



DIVERSITY OF ALGAE FROM SAHLER FORT, TAL. BAGLAN, DIST. NASHIK, MAHARASHTRA

S. B. Andhale, V. C. Pawar and K.N. Gaikwad

^{1,2}Department of Botany, K.A.A.N.M. Sonwane Arts, Commerce and Science College,

³Principal, K.A.A.N.M. Sonwane Arts, Commerce and Science College,

Satana, Tal. Baglan, Dist. Nashik, Maharashtra.

[Mail-1\) shivaji.andhale@gmail.com](mailto:shivaji.andhale@gmail.com)

ABSTRACT:

The study focused on evaluating the taxonomic details and geographic distribution of the periphytic genera *Closterium*, *Cosmarium* and *Euastrum* in various parts of diversity of Algae from Sahler Fort. Over the course of three years from January 2024 to December 2025, sample were gathered from multiple sites around the diversity of Algae from Sahler Fort. Findings include the identification of 09 species of *Closterium*, 06 species of *Euastrum* and 12 species of *Cosmarium*, all of which were documented for the first time in this location. The highest diversity of these species was observed during the winter, followed by the monsoon and summer seasons. The physicochemical parameters of the diversity of Algae from Sahler Fort were found to be highly conducive for the growth of these taxa. This research underscores the potential of using *Closterium*, *Cosmarium* and *Euastrum* as biological indicators in freshwater ecosystems.

Keyword: - Algae, from diversity of Algae from Sahler Fort, Tal. Baglan, Nashik district, Maharashtra.

INTRODUCTION:

A preliminary survey of algae of the water body was undertaken at sites of the diversity of Algae from Sahler Fort during the years 2024-2025. Many taxa of fresh water algae have been recorded from different sites of diversity of Algae from Sahler Fort, *Closterium*, *Cosmarium* and *Euastrum* are found to be dominant species at certain sites of the water during rainy and winter season.

This appears to be significant systematic study on the Algal diversity of the diversity of Algae from Sahler Fort of Baglan, present work has under taken. The present investigation is the outcome of Biodiversity studies of fresh water algae of area and enriches our knowledge of algal flora of this diversity of Algae from Sahler Fort area. Therefore, the study of vegetation of the water body was undertaken during years 2024-2025.

During the study, a large amount of phytoplankton's like *Closterium*, *Cosmarium* and *Euastrum* were observed. However, the algal flora of diversity of Algae from Sahler Fort has not been studied so far and this is the first report. For the present study, different locations of the diversity of Algae from Sahler Fort water body were selected.

MATERIAL AND METHOD:

The algal samples from Sahler Fort site were collected once in a month in the morning, between 8.00 a.m. to 10.00 a.m. The collections were made year 2024-2025. The algal samples were collected in 100 ml capacity bottles and brought to the laboratory. They were preserved in 20 ml capacity bottles in 4 % formalin for further taxonomic investigation. In laboratory, 20 ml of water sample was preserved as described earlier. The morphological studies of specimens were done by using Olympus Research Microscope and Labomed Microscope and the photographs were taken using Kodak EazyShare cx 7330 cameras. Identification of taxa was done using Fritsch (1935), Patel and George (1977), Philipose (1967), Prescott (1951), Rath and Adhikari (2005) and other relevant literature.

1. *Closterium acerosum* Ehrenberg ex Ralfs

(Plate 1, Fig. 1)

Prasad and Misra (1992), pg. 97, Plate 16, Figure

Cells 11-15 times longer than wide. Cells slightly curve, ventral margin slightly concave. Apex truncated-rounded. Cell wall brownish striated. Chloroplast axial. Cells 334-336 μm long, center 46-48 μm in diameter, apex 3-4 μm in diameter

2. *Cl. baillyanum* (Brébisson ex Ralfs) Brébisson var. *baillyanum*, Mém. Soc. Imp. Sc.Nat.

Cherbourg

(Pl.1, Fig. 2)

Camila A. N. A., *et.al*, (2018, Vol.30 e202).

Cells 5-10 times longer than wide. Cells slightly curved with dorsal margin slightly convex; sometimes straighter in the median portion, ventral margin a bit concave. Apex truncated. Cell dense punctuations and wall with fine striae, mainly in the apical region. Chloroplast axial. Pyrenoids 5-8, arranged in a median series. Length 217-233.8 μm ; Width 23.9-35.9 μm .

