



Systematic Enumeration of Genus *Cosmarium* Corda Ex Ralfs from Mor Dam, District Jalgaon, Maharashtra

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Article Info

Received: 20-09-2025,

Revised: 17-12-2025,

Accepted: 30-12-2025

Keywords: *Cosmarium*,
Desmidiaceae, Mor
Dam, Jalgaon,
Maharashtra

Abstract

The present investigation deals with the systematic enumeration of 24 taxa of genus *Cosmarium* from Mor Dam, District Jalgaon, Maharashtra. The samples were collected from two sites of Mor dam near village Hingona, District Jalgaon. These taxa belonging to 15 different species, 08 varieties and 01 forma, namely *Cosmarium angulosum* var. *concinnum*, *C. awadhense*, *C. biretum*, *C. divergens*, *C. formosulum*, *C. granatum*, *C. hammeri* var. *protuberans*, *C. javanicum*, *C. nitidulum*, *C. norimbergense* var. *elongatum*, *C. obtusatum*, *C. portianum* var. *nephroideum*, *C. portianum*, *C. portianum* var. *portianum*, *C. punctulatum* var. *subpunctulatum*, *C. pygmaeum*, *C. regnellii* f. *minus*, *C. reniforme*, *C. subimpressulum*, *C. subprotumidum* var. *gregory*, *C. spinosporum*, *C. subspeciosum* var. *validius*, *C. vexatum* and *C. westii* respectively. All these taxa are reported first time from the study area.

INTRODUCTION

The genus *Cosmarium* is well known for its ecological significance and morphological diversity. These desmids are flourish in freshwater environments with consistent physicochemical conditions, are sensitive water quality indicators. The genus *Cosmarium* Corda ex Ralfs is a unicellular placoderm desmid and most species-rich genus of desmids group with approximately 1354 species which are currently accepted taxonomically (Guiry and Guiry, 2025).

Desmids diversity of Maharashtra were explored through the contributions of Kamat (1975), Kamat and Tiwari (1978), Freitas and Kamat (1979), Agarkar and Kamat (1979), Tarar *et.al* (1998), Nandan and Jain (2004), Jawale *et.al* (2005), Dhande and Jawale (2009), Jadhavar and Papdiwal (2011, 2012), Mahajan (2011), Bandgar and Papdiwal (2013), Patil and Jawale (2014), Patil and Kumawat (2014, 2015), Patil and Deore (2017), Reddy and Chaturvedi (2017), Mhaske and Talwankar (2018), Shejul and Sawant (2018), Bansod and Patil (2019), Patil (2019 a, b), Patil and Kumawat (2019), Valvi

and Gautam (2020), Yadav (2020), Andhale (2021), Jadhavar and Papdiwal (2022). Behera *et. al* (2023) Patil and Patil (2024), Mahajan (2025).

Materials and Methods

Study area

Mor dam (Latitude 21° 14' 45' N and longitude 75° 47' 30"E) is situated on Mor River near Hingona, Tal Yawal, district Jalgaon. Dam is completed in 2003. The dam water is primarily used for drinking and irrigation purpose. The catchment area of the dam is 74.42 sq/km. The height of dam wall is 44.60 meter.



Fig. Satellite view of Mor Dam showing M₁ and M₂ sites

The algal samples were collected early in the morning from 08:00–10:00 am in clean specimen bottles from M₁ and M₂ sites. These samples were examined fresh as far as possible and photomicrographs of algal taxa were taken with the help of Radicon USB Digital Camera 5.0 M attached with Labomed LX 300 microscope and measurement is done by Digicam Software. Identification of the taxa is done with the help of Standard Monographs and Books, namely West and West (1905, 1908, 1912), Scott and Prescott (1961), Prasad and Misra Vol.-II (1992), Das and Keshri (2016) and relevant research publications.

