

Research Article

DESMIDS FROM ABHORA DAM OF RAVER TAHSIL OF JALGAON DISTRICT, MAHARASHTRA

***Patil SB and Kumawat DA**

¹Department of Botany Dhanaji Nana Mahavidyalaya, Faizpur, Maharashtra, India

²Sardar Vallabhbhai Patel Arts and Science College, Ainpur, Maharashtra, India

**Author for Correspondence*

ABSTRACT

While exploring the algal flora and ecological study of Abhora dam of Raver Tahsil of Jalgaon district of Maharashtra, the authors collected 36 desmids belonging to five genera namely *Closterium* (3), *Euastrum* (6), *Actinotaenium* (1), *Cosmarium* (22) and *Staurostrum* (4) have been illustrated and described with periodicity in the present paper with regard to number of species and individuals. The dominant genus was *Cosmarium* represented by 22 species while *Actinotaenium cucurbita* was recorded by monotypic species from genus *Actinotaenium*. All these taxa are new records from this region.

Keywords: Desmids, Abhora Dam, Maharashtra

INTRODUCTION

During the course of studies on the algal flora and ecology of Abhora dam, we collected 36 taxa of desmids. In this communication description of 36 desmids is given. Our knowledge of desmids in Maharashtra is known through the work of Gonzalves and Gangla (1947), Kamat (1947), Ashtekar and Kamat (1978), Freitas and Kamat (1978) Barhate and Tarar (1983), Tarar *et al.*, (1998), Jawale *et al.*, (2005), Dhande and Jawale (2009) Jadhavar and Papdiwal (2011), Mahajan (2011) Bhosale *et al.*, (2012).

MATERIALS AND METHODS

The algal collections were made during April 2007 to March 2008 from Abhora dam near village Abhora of Raver Tahsil. Abhora dam is located near foot of Satpura hills (76° 01' North latitude and 21° 18' East longitude) in the Raver Tahsil of Jalgaon district, Maharashtra.

The collected samples were preserved in 4% formalin for microscopic studies and line drawings were drawn with the help of camera lucida technique from fresh as well as preserved material and photomicrograph of important taxa were taken by Nikon coolpix P₄ digital camera. Identification was made with the help monograph of Turner (1892) and other relevant literature.

Systematic Account

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

Plate I, Figure 1

Cell 23.6 µm broad, 226 µm long; medium size, 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.

Habitat: Coll. No. 496, February 2008.

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

Plate I, Figure 2

Cell 32.7 µm broad, 201.0 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; cell wall smooth; chloroplast with 4 ridges and 6 pyrenoids arranged in a row in each semi cell.

Habitat: Coll. No. 421, August 2007.

***Closterium lunula* (Muell.) Nitzsch**

Plate I, Figure 3

Cell 103 µm in diameter; 610 µm long; large, almost straight, relatively broad abruptly but slightly attenuated near the poles which are truncately rounded; wall smooth, colourless; chloroplast with 4-5 ridges and containing 6 pyrenoids in each semicells, arranged in a row.

Habitat: Coll. No. 417, July 2007.

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***Euastrum bombayense* (Gonz. et Gangla) Brandham**

Plate I, Figure 4

Cell 36.4 μm broad, 63.6 μm long and isthmus 15.4 μm long, cells longer than broad; semicells trilobulate pyramidal, without median notch, in face view each semicell shows five facial lobes; semicells in the centre with a large granulate protuberance and with smaller granulate protuberances within each of the lateral lobes and within the polar lobes, granules especially prominent on all the rounded angles; sinus linear closed, open towards outer side.

Habitat: Coll. Nos. 456, January 2008; 406, April 2007.

***Euastrum bombayense* var. *gokakense* Bongale et Kaulapur.**

Plate I, Figure 5

Cell 36.3 μm broad, 63.6 μm long and isthmus 11.8 μm ; about 11/2 times as long as broad; sinus closed, flat inside and broadly open out side; asymmetrical and variable in outline, obliquely bent towards one side, 6 lobe at one side; verrucate of rosetts five on each semicell; wall granulated, granules more prominent on polar and lateral lobes, chloroplast single in each semicell with one pyrenoid.

Habitat: Coll. No. 453, January 2008.

