

Contribution to Desmidiaceae Genus – *Closterium* Nitzs. from Jalgaon District, Maharashtra, India

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Abstract

During the systematic investigation of desmid flora of Jalgaon district, Maharashtra, author visited to different fresh water habitats of Jalgaon district and recorded 15 taxa of genus *Closterium* Nitzsch, of these *Closterium acutum*(Lyngh.)Breb.var. *linea* (Perty) West et West, *C. diana* Ehr. Var. *brevius* (Wittr.) Petkoff, *C. diana* Ehr. Var. *pseudodiana* (Roy) Krieg, *C. moniliferum* (Bory) Ehr. Var. *malinvernianiforme* (Gronble) Kossinskaja are reported first time from Maharashtra. *Closterium diana* Ehr.var. *diana* f. *diana* is newly added to Indian desmids while *C. archerianum* Cleve, *C.closterioides* (Ralfs.) Levis et Peetr var. *closterioides*, *C.cynthia* De Not.,*C. kuetzingii* Breb.,*C.lanceolatum* Kuetz., *C.leibleinii* Kuetz. Var. *recurvatum* W. et G. S. West, *C.lunula* (Muell.) Nitzsch, *C.rectimarginatum* Scott et Prescott, *C. setaceum* Ehr. Var. *minor* Kumawat and *C. tumidulum* Gay. are recorded from the study area. All the taxa are systematically described with illustrations.

Keywords: Desmidiaceae, *Closterium*, Jalgaon district, Maharashtra.

Introduction

Our knowledge of desmids in Maharashtra is known through the work of Dixit [1], Gonzalves and Joshi [2], Kamat [3-5], Ashtekar and Kamat [6], Freitas and Kamat [7], Pingle [8], Bodas [8], Kalantri and Gunale [9], Nandan [10], Tarar *et al.* [11], Pendse *et al.* [12], Kumawat [13], Divekar *et al.* [14], Jawale *et al.* [15], Kumawat *et al.* [16], Mahajan and Nandan [17,18], Dhande *et al.* [19].

The present communication includes total 15 taxa of genus *Closterium* Nitzsch which belongs to 07 species, 07 varieties and 01 forma. Of these 04 varieties have been reported new in Maharashtra and 01 forma is addition to Indian desmid population.

Methodology

The present research work was carried out during August, 2017 to July, 2019. Algal samples were collected fortnightly or monthly intervals from the various fresh water bodies of Jalgaon district through plankton net or by hand or scrapping from other objects in water between 7.30 to 9.00 am in plastic vials. Collected samples were tagged and labelled then preserved with 4% formalin solution on the spot. Morpho taxonomy was performed in the Research Laboratory, Department of Botany, S. V. P, Arts and Science College, Ainpur. Morphological details were studied by using Labomed make Trinocular Research Microscope (Labomed Lx 400). Camera lucida drawings were made with the help of mirror type of camera lucida from fresh as well as preserved material. The measurement of taxa was taken with the help of stage ocular micrometer. Identification of the taxa was based on standard literatures [20-23] and other relevant research publications. The collections have been deposited at Department of Botany, S. V. P. Arts and Science College, Ainpur bearing Accession numbers JD101 to 300. The numbers in the brackets at the end of description of each taxon, indicate the code numbers of algal samples.

Results and Discussions

Systematic Enumeration

Closterium acutum (Lyngb.)Breb.var. *linea*(Perty) West et West **Pl. 1, Fig.1** B. N. Prasad and P. K. Misra, [24], P. 100, Pl. 16, Fig. 2. Cell 10.4 µm broad, 124.2 µm long, straight, gradually attenuated to acute and faintly curved apices; chloroplast with 10 pyrenoids, arranged in a row.

Habitat: Road side ditches near Mothe Waghoda, August 2018, (JD204). This alga is a new record for Maharashtra.

Closterium archerianum Cleve

Pl. 1, Fig. 14 Jiří Růžička, [32, P. 198, Pl.5, Fig. 10.

Cells 24.2 µm broad, 205.8 µm long; relatively stouter and less curved in the middle; apices obtuse; apex flattened at the end, wall thickened at the sides.

Habitat: Road side ditches near Nimbhora Railway station, July 2018, (JD118).

