell-wall yellowish-brown. (Pl. 2, Fig. 7)

Collection No. MAH/PAL/02; Date No. 25 Nov 2017.

Closterium striolatum Ehrenberg

Tiffany, L.H. and Britton, M.E. (1952) (Pl.51, Fig. 546, Pg.169-170)

Cells 20-53 x 135-478 μ , 8-12 times longer than wide and pyrenoids 5-7 in a median series;. (Pl. 2, Fig. 8)

Collection No. MAH/PAL/04; Date No. 25 Aug 2017.

Euastrum spinulosum Delp

Scott and Prescott 1961, p. 40, Pl.10, Fig. 4.

Long cell 85 μ m, lateral cell 75 μ m, isthmus 20 μ m. (Pl. 3, Fig. 9)

Collection No. MAH/PAL/05; Date No. 25 Aug 2017.

Cosmarium margaritatum (P. Lundell) J.Roy & Bisset

Scott and Prescott 1961, p. 63, Pl.29, Fig. 4.

Long cell 50.0 μ m, lateral cell 45.0 μ m, Isthmus 15.0 μ m. (Pl. 3, Fig. 1)

Collection No. MAH/PAL/04; Date No. 25 Nov 2017.

Cosmarium turpinii Brebisson

Tiffany, L.H. and Britton, M.E. (1952) (Pl.54, Fig. 593, Pg.190-191)

Cells 50-67 x 60-77 μ and 20-25 μ thick, pyrenoids 2 in each semicell. (Pl. 3, Fig. 2)

Collection No. MAH/PAL/05; Date No. 25 Nov 2017.

Cosmarium obtusatum Schmidle forma

T. Hortobagyi (1973) (Fig.599, Pg. 336)

Cells 62.4 x 52.7 μ . Isthmus 14.3 μ . Each half cell contains two large pyrenoids. (Pl. 3, Fig. 3)

Collection No. MAH/PAL/03; Date No. 25 Sep 2017.

Cosmarium granatum Breb.

Tiffany, L.H. and Britton, M.E. (1952) (Pl.53, Fig. 565, Pg.186-187)

Cell 38 μ m long, 27 μ m broad and isthmus 7 μ m. Isthmus 7.8 μ . (Pl. 3, Fig. 4)

Collection No. MAH/PAL/02; Date No. 25 Jan 2017.

Cosmarium subcrenatum Hantzsch

Tiffany, L.H. and Britton, M.E. (1952) (Pl.54, Fig. 596, Pg.188-189)

Cells 18-32 x 23-37 μ and 12-21 μ thick, pyrenoid single. (Pl. 3, Fig. 5)

Collection No. MAH/PAL/03; mDate No. 25 Nov 2017.

Cosmarium pachydermum Lundell var. *aethiopicum* W. and G.S.West

Tiffany, L.H. and Britton, M.E. (1952) (Pl.53, Fig. 581, Pg.184-185)

Cells 61-80 x 69-107 μ and 40-45 μ thick, pyrenoids 2 in each chromatophore. (Pl. 3, Fig. 6)

Collection No. MAH/PAL/02; Date No. 25 Dec 2017.

Cosmarium rectangulare Grunow

Tiffany, L.H. and Britton, M.E. (1952) (Pl.53, Fig. 583, Pg.186-187)

Cells 30-36 x 37-47 μ and 18-24 μ cell-wall finely punctate. (Pl. 3, Fig. 7)

Collection No. MAH/PAL/02; Date No. 25 Aug 2017.

Cosmarium formosulum Hoffman

Tiffany, L.H. and Britton, M.E. (1952) (Pl. 54, fig. 589, Pg. 189-190)

Cells 34-40 x 40-50 x 22-25 μ thick, deeply constricted, pyrenoids 2. (Pl. 3, Fig. 10)

Collection No. MAH/PAL/02; Date No. 25 Jan 2017.

Staurostrum punctulatum Brebisson

Tiffany, L.H. and Britton, M.E. (1952) (Pl.54, Fig. 603, Pg.197-198)

Cells 23.0-35.5 x 26.0-40.5 μ ,deeply constricted, (Pl. 3, Fig. 8)

Collection No. MAH/PAL/02; Date No. 25 Jan 2017.

Hyalotheca dissiliens Brebisson

Tiffany, L.H. and Britton, M.E. (1952) (Pl.56, Fig.631, Pg.204)

Cells 10-39 x 10-33 μ , width greater than length, cells cylindric-discoidal, lateral margins slightly convex; chromatophore axial, 1 in each semi-cell, with a number of radiating ridges; pyrenoid single, central.(Pl. 3, Fig. 11)

Collection No. MAH/PAL/01; Date No. 25 Sep 2017.