***Euastrum irregulare* Gonz. et Gangla**

Plate I, Figure 6

Cell 31.8 μm broad, 59.9 μm long, isthmus 13.6 μm long, cell small usually longer than broad, deeply constricted, sinus narrowly linear with a dilated extremity; semi-cells pyramidal, 5-lobed; semi-cells in the centre with a large granulate protuberance; polar lobe rounded with no median notch but with a slight median thickening; the lower lateral lobes rounded and unequal the upper lobes definitely large on one side than on the other; cell wall irregularly granulate, granules prominent on all the rounded angles; one chloroplast in each semi-cell with a single pyrenoid.

Habitat: Coll. No. 402, April 2007.

***Euastrum spinulosum* Delp. subsp. *africanum* Nordst. var. *minus* Nordst. Plate I, Figure 7, Plate IV, Figure 1**

Cell 51.0 μm broad, 59.0 μm long and isthmus 10.0 μm long, cell smaller with notch at apex, rounded lobes and elaborate central ornamentation, somewhat reduced and some times less definite apical notch.

Habitat: Coll. No. 406, April 2007.

***Euastrum spinulosum* Delp. var. *burmense* (West & west) Krieger**

Plate I, Figure 8

Cell 48.1 μm broad, 57.2 μm long and isthmus 14.5 μm ; cell small, constriction deep; sinus narrow and open; each semicells 5 lobed with rounded angles, polar lobe with faint median notch. Cell wall with short spines within the polar and lateral lobes and one large median and 2 relatively small lateral protuberance above the isthmus.

Habitat: Coll. Nos. 456, January 2008; 440, December 2007.

***Euastrum spinulosum* Delp. var. *inermis* Nordst**

Plate 1, Figure 9, Plate IV, Figure 2

Cell 49.9 μm broad, 63.6 μm long and isthmus 12.7 μm long, cells longer than broad, deep constricted, sinus deeply and closed, slightly dilated at apex; broadly rounded to flattened lateral lobes, semicells 6 lobed; incisions are deep and the polar lobes are excavated; cell wall with relatively bigger granules, arranged in more or less circular fashion central protuberance with 10 big peripheral and 4 large internal granules.

Habitat: Coll. No. 456, January 2008

***Actinotaenium cucurbita* (Breb.) Teil.**

Plate I, Figure 10

Cell almost cylindrical with a slight median constriction; lateral margins sub parallel and very slightly convex; apex rounded truncate; cell wall punctate; chloroplasts axile with several irregular ridges and a single central pyrenoid. Cell 23.8 μm broad; 43.0 μm long isthmus 23.4 μm .

Habitat: Coll. No. 427, October 2007.

***Cosmarium awadhense* Prasad and Mehrotra.**

Plate I, Fig.11, Plate IV, Fig.3

Cell 19.5 μm broad, 24.9 μm long, isthmus 5.3 μm long, cell longer than broad, deeply constricted, sinus narrowly linear with a dilated extremity semicells subcircular, cell apices truncate and flat with straight margin, sides having 3-4 crenations without granules; side view elliptic; cell wall smooth; chloroplast axile with a single pyrenoid in each semicell.

Habitat: Coll. No. 416, July 2007.

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***Cosmarium bicardia* Reinsch.**

Plate I, Figure 12

Cell 13.4 μm broad, 21.1 μm long and isthmus 7.3 μm long; cell slightly longer than broad, deeply constricted, sinus linear; semicells semicircular, lateral margins rounded; cell wall smooth; chloroplast with a single pyrenoid in each semicell.

Habitat: Coll. No. 422, October 2007

***Cosmarium bioculatum* Breb. var. *canadense* Krieg. et Gerl.**

Plate I, Figure 13

Cell 23.0 μm broad, 29.2 μm long and isthmus 5.7 μm long; as long as broad or very slightly longer, deeply constricted in the middle, sinus narrowly linear and with slightly dilated apex; semicells not perfectly elliptic, upper margin more convex than the ventral, lateral margins rounded; lateral view of semicell subcircular; apical view elliptic; cell wall smooth and colourless; chloroplast axile, with a single pyrenoid.

Habitat: Coll. No. 425, October 2007

***Cosmarium contractum* Kirch. var. *contractum* Kirch.**

Plate I, Figure 14

Cells 24.9-26.1 μm broad, 29.9-33.4 μm long and isthmus 6.1-6.5 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. Nos. 458, February 2008; 459, February 2008

***Cosmarium furcatospermum* W. et G.S. West. var. *maius* Prasad & Misra**

Plate II, Figure 1

Cell 23.0 μm broad, 32.6 μm long and isthmus 7.6 μm long, small, slightly longer than broad, deeply constricted, sinus linear; semicells truncate, sub-semicircular, lateral margins 4-5 crenately-granulate, apex broadly truncate and 5-6 undulate with 3 series of small granules within the whole margin, central region smooth; top view oblong-elliptic; each semicell with an axile chloroplast containing a large pyrenoid in the centre.

