DESMIDS FROM MANGRUL DAM, DIST. JALGAON, MAHARASHTRA

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ABSTRACT
The present paper deals with an account of 36 taxa of desmids, collected from Mangrul dam, (21°19’45” N and 72°2’15” E) district Jalgaon, Maharashtra. Of these 23 taxa are reported for the first time from Maharashtra, 10 are additions to Indian desmids and 3 taxa, Euastrum bombayense var. minor var. nov., Euastrum spinulosum var. major var. nov., and Cosmarium contractum var. ellipsoideum f. major f. nov., are new to science.

Keywords: Desmids, Mangrul Dam, Maharashtra, India

INTRODUCTION

MATERIALS AND METHODS
The algal collections were made during Nov. 2006 – Oct. 2008 from Mangrul dam (21°19’45” N and 72°2’15” E) in Jalgaon district of Maharashtra. Two sites (SI and SII) were selected for collection of algal samples. Collections were made between 7.30 to 9.00 a.m. at fortnightly or monthly intervals. Camera lucida drawings were made from fresh as well as materials preserved in 4% formalin. Identification of taxa was done with the help of monograph by Turner (1892), book by Prasad and Misra (1992) and relevant research publications.

Systematic Account

Closterium acutum (Lyngb.) Breb. var. linea (Perty) West et West
Prasad and Misra, (1987), P. 100, Pl. 16, Fig. 2.
Cell 10.3 μm broad, 124.5 μm long, straight, gradually attenuated to acute and faintly curved apices; cell wall smooth; chloroplast with 10 pyrenoids arranged in a row.


Closterium dianae Ehr. var. brevius (Wittr.) Petkoff
Parra and Gonzalez, (1977), P. 17, Figs. 33-34
Cell 21.8 μm broad, 124.5 μm long; strongly curved towards the apices, inner side concave, apex broadly acute; chloroplast lamellated, pyrenoids 4-6; wall smooth.

Habitat: Coll. Nos. 729, S-I (9/7/2008); 742, S-II (12/8/2008).

Closterium dianae Ehr. var. dianae f. dianae Ehr.
Růžička, (1973), P. 200, Pl.5, Figs. 3-4.
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Cell 24.5 μm broad, 200.8 μm long; medium sized, outer margin strongly curved with 112-125 degrees of arc, inner slightly tumid, cell gradually attenuated to acute or subacute apices; cell wall smooth; chloroplast with 6-8 pyrenoids arranged in a row.


*Closterium dianae* Ehr. var. *pseudodianae* (Roy) Krieg. 

Groenblad, Scott and Croasdale, (1968), P. 9, Fig. 17.

Cell 17.2 μm broad, 231.7 μm long; slightly curved, little inflated in the middle towards the inner side; apices acutely rounded; chloroplast with 10 pyrenoids arranged in a linear series.


*Closterium moniliferum* (Bory) Ehr. var. *malinvernianiforme* (Gronble) Kossinskaja

Patel and Asoka Kumar, (1979), 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: Coll. No. 729, S-I (9/7/2008).

*Pleurotaenium trabecula* (Ehr.) Naeg. var. *hirsutum* (Bail.) Krieg.

Agarkar, (1969), P.3, Fig. 26.

Cell 42.2 μm broad, 549.1 μm long, isthmus 23 μm; basal inflation prominent; margins more or less parallel; cell wall with spinaceous hairs.


*Euastrum bombayense* (Gonz. et Gangla) Brandham var. *minor* var. nov.

Cell 21.5 μm broad, 34.9 μm long, isthmus 6.1 μm long, cell longer than broad; semi-cells trilobulate pyramidate, without median incision but with slight median thickening, in face view each semicell shows five facial lobes; sinus linear closed, open towards outer side.

Cellula 21.5 μm lata, 34.9 μm longa, isthmus 6.1 μm; cellula longior quam latior; semicellulae trilobulata pyromidalae, sine medians incissione sed tenuiter in media increassatus, utrius semicellulae a super ficie visae cum 5 faciales lobi, sinu linearis, clauso, aperto ad extrinsecus.

