

## **HYDROBIOLOGICAL STUDIES WITHIN THE TEA GARDENS AT SRIMANGAL, BANGLADESH. IV. DESMIDS (17 GENERA)**

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*Key words:* Desmids, acidic habitats, phytoplankton, new records

### **Abstract**

Fifty nine taxa of desmids under 17 genera, namely *Cylindrocystis*, *Netrium*, *Spirotaenia*, *Gonatozygon*, *Penium*, *Closterium*, *Pleurotaenium*, *Triploceras*, *Triplastrum*, *Hyalotheca*, *Groenbladia*, *Bambusina*, *Teilingia*, *Sphaerozosma*, *Spondylosium*, *Onychonema* and *Desmidium* have been recorded from different aquatic habitats located within the tea gardens at Srimangal, Maulvi Bazar. Eight taxa are described as new records for Bangladesh including two genera, namely, *Cylindrocystis* and *Spirotaenia*.

### **Introduction**

Recently, Islam and Irfanullah have described the aquatic macrophytes (Islam and Irfanullah 2000) and algae (excluding desmids) (Islam and Irfanullah 2005a, 2005b) of some selected habitats within the tea gardens at Srimangal, Maulvi Bazar. The present paper is the third installment of the same series and it records 17 desmid genera.

### **Materials and Methods**

For the description and meteorological data of the study area see Islam and Irfanullah (2000). The studied waterbodies, namely, Baraooora Lake, the Burburia River, ditches and paddy fields were mostly acidic (Islam and Irfanullah 2005). In the winter of 1996 (9 January) and in different seasons of 1997 (winter, 6 January; spring, 18 March; rainy season, 20 July and autumn, 20 October), a total of 120 algal samples were collected. See Islam and Irfanullah (2005) for the sample collection methods, and their preservation and examination.

### **Taxonomic enumeration**

The present study reveals 59 taxa of desmids belonging to 17 genera of which eight taxa are newly recorded for Bangladesh (marked by \* asterisks). Nonetheless, a few algal taxa have already been reported as new records by the same authors from this area (Islam and Irfanullah 1998, 1999), which are not marked in this account.

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**Class: Chlorophyceae; Order: Zygnematales; Family: Mesotaeniaceae****Genus: *Cylindrocystis* Meneghini ex Ralfs 1848**

1. \*? ***C. brebissonii*** Meneghini (Pl. 3, Fig. 30)  
(Scott and Prescott 1961, 1: 3)  
L. 47.2 µm, W. 23 µm, t. 10.8–13.5 µm; two pyrenoids per cell. River; spring 1997; few.

**Genus: *Gonatozygon* de Bary, 1858**

2. ***G. aculeatum*** Hastings (Pl. 5, Fig. 48)  
(Smith 1924, 52: 3; Scott and Prescott 1961, 1: 7)  
L. 250 µm, W. csp. 20–21.6 µm, W. ssp. 10.8–12 µm, t. ssp. 12–12.8 µm. Lake; winter 1997; common.
3. ***G. kinahani*** (Archer) Rab. fa.  
(Islam and Irfanullah 1999, 118, 1: 4)  
Lake; autumn 1997; few.
4. ***G. pilosum*** Wolle (Pl. 5, Fig. 49)  
(Růžička 1977, 1: 15–16)  
L. 262 µm, W. csp. 13.5 µm, W. ssp. 12 µm, t. 12 µm. Lake; winter 1997; few.

**Genus: *Netrium* (Näg.) Itz. & Rothe in Rab., 1856**

5. ***N. digitus*** (Ehr. ex Ralfs) Itz. & Rothe var. ***lamellosum*** (Bréb.) Grönbl. (Pl. 5, Figs. 50–51)  
(Islam and Haroon 1980, 2: 27)  
L. (163)–211–346 µm, W. 39–64 µm, t. 19.2–25.6 µm. River; spring 1997; common.

**Family: Desmidiaceae; Genus: *Spirotaenia* de Brébisson, 1844**

6. \****Spirotaenia*** sp. (Pl. 3, Fig. 31)  
(Smith 1924, 5)  
L. 86.4–143 µm, W. 13.5–16.2 µm; smooth cell wall; spiral chloroplast with pyrenoids. River; spring 1997; common.

**Genus: *Penium* Bréb. ex Ralfs in Ralfs, 1848**

7. ***P. spirostriolatum*** Barker (Pl. 3, Fig. 32)  
(Scott and Prescott 1961, 1: 12)  
L. 198 µm, W. 23 µm, I. 20.2 µm, t. 13.5 µm. Lake; winter 1997; rare.

**Genus: *Triplastrum* Iyengar & Ramanathan, 1942**

8. ***T. abbreviatum*** (Turner) Iyengar & Ramanathan (Pl. 1, Fig. 6)  
(Islam 1980, 3: 36–41)  
L. csp. 85.7 µm, L. ssp. 83.7 µm, W. 10.8 µm, I. 8.5 µm, t. 11.5–13.5 µm. Lake; winter 1996; rare.

