

ALGAL DIVERSITY OF LOKTAK LAKE, MANIPUR

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ABSTRACT

One hundred and five taxa belonging to 40 genera were recorded from different sites of Loktak lake. Out of these 6 species belong to 4 genera of Cyanophyceae, 2 species to a genus of Euglenophyceae, 90 species to 28 genera of Chlorophyceae, 1 species to a genus of Charophyceae and 6 species to 6 genera of Bacillariophyceae. The number of Chlorophyceae was about 80 % of the total algal taxa. The members of Desmids (Zygnematales) are more diversified amounting to 87% of Chlorophyceae. In 2007 during survey of Loktak lake, 85 additional algal forms were recorded from this habitat. However, several algal taxa reported earlier in the lake were not observed in the present study.

Key words : Algae, Loktak Lake, Manipur.

INTRODUCTION

Loktak lake is the largest fresh water lake in north-eastern India. It is also called the only “floating lake” in the world due to floating phundies on it. It is located near Moirang in Manipur state (latitude 24°30'26"N and longitude 93°47'20"E). It was designated as a wetland of International importance under the Ramsar Convention in 1990. It is an ancient lake and plays an important role in the economy of Manipur, also serving as a source of water for hydropower generation, irrigation and drinking water supply. The Loktak lake occupies a variable area in the southern part of the valley and is fed by hilly streams with scanty aquatic vegetation; most of these streams arise in the Naga Hills. The lake itself occupies one of the several depressions met within the Manipur valley. Most of these, dry up more or less during the winter season. At no time it is little more than a large, deep swamp, though in places the depth reaches ten feet. It is now largely filled with submerged vegetation; a considerable part is covered with floating islands formed of living and decayed plants. The bottom of the lake is composed of evil-smelling mud containing much rotten vegetation. Since the earlier work of Turner (1892), West and West (1907) and Brühl and Biswas (1926), the algal flora of this lake has not been surveyed during the last eight decades to assess the changes of their occurrence if any over time.

MATERIALS AND METHODS

Totally 36 samples were collected from 5 different sites of Loktak lake in a survey during March 2007. These sites were: Pen culture area, Sendra; Sendra fishing village, near Loktak Development Authority office; Boating Ghat near Para Military security office and from Sendra (Plate 1: 1 - 6). The location of each site was determined with Garmin 12 GPS receiver. All the samples were collected in clean sterilized specimen tubes (Tarsons) by using forcep and needle and the plankton samples collected by plankton net (25 µm pore size). Microphotographs of each specimen was taken using Meiji trinocular research microscope fitted with Nikon coolpix 4500 digital camera. Cell dimensions of the specimen was measured following micrometry procedure and organisms were identified following standard monographs (Kützing 1865, Turner 1892, West & West 1904, 1905, 1907, 1908, West & al. 1923, Brühl & Biswas 1926, Huber-Pestalozzi 1955, Desikachary 1959, Randhawa 1959, Pal & al. 1962, Philipose, 1967, Komárek & Fott 1983, Kadlubowka 1984, Desikachary 1989, Dillard 1989, Kant & Gupta 1998, Krishnamurthy 1998, Wolowski 1998, Komárek & Jankovská 2001, Komárek & Anagnostidis 2005). Each sample was assigned with a voucher number along with the date of collection, fixed in 4% formaldehyde and deposited at the P. G. Department of Botany, Utkal University, Bhubaneswar, Orissa for record.

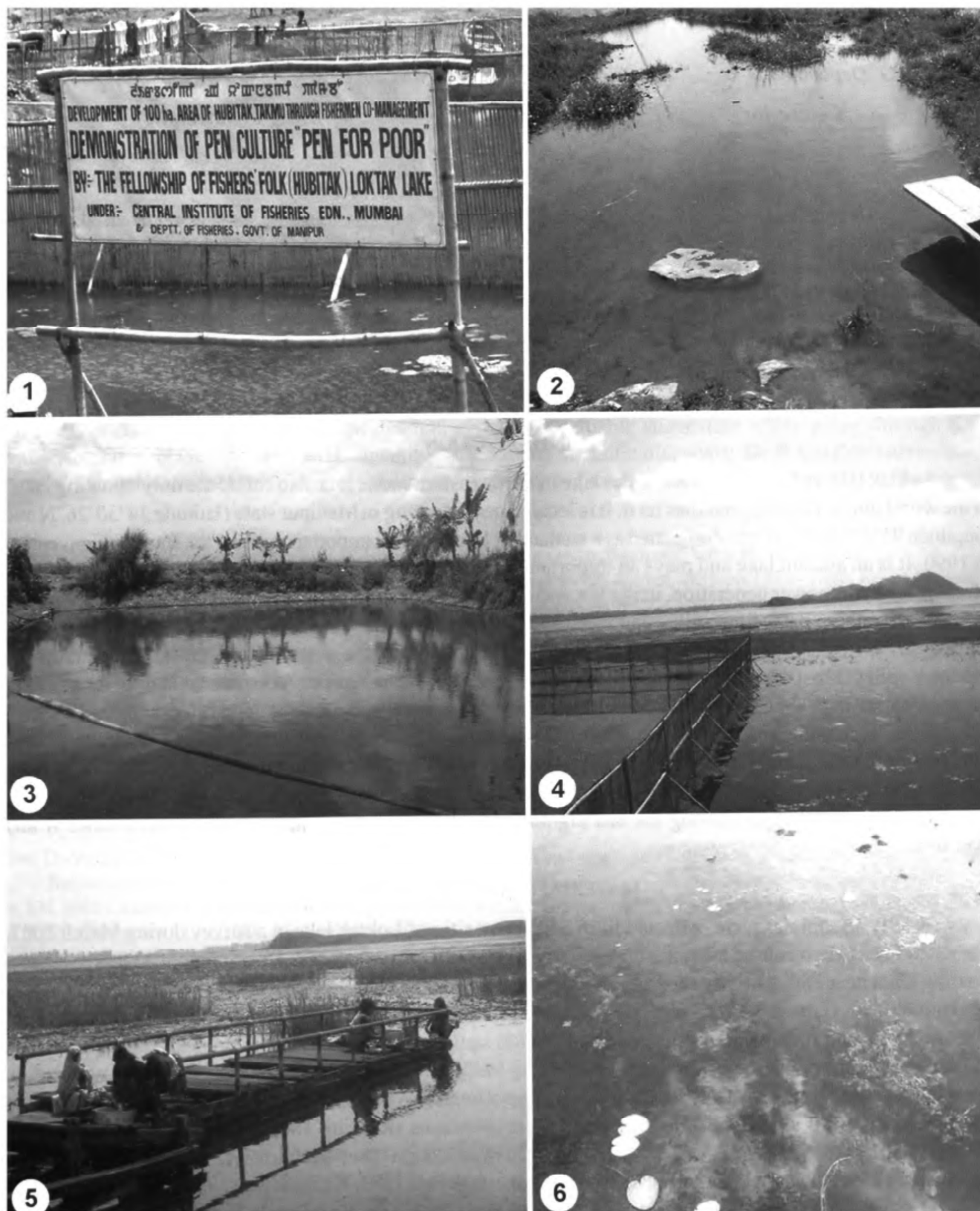


Plate 1: 1-6. Photographs showing the collection sites at Loktak lake: 1 & 2. Pen culture area near Sendra village of Loktak lake, 3 & 4. Lake site at Loktak development authority office, Sendra village, 5. Pond in Sendra fishing village, 6. Submerged algal growth in Loktak lake.

Systematic Enumeration:

CYANOPHYCEAE (CYANOBACTERIA/ CYANOPROKARYOTA)

Order: NOSTOCALES

1. *Oscillatoria princeps* Vaucher ex Gomont (Pl.2.1)

Thallus blackish green to yellowish-green; trichome straight, not constricted, at cross walls; end cell rounded mostly straight or slightly curved; cell 40 - 46.6 μm broad, 4.4 - 7.5 μm long, occasionally with a thin sheath.

Epiphytic on grass, 1122, 24.03.2007.

2. *Oscillatoria tenuis* C.Agardh ex Gomont (Pl.2.2)

Thallus yellowish-green; trichome single, long, straight or very slightly irregularly curved, not constricted or very slightly constricted at cross walls, without calyptra, hemispherical or truncate, end cells rounded; cells 9 - 11 μm broad, 4 - 7 μm long, apical cell not capitate.

Epiphytic on grass, near boating site, Sendra, 1129, 25.03.2007.

3. *Lyngbya cincinnata* (Itzigs.) Compère (Pl.2.3)

Thallus blackish-green; trichome long, bent, 16 - 21 μm broad; apical cell rounded; sheath 2 - 3 μm thick; cells 14 - 18 μm broad, 2 - 4 μm long, slightly constricted at granulated cross walls.

Epiphytic on aquatic weed, 1124, 24.03.2007.

4. *Lyngbya magnifica* N.L.Gardner (Pl.2.4)

Thallus blackish-green; trichome rigid, long, straight; 30 - 40 μm broad; apical cell rounded; sheath 2.5-5.5 μm thick; cells 27 - 38 μm broad, 3.8 - 5.5 μm long, not constricted at cross walls.

Epiphytic on aquatic weed, 1124, 24.03.2007.

5. *Anabaena torulosa* Lagerh. ex Bornet & Flahault (Pl.2.5)

Thallus bluish-green; trichome slightly bent, without sheath; cells quadrate or barrel shaped, slightly constricted at the middle, 3 - 5 μm broad and 4 - 6 μm long; heterocysts barrel shaped 4 - 5.5 μm broad and 5 - 7 μm long, end cell acutely conical.

Epiphytic on grass, 1122, 24.03.2007.

6. *Gloeotrichia echinulata* (Smith) P.Richter var. *berhampurensis* C.B.Rao (Pl.2.6)

Thallus yellowish brown; trichomes single, sheath thick; cell with sheath 6 - 13.5 μm broad, trichome 280 - 407 μm long; cells at base barrel-shaped, quadrate or elliptical, 5 - 11.2 μm long, apex cells cylindrical, 3.7 - 8.7 μm broad, 5 - 12.5 μm long, basal cells gas vacuolated: heterocyst basal, single, spherical to sub-spherical, 10 - 14 μm broad; spores cylindrical, 7.5 - 11.2 μm broad, with sheath 10 - 17.5 μm broad, 22 - 84 μm long.

Epiphytic on aquatic weed, 1121, 23.03.2007.

EUGLENOPHYCEAE

Order: EUGLENALES

7. *Euglena proxima* P.A.Dang. (Pl.2.7)

Cells green, fusiform; blunt towards the anterior end, tapered gradually to a pointed posterior end; changing shape markedly by contraction or bulging, easily rounding up on irritation; chloroplast numerous, irregularly disc shaped; paramylum bodies numerous, small rod shaped and scattered throughout the cell; cell 50 - 95 μm long, 15 - 21 μm broad; cyst rounded, 23 - 30 μm diameter.

Planktic (polluted water near village), Sendra fishing village, 1125, 25.03.2007.

8. *Euglena sociabilis* P.A.Dang. (Pl.2.8)

Cells deep green, spindle shaped, or ellipsoid; anterior end conical, posterior end tapered to a tail (cauda), blunt; chloroplast numerous, spindle shaped; paramylum bodies discoid; cell 76 μm long and 25 μm broad.

Planktic (polluted water near village), Sendra fishing village 1126, 25.03.2007.

CHLOROPHYCEAE

Order: CHLOROCOCCALES

9. *Pediastrum duplex* Meyen var. *asperum* (A.Braun) Hansg. (Pl.2.9)

[*Synonym: Pediastrum pertusum* var. *asperum* A.Braun]

Coenobia 16 - 32 - 64 celled, 90 µm in diameter, small lens shaped perforation between cells, inner cells quadrate to angular and in contact at the central portion of the side wall, inner side of marginal cells concave, outer sides produced into two short truncate processes; chloroplast single and parietal with a pyrenoid; cells 8 - 18 µm in diameter.

Epiphytic on submerged and emergent grasses near boating site, Sendra, 1129 & 1130, 25.03.2007.

10. *Pediastrum duplex* Meyen var. *duplex* Sulek. (Pl.2.10)

[*Synonym: Pediastrum pertusum* Kütz.]

Coenobia 16 celled, 50 - 70 µm in diameter, intercellular spaces large and oval in between the inner cells; cells more or less H-shaped with marginal sides, cells nearly parallel; chloroplast single and parietal with a distinct pyrenoid; cells 12 - 15 µm in diameter.

Epiphytic on grass, 1127, 25.03.2007.

11. *Pediastrum simplex* Meyen var. *biwaense* Fukush. (Pl.2.11 & 12)

Coenobia 16 - 32 or more celled, circular; large intercellular spaces or a single central space with the cells arranged in a ring at the periphery; inner face of marginal cells concave, outer face prolonged into a single tapering process; side of marginal cells concave or nearly straight; inner cells similar to marginal cells but short in processes; cell wall smooth or slightly punctuate; cells 7 - 20 µm broad and 10 - 35 µm long; coenobia up to 130 µm in diameter.

Planktic in lake, 1120, 23.03.2007.

12. *Pediastrum simplex* Meyen var. *simplex*. (Pl.2.13)

[*Synonym: Pediastrum ovatum* (Ehrenb.) A.Braun]

Coenobia circular, 8 - 16 celled coenobia up to 80 - 85 µm in diameter; large intercellular spaces or a central space with the cells arranged in a ring at the periphery, inner side of marginal cells concave, outer surface prolonged into a single delicately tapering process, sides of marginal cells concave or straight, internal cells similar to marginal cells with shorter process, cell wall smooth; chloroplast single and parietal; cells 12 - 15 µm broad and 20 - 25 µm long.