3. *Cl. closterioides* (Ralfs) A. Louis & Peeters var. *closterioides*, Bull. Jard. Bot. Natl. Belg.

(Pl.1, Fig.3)

Camila A. N. A., *et.al*, (2018, Vol.30 e202).

Cells 3-4 times longer than wide. Cells straight, elliptic to fusiform, ventral margins equally convex and with both dorsal. Cell wall smooth, colorless. Apex truncated-rounded. Chloroplast axial divided incompletely and transversally. Pyrenoids 3-5, arranged in a median series. Length 92.1-142.8 μm ; Width 23.9-57.6 μm .

4. *Cl. ehrenbergii* Meneghini ex Ralfs

(Pl.1, Fig. 4)

Scott and Prescott (1961), pg.11, Plate 2, Figure 22

Cell 12-15 times longer than wise. Cells almost curved; Apex rounded and slightly curved. Chloroplast axial. Cell wall smooth, colorless. Cells 420-429 μm long, center 69-84 μm , apex 15 μm

5. *Cl. kuetzingii* Brébisson var. *kuetzingii*, Mém. Soc. Imp. Sc. Nat.

(Pl.1, Fig.5)

Camila A. N. A., *et.al*, (2018, Vol.30 e202).

Cells 15-22 times longer than wide. Cells almost straight; ventral margins equally convex and median portion fusiform with dorsal. Apex rounded and slightly curved. Chloroplast axial. Cell wall finely striated. Pyrenoids 4-6, arranged in a median series. Length 224.7-391.9 μm ; Width 14.3-17.4 μm .

6. *Cl. libellula* Focke ex Nordstedt)

(Pl.1, Fig.6)

Camila A. N. A., *et.al*, (2018, Vol.30 e202).

Cell 4-5 times longer than broad. Cells almost straight; cell wall smooth, colorless. Apex rounded; cell wall striated. Chloroplast axial divided incompletely and transversally. Pyrenoids 3-4 arranged in a median series. Cells 139-142 μm long, center 24-27 μm , apex 10 μm .

7. *Cl. leibleinii* var. *recurvatum* West & G. S. West

(Pl.1, Fig.7)

Prasad and Misra (1992), pg.110, Plate 17, Figure 16

Cell 7-8 times longer than broad. Cells almost curved; Apex rounded and slightly curved.; cell wall smooth, colorless. Chloroplast axial divided incompletely and transversally. Pyrenoids 5-6 arranged in a median series. Cells 190-198 μm long, center 31-33 μm , apex 6-7 μm

8. *Cl. pseudolunula* Borge var. *pseudolunula*, Ark. Bot.,

(Pl.1, Fig. 8)

Camila A. N. A., *et.al*, (2018, Vol.30 e202).

Cells 6-8 times longer than wide. Cells straight, elliptic to fusiform with dorsal margin slightly convex and ventral margin straight. Apex truncated-rounded. Cell wall smooth. Chloroplast axial. Pyrenoids not observed. L: 344.9-388 μm ; W: 40-57.4 μm . Figure 17-19.

9. *Cl. tumidum* L. N. Johnson var. *tumidum*, Bull. Torrey Bot.

(Pl.1, Fig. 9).

Camila A. N. A., *et.al*, (2018, Vol.30 e202)

Cells 4-5 times longer than wide. Cells slightly curved with dorsal margins convex and ventral margin slightly straight; truncated apex. Cell wall smooth, yellowish, or brownish. Chloroplast axial. Pyrenoids 3-5, arranged in a median series. Length 72.6-80.3 μm ; Width 13.5-14.8 μm .

10. *Eustrum bidentatum* Nag.

(Pl.1 Fig.10)

Rai and Misra, 2008, p 49, pl 2, f 4

Cells 45 μ long, 30 μ broad, deeply constricted, sinus slightly dilated at the extremity; isthmus narrow 6 μ wide; semicells three lobed, polar lobe with deep median incision, apical angles with short spines; lateral lobes bilobed, semicells with 5 protuberances, one large just above the isthmus, one on each lateral lobe and one on each side of apical notch in the polar lobe.

11. *E. bidentatum* Nägeli var. *bidentatum*, Gatt. Einz.