*Euastrum bombayense* (Gonz. et Gangla) var. *minor* var. nov. somewhat resembles with *E. bombayense* (Gonz. et Gangla) Brandham (Venkateswarlu, 1976) because of its trilobulate, pyramidate five facial lobe but present plant differs from it in its very small dimensions (21.5 μm broad, 34.9 μm long and isthmus 6.1 μm long), therefore it is considered as a new variety.


*Euastrum sinuosum* Lenorm. var. *parallelum* Krieg.

Hinode, (1964), P. 84, Fig. V. 14.

Cells 15.3–25 μm broad, 56.8–59.2 μm long, isthmus 8.4-9.2 μm long; longer than broad, deeply constricted, sinus narrowly linear with dilated extremity; semicells 2-3 lobed, lateral lobes bilobulate and less prominent, polar lobe quadrate, oblong with deep median incision; punctations on cell wall not seen.


*Euastrum spinulosum* Delp. var. *major* var. nov.

Cell 62.7 μm broad, 74.5 μm long, isthmus 21.8 μm long; slightly longer than broad, deeply constricted, sinus narrow and linear; semicells 5 lobed; lateral lobes rounded with 8-10 small acute spines, polar lobe broadly truncate with a median notch; cell wall granulate within the polar and lateral lobes, each semicell with a rounded central protuberance with two rows of relatively larger granules.

Cellula 62.7 μm lata, 74.5 μm longa, isthmus 21.8 μm. Cellulæ leviter longior quam latior, profunde constricta; sinus angustus, linearis, semicellula 5-lobata, lobi laterales rotundato cum 8-10 parvae acuti spinae, lobus polaris late trucati cum medio incissionis; parietes cellulares granulati in polaris et lateralis lobi, centralis rotundati protuberationem in utreque semicellula cum 2 seriebus relative magnorum granulosum.
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_Euastrum spinulosum_ Delp. var. _major_ var. nov. closely resembles in size and ornamentation to _E. spinulosum_ Delp. (Prasad and Misra, 1992, Pl. 19, Fig. 17); _E. spinulosum_ Delp. Sub sp. _africanaum_ Nordst. var. _minus_ Nordst. (Groenblad and Croasdale, 1971, Figs, 44, 45, 138) and _E. spinulosum_ Delp. var. _inermius_ Nordst. (Venkateswarlu, 1976, Pl. 2, Fig. 34) but the present plant differs from them in larger size and more number of spines (8-10) on lateral margins, hence it is considered here as a new variety.

**Habitat:** Coll. No. 670, S-I (13/2/2008).

_Euastrum verrucosum_ Ehr. var. _vallesiacum_ Viret.

Suxena and Venkateswarlu, (1968), P. 29, Fig. 19.

Cells 35.4–39 μm broad, 40–42.7 μm long, isthmus 9-10 μm long; deeply constricted in the middle; cells smaller with rounded lobes and not wavy; elaborate central ornamentation, less apical notch; sinus narrow, linear arrangement of granules specially in the centre of the semicell.

**Habitat:** Coll. Nos. 670, S-I (9/7/2008).

_Cosmarium angulatum_ (Perty) Rabenh. f. _major_ Grun.

Turner, (1892), PP. 56-57, Pl. 8, Fig. 35, Pl.9, Fig. 25.

Cell 32.7 μm broad, 58.2 μm long, isthmus 10 μm long; chloroplast in large granular masses with two pyrenoids in each semicell; lateral margins angular, apex truncate and retuse.

**Habitat:** Coll. Nos. 631, S-II (6/10/2007); 742, S-II (12/8/2008).

_Cosmarium bicardia_ Reinsch var. _latius_ Gutw.

Hortobagyi, (1973), P.113, Figs. 588-589.

Cell 10 μm broad, 8.4 μm long, isthmus 1.9 μm long; cell wall flat, slightly intended in the middle, membrane smooth, colourless; each semicell contains single pyrenoid.

**Habitat:** Coll. No. 506, S-I (1/11/2006).

_Cosmarium circularae_ Reinsch

Parra, (1975), P. 37, Fig. 87.

Cell 40.9 μm broad, 46.3 μm long, isthmus 12.7 μm long; deeply constricted, sinus linear; semicells subpyramidate, apex rounded to flat; cell wall smooth; chloroplast axile with single pyrenoid in each semicell.

**Habitat:** Coll. No. 506, S-I (1/11/2006).

_Cosmarium contractum_ Kirch. var. _contractum_ Kirch.

Groenblad and Croasdale, (1971), P. 13, Fig. 66.

Cell 18.8 μm broad, 30.3 μm long, isthmus 9.6 μm long; longer than broad, deeply constricted in the middle, sinus narrowly linear; undulations subacute, apex narrow and retuse with rounded angles; semicells elliptic; cell wall smooth, colourless; chloroplast axile with a single pyrenoid in each semicell.

**Habitat:** Coll. No. 670, S-I (13/2/2008).

_Cosmarium contractum_ Kirch. var. _ellipsoideum_ (Elfv.) West et West f. _major_ f. nov.

Cells 36.3 – 37.2 μm broad, 57.2 μm long, isthmus 9 μm long; deeply constricted in the middle, sinus narrowly linear, apex slightly retuse with rounded angles; semicells transversely ellipsoid; cell wall smooth.

Cellulæae 36.3 – 37.2 μm lata, 57.2 μm longa, isthmus 9 μm, profunde constrictæ in medio, sinu anguste lineari, retusa apicibus cum rotundiformis angular; semicellularæ transversæ ellipsoidi; cellularum parietibus levibus.

_Cosmarium contractum_ Kirch. var. _ellipsoideum_ (Elfv.) West et West f. _major_ f. nov. is nearer to _C. contractum_ Kirch. var. _ellipsoideum_ (Elfv) West et West (Prescott, 1966; Suxena and Venkateswarlu, 1968 and Prasad and Mehrotra, 1977) in having semicells transversely ellipsoid, apex retuse with rounded angles but the present plant differs from it in larger size and wider isthmus (36.3–37 μm broad, 57.2 μm long and isthmus 9 μm long). Therefore it is considered as a new forma.

**Habitat:** Coll. No. 506, S-I (1/11/2006).

_Cosmarium cuminum_ (Corda) Ralfs

Růžička, (1973), P. 209, Pl.9, Fig. 16.
Cell 52.7 μm broad, 91.8 μm long, isthmus 22.7 μm long; longer than broad, deeply constricted; sinus narrowly linear and open; semicells obovate with slightly depressed apex; cell wall within the margin finely granulate; chloroplast axile with one pyrenoid in each semicell.

**Habitat**: Coll. No. 631, S-II (6/10/2007).

*Cosmarium depressum* (Naeg.) Lund. var. *circulare* Krieg. et Gerl.  
Parra, (1975), P. 38, Fig. 90.

Cell 18.8 μm broad, 24.6 μm long, isthmus 9.2 μm long; cells longer than broad, deeply constricted in the middle, sinus linear with a slightly dilated apex; semicells elliptic or compressed hemispherical, apical angles thickened, obtusely rounded; cell wall smooth, colourless; chloroplast axile with one central pyrenoids in each semicell.


*Cosmarium didymoprotupsum* W. et. G. S. West  
Prasad and Misra, (1987), P. 169, Fig. 19

Cell 44.5 μm broad, 50.9 μm long, isthmus 11.8 μm long, cells medium sized, very deeply constricted, sinus narrowly linear with a dilated extremity; semicells broadly truncate pyramidal, basal angles broadly rounded and granulate, apex truncate and straight; cell wall within the margin densely granulate, granules reduced towards the centre of the semicell; chloroplast axile with pyrenoids in each semicell.

**Habitat**: Coll. No. 633, S-II (6/10/2007).

*Cosmarium hammeri* Reinsch var. *schmidlei* Groenblad et Scott  
Prasad and Misra, (1992), P. 162, Pl. 21, Figs. 13, 18, 19.

Cell 25.3 μm broad, 39.1 μm long, isthmus 6.9 μm long; small, longer than broad, sub-hexagonal, deeply constricted, sinus narrowly linear with dilated apex; semicells with upper part of lateral margins converging and retuse, apices faintly retuse with rounded angles; cell wall thick and smooth; top view elliptic.

**Habitat**: Coll. No. 509, S-II (1/11/2006).

*Cosmarium isthmocymatium* Skuja  
Suxena and Venkateswarlu, (1968), P. 34, Figs. 30 a, b

Cells 21.1 – 22.6 μm broad, 56.8 – 62.2 μm long, isthmus 8.4–11.1 μm long; elliptic, longer than broad, deeply constricted in the middle, sinus narrowly linear; margins broadly undulate, undulations subacute, apex flat; cell wall with small and solid granules within margin; chloroplast parietal with single pyrenoid in each semicell.


*Cosmarium lagenarioides* (Roy et Biss.) Luetk var. *intermedium* Gutw.  
Taft, (1949), P. 214, Pl.2, Fig. 8.

Cell 18.8 μm broad, 61.4 μm long, isthmus 9.2 μm long; cell longer than broad, deeply constricted, sinus linear with dilated extremity; semicells oblong–rectangular with rounded angles and slightly convex sides; cell wall smooth; chloroplast axile with a single pyrenoid in each semicell.

**Habitat**: Coll. No. 720, S-II (3/6/2008).

*Cosmarium lundellii* Delp. var. *ellipticum* W. et G. S. West f. *minus* Prescott  
Prasad and Misra, (1987), PP. 164-165, Pl. 22, Fig. 23.

Cell 23.8 μm broad, 32.6 μm long, isthmus 9.6 μm long; sinus dilated at the tip; semicells sub-semicircular with relatively broader and rounded apices; chloroplast axile with two pyrenoids in each semicell.

Prasad and Misra, (1987), PP. 169-170, Pl. 21, Fig.12.

Cell 14 µm broad, 18 µm long; isthmus 4.2 µm long; very small, deeply constricted, sinus narrowly linear; semicells sub-rectangular, sides with a subacute undulations just above the rounded basal angles and slightly retuse in upper half, apex moderately narrowed with rounded angles and more or less straight margin; cell wall smooth; chloroplast axile with one pyrenoid in each semicell.


*Cosmarium obtusatum* Schm. var. *undulatum* Fritsch and Rich  
Groenblad and Croasdale, (1971), P. 16, Fig. 80.

Cell 36.8 µm broad, 51.8 µm long; cells longer than broad, constricted in the middle; sinus linear with slightly dilated apex; semicells in vertical view narrowly ellipsoid; poles flattened slightly exerted; margins with 5-6 undulated shallow undulation, chloroplast with two pyrenoids in each semicells.


*Cosmarium ocellatum* Eichl. and Gutw. var. *incrassatum* West et West  
Bharati and Hegde, (1982), P. 746, Pl. 11, Fig.4.

Cell 15.3 µm broad, 18.8 µm long; cells longer than broad, deeply constricted in the middle, sinus slightly open; semicells elliptic, basal angles dilated, apex rounded; cell wall smooth and colourless; chloroplast axile with single pyrenoid in each semicell.


*Cosmarium pachydermum* Lund. var. *pachydermum*  
Groenblad and Croasdale, (1971), P. 16, Fig. 58.

Cell 56.3 µm broad, 71.8 µm long, isthmus 24.5 µm long; cells longer than broad, deeply constricted; sinus narrowly linear with slightly dilated apex; semicells somewhat elliptic; lateral margins rounded; cell wall smooth; chloroplast axile with two pyrenoids in each semicells.

**Habitat** : Coll. No. 631, S-II (6/10/2007).

*Cosmarium praemorsum* Breb. var. *praemorsum*  
Tomaszewicz, (1988), P. 48, Pl. 11, Fig. 14.

Cell 32.2 µm broad, 44.5 µm long, isthmus 11.1 µm long; cells longer than broad, deeply constricted; sinus narrowly linear; semicells elliptic; cell wall uniformly granular, granules rounded; lateral margins with shallow undulations, apex also undulate; chloroplast axile with one pyrenoid in each semicell.

**Habitat** : Coll. No. 646, S-I (5/12/2007).

*Cosmarium rectosporum* Turn.  
Turner, (1892), P. 69, Pl.10, Fig.16.

Cell 26.3 µm broad, 32.7 µm long, isthmus 5.4 µm long; cell longer than broad, deeply constricted; sinus broad, dilated at the apex; basal angles broadly rounded, apex straight, semicells oval; cell wall smooth, single pyrenoid in each semicell.

**Habitat** : Coll. No. 725, S-I (9/7/2008).

*Cosmarium speciosum* Lund.  
Prasad and Misra, (1987), P. 183, Pl. 24, Fig. 14.

Cells 33.7–34.9 µm broad, 47.1–50.3 µm long; isthmus 11.1–11.9 µm long, medium sized, about 1.5 times longer than broad; moderately constricted, sinus narrowly linear; semicells sub-rectangular or subpyramidal with rounded angles, sides slightly convex and very gradually attenuated upwards to broadly truncate apex, margin with 4 apical and 7 lateral crenations; cell wall granulate, granules in regular, radial and concentric series, each showing 3-5 granules; space across the base and just above the isthmus exhibits 5-6 vertical series of 6-7 granules; chloroplast axile with two pyrenoids in each semicell.


*Cosmarium strabo* Bruhl et Biswas  
Pl. 2, Fig. 13

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Bruhl and Biswas, (1926), P. 289, Pl.8, Fig. 84, Pl.9, Figs.85 a-c.

Cell 48.1 µm broad, 59.9 µm long, isthmus 20.9 µm long; cell almost as long as broad, deeply constricted; sinus narrowly linear with dilated apex; semicells somewhat elliptic; lateral margins rounded; cell wall smooth; chloroplast axile with two pyrenoids in each semicell.


*Staurastrum mamillatus* (Nordst.) Teiling

Hortobagyi, (1973), P. 114, Fig. 601.

Cell 21.2 µm broad, 23.4 µm long, isthmus 4.6 µm long; cell shaped in sand–glass fashion; poles with long, bluntly terminating spines attached to a thickened surface; cells enveloped in a broad, colourless mucilage.

**Habitat**: Coll. No. 631, S-II (6/10/2007).

*Cosmoastrum alternans* (Breb.) Pal.- Mordv. var. *alternans*  

Tomaszewicz, (1988), P. 64, Pl.13, Fig. 38.

Cell 19.2 µm in diameter with straight apices, widely open sinus and densely granulate cell wall.

**Habitat**: Coll. No. 720, S-II (3/6/2008).

*Staurodesmus beineanum* Raben.

Prasad and Misra, (1987), P. 195, Pl.26, Fig.8.

Cell 14.9 µm broad, 16.5 µm long, isthmus 4.2 µm long; small, deeply constricted; sinus widely open; semicells narrowly elliptic, lateral angles subacute; cell wall finely punctate, punctuations arranged in concentric series around the angles.

**Habitat**: Coll. No. 687, S-II (2/3/2008).

*Staurodesmus cycloacanthum* West et West var. *submanfeldtoides* Scott et Prescott  

Shaji, Jose and Patel, (1989), P. 178, Pl. 3, Fig. 8.

Cells 29.9-30.9 µm broad, 22.7-24.5 µm long, isthmus 6.4-7.2 µm broad; small, deeply constricted with open sinus; semicells fusiform with dorsal margin convex undulate; ventral margin tumid, angles produced into short, stout, recurved processes, each tipped with 2 spines and showing many concentric series of denticulations; top view triangular; chloroplast axile with one pyrenoid in each semicell.

**Habitat**: Coll Nos. 658, S-I (6/1/2008); 670, S-I (13/2/2008).

*Staurodesmus striolatum* (Naeg.) Arch.

Parra, (1975), P. 49 , Fig. 141.

Cells 17.6-18.4 µm broad, 25-26.1 µm long, isthmus 7.3-10.3 µm long; cells longer than broad; sinus shallow, open; semicells ovate, elliptic, crenate, lower lateral ends rounded; cell wall uniformly granular; vertical view broadly angularly ovate; chloroplast axile with two pyrenoids in each semicell.

**Habitat**: Coll Nos. 658, S-I (6/1/2008); 670, S-I (13/2/2008); 720, S-II (3/6/2008).

Conclusions

The present paper deals with the systematic account of 36 taxa of desmids (Chlorophyceae) belonging to 7 genera. Of these 23 taxa are being reported for the first time from Maharashatra viz. *Closterium acutum* var. linea, *C. diana* var. *brevius*, *C. diana* var. *pseudodianae*, *C. moniliferum* var. *malinvernianiforme*, *Pleurotaenium trabeula* var. *hirsutum*, *Euastrum verrucosum* var. *vallesiacum*, *Cosmarium angulatum* f. *major*, *C. circulare*, *C. contractum* var. *contractum*, *C. cucumis*, *C. depressum* var. *minutum*, *C. didymoprotus*, *C. hammeri* var. *schmidlei*, *C. isthmocymatium*, *C. lundellii* var. *ellipticum* f. *minus*, *C. norimbergense* var. *elongatum*, *C. obtusatum* var. *undulatum*, *C. ocellatum* var. *incassatum*, *C. rectosporum*, *C. speciosum*, *Staurodesmus beineanum*, *S. cycloacanthum* var. *submanfeldtoides*, and *S. striolatum*; 10 are addition to Indian desmids viz. *Closterium diana* var. *diana*, *Euastrum sinuosum* var. *parallelum*, *Cosmarium bicaldria* var. *latius*, *C. depressum* var. *circulare*, *C. lagenarioidei* var. *intermedium*, *C. pachydermum* var. *pachydermum*, *C. praemorsum* var. *praemorsum*, *C. strabo*, *Staurodesmus mamillatus*, *Cosmoastra alternans* var. *alternans* and 3 taxa viz. *Euastrum bombayense* var. *minor* var. nov., *E. spinulosum* major var. nov., *Cosmarium contractum* var. *ellipsoideum* f. *major* f. nov. are new to science.

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1. *Closterium acutum* (Lyngb.) Breb. var. *linea* (Perty) West et West
2. *Closterium dianae* Ehr. var. *brevius* (Wittr.) Petkoff
5. *Closterium moniliferum* (Bory) Ehr. var. *malinvernianiforme* (Gronble) Kossinskaja
7. *Euastrum bombayense* (Gonz. et Gangla) Brandham var. *minor* var. nov.
9. *Euastrum spinulosum* Delp. var. *major* var. nov.
13. *Cosmarium circulare* Reinsch
15. *Cosmarium contractum* Kirch. var. *ellipsoideum* (Elfv.) West et West f. *major* f. nov.
16. *Cosmarium cucumis* (Corda) Ralfs
1. *Cosmarium didymoprotussum* W. et. G. S. West
2. *Cosmarium hammeri* Reinsch var. *schmidlei* Groenblad et Scott
3. *Cosmarium isthmocymatium* Skuja
7. *Cosmarium obtusatum* Schm. var. *undulatum* Fritsch and Rich
8. *Cosmarium ocellatum* Eichl. and Gutw. var. *incrassatum* West et West
9. *Cosmarium pachydermum* Lund. var. *pachydermum*
10. *Cosmarium praemorsum* Breb. var. *praemorsum*
11. *Cosmarium rectosporum* Turn.
13. *Cosmarium strabo* Bruhl et Biswas
14. *Staurodesmus mamillatus* (Nordst.) Teiling
15. *Cosmoastrum alternans* (Breb.) Pal.- Mordv. var. *alternans*
17,18. *Staurastrum cyclacanthum* West et West var. *submanfeldtoides* Scott et Prescott
18. *Staurastrum striolatum* (Naeg.) Arch.
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