Habitat: Coll. No. 498, March 2008.

***Cosmarium granatum* Breb.**

Plate II, Figure 2

Cell 27.2 μm broad, 46.3 μm long and isthmus 7.2 μm long; medium sized, elongate-rhomboid; semi cells sub pyramidal with rounded angles, side coverings to a broadly rounded or sub truncate apex; sinus narrow and closed; wall punctate.

Habitat: Coll. Nos. 435, December 2007; 465, March 2008.

***Cosmarium hammeri* Reinsch var. *schmidlei* Groenblad et Scott.**

Plate II, Figure 3

Cell 27.2 μm broad, 40.9 μm long and isthmus 7.2 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. 466, March 2008.

***Cosmarium isthmocymatium* Skuja**

Plate II, Figure 4, Plate IV, Figure 4

Cell 24.9 μm broad, 72.5 μm long and isthmus 6.9 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; chloroplast parietal; single pyrenoid in each semicell.

Habitat: Coll. Nos. 406, April 2007; 463, February 2008.

***Cosmarium laeve* Raben.**

Plate II, Figure 5, Plate IV, Figure 5

Cell 15.4 μm broad, 19.2 μm long and isthmus 5.0 μm long, cells longer than broad, oval, deeply constricted; sinus linear with dilated apex; semicells semi elliptic; basal angles rounded, apex narrowly truncate, rounded and retuse; cell wall slightly undulate; chloroplast axile, single pyrenoid in each semicell.

Habitat: Coll. Nos. 440, December 2007; 443, December 2007

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Cosmarium lagenarioides (Roy et Biss.) Luetk var. ***intermedium*** Gutw.

Plate II, Figure 6

Cell 21.1 µm broad, 68.3 µm long and isthmus 9.9 µm long; cell longer than broad, deeply constricted, sinus linear with dilated extremity; semicells oblong-rectangular with rounded angles and slightly convex sides and apex; cell wall smooth; chloroplast axile with two pyrenoids in each semicell.

Habitat: Coll. Nos. 414, June 2007; 451, January 2008

Cosmarium margaritatum (Lund) Roy et Biss.

Plate II, Figure 7

Cell 43.6 µm broad, 51.8 µm long and isthmus 11.8 µm long; small, longer than broad, deeply constricted, sinus gradually opening from a round extremity, isthmus slightly elongated; semicells sub-reniform and granulate; each semicell with an axile chloroplast and a pyrenoid.

Habitat: Coll. No. 455, January 2008

Cosmarium melanosporum Archer.

Plate II, Figure 8

Cell 10.3 µm broad, 13.4 µm long, isthmus 4.2 µm long, cells globose, small, slightly longer than broad, deeply constricted in middle, sinus linear; semi cells sub globose; single pyrenoid in each semicell.

Habitat: Coll. No. 453, January 2008

Cosmarium nitidulum De Not

Plate II, Figure 9, Plate IV, Figure 6

Cells 21.1-23.4 µm broad, 37.2-37.6 µm long, isthmus 5.3-6.1 µm long, cell slightly longer than broad, deeply constricted, sinus narrowly linear with slightly dilated apex; semicells truncate-sub semicircular, tapering evenly from rounded basal angles to flattened apex with straight margins; cell wall minutely punctate; top view elliptic; chloroplast monocentric with one pyrenoid

Habitat: Coll. Nos. 406, April 2007; 497, March 2008.

Cosmarium obtusatum Schm. var. ***undulatum*** Fritsch and Rich **Plate II, Figure 10, Plate IV, Figure 7**

Cell 36.4 µm broad, 51.8 µm long and isthmus 10.7 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; lateral margins with only 5-6 shallow undulation, apex also undulate; two chloroplast in each semicells; one pyrenoid in each chloroplast.

Habitat: Coll. No. 454, January 2008

Cosmarium ocellatum Eichl. and Gutw. var. ***incrassatum*** West et West

Plate II, Fig.11

Cell 15.3 µm broad, 17.6 µm long and isthmus 4.2 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.