Closterium closterioides (Ralfs.) Levis et Peetr s var. *closterioides* **Pl. 1, Fig. 2** Jiří Růžička, [32], P. Pl.2, Fig. 22. Cell 35.2 µm broad, 214.4 µm long; straight on both sides slight notch present in the centre, gradually tapering towards both ends, apices flatly obtuse; chloroplast lamellated, 5 pyrenoids in each semicell.

Habitat: Tapi river near Kandari, Bhusawal, October 2018, (JD128).

Closterium cynthia De Not.

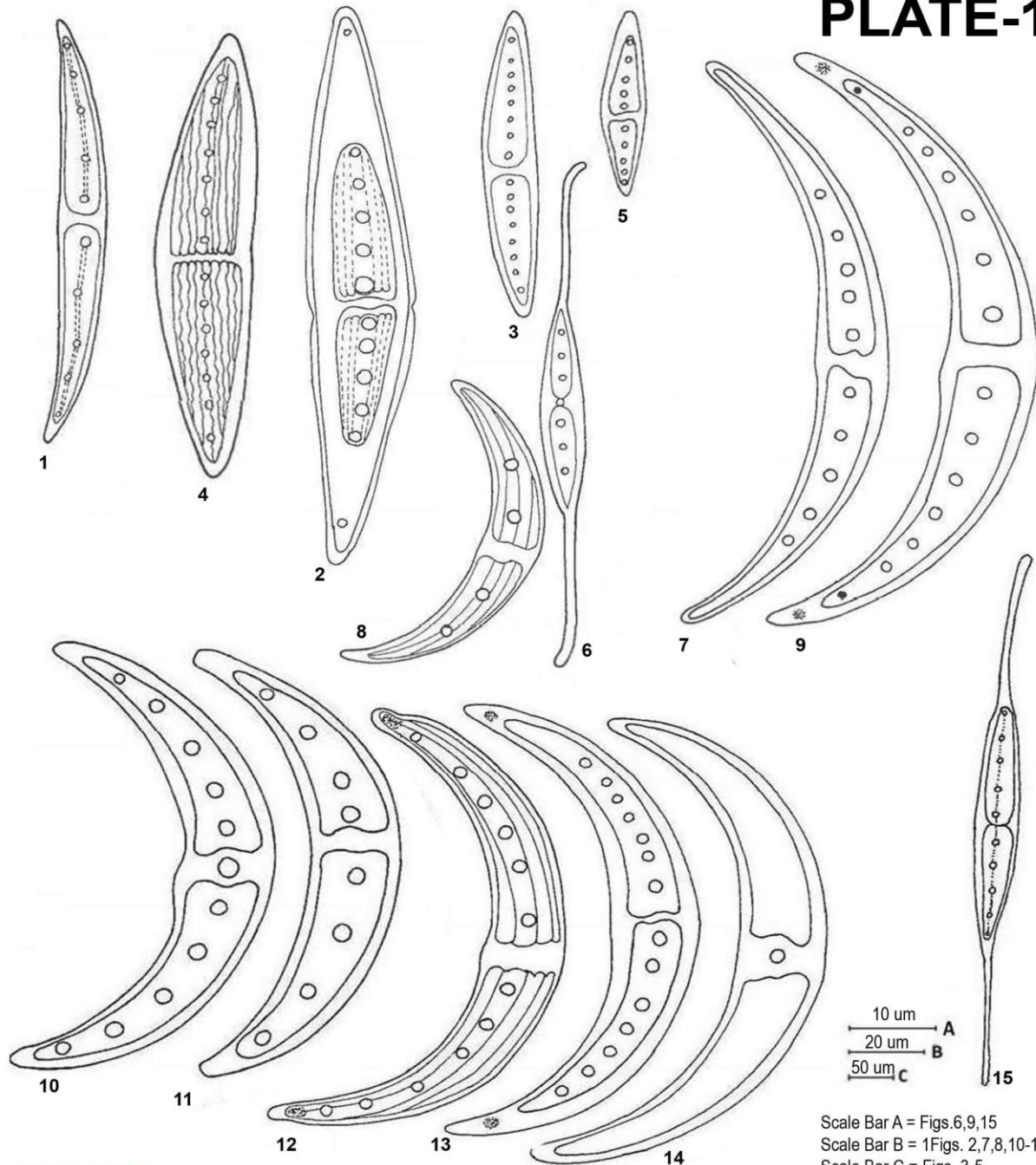
Pl. 1, Fig. 10 Waqar-ul-Haq, A. Zarina, Masud-ul-Hasan and Mustafa Shameel, [25], P. 59, Fig. 4. Cell lunate, tapering to sharp poles; wall with longitudinal striae; pyrenoids 5-6 in each semi-cell; curvature with 135-165 of arc.

