PARIPEX - INDIAN JOURNAL OF RESEARCH | Volume-9 | Issue-4 | April - 2020 | PRINT ISSN No. 2250 - 1991 | DOI : 10.36106/paripex

ORIGINAL RESEARCH PAPER



A SYSTEMATIC ACCOUNT OF CHLOROCOCALES-I NEW TO MARATHWADA, MAHARASHTRA.

KEY WORDS: Chlorococcales, Seasonal Variation, Latur, Marathwada, Maharashtra.

Yadav S.G.*

Department of Botany Shivaji Mahavidyalaya Renapur District Latur, Maharashtra-413527.*Corresponding Author

While working on algal taxonomy of Latur district in the Marathwada region of Maharashtra during April 2018 to March 2019 the author came across some interesting members of Chlorococcales. A total of 125 taxa under 25 genera of Chlorococcales have been encountered for the first time from the Latur district by visiting various habitats like pools, ponds, streamlets, streams, polluted water passages (gutter) and puddles. As far as seasonal variation studies, they were recorded in all seasons; maximum numbers of species were found in winter season and followed by monsoon and summer. The present paper deals with the systemic enumeration of 13 genera of Chlorococcales under 42 taxa.

INTRODUCTION:

ABSTRACT

Review of literature reveals that, studies on Chlorococcales in abroad and in India have been done extensively by many researchworkers. India has a very rich and diversified algal flora.InIndia,Wallich,(1860) appears to have been the first to records some Chlorococcales (Tetraedron) from Bengal for first time in India.Carter,(1869)reportednewgenusConococcus.Bruhland Biswas, (1992, 1926) recorded 29 Chlorococcales from the filter beds of Bengal and Loktak lake of Manipur. Iyengar,(1925) described a new species of Hydridictyon from Madras. N.Carter,(1926) reported 15 chlorococcales from North-East India. During the years 1930, 1934, and 1936 Biswas recorded about 20 Chlorococcales from Bengal Assam.Skuja,(1949) reported71ChlorococcalesfromBurma.Philipose,(1940;1959) finally reported a total of 1079 species of Chlirococcales under $173 {\tt genera.} In Mahara {\tt shtrat} remendous {\tt work} has {\tt been done on}$ algal taxonomy by various workers (Iyengar and Balkrishnan (1959) described new species of Golenkinia from Poona city, Gonzalves (1959) recorded some chlorococcales from Bombay.) In Marathwada region of Maharashtra except few reports (Ashtekar 1979a, Andhale 2008, Talekar 2009) very rare attention has been paid towards algal taxonomy, although the climatic conditions of Marathwada region are most suitable to grow Chlorococcales luxuriantly and indiverse form, therefore tofulfilthislacuna, it has been decided to work on algalt axonomy (Chlorococcales) of Latur district in Marathwada region of Maharashtra.

MATERIALS AND METHODS:

The present investigation was carried out by visiting various selected habitats like pools, ponds, streamlets, streams, polluted water passages (gutter) and puddles. The algal samples were collected during April 2018 to March 2019. The algal collections were made regularly from selected sampling stations. Acid washed collection bottles were used for the collectionofalgalsamples. Onreturntothelaboratoryfromfield, the collections were carefully observed under the microscope and important pointswere noted. All collectionswere preserved in 4% commercial formalin added with 5% glycerine. Identification of algal taxa was performed by referring to the standard literature on algae. Brunnthaler (1915), Collins (1928), Philipose (1967), Prescott (1951), Smith, (1920), (1951), Tiffany and Britton (1952), Scottand Prescott (1961).

SYSTEMIC ENUMERATION:

CHLOROCOCCUMFries,1825

Chlorococcum humicola (Naegeli) Rabenhorst:

 $\label{eq:cellsspherical;solitary or in small clumps; chloroplast a hollow sphere with a lateral not chand a single pyrenoid; cells 8-18.5 \mu in diameter.$

Chlorococcuminfusionum(Schrank)Meneghini:

Cell spherical, solitary or in flat irregular colonies, chloroplast likeahollowspherewithanotchononeside, with apyrenoid; cells 15-16.5 indiameter.

CHARACIUMA.Braun.1849

*Characiumambiguum*Hermannex.Rabenhorst: Cells small, elongate and oblique; apex in the form of a slightly bent hyaline beak; attached by a short stalk, without basal thickening;cells4-7µindiameter,14-26µlong.