Habitat: Coll. No. 497, March 2008.

Cosmarium pygmaeum Arch.

Plate II, Fig.12

Cell 11.1 µm broad, 12.6 µm long, isthmus 4.2 µm long, cell slightly shorter, deeply constricted in the middle, sinus narrow linear; semicells transversely oblong-rectangular, basal angles obtuse, rounded, lateral margin some what straight, apex straight, minute papilla within each lateral angles, lateral view of semicells subcircular, apical view elliptic and with a minute papilla on each side near the poles; cell wall smooth, colourless; chloroplast axile, each with a central pyrenoid.

Habitat: Coll. No. 475, April 2007.

Cosmarium regnellii Wille

Plate III, Figure 1

Cell 12.2 µm broad, 14.9 µm long and isthmus 5.3 µm long, as long as broad; deeply constricted in the middle; sinus linear open; semicells sub-rectangular, basal angles rounded; apex straight; lateral margin undulate; single pyrenoid in each semicell.

Habitat: Coll. No 497, March 2008.

Cosmarium reniforme (Ralfs) Arch.

Plate III, Figure 2, Plate IV, Figure 8

Cell 50.9 µm broad, 60.9 µm long and isthmus 14.5 µm long, medium size, slightly longer than broad, constriction deep, sinus narrow and linear with widely dilated extremity; semicells reniform; cell wall granulate, granules fairly regular, horizontal and in indistinct vertical series; chloroplast axile with two pyrenoids in each semicell.

Habitat: Coll. No. 453, January 2008

PLATE-I

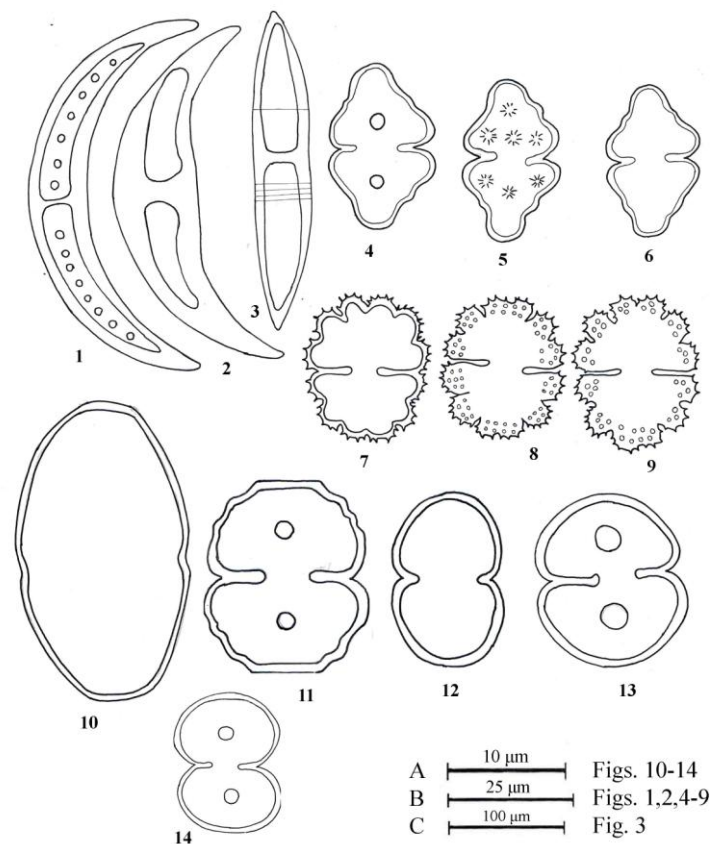
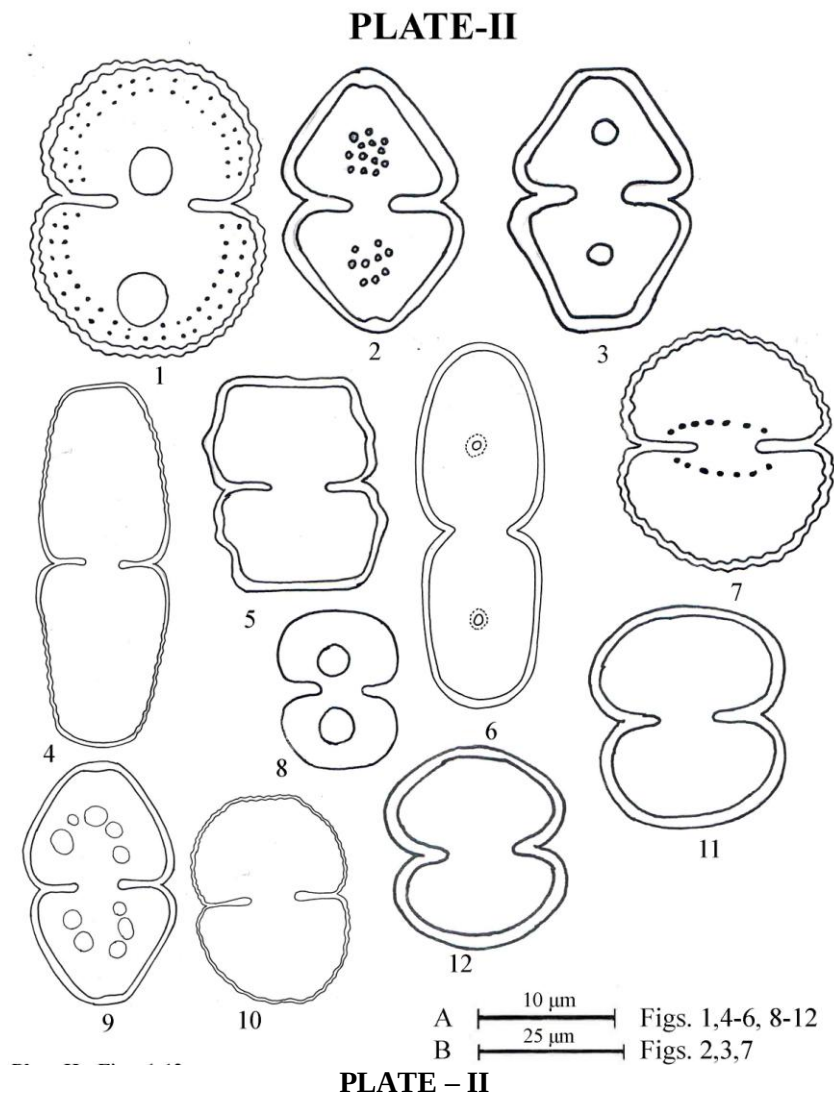