Systematic Enumeration:

Class: **Zygnematophyceae**

Order: **Desmidiiales**

Family: **Desmidiaceae**

Genus: ***Cosmarium* Corda ex Ralfs, 1848**

1. *Cosmarium angulosum* var. *concinnum* (Rabenhorst) West & G. S. West 1901- **Pl. 1, Fig 1**

Prasad B.N. and Misra P.K. 1992, P. 152, Pl. 21, Figs 5, 8.

Cells small, deeply constricted, margin entire, sinus narrow and linear; semi cells hexagonal with sharp angle in parallel sides, apex slightly retuse; straight, cell wall smooth. Cells 14.53 µm broad, 16.72 µm long; isthmus 4.15µm long.

Habitat: Coll. No. M2-170 (10/07/2024)

2. *Cosmarium awadhense* B. N. Prasad & R. K. Mehrotra 1977- **Pl. 1, Fig 2**

Prasad B.N. and Misra P.K., 1992, P. 153, Pl.21, Fig.17

Cells longer than broad, constriction deep, sinus narrowly linear towards apex with a dilated extremity; semi cells semicircular, 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 semi cell. Cells 19.32 µm broad, 23.17 µm long; isthmus 6.29 µm long.

Habitat: Coll. No. M2-184 (03/08/2024)

3. *Cosmarium biretum* Brebisson ex Ralfs 1848 -**Pl. 1, Fig 3**

Prasad B. N. and Misra P. K. 1992, P. 154, Pl. 23, Fig. 19.

Cell rather small, a little longer than broad, very deeply constricted, sinus narrowly linear with slightly dilated extremity; semi cells sub rectangular with somewhat convex sides and apex; cell wall with granules arranged in indistinct curved vertical series. Each semi cell with an axile chloroplast and two pyrenoids. Cells 46.83 µm broad, 64.83 µm long; isthmus 16.88 µm long.

Habitat: Coll. No. M2-183 (03/08/2024)

4. *Cosmarium divergens* Willi Krieger 1932 -**Pl. 1, Fig. 4**

Agarkar D. S. and Agarkar M. S., 1973, P. 12, Fig. 10 Cell deeply constricted; cell wall crenate; semi-cells somewhat rectangular with flat apices. Cells 16.17 µm broad, 21.26 µm long; isthmus 5.9 µm long.

Habitat: Coll. No. M2-183 (03/08/2024)

5. *Cosmarium formosulum* Hoff - **Pl. 1, Fig 5**

Peter F. M. Coesel and Koos (J.) Meesters, 2007, P. 118, Pl 78, Figs 4-6

Cells proportionately a little broader; semi cells with less rounded basal angles, lateral margins with 3-6 bi-granulate (or emarginate) crenations, granules of central tumour stronger and more pronounced. Cells 44.70 μm broad, 48.03 μm long; isthmus 13.79 μm long.

Habitat: Coll. No. M2-191 (08/09/2024)

6. *Cosmarium granatum* Ralfs 1848 -Pl. 1, Fig 6

West and West 1905, P. 186, Pl. 63: 1-3.

Cells longer than broad with, sub rhomboid-elliptic, deeply constricted, sinus narrowly linear, slightly dilated at the apex; semi cells truncate pyramidate, basal angles rounded, sub rectangular, sides at the base subparallel, then converging towards the apex, commonly straight or slightly convex, upper angles obtuse, apex narrowly truncate and straight. Cell wall smooth. Cells 23.08 μm broad, 37.23 μm long; isthmus 6.18 μm long.

Habitat: Coll. No. M1-188 (08/09/2024)

7. *Cosmarium hammeri* Reinsch var. *protuberans* West W. and West G. S. 1896 - Pl. 1, Fig 7

West W. and West G.S 1905, P. 183, Pl. 62, Fig. 24, 25.

Cells medium sized, longer than broad; semi cells with lateral margins slightly convex; apex broadly concave; basal lateral angles broadly rounded; semi cells with slightly retuse sidely; apex flat; wall smooth, chloroplast single in each semi cells with single pyrenoid. Cell 19.86 μm broad, 28.54 μm long; isthmus 6.59 μm long.