Botany

CharaciumcurvatumG.M.Smith:

Cells lunate, either sharply or bluntly pointed; stipe stout, without an attaching disc; chloroplast with a pyrenoid; cells 3-7µ indiameter; 23-32.5µ long, including stipe.

CharaciumlimneticumLemmermann:

Cells lunate or fusiform, extended anteriorly into a long, sharp, spine liketip, tapering posteriorly rather abruptly to formalong narrow stipe, without a basal attaching disc; chloroplasts 1-8, arranged to formaseries of parietal bands; cells 5-7 µindiameter, 49-69 µlong, including stipe.

CharaciumrostratumReinhard:

Cells lanceolate-falcate, with curved apex; stipe long and slender from an attaching disc; chloroplast laminate, nearly covering the entire wall; cells 08-10µ in diameter, 60-65µ long, including the stipe, stipe 15-18µ long.

Characiumstipitatum(Bachm.)Wille:

Cells ovate to subspherical or pyriform; stipe slender and tapering from the base of the cell, without an attaching disc; chloroplastparietal, along the apical wall, with a pyrenoid; cells 7-13µindiameter; stipe 7-9µlong.

SCHROEDERIALemmermann,1898

Schroederiaindicasp.nov.:

Cells more or less semicircular, ends of cells with solid, slightly brownish spines; chloroplast parietal, with a pyrenoid; cells 7-8.5µindiameter, 25-27.5µlong, without spines, 18-20µlong.

Schroederiaplanctonica(Skuja)Philipose:

Cells fusiform, tumid in the middle with drown out apex and slightly curved hind end; cell membrane fairly thick and produced into a long, solid spine at either end; chloroplast parietal, with a pyrenoid; cells $5-7.5\mu$ in diameter, $40-52\mu$ long withspines, spines up to 16μ long.

Schroederiasetigera(Schroeder)Lemmermann:

Cells solitary, free floating, spindle shaped, straight, with the ends produced into a long, stout spines; chloroplast single, parietal, with a pyrenoid; cells 3-6.5 μ in diameter, 60-70 μ long, includingspines, spines 15-17 μ long.

TROCHISCIAKuetzing, 1845

Trochisciagranulata(Reinsch)Hansgirg:

 $\label{eq:cellspherical,cellwallthick,denselycovered,with granular or wardlike protuberances; cells 10-12.5 \mu indiameter.$

Trochisciaobtusa(Reinsch)Hansgirg:

Cells spherical, cell wall thick, with well developed verrucose

www.worldwidejournals.com

PARIPEX - INDIAN JOURNAL OF RESEARCH | Volume-9 | Issue-4 | April - 2020 | PRINT ISSN No. 2250 - 1991 | DOI : 10.36106/paripex

ridgesintheformoffolds;cells18-21µindiameter.

Trochisciareticularis(Reinsch)Hansgirg:

 $\label{eq:cellsfreefloating,spherical;cellwallfairly thick and covered by linear ridges which intersect to form polygons; cells 10-14.5 \mu in diameter.$

GOLENKINIAChodat,1894

GolenkiniaradiataChodat:

Cells usually solitary, spherical, with the entire cell wall covered by number of spines; chloroplast cup shaped, with a pyrenoid; cells $10-12.5\mu$ indiameter; spines $10-19\mu$ long.

MICRACTINIUM Fresenius, 1858 MicractiniumpusilliumFresenius:

Colonies quadrate, tetrahedric, with 8 cells arranged in groups offour, eachgroup being quadrate; cells spherical with a thin firm cell membrane and with 2-3 long, hyaline setae from their outer surface; chloroplast single, parietal, cup shaped, with a pyrenoid; cells 6-7.5 µindiameter; setaeupto 10-20 µlong.

Micractiniumquadrisetum(Lemm.)G.M.Smith:

Colony of 4 ovate cells, arranged in groups, cells with 1-4 long, finelytaperingsetaefromoutersurface; chloroplast parietal cup with a pyrenoid; cells 5-7 μ in diameter, 6-8 μ long; setae 10-21 μ long.

CONOCOCCUSCarter, 1869

ConococcuselongatesCarte:

Colonies consisting of two to four spherical cells; each cell with a transparent conical appendage from the outer side of cell wall which is about two times longer than the diameter of the cell; chromatophoregreen, with a central pyrenoid; cells of two celled colonies are $7-8.8\mu$ in diameter, spines $10-17.5\mu$ long, cells of 4-celled colonies are $5-5.2\mu$ indiameter, spines $10-10.2\mu$ long.