PLATE – I

Figures 1-14

1. *Closterium diana* Ehr. var. *diana* f. *diana*
2. *Closterium leibleinii* Kuetz. var. *recurvatum* W. et G. S. West
3. *Closterium lunula* (Muell.) Nitzsch
4. *Euastrum bombayense* (Gonz. et Gangla) Brandham
5. *Euastrum bombayense* var. *gokakense* Bongale et Kaulapur
6. *Euastrum irregulare* Gonz. et Gangla
7. *Euastrum spinulosum* Delp. subsp. *africanum* Nordst. var. *minus* Nordst.
8. *Euastrum spinulosum* Delp. var. *burmense* (West & west) Krieger
9. *Euastrum spinulosum* Delp. var. *inermius* Nordst.
10. *Actinotaenium curcubita* (Breb.) Teil.
11. *Cosmarium awadhense* Prasad and Mehrotra
12. *Cosmarium bicardia* Reinsch
13. *Cosmarium bioculatum* Breb. var. *canadense* Krieg. et Gerl.
14. *Cosmarium contractum* Kirch. var. *contractum* Kirch.

Scale bar A : 10 µm
 Scale bar B : 25 µm
 Scale bar C : 100 µm
 Scale A : Figures 10-14
 Scale B : Figures 1, 2, 4-6
 Scale C : Figure 3



Figures 1-12

1. *Cosmarium furcatospermum* W. et G.S. West. var. *maius* Prasad & Misra
2. *Cosmarium granatum* Breb.
3. *Cosmarium hammeri* Reinsch var. *schmidlei* Groenblad et Scott
4. *Cosmarium isthmocymatium* Skuja
5. *Cosmarium laeve* Raben.
6. *Cosmarium lagenarioides* (Roy et Biss.) Luetk var. *intermedium* Gutw.
7. *Cosmarium margaritatum* (Lund) Roy et Biss.
8. *Cosmarium melanosporum* Archer.
9. *Cosmarium nitidulum* De Not
10. *Cosmarium obtusatum* Schm. var. *undulatum* Fritsch and Rich
11. *Cosmarium ocellatum* Eichl. and Gutw. var. *incrassatum* West et West
12. *Cosmarium pygmaeum* Arch.