Habitat: Coll. No.M2-183 (03/08/2024)

8. *Cosmarium javanicum* Nordstedt 1880 - Pl. 1, Fig 8

Agarkar M.S. and Agarkar D.S., 1977, P. 29, Pl. IV Fig. 65.

Cells large, about two times longer than broad; median constriction shallow, sinus linear, closed but dilated at the end; lateral margins evenly convex to broadly rounded apex; narrow rounded basal angles;

striated and punctate cell wall. Cells 67.65 μm broad, 118.98 μm long; isthmus 44.15 μm long.

Habitat: Coll. No. M2-288 (06/07/25)

9. *Cosmarium nitidulum* De Notaris 1867. - Pl. 1, Fig 9

Prasad B.N. and Misra P.K., 1992, P. 168, Pl. 22, Figs. 17, 21.

Cell small, slightly longer than broad, deeply constricted, sinus narrowly linear with slightly dilated apex; semi cells truncate-sub semicircular, tapering evenly from rounded basal angles to flattened apex with straight margins; cell wall minutely punctate; elliptic top view; chloroplast monocentric with one pyrenoid. Cells 23.96 μm broad, 33.03 μm long; isthmus 6.58 μm long.

Habitat: Coll. No. M2-183 (03/08/2024)

10. *Cosmarium norimbergense* var. *elongatum* (West & G.S.West) Willi Krieger & Gerloff 1969 - Pl. 1, Fig 10

Prasad B. N. and Misra P. K., 1992, P. 169, Pl. 21, Fig.12.

Cell very small, deeply constricted, sinus narrowly linear; semi cells sub-rectangular, sides with a subacute undulation 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 semi cell. Cell 12.87 μm broad, 16.77 μm long; isthmus 4.20 μm long.

Habitat: Coll. No. M2-183 (03/08/2024)

11. *Cosmarium obtusatum* Schmidle 1898 - Pl. 1, Fig. 11

Hortobagyi, T. 1973, P. 114, Fig. 599.

Cells longer than broad, constricted in the middle; sinus linear with slightly dilated apex; semi cells in vertical view narrowly ellipsoid, cell margin as well as apex crenate; poles flattened, slightly exerted; two chloroplasts in each semi cells; one pyrenoid in each chloroplast.

Cells 45.70 μm broad, 52.58 μm long; isthmus 13.38 μm long.

Habitat: Coll. No. M2-190 (08/09/2024)

12. *Cosmarium portianum* W. Archer 1860 - Pl. 1, Fig 12

West W. and West G.S., 1908, P. 165, Pl. 80, Figs. 4-7

Cells small, longer than broad; median constriction moderately deep, sinus broadly open with rounded extremity; semi cells elliptic, granulate, granules rounded, arranged in vertical series or irregularly; chloroplast single, axial with single pyrenoid.

Cell 23.17 μm broad, 32.12 μm long; isthmus 6.07 μm long.

Habitat: Coll. No. M2-172 (10/07/2024)

13. *Cosmarium portianum* W. Archer. var. *nepthroidum* Wittrock.1872 - Pl. 2, Fig 1

B. N. Prasad and P. K. Misra, 1992, P. 172, Pl. 23, Fig. 13.

Cells small, longer than broad, deeply constricted, sinus gradually opening from a rounded extremity, isthmus slightly elongated, semi cells sub-reniform and granulate, granules rounded and evenly dispersed in indistinct vertical series, each semi cell with an axile chloroplast and a pyrenoid. Cell 20.77 μm broad, 30.01 μm long; isthmus 8.49 μm long.

