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Remarking
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Contribution to Desmidiaceae (Genus–*Closterium* Nitzsch.) From Hartala Lake, Maharashtra

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Abstract

During extensive study on algae from Hartala lake, district Jalgaon,Maharashtra (21^0 00' 20.56" north latitude and 76^0 01' 31.31" east longitude) the authors collected 82 taxa of desmids.Present communication deals with 23 taxa of genus *Closterium* Nitzsch. Of these *Closterium archerianum* Cleve, *C. dianae* Ehrbg. var. *brevius* Wittr.Petkoff, *C. dianae* Ehrbg. var. *pseudodianae* Roy Krieg., *C. dianae* Ehrbg. var. *pseudoleiblenii* Foerster, *C. moniliferum* (Bory) Ehrenbg. var. *concavum* Klebs, *C. striolatum* Ehrenb., *C. venus* Kuetz. *ex* Kuetz. var. *venus, C. wallichii* Turner are reported first time from Maharashtra. *Closterium closterioides* (Ralfs) Lvis *et* Peetrs var. *closterioides, C. dianae* Ehrbg. var. *dianae* f. *intermadium* Kosinsk., *C. jenneri* Ralfs var. *jenneri, C. leibleinii* Kuetz. *ex* Ralfs var. *leibleinii, C. moniliferum*(Bory) Ehrenb. var. *moniliferum, C. venus* Kuetz. *ex* Kuetz. var. *westii* W. Krieg are addition to Indian flora while *Closterium acerosum* (Schr.)Ehr.var. *inflata* var. nov. is new to science.

Keywords: Desmidiaceae, Closterium, Hartala.

Introduction

Desmids of Maharashtra are known the through work of Dixit (1937), Gonzalves and Joshi (1943), Kamat (1963,1968,1974), Ashtekar and Kamat (1978), Freitas and Kamat (1978), Pingle (1988), Bodas (1991), Kalantri and Gunale (1992), Nandan (1993), Pendse *et al* (2000), Kumawat (2002), Divekar *et al* (2005), Nandan and Jain (2005),Zaware and Pingle (2005), Mahajan and Nandan (2007,2008), Kumawat *et al* (2007), Vanjari and Kumawat (2007) and Sanap *et al* (2008).

Present communication includes total 23 taxa of genus *Closterium* Nitzsch which belongs to 11 species, 1 variety and 01 forma. Of these 03 species, 05 varieties are reported for the first time from Maharashtra, 05 varieties and 01 forma are recorded for the first time from India while 01 variety is new to science.

Aim of Study

The main aim of study is to explore the genus from study area.

Materiales and Methodes

The algal samples were collected early in the morning between 7.00 to 9.00 am during 2004-2006 from Hartala lake (M.S.). All the collected samples observed fresh as far as possible. Later on preserved in 4 % formaline for further studies. Camera lucida drawings were made with the help of mirror type of Camera Lucida. The identification of taxa is based on relevant research papers. The material is deposited in the Department of Botany, Dhanaji Nana Mahavidyalaya, Faizpur, district Jalgaon, (M.S.).

Systematic Account

Family -Desmidiaceae

Genus - ***Closterium*** Nitzsch, 1817

Closterium acerosum (Schr.) Ehr. var. ***inflata*** var**.** nov**.**

Pl. 1, Fig. 1

Cells straight, fusiform, outer margin almost straight or slightly curved, inner margin almost straight; semicells gradually tapering towards the apices; apices broadly rounded; cell wall yellowish to colourless; chloroplast with 8-10 pyrenoids; both margins inflated in the center; cells 290.6-292.3 μm long, 50.0-52.2 μm broad, apex 11.5 μm wide. (Coll. Nos.302, 305, 335).

Cellulae recta, fusiformes, exterius margines fere recti vel parum curvata, margines interior feri recti; semicellulae gradatim ad apicem attenuata; apices fere circulares; paries cellulae flavido ac incoloratus; chloroplastus cum 8-10 pyrenoidibus; margines inflata a centro; cellulae 290.6-292.3 μm longa, 50.0-52.2 μm lata ad apicem.

Holotype:205

Present taxon agrees with *Cl.acerosum* (Schr.) Ehr. in all respect but it is inflated in the centre of the cell, therefore it is considered as a new variety.

***Closterium archerianum* Cleve**

Pl. 1, Fig. 2

M.R. Suxena and V.Venkateswarlu, *Jour. Osmania Univ. (Sci.) Golden Jubilee sp. Vol.*, p.180, Pl. 2, Figs. 14a,b, 1968.

