

Species Diversity of Genus *Cosmarium* Corda, (1834) from Marathwada, Maharashtra

Yadav S.G.

Department of Botany Shivaji Mahavidyalaya Renapur Dist.Latur (413527) MS, India

Abstract- While working on algal diversity of Bhandarwadi minor irrigation project during June 2016 to May 2017, the author came across a total of 42 interesting members of desmids like *Closterium* (05), *Euastrum* (02), *Cosmarium* (28), *Staurastrum* (05) and *Desmidium* (02).

The present paper deals with the taxonomic enumeration of 28 species of genus *Cosmarium* Corda, 1834.

Index terms- Diversity, *Cosmarium*, Bhandarwadi

INTRODUCTION

Study of algal diversity from the Bhandarwadi reservoir is needed to explain mainly with the relationship between algae and the environment. The algal life is widely spread in the aquatic environment and the water plays an important role in their growth. Review of literature reveals that, studies on algal taxonomy in abroad and in India have been done extensively by many research workers. In Maharashtra tremendous work has been done on algal taxonomy by various workers, but in the Marathwada region of Maharashtra except few reports (Ashtekar 1980, Kamble 2008, 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 algae luxuriantly and in diverse form, therefore to fulfil this lacuna, it has been decided to work on algal taxonomy of Bhandarwadi reservoir constructed on Rena river just 15km away from Renapur tehsil of Latur district, in the Marathwada region of Maharashtra.

MATERIALS AND METHODS

The algal samples were collected regularly at monthly intervals from June 2016 to May 2017. Acid washed collection bottles were used for the collection

of algal samples. The samples were collected from different five selected sampling stations. The collections were carefully observed under the microscope and were preserved in 4% commercial formalin added with 5% glycerine. Generally 5 to 10 random temporary mounts were made from each collection for microscopic observations. Microphotograph were also taken and presented in taxonomic description of algae. Identification of algal taxa was performed by referring to the standard literature on algae.

TAXONOMIC ENUMERATION

Cosmarium contractum Kirchner

Cells longer than broad, about 1½ times as long as broad, deeply constricted, sinus narrow towards the apex, widening outwards; semicells broad elliptic, apex usually somewhat flattened, circular in side view, elliptic in vertical view; cells 16-17.8 µ in diameter, 25-28.5 µ long, isthmus 7.5-8 µ in diameter; cell wall smooth, colourless; chloroplast exile, with a pyrenoid in each semicell.

Cosmarium garrolense Roy et Bisset v. *pyramidatum* Krieger et Gerloff

Cells longer than broad, about 1½ times as long as broad, deeply constricted, sinus linear, narrow, slightly dilated at the apex. outer extremity open; semicells pyramidal-truncate with 5-6 crenulations on each side, apex truncate, vertical view elliptic, tumid in the middle portion on both the sides; cells 15-17.5µ in diameter, 24.8-26.2µ long, isthmus 7-7.5µ in diameter; cell wall smooth; chloroplast one, with a central pyrenoid.

Cosmarium granatum de Brebisson

Cells longer than broad, about 1½ times as long as broad, deeply constricted, sinus narrow, linear,

slightly dialated at the apex; semicells more or less triangular or truncate – pyramidate, apex narrow, truncate and rounded, side view of semicells elliptic, vertical view elliptic, cells 17.5-18.2 μ in diameter, 25-26.8 μ long, isthmus 3.5-4.5 μ in diameter; cell wall smooth; chloroplast axile, with a central pyrenoid.

Cosmarium granatum de Brebisson V. delpontii Gutw.

Cells medium sized, deeply constricted, sinus linear, narrow, outer extremity open; semicells conical, basal angles rounded, sedes symmetrical apices not truncated, side view of semicells elliptic-ovate, with tumid in the middle portion on both the sides, vertical view elliptic; cells 25-26.8 μ in diameter, 40-42.8 μ long, isthmus 10-10.2 μ in diameter; cell wall smooth, chloroplast axile, with a central pyrenoid.

Cosmarium impressulum Elfv.