(Pl. 1, Fig. 11)

Algen, 122, pl. 7D, fig. 1a-f. 1849.

Cell 1.4-1.6 times longer than wide. Semicells semi-elliptical, Apical margin truncated-rounded, angular and

with a wide V-shaped incision, ornamented with a spine-like process. Face of semi-cell ornamented with several granules. Chloroplast axial. Median constriction deep, with closed linear sinus. Pyrenoids 1 per semi cell. Long 47.4-47.2 μm ; Width 33.4-34.6 μm ; Isthmus 7.5-7.8 μm .

12. *Euastrum ansatum* Ralfs var. *pyxidatum* Delp.

(Pl.1, Fig.12)

Prasad and Misra, 1992, p 134, pl 19, f 1

Cells small, twice as long as broad, deeply constricted, sinus narrowly linear; semicells with large undulations above the basal angles; cell wall with punctations arranged in distinct vertical series, apices subquadrate with rounded angles. Long cell 70 μm , lat. cell 37.5 μm , lat. isthmus 7.5 μm .

13. *E. spinulosum* Delp.

(Pl.1, Fig. 13)

Misra, Mehrotra, Srivastava and Kishore, 2000, p 65, pl 1, f 1

Cells small, slightly longer than broad, 46 μm in diameter and 60 μm long, deeply constricted, sinus narrow linear, semi cells 5 lobed, lateral lobes rounded and furnished with 5-6 small and acute spines, polar lobe small, broadly truncate with a shallow median notch and angles furnished with 3 small acute spines; cell wall granulate within the polar and lateral lobes, each semi-cell with a rounded central protuberance, consisting of two rows of relatively larger granules

14. *E. irregulare* Gonzalves et. Gangla.

(Pl.1, Fig. 14)

Ashtekar, 1980, p 110, pl 36, f 213

Cells usually 1½ times longer than broad, 39-40.5 μm broad, 64-65.5 μm long, isthmus 14-14.2 μm broad, deeply constricted, sinus narrowly linear, open, dilated at apex, semicells pyramidate, 5 lobed, polar lobes rounded at apex with no median incision, the lower lateral lobes rounded and unequal, much larger than the upper ones; semi-cells in the center with a large granular protuberance and with smaller granulate. Protuberances within each of the lateral lobes and within the polar lobes, semi cells in lateral view somewhat rectangular with a protuberance on each side near the base with an apical granule, elliptic in vertical view, with rounded poles and with three large rounded protuberances on each side, cell wall irregularly granulate, granules especially prominent on all the rounded angles; chloroplast solitary in each semicell with a single central pyrenoid.

15. *E. spinulosum* Delp.var.*burmense* (West et west) Krieger

(Pl.1 Fig.15)

Prasad and Misra, (1992), p 137, pl 19, f 8

Cells small, a little longer than broad, constriction deep, sinus narrow and open; each semicell 5 lobed with rounded angles; lateral lobe rotundo- truncate, polar lobe broadly truncate with faint median notch, lateral and polar lobes furnished with 5-6 unevenly disposed, prominent and acute spines; cell wall with short spines within the polar and lateral lobes and one large median and two relatively small lateral protuberances above the isthmus. Long cell 52.2 μm , lat cell 45 μm , lat. isthmus 12.5 μm .

16. *Cosmarium costatum* Nordstedt

(Pl.2, Fig.1)

West and West 1905, p. 239. pl. 87. f. 13-16.

Cell size medium, 1.1-1.3 times longer than broad; sinus closed, constriction deep; undulations with 1-2 acute granules; semi cells trapeziform with undulated margins; granules arranged below margins and in central part of semi-cell; Length 30.2-38.4 μm , width is 24-30 μm , and isthmus is 7-14.1 μm .

17. *C. pseudonitidulum* Nordstedt

(Pl.2, Fig.2)

Camila A. N. A., *et.al.*, (2019), p-45 fig. 2 (G)

Cells moderate, truncate-elliptical, about 1-1.6 times long as broad, semi cells truncate-pyramidal, sinus deep, narrow with dilated extremity; base rounded, upper angles rounded, lateral sides convex, apex truncate-convex. Cell wall punctate; length 40.2- 45 μm , breadth 33-37 μm , isthmus 17-18 μm .