Cells relatively stouter and less curved in the middle; apices more obtuse; wall with more striae, brownish, apex which is flattened at the end with the wall thickened at the sides; cell 226.8 μm long, 17.7 μm broad, apex 3.8 μm. (Coll. No. 300).

***Closterium calosporum* Wittr.**

Pl. 1, Fig. 3

M.R. Suxena and V. Venkateswarlu, *J. Indian bot. Soc.*, **42**(1&2): 23, Fig. 1, 1968.

Cells 77.7 μm long, 8.5 μm broad, 8-9 times longer than broad; outer margin strongly curved with 120-126 degrees of arc, inner margin parallel to outer near apices and some what straight in the middle; cell gradually attenuated to sub-acute at apices; cell wall smooth, chloroplast lamellate, 6 pyrenoids in a linear series. (Coll. No. 231).

Closterium closterioides* (Ralfs) Lvis *et* Peetrs var. *closterioides

Pl. 1, Fig. 4

J. Růžička, Preslia *Praha,* **45** (2): Pl. 2, Fig. 22, 1973.

Cells straight, on both sides slight notch present in the centre, gradually tapering towards both ends, apices flatly obtuse; chloroplast lamellate, 4 pyrenoids in each semicell; cells 237.6 μm long, 38.5 μm broad, apex 9.2 μm wide. (Coll. No. 302).

***Closterium dianae* Ehrbg.**

Pl. 1, Fig. 5

T. Hinode, *HIKOBIA,* **4**(1&2): 73, Pl. 1, Figs. 27,28, 1964.

Cells 200-250 μm long, 25.0-28.1 μm broad, cells slightly to moderately curved, concave to slightly tumid in middle part, gradually attenuated towards the apices; apices obtusely rounded with the dorsal margin, obliquely truncate and thickened; cell wall smooth; chloroplast lamellate with single row of 4-8 pyrenoids. (Coll. No. 295).

***Closterium dianae* Ehrbg. var. *brevius* Wittr.Petkoff**

Pl. 1, Fig. 6

O.O. Parra and M. Gonzalez, *Gayana Botanica,* **34:** 17, Figs. 33-34, 1977.

Cells strongly curved towards the apices, inner side concave tumid at the centre, apex broadly acute; chloroplast lamellate, 8-10 pyrenoids; wall smooth, yellowish; cells 131.5-138.4 μm long, 16.1-17.7 μm broad. (Coll. Nos. 173, 292, 295, 306).

***Closterium dianae* Ehrbg. var. *dianae* f. *intermadium* Kosinsk.**

Pl. 1, Fig. 7

J. Růžička, *Preslia Praha*, **45** (2): 200, Pl. 5, Fig. 5, 1973.

Cells curved, inner side straight in middle while greatly curved at apices; apices broadly rounded; cell wall smooth; chloroplast contains 6-8 pyrenoids in a linear series; apical vacuoles with many moving granules; cells 138.4-146.1 μm long, 19.2-20 μm broad. (Coll. No. 306).

***Closterium dianae* Ehrbg. var. *pseudodianae* Roy Krieg.**

Pl. 1, Fig. 8

G.H. Tomaszewiez, *Monographiae Botanicae,* **70:** 21, Pl. 3, Figs. 11, 1988.

Cells slightly curved, little inflated in the middle towards the inner side; 10 pyrenoids in the chloroplast in a linear series; apices acutely rounded; cells 232.2 μm long, 16.9 μm broad.
(Coll. No. 306).

***Closterium dianae* Ehrbg. var. *pseudoleiblenii* Foerster**

Pl. 1, Fig. 9

M.R. Suxena and V. Venkateswarlu, *Jour. Osmania Univ. (Sci.)*, **3**(1&2): 42, Pl.1, Figs. 5a,b, 1966.

Cells curved inner side slightly inflated in the middle; wall smooth; apices moderately curved, bluntly pointed; chloroplast lamellate, 12-16 pyrenoids arranged in linear row; apical vacuole present; cell 217.6-219.2 μm long, 32.3 μm broad. (Coll. No. 314).

Closterium jenneri* Ralfs var. *jenneri

Pl. 1, Fig. 10

G.H. Tomaszewicz, *Monographiae Botanicae,* **70:** 22, Pl.6, Fig.1, 1988.