Scale bar A : 10 µm
 Scale bar B : 25 µm
 Scale A : Figures 1, 4, 6, 8-12
 Scale B : Figures 2, 3, 7

PLATE-III

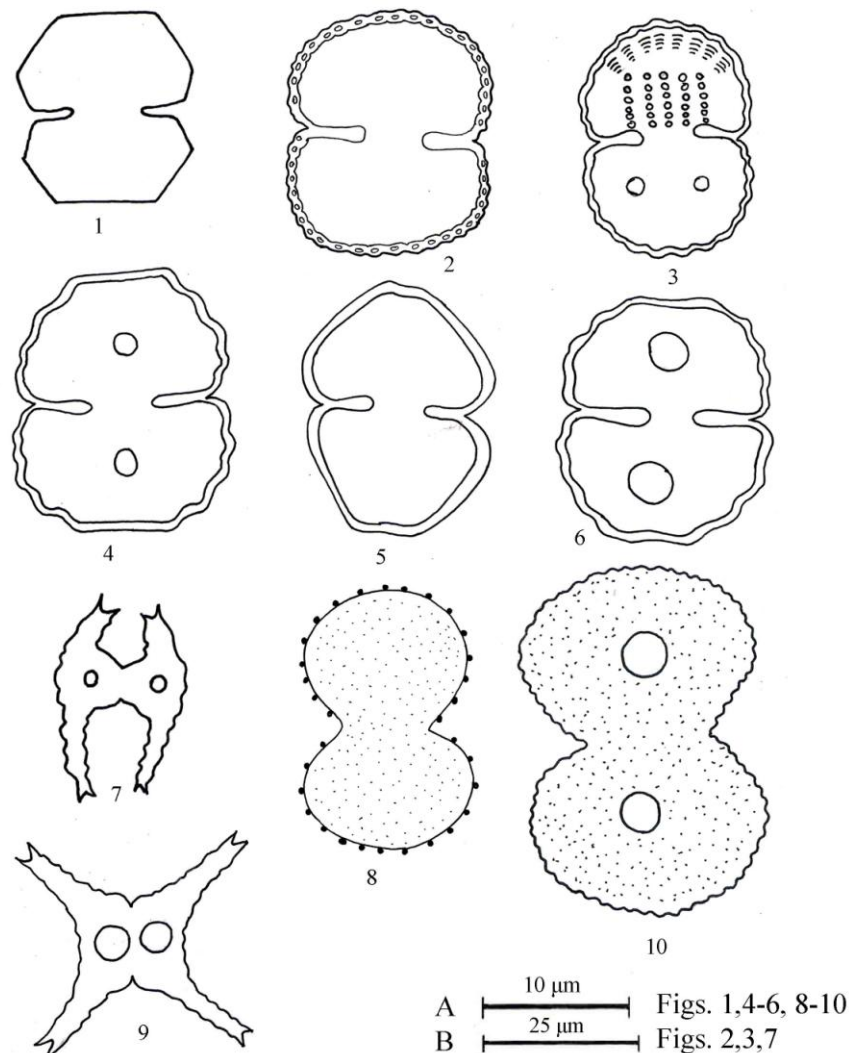


PLATE -III
Figures 1-10

1. *Cosmarium regnellii* Wille
 2. *Cosmarium reniforme* (Ralfs) Arch.
 3. *Cosmarium speciosum* Lund.
 4. *Cosmarium subalatum* W. et G.S. West.
 5. *Cosmarium subtumidium* Nordst. var. *borgei* Krieg. et Gerl.
 6. *Cosmarium undulatum* Corda ex Ralf. var. *minutum* Witttr.
 7. *Staurastrum cyclacanthum* West et West var. *submanfeldtoides* Scott et Prescott
 8. *Staurastrum dilatatum* Ehr.
 9. *Staurastrum iotatum* Wolle.
 10. *Staurastrum punctulatum* Breb.
- Scale bar A : 10 µm
 Scale bar B : 25 µm
 Scale A : Figures 1, 4, 6, 8-10
 Scale B : Figures 2, 3, 7