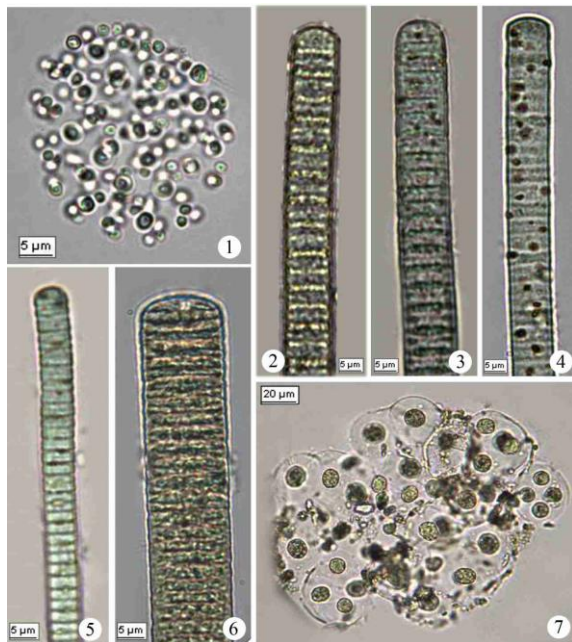


Plate 1 1. *Microcystis viridis* Lemm. 2. *Oscillatoria irrigua* Gimint 3. *Oscillatoria curviceps* Ag. Ex Gomont 4. *Oscillatoria princeps* Vaucher 5. *Oscillatoria limosa* Ag 6. *Oscillatoria subbrevis* Schmidle f. *crassa* Dixit 7. *Gloeocystis ampla* Kuetzing.

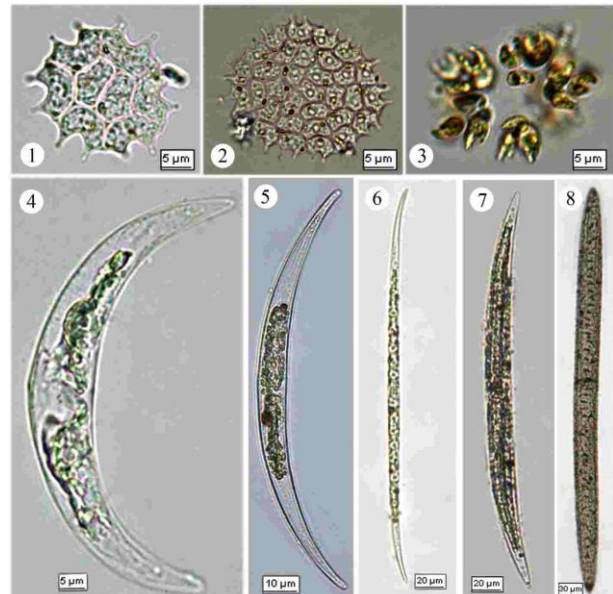


Plate 2 1. *Pediatrum boryanum* Meneghini 2. *Pediatrum boryanum* var. *longicorne* Raciborski 3. *Kirchneriella obesa* (W.West) Schmidle var. *major* (Bernard) G.M. Smith 4. *Closterium moniliferum* Ehrenberg 5. *Closterium dianaeh* Ehrenberg 6. *Closterium gracile* var. *elongatum* W. and G. S. West 7. *Closterium acerosum* var. *elongatum* Brebisson 8. *Closterium striolatum* Ehrenberg

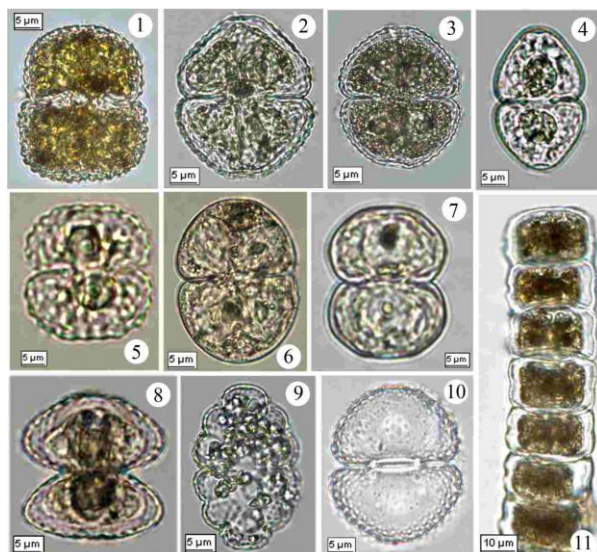


Plate 3 1. *Cosmarium margaritatum* (P. Lundell) J.Roy & Bisset 2. *Cosmarium turpinii* Brebisson 3. *Cosmarium obtusatum* Schmidle forma 4. *Cosmarium granatum* Breb 5. *Cosmarium subcrenatum* Hantzsch 6. *Cosmarium pachydermum* Lundell var. *aethiopicum* W. and G.S.West 7. *Cosmarium rectangulare* Grunow 8. *Staurastrum punctulatum* Brebisson 9. *Euastrum spinulosum* Delp 10. *Cosmarium formosulum* Hoffman 11. *Hyalotheca dissiliens* Brebisson

DISCUSSION

The current study was undertaken with an objective to understand the community dynamics of the algae during pre and post monsoon periods. In the class Cyanophyceae, *Oscillatoria* occur dominantly and represented by five species and *Microcystis* is represented by only single species *Microcystis viridis* Lemm.; while in Chlorophyceae, Genus *Cosmarium* with 7 species and 1 variety is the most dominating genera of the study area. *Closterium* is the second dominating genera represented by 3 species and 2 varieties. *Pediastrum* is represented with one species and one variety followed by single species of each genera of *Euastrum*, *Gloeocystis* Kuetzing., *Kirchneriella* (W.West), *Staurastrum*, *Hyalotheca*.

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