SORASTRUM Kuetzing, 1845

Sorastrum americanum (Bohlin) Schmidle v. undulatum G.M.Smith:

Colonies solitary, spherical, 8-16, heart shaped to subpyramidate cells with their outer walls emarginate and furnished at each of the four angles with a long stout, outwardly directed spines; cells narrowed towards the base and attached to the centre of the colony by a short, cylindrical stalk; stalk 5-6, faceted, base undulate; cells 4-7 μ in diameter, without stalk 10-12 μ long; spines3-4.8 μ long.

SorastrumbengalicumNaegeli:

 $\label{eq:colonies} Colonies more or less spherical, 18 celled, with the cells more or less compactly arranged, cells spherical to ovoid with two short spines from the outer face and a short stalk from the inner; cells 2.8-5 \muindiameter; 18 celled colonies up to 25 \muindiameter.$

SorastrumspinulosumNaegeli:

Colonies 4 celled; cells reniform to cuneate, three angled, with short stalk from the basal angle, two short pointed spines from each of the outer angles chloroplast parietal with a single pyrenoid; cells $5-12\mu$ in diameter, $10-13\mu$ long, spines $1.5-2.5\mu$ long; colonies $20-28\mu$ indiameter.

HYDRODICTYON Roth,1800

Hydrodictyonreticulatum(Linn.)Lagerheim:

Thallus macroscopic, consisting of cylindrical cells, adjoined at their ends to form a cylindrical net with five or six sided mesh; chloroplast at first parietal plate with a single pyrenoid, later becoming a reticulum covering the entire cell withmanypyrenoid;cellsupto185µindiameter.

TETRAEDRON Kuetzing,1845

Tetraedron bifurcatum (Wille) Lagerheim f. submammillata:

Cells pyramidal, with the sides somewhat concave or convex or straight ends, rounded, with a short, often curved spines from each angle of the cell end, spines being submammillate, cell membrane is punctate; cells 27-32.5µ in diameter, without spines,spines1.5-2µlong.

Tetraedroncaudatum(Corda)Hansgirg:

Cellssmall,flat,fivesided,withfoursidesconcave,fifthintheform ofanotch of varying depth,anglesrounded and produced into a short,straightspines;cells6.5-9.5µin diameter;spinesupto 2.5µindiameter.

TetraedronhemisphaericumSkuja:

Cells triangular in vertical view, concave and depressed in the formofahemisphereinlateralview; angles broadlyrounded and without spines; cell wall hyaline, densely punctate; chloroplast parietal, with apyrenoid; cells 9-16µindiameter.

TetraedronlimneticumBorgev.gracilePrescott:

Cells tetragonal, with the angles produced into processes, having one to two dichotomous brachings, processes narrower, which almost adjoin at the base, there being scarcely any cell body; cells 30-32 μ in diameter, base of processes 3.5-5 μ in diameter.

Tetraedronminimum(Braun)Hansgirg:

Cells small, flat, tetragonal, angles rounded without spines or processes, lobessometimescruciately arranged; margins of the cells concave, with one frequently incised; cells 7.5-11 μ in diameter.

Tetraedron minimum (Braun) Hansgirg f. apiculatum (Reinsch)DeToni:

Cells small, flat, tetragonal, angles rounded, with short blunt papilla-likeprocesses;marginsofthecellslightlyconcave;cells 9-12µindiameter.

Tetraedronmuticum(A.Braun)Hansgirg:

Cells small, flat, triangular, sides slightly concave, angles broadlyrounded;cellwallsmooth;cells10-12.5µindiameter.

TetraedronpentaedricumWestet.West:

Cells irregularly 5 lobed, with one lobe extended in a different plane from the others; angles sharply rounded, the apex of the each lobe furnished with a sharp spines; cells 17.5-30 μ in diameter, with spines; spines up to 4.5 μ long.

Tetraedronproteiforme(Turner)Brunnthaler:

Cells3-cornered, angles drown out and ending in a long spines; sides, wavy; three angled; cells $32.5-35\mu$ in diameter without spines, $7.5-10\mu$ long.

Tetraedronquadratum(Reinsch)Hansgirg:

Cells quadrangular in front view, the lateral margins straight or slightly convex; each angle with a short spine, memebrane two layered; cells $22.5-28\mu$ indiameter.

TetraedronregulareKuetzing:

Cells tetragonal, pyramidal, with the sides concave, straight or slightlyconvex; angles with ablunt, stout spines, cells 8.5-12.5 µin diameter without spines, spines 2.5-5 µlong.