18. *C. subspeciosum* Nordstedt var. *subspeciosum*, Kongl. Vet. -Akad.

(Pl. 2, Fig. 3)

Camila A. N. A., *et.al.*, (2019), p-45 fig. 2 (N)

Cells 1.3-1.4 times longer than wide. Semi-cells semicircular to pyramidal, with crenulate margins. Apex truncated-rounded, granulate. Cell wall densely granulate; granules in radial series toward the cellular center, median region with some angles. Median constriction deep. Linear median sinus closed. Chloroplast axial. Pyrenoids 2 per semi-cell. Length 43.9-49 μm ; Width 30-35.9 μm ; Isthmus 10.2-13.4 μm .

19. *C. granatum* Brébisson ex Ralfs

(Pl.2, Fig. 4)

Prescott *et. al.* 1961,
p. 146, pl. 185, figs. 1-3

Cells small, 1.4-1.5 times long as broad; constriction deep, sinus closed; semi cell trapezoid with rounded basal angles and apex; cell wall punctuated; length 30-37 μm , breadth 20-26 μm , isthmus 4-7 μm .

20. *C. dubium* Borge

(Pl.2, Fig.5)

Scott and Prescott, 1961, p 58, pl 32, f 3

Cells longer than broad, up to 1½ times as long as broad, deeply constricted, sinus linear, narrow, not dilated at the apex; semicells truncate-pyramidal, with 4 undulations on each side, apices retuse, in side view elliptic-oblong, vertical view elliptic, with inflations on each side; long cells 33 μm , lat. cell 22 μm , Isthmus 7 μm , broad; cell wall smooth; chloroplast one; axile with a central pyrenoid.

21. *C. angulatum* f. *majus* (Grunow) Turner,

(Pl. 2, Fig. 6)

Turner, 1892, p. 56, pl. 8 fig. 35; pl. 9, fig. 25.

Cells medium sized, about 1.5-2 times longer than broad; 34 μm long and 18.4 μm wide; median constriction deep, isthmus narrow, 18 μm ; sinus closed; semicells 6-angled, basal angles rounded, lateral margins

little convex above the basal angles and broadly rounded upper, lateral angles, then converging and retuse to a narrow, truncate to retuse apex.

22. *C. awadhense* Prasad & Mehrotra

(Pl.2, Fig. 7)

Misra and Srivastava, 2003, p 87, pl 1, f 21

Cells slightly longer than broad, constriction deep; sinus narrowly linear, semicell sub-semicircular, side with crenation, apex truncate with more or less straight margin, cell wall smooth, each semicell with single chloroplast. Long cell 30 µm long, lat. cell 28.5 µm, isthmus 7.5 µm.

23. *C. depressum* var. *apertum* (W. B. Turner) M. Hirano

(Pl. 2, Fig. 8)

Turner, 1892, p. 54, pl. 8, fig. 11; Paul and Sreekumar, 2015, p. 3, pl. 1, fig. 17.

Cells 23 µm long and 20 µm wide, isthmus 6 µm, cells length and breadth almost equal, constriction very deep, sinus open and acuminate ends; semicells sub-semicircular, margins and apices convex, lateral angles rounded; cell wall minutely punctate; chloroplast one in each of the sub cells.

24. *C. depressum* var. *minutum* Heimeri

(Pl. 2, Fig. 9)

Prescott *et. al.* 1981, p. 124, pl. 179, fig. 4, 5

Cells 20 µm long and 23 µm wide, isthmus 9 µm; length almost similar to breadth; deeply constricted in middle; sinus open, acute-angled; semi cells sub elliptic with convexed dorsal margin, angles thickened, obtusely rounded; cell wall smooth.

25. *C. dubium* Borge

(Pl. 2, Fig.10)

Scott and Prescott, 1961, p 58, pl 32, f 3

Cells longer than broad, up to 1½ times as long as broad, deeply constricted, sinus linear, narrow, not dilated at the apex; semicells truncate-pyramidate, with 4 undulations on each side, apices retuse, in side view elliptic-oblong, vertical view elliptic, with inflations on each side; long cells 33 µm, lat. cell 22 µm, Isthmus 7 µm, broad; cell wall smooth; chloroplast one; axile with a central pyrenoid.

26. *C. formosulum* Hoffman.