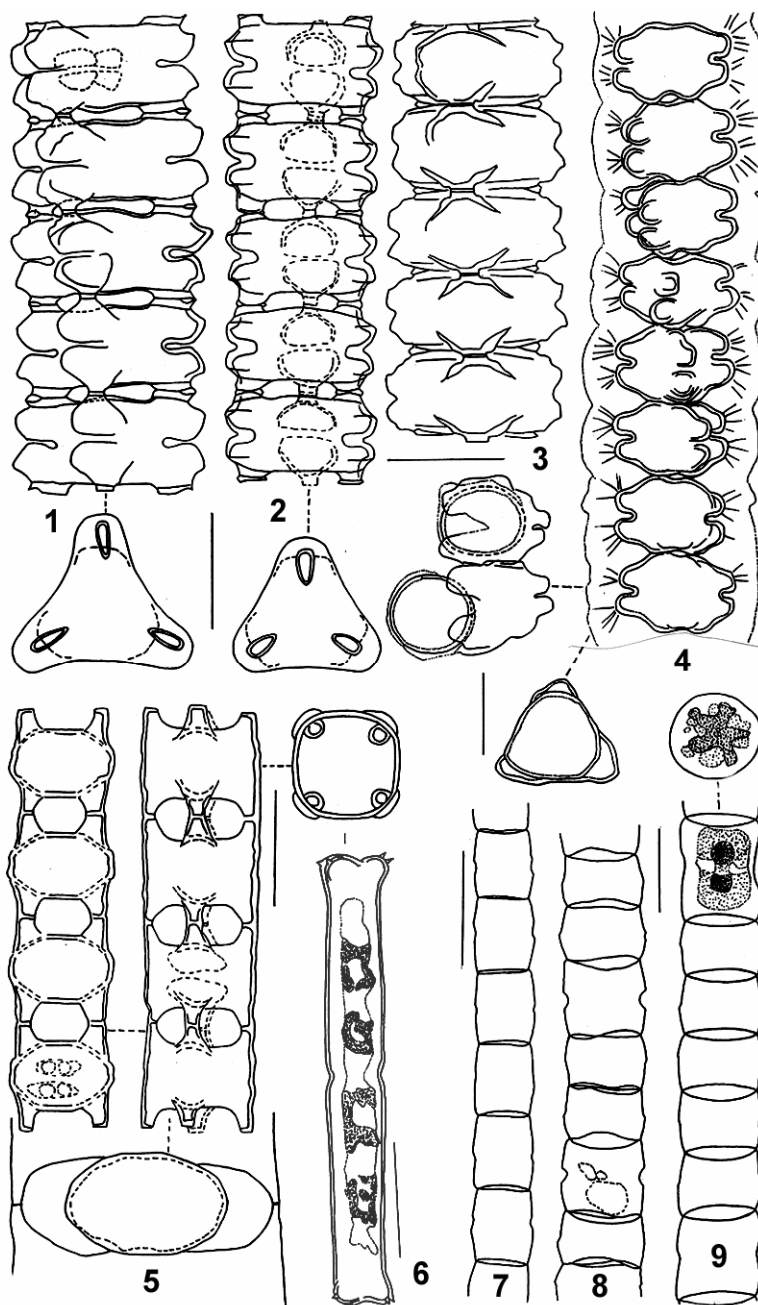


Plate 1

Figs. 1-2. *Desmidium aptogonum* var. *acutius*, 3. *D. swartzii* var. *ambloydon*, 4. *D. bengalicum*, 5. *D. baileyi* var. *baileyi*, 6. *Triplastrum abbreviatum*, 7, 9. *Hyalotheca dissiliens* var. *tatica*, 8. *H. dissiliens* var. *hians*. [Scales = 20  $\mu$ m]

**Genus: Triploceras** Bailey, 1851

9. **T. gracile** Bailey var. **undulatum** Scott & Prescott (Pl. 5, Fig. 47)  
(Scott and Prescott 1958, 27, 3: 8)  
L. csp. 624 µm, L. ssp. 608 µm, W. csp. 52 µm, W. ssp. 35 µm, I. 30 µm, t csp. 46 µm, t. ssp. 40.5 µm. Lake (autumn 1997) and river (spring 1997); few.

**Genus: Closterium** Nitzsch ex Ralfs, 1848

10. **Cl. angustatum** Kütz. ex Ralfs (Pl. 2, Fig. 11)  
(Islam 1970, 909, 4: 17; Islam and Haroon 1980, 558, 1: 14)  
L. 192 µm, W. 13.5 µm, t. 6.7–8 µm. Lake; winter 1997; rare.
11. \***Cl. closterioides** (Ralfs) Louis and Peeters var. **intermedium** (Roy & Biss.) Růžičk (Růžička 1977, 93, 6: 3–6) (Pl. 2, Fig. 18)  
L. 109.3 µm, W. 23 µm, t. 8–9 µm; eight axial chloroplasts, smooth wall, pyrenoids were not clearly evident. Lake; winter 1996 and 1997; rare to few.
12. \***Cl. diana**e var. **minus** Hieron. (Pl. 2, Fig. 13)  
(Růžička 1977, 135, 13: 10–12; as *C. diana*e var. *minor* Hieron. in Prescott *et al.* 1975, 47, 23: 8)  
L. 213 µm, W. 23 µm, t. 4.7 µm. Lake; winter 1997; rare.
13. **Cl. gracile** Bréb. ex Ralfs (Pl. 2, Fig. 12)  
(Prescott *et al.* 1975, 52, 16: 2; Růžička 1977, 168, 21: 1–4)  
L. 416 µm, W. 17.5 µm, t. 5.4 µm; cell wall punctate. Lake; winter 1997; rare.
14. **Cl. jenneri** Ralfs var. **tenue** Croasdale (Pl. 2, Fig. 15)  
(Prescott *et al.* 1975, 56, 23: 2)  
L. 97–103 µm, W. 9.4–12 µm, t. 4 µm. Lake (winter 1997; few) and river (spring 1997; common).
15. **Cl. kuetzingii** Bréb. var. **vittatum** Nordst. (Pl. 2, Fig. 21)  
(Růžička 1977, 209, 30: 15–17)  
L. 384 µm, W. 13.5 µm, t. 2.7 µm. Lake; winter 1996 and 1997; few.
16. **Cl. moniliferum** (Bory) Ehr. ex Ralfs (Pl. 2, Fig. 14)  
(Prescott *et al.* 1975, 70, 21: 3)  
L. 115 µm, W. 16.2 µm, t. 4 µm. Lake; winter 1996 and 1997, and autumn 1997; few.
17. **Cl. pritchardianum** Archer (Pl. 2, Fig. 10)  
(Prescott *et al.* 1975, 77, 25: 7, 14)  
L. 528 µm, W. 35.2 µm, t. 8 µm. Lake; winter 1997; rare.