Epiphytic on aquatic weeds, 1121, 23.03.2007.

13. *Pediastrum simplex* Meyen var. *sturmii* (Reinsch) Wolle (Pl.2.14)

[*Synonym: Pediastrum sturmii* Reinsch; *Pediastrum sturmii* var. *crenulatum* Prescott]

Coenobia 8 - 16 celled, inner side of marginal cells nearly straight, outer side produced into a gradually tapering process, sides concave, cells polygonal, cells in contact with adjacent cells without intercellular spaces; chloroplast single and parietal, cell wall smooth, cells 5 - 13 µm broad and 20 - 30 µm long.

Planktic in pond (polluted water), Sendra fishing village, 1126, 25.03.2007.

14. *Ankistrodesmus falcatus* (Corda) Ralfs (Pl.2.15 & 16)

[*Basionym: Micrasterias falcata* Corda]

[*Synonym: Ankistrodesmus biplex* (Reinsch) G. S. West; *Ankistrodesmus lundbergii* Koršikov]

Coenobia 2 - 4 - 8 celled, cells fasciculate bundles; cells acicular to narrowly fusiform with the ends tapering to acute apices; chloroplast single, parietal and without pyrenoid; cells 2 - 3 µm broad and 20 - 165 µm long.

Planktic (polluted water near village), Sendra fishing village, 1125, 25.03.2007.

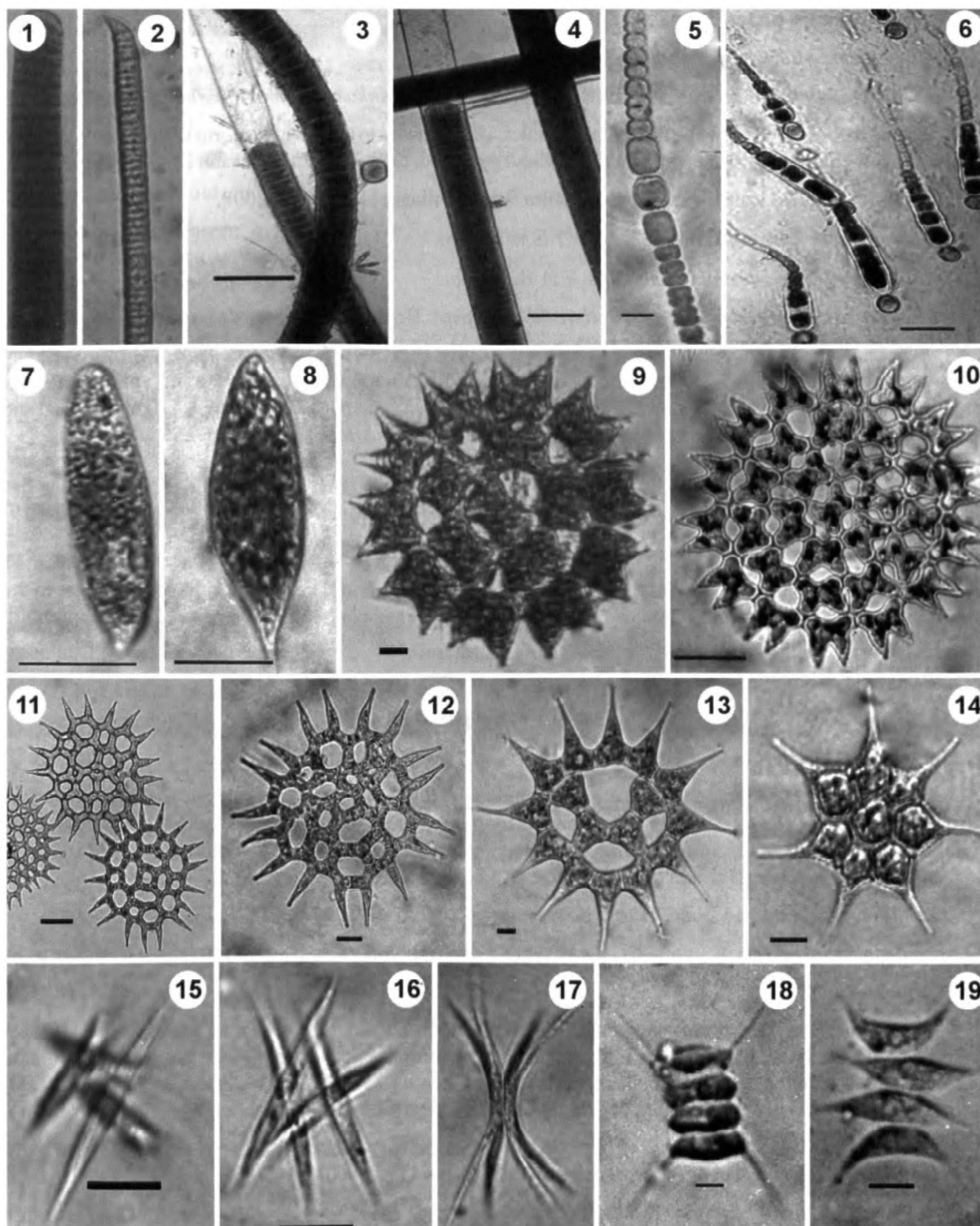


Plate 2: 1. *Oscillatoria princeps* Vaucher ex Gomont; 2. *Oscillatoria tenuis* C.Agardh ex Gomont; 3. *Lyngbya cincinnata* (Itzigs.) Compère; 4. *Lyngbya magnifica* N.L.Gardner; 5. *Anabaena torulosa* Lagerh. ex Bornet & Flahault; 6. *Gloeotrichia echinulata* (Smith) P.Ritcher var. *berhampurensis* C.B.Rao; 7. *Euglena proxima* P.A.Dang.; 8. *Euglena sociabilis* P.A.Dang.; 9. *Pediatrum duplex* Meyen var. *asperum* (A.Braun) Hansg.; 10. *Pediatrum duplex* Meyen var. *duplex* Sulek; 11 & 12. *Pediatrum simplex* Meyen var. *biwaense* Fukush.; 13. *Pediatrum simplex* Meyen var. *simplex*; 14. *Pediatrum simplex* Meyen var. *sturmii* (Reinsch) Wolle; 15 & 16. *Ankistrodesmus falcatus* (Corda) Ralfs; 17. *Ankistrodesmus tortus* Komárek & Comas; 18. *Desmodesmus communis* (E.H.Hegew.) E.H.Hegew.; 19. *Scenedesmus acuminatus* (Lagerh.) Chodat var. *minor* G.M.Sm. (Scale bar, Figs. 1 - 4, 6, 9 - 19 = 10 μ m, 5, 7, 8 = 20 μ m).

15. Ankistrodesmus tortus Komárek & Comas

(Pl.2.17)

[*Basionym: Micrasterias falcata* Corda][*Synonym: Ankistrodesmus biplex* (Reinsch) G.S. West; *Ankistrodesmus lundbergii* Koršikov]

Coenobia 2 - 4 - 8 celled, cells fasciculate bundles; cells acicular to narrowly fusiform with the ends tapering to acute apices; chloroplast single, parietal and without pyrenoid; cells 2 - 3 μm broad and 20 - 165 μm long.

Planktic (polluted water near village), Sendra fishing village, 1126, 25.03.2007.

16. Desmodesmus communis (E.H.Hegew.) E.H.Hegew.

(Pl.2.18)

[*Basionym: Scenedesmus communis* E.H.Hegew.]

[*Synonyms: Scenedesmus quadricauda* (Turpin) Brébisson; *Scenedesmus longus* Meyen; *Scenedesmus caudatus* Corda; *Scenedesmus westii* (G.M.Sm.) Chodat]

Coenobia 2 - 4 celled; cells oblong cylindrical with rounded ends, long curved spine; cell wall smooth, cells broader than long; chloroplast single and parietal without pyrenoid; cells 9.6 - 10.6 μm broad and 24.5 - 27.3 μm long.

Epiphytic on aquatic weed, 1121, 23.03.2007.

17. Scenedesmus acuminatus (Lagerh.) Chodat var. **minor** G.M.Sm.

(Pl.2.19)

[*Synonym: Scenedesmus falcatus* Chodat]

Coenobia 4 celled; outer cell of the coenobia less lunate, the central cell of the colony at an angle to the axes of the terminal cells instead of the being parallel to them; chloroplast single and parietal with a pyrenoid; cells 3 - 7 μm broad and 20 - 34 μm long.

Epiphytic on aquatic weed, 1121, 23.03.2007.

Order: CLADOPHORALES

18. Cladophora glomerata (L.) Kütz.

(Pl.3.1 & 2)

Filaments branched, branches making acute angle with the axis; verticillate in lower portions, solitary in upper portions, crowded in the upper limits, rhizoids long; aseptate developing from the base of the axis; cells attenuated towards the apices, bluntly pointed, cells of the main axis 30 - 80 μm in diameter and 200 - 400 μm long, cells of the branches 45 μm in diameter and 140 - 175 μm long.

Epilithic on submerged stone, Takmu fisheries area, Sendra, 1119, 23.03.2007.

Order: OEDOGONIALES

19. Bulbochaete sp.

(Pl.3.3)

Thallus branched, vegetative cells 9 - 12 μm broad and 8 - 35 μm long, division of sulffultory cell basal or lacking ; vegetative cells widening towards distal end, terminal cells of branches and of the main axis always provided with long setae, branches obliquely form the distal end of vegetative cells; the first new cell forming a bulbous based seta on its upper end. Species not identified because it is a young filaments it's not having antheridia and oogonia.

Epiphytic on aquatic weed, Takmu fisheries area, Sendra, 1118, 23.03.2007.

Order: ZYGNEMATALES (Desmids)

20. Bambusina brébissonii Kütz. ex Kütz.

(Pl.3.4)

[*Synonym: Gymnozyga moniliformis* Ehrenb. ex Ralfs]

Unbranched filamentous; cells are united by either apices to form filaments, cell shaped like of two flower-pots, one being placed upside down on the other, median constriction very straight semicells inflated at the base and flattened at the apex; cells 20 - 30 μm long and 10 - 18 μm broad.

Epiphytic on grass, 1122 & 1123, 24.03.2007.

21. *Closterium acerosum* (Schrank) Ehrenb. var. *elongatum* Bréb. (Pl.3.5)

Cells solitary, green, straight central part cylindrical, attenuated towards apex; no curvature at the middle, apex obtuse; cell wall irregular, but finely striated; chloroplast constricted at the middle and divided into two parts; cells 10 - 15 times longer than broad; 220 - 300 µm long and 15 - 25 µm broad.

Planktic and epiphytic on aquatic weed, 1120 & 1121, 23.03.2007.

22. *Closterium arcuatum* Bréb. (Pl.3.6)

Cells solitary, green, lunate, inner margin concave, middle portion parallel, straight, slightly attenuated towards the ends; obtusely rounded ends; cell wall smooth; chloroplasts single, axial not at the ends; cells 120 - 140 µm long and 10 - 20 µm broad.

Epiphytic on grass, 1122, 24.03.2007.

23. *Closterium calosporum* Wittr. var. *maius* (W. West & G.S. West) Willi Krieger (Pl.3.7)

[*Synonym: Closterium calosporum* Wittr. f. *major* W. West & G.S. West]

Cells solitary, green, semilunate, gradually, attenuated; inner ventral side concave; wider at the central part, apex-obtuse; chloroplast axial, slightly constricted at the apex with two to five longitudinal ridges, granular; cell wall smooth; cells 5 - 8 times longer than broad; 220 - 250 µm long and 20 - 40 µm broad.

Epiphytic on grass, 1122, 24.03.2007.

24. *Closterium dinnae* Ehrenb. ex Ralfs. (Pl.3.8)

Cells solitary, strongly curved, with less pronounced curvature at the central part; attenuated towards apex; central part of the ventral side is slightly convex; dorsal side is distinctly inflated; apex obtuse; cell wall smooth; chloroplast single axial; cells 8 - 10 times longer than broad; 100 - 170 µm long and 10 - 20 µm broad.

Epiphytic on grass, 1122, 24.03.2007.

25. *Closterium dinnae* Ehrenb. ex Ralfs var. *pseudodinnae* (J.Roy) Willi Krieger (Pl.3.9)

[*Synonym: Closterium pseudodinnae* J.Roy]

Cells solitary brownish-green, lunate, curved; central part obtuse, gradually broader, slightly swollen at the middle; attenuated towards apex; cell wall brown; chloroplast single, axial, pyrenoids small arranged in a single row at the middle; absent at the apex; cells 200 - 300 µm long, 10 - 15 µm broad at the middle and 5 - 7 µm broad at the apex.

Epiphytic on grass and planktic in lake, 1127 & 1128, 25.03.2007.

26. *Closterium ehrenbergii* Menegh. var. *ehrenbergii* f. *maninvernianum* (De Not.) Rabenh. (Pl.3.10)

Cells solitary, green, curved, inner ventral margin concave, dorsal margin convex, gradually attenuated towards the apex, central part wider; apex semi-obtuse or rounded; chloroplast single axial, longitudinally ridged, pyrenoids many, at the apex granular; cells 200 - 350 µm long and 20 - 35 µm broad.