(Pl.2, Fig. 11)

Misra and Srivastava, 2003, p 87, pl 1, f 19

Cells slightly longer than wide, deeply constricted, sinus linear, semi cells are broadly ovate, margin crenate, cell wall smooth chloroplast axile. Long cell 38 µm, lat. cell 36µm, isthmus 8.5-9µm.

27. *C. hammeri* Reinsch v. *homalodermum* (Nordest) W. & G.S. West.

(Pl.5. 2 Fig. 12)

Misra, and Srivastava, 2003, p 87, pl 1, f 1

Cells medium sized, sub-hexagonal, deeply constricted, sinus narrowly linear with slightly dilated apex and opening outwards, semicells truncate-pyramidate with rounded basal angles and faintly retuse sides converging to broadly truncate apex; cell wall punctate, chloroplast axile with one pyrenoid, cell wall smooth. Long cell 80 µm,

lat. cell 70 µm, isthmus 18 µm.

RESULT AND DISCUSSION:

The current research indicates that the diversity of Algae from Sahler Fort, Tal. Baglan, Dist. Nashik district are abundant and varied. Among the genera studied, *Closterium* is the most prevalent, comprising 09 species of *Closterium*, 06 species of *Euastrum* and 12 species of *Cosmarium*, have four species represented. Regular seasonal surveys are critical for the thorough documentation of these species. The rapid urbanization and environmental degradation in the area are causing a swift reduction in freshwater habitats. Consequently, it is vital to conserve these environments to protect the algal communities. There is a pressing need for widespread awareness to safeguard these habitats, which is crucial for sustaining ecological balance. Given their high species diversity, these habitats are suitable for monitoring the ecological health of the region. Additionally, conducting comprehensive limnological studies in these areas will further support their use in ecological monitoring.

REFERENCE:

- Ashtekar, P.V. (1980)** *Studies on the freshwater algae of Aurangabad district*. Ph.D. thesis, Marathwada University, Aurangabad.
- Camila A. N. A., Et.al**, (2018, Vol.30 e202.) Desmids (Zygnematophyceae) from the littoral zone of an urban artificial lake: taxonomic aspects and geographical distribution, *Acta Limnologica Brasiliensia*.
- Camellia Nandi, Et al. (2019)**, New and Rare Records of *Cosmarium* (Desmidiaceae, Zygnematales) from India, *An International Journal of Plant Sciences*, P 41-49
- Misra, P.K., R.K. Mehrotra, Jai Prakash, A.K. Srivastava and S. Kishore (2000)** Fresh water planktonic algae from Basti, Uttar Pradesh. *Geophytology* **30** (1 & 2): 61-73.
- Misra, P.K., R.K. Mehrotra, Jai Prakash, A.K. Srivastava and S. Kishore (2000)** Fresh water planktonic algae from Basti, Uttar Pradesh. *Geophytology* **30** (1 & 2): 61-73.
- Prasad, B.N. and P.K. Misra (1992)** *Fresh water algal flora of Andaman and Nicobar Islands*, Vol. II, Bishen Singh Mahendra Pal Singh, Dehra Dun.
- Prescott, G.W. (1951)** *Algae of the Western Great Lakes Area*, Cranbrook Institute of Science, Michigan.
- Rai, S.K. and P.K. Misra (2008-a)** On some desmids from Koshi Tappu Wildlife Reserve, Nepal. *Ecoprint* **15**: 47-58.
- Rai, S.K. , B.R. Subba and K.P. Limbui (2008)** Fresh water algae from running streams of Gajurmukhi VDC, Ilam Nepal. *Our Nature* **6**: 80-81.
- Scott, A.M. and G.W. Prescott (1961)** Indonesia Desmids. *Hydrobiologia* **17** (1-2): 1-132.
- West, W. and G.S. West (1905)** *A monograph of the British Desmidiaceae*, Ray Society, London, Vol.2, p 180.