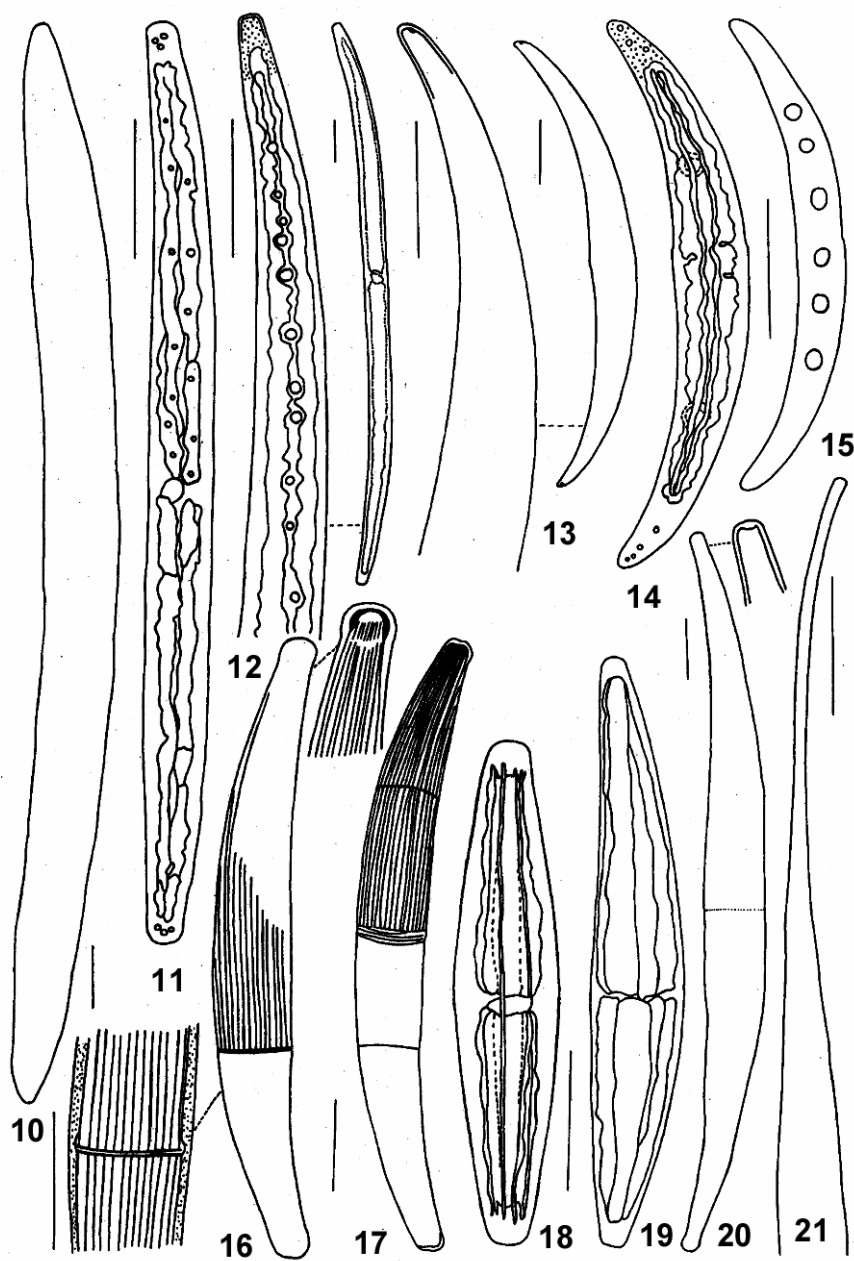


Plate 2

Figs. 10. *Closterium pritchardianum*, 11. *Cl. angustatum*, 12. *Cl. gracile*, 13. *Cl. diana* var. *minus*, 14. *Cl. moniliferum*, 15. *Cl. jenneri* var. *tenue*, 16-17. *Cl. striolatum* var. *subtruncatum*, 18. *Cl. closterioides* var. *intermedium*, 19. *Cl. tumidum*, 20. *Cl. ralfsii* var. *hybridum*, 21. *Cl. kuetzingii* var. *vittatum*. [Scales = 30  $\mu$ m].