Epiphytic on grass and planktic in lake, 1127 & 1128, 25.03.2007.

27. *Closterium idiosporum* W. West & G.S. West (Pl.3.11)

Cells solitary, green, long, central part cylindrical and straight, poles curved and attenuated, apex broadly truncate; cell wall smooth with pseudo-girdles; chloroplast axial; cells 10 - 15 times longer than broad; 125 - 175 µm long and 8 - 15 µm broad.

Epiphytic on grass, 1127, 25.03.2007.

28. *Closterium incurvum* Bréb. (Pl.3.12)

Cells solitary, small green, arcuate, curvature, at the middle of central part, gradually attenuated towards pole, apex slightly acute or obtuse, inner margin concave; cell wall smooth; chloroplasts constricted at the middle and separated to two part, axial, not at the pole; cells longer than broad 2.5 - 10 µm.

Epiphytic on weed near boating site, Sendra, 1130, 26.03.2007.

29. Closterium kützingii Bréb. (Pl.3.13)

Cells solitary, green, central part, semi-spindle, long, straight attenuated towards end to long setae, ends semi-obtuse; chloroplast axial, present at the central part, pyrenoids not found; cells 420 - 480 µm long and 12 - 20 µm broad at the apices 5 - 3 µm.

Epiphytic on weed near boating site, Sendra, 1130, 26.03.2007.

30. Closterium lanceolatum Kütz. ex Ralfs. (Pl.3.17)

Cells solitary, long, lanceolate, elongated, central part cylindrical, straight, gradually attenuated towards apex; apex obtuse; chloroplast slightly constricted at the middle, pyrenoids many arranged in a single ridge; cells 200 - 350 µm long and 35 - 55 µm broad and at the apex 10 - 20 µm broad.

Epiphytic on grass, 1127, 25.03.2007.

31. Closterium loktakense Brühl & Biswas (Pl.3.18)

Cells solitary, green, long, fusiform, gradually attenuated, central part curvature, latero-ventral and middle part, acute-inflated, apex sub-obtuse; cell wall smooth; chloroplast single, slightly constricted at the middle; cells 3 - 5 times longer than broad; cells 130 - 150 µm long and 20 - 30 µm broad.

Planktic in lake, 1128, 25.03.2007.

32. Closterium lunula (O.F. Müll.) Nitzsch ex Ralfs var. coloratum G.A.Klebs (Pl.3.14 & 15)

Cells solitary, elongated, semilunate, gradually attenuated towards the end; margin of dorsal side convex and inner ventral side inflated, no curvature at the middle of central part, chloroplast with longitudinal linear ridge, constricted and separated at the middle, granular, at the ends granular; cells 150 - 350 µm long and 20 - 40 µm broad.

Epiphytic on grass, 1127, 25.03.2007.

33. Closterium ralfsii Bréb. ex Bréb. var. hybridum Rabenh. (Pl.3.16)

Cells solitary, long, shape spatulate from central part to towards pole, gradually attenuated towards poles, distinct curvature at the middle of central part, cylindrical dorsal side margin acute inflated; apex long obtuse; cell wall smooth; chloroplast axial, constricted at the middle not at the apex, granulated CELLS 6 - 10 times longer than broad; 200 - 300 µm long and 20 - 60 µm broad.

Planktic in lake, near prawn culture area, Sendra, 1128, 25.03.2007.

34. Cosmarium askenasyi Schmidle (Pl.4.1)

Cells solitary, green, longer than broad, sides converging upwards from a wide base to some what narrow and flattened apex, deeply constricted at the middle, sinus narrowly linear and slightly open outwards, basal angles rounded and apical angles not rounded; semicells with 2 - 3 small protuberance just above the basal angles at lateral sides; cell smooth; chloroplast single, axial; cells 90 - 120 µm long, 70 - 90 µm broad, isthmus 40 - 50 µm broad.

Epiphytic on grass, 1127, 25.03.2007.

35. Cosmarium candianum Delponte (Pl.4.2)

[Synonym: *Cosmarium circulare* Reinsch]

Cells solitary; front view elliptic - circular; lateral view sub-circular, variety oblong-rhomboids; deeply constricted; sinus narrowly linear with dilated apex, basal angle acute rounded; semicell-semicircular; outer margin slightly prostrate; cell wall smooth; chloroplast axial; cell wall smooth; cells 30 - 36 µm long, as well as broad; isthmus 15 - 20 µm broad.

Epiphytic on grass, 1127, 25.03.2007.

36. Cosmarium ellipsoidale Brühl & Biswas (Pl.4.3)

Cells solitary, medium size; ellipsoidal, in front view prolong-elliptic, deeply constricted, sinus

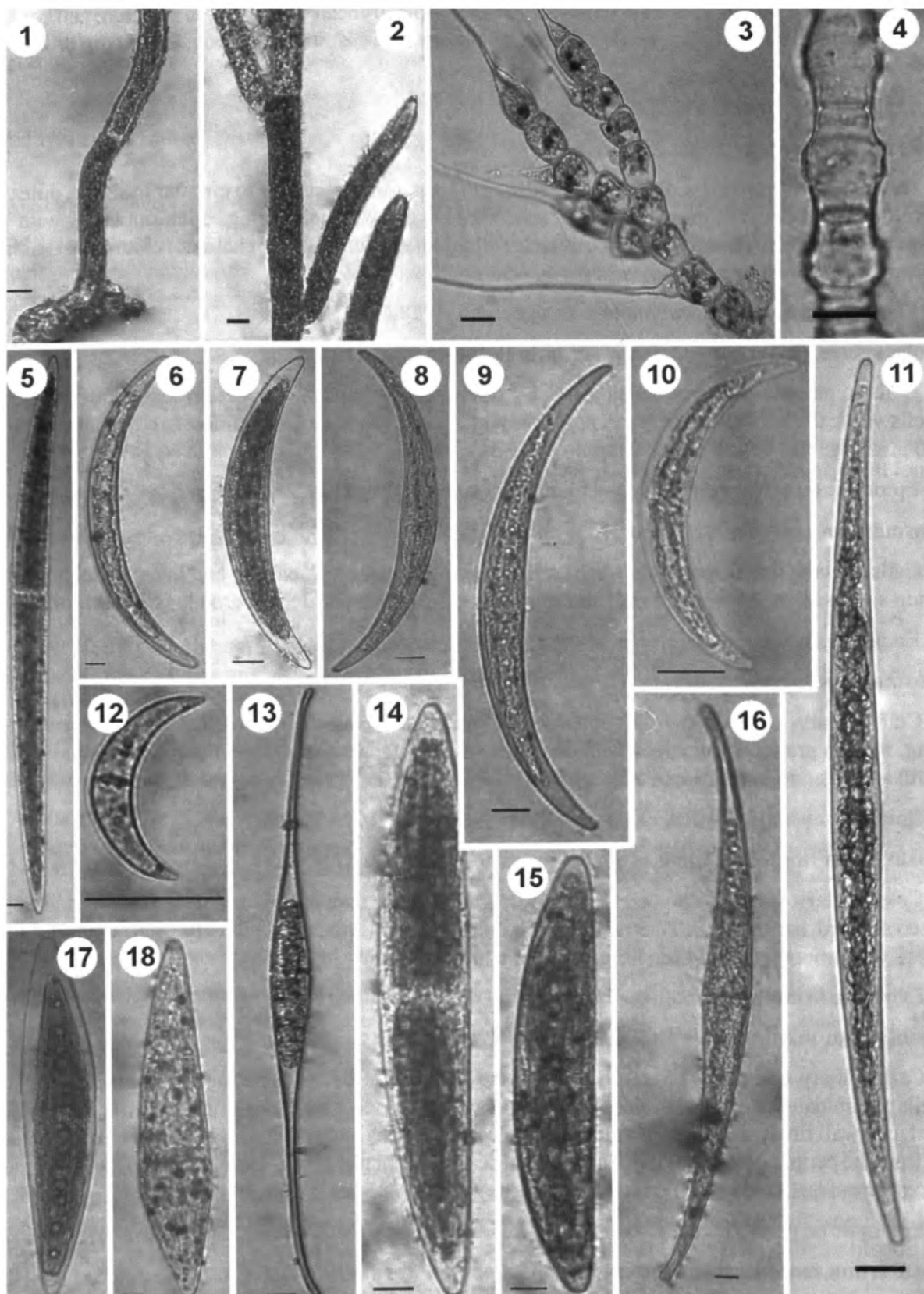


Plate 3: 1 & 2. *Cladophora glomerata* (L.) Kütz.; 3. *Bulbochaete* sp.; 4. *Bambusina brébissonii* Kütz. ex Kütz.; 5. *Closterium acerosum* (Schränk) Ehrenb. var. *elongatum* Bréb.; 6. *Closterium arcuatum* Bréb.; 7. *Closterium calosporum* Witttr. var. *maius* (W. West & G. S. West) Willi Krieger; 8. *Closterium dinnae* Ehrenb. ex Ralfs; 9. *Closterium dinnae* Ehrenb. ex Ralfs var. *pseudodinnae* (J. Roy) Willi Krieger; 10. *Closterium ehrenbergii* Menegh. var. *ehrenbergii* f. *maninvernianum* (De Not.) Rabenh.; 11. *Closterium idiosporum* W. West & G.S. West; 12. *Closterium incurvum* Bréb.; 13. *Closterium kützingii* Bréb.; 14 & 15. *Closterium lunula* (O.F. Müll.) Nitzsch ex Ralfs var. *coloratum* G.A. Klebs; 16. *Closterium ralfsii* Bréb. ex Bréb. var. *hybridum* Rabenh.; 17. *Closterium lanceolatum* Kütz. ex Ralfs; 18. *Closterium loktakense* Brühl & Biswas (Scale bar, Figs. 1, 2 = 30 μ m, 3, 11 = 20 μ m, 4 10, 12 - 18 = 10 μ m).

linear, semicells semi-elliptic, margin uniformly convex, apex truncate; apical angle rounded; cell wall margin granular with crenate; chloroplast single axial, pyrenoids many; cells 80-96 μm long; 65 - 80 μm broad; isthmus 15 - 30 μm .

Epiphytic on grass, 1127, 25.03.2007.

37. *Cosmarium forceps* Brühl & Biswas (Pl.4.4)

Cells solitary, front view distinctly broader than long; oblong-elliptic to circular in shape; outer margin uniformly curved; deeply constricted sinus much narrower, with not gaping, open outwards with forcep shaped angles, semicells basal angles acute, small, denticulate, cell wall is punctuate; chloroplasts axial; cells 60 - 80 μm long; 70 - 85 μm broad; isthmus 40 - 50 μm broad.

Planktic in lake near prawn culture area, Sendra, 1128, 25.03.2007.

38. *Cosmarium globosum* Bulnheim var. *minus* Hansg. (Pl.4.5)

Cells commonly seen attached in pairs of 2 or 4, apex slightly angular, deeply constricted, sinus obtuse; semicells vertically sub-quadrate; apex angles rounded and retuse; cell wall smooth; chloroplast axial; cells 40 - 60 μm long, 30 - 40 μm broad; isthmus 10 - 20 μm broad.

Epiphytic on submerged grass and planktic in lake, 1127 & 1128, 25.03.2007.

39. *Cosmarium inaequalipellicum* W. West & G.S. West (Pl.4.6)

Cells solitary, green, longer than broad; sinus deeply constricted, narrow and linear; semicells flattened at the top and swollen at base; cell wall smooth; cells 22 μm long and 15 μm broad; isthmus 6 μm broad.

Epiphytic on aquatic weed, near boating site, Sendra, 1130, 26.03.2007.

40. *Cosmarium laeve* Rabenh. (Pl.4.7)

Cells solitary, longer than broad; sinus deeply constricted, closed, linear; semicells semicircular, slightly tapering, margin granular, apex less flattened with slightly depression at the middle; chloroplast axial, one pyrenoid at the centre in each semi cell; cells 25 - 26 μm long and 19 - 20 μm broad; isthmus 5 - 7 μm broad.

Epiphytic on aquatic weed, near boating site, Sendra, 1130, 26.03.2007.

41. *Cosmarium lundellii* Delponte var. *ellipticum* W. West & G.S. West (Pl.4.8)

Cells solitary, green, transversely elliptic, slightly longer than broad or almost as long as broad; sinus deeply constricted, narrow with dilated apex and slightly open outwards; semicells depressed circular; chloroplast axial; cell wall smooth; cells 44 μm long and 40 μm broad; isthmus 24 μm .

Epiphytic in lake, near boating site, Sendra, 1130, 26.03.2007.

42. *Cosmarium manipurens* Brühl & Biswas (Pl.4.9)

Cells solitary, one to two times as long as broad; deeply constricted, sinus narrowly linear, partly closed; semicells pyramidal, semicircular, sides strongly convex, apex sub-truncate or truncately rounded basal angles rounded, cell wall finely or minute granulate, granules in radiating and concentric series; gradually diminishing in size from the periphery towards the centre, apical centre part plane, exterior lateral part convex, marginal line punctate; chloroplast single axial; cells 40 - 45 μm long and 31 - 33 μm broad; isthmus 11 - 12 μm broad.

Epiphytic on grass, Takmu fisheries area, Sendra, 1118, 23.03.2007 & 1127, 25.03.2007.

