

## SOME CHLOROCOCCALEAN ALGAE FROM TAPI RIVER OF JALGAON DISTRICT, MAHARASHTRA, INDIA

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The Tapi is one of the main and perennial river in Jalgaon district. The river flows for about 307 km in Maharashtra State, of which approximately 140 km length is in Jalgaon district. Twenty three taxa of Chlorococcales were collected during Sept. 2007-Dec. 2010. Of these 21 taxa belonging to genus *Characium* A. Braun ex. Kuets. (*Characium acuminatum*, *C. ambiguum*, *C. anophelesi*, *C. angustum*, *C. apiculatum*, *C. braunii*, *C. bulbosum*, *C. cucurbitinum*, *C. cylindricum*, *C. debaryanum*, *C. enciforme*, *C. gracilipes*, *C. hookeri*, *C. indicum*, *C. lanceolatum*, *C. nasutum*, *C. obtusum*, *C. orissicum*, *C. pringsheimii*, *C. rostratum*, *F. minor* f. nova and *C. sieboldii*), one taxon belonging to genus *Characiosiphon* Iyengar (*Characiosiphon rivularis* var. *obtusum* var. nova) and one taxon is to genus *Rhopalosolen* Fott (*Rhopalosolen saccatus*). Out of 23 taxa *Characium bulbosum*, *C. cucurbitinum*, *C. lanceolatum*, *C. pringsheimii*, *C. sieboldii*, and *Rhopalosolen saccatus* are new to India. Two new taxa such as *Characium rostratum* f. *minor* forma nova and *Characiosiphon rivularis* var. *obtusum* variety novo are proposed. An illustrated detailed account has been given for the new species and new records for India and rest of the taxa only brief taxonomic notes are given.

**Keywords:** Algae; Chlorococcales; Maharashtra ; Tapi river.

### Introduction

While studying the algae from Tapi river from Jalgaon district, the authors collected 95 taxa of Chlorococcales. In this communication description of 21 taxa of genus *Characium* A. Braun ex Kuets., one taxon each from genus *Characiosiphon* Iyengar and genus *Rhopalosolen* Fott is given. Several accounts of Indian Chlorococcales have appeared closely on the heel of the publication of the monograph by Philipose<sup>1</sup>. In the past a good deal of research work has been carried out on the Chlorococcales from India<sup>2-9</sup> and the Chlorococcalean flora were brought on the map of Maharashtra by some workers<sup>10-17</sup>. Very few reports are available on the Chlorococcales occurring in Jalgaon district<sup>18-25</sup>. Keeping this in mind the author surveyed the members of Chlorococcales from Jalgaon district. All the taxa are taxonomically and ecologically described.

### Material and Methods

Algal collections were made during Aug. 2007-Dec. 2010 from both banks of Tapi rivers from Jalgaon district (20° and 21° North latitude and 74°, 75°, and 76°, 28°, East longitude). Camera lucida drawings were made from fresh as well as materials preserved in 4% formalin. Microphotographs were taken using Trinocular reserach

microscope in combination with 8 megapixel Nikon Coolpix P4 digital camera. Taxa were identified following the monograph on Chlorococcales by Philipose<sup>1</sup> and relevant research publications<sup>1,26-33</sup>.

### Systematic account-

1. *Characium acuminatum* A. Braun ex Kuetz. (Pl. I, Fig. 1; Pl. III, Fig. 8).

Cell narrowly ovate with short apiculation to form acuminate beak. Stalk short with basal knob like thickening. Cell 9.4 µm broad and 48.7 µm long.

Habitat : Epiphytic on filamentous algae in shallow water near Kandwel Tal. Raver. Coll. No. 334, Oct. 2009.

2. *C. ambiguum* Hermann ex Rabenh. (Pl. I, Fig. 2; Pl. III, Fig. 7.)

Cell small, elongated, oblique, narrowed to a sharp point anteriorly, tapering posteriorly and attached to the substratum by short stalk with basal thickening. Cell 9.4 µm broad and 43 µm long.

Habitat : Epiphytic on *Hydrilla* near Ajnade Tal. Raver. Coll. No. 53, Oct. 2007.

3. *C. angustum* A. Braun. (Pl. I, Fig. 3; Pl. II, Fig. 6)

Cell straight and lanceolate with a short hyaline apical beak; stalk short, thick colourless but without basal thickening. Cells 15-18.3 µm broad and 63.3-78 µm long.

**Habitat :** On decaying vegetation, Dondwade Tal. Chopda. Coll. No. 23, Dec. 2008.

4. *C. anophelesi* Iyengar et. Iyengar (Pl. I, Fig.4; Pl. II, Fig.3)

Cell pear-shaped, elongated, broadly rounded towards the top and narrowed gradually below into a rounded base; attached to substratum by colourless rounded pad of mucilage. Cells 18.3-21.2  $\mu\text{m}$  broad and 56.6-60  $\mu\text{m}$  long.

**Habitat :** Attached to larvae, Kandari Tal. Bhusawal. Coll. No. 230, Dec. 2008.

5. *C. apiculatum* Rabenh. (Pl. I, Fig.5; Pl. III, Fig.10)

Cell straight, clavate-shaped. Apex broadly rounded with stumpy apical point. Stalk short, thick and dark, with the base widened. Cell. 9.7  $\mu\text{m}$  broad and 48.7  $\mu\text{m}$  long.

**Habitat :** Epiphytic on *Pithophora*, Duskheda Tal. Yawal. Coll. No. 257, Jan. 2008.

6. *C. braunii* Bruegger (Pl. I, Fig. 6; Pl. II, Fig.8)

Cell fusiform and slightly curved with short stipe and attaching disc, the anterior end gradually tapering to a short, sharp point. Cell 12.5  $\mu\text{m}$  broad and 48.8  $\mu\text{m}$  long. **Habitat :** As epiphytic on *Pithophora* sp, near Paper Mill, Duskheda Tal. Yawal. Coll No. 456, Nov. 2010.

7. *C. bulbosum* Korshikov. (Pl. I, Fig. 7; Pl. III, Fig. 4)

Korshikov, 1953, p. 163, f. 107.- Cell obpyriform, short, gibbose in the middle, broadly rounded anteriorly and slightly narrowing posterior part with very short stalk, with an attaching disc. Chloroplast single without pyrenoids. Cell 16.4  $\mu\text{m}$  broad and 30  $\mu\text{m}$  long.

**Habitat :** Attaching on thermocoal in polluted pond near hatnur Tal. Bhusawal. Coll. No. 377, Jan. 2008.

8. *C. cucurbitinum* Jao. (Pl. I, Fig. 8; Pl. III, Fig.5)

Jao., 1947, p. 246, figs. 1 g-h. Cell reniform, short, slightly curved with one side convex and the other slightly concave. Ends of cell broadly rounded. Posterior end with disc-shaped thickening. Cell with a parietal chloroplast having a single pyrenoid. Cell 12.9  $\mu\text{m}$  broad and 28.7  $\mu\text{m}$  long.

**Habitat :** One decaying algae. Tapi pumping near Sakegaon Tal. Bhusawal. Coll. No. 347, Nov. 2009.

9. *C. cylindricum* Lamberg. (Pl. I, Fig.9; Pl. III, Fig.2)

Cell elongated, oblong cylindrical with rounded ends, stalk short with distinct basal thickening. Cells 13-15.2  $\mu\text{m}$  broad and 49.2-15.2  $\mu\text{m}$  long.

**Habitat :** Growing in cluster on wooden debris near Lumkheda Tal. Raver. Coll. No. 193, Oct. 2008.

10. *C. debaryanum* (Reinsch) De Toni (Pl. I, Fig.10; Pl. III, Fig.14)

Cell obovoid, broadly rounded anteriorly and

narrowed posteriorly with a stout stalk ending into a swollen adhesive disc. Cells 4.3-5  $\mu\text{m}$  broad and 15.6-17.1  $\mu\text{m}$  long.

**Habitat :** Attached to Copepod animal, near Puri Tal. Raver. Coll. No. 103, Jan. 2007.

11. *C. enciforme* Hermann (Pl. I, Fig. 11; Pl. III, Fig.9)

Cell linear lanceolate with unequal curvature on two sides with short stalk without an attaching disc. Cell 8.2  $\mu\text{m}$  broad and 67.5  $\mu\text{m}$  long.

**Habitat :** Attached to filamentous algae near Dhodhe Tal. Raver. Coll. No. 415, March, 2009.

12. *C. gracilipes* Lambert. (Pl. I, Fig. 12; Pl. III, Fig.11)

Prescott, 1970, p. 217, pl. 45, fig. 16.

Cell elongate, cylindric, slightly curved, abruptly tapering anteriorly and extended to form a long hyaline hair and abruptly tapering below to a slender stipe with 2 to 3 fine rhizoidal branchings at the base. Cells 2.9-3.1  $\mu\text{m}$  broad and 35-41.9  $\mu\text{m}$  long.

**Habitat :** Attached to colonial alga, near Jalod Tal. Amalnder. Coll. No. 18, Aug. 2007.

13. *C. hookeri* (Reinsch) Hansg. (Pl. I, Fig. 13; Pl. II, Fig.7)

Prescott, 1970, p. 217, pl. 45, fig. 17.

Cell sub cylindric to oblong, cell rounded anteriorly as well as posteriorly, stipe short with an attaching disc. Cell 13.6  $\mu\text{m}$  broad and 54.6  $\mu\text{m}$  long.

**Habitat :** On cyclops near Raipur Tal. Raver. Coll. No. 274, Feb. 2008.

14. *C. indicum* Patel et. Isabella (Pl. I, Fig.14; Pl. III, Fig.13)

Cells slightly curved, more or less lanceolate with both sides some what tapering, with a distinct short and stout stalk having small knob like basal disc. Cell tip rounded. Cells 5.8-7  $\mu\text{m}$  broad and 24-28.3  $\mu\text{m}$  long.

**Habitat :** Attached to *Albizzia* leaves in small ditch near Uchande Tal. Muktainagar. Coll. No. 302, Aug. 2009.

15. *C. lanceolatum* Jagg (Pl. I, Fig. 15; Pl. II, Fig.1)

Jagg, 1938, p. 119-120, fig. 26.

Cell rhombic lanceolate on a thick stalk with a basal attaching disc and broadly rounded anteriorly. Chloroplast laminate, nearly covering the entire wall with single pyrenoid. Cell 27.3  $\mu\text{m}$  broad and 58.5  $\mu\text{m}$  long.

**Habitat :** On submerged plants near Morgaon Tal. Raver. Coll. No. 170, Sept. 2008.

16. *C. nasutum* Rabench. (Pl. I, Fig.16; Pl. III, Fig.12)

Cells obliquely lanceolate with a stumpy hyaline beak at the apex. Stalk long, broad, thick and attached by broad base. Cells 4.7-5.2  $\mu\text{m}$  broad and 33.2-37.1  $\mu\text{m}$  long.

**Habitat :** Epiphytic on *Oedogonium* near Taskheda Tal. Raver. Coll. No. 87, Dec. 2007.

17. *C. obtusum* A. Braun (Pl. I, Fig. 17; Pl. II, Fig.2)

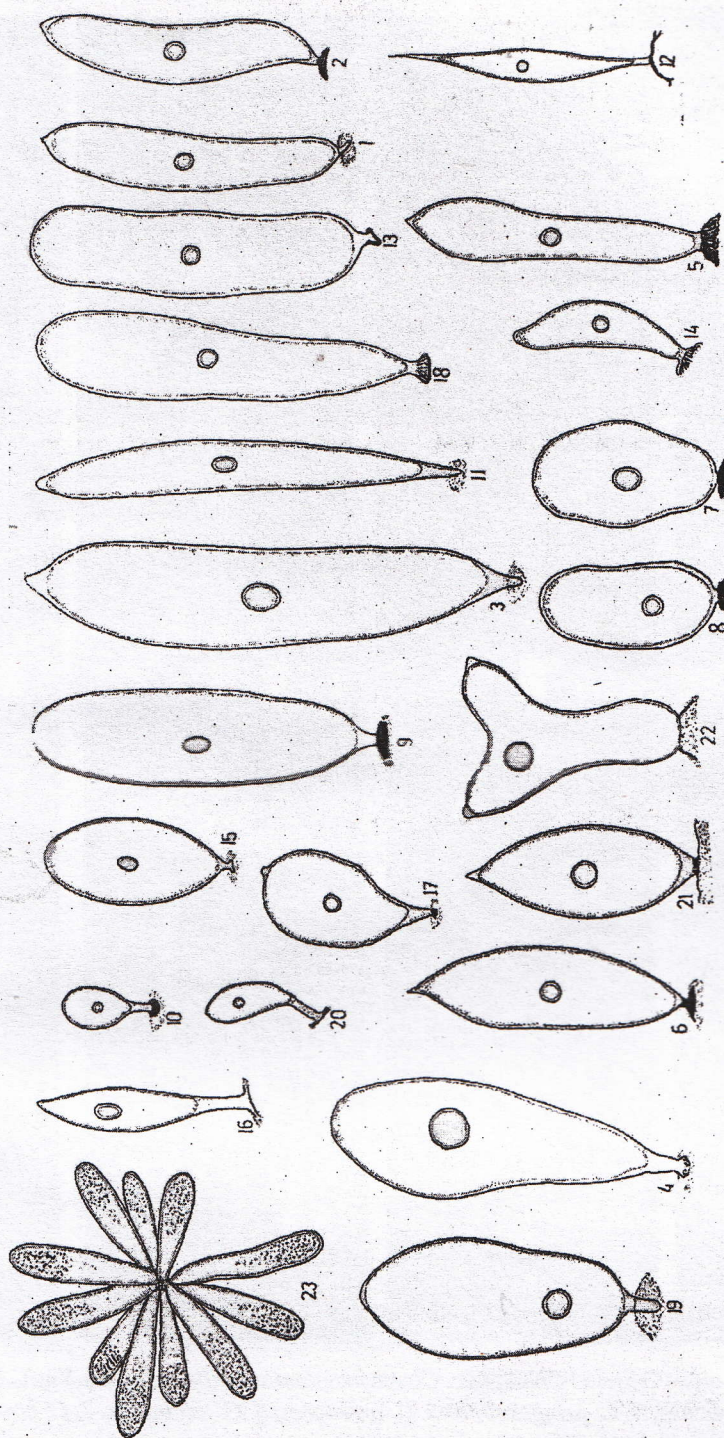


Plate I. Some Chlorococcalean algae from Tapi river, Jalgaon district (M.S.) Genera : *Characium*, *Characiosiphon* and *Rhopalosolen*. Fig.1. *Characium acuminatum*, 2. *C. ambiguum*, 3. *C. angustum*, 4. *C. anophelesi*, 5. *C. apiculatum*, 6. *C. braunii*, 7. *C. bulbosum*, 8. *C. cucurbitinum*, 9. *C. cylindricum*, 10. *C. debaryanum*, 11. *C. ensiforme*, 12. *C. gracilipes*, 13. *C. hookeri*, 14. *C. indicum*, 15. *C. lanceolatum*, 16. *C. nasutum*, 17. *C. obtusum*, 18. *C. orissicum*, 19. *C. pringsheimii*, 20. *C. rostratum* f. *minor* f. *nov.*, 21. *C. sieboldii*, 22. *Characiosiphon rivularis* var. *obtusum* var. *nov.*, 23. *Rhopalosolen saccatus*.

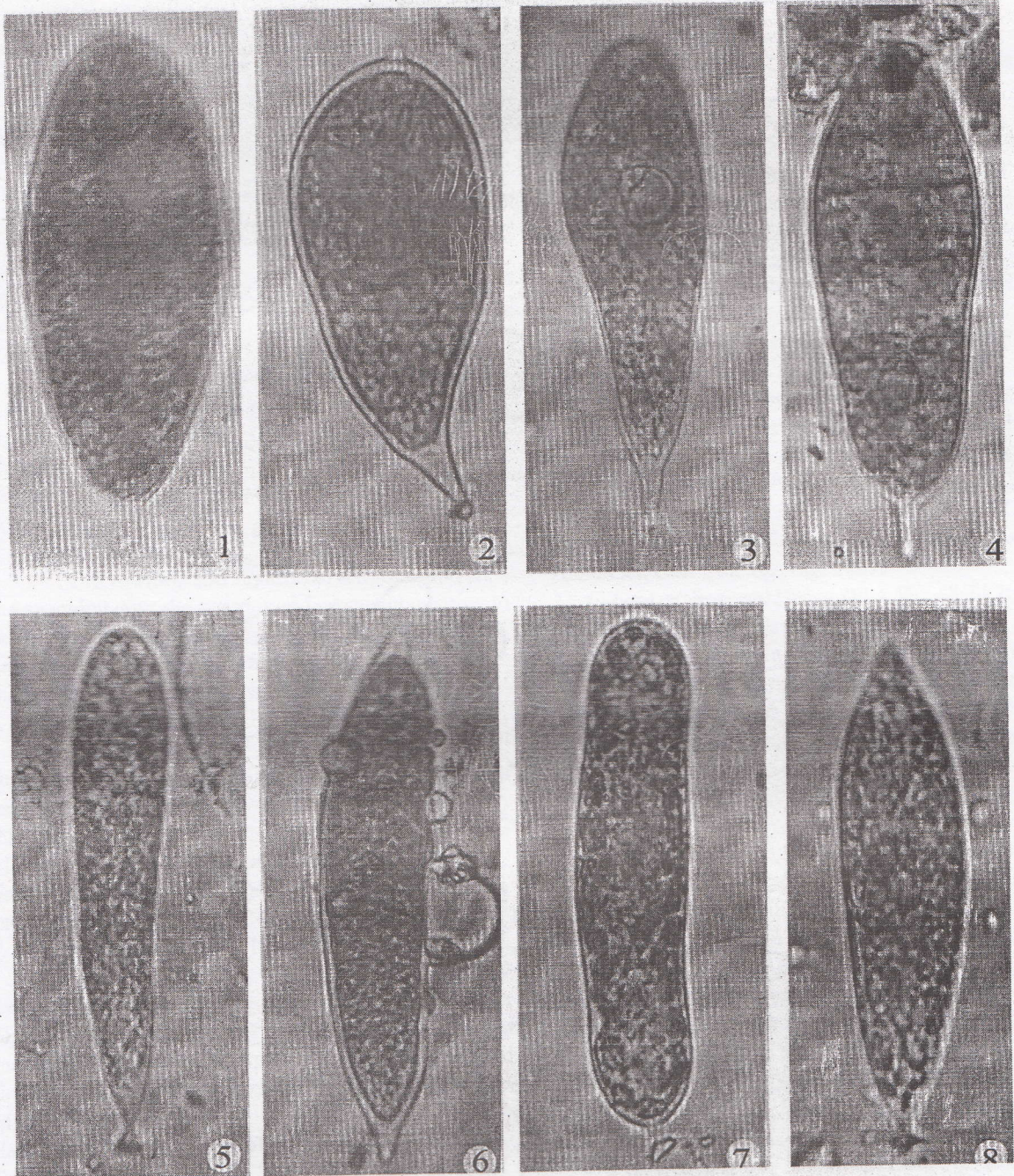


Plate II. Chlorococcalean algae Genera : *Characium*, *Characiosiphon* and *Rhopalosolen*. Fig.1. *Characium lanceolatum*, 2. *C. obtusum*, 3. *C. anophelesi*, 4. *C. pringsheimii*, 5. *C. orissicum*, 6. *C. angustum*, 7. *C. hookeri*, 8. *C. braunii*.

Cell oblong-ovate, anterior end rounded with thickened plug at the apex; stalk short and with a basal knob like thickening. Cell 28.1  $\mu\text{m}$  broad and 56.7  $\mu\text{m}$  long.

Habitat : On submerged *Hydrilla*, near Railway bridge,

Bhusawal. Coll. No. 60, Oct. 2007.

18. *C. orissicum* Philipose (Pl. I, Fig.18; Pl.II, Fig.5)

Cells club shaped with broadly rounded apex and gradually attenuated base forming a very short stalk, thick, which enlarge at the base into an adhesive disc. Cells 12.5-

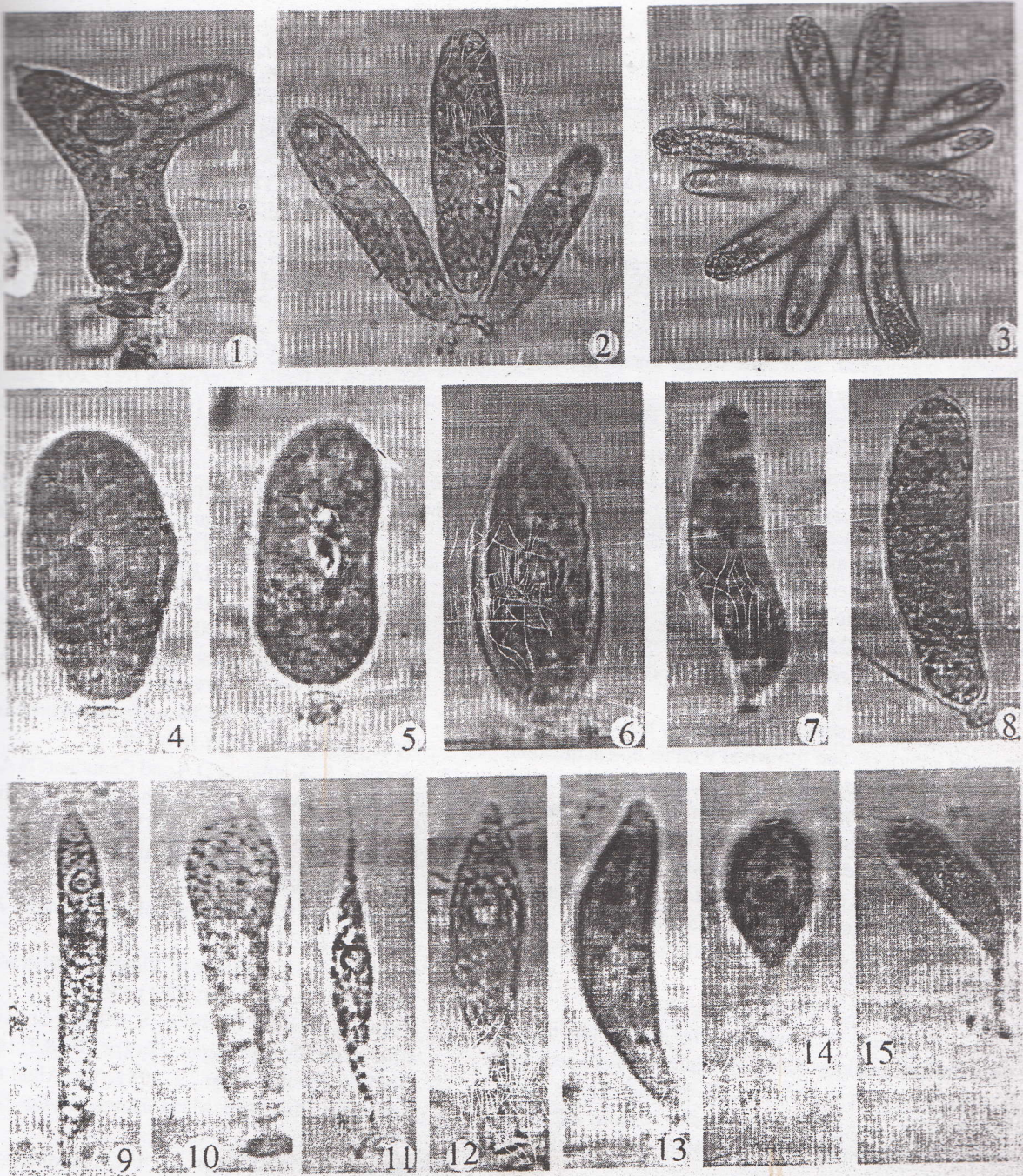


Plate III. Fig.1. *Characiosiphon rivularis* var. *obtusum* var. nov., 2. *Characium cylindricum*. 3. *Rhopalosolen sacatus*. 4. *Characium bulbosum*, 5. *C. cucurbitinum*, 6. *C. sieboldii*, 7. *C. ambiguum*, 8. *C. acuminatum*. 9. *C. enciforme*. 10. *C. apiculatum*, 11. *C. gracilipes*, 12. *C. nasutum*, 13. *C. indicum*, 14. *C. debaryanum*, 15. *C. rostratum* f. *minor* f. nov.

13.7 µm broad and 62.4-65 µm long.

Habitat : Attached on decaying wood, Nimghawan Tal. Chopda. Coll. No. 345, Nov. 2009.

19. *C. Pringsheimii* A. Braun (Pl. I, Fig. 19, Pl. II, Fig. 4)

Cells broadly naviculoid, erect, broad in the

middle, tapering towards both ends. Narrowed anteriorly but with bluntly rounded apex; narrowed below to a short stalk without attaching disc. Cell 17.9 µm broad and 46.8 µm long.

Habitat : On submerged filamentous algae, Nanded Tal.

Amalner. Coll. No. 123, Feb. 2007.

20. *C. rostratum* Renhard f. *minor* f. nov. (Pl. I, Fig. 20; Pl. III, Fig. 15)

Cell lanceolate falcate with rounded apex; stalk long, thick slender and epiphytic by a broad base. Chloroplast laminate covering the entire cell. Cell 5.5 µm broad and 15.6 µm long.

Habitat : Attached to *Oedogonium*, Dopori Tal. Amalner. Coll. No. 15, Aug. 2007.

Differs from the type in having smaller cell with rounded apex; the stalk is also much shorter and absence of distinct basal disc but taxa attached by broad base. It is therefore considered as a new forma under the name *Characium rostratum* f. *minor* f. nov.

Habitat : Attached on *Spirogyra* near Budhgaon, Tal. Chopda