Cells slightly longer than broad, deeply constricted, sinus narrow, linear, slightly dialated apex; semicells elliptic to subsemicircular, margin with 8 undulations, vertical view elliptic, with tumid in the middle portion on both sides, side view of semicells subcircular; cells 15-16.5 μ in diameter, 15-18.5 μ long, isthmus 2.8-3.5 μ in diameter; cell wall smooth; chloroplast axile, with a central pyrenoid.

Cosmarium laeve Rabenhorst

Cells small, deeply constricted, sinus narrowly linear, with a dialated apex; semicells nearly elliptic, basal angles rounded, apex narrowly truncate and retuse, side view of semicells ovate elliptic, vertical view elliptic; cells 15-17.2 μ diameter, 20-24.8 μ long, isthmus 4.8-5.2 μ in diameter; cell wall smooth; chloroplast one, axile, with a central pyrenoid.

Cosmarium laeve Rabenhorst v. *acervatum* Forster

Cells longer than broad, about 1½ times as long as broad, deeply constricted, sinus linear; semicells nearly elliptic, basal angles rounded, apices flat, vertical view elliptic; cells 14-17.5 μ in diameter, 23-25.2 μ long, isthmus 2.8-3.5 μ in diameter; cell wall smooth; chloroplast axile, with a central pyrenoid.

Cosmarium laeve Rabenhorst v. *depressum* Croasdale

Cells small, slightly longer than broad, deeply constricted, sinus narrowly linear, open, not dialated at the apex; semicells horizontally ellipsoid, apex retuse or notched, in lateral view subcircular, vertical view elliptic; cells 10-12.5 μ in diameter, 12-14.5 μ long, isthmus 2.5-3 μ in diameter; cell wall smooth; chloroplast with one pyrenoid in each semicell.

Cosmarium laeve Rabenhorst v. *octangulare* (Wille) West et West

Cells small, deeply constricted, sinus narrowly linear, open, not dialated at the apex semicells irregularly 8 angled, with basal angles acutely truncated, apical angles flattened, more or less distined, side view of semicells ovate elliptic, vertical view elliptic; cells 11-13.8 μ in diameter, 24-26.2 μ long, isthmus 2.2-2.5 μ in diameter; cell wall smooth; chloroplast one, axile, with a pyrenoid in each semicell

Cosmarium laeve Rabenhorst v. *westii* Krieger et Gerloff

Cells longer than broad, about 1½ times as long as broad, deeply constricted, sinus linear, narrow, open, slightly dialated at the apex; semicells somewhat pyramidate, truncated at the apex, with 4 crenulations on each side, elliptic in lateral view, vertical view elliptic; cells 13-14.8 μ in diameter, 20-23.5 μ long, isthmus 4.5-5.2 μ in diameter; cell wall smooth; chloroplast one, axile, with a pyrenoid in each semicell.

Cosmarium libogense West et West

Cells longer than broad, deeply constricted, sinus linear, narrow, slightly dialated at the apex, outer extremity open; semicells pyramidate – truncate, flattened, side convex, side view of semicells semicircular, vertical view elliptic; cells 15-16.5 μ in diameter, 20-21.8 μ long, isthmus 4.5-5 μ in diameter; cell wall strongly punctate.

Cosmarium pseudoprotuberans kirchner

Cells longer than broad, deeply constricted, sinus narrow, not dialated at the apex; semicells transversely subelliptic, apical and basal angles rounded, side view of semicells subcircular, vertical view elliptic; cells 15-17.2 μ in diameter, 20-22.8 μ long, isthmus 2.5-3 μ in diameter; cell wall smooth; chloroplast axile, with a pyrenoid in each semicell.

Cosmarium pseudopyramidatum Lund.

Cells longer than broad, about ½ times as long as broad, deeply constricted, sinus linear, narrow, not dilated at the apex, outer extremity open; semicells pyramidate, basal angles rounded, sides straight, apices truncate and straight or slightly convex, side view of semicells elliptic-ovate, vertical view elliptic; cells 23.5-24.8 µ in diameter, 36-38.5 µ long, isthmus 7.5-8 µ in diameter; cell wall punctate; chloroplast axile, with a central pyrenoid.

Cosmarium repandum Nordstedt

Cells longer than broad, deeply constricted, sinus linear; semicells transversely rectangular in the lower part, pyramidate in the upper part, sides divergent, straight, apices truncated, side view subcircular, vertical view elliptic; cells 16-22µ in diameter, 18-23.2µ long; isthmus 5-6µ broad; cell wall smooth; chloroplast axile, with a pyrenoid in each semicell.