Habitat: Coll. No. M2 183 (03/08/2024)

14. *Cosmarium portianum* W. Archer var. *portianum* - Pl. 2, Fig 2

Peter F. M. Coesel P., 2017 P. 132, Pl. 71, Figs. 14-16

Cells longer than broad with a deep, open sinus. isthmus somewhat extended. Semi cells transversally sub-elliptic. Cell wall with granules arranged in regular and longitudinal rows. Apical view elliptic.

Cell 23.97 μm broad, 32.65 μm long; isthmus 4.3 μm long.

Habitat: Coll. No. M2-169 (10/07/2024)

15. *Cosmarium punctulatum* Brebisson var. *subpunctulatum* (Nordstedt) Borgesen 1894 - Pl. 2, Fig 3

Prasad B. N. and Misra P. K., 1992, P. 176, Pl. 23, Fig. 21.

Cells small, longer than broad, very deeply constricted, sinus with slightly dilated extremity; semi cells sub quadrangular -trapezi form, basal

angles rounded, sides convex and converging upward to broadly truncate with straight margins and sharp angles; cell wall granulate, granules small to uniform, disposed evenly towards the periphery, central region with 3 transverse series of slightly bigger granules.

Cell 24.75 μm broad, 29.16 μm long; isthmus 7.40 μm long.

Habitat: Coll. No.M2-183 (03/08/2024)

16. *Cosmarium pygmaeum* Archer. 1864 - Pl. 2, Fig 4

Prasad B.N. and Misra P.K., 1992, P. 177, Pl. 21, Fig.10.

Cells small, little longer than broad, constriction deep, sinus narrowly linear; semi cells oblong hexagonal, basal and apical angles sharp, apex widely truncate with straight margin, center of each semi cell with a faint protuberance; cell wall smooth.

Cell 10.83 μm broad, 15.14 μm long; isthmus 3.87 μm long.

Habitat: Coll. No. M2-184 (03/08/2024)

17. *Cosmarium regnellii* Wille f. *minus* H. C. Boldt.1964 - Pl. 2, Fig 5

Suxena, M. R. and Venkateswarlu, V. 1968, P. 191, Pl. 5, Figs. 53 a, b.

Cells small, slightly longer than broad, deeply constricted, sinus narrow, semi cells depressed-globose; apex rounded; each semi cell with single pyrenoid.

Cell 11.81 μm broad, 13.91 μm long; isthmus 4.19 μm long.

Habitat: Coll. No. M2 183 (03/08/2024)

18. *Cosmarium reniforme* (Ralfs) W. Archer 1874- Pl. 2, Fig 6

Prasad, B. N. and Misra, P. K. 1992, P. 181, Pl. 23, Fig. 8.

Cell medium sized, slightly longer than broad, constriction deep, sinus narrow and linear with widely dilated extremity; semi cells reniform; cell wall granulates, granules fairly regular in horizontal and indistinct vertical series; chloroplast axile with two pyrenoids in each semi cell.

Cell 49.56 μm broad, 66.02 μm long; isthmus 17.99 μm long.

Habitat: Coll. No. M1-104 (06/11/2023)

19. *Cosmarium spinosporum* Lagerheim 1887 - **Pl. 2, Fig 7**

Ok Min Lee 2015, P. 29, Fig. 26

Cell is medium in size; length is similar to width. The inner side of sinus is closed, whereas outer side of sinus is open. Semi cell is oblong, and the apex of semi cell is truncate.

Cell 22.73 μm broad, 22.30 μm long; isthmus 5.19 μm long.

Habitat: Coll. No. M2-263 (06/04/2025)

20. *Cosmarium subspicosum* var. *validius* Nordstedt 1887 - **Pl. 2, Fig 8**

West W. and West G.S, 1908, P. 253, Pl. 89, Figs. 12, 13

Cells rather larger, semi cells with 7-9 lateral crenation and a larger basal tumour furnished with 7-9 vertical series of granules.

Cell 47.45 μm broad, 64.78 μm long; isthmus 16.23 μm long.