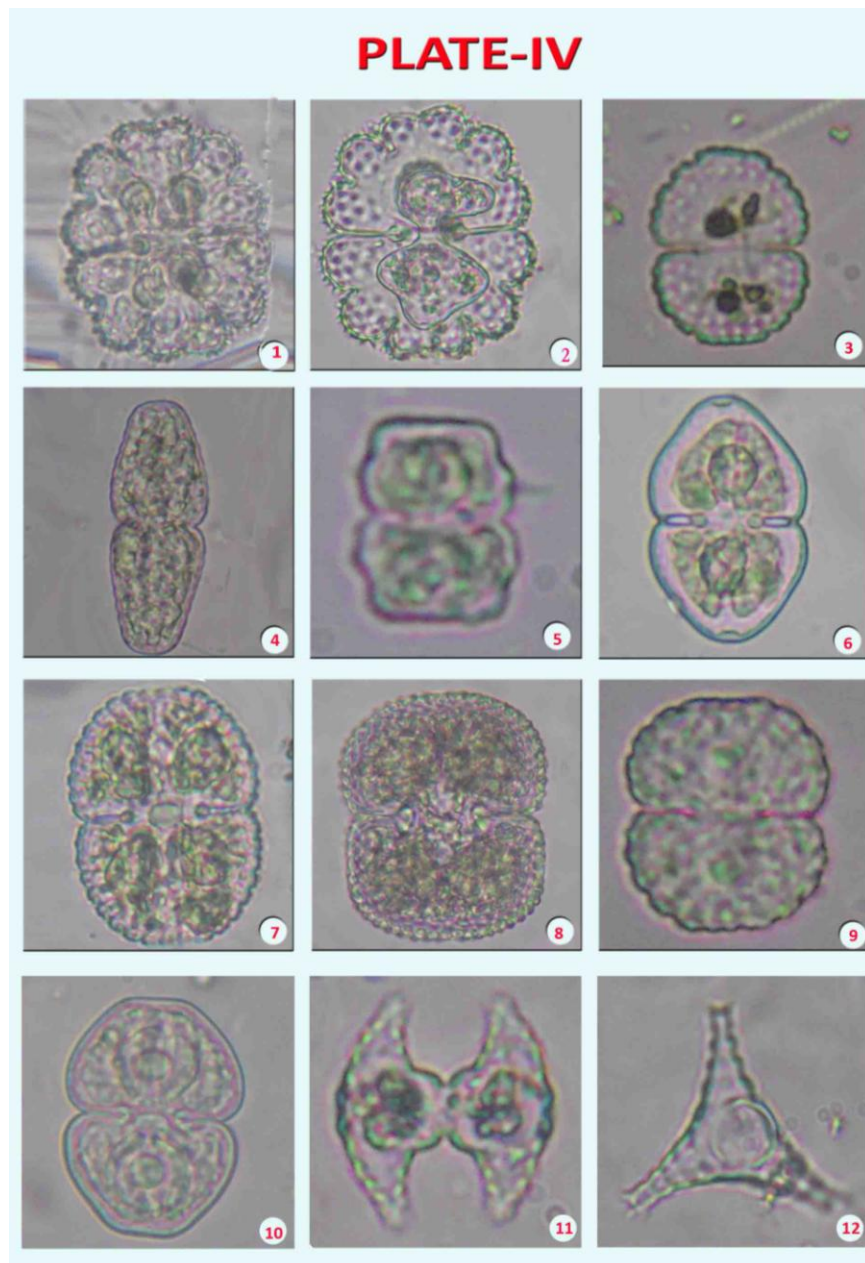


PLATE -IV

Figures 1-12

1. *Euastrum spinulosum* Delp. subsp. *africanum* Nordst. var. *minus* Nordst.
2. *Euastrum spinulosum* Delp. var. *inermius* Nordst.
3. *Cosmarium awadhense* Prasad and Mehrotra.
4. *Cosmarium isthmocymatium* Skuja
5. *Cosmarium laeve* Raben.
6. *Cosmarium nitidulum* De Not
7. *Cosmarium obtusatum* Schm. var. *undulatum* Fritsch and Rich
8. *Cosmarium reniforme* (Ralfs) Arch.
9. *Cosmarium subalatum* W. et G.S. West.
10. *Cosmarium subtumidium* Nordst. var. *borgei* Krieg. et Gerl.
11. & 12. *Staurastrum cyclacanthum* West et West var. *submanfeldtoides* Scott et Prescott

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***Staurostrum cyclacanthum* West et West var. *submanfeldtoides* Scott et Prescott**

***Cosmarium speciosum* Lund.**

Plate III, Figure 3

Cell 37.0 µm broad, 53.6 µm long and isthmus 10.9 µm long, medium size, about 1.5 times longer than broad; moderately constricted, sinus narrowly linear; semicells sub-rectangular or sub pyramideate 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 3-4 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.