43. *Cosmarium moniliforme* (Turpin) Ralfs var. *subpyriforme* W. West & G.S. West (Pl.4.12)

Cells 1-2 times longer than broad; moderately constricted; sinus open-outwards; apex-truncately rounded; apical angle rounded; cell wall smooth; chloroplasts axial; cells 45 - 50 μm long, 20 - 25 μm broad; isthmus 15 - 20 μm broad.

Epiphytic on grass, Takmu fisheries area, Sendra, 1118, 24.03.2007.

44. *Cosmarium norimbergense* Reinsch (Pl.4.10)

Cells small size; deeply constricted, sinus narrow and linear, semicells sub-rectangular with a undulation

just above the rounded basal angles and slightly retuse upper half; apex with rounded angles and more or less straight margin; cell wall smooth, axial chloroplast with one pyrenoids in each semicells; cell 15 - 20 µm long, 13 - 15 µm broad; isthmus 5 - 7 µm broad.

Epiphytic on grass, Takmu fisheries area, Sendra, 1118, 23.03.2007.

45. *Cosmarium norimbergense* Reinsch var. *depressum* (W. West & G.S. West) Willi Krieger & Gerloff (Pl.4.11)

[*Synonym: Cosmarium norimbergense* Reinsch f. *depressa* W. West & G.S. West]

Cells very small in size, deeply constricted, sinus narrowly linear and slight open outwards; semicell sub-rectangular, without undulations, apex with rounded angles and somewhat straight margin; cell wall smooth; axial chloroplast with single pyrenoids in each cell; cells 10 - 15 µm long, 10 - 13 µm broad; isthmus 3 - 5 µm broad.

Epiphytic on aquatic weed, 1127, 23.03.2007.

46. *Cosmarium obsoletum* (Hantzsch) Reinsch (Pl.4.13)

Cells solitary, green, transversely elliptic, almost as long as broad, deeply constricted sinus narrow, open outwards; semicells depressed semicircular; chloroplast axial; cell wall smooth; cells 60 - 64 µm long and 60 - 63 µm broad; isthmus 30 µm.

Epiphytic on submerged grass, 1127, 25.03.2007.

47. *Cosmarium plicatum* Reinsch var. *hibernicum* W. West & G.S. West. (Pl.4.14)

Cells longer than broad; deeply constricted at the middle; sinus linear and open outwards, basal angle rounded with slightly swollen at basal angle, semicells pyramidal with slightly retuse lateral side; broadly roundly-truncate apex, apical angles rounded; cell wall smooth; cells 40 - 50 µm long and 20 - 25 µm broad; isthmus 8 - 10 µm broad.

Epiphytic on grass, near boating site, Sendra, 1129, 26th March, 2007.

48. *Cosmarium pseudophaseolus* Brühl & Biswas (Pl.4.15)

Cells solitary, front view slightly longer than broad, sinus open outwards; margin convex; semicells sub-circular, asymmetric reniformis; basal angle rounded, apical margin uniformly convex rounded, apex obtuse-rounded; cell wall smooth; chloroplast axial; 22 - 30 µm long, 22 - 29 or 30 µm broad; isthmus 5 - 8 µm broad.

Epiphytic on grass, Takmu fisheries area, Sendra, 1118, 23.03.2007.

49. *Cosmarium radiosum* Wille (Pl.4.16)

Cells medium size; longer than broad, deeply constricted, sinus narrowly linear with slightly dilated extremity; semicells, sub-circular, sides strongly convex; apex sub-truncate rounded, cell wall periphery finely crenate or wavy, granulated, granules radiating a series and gradually diminishing from periphery towards the centre; chloroplast single axial; cells 60 - 80 µm long, 50 - 70 µm broad; isthmus 20 - 30 µm broad.

Epiphytic on grass, 1127, 25.03.2007.

50. *Cosmarium scabrum* W.B.Turner (Pl.4.18)

Cells broader than long, quadrate, deeply constricted, sinus narrowly linear with dilated extremities, semicells rectangular, apex rectangular, cell wall dense, verrucose, scabrous; granular, radiating from margin towards centre; chloroplast axial; cells 45 - 50 µm long, 50 - 55 µm broad; isthmus 18 - 20 µm broad.

Epiphytic on grass, Takmu fisheries area, Sendra, 1118, 23.03.2007.

51. *Cosmarium sexnotatum* Gutwinski var. *tristriatum* (Lütke.) Schmidle (Pl.4.17)

Cell very small, slightly longer than broad, deeply constricted, sinus narrowly linear with slightly dilated extremities; semicells sub-quadrangular with rounded angles, sides with undulation; apex truncate with straight or faintly undulate margins; chloroplast axial; cells 14 - 19 µm long, 13 - 16 µm broad; isthmus 4 - 5 µm broad.

Epiphytic on grass, Takmu fisheries area, Sendra, 1118, 23.03.2007.

52. *Cosmarium speciosum* (Gutwinski) W. West & G.S. West (Pl.4.19)

Cells medium size, moderately constricted; sinus linear, semicells sub-rectangular with rounded angles and slightly convex sides, very gradually attenuated to broadly truncate, apex; margin, crenate; cell wall with radial and concentric series of scrobiculations in the periphery of each semicell; chloroplast axial; cells 45 - 56 μm long and 38 - 42 μm broad, isthmus 15 - 20 μm broad.

Epiphytic on grass and planktic in lake, Takmu fisheries area, Sendra, 111 8 & 1120, 23.03.2007.

53. *Cosmarium venustum* Bréb. var. *majus* Wittr., W. West & G.S. West (Pl.4.21)

Cells solitary, small; longer than broad; front view rectangular; deeply constricted; sinus with dilated extremities nearly linear; semicells sub-rectangular; with pseudo-elevated and ridges; apex truncate with a depression at middle; apical angle rounded; cell wall smooth; chloroplast axial; cells 15 - 20 μm long, 12 - 15 μm broad; isthmus 3 - 4 μm broad.

Epiphytic on aquatic weed, 1121, 23.03.2007.

54. *Cosmarium vexatum* W. West var. *aethiopicum* Forster (Pl.4.20)

Forster cells small, solitary, larger than broad; deeply constricted, sinus narrowly linear; less open outwards; semicells sub-pyramidal slightly swollen, apex truncate-straight; apical rounded; cell wall very small crenate or smooth, slightly punctuate at margin; chloroplast axial; cells 25 - 30 μm long, 24 - 26 μm broad; isthmus 15 - 18 μm broad.

Epiphytic on aquatic weed, 1121, 23.03.2007.

55. *Cylindrocystis brebissonii* (Menegh. ex Ralfs) de Bary (Pl.4.22)

Cells solitary, cylindrical, straight rounded apex; without median constriction; cell wall smooth or bearing granules chloroplasts ridges without complex lobing; cells longer than broad; 30 - 45 long and 15 - 20 μm broad.

Epiphytic on aquatic weed, 1124, 24.03.2007.

56. *Cylindrocystis crassa* de Bary (Pl.4.23)

Cells solitary, ovate; very shallow depress at the middle or without constriction; semicells broad at apex; cell wall smooth chloroplast axial with one or more pyrenoids in each cells; cells slightly longer than broad; 25 - 35 μm long and 18 - 22 μm broad.

Epiphytic on aquatic weed, 1124, 24.03.2007.

57. *Desmidium baileyi* (Ralfs) Nordst. (Pl.4.25)

Unbranched filamentous; filaments straight without gelatinous envelope; median constriction reduced to very small undulation; cells rectangular with the lateral parallel margins and broad apex, showing deep and semi-elliptic to sub-rectangular opening, cell wall smooth each semicell with two exile chloroplast each containing one pyrenoid; cells 15 - 20 μm long; 25 - 30 μm broad.

Planktic in lake, 1120, 23.03.2007.

58. *Desmidium baileyi* (Ralfs) Nordst. var. *coelatum* (Kirchner) Nordst. (Pl.4.24)

Filamentous; cells not twisted in the filament and the broad; cells has an unusual shape due to very shallow apical depression; constriction shallow at the middle of lateral side; chloroplast single, parietal, separated into 2 - 2 lobes in each semi-cells; cells 18 - 22 μm long and 25 - 30 μm broad.

Planktic in lake, 1120, 23.03.2007.

59. *Desmidium baileyi* (Ralfs) Nordst. var. *wallichii* W.B.Turner (Pl.5.1)

Filamentous, unbranched; filaments straight, shallow, constricted at the middle, undulated; cells quadrangular, margins centrally elevated and apex truncate; cell wall smooth with a lobe of small incision; cells 15 - 20 μm long and 20 - 25 μm broad.

Epiphytic on grass, Takmu fisheries area, Sendra, 1118, 23.03.2007.

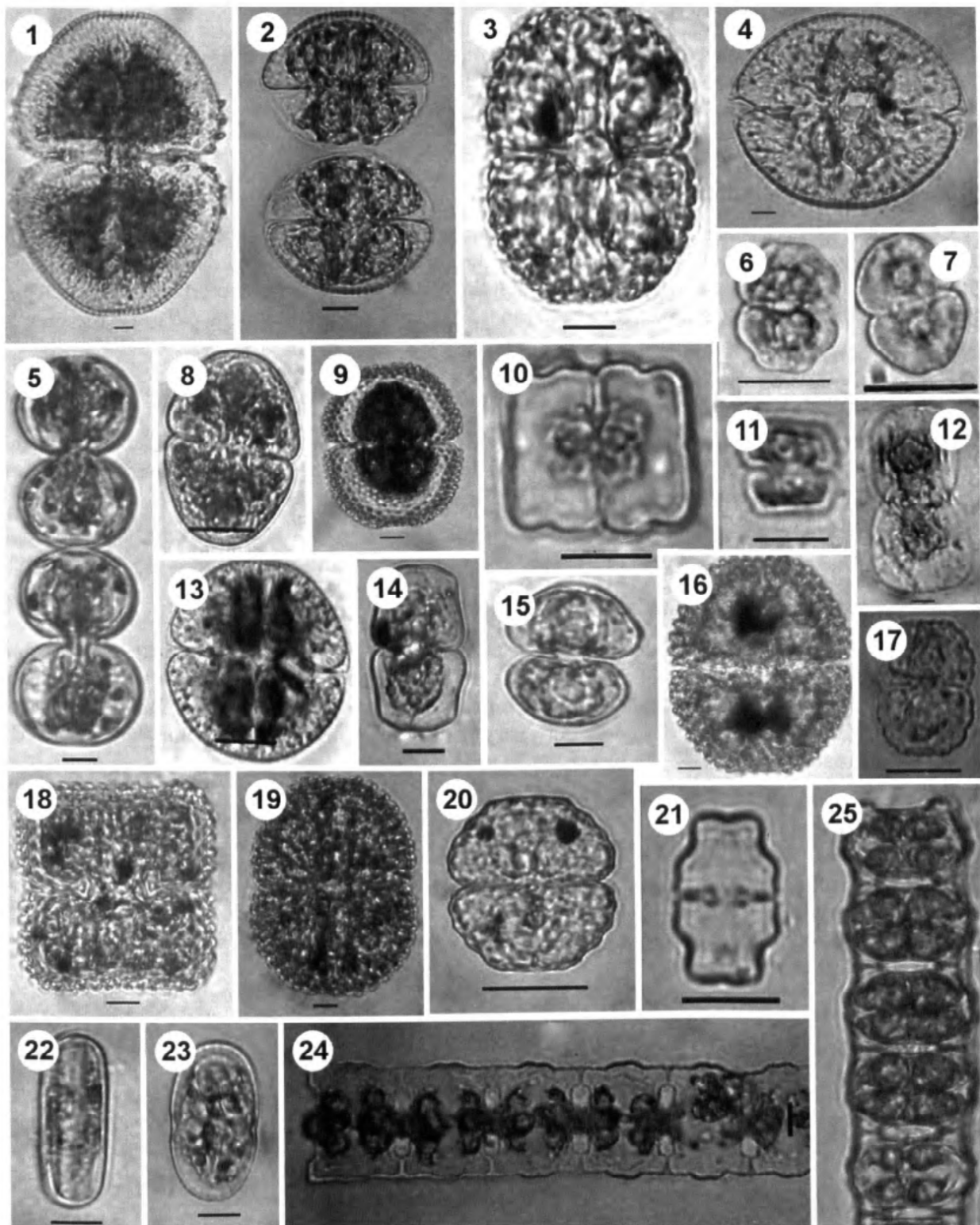


Plate 4: 1. *Cosmarium askenasyi* Schmidle; 2. *Cosmarium candianum* Delponte; 3. *Cosmarium ellipsoidale* Brühl & Biswas; 4. *Cosmarium forceps* Brühl & Biswas; 5. *Cosmarium globosum* Bulnheim var. *minus* Hansg.; 6. *Cosmarium inaequalipellucum* W. West & G.S. West; 7. *Cosmarium laeve* Rabenh.; 8. *Cosmarium lundellii* Delponte var. *ellipticum* W. West; 9. *Cosmarium manipurens* Brühl & Biswas; 10. *Cosmarium norimbergense* Reinsch; 11. *Cosmarium norimbergense* Reinsch var. *depressum* (W. West & G. S. West) Willi Krieger & Gerloff.; 12. *Cosmarium moniliforme* (Turpin) Ralfs var. *subpyriforme* W. West & G.S. West; 13. *Cosmarium obsoletum* (Hantzsch) Reinsch; 14. *Cosmarium plicatum* Reinsch var. *hibernicum* W. West; 15. *Cosmarium pseudophaseolus* Brühl & Biswas; 16. *Cosmarium radiosum* Wolle; 17. *Cosmarium sexnotatum* Gutwinski var. *tristriatum* (Lütkem.) Schmidle; 18. *Cosmarium scabrum* W.B. Turner; 19. *Cosmarium speciosum* (Gutwinski) W. West & G.S. West; 20. *Cosmarium vexatum* W. West var. *aethiopicum* Forster; 21. *Cosmarium venustum* Bréb. var. *majus* Witttr.; 22. *Cylindrocystis brebissonii* (Menegh. ex Ralfs) de Bary; 23. *Cylindrocystis crassa* de Bary; 24. *Desmidium baileyi* (Ralfs) Nordst. var. *coelatum* (Kirchner) Nordst.; 25. *Desmidium baileyi* (Ralfs) Nordst. (Scale bar, Figs. 1 - 5, 12, 14 - 25 = 10 μ m, 6 - 8, 13 = 20 μ m).