18. **Cl. ralfsii** de Bréb. var. **gracilius** (Maskell) Krieger (Pl. 5, Fig. 58)  
(Růžička 1977, 191, 25: 9)  
L. 143 µm, W. 5.4 µm, t. 2 µm. Lake; winter 1997; few.
19. **Cl. ralfsii** var. **hybridum** Rab. (Pl. 2, Fig. 20)  
(Růžička 1977, 192, 25: 10–13)  
L. 352 µm, W. 28.8 µm, t. 6.7 µm. River; spring 1997; few.
20. \* **Cl. rectimarginatum** Scott & Prescott (Pl. 5, Fig. 57)  
(Scott and Prescott 1961, 13, 1: 27–28)  
L. 189 µm, W. 23 µm, t. 4 µm. River; spring 1997; rare. Note: it is somewhat similar to *C. subfusiforme* (see Prescott *et al.* 1975, 14: 11).
21. **Cl. rostratum** Ehr. var. **rostratum** (Pl. 5, Fig. 59)  
(Prescott *et al.* 1975, 83, 31: 3, 12)  
L. 243 µm, W. 20.2 µm, t. 5.4 µm. Lake; winter 1996; rare.
22. \***Cl. striolatum** var. **subtruncatum** (W. & W.) Krieger (Pl. 2, Figs. 16–17)  
(Prescott *et al.* 1975, 89, 27: 5 & 28: 7; Růžička 1977, 218, 32: 12–14)  
L. 192–195 µm, W. 21.6–24.3 µm, t. 9.4–12.2 µm; 5–8 striations per 10 µm. Lake (autumn 1997) and river (spring 1997); few.
23. **Cl. tumidum** Johnson (Pl. 2, Fig. 19)  
(Islam and Akter 1999, 26, 2: 27)  
L. 127 µm, W. 21.6 µm, t. 5.4 µm; six axial chloroplasts per semicell. Paddy field; autumn 1997; few.
- Genus: Pleurotaenium** Nägeli, 1849
24. **Pl. ehrenbergii** (Bréb.) de Bary var. **ehrenbergii** (Pl. 4, Fig. 37)  
(Prescott *et al.* 1975, 114, 45: 1–5)  
L. 230 µm, W. 21.6 µm, I. 14.8 µm, t. 13.5 µm. River; spring 1997; rare.
25. **Pl. ehrenbergii** var. **elongatum** West (Pl. 4, Fig. 40)  
(Prescott *et al.* 1975, 117, 46: 1–3)  
L. 270 µm, W. 12–13.5 µm, I. 9.4 µm, t. 9.4–10 µm. Lake; winter 1996; rare.
26. **Pl. ehrenbergii** var. **undulatum** Schaars. (Pl. 4, Fig. 41)  
(Islam 1970, 913, 4: 15; Prescott *et al.* 1975, 117, 46: 5, 6, 18)  
L. 512 µm, W. 54.4 µm, t. 41.6–43.2 µm. Paddy field; autumn 1997; rare.
27. **Pl. kayei** (Archer) Rab. (Pl. 4, Figs. 42–43)  
(Islam and Haroon 1980, 562, 4: 54–55)  
L. 275–320 µm, W. csp. 56.7–67.5 µm, W. ssp. 44.5–54 µm, I. 32.4 µm, t. csp. 38–40.5 µm, t. ssp. 28 µm. Lake (autumn 1997; few) and river (winter 1997; common).