Habitat: Coll. No. 467, March 2008.

***Cosmarium subalatum* W. et G.S. West.**

Plate III, Figure 4, Plate IV, Figure 9

Cell 19.5 µm broad, 24.5 µm long and isthmus 5.3 µm long, cells small, slightly longer than broad, deeply constricted, sinus narrowly linear, semicells widely truncate to pyramideate, sides tricriate, angles rounded, apex with two small crenations, crenations bigranulate, central tumour rounded with 7 granules arranged in circular fashion; top view elliptic; chloroplast axile with one pyrenoid in each cell.

Habitat: Coll. No. 463, February 2008.

***Cosmarium subtumidum* Nordst. var. *borgei* Krieg. et Gerl.**

Plate III, Figure 5, Plate IV, Figure 10

Cells 19.5-20.3 µm broad, 25.3-26.1 µm long and isthmus 4.2-5.7 µm long, cells longer than broad, constricted in the middle; sinus narrowly linear and dilated towards the apices; semicells pyramidal, basal angles rounded, apex rounded; in side view circular, in end view broadly elliptic and thicker; chloroplast with single pyrenoid.

Habitat: Coll. Nos. 406, April 2007; 415 April 2007.

***Cosmarium undulatum* Corda ex Ralf. var. *minutum* Wittr.**

Plate III, Figure 6

Cell 20.3 µm broad, 23.8 µm long and isthmus 3.8 µm long; cells small quadrate-elliptic, slightly longer than broad, deeply constricted, sinus narrow with dilated extremity; semicells sub-semicircular with 7-8 shallow undulations, apex slightly retuse, cell wall smooth; chloroplast axile with a single pyrenoid in each semicell.

Habitat: Coll. No. 415, April 2007.

Plate III, Figure 7, Plate IV, Figures 11,12

Cell 34.5 µm broad, 21.8 µm long and isthmus 6.3 µm broad, small, deeply constricted with open sinus; semicells fusiform with dorsal margin convex undulate and ventral margin tumid, angles produced into short, stout, recurved processes, each tipped with 2-3 spines and showing many concentric series of denticulations; top view triangular; chloroplast axile with one pyrenoid in each semicell.

Habitat: Coll. Nos. 418, April 2007; 415, April 2007; 426, October 2007

***Staurostrum dilatatum* Ehr.**

Plate III, Figure 8

Cell 21.1 µm broad, 33.7 µm long and isthmus 10.7 µm long, cell little longer than broad, deeply constricted in the middle, sinus acute and open; semicells sub elliptic, dorsal and ventral margins about equally convex, angles rounded, cell wall colourless, uniformly granulate, granules in regular series around the angles.

Habitat: Coll. No. 497, March 2008.

***Staurostrum iotatum* Wolle.**

Plate III, Figure 9

Cell 10.7 µm broad, 20.3 µm long and isthmus 6.9 µm long, cells longer than broad, deeply constricted; sinus widely open and broadly triangular in outline; dorsal and ventral margins concave angles extended into stubby arms, tipped with 2-3 minute spines, lateral angles produce to form strongly divergent processes.

Habitat: Coll. Nos. 414, April 2007; 417, April 2007.

***Staurostrum punctulatum* Breb.**

Plate III, Figure 10

Cell 21.1 µm broad, 31.1 µm long and isthmus 11.1 µm long; little longer than broad, deeply constricted in the middle; sinus acute and open; semicells sub elliptic to sub rhomboidal-elliptic, dorsal and ventral margins about equally convex; angles somewhat acutely rounded; apical view of cell 3-angular, rarely 4-angular and very rarely 5-angular, sides slightly retuse, angles acutely rounded, the ones of one semicell

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often partially or entirely alternating with those of the other; cell wall colourless, uniformly granulate; granules in regular series around the angles.

Habitat: Coll. No. 415, April 2007

CONCLUSION

Total 36 desmids taxa have been identified. High species diversity was exhibited by *Cosmarium* (22), which is followed by *Eustratum* (6), *Staustrium* (4), *Closterium* (3) and *Actinotaenium* (1). The greatest numbers of taxa were found during summer season moderate in winter and minimum during rainy season. All species are new records from this region.

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