60. *Desmidium bengalicum* W.B.Turner (Pl.5.2)

Filamentous, unbranched, cells broader than long, quadrangular; median constriction shallow; sinus diverse shaped, not angular; cells connected to adjacent cell at the end of small process, cell apex having U-shaped shallow depression; cells 15 - 20 μm long and 20 - 30 μm broad.

Epiphytic on grass, Takmu fisheries area, Sendra, 1118, 23.03.2007.

61. *Docidium subcoronulatum* W.B.Turner (Pl.5.3, 4 & 5)

Cells solitary, long, cylindrical, two or more cells jointed to form filaments; slightly constricted at the middle to form two semicells; semicells regular diameter, at the central part margin undulate, base inflated; apex of cell truncate and link to form a conjugate filament, at the apex a plicate or fissure proceeds from the base of each tubercles; cells longer than broad, 300 - 400 μm long, 30 - 32 μm broad and 24 - 30 μm at the apex.

Planktic in lake, 1120, 23.03.2007.

62. *Euastrum ansatum* Ralfs var. *pyxidatum* Delponte ex Delponte (Pl.5.6)

Cells solitary, larger than broad, deeply constricted at the middle, sinus narrowly linear; apical margin of semicells elevated, polar lobe elevated with an angled deep incision; lobe of sinus is rotundus; apex truncate lateral side undulated near upper-side of semicell base; cells 65 - 90 μm long, 30 - 45 μm broad at base, apex 15 μm broad; isthmus 10 - 15 μm broad.

Epiphytic on aquatic weed, 1121, 23.03.2007

63. *Euastrum elegans* (Bréb.) Kütz. var. *loktankense* Brühl & Biswas (Pl.5.7)

Cells small, longer than broad, deeply constricted at the middle, sinus narrowly linear, closed; semicells oblong pyramidal, the apical margin of polar lobe elevated, with a deep median incision; vertically semicells oblong-rectangular, pole truncate rotundus, at the middle of lateral side having protuberance, beyond the linear sinus being sharply inclined, obliquely outward on either side; protuberance granulate; cells 30 - 35 μm and 15 - 18 μm broad; isthmus 4 - 7 μm broad.

Epiphytic on weeds, 1121, 23.03.2007 & 1124, 24.03.2007

64. *Euastrum elegans* (Bréb.) Kütz. var. *pseudoelegans* (W.B.Turner) W. West & G.S. West (Pl.5.8)

Cells small, much larger than broad, deeply constricted, sinus narrowly linear, slightly open outwards; apical margin of polar lobe deeply elevated; pole roundly- truncate, margin of lateral side undulate with small protuberance at the lower portion of apical lobe; cell wall smooth; cells 30 - 36 μm , 18 - 22 μm broad; isthmus 7 - 8 μm broad.

Planktic in lake, 1120, 23.03.2007.

65. *Euastrum spiculatum* Brühl & Biswas (Pl.5.9)

Cells solitary, as long as broad; at the middle deeply constricted; sinus angular and widely open outwards, semicells base broadly trapezoids, tri-lobed; lateral lobe horizontal, broadly semi-ovate, apex-obtuse, margin of polar lobe concave, transverse- oblong, angles-rounded concave, apex lessly concave; lobes margin ornate with small spine at angle of polar lobe at both sides; lateral side lobe apex and side with spine; cells 40 - 48 μm ; isthmus 9 - 11 μm broad.

Epiphytic on emergent and submerged weeds, 1123 & 1124, 24.03.2007.

66. *Hyalotheca undulata* W. West ex Lütkem. (Pl.5.10)

Filamentous, unbranched; cells cylindrical, poles flattened and without projection; slightly constricted at the middle; cells base flattened and slightly above the bulges; cells 12 - 18 μm long and 10 - 12 μm broad.

Epiphytic on aquatic weed, 1124, 24.03.2007.

67. *Micrasterias alata* G.C.Wall. (Pl.5.11 & 12)

Cells medium size, sub-circular, very deeply constricted, sinus with linear open outwards; semicells seven-lobed, radial and widely open incisions; lobe tubular with slightly attenuated towards pole,

apex with furcated-acuminate extremity, lateral lobes sub-parallel, polar lobe or central lobe straight with two big process with bifurcate acuminate extremities at apex; cell wall smooth; cells 150 - 180 μm long, 148 - 160 μm broad, isthmus 15 - 20 μm broad, lobe 50 - 70 μm long, 20 - 25 μm broad at the base and at the apex 10 - 12 μm broad.

Epiphytic on aquatic weed, 1124, 24.03.2007.

68. *Micrasterias foliacea* Bailey

(Pl.5.13)

Cells small, united in filaments by interlocking at polar lobes; outer line rectangular, deeply constricted, sinus narrowly linear; semicells 5-lobed, polar lobe exerted basal part of polar lobes with sub-parallel sides, upper parts greatly expanded and anvil shaped with an excavation in the median portion; base of excavation exhibits 2-asymmetrically produced spines of unequal length, polar and lateral angles uncinata, lateral lobes asymmetrical, superior lobes divergent, inferior horizontally disposed; incisions simple and sub-acuminate, the ultimate lobelets with truncate, emarginated apex; cell wall smooth; cell 60 - 70 μm long and 60 - 73 μm broad, isthmus 13 - 18 μm .

Epiphytic on aquatic weed, 1124, 24.03.2007.

69. *Mecrasterias mahabaleshwariensis* Hobson

(Pl.5.14)

Cells medium sized, constriction deep; open sinus with acuminate extremity; normal semicell 3-lobed, with symmetry in three planes, incisions between lobes, wide, polar lobe large, with sub-quadrate lower half and dilated upper half producing prominent, diverging, denticulate process and existing a pair of small, accessory, asymmetrical denticulate process in front and back near slightly concave base, margin with small and acute spines, lateral lobes with wide, deep and acute angled incision, divided into two quadric-denticulate, portion above the isthmus furnished with a row of denticulations; cell 100 - 130 μm long, 80 - 90 μm broad and isthmus 20 - 28 μm broad.

Epiphytic on aquatic weed, 1124, 24.03.2007.

70. *Micrasterias pinnatifida* (Kütz.) Ralfs

(Pl.5.15)

Cells small, deeply constricted, linear sinus, slightly open outwards; semicells 3-lobed, interlobular incisions deep and broadly constricted, lateral lobes horizontal, sub-fusiform with minutely bifid apex exhibiting acuminate ends, polar lobe with basal portion sub-rectangular and apical portion with extremities like lateral lobes, relatively shorter in length; cell wall minutely punctuate; cells slightly longer than broad, 40 - 60 μm long and 40 - 50 μm broad; isthmus 10 - 15 μm broad.

Epiphytic on aquatic weed, 1124, 24.03.2007.

71. *Netrium digitus* (Ehrenb.) Itzigsh & Rothe.

(Pl.5.16)

Cells solitary, stout, elliptical; poles rounded; cell wall unsegmented, unconstricted, smooth, 30 - 35 μm broad and 174 - 182 μm long; chloroplast large, axial, one each half of the cell with radiating longitudinal seriated ridges.

Epiphytic on aquatic weed, 1121, 23.03.2007.

72. *Onchonema uncinatum* G.C. Wall.

(Pl.5.17)

Thallus filamentous, cells strongly depressed, constricted, linear; semicells oblique, elliptic, front view quadrangular with spine, not incised; chloroplast with single, axial, laminate chloroplast bearing a pyrenoid; cells 18 - 20 μm long, 24 - 30 μm broad; isthmus 5 - 8 μm broad.

Epiphytic on aquatic weed, 1124, 24.03.2007.

73. *Penium cucurbitinum* Bisset var. *subpolymorphum* Nordst.

(Pl.5.18)

Cells solitary, slightly attenuated towards apex; shallow to marked median constriction, semicells apex truncate or broadly rounded; cell wall with small granules; cells longer than broad; 10 - 120 μm long, 40 - 60 μm broad.

Epiphytic on aquatic weed, 1124, 24.03.2007.

74. *Penium spinospermum* Joshua (Pl.5.19 & 20)

Cells solitary, small, very slightly attenuated towards apex; apex rounded; unconstricted at the middle; chloroplast one axial with three ridges and one pyrenoids; cells 2.5 times longer than broad, 25 - 30 μm long and 10 - 15 μm broad.

Epiphytic on aquatic weed, 1124, 24.03.2007.

75. *Pleurotaenium eugeneum* (W.B.Turner) W. West & G.S. West var. *maius* B.N.Prasad & P.K.Misra (Pl.5.21; Pl.6.1)

Cells cylindrical, straight, prominent inflation at the basal portion, semi-cells regular in shape from base to apex; apex round-truncate, bears 10 - 13 small tubercles; cells longer than broad, 600 - 780 μm long and 60 - 70 μm broad.

Epiphytic on submerged and emergent weeds, Takmu fisheries area, Sendra, 1118, 23.03.2007 & 1123, 24.03.2007.

76. *Pleurotaenium nodulosum* (Bréb.) de Bary var. *nodulosum* (Bréb.) W. West & G.S. West (Pl.6.2)

[Synonym: *Pleurotaenium coronatum* (Bréb.) Rabenh. var. *nodulosum* (Bréb.) West]

Cells sub-cylindrical, slightly gradually attenuated towards apex, median inflation prominent with 2 - 3 faint undulations; apex truncate, apex with 10 - 12 tubercles; cell wall scrobiculate; margin undulate; equally broad at the base but sharply narrowed; cells longer than broad, 600 - 750 μm long, 40 - 50 μm broad at the base and 30 - 40 μm at the apex.

Epilithic on submerged stone, Takmu fisheries area, Sendra, 1119, 23.03.2007.

77. *Pleurotaenium ovatum* Nordst. (Pl.6.3)

Cells solitary, tumid-cylindrical, deeply constricted at the middle to form semicells; semicells oblong ovate, gradually less attenuated towards the margin recurved; apex truncate, apex with very small tubercles, cell wall tenuiter punctuate; cells 250 - 300 μm long and 70 - 115 μm broad at the middle and 35 - 45 μm broad at apex.

Epiphytic on aquatic weed, Takmu fisheries area, Sendra, 1118, 23.03.2007.

78. *Pleurotaenium rectum* Delponte (Pl.6.4)

[Synonym: *Pleurotaenium trabecula* Ehrenb. ex Nägeli var. *rectum* (Delponte) W. West & G.S. West]

Cells solitary, long and robust, basal wall marked with one or two undulations; broader at the middle of the semicells gradually tapering towards apex from the base; pole is cylindrical, apex is truncate and bears very small minutes tubercles; cell wall is punctuate; cell many times longer than broad; 300 - 400 μm long and 15 - 25 μm middle, 10 - 18 μm broad at apex.

Epiphytic on aquatic weed, Takmu fisheries area, Sendra, 1118, 23.03.2007.

79. *Pleurotaenium verrucosum* (Bailey) P.Lundell (Pl.6.5 & 6)

Cells solitary, cylindrical, constricted at the middle to form two small basal inflation, prominent; margins undulate, gradually attenuated towards apex; sharply truncate apex with prominent tubercles; cells many times longer than broad, 300 - 400 μm long, 30 - 36 μm broad at middle and 28 - 32 μm at the apex.

Planktic in lake, 1120, 23.03.2007.

80. *Sphaerosma manipurens* Brühl & Biswas (Pl.6.7)

Filamentous, unbranched, apical processes of semicells short, often tuberculate and never overlap the adjoining cells, sinus open; shortly compressed, deeply constricted; in laterals view semicells elliptical, in front view oblong, vertical view elliptic oblong; cells 10 - 15 μm long and 10 - 12 μm broad; isthmus 5 - 6 μm .

Epiphytic on aquatic weed, Takmu fisheries area, Sendra, 1118, 23.03.2007.