Cosmarium repandum Nordstedt v. minus (West et West)

Cells longer than broad, about 1½ times as long, as broad, deeply constricted, sinus narrow, linear; semicells transversely rectangular in the lower part, pyramidate in the upper part, sides divergent, straight, apices truncated, side view circular, vertical view elliptic; cells 10-12 µ in diameter, 15-17.2µ long, isthmus 2.8-3µ in diameter; cell wall smooth; chloroplast axile, with a pyrenoid in each semicell.

Cosmarium schmidtianum Forster

Cells small, longer than broad, moderately constricted, sinus open, obtuse; semicells cylindrical with rounded angles, apices retuse, side view of semicells elliptic, vertical view circular; cells 7-7.5 µ in diameter, 20-21.8 µ long, isthmus 5-6.2 µ in diameter; cell wall smooth; chloroplast axile, with a pyrenoid in each semicell.

Cosmarium sexangulare Lundell

Cells longer than broad, ¼- ½ times as long as broad, deeply constricted, sinus linear, narrow, not dilated at the apex, outer extremity open; semicells transversely elliptic-hexagonal, angles rounded, lateral margins very slightly convex, apices narrowly truncate, retuse, side view of semicells subcircular, vertical view elliptic; cells 18-21µ broad, 25-27.5µ

long, isthmus 5-6.5µ broad; cell wall smooth; chloroplast axile.

Cosmarium subimpressulum Borge

Cells small, longer than broad, deeply constricted, sinus linear, narrow; semicells transversely rectangular in lower part, pyramidate – truncate above, with 4 crenulations on each side, vertical view elliptic, with broad inflations on each side, lateral view of semicells ovate, apices truncate, tumid in the middle portion on both the sides; cells 17.2-18.5 µ in diameter, 24.8-26.5 µ long, isthmus 5-6.8 µ in diameter; cell wall smooth; chloroplast one, with a central pyrenoid.

Cosmarium sublatereundatum West et West

Cells nearly as long as broad, deeply constricted, sinus linear, not dilated at the apex, outer extremity open; semicells pyramidate truncate, side view of semicells circular, vertical view elliptic, with wavy ends and undulating transverse lines; cells 25.8-27.2 µ in diameter, 28-30.2 µ long, isthmus 12-12.5 µ in diameter; cell wall smooth; chloroplast one, with a central pyrenoid.

Cosmarium submamillatum West et West

Cells medium sized, about 1¼ times as long as broad, deeply constricted, sinus closed, dilated at the apex; semicells trapezoid, basal angles broadly rounded, apical angles hemispherical, apices and sides concave, vertical view elliptic; cells 22.5-25 µ in diameter, 28-29.5 µ long, isthmus 5-6.8 µ in diameter; cell wall smooth.

Cosmarium tetragonum (Naegeli) Archner

Cells small, longer than broad, upto twice as long as broad, deeply constricted, sinus linear, dilated at the apex; semicells quadrate elliptic, vertical view elliptic; sides with 3 undulations, apices truncate; cells 12.5-13 µ in diameter, 23-24.8 µ long, isthmus 5-5.5 µ in diameter; cell wall smooth; chloroplast axile, with a pyrenoid.

Cosmarium undulatum Corda ex Ralfs

Cells medium sized, about 1½ times as long as broad, deeply constricted, sinus linear, narrow; semicells truncate-subpyramidate, with 8-10 undulations on each side of the semicells, lateral view of semicells subcircular to ovate, vertical view

elliptic; cells 16-17.5 μ in diameter, 22.5-24.8 μ long, isthmus 5-5.2 μ in diameter; cell wall smooth; chloroplasts two, parietal, each with a pyrenoid.

Cosmarium undulatum Corda ex Ralfs v. *minutum* Wittrock

Cells small, slightly longer than broad, moderately constricted, sinus linear, narrow; semicells truncate-subpyramidate, to angular subtrapezoid with 6-8 undulations on each side of the semicells, apices truncate, with undulations, lateral view of semicells subcircular to ovate, with tumid in the middle of each semicell, vertical view elliptic; cells 12.5-13.2 μ in diameter, 15-16.2 μ long, isthmus 3.8-4.2 μ in diameter; cell wall smooth; chloroplasts two, parietal, each with a pyrenoid.