Habitat: Road side ditches near Tandalwadi village, July 2018, (JD116).

*Closterium diana*e Ehr.var. *brevius* (Wittr.) Petkoff **Pl. 1, Fig. 11** O. O. Parra and M. Gonzalez, [26], P. 17, Figs. 33-34; R. J. Patel and C. K. Asoka Kumar, [27], P. 114, Pl.1, Fig.9. Cells 21.6 µm broad, 124.4 µm long; strongly curved towards the apices, inner side concave, apex broadly acute; chloroplast lamellated with 4 - 6 pyrenoids.

Habitat: Tapi river near Kandari, Bhusawal October, 2018, (JD128). This alga is a new record for Maharashtra

PLATE-1



Figures 1-15 :-

1. *Closterium acutum* (Lyngb.) Breb. var. *linea* (Perty) West et West, 2. *C. closterioides* (Ralfs.) Levis et Peetrus var. *closterioides*, 3. *C. rectimarginatum* Scott et Prescott, 4. *C. lunula* (Muell.) Nitzsch 5. *C. lanceolatum* Kuetz., 6. *C. setaceum* Ehr. var. *minor* Kumawat, 7. *C. diana* Ehr. var. *pseudodiana* (Roy) Krieg, 8. *C. tumidulum* Gay., 9. *C. moniliferum* (Bory) Ehr. var. *malinvernianiforme* (Gronble) Kossinskaja, 10. *C. cynthia* De Not., 11. *C. diana* Ehr. var. *brevius* (Wittr.) Petkoff, 12. *C. leibleinii* Kuetz. var. *recurvatum* W. et G. S. West, 13. *C. diana* Ehr. var. *diana* f. *diana*, 14. *C. archerianum* Cleve, 15. *C. kuetzingii* Breb.

Scale Bar A = Figs.6,9,15
 Scale Bar B = 1Figs. 2,7,8,10-14
 Scale Bar C = Figs. 3-5

Closterium diana Ehr.var.*diana* f. *diana*

Pl. 1, Fig. 13 Jiří Růžička, [32], P. 200, Pl.5, Figs. 3-4. Cell 24.5 µm broad, 200.6 µm long; outer margin strongly curved with 112-125 degrees of arc, inner slightly tumid, cell gradually attenuated to acute or sub-acute apices; cell wall smooth; chloroplast with 6-8 pyrenoids in a row.

Habitat: Road side ditches near Nimbhora Railway station, July 2018, (JD118). This form is being reported for the first time from India.

Closterium diana Ehr.var.*pseudodiana* (Roy) Krieg

Pl.1, Fig.7R. Groenblad, A. M. Scott and H. Croasdale, [28] P. 9, Fig. 17. Cell 17.1 µm broad, 231.5 µm long; slightly curved, little inflated in the middle towards the inner side; pyrenoids 10 in the chloroplast in a linear series; apices acutely rounded.

Habitat: Mangrul dam, Raver, November 2018, (JD182). This alga is a new record for Maharashtra.

Closterium kuetzingii Breb.

Pl. 1, Fig. 15 B. N. Prasad and P. K. Misra, [24], PP. 107-108, Pl.16, Figs. 21-22. Cell 4.5µm broad, 73.6 µm long; almost straight, median part fusiform, lanceolate with convex margins, cells tapering towards both extremity and ending in long setaceous processes with parallel sides and rounded apices; cell-wall longitudinally striated; chloroplast with 4-5 pyrenoids, arranged in a row.

Habitat: Tapi river near Kandari Bhusawal , October 2018 , (JD128).

Closterium lanceolatum Kuetz.

Pl. 1, Fig. 5U. C. Pandey, I. Habib, F. C. Gangwar and H. M. Shukla, [29], P. 91. Cell 42.3 µm broad, 219.5 µm long; lanceolate, dorsal side concave in the centre while ventral side slightly curved, uniformly narrowed towards the apices; apices rounded; chloroplast with 5 pyrenoids, in a row in each semicell.

Habitat: Road side ditches near Garbardi village Raver, January 2019, (JD144).