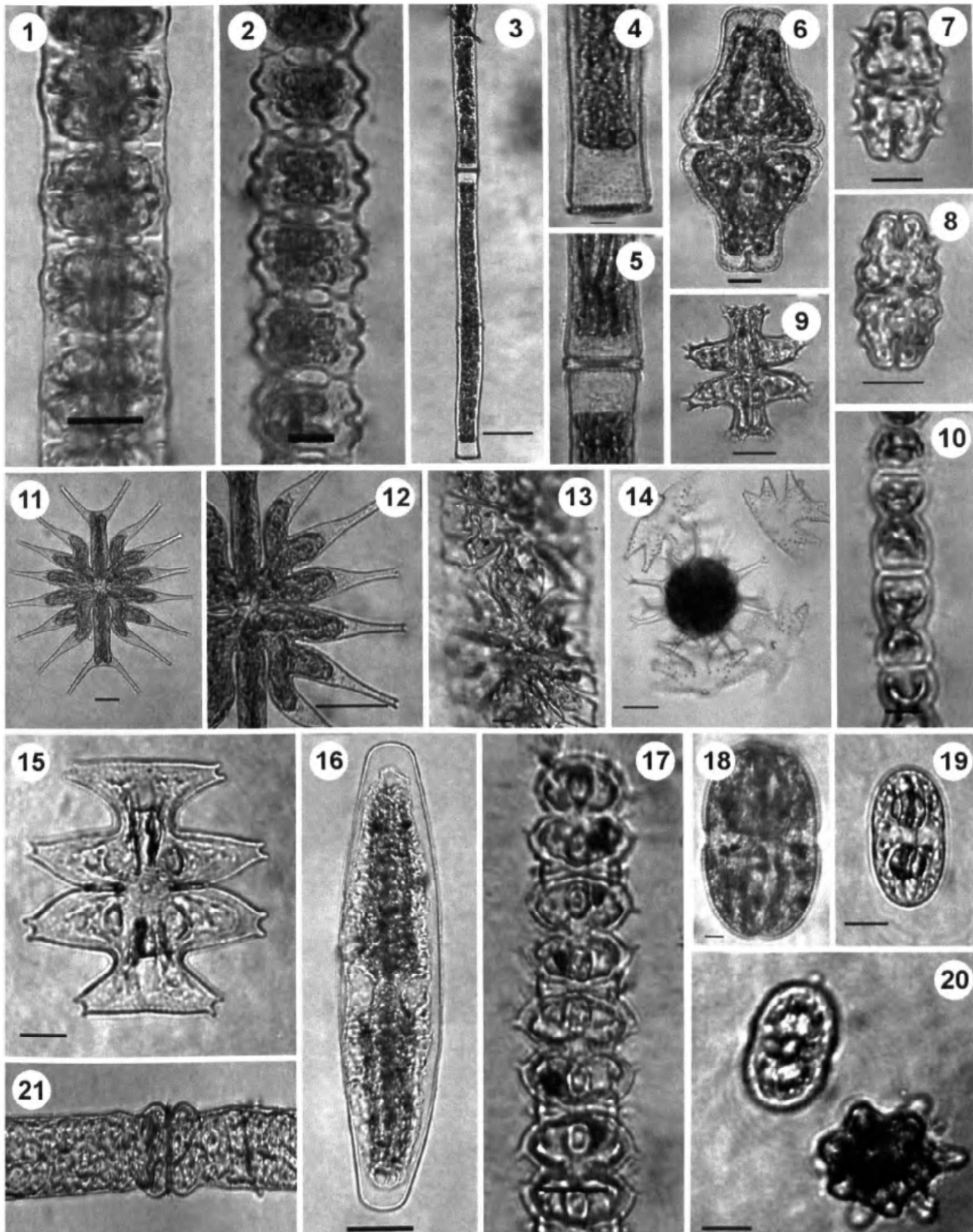


Plate 5: 1. *Desmidium baileyi* (Ralfs) Nordst. var. *wallichii* W.B.Turner; 2. *Desmidium bengalicum* W.B.Turner; 3, 4 & 5. *Docidium subcoronulatum* W.B.Turner; 6. *Euastrum ansatum* Ralfs var. *pyxidatum* Delponte ex Delponte; 7. *Euastrum elegans* (Bréb.) Kütz. var. *loktankense* Brühl & Biswas; 8. *Euastrum elegans* (Bréb.) Kütz. var. *pseudoelegans* (W.B.Turner) W. West & G.S. West; 9. *Euastrum spiculatum* Brühl & Biswas; 10. *Hyalotheca undulata* W. West ex Lütke.; 11 & 12. *Microasterias alata* G.C.Wall.; 13. *Microasterias foliacea* Bailey; 14. *Mecrasterias mahabaleshwariensis* Hobson; 15. *Microasterias pinnatifida* (Kütz.) Ralfs; 16. *Netrium digitus* (Ehrenb.) Itzigsh & Rothe; 17. *Onchonema uncinatum* G.C.Wall.; 18. *Penium cucurbitinum* Bisset var. *subpolymorphum* Nordst.; 19 & 20. *Penium spinospermum* Joshua; 21. *Pleurotaenium eugeneum* (W.B.Turner) W. West & G.S. West var. *maius* B.N.Prasad & P.K.Misra (Scale bar, Figs. 1, 2, 4 - 8, 10, 12, 13, 15 - 20 = 10 μ m, 3 = 40 μ m, 9, 11 = 20 μ m, 14 = 30 μ m, 21 = 50 μ m).

81. Sphaerosoma vertebratum W. West & G.S. West (Pl.6.8)

Filamentous unbranched, cells small, strongly compressed, constricted at the middle, sinus linear narrow with process slightly curved; the apical process of the semicells very short, often tuberculate and not overlap the adjoining cells, sinus open; single pyrenoid in each semicells; cells 15 - 20 μm long and 30 - 40 μm broad, isthmus 6 - 8 μm broad.

Epiphytic on aquatic weed, Takmu fisheries area, Sendra, 1118, 23.03.2007.

82. Spondylosium incurvatum W.B.Turner (Pl.6.11)

Cells united in filaments joined together by mucilaginous pads; semi-cells and process or spines deeply constricted; sinus widely open and linear; semicells broader than long, compressed; slightly curved at apex inward; oblong-elliptic, apex broadly rounded, united; cell wall smooth; chloroplast single, axial with a pyrenoid in each semicell; cells 24 - 26 μm long, 25 - 30 μm broad; isthmus 7 - 8 μm broad.

Epiphytic on weed, 1124, 25.03.2007.

83. Spondylosium nitens (G.C.Wall.) Archer f. *tensa* W.B.Turner (Pl.6.10)

Cells united in filaments, joined together by mucilaginous pads; semicells without lateral processes or sinus; deeply constricted; sinus widely open like dumb bell shaped; basal angle rounded; semicells oblong-elliptic; apex broadly rounded, united; chloroplast single, axial, with two pyrenoids in each cells; cells 20 - 26 μm long and 18 - 22 μm broad; isthmus 5 - 8 μm broad.

Epiphytic on aquatic weed, 1124, 24.03.2007.

84. Spondylosium rectum W.B.Turner (Pl.6.9)

Cells united in filaments, joined together by mucilaginous pads; semicells without lateral processes or sinus; sinus widely open; basal angle rounded; semicells oblong-elliptic; apex rounded; chloroplast single, axial; cells 20 - 36 μm long and 14 - 27 μm broad; isthmus 5 - 9 μm broad.

Epiphytic on aquatic weed, 1124, 24.03.2007.

85. Stauradesmus cuspidatus (Bréb. ex Ralfs) Teizing (Pl.6.12 & 13)

Cells solitary, small in size, constricted at middle, isthmus long, sinus with angle widely open outwards; semicells elliptic and projected into one long spine in each sides; glabrous; cell wall granulated at the middle; cells 10 - 20 μm long and 20 - 25 μm broad with spines; isthmus 4 - 6 μm .

Epiphytic on submerged grass, 1127, 25.03.2007.

86. Staurastrum anatinum Cooke & A.Wills (Pl.6.14)

Cells solitary, broader than long, constricted at the middle; sinus widely open outwards; semicells with three distinct long denticulate or crenate processes tipped with three minute spines, in vertical view triangular; cells granulated; cells 20 - 25 μm long and 30 - 40 μm , with horns 40 - 60 μm broad; isthmus 10 - 12 μm .

Epiphytic on submerged and emergent aquatic weeds, 1123, 24.03.2007.

87. Staurastrum chaetoceras (Schröder) G.M. Sm. (Pl.6.15)

Cells solitary, much broader than long, strongly compressed, constricted at the middle, sinus widely open outwards with acute angle; semicells extended into 2 very long divergent crenate processes ending with bifid small spines; in vertical view semicells with crenate processes slightly triangular; cell walls ornamented; cells 20 - 30 μm long and 80 - 85 μm broad; isthmus 8 - 10 μm .

Epiphytic on submerged and emergent aquatic weeds, 1123, 24.03.2007.

88. Staurastrum leptocladum Nordst. (Pl.6.16)

Cells solitary, broader than long, at the middle constricted with acute incised sinus; isthmus long; semicells having elongated base and extended into prolong horns at both side; horns crenate and apex with bifid apex; pyrenoids single in each semicells; cells 35 - 45 μm long and 80 - 100 μm broad with horns; isthmus 8 - 10 μm .

Epiphytic on weed, 1124, 25th March, 2007.

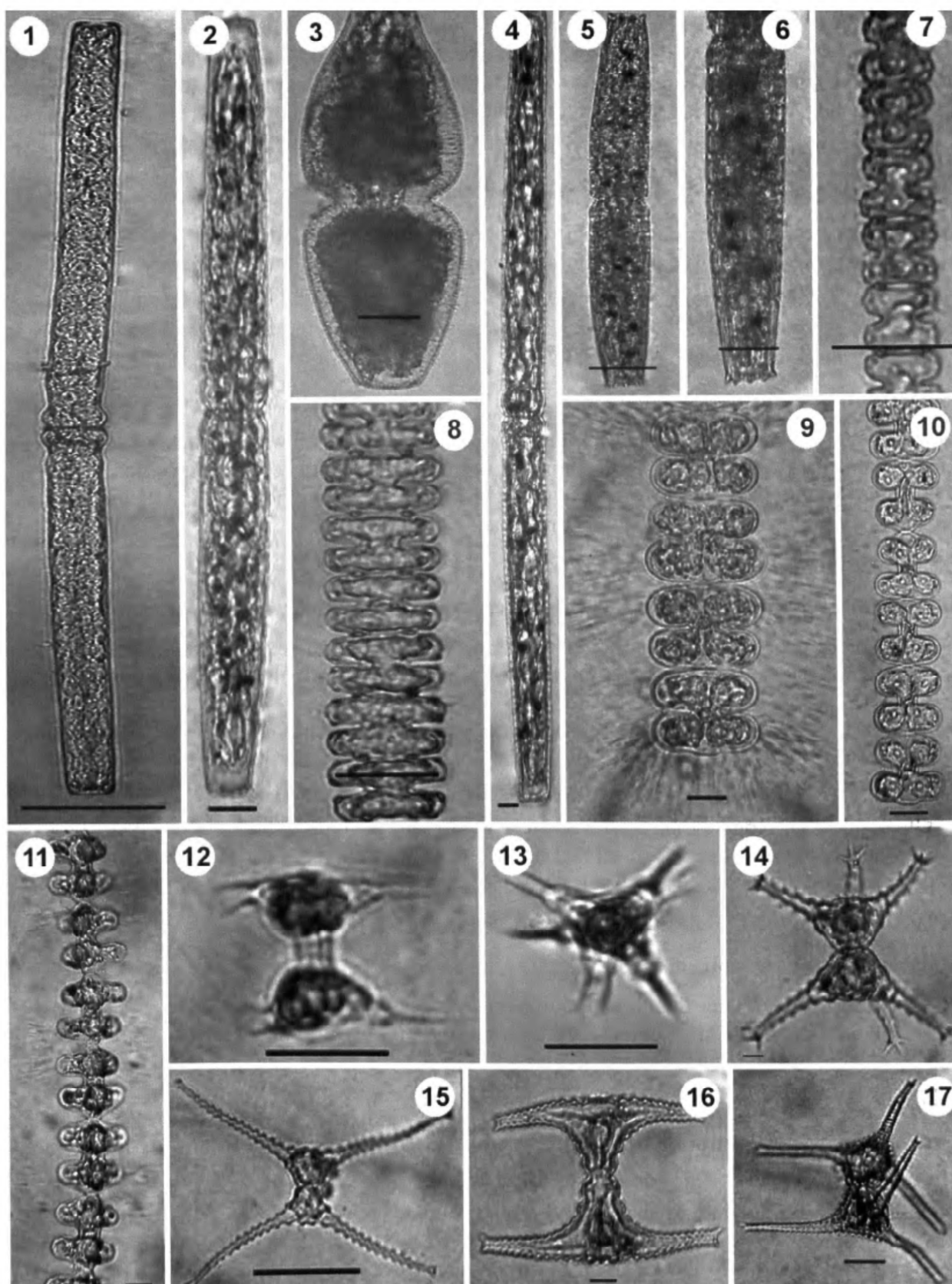


Plate 6 : 1. *Pleurotaenium eugeneum* (W.B.Turner) W. West & G.S. West var. *maius* B.N.Prasad & P.K.Misra; 2. *Pleurotaenium nodulosum* (Bréb.) de Bary var. *nodulosum* (Bréb.) W. West; 3. *Pleurotaenium ovatum* Nordst.; 4. *Pleurotaenium rectum* Delponte; 5 & 6. *Pleurotaenium verrucosum* (Bailey) P.Lundell; 7. *Sphaerosozma manipurense* Brühl & Biswas; 8. *Sphaerosozma vertebratum* W. West & G.S. West; 9. *Spondylosium rectum* W.B.Turner; 10. *Spondylosium nitens* (Wallich) Archer f. *tensa* W.B.Turner; 11. *Spondylosium incurvatum* W.B.Turner; 12 & 13. *Stauradesmus cuspidatus* (Bréb. ex Ralfs) Teizing; 14. *Staurastrum anatinum* Cooke & A.Wills; 15. *Staurastrum chaetoceras* (Schröder) G.M. Sm.; 16. *Staurastrum leptocladum* Nordst.; 17. *Staurastrum paradoxum* Meyen var. *evolutum* W. West (Scale bar, Figs. 1, 3, 9, 17 = 10 μ m, 2, 4, 7 = 30 μ m, 8 = 20 μ m).