Habitat: Coll. No. M1-281 (06/07/2025)

21. *Cosmarium subprotumidum* var. *gregorii* (J. Roy et Bisset) West and West 1900 - **Pl. 2, Fig 9**

West W. and West G.S, 1908, P. 232. Pl. 86. F. 23-25.

Cell is small in size, longer than broad. Median constriction is deeply constricted and sinus is closed linearly. Semi cell oblong, trapezoid. In lateral margins, it has 3 undulations and apex margins has 4 undulations. Each undulation has 1-2 granules.

Cell 20.75 μm broad, 25.16 μm long; isthmus 6.07 μm long.

Habitat: Coll. No. M1-177 (03/08/2024)

22. *Cosmarium subimpressulum* Borge 1894. - **Pl. 2, Fig 10**

Sinha J. P. and Mishra G. D., 1967, P. 102, Fig. 2.

Cell small, longer than broad, deeply constricted in the middle; sinus linear; margins broadly undulate, apex flat; cell wall smooth; chloroplast parietal; single pyrenoid in each semi cell. Cell 18.87 μm broad, 22.74 μm long; isthmus 5.22 μm long.

Habitat: Coll. No. M2-184 (03/08/2024)

23. *Cosmarium vexatum* West 1892 - **Pl. 2, Fig 11**

Prescott, G. W. 1966, P. 23, Pl. 4, fig. 6.

Cell slightly longer than broad; sinus linear, dilated at the apex; semi cells elliptic, undulate; apex straight, chloroplast lamellate, 2 pyrenoids in each semi cells.

Cell 28.92 μm broad, 34.40 μm long; isthmus 7.07 μm long.

Habitat: Coll. No. M2-192 (08/09/2024)

24. *Cosmarium westii* C. Bernard 1908 - **Pl. 2, Fig 12**

Hinode, T. 1966, P. 28, Figs. 8, 9.

Cell almost cylindrical, globose, isthmus shallow; lateral margins subparallel and slightly convex; apex rounded; cell wall punctate; two chloroplasts lamellate with two pyrenoids.

Cells 55.29 μm broad, 98.89 μm long and isthmus 45.58 μm long.

Habitat: Coll. No. M1-295 (3/08/2025)

Conclusion

During the present study a total of 24 taxa are identified of these 15 species, 08 varieties and 01 forma of *Cosmarium* were described. The identified species serve as baseline data for further taxonomic and ecological research in the area and show that the water quality is good.

Acknowledgements

The authors are thankful to Principal and Head, Department of Botany, Sardar Vallabhbhai Patel Arts and Science College, Ainpur, District Jalgaon for providing laboratory facilities and encouragement. Also thankful to Principal and Head, Department of Botany, Dhanaji Nana Mahavidyalaya, Faizpur for inspiration and guidance. One of us (SPM) is grateful to Kavayitri Bahinabai Chaudhari North Maharashtra University, Jalgaon for grants under scheme of Vice Chancellor Research Motivation Scheme.

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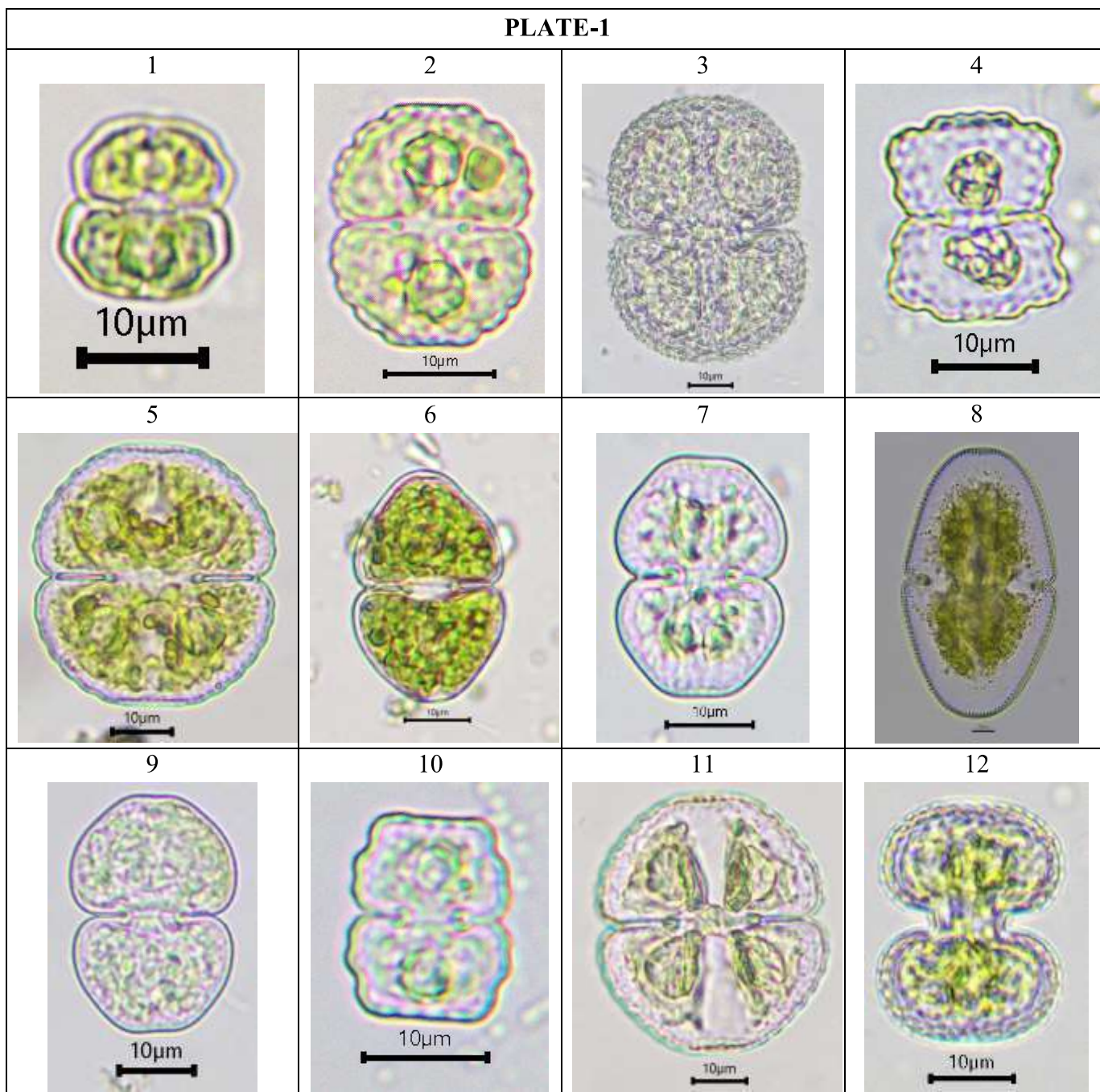
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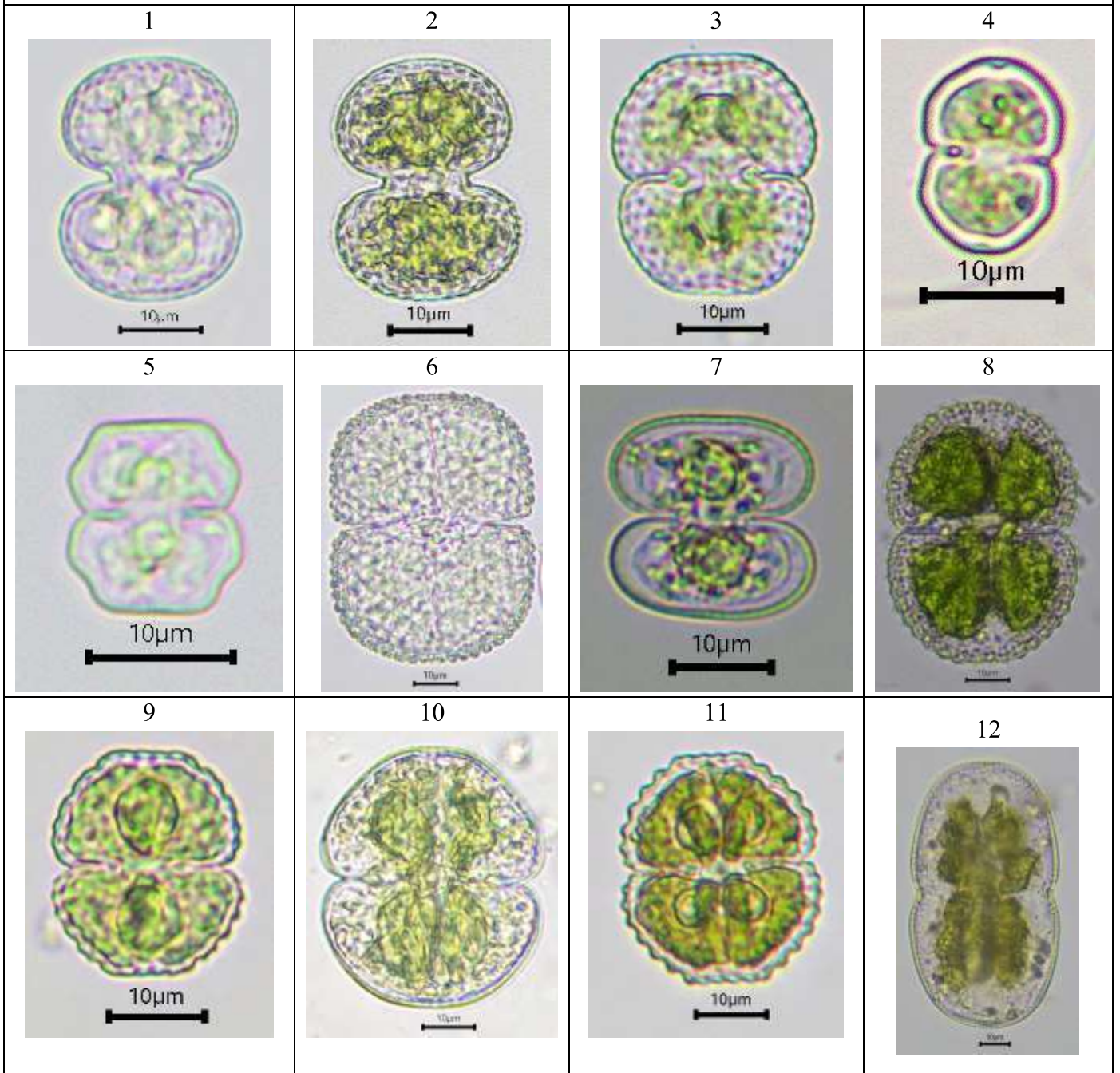
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PLATE-1



Figs. 1-12. 1. *Cosmarium angulosum* var. *concinnum* 2. *C. awadhense* 3. *C. biretum* 4. *C. divergens* 5. *C. formosulum* 6. *C. granatum* 7. *C. hammeri* var. *protuberans* 8. *C. javanicum* 9. *C. nitidulum* 10. *C. norimbergense* var. *elongatum* 11. *C. obtusatum* 12. *C. portianum* var. *nephroideum*

PLATE-2



Figs. 1-12: 1 *Cosmarium portianum* 2. *C. portianum* var. *portianum* 3. *C. punctulatum* var. *subpunctulatum* 4. *C. pygmaeum* 5. *C. regnellii* f. *minus* 6. *C. reniforme* 7. *C. subimpressulum* 8. *C. spinosporum* var. *validius* 9. *C. subprotumidum* var. *gregory* 10. *C. subimpressulum* 11. *C. vexatum* 12. *C. westii*

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