TetraedronregulareKuetzingv.granulataPrescott:

Cells tetragonal, with convex or slightly concave sides, angles broadly rounded, with stout spines; cell wall granular; cells 30-40µindiameterwithoutspines, spines 15-18µlong.

Tetraedron regulare Kuetzing var. *torsum* (Turner) Brunnthaler:

Cells tetragonal, with two halves twisted in a cruciate manner, sides of arms slightly convex, angles with a short spines; cells 14.5-18µindiameter,spinesupto2.5µlong.

Tetraedrontrigonum(Naegeli)Hansgirg:

Cellsflat, three angled, the angles tapering to sharply rounded, spines, stipped apices; margins convex; sides of the cells concave or straight; cells $20-23\mu$ in diameter with the spines;

PARIPEX - INDIAN JOURNAL OF RESEARCH | Volume-9 | Issue-4 | April - 2020 | PRINT ISSN No. 2250 - 1991 | DOI : 10.36106/paripex

spines3-5µlong.

Tetraedron trigonum (Naegeli) Hansgirg f. crassum (Reinsch)Detoni:

Cells flat, three angled, angles with spines; sides concave; cells 15-17.2µindiameter;spines4-4.5µlong.

Tetraedron trigonum (Naeg.) Hansgirg v. tetragonum (Naegeli)Rabenh.:

Cells small, flat, four sided; sides concave with a prominent depression; angles with a spine; cells 12-14.5µ in diameter, withoutspines;spines2.5-3µlong.

Tetraedrontumidulum(Reinsch)Hansgirg:

Cells pyramidal, the margins straight, concave or convex; the anglesbluntlyroundedorsometimeswithknoblikeprojections; cells12-15µindiameter.

CHODATELLA Lemm.emend.Fott,1848 ChodatellalongisetaLemmermann:

Cells solitary, free floating, subcylindrical, ornamented with long setae that are both subpolar in insertion; chloroplast one,

parietalwithapyrenoid;cellsupto7.5µindiameter,10-13µlong withoutsetae;setae8-21µlong.

ChodatellaquadrisetaLemmermann:

Cellsovate, with 2 long, diverging setae, arising near the apices; cells5-7µindiameter,9-12µlong;setae10-14µlong.

CHLORELLABeijerinck,1890

ChlorellavulgarisBeijerinck:

Free living; cells usually solitary or in small colonies, spherical andwithathincellmembrane;chloroplastparietal,cup-shaped, withapyrenoid;cells5-7.5µindiameter.

PALMELLOCOCCUSChodat, 1894

Palmellococcussaccharophilus(Krieger)Chodat:

Cells ellipsoid, ovoid or rarely spherical; cell membrane thin, colour less and slimy; chloroplast parietal, without a pyrenoid.

REFERENCES

- Allen, W.E. (1920). A quantitative and statistical study of the plankton of the Son Joaquin river and tributaries in and near Stockton, California in 1913. Publi 2001. 22:1-297.
- Anand, V.K. (1975). A check list of planktonic algae from Mansar lake, Jammu. . Phykos 14(1 & 2): 77-79. Andhale S.B. (2008). Studies on the flora of Jayakwadi Bird Sanctuary. Ph.D.
- Thesis, Dr. B.A.M.U. Aurangabad.
- Ashtekar, P.V. (1980). Studies on fresh water algae of Aurangabad district. Ph.D. thesis, Marathwada University, Aurangabad. Ashtekar, P.V. and Kamat, N.D. (1979b). Chroococcales of Aurangabad district, .
- Maharashtra. Marathwada Univ. J. Sic. 18(11): 47-52.
- Aykulu, G., (1978). A quantitative study of the phytoplankton of the river Avon Bristol Br. Phykal J. 13:1-102.
- Barhate, V.P. and J.L. Tarar (1981). The algal flora of Tapi river, Bhusawal Maharashtra, Phykos, 20: 75-78.
- Brunnthaler, J. (1915). Protococcales, In A. Pascher, Die Susswasserflora Deutschlands, Osterreich und der Schweiz. 5 (2): 52-205, F. 1330, Jena
- Collins, F.S. (1928). Green algae of North America. G.E. Strechert and Co. New York
- Cronberg. G. (1999). Qualitative and quantitative investigations of phytoplankton in lake Ringsjon, Scania, Swedon. *Hydrobiologia*. **404(0)**: 27-40. Das, S.K., Samad, L.K, Ramanujam. P. and Adikari, S.P. (2009). Freshwater algae
- of Meghalaya. J. Indian Bot. Soc. Vol. 88 (142): 102-188. Dixit, S.C. (1937). The Chlorophyceae of the Bombay Presidency, India-I. Ibid.
- 5(1): 16-25 Fritsch, F. E. (1903). Observations of phytoplanktons of the river Tames, Ann.
- Bot. 17:631-647. Hegde G.R. and Bharati, S.G. (1983). Freshwater algae of Bijapur district, Karnataka state, India. Phykos. 22: 167-170.
- Hegde, G. R. (1988b). Freshwater algae of Karnataka state-certain new records from Dharwad. *Indian Bot. Rpt.* **7(1 and 2):** 51-53.
- Hilliard, D.K. (1959). Notes on the Phytoplankton of Karluk lake, Kodiak, Island, Alaska. The Canadian Field Naturalist. 73 (3): 135-143.
- Jawale, A.K. and Kumawat, D.A. (2003). Some Ankistrodesmus (Chlorococales) from fish ponds, Maharashtra. J. Aqua Bio. Vol. 18 (2): 17-19.
- Jose, L. and Patel, R.J. (1992). A systematic account of Chlorococales new to Kerala. Phykos. 31 (1 & 2): 95-102.
- Jyothi, B., Sudhakar, G. and Venkateshwaralu, V. (1990). Ecological evaluation of C hlorococaleanblooms-Acomparativeaccount. J. Indian Botanical. Soc. 69: 115-119.
- Kamat, N.D. (1962a). Chlorophyceae of Ahmedabad, India. Ibid. 20(2): 248-279.
- Kamat, N.D. (1974). Algae of Marathwada, Maharashtra. Phykos 13: 22-32.