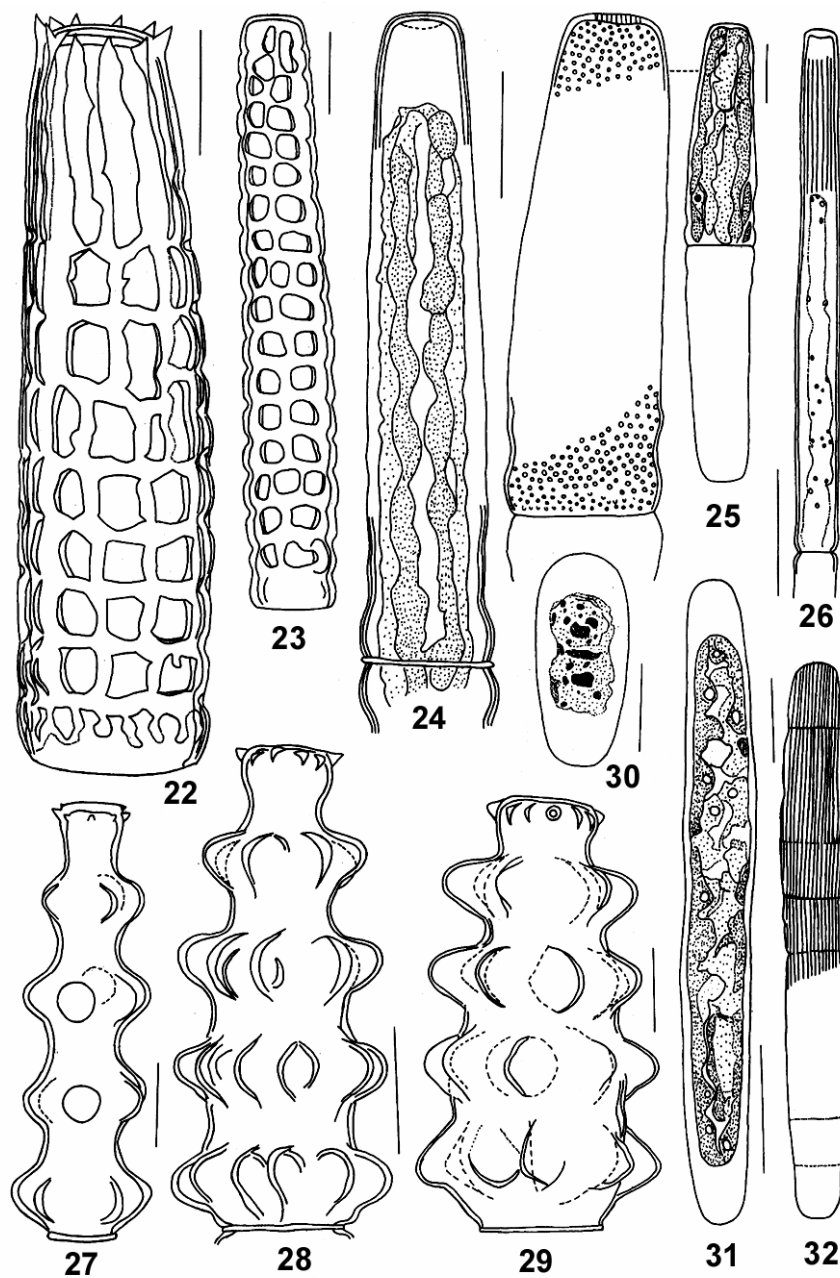


Plate 3

Figs. 22. *Pleurotaenium verrucosum* var. *validum*, 23. *Pl. trochiscum*, 24. *Pl. trabecula* fa., 25. *Pl. trabecula* var. *crassum*, 26. *Pl. trabecula* var. *elongatum*, 27. *Pl. nodosum* var. *borgei*, 28–29. *Pl. nodosum* var. *gutwinskii*, 30. ? *Cylindrocystis brebissonii*, 31. *Spirotaenia* sp., 32. *Penium spirostriolatum* [Scales = 20  $\mu$ m].

28. **Pl. kayei** var. **ovoideum** Islam and Haroon (Pl. 4, Fig. 44)  
(Islam and Haroon 1980, 562, 5: 77)  
L. 243  $\mu\text{m}$ , W. csp. 71.5  $\mu\text{m}$ , W. ssp. 56.7  $\mu\text{m}$ , I. 37.8  $\mu\text{m}$ , t. csp. 40.5  $\mu\text{m}$ , t. ssp. 25.6  $\mu\text{m}$ . Paddy field; autumn 1997; rare.
29. **Pl. nodosum** (Bail.) Lund. var. **borgei** (Grönbl.) Krieger (Pl. 3, Fig. 27)  
(Islam 1970, 914, 5: 15; Prescott *et al.* 1975, 125, 44: 6–9)  
L. 248–346  $\mu\text{m}$ , W. 49–50  $\mu\text{m}$ , I. 23  $\mu\text{m}$ , t. csp. 23–29, t. ssp. 20.2–21.6  $\mu\text{m}$ . Lake (winter 1997; few) and paddy field (autumn 1997; rare).
30. **Pl. nodosum** var. **gutwinskii** Krieger (Pl. 3, Figs. 28–29)  
(Prescott *et al.* 1975, 126, 44: 10; Islam and Haroon 1980, 562, 5: 86)  
L. 232–313  $\mu\text{m}$ , W. 51–86  $\mu\text{m}$ , I. 23–43  $\mu\text{m}$ , t. csp. 24–41  $\mu\text{m}$ , t. ssp. 22–34  $\mu\text{m}$ ; band present at the isthmus, 10–12 nodules on the basal ring, 12 spines at each semi-cell tip. Quite robust and slightly differs from the typical. Paddy field; autumn 1997; rare.
31. **Pl. subcoronulatum** (Turn.) W. & W. (Pl. 4, Figs. 38–39)  
(Scott and Prescott 1961, 132, 49: 2–4, 10; Islam 1970, 914, 4: 1–2)  
L. 740  $\mu\text{m}$ , W. 47  $\mu\text{m}$ , I. 41  $\mu\text{m}$ , t. 39  $\mu\text{m}$ ; cell wall pitted. Lake; winter 1996; few.
32. **Pl. trabecula** (Ehr.) Näg. (Pl. 4, Figs. 33–34)  
(Prescott *et al.* 1975, 133, 40: 1–5)  
L. 550–660  $\mu\text{m}$ , W. 38–44.5  $\mu\text{m}$ , I. 24.3–28.3  $\mu\text{m}$ , t. 24.3–28.3  $\mu\text{m}$ . River; spring 1997; few.
33. **Pl. trabecula** var. **crassum** Wittr. (Pl. 3, Fig. 25)  
(Prescott *et al.* 1975, 134, 40: 14)  
L. 160  $\mu\text{m}$ , W. 25  $\mu\text{m}$ , I. 22.5  $\mu\text{m}$ , t. 14  $\mu\text{m}$ . Paddy field; autumn 1997; rare.
34. **Pl. trabecula** var. **elongatum** Cedergrén (Pl. 3, Fig. 26; Pl. 4, Fig. 36)  
(Prescott *et al.* 1975, 134, 40: 10–11)  
L. 162–167  $\mu\text{m}$ , W. 7–9.6  $\mu\text{m}$ , I. 5.4–7.8  $\mu\text{m}$ , t. 4.8–5.4  $\mu\text{m}$ . Lake; winter 1996; common.
35. **Pl. trabecula** var. **maximum** (Reinsch) Roll fa. **constrictum** Scott & Presc. (Pl. 4, Fig. 35)  
(Scott and Prescott 1961, 18, 3: 11)  
L. 570  $\mu\text{m}$ , W. 40.5  $\mu\text{m}$ , I. 31  $\mu\text{m}$ , t. 25.6  $\mu\text{m}$ . Lake; winter 1996; few.
36. **Pl. trabecula** fa. (Pl. 3, Fig. 24)  
L. 307–320  $\mu\text{m}$ , W. 30–31  $\mu\text{m}$ , I. 26  $\mu\text{m}$ , t. 17.5–19  $\mu\text{m}$ ; one band at the isthmus. River; spring 1997; very rare.
37. **Pl. trochiscum** W. & W. (Pl. 3, Fig. 23)  
(Prescott *et al.* 1975, 136, 50: 9–12)  
L. 448  $\mu\text{m}$ , W. 32.4  $\mu\text{m}$ , I. 28.8  $\mu\text{m}$ , t. 22.4  $\mu\text{m}$ . Lake; winter and rainy 1997; rare to few.