Cells some what flat in the center while slightly or moderately curved at the apices, inner side straight at mid region; cell wall smooth; chloroplast lamellate, 3 pyrenoids in each semicell, apical vacuoles with moving granules; cells 110.7-112.8 μm long, 17.7 μm broad. (Coll. No.271).

***Closterium lanceolatum* Kuetz.**

Pl. 2, Fig. 1

G.W. Prescott, *Phykos,* **5**(1&2): 5, Pl. 1, Figs.9, 10, 1966.

Cells lanceolate, dorsal side concave in the center while ventral side slightly curved, uniformly narrowed towards the apices; apex rounded, wall smooth, colourless; chloroplast with 5 pyrenoids in a single series in each semicell; cells 205.5-242.2 μm long, 40.7-41.5 μm broad, apices 7.7-9.2 μm wide. (Coll. Nos. 302, 320).

Closterium leibleinii* Kuetz. *Ex* Ralfs var. *leibleinii

Pl. 2, Fig. 2

G.H. Tomaszewiez, *Monographiae Botanicae,* **70:** 22, Pl. 3, Figs. 13-14, 1988.

Cells curved, highly inflated in the center, gradually narrowed from median part towards apices; apices bluntly acute, wall smooth, colourless; 4 pyrenoids in linear row; at the apex with revolving granules vacuole is present; cells 109-146.8 μm long, 14.9-22.3 μm broad.
(Coll. Nos. 271, 306).

***Closterium moniliferum* (Bory) Ehrebg.**

Pl. 2, Fig. 3

S.G. Bharati, *J. Karnataka Univ. Sci.*, **9:**4, 1965.

Cells 175.5-187.5 μm long, 27.7-28.2 μm broad, cells moderately curved, inner margin distinctly inflated in the middle, uniformly narrowed towards the apices; apices obtusely rounded; cell wall smooth and colourless; chloroplast lamellate

with a single series of 6-8 pyrenoids, apical vacuoles with many moving granules. (Coll. Nos. 202, 252).

Closterium moniliferum (Bory) Ehrenbg. var. ***concavum*** Klebs

Pl. 2, Fig.4

G.W. Prescott, *Phykos,* **5**(1&2): 7, Pl. 2, Figs. 2,3, 1966.

Cells large, slightly convex, slightly or moderately curved tumid in the center, ventral margin slightly straight in the mid region; wall smooth, colourless; cells 299.1 μm long, 46.9 μm broad, poles 6.2 μm wide. (Coll. No. 320).

Closterium moniliferum **(**Bory) Ehrenb. var**.** ***moniliferum***

Pl. 2, Fig. 6

J. Růžička, *Preslia Praha,* **45** (2): 201, Pl.4, Figs. 1-2, 1973.

Cells curved towards the apex, inner margin plane, gradually attenuated towards the apices; apex obtuse; cell wall smooth, colourless; chloroplast striated with 4-5 pyrenoids in each semicell; cell 198.4 μm long, 29.2 μm broad, apex 4.6 μm wide. (Coll. No. 314).

Closterium parvulum Naeg**.**

Pl. 2, Fig. 5

G.W. Prescott, *Los Angeles Country Museum* **7**(11): 11, Pl.3, Fig. 25, 1957.

Cells 102.3-138.4 μm long, 15.4-21.5 μm broad, cells moderately to strongly curved, inner margin concave, gradually attenuated to the apices; acutely rounded to bluntly pointed apices; cell wall smooth colourless; chloroplast lamellate with single series of 2-6 pyrenoids; apical vacuoles with several moving granules. (Coll. Nos.180, 202, 245).

Closterium striolatum Ehrenb.

Pl. 2, Fig. 7

R.J. Patel and C.K. Asoka Kumar, *Phykos,* **18**(1&2): 119, 1978.

Cells straight both margins are convex, outer margin more convex than the inner, outer margin regularly attenuated towards apex; apices obtusely rounded; cell wall smooth brownish striated, striae linear; chloroplast with 12 pyrenoids in a linear series; cells 209-215 μm long, 40-40.7 μm broad, apex 5.4 μm wide. (Coll. Nos.300, 302).

Closterium tumidulum Gay**.**

Pl. 2, Fig.8

M.R. Suxena and V.Venkateswarlu, *J. Indian bot. Soc*., **42** (1&2): 26, Fig. 12, 1968.

Cells slightly to moderately curved, very slightly tumid in the median portion, gradually attenuated towards the apices, apices acutely rounded; cell wall smooth, colourless; chloroplast lamellate with axially arranged 2-6 pyrenoids; cells 100-123 μm long, 16.1-18.5 μm broad, apex 3-3.5 μm wide. (Coll. Nos. 271, 306).

Closterium tumidum Johns**.**

Pl. 2, Fig.9

M.R. Suxena and V.Venkateswarlu, *J. Indian bot. Soc*., **42** (1&2): 26, Fig. 12, 1968.

Cell about 8 times longer than broad, outer margins slightly curved or straight, cell gradually attenuated towards truncately rounded apices; cell wall smooth; chloroplast with 6-8 ridges and 5-6 pyrenoids, arranged in a row; cell 86.1 μm long, 10.8 μm broad, apex 4.6 μm wide. (Coll. No. 306).

Closterium venus Kuetz.

Pl. 2, Fig. 10

G.W. Prescott and W.C. Vinyard, *Trans. Amer. Micros. Soc.*, **84**(4): 467, Pl. 11, Fig. 12, 1965.

Cell 82.3 μm long, 10.0-11.5 μm broad, strongly curved, inner margin concave, gradually attenuated to the apices; apices acutely rounded; cell wall smooth, colourless to yellowish brown; chloroplast lamellate with 2-4 pyrenoids; pical vacuoles with several moving granules.
(Coll. Nos. 170, 320).

Closterium venus Kuetz**.** *Ex* Kuetz**.** var**.** ***venus***

Pl. 2, Fig. 11

G.H. Tomaszewiez, *Monographiae Botanicae,* **70:** 31, Pl.3, Fig. 12, 1988.

Cell strongly curved, inner margin concave, gradually attenuated to the apices; apices rounded; cell wall smooth; chloroplast lamellate, 6 pyrenoids, apical vacuoles with several moving granules, cell 87.7 μm long, 10.8 μm broad, apex 2.3 μm. wide. (Coll. No. 170).

Closterium venus Kuetz**.** *Ex* Kuetz**.** var**.** ***westii*** W. Krieg

Pl. 2, Fig. 12

J. Růžička, *Preslia Praha,* **45**(2): 203, Pl. 1, Fig. 20, 1973.

Cells sharply curved, attenuated towards the ends; apices broadly acute; chloroplast with 4 pyrenoids; apical granule single, cell wall smooth; cells 79.2-81.3 μm long, 10.8 μm broad, apex 1.5 μm wide. (Coll. No. 158).

Closterium wallichii Turner

Pl. 2, Fig. 13

G.W. Prescott, *Phykos,* **5**(1&2): 8, Pl. 2, Fig. 1, 1966.

Dorsal margin strongly curved than the ventral; wall colourless or faintly yellow, striated, apices acutely rounded; cells 225 μm long, 34.4 μm broad, poles 9.3 μm wide. (Coll. No. 183).

Conclusion

Present communication deals with the taxonomic description of total 23 taxa of genus *Closterium* Nitzsch. Recorded from fresh water lake. One veriety is new to science. It has been observed that *Closterium* Nitzsch. Is common throughout the year.

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Plate - 1

1. *Closterium* (Schr.) Ehr. *acerosum* var.*inflata* var. nov.
2. *Closterium archerianum* Cleve
3. *Closterium calosporum* Wittr.
4. *Closterium closterioides* (Ralfs) Lvis *et* Peetrs var. *closterioides*
5. *Closterium dianae* Ehrbg.
6. *Closterium dianae* Ehrbg. var. *brevius* Wittr. Petkoff
7. *Closterium dianae* Ehrbg. var. *dianae* f. *intermadium* Kosinsk.
8. *Closterium dianae* Ehrbg. var. *pseudodianae* Roy Krieg.
9. *Closterium dianae* Ehrbg. var. *pseudoleiblenii* Foerster
10. *Closterium jenneri* Ralfs var. *jenneri*

Scale bar A : 50 μm
Scale bar B : 25 μm
Scale A : Fig. 1,5
Scale B : Fig. 2,3,4,6,7,8,9,10

Plate -2

1. *Closterium lanceolatum* Kuetz.
2. *Closterium leibleinii* Kuetz. *ex* Ralfs var. *leibleinii*
3. *Closterium moniliferum* (Bory) Ehrenb.
4. *Closterium moniliferum* (Bory) Ehrenb. var. *concavum* Klebs
5. *Closterium parvulum* Naeg.
6. *Closterium moniliferum* (Bory) Ehrenb. var. *moniliferum*
7. *Closterium striolatum* Ehrenb.
8. *Closterium tumidulum* Gay.
9. *Closterium tumidum* Johns.
10. *Closterium venus* Kuetz.
11. *Closterium venus* Kuetz. *ex* Kuetz. var. *venus*
12. 12 *Closterium venus* Kuetz. *ex* Kuetz. var. *westii* W. Krieg

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13. *Closterium wallichii* Turner
Scale bar A : 50 μm
Scale bar B : 25 μm

Scale A : Fig. 3,13
Scale B : Fig. 1,2,4, 5,6,7,8,9,10,11,12

Plate -1

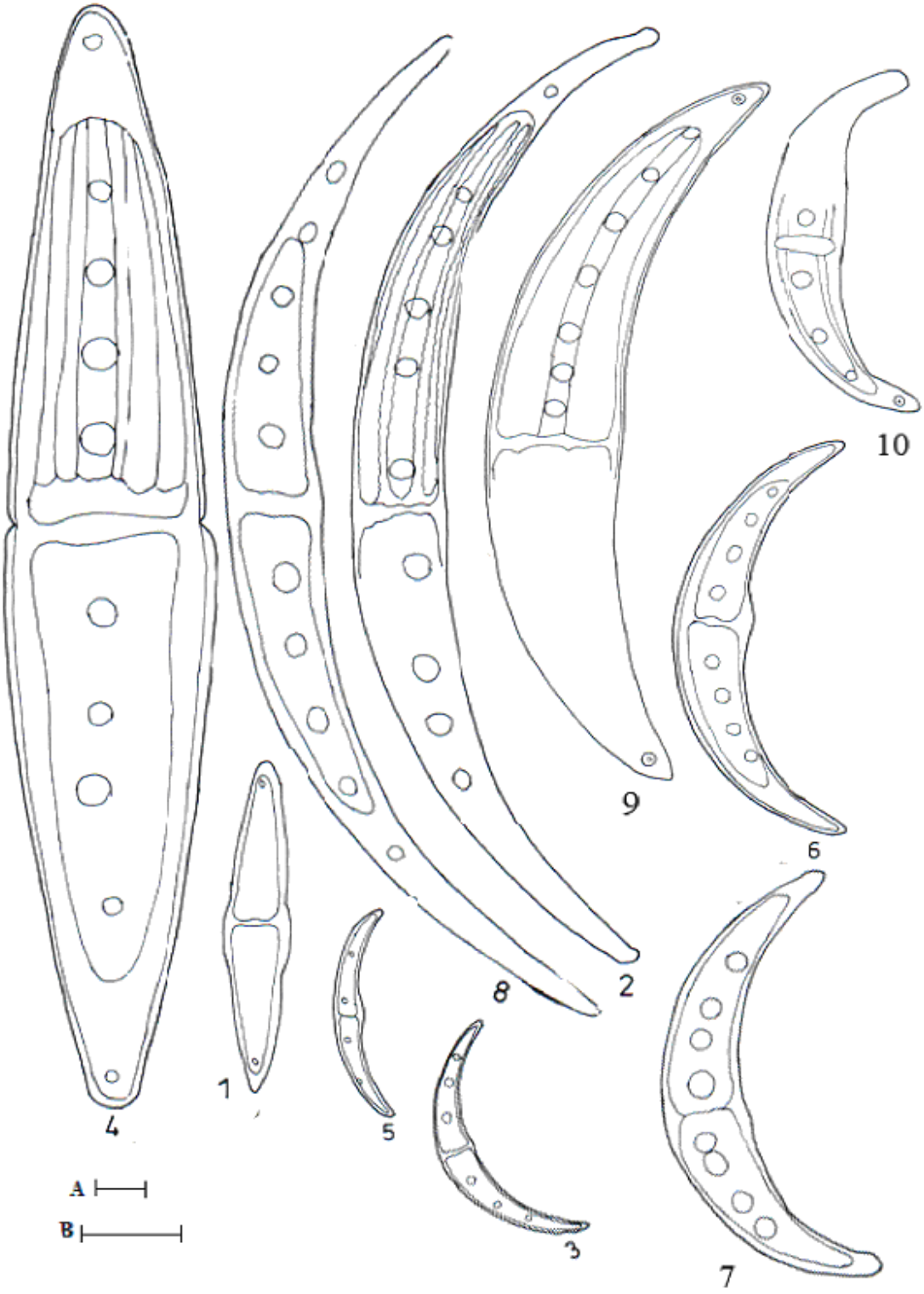

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Plate -2