Cosmarium variolatum Lund.

Cells longer than broad, upto twice as long as broad, deeply constricted, sinus narrow, linear, not dialated at apex; semicells triangular to pyramidate, angles convex, apices rounded, side view of semicells elliptic-ovate, vertical view elliptic; cells 14.5-15.2 μ in diameter, 26.8-28.2 μ long, isthmus 4.5 μ in diameter; cell wall punctate; chloroplast with a central pyrenoid.

Cosmarium variolatum Lund. v. *rotundatum* (Krieger) Messik

Cells longer than broad, about 1½ times as long as broad, deeply condtricted, sinus narrowly linear, slightly dialated at apex; semicell triangular to subpyramidate, angles rounded, apices rounded, side view of semicells subcircular, vertical view elliptic; cells 17.5-18.8 μ in diameter, 28.2-29.8 μ long, isthmus 4.8-5.2 μ in diameter; cell wall punctate; chloroplast with a central pyrenoid.

Cosmarium venustum (Brebisson) Archner

Cells large, longer than broad, deeply constricted, sinus linear, dialated at apex; semicells truncate – pyramidate, with 3 undulations on each side, apices retuse, side view of semicells elliptic, vertical view elliptic; cells 30-32.2 μ in diameter, 35-37.5 μ long, isthmus 8.5-9.2 μ in diameter; cell wall smooth; chloroplast with 2 pyrenoids in each semicell.

Cosmarium venustum (Brebisson) Archner v. *americanum*

Cells small, longer than broad, about 1½ times as long as broad, deeply constricted, sinus narrow, linear, dialated at the apex; semicells truncate-pyramidate, with 6 undulations, apices retuse, side view of semicells elliptic with tumids, vertical view elliptic with tumids; cells 15.8-16.2 μ diameter, 25-26.2 μ long, isthmus 6-6.5 μ in diameter; cell wall smooth; Chloroplast with a pyrenoid in each semicell.

Cosmarium venustum (Brebisson) Archner v. *basichondrum* (Nordstedt)

Cells small, longer than broad, about 1½ times as long as broad, deeply constricted, sinus narrowly linear; semicells truncate-pyramidate, with 6 undulations, apices retuse, side view of semicells elliptic, vertical view elliptic; cells 14.5-15 μ in diameter, 22-22.5 μ long, isthmus 5-5.2 μ in diameter; cell wall smooth; chloroplast with a pyrenoid in each semicell.

REFERENCES

- [1] Anand, V.K. A check list of planktonic algae from Mansar lake, Jammu. *Phykos* 14(1 & 2)pp.77-79,1975.
- [2] Andhale S.B. Studies on the flora of Jayakwadi Bird Sanctuary. Ph.D. Thesis, Dr. B.A.M.U. Aurangabad,2008.
- [3] Ashtekar, P.V. and Kamat, N.D. Addition to the desmids flora of Marathwada, Maharashtra. *Phykos* 18,pp.45-50,1979a.
- [4] Aykulu, G., A quantitative study of the phytoplankton of the river Avon Bristol Br. *Phykal J.* 13:1 -102,1978.
- [5] Barhate, V.P. and J.L. Tarar .The algal flora of Tapi river, Bhusawal Maharashtra, *Phykos*, 20,pp.75-78,1981.
- [6] Bharti, S.G. A systematic survey of the desmids of the Bombay-Karnataka Part-I. *J. Karnataka Univ. Sci.* 9,pp.2-8,1965.
- [7] Claus, G. and Reimer, C.W. A Quantitative and Qualitative study of the phytoplankton of the Danube River at Vienna. *Revista De Biologia* 2(3-4),pp.261-275,1961.
- [8] Collins, F.S. Green algae of North America. G.E. Strechert and Co. New York,1928.