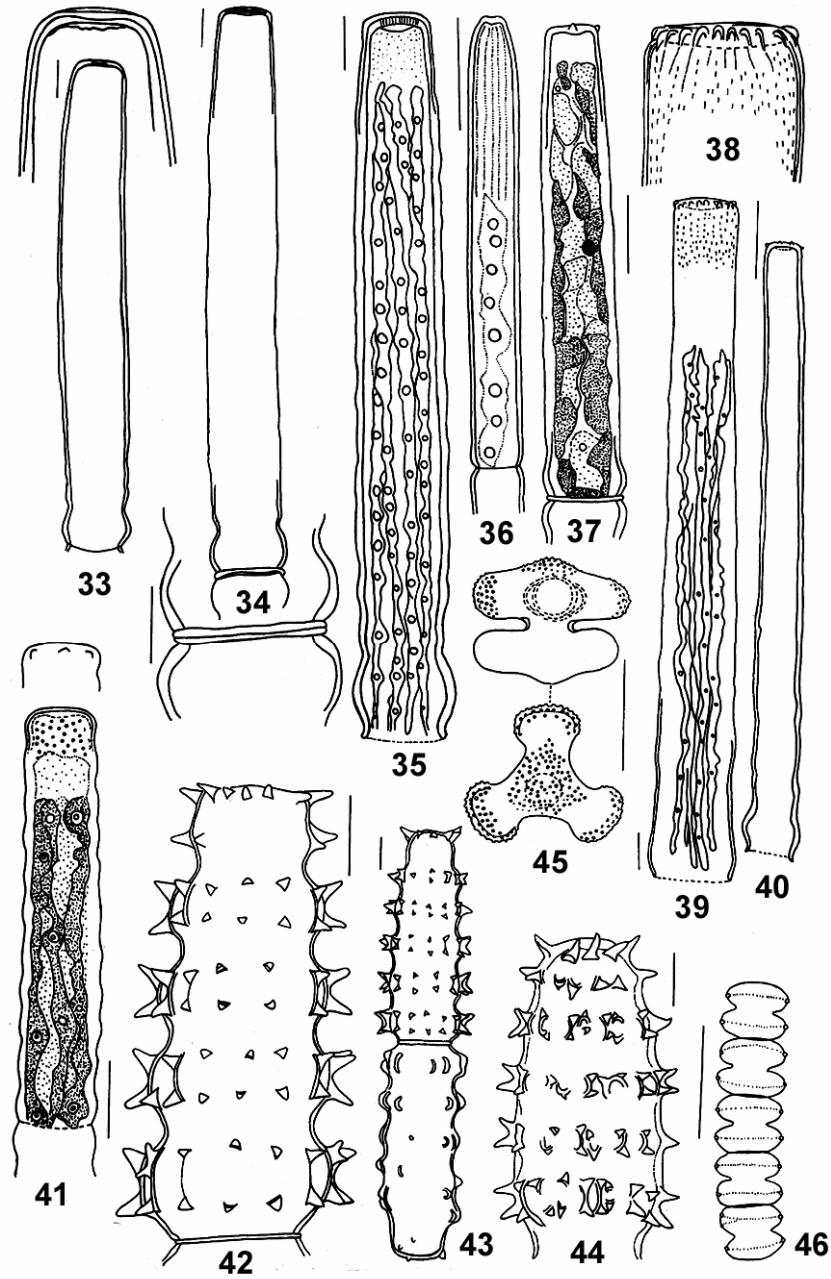


Plate 4

Figs. 33-34. *Pleurotaenium trabecula*, 35. *Pl. trabecula* var. *maximum* fa. *constrictum*, 36. *Pl. trabecula* var. *elongatum*, 37. *Pl. ehrenbergii* var. *chrenbergii*, 38-39. *Pl. subcoronulatum*, 40. *Pl. ehrenbergii* var. *elongatum*, 41. *Pl. ehrenbergii* var. *undulatum*, 42-43. *Pl. kayei*, 44. *Pl. kayei* var. *ovoideum*, 45. *Spondylosium* sp., 46. *Sphaerosma aubertianum* [Scales = 20  $\mu$ m].

38. \* **Pl. verrucosum** (Bail.) Lund. var. **validum** Scott and Grönl. (Pl. 3, Fig. 22)  
(Prescott *et al.* 1975, 139, 51: 1)  
L. 275 µm, W. 41.8–58 µm, I. 29.7 µm, t. 23 µm. River; spring 1997; rare.

**Genus: Hyalotheca** Ehrenberg ex Ralfs, 1848

39. **H. dissiliens** (Smith) Bréb. var. **hians** Wolle (Pl. 1, Fig. 8)  
(Croasdale *et al.* 1983, 29, 461: 2–3)  
L. 12–19 µm, W. 21.6 µm, I. 16.2–17.5 µm. Lake; winter 1997; few.
40. **H. dissiliens** var. **tatrica** Racib. (Pl. 1, Figs. 7, 9)  
(Croasdale *et al.* 1983, 29, 461: 4)  
L. 12–19 µm, W. (10.8–12.8)–21.6 µm, I. (10.2)–16.2–17.5 µm. Lake (winter 1996 and 1997; rare to common) and river (spring 1997; common).
41. **H. mucosa** (Mert.) Ehr. ex Ralfs  
(Islam and Irfanullah 1999, 122, 1: 3)  
Lake (autumn 1997; few) and river (spring 1997; common).

**Genus: Groenbladia** Teiling, 1952

42. **G. neglecta** (Racib.) Teiling  
(Islam and Irfanullah 1998, 93, Figs. 1–3)  
Lake (winter 1997) and river (spring 1997); common.
43. **G. undulata** (Nordst.) Förster  
(Islam and Irfanullah 1998, 95, Figs. 4–5)  
Lake; autumn 1997; few.

**Genus: Bambusina** Kützing ex Kützing, 1845

44. **B. brebissonii** Kütz. var. **brebissonii** (Pl. 5, Fig. 54)  
(Islam 1970, 934, 3: 9–10)  
L. 24.3–27 µm, W. 16.2–19 µm, t. 12 µm. Lake (winter 1996; rare), river (spring 1997; common) and paddy field (autumn 1997; few).

**Genus: Teilingia** Bourrelly, 1964

45. **T. exigua** (Turner) Bourrelly  
(Islam and Irfanullah 1999, 122, 1: 11)  
Lake; autumn 1997; few.

**Genus Sphaerosma** Corda ex Ralfs, 1848

46. \***S. aubertianum** West, W. (Pl. 4, Fig. 46)  
(Croasdale *et al.* 1983, 2, 448: 1–5)  
L. 10.8 µm, W. 12–13.5 µm, I. 6.7 µm; a fine horizontal row of pores across the middle of the semicell; mucilage strand from the pore appearing as granules on the lateral margins. Lake; autumn 1997; common.

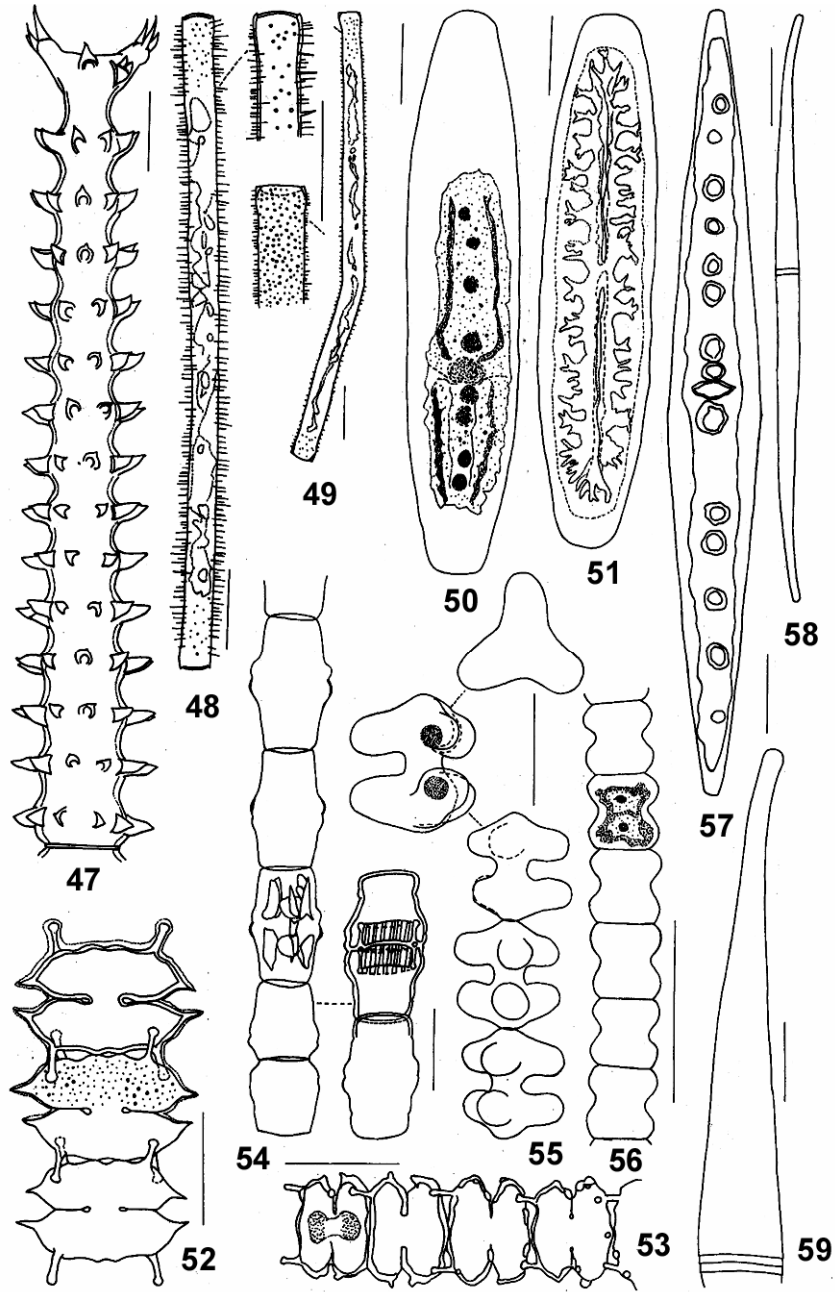


Plate 5

Figs. 47. *Triploceras gracile* var. *undulatum*, 48. *Gonatozygon aculeatum*, 49. *G. pilosum*, 50-51. *Netrium digitus* var. *lamellosum*, 52. *Onychonema laeve* var. *laeve*, 53. *O. laeve* var. *micracanthum*, 54. *Bambusina brebissonii* var. *brebissonii*, 55. *Spondylosium javanicum* var. *javanicum*, 56. *S. planum* var. *planum*, 57. *Closterium* var. *rectimarginatum*, 58. *Cl. raflsii* var. *gracilius*, 59. *Cl. rostratum* var. *rostratum* [Scales, Figs. 47-51 = 30  $\mu$ m, Figs. 52-59 = 20  $\mu$ m].

**Genus: Spondylosium** Brébisson ex Kützing, 1849

47. **S. javanicum** (Gutw.) Gronblad var. **javanicum** (Pl. 5, Fig. 55)  
(Croasdale *et al.* 1983, 19, 457: 14-15; Scott and Prescott 1961, 121, 60: 10 as *S. nitens* (Wall.) Arch. var. *triangulare* Turner fa. *javanicum* Gutw.).  
L. 27 µm, W. 24.3 µm, I. 6.7 µm. Lake; winter 1996; common.
48. **S. panduriforme** (Heim.) Teil.  
(Islam and Irfanullah 1999, 122, 1: 5-9)  
Lake; autumn 1997; common.
49. **S. panduriforme** var. **panduriforme** fa. **limneticum** (W. & W.) Teil.  
(Islam and Irfanullah 1999, 122, 1: 10)  
Lake; winter 1996 (few) and spring 1997 (common).
50. **S. planum** var. **planum** (Wolle) W. & W. (Pl. 5, Fig. 56)  
(Croasdale *et al.* 1983, 21, 456: 6-7)  
L. 8 µm, W. 4 µm, I. 2.7 µm, t. 2.7 µm. Paddy field; autumn 1997; few.
51. **Spondylosium** sp. (Pl. 4, Fig. 45)  
L. 24.3-26.3 µm, W. 28.3-30.4 µm, I. 7.4 µm; warts present on the tips of the arms and at the poles. Lake; autumn 1997; rare.

**Genus: Onychonema** Wallich, 1860

52. **O. laeve** Nordst. var. **laeve** (Pl. 5, Fig. 52)  
(Croasdale *et al.* 1983, 13, 452: 6-10)  
L. cpr. 28.3-31 µm, L. spr. 18.2-21.6 µm, W. csp. 27.7-35.8 µm, W. ssp. 21.6-31 µm, I. 3-8 µm. Lake; winter 1996; rare.
53. **O. laeve** var. **micracanthum** Nordst. (Pl. 5, Fig. 53)  
(Croasdale *et al.* 1983, 14, 453: 7-9)  
L. 14.8 µm, W. csp. 22.3 µm, I. 6 µm. Paddy field; autumn 1997; rare.

**Genus: Desmidium** Agardh, 1848

54. **D. aptogonum** Bréb. ex Kütz. var. **acutius** Nordst. (Pl. 1, Figs. 1-2)  
(Croasdale *et al.* 1983, 39, 463: 7-8)  
L. 16-19 µm, W. 28.3-35 µm, I. 19-28.3 µm, t. 11.3-24.3 µm. Lake; winter 1996; common.
55. **D. baileyi** (Ralfs) Nordst. var. **baileyi** (Pl. 1, Fig. 5)  
(Croasdale *et al.* 1983, 41, 464: 8-9)  
L. 21 µm, W. 21.6-23 µm, t. 21.6-23 µm; zygosporic dimension 27-29.7 µm X 19-21.6 µm. Lake; winter 1996; common.

56. **D. baileyi** fa. **tetragonum** Nordst.  
(Islam and Irfanullah 1999, 120, 1: 1)  
Lake; winter 1996; few.
57. **D. bengalicum** Turner (Pl. 1, Fig. 4)  
(Scott and Prescott 1961, 124, 62: 12–13; Islam 1970, 934, 2: 7 & 7: 6)  
L. 19  $\mu\text{m}$ , W. 28.3–29.7  $\mu\text{m}$ , Ist. 20.2–21.6  $\mu\text{m}$ , t. 12  $\mu\text{m}$ ; zygospore 17.5–19  $\mu\text{m}$   $\times$  17.5–21  $\mu\text{m}$ . Colonies are embedded in mucilage with ray-like deposition but no spines. River; winter and spring 1997; few to common.
58. **D. quadrangulatum** Ralfs  
(Islam and Irfanullah 1999, 122, 1: 2)  
Lake; winter 1996; few.
59. **D. swartzii** var. **ambloydon** (Itz.) Rab. (Pl. 1, Fig. 3)  
(Islam 1970, 934, 2: 8–9; Croasdale *et al.* 1983, 49, 468: 5–10)  
L. 16.2  $\mu\text{m}$ , W. 35  $\mu\text{m}$ , I. 29.7–31  $\mu\text{m}$ , t. 24.3  $\mu\text{m}$ . Lake; winter 1997; rare.

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