PLATE - 1

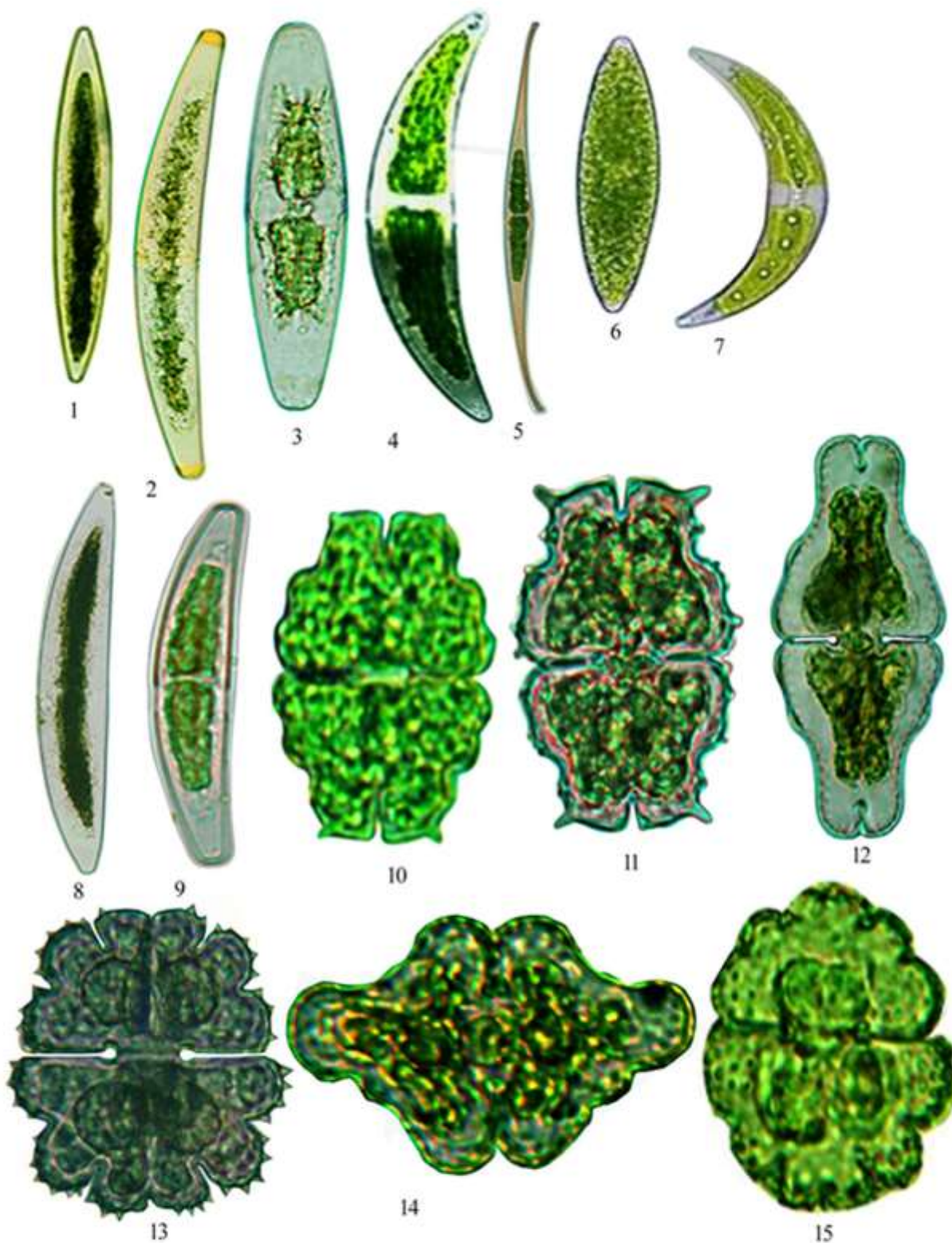


Fig. 1. *Closterium acerosum* 2. *Cl. baillyanum* var. *baillyanum* 3. *Cl. closterioides* var. *closterioides* 4. *Cl. ehrenbergii* 5. *Cl. kuetzingii* var. *kuetzingii* 6. *Cl. libellula* 7. *Cl. libellula* var. *recurvatum* 8. *Cl. pseudolunula* var. *pseudolunula* 9. *Cl. tumidum* var. *tumidum* 10. *Euastrum bidentatum* 11. *Euastrum bidentatum* var. *bidentatum* 12. *Euastrum ansatum* var. *pyxidatum* . 13. *E. spinulosum* 14. *E. irregulare* 15. *E. spinulosum* var. *burmense*