- Kamat, N.D. and Frietas, J.F. (1976). A Check list of Eulgenophyceae and Chlorophyceae of Nagpur, Maharashtra. Phykos. 15: 121-125.
- Kumawat D.A.andJawale, A.K. (2003a). A Noteworthy on genus Dictyophaerium (Chlorococcales).Naeg.from fish ponds.Indian J. Environ.And Ecoplan. 7 (3): 583-585.
- Kumawat D.A. and Jawale A.K. (2004b). An Ecological study of chlorococcales in the Inland Fishery. J. Phytol. Res. 17 (1): 43-46. Nandan, S.N. (1993). Algal flora of fish pond in Dhule, Maharashtra. Indian Bot.
- Rept. 12 (land 2): 61-63. Nandan, S. N. and Patel, R. J., (1986a). Algal flora of Vishwamitri river Baroda-II
- Chlorophyceae. Indian Bot. Reptr. 5(1): 97. Philipose, M.T. (1960). Fresh water phytoplankton of inland fisheries. Proc.
- Symp Algology, ICAR. 272-291. Phllipose.M.T.(1967).Chlorococcales.ICAR.Monograph,NewDelhi.P.365.
- Pingle, S.D. (1981). Studies on algae of impoundments and streams in Maharashtra, Ph.D. thesis, Poona University.
- Prescott G.W. (1951). Algae of the Western great lakes area. Granbrook Institute of Science, Michigan.
- Sabri, K. (1998): A study in the seasonal variation of phytoplankton in Hafik lake (Sivas Turkey). Turkish J. of Bot. 22(1):35-4.
- Sirsat D.B., Ambore N.E. and Pulle J.S. (2004). Study of Phytoplankton of fresh water pond at Dharnapuri in Beed District (M.S.) *J.Aqua.Biol.* **19(2):** 7-10. Smith, G. M. (1950).The fresh water algae of the United states. McGraw Hill
- Book Co., New York. P:719.
- Smith, G.M. (1920). Phytoplankton of the Inland lake of Wiscosin Part-I, Myxophyceae, Phaeophyceae, Heterokontae and Chlorophyceae exclusive of the Desmidiaceae. Wis. Geol. Nat. Hist. Surv. 57: 1-243.
- Talekar Santosh and Jadhav Milind (2009). Biodiversity of desmids in Manjara river in Maharashtra. *The Ecotech* **1(2)**: 104-105. Tiffany, L.H. and Britton, M.E. (1952). The algae of Illionois. Chicago.
- Venkatraman, G.S. (1957). The algal flora of the ponds and puddles inside the Banaras Hindu University grounds, India J. Bom. Nat. His. Soc. 54 (4): 908-919.
- Whitton, B.A. (1969). Seasonal changes in the phytoplankton of St. James park lake, London. London Nat. 48: 14-39.