Closterium leibleinii Kuetz.var. *recurvatum* W. et G. S.

West **Pl. 1, Fig. 12** R. J. Patel and C. K. Asoka Kumar, [27]. P. 117, Pl.1, Fig. 11; B. N. Prasad and P. K. Misra, [24], P. 109, Pl. 17, Figs. 3,8. Cell 22.7 µm broad, 206.3 µm long; strongly curved, outer margin with 115-120 degrees of arc, inner margin deeply concave with inflated middle part, cells having slightly recurved apices; chloroplast with 4 ridges and 6 pyrenoids arranged in a row in each semicell.

Habitat: Road side ditches near Tandalwadi village, July 2018, (JD116).

Closterium lunula (Muell.) Nitzsch

Pl. 1, Fig. 4 G. S. Prescott, 1966, P. 6, Pl.2, Figs. 9, 10; Jiří Růžička, [32], P. 201, Pl.3, Fig.13. Cells 88.1–102 µm in diameter 494.8–607.8 µm long; large, almost straight, broad abruptly but slightly attenuated near the poles which are truncately rounded; chloroplast with 4-5 ridges and containing 6 pyrenoids in a row in each semicells.

Habitat: Mangrul dam, Raver, September 2017, (JD101).

Closterium moniliferum (Bory)

Ehr.var.*malinvernianiforme* (Gronble) Kossinskaja

Pl. 1, Fig. 9R. J. Patel and C. K. A. Kumar, [27], P. 117, Pl.2, Fig.2.Cell 11.1 µm broad, 112.1 µm long, moderately curved, inner margin distinctly inflated in the middle, uniformly narrowed to the apices; apices obtusely rounded; cell wall smooth; chloroplast lamellate with 4-8 pyrenoids arranged in row in each semicell.

Habitat: Aner river near Galangi Chopda, July 2018, (JD132). This alga is a new record for Maharashtra.

Closterium rectimarginatum Scott et Prescott [31,32]

Pl. 1, Fig. 3R. J. Patel and C. K. A. Kumar, [27], P. 119, Pl.2, Fig.7.Cell 65.2 µm broad, 433.6 µm long, straight, lanceolate, lateral margins slightly convex, gradually attenuated to the apices; apices truncate with rounded angles; chloroplast with about 3-4 ridges and 8 pyrenoids in a row in each semi cell.

Habitat: Aner river near Galangi Chopda, July 2018,(JD132).

Closterium setaceum Ehr.var.*minor* Kumawat

Pl., Fig. 6D. A. Kumawat, [13], P. 61, Pl.11, Fig. 9. Cell 4.5 µm broad, 73.5 µm long, fusiform, lanceolate, almost straight, median portion narrow, both margins equally convex extremities prolonged into slender, setaceous, colourless processes which are slightly incurved; apices obtuse; apical vacuoles with the base of the apical processes with few moving granules: chloroplast lamellate with 3 pyrenoids.

Habitat: Road side ditches near Mothe Waghode Raver, August 2018, (JD204).

Closterium tumidulum Gay.

Pl. 1, Fig. 8 Jiří Růžička, [32], P. 202, Pl.2, Figs. 20-21. Cells 16.5 µm broad, 131.6 µm long; apex 3.6 µm wide, slightly to moderately curved, very slightly tumid in the median portion, gradually attenuated towards the apices, apices acutely rounded; cell wall smooth; chloroplast lamellate with axially arranged 2-6 pyrenoids.

Habitat: Tapi river near Nimgvhan Chopda, November 2018,(JD129).

Conclusion

During the present investigation author recorded 15 of the genus *Closterium* Nitzsch belonging to 07 species, 07 varieties and 01 forma. Of these 04 varieties viz. *Closterium acutum* (Lyngb.) Breb.var. *linea* (Perty) West et West, *C.dianae* Ehr. var. *brevius* (Wittr.) Petkoff, *C.dianae* Ehr.var. *pseudodiana* (Roy) Krieg, *C. moniliferum* (Bory) Ehr. var. *malinoernianiforme* (Gronble) Kossinskaja are reported first time from Maharashtra and 01 forma *Closterium dianae* Ehr.var. *dianae* f. *dianae* is newly added to Indian desmid flora. The investigation on the algal diversity of this dam has never done before. The genus *Closterium* Nitzsch have been found dominant during rainy season.

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