PLATE - 2

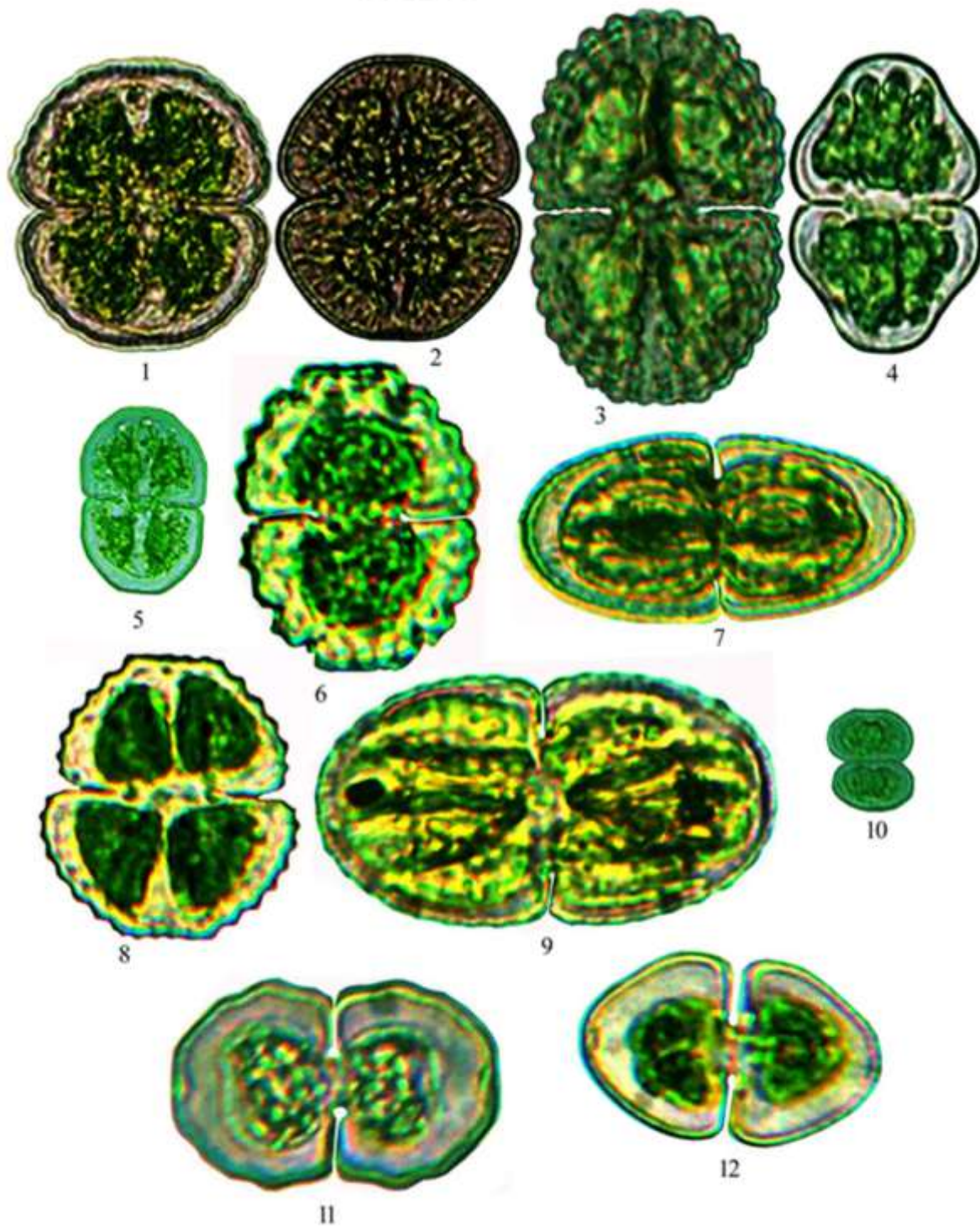


Fig. 1 *Cosmarium costatum* 2. *C. pseudonitidulum* 3. *C. subspicosum* var. *subspicosum* 4. *C. granatum* 5. *C. dubium* 6. *C. angulatum* f. *majus* 7. *C. awadhense* 8. *C. depressum* var. *apertum* 9. *C. depressum* var. *minutum* 10. *C. dubium* 11. *C. formosulum* 12. *C. hammeri* v. *homalodermum*