- [9] Croasdale, H. Freshwater algae of Alaska I. Some Desmids from the interior. 4(4), pp.513-565, 1955.
- [10] Das, S.K., Samad, L.K., Ramanujam. P. and Adikari, S.P. Freshwater algae of Meghalaya. J. Indian Bot. Soc. Vol. 88 (142), pp. 102-188, 2009.
- [11] Dawning, R.C. Shoreline algae of western lake Erie. The Ohio Journal of science 70 (5), pp.257-276, 1970.
- [12] Dixit, S.C. The Chlorophyceae of the Bombay Presidency, India-I. Ibid. 5(1), pp.16-25, 1937.
- [13] Forest, H.S. Handbook of Algae. The University of Tennessee Press, Knoxville. 1954
- [14] Freitas, J. F. and Kamat. Desmids of Nagpur, Phykos, 18, pp. 97-103, 1979.
- [15] Fritsch, F. E. Observations of phytoplanktons of the river Tames, Ann. Bot. 17, pp.631-647, 1903.
- [16] Hegde G.R. and Bharati, S.G. Freshwater algae of Bijapur district, Karnataka state, India. Phykos. 22, pp.167-170, 1983.
- [17] Hisano, M. and Minoru H. Some new or noteworthy desmids from Japan, II. Acta Phytotax. Geobot. 14 (2), pp.34-38, 1950.
- [18] Hisano, Y. and Minoru, H. Plankton desmids from lake Biwa, Japan. Acta Phytotax. Geobot. 15(2), pp.56-60, 1953.
- [19] Iqbal, Habib. Some desmids of Jaipur, Rajasthan. Res. Bull. of the Punjab Univ. Sci. 43(1-4), pp.61-64, 1993.
- [20] Iqbal, Habib. Desmids of Shimla, Himachal Pradesh. Acta Bot. Indica. 24(1), pp.119, 1996.
- [21] Islam N. and Haroon, Y. Desmids of Bangladesh. Int. revue. ges. Hydrobiology. 65 (4), pp.551-604, 1980.
- [22] Jadhav Milind, Amrapali Bhagat and Savita Salve. Algal Biodiversity of Salim Ali lake of Aurangabad Maharashtra, Abstract, Nat. Conf. of modern trends in Plant Sci Dr. B.A.M.U. Aurangabad, pp.66., 2007.
- [23] Kamat, N.D. Desmids of Marathwada, Maharashtra. Ibid. 72, pp.616-618, 1975a.
- [24] Nasar, S.A.K. and J.D. Munshi. On the algal flora of some ponds of Bhagalpur, India. Phykos 15(1 & 2), pp.49-52, 1976.
- [25] Pandey, U.C. and Pandey D.C. Addition to the algal flora of Allahabad-V Desmids. Phykos. 19 (2), pp.161-170, 1980.
- [26] Prescott G.W. Algae of the Western great lakes area. Granbrook Institute of Science, Michigan, 1951.
- [27] Saxena M.R. and Venkateshwarlu V. Desmids of A.P., I. from Pakhal lake, Warangal. Hydrobiologia. 28, pp.49-65, 1966a.
- [28] Saxena M.R. and Venkateshwarlu V. Desmids of Andhra Pradesh-III. J. Osmania Univ. 3, pp.41-60, 1966b.
- [29] Saxena M.R. and Venkateshwarlu V. Desmids of Andhra Pradesh-II. From Dharmasagar lake, Warangal. J. Indian bot. Soc. 47, pp.23-45+1 Plt, 1968a.
- [30] Scott, A.M. and Prescott, C.W. Indonesian desmids. Hydrobiologia 17, pp.1-132, Plts. 1-63, 1961.
- [31] Sophia, M. G. Desmids of phytohelmic environments. Rev. Brasileira de Biol. 59(1), pp.141-150, 1999.
- [32] Talekar Santosh and Jadhav Milind. Biodiversity of desmids in Manjara river in Maharashtra. The Ecotech 1(2), pp.104-105, 2009.
- [33] West, W. and West, G.S. A monograph of the British Desmidiaceae vols. I-IV. Ray Society, London, 1904, 1905, 1908, 1912).
- [34] Yadav S.G. and P.V. Ashtekar. A preliminary survey of Desmids from Bindusara Dam, Beed. Abstract Nat. Conf. on Modern trends in plants sciences, Dr. B.A.M.U. Aurangabad, pp.66, 2007.