89. *Staurastrum paradoxum* Meyen var. *evolutum* W. West (Pl.6.17)

Cells solitary, slightly compressed; deeply constricted at the middle sinus widely open outwards with acute angled; semicells crenate extended into 3 medium sized attenuated processes with 2 small spines; cells 15 - 25 μm long and with processes 55 - 65 μm broad; isthmus 8 - 10 μm .

Epiphytic on aquatic weed, 1124, 24.03.2007

90. *Staurastrum paradoxum* Meyen var. *longiceps* Nordst. (Pl.7.1)

Cell solitary, broader than long, strongly compressed, constricted at the middle with acute angles, sinus widely open outwards; semicells extended into three medium length denticulate processes; processes tipped with 2 - 3 small spines; cell wall crenate; cells 40 - 50 μm long and with processes 65 - 75 μm broad; isthmus 8 - 10 μm broad.

Epiphytic on aquatic weed, 1124, 24.03.2007.

91. *Staurastrum pseudosebaldi* Wille (Pl.7.2 & 3)

Cells solitary, compressed, radially symmetrical, deeply constricted with acute angled sinus; semicells projected into processes somewhat straight, elliptical; semicell apex slightly convex; in vertical view triangular and at the middle internally concave, processes apex bifid with 2 small spine; cells 15 - 25 μm long and with processes 30 - 40 μm broad; isthmus 10 - 15 μm broad.

Epiphytic on aquatic weed, 1124, 24.03.2007.

92. *Staurastrum sexagulare* (Brühl) Lundell var. *crassum* W.B.Turner. (Pl.7.4)

Cells solitary, deep median constriction in top view, cell with 5 radiate processes, processes denticulate, glabrous and serrate; apex with trifid and smooth small teeth; cells 40 - 50 μm long, with processes 60 - 70 μm long, isthmus 12 - 15 μm broad.

Epiphytic on grass, 1127, 25.03.2007.

93. *Staurastrum stellium* W.B.Turner (Pl.7.5)

Cells solitary, cell longer than broad, semicells with long 4 - 6 processes slightly convex; divergens, attenuated-sinuses towards apex with dilated minute teeth; sinus very incised; cells highly ornamented, 50 - 60 μm long with processes 80 - 90 μm long and 25 - 35 μm broad; isthmus 7 - 10 μm broad.

Planktic in lake, 1120, 23.03.2007.

94. *Staurastrum tohopekaligense* Wolle (Pl.7.6 & 7)

Cell solitary; cells longer than broad, number of processes 6 - 8, attenuated towards apex with bifid teeth, cell wall with distinctly large pores; cells with process 50 - 60 μm long, without processes 30 - 40 μm long and 20 - 30 μm broad; isthmus 13 - 15 μm broad.

Planktic in lake, 1120, 23.03.2007.

95. *Staurastrum trissacanthum* Scott & Prescott var. *dissacanthum* Scott and Prescott f. *longinum* Kanetsuna (Pl.7.8)

Cells solitary, medium in size, about twice as long as broad with spines, deeply constricted in the middle, sinus widely open; semicells trapeziform, apical angles with short spine and lateral angles with a curved divergent long spine; vertical view of semicells triangular, sides slightly retuse in the middle and convex near the angles, each angle with two unequal spines; cells with spines 65 - 70 μm long and 33 - 34 μm broad; isthmus 9 - 15 μm broad.

Epiphytic on aquatic weed, 1121, 23.03.2007,

96. *Streptonema tribolatum* G.C.Wall. (Pl.7.9)

Thallus filamentous, joints very deeply constricted, furnished on their outer surfaces with 3 stout connecting bands, segments 3-lobed, bases of lobes parallel with base constriction, connecting processes looks like leave, in front view the lobes are distorted to some extent and connecting the band like the mamer,

the constricted portion of joints presents a short isthmus; each lobe inflated at its three extremities, from margin of which the lobe arise at equal distance and the tabular bases of the connecting bands being placed mid way between thallus; cells smooth; chloroplasts small, single, cells 21 - 24 μm long and 30 - 40 μm broad; isthmus 10 - 15 μm .

Epiphytic on aquatic weed, 1121, 23.03.2007.

Order: ZYGNEMATALES

97. *Zygnema czurdae* Randhawa (Pl.7.10)

Vegetative cells 20 - 30 μm broad and 30 - 80 μm long; chloroplasts 2, stellate (rounded) with a conspicuous pyrenoids in each, one seen in each cell; conjugation both lateral and scalariform, in scalariform conjugation with globose or flatted zoospores in the conjugation canal; zygospores 20 - 45 μm in diameter, oval, laterally rounded in shape.

Epiphytic on grass, 1127, 25.03.2007.

98. *Spirogyra ghosei* G.C.Singh (Pl.7.12 &12)

Vegetative cell cylindric, longer than broad, 40 - 100 μm broad and 150 - 225 μm long, end wall plain; chloroplast 6 to 7, conjugation scalariform, fructifying cells unswollen; conjugation canal 45 - 60 μm broad; zygospores ovoid with round ends, 90 - 100 μm broad and 100 - 115 μm long; exospore thin, reticulate; mesospore thick and brown.

Epiphytic on grass and emergent weeds, near boating site, Sendra, 1127, 25.03.2007 & 1130, 26.03.2007.

Order: CHARALES

99. *Chara hydropitys* Reich var. *indica* A.Braun f. *minor* A.Braun (Pl.7.16)

Monoecious; stem 280 - 320 μm thick; internodes little shorter than the branchlets, primary row of cortical cells more prominent than the secondary row; branchlets 9, straight, with six segments, bracts and bracteoles 8 - 9; antheridia 198 - 210 μm in diameter; oogonium 336 - 500 μm long and 228 - 330 μm broad with spiral cell showing 13 - 14 convolution, oval-ellipsoid, coronula 50 - 60 μm high and 128 μm broad at the base; oospore black, 350 μm long and 228 μm broad.

Submerged in lake, near boating site, Sendra; Voucher number and date: 1130, 26.03.2007.

BACILLARIOPHYCEAE

Order: FRAGILARIALES

100. *Diatoma anceps* (Ehrenb.) Kirchner (Pl.7.17)

[*Synonym: Diatoma hyalinum* Kütz.]

Frustules joined to form zig-zag colonies; valves slightly lanceolate to linear, with obtuse end, 30 - 60 μm long and 8 - 12 μm broad; striation not distinct in fresh material.

Epiphytic on aquatic weed, 1124, 24.03.2007.

101. *Synedra crystallina* Kütz. (Pl.7.13)

[*Synonym: Diatoma crystallinum* J. Agardh]

Frustules slender, long, linear, straight, end rounded-obtuse, apices truncate, longer than broad, 150 - 400 μm long and 9 - 13 μm broad; striation thin and not clearly visible.

Epiphytic on submerged and emergent weeds, Takmu fisheries area, Sendra, 1118, 23.03.2007 & 1123, 24.03.2007.

Order: NAVICULALES

102. *Diadesmis confervacea* Kütz. (Pl.7.14)

Frustules attached side by side to form ribbon shaped colony; filamentous, gelatinous, rectangular in

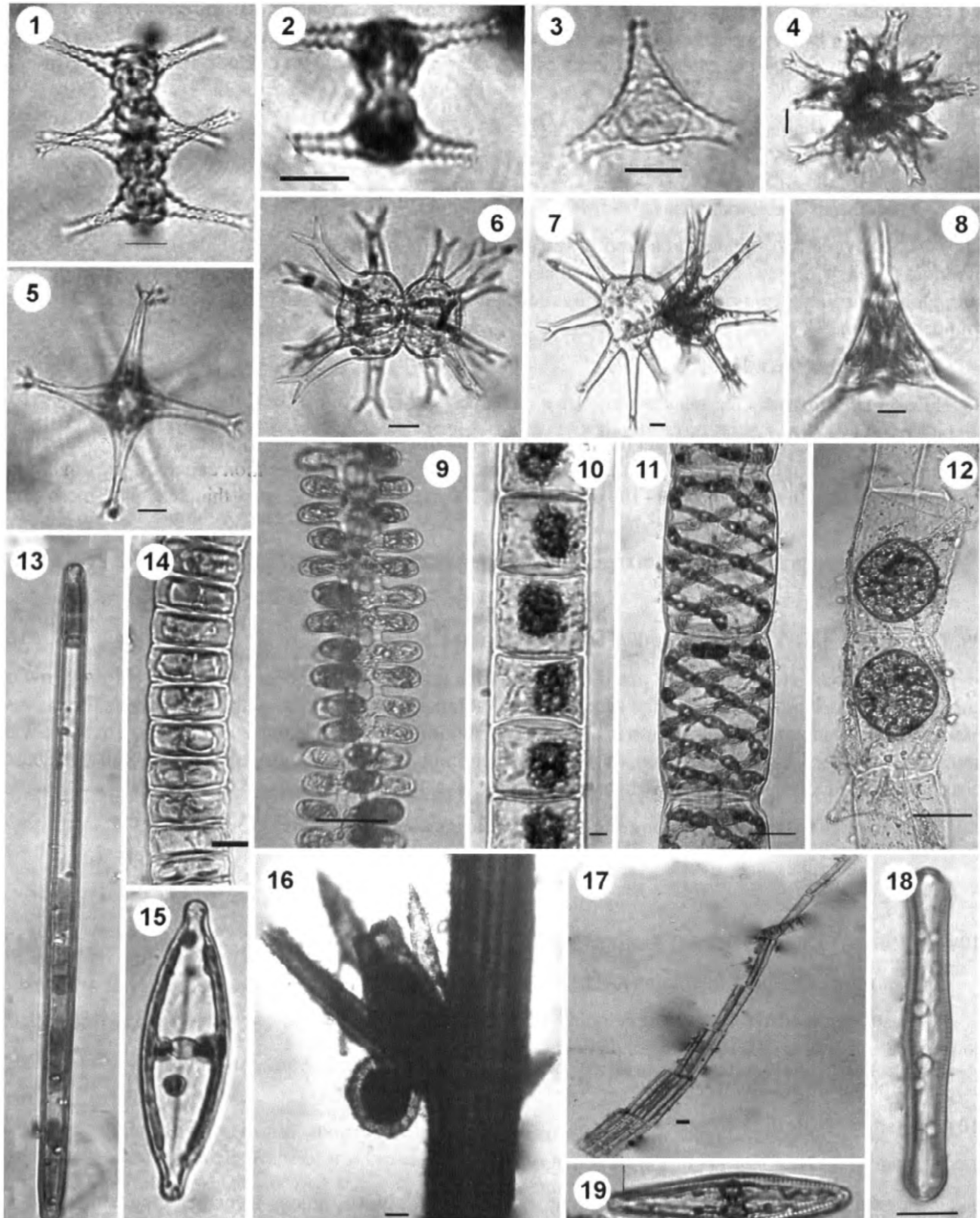


Plate 7: 1. *Staurastrum paradoxum* Meyen var. *longiceps* Nordst.; 2 & 3. *Staurastrum pseudosebaldi* Wille; 4. *Staurastrum sexagulare* (Brühl) Lundell var. *crassum* W.B.Turner; 5. *Staurastrum stellium* W.B.Turner; 6 & 7. *Staurastrum tohopekaligense* Wolle; 8. *Staurastrum trissacanthum* Scot et Prescott var. *dissacanthum* Scott and Prescott f. *longinum* Kanetsuna; 9. *Streptonema tribolatum* G.C.Wall.; 10. *Zygnema czurdae* Randhawa; 11 & 12. *Spirogyra ghosei* G.C.Singh; 13. *Synedra crystallina* Kütz.; 14. *Diademesmis confervacea* Kütz.; 15. *Navicula microspora* Kant & P.Gupta; 16. *Chara hydropitys* Reich var. *indica* A.Braun f. *minor* A.Braun; 17. *Diatoma anceps* (Ehrenb.) Kirchner; 18. *Pinnularia gibba* Ehrenb.; 19. *Gomphonema montanum* Schumann var. *genuinum* C. Mayer. (Scale bar, Figs. 1 - 9, 14, 15, 17 - 19 = 10 μ m, 10 = 30 μ m, 11-13 = 20 μ m, 16 = 100 μ m).

girdle view, truncate flat, slightly gap between the valve at the middle, 10 - 30 μm long and 5 - 12 μm broad; striation not distinct.

Planktic in lake, 1120, 23.03.2007.

103. *Navicula microspora* Kant & P.Gupta (Pl.7.15)

Frustules, elliptical- lanceolate, rostrate apices, capitate, axial area broad, 30 - 50 μm long and 6 - 12 μm broad; pseudoraphe at the centre; striation not visible in fresh material.

Epilithic on submerged stone and planktic in lake, Takmu fisheries area, Sendra, 1119 & 1120, 23.03.2007.

104. *Pinnularia gibba* Ehrenb. (Pl.7.18)

Frustules linear, slightly gibbous in the middle, end broadly rounded, 30 - 50 μm long and 8 - 10 μm broad; striation radial in the middle, striae 8 - 10 in 10 μm .

Epiphytic on weed, 1123, 24.03.2007.

105. *Gomphonema montanum* Schumann var. *genuinum* C.Mayer (Pl.7.19).

Frustules slightly clavata with rounded poles, central area broad, one side is normal where as other side is attenuated, 40 - 74 μm long and 5 - 11 μm broad; striation distinct, not regular, convergent toward base, striae 5 - 8 in 10 μm .

Epiphytic on submerged weeds and planktic, 1127 & 1128, 25.03.2007.

DISCUSSION

Altogether 105 algal taxa were recorded from five different sites of Loktak lake during March, 2007. 80% of taxa belong to Chlorophyceae and of these most of the taxa were desmids. Similar abundance of desmids in Loktak lake were also recorded by Brühl and Biswas (1926). In that report of the total 124 taxa except eight taxa under Cyanophyceae rest 116 were members of Chlorophyceae. In the present work 6 species of Cyanophyceae, 90 species of Chlorophyceae, 1 species of Charophyceae, 2 species of Euglenophyceae and 6 species of Bacillariophyceae were recorded (Table -1) out of which 20 species reported are common belonging to Cyanophyceae (1) and Chlorophyceae (19). It reflects that considerable change might have occurred in the lake ecosystem over the last eighty years leading to change in the occurrence of particular algal species and also appearance of *Euglena proxima* indicating organic pollution of the lake. However, it was remarkable to observe that desmids still are the principal algal forms in the lake followed by other green algae and Cyanophyceae members.

Table 1. List of algal taxa recorded from Loktak lake during March 2007 & comparison of these taxa with that of their occurrence in the lake in 1926 (recorded by Brühl and Biswas) is also presented.

Sl.No.	Algal Taxa	Present work 2007	Brühl & Biswas, 1926
Cyanophyceae (Cyanobacteria/Cyanoprokaryota)			
Order: Nostocales			
1	<i>Oscillatoria princeps</i> Voucher ex. Gomont	+	
2	<i>Oscillatoria tenuis</i> C. Agardh ex. Gomont	+	+
3	<i>Lyngbya cincinnata</i> (Itzigs.) Compère	+	
4	<i>Lyngbya magnifica</i> N.L. Gardner	+	
5	<i>Anabaena torulosa</i> Lagerh. ex Bornet & Flahault	+	
6	<i>Gloeotrichia echinulata</i> (Smith) P. Richter var. <i>berhampurensis</i> C.B. Rao	+	
Euglenophyceae			
Order : Euglenales			
7	<i>Euglena proxima</i> P.A. Dang.	+	

Sl.No.	Algal Taxa	Present work 2007	Brühl & Biswas, 1926
8	<i>Euglena sociabilis</i> P.A.Dang.	+	
	Chlorophyceae		
	Order : Chlorococcales		
9	<i>Pediastrum duplex</i> Meyen var. <i>asperum</i> (A.Braun) Hansg.	+	
10	<i>Pediastrum duplex</i> Meyen var. <i>duplex</i> Sulek	+	
11	<i>Pediastrum simplex</i> Meyen var. <i>biwaense</i> Fukush.	+	
12	<i>Pediastrum simplex</i> Meyen var. <i>sturmii</i> (Reinsch) Wolle	+	
13	<i>Pediastrum simplex</i> Meyen var. <i>simplex</i>	+	
14	<i>Ankistrodesmus falcatus</i> (Corda) Ralfs	+	+
15	<i>Ankistrodesmus tortus</i> Komárek & Comas	+	
16	<i>Desmodesmus communis</i> (E.H. Hegew.) E.H.Hegew.	+	
17	<i>Scenedesmus acuminatus</i> (Lagerh.) Chodat var. <i>minor</i> G.M.Sm.	+	
	Order : Cladophorales		
18	<i>Cladophora glomerata</i> (L.) Kütz.	+	
	Order : Oedogoniales		
19	<i>Bulbochaete</i> sp.	+	+
	Order : Zygnematales		
20	<i>Bambusina brébissonii</i> Kütz. ex Kütz.	+	
21	<i>Closterium acerosum</i> (Schränk) Ehrenb. var. <i>elongatum</i> Bréb.	+	
22	<i>Closterium arcuatum</i> Bréb.	+	
23	<i>Closterium calosporum</i> Wittr. var. <i>maius</i> (W. West & G.S. West) Willi Krieger	+	
24	<i>Closterium dinnae</i> Ehrenb. ex Ralfs	+	
25	<i>Closterium dinnae</i> Ehrenb. ex Ralfs var. <i>pseudodinnae</i> (J.Roy) Willi Krieger	+	
26	<i>Closterium ehrenbergii</i> Menegh. var. <i>ehrenbergii</i> f. <i>maninvernianum</i> (De Not.) Rabenh.	+	
27	<i>Closterium idiosporum</i> W. West & G.S. West	+	
28	<i>Closterium incurvum</i> Bréb.	+	
29	<i>Closterium Kützingii</i> Bréb.	+	
30	<i>Closterium lanceolatum</i> Kütz. ex Ralfs	+	
31	<i>Closterium loktakense</i> Brühl & Biswas	+	+
32	<i>Closterium lunula</i> (O.F. Müll.) Nitzsch ex Ralfs var. <i>coloratum</i> G.A.Klebs	+	
33	<i>Closterium ralfsii</i> Bréb. ex Bréb. var. <i>hybridum</i> Rabenh.	+	
34	<i>Cosmarium askenasyi</i> Schmidle	+	
35	<i>Cosmarium candianum</i> Delponte	+	
36	<i>Cosmarium ellipsoidale</i> Brühl & Biswas	+	+
37	<i>Cosmarium forceps</i> Brühl & Biswas	+	+
38	<i>Cosmarium globosum</i> Bulnheim var. <i>minus</i> Hansg.	+	

Sl.No.	Algal Taxa	Present work 2007	Brühl & Biswas, 1926
39	<i>Cosmarium inaequalipellicum</i> W. West & G.S. West	+	-
40	<i>Cosmarium laeve</i> Rabenh.	+	+
41	<i>Cosmarium lundellii</i> Delponte var. <i>ellipticum</i> W. West & G.S. West	+	+
42	<i>Cosmarium manipurens</i> Brühl & Biswas	+	+
43	<i>Cosmarium moniliforme</i> (Turpin) Ralfs var. <i>subpyriforme</i> W. West & G.S. West	+	
44	<i>Cosmarium norimbergense</i> Reinsch	+	
45	<i>Cosmarium norimbergense</i> Reinsch var. <i>depressum</i> (W. West & G.S. West) Willi Krieger & Gerloff.	+	
46	<i>Cosmarium obsoletum</i> (Hantzsch) Reinsch	+	+
47	<i>Cosmarium plicatum</i> Reinsch var. <i>hibernicum</i> W. West	+	+
48	<i>Cosmarium pseudophaseolus</i> Brühl & Biswas	+	
49	<i>Cosmarium radiosum</i> Wolle	+	
50	<i>Cosmarium scabrum</i> W.B.Turner	+	
51	<i>Cosmarium sexnotatum</i> Gutwinski var. <i>tristriatum</i> (Lütkem.) Schmidle	+	
52	<i>Cosmarium speciosum</i> (Gutwinski) W. West & G.S. West	+	
53	<i>Cosmarium venustum</i> Bréb. var. <i>majus</i> Wittr.	+	
54	<i>Cosmarium vexatum</i> W. West var. <i>aethiopicum</i> Forster	+	
55	<i>Cylindrocystis brebissonii</i> (Menegh. ex Ralfs) de Bary	+	
56	<i>Cylindrocystis crassa</i> de Bary	+	
57	<i>Desmidium baileyi</i> (Ralfs) Nordst.	+	
58	<i>Desmidium baileyi</i> (Ralfs) Nordst. var. <i>coelatum</i> (Kirchner) Nordst.	+	
59	<i>Desmidium baileyi</i> (Ralfs) Nordst. var. <i>wallichii</i> W.B.Turner	+	
60	<i>Desmidium bengalicum</i> W.B.Turner	+	
61	<i>Docidium subcoronulatum</i> W.B.Turner	+	
62	<i>Euastrum ansatum</i> Ralfs var. <i>pyxidatum</i> Delponte ex Delponte	+	+
63	<i>Euastrum elegans</i> (Bréb.) Kütz. var. <i>loktankense</i> Brühl & Biswas	+	+
64	<i>Euastrum elegans</i> (Bréb.) Kütz. var. <i>pseudoelegans</i> (W.B. Turner) W. West & G.S. West	+	
65	<i>Euastrum spiculatum</i> Brühl & Biswas	+	+
66	<i>Hyalotheca undulata</i> W. West ex Lütkem.	+	
67	<i>Micrasterias alata</i> G.C.Wall.	+	+
68	<i>Micrasterias foliacea</i> Bailey	+	
69	<i>Mecrasterias mahabaleshwariensis</i> Hobson	+	+
70	<i>Micrasterias pinnatifida</i> (Kütz.) Ralfs	+	+
71	<i>Netrium digitus</i> (Ehrenberg) Itzigsh & Rothe	+	
72	<i>Onchonema uncinatum</i> W.C.Wall.	+	
73	<i>Penium cucurbitinum</i> Bisset var. <i>subpolymorphum</i> Nordst.	+	
74	<i>Penium spinospermum</i> Joshua	+	

Sl.No.	Algal Taxa	Present work 2007	Brühl & Biswas, 1926
75	<i>Pleurotaenium eugeneum</i> (W.B.Turner) W. West & G.S. West var. <i>maius</i> B.N.Prasad & P. K.Misra	+	
76	<i>Pleurotaenium nodulosum</i> (Bréb.) de Bary var. <i>nodulosum</i> (Bréb.) W. West	+	
77	<i>Pleurotaenium ovatum</i> Nordst.	+	
78	<i>Pleurotaenium rectum</i> Delponte	+	
79	<i>Pleurotaenium verrucosum</i> (Bailey) P.Lundell	+	
80	<i>Sphaerosoma manipurens</i> Brühl & Biswas	+	+
81	<i>Sphaerosoma vertebratum</i> W. West & G.S. West	+	
82	<i>Spondylosium incurvatum</i> W.B.Turner	+	
83	<i>Spondylosium nitens</i> (G.C. Wall.) Archer f. <i>tensa</i> W.B.Turner	+	
84	<i>Spondylosium rectum</i> W.B.Turner	+	
85	<i>Stauradesmus cuspidatus</i> (Bréb. ex Ralfs) Teizing	+	
86	<i>Staurastrum anatinum</i> Cooke & A.Wills	+	
87	<i>Staurastrum chaetoceras</i> (Schröder) G.M.Sm	+	
88	<i>Staurastrum leptocladum</i> Nordst.	+	+
89	<i>Staurastrum paradoxum</i> Meyen var. <i>evolutum</i> W. West	+	
90	<i>Staurastrum paradoxum</i> Meyen var. <i>longiceps</i> Nordst.	+	+
91	<i>Staurastrum pseudosebaldi</i> Wille	+	
92	<i>Staurastrum stellium</i> W.B.Turner	+	
93	<i>Staurastrum sexagulare</i> (Brühl) Lundell var. <i>crassum</i> W.B.Turner	+	
94	<i>Staurastrum tohopekaligense</i> Wolle	+	
95	<i>Staurastrum trissacanthum</i> Scott & Prescott var. <i>dissacanthum</i> f. <i>longinum</i> Kanetsuna	+	
96	<i>Streptonema tribolatum</i> G.C.Wall.	+	
97	<i>Zygnema czurdae</i> Randhawa	+	
98	<i>Spirogyra ghosei</i> G.C.Singh	+	
	Order : Charales		
99	<i>Chara hydropitys</i> Reich. var. <i>indica</i> A.Braun f. <i>minor</i> A.Braun	+	
	Bacillariophyceae		
	Order : Fragilariales		
100	<i>Synedra crystallina</i> Kütz.	+	
	Order : Naviculales		
101	<i>Diadesmis confervacea</i> Kütz.	+	
102	<i>Navicula major</i> Kütz.	+	
103	<i>Navicula microspora</i> Kant & P.Gupta	+	
104	<i>Pinnularia gibba</i> Ehrenb.	+	
105	<i>Gomphonema montanum</i> Schumann var. <i>genuinum</i> C.Mayer	+	
	Total Taxa	105	20

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लोकतक झील, मणिपुर की शैवाल विविधता

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सार संक्षेप

लोकतक झील के विभिन्न स्थलों से 40 वंशों के 105 टैक्सा का अभिलेखन हुआ है। इनमें सायनोफाइसी के 4 वंशों की 6 जातियाँ, यूग्लेनोफाइसी की 2 जातियाँ, क्लोरोफाइसी के 28 वंशों की 90 जातियाँ, केरोफाइसी वंश की एक जाति तथा बेसिलेरियोफाइसी के 6 वंशों की 6 जातियाँ हैं। कुल शैवाल टैक्सा का लगभग 80 प्रतिशत क्लोरोफाइसी है। क्लोरोफाइसी के 87 प्रतिशत में डेस्मिड (जाइग्नेमेटेलस) की अधिक विविधता है। इनमें 20 टैक्सा की जानकारी आठ दशक पहले हुई थी। 2007 में लोकतक झील के सर्वेक्षण के दौरान इस प्राकृतवास से 85 अतिरिक्त शैवाल रूपों के अभिलेखन हुए। झील में पूर्व वर्णित कई शैवाल टैक्सा वर्तमान अध्ययन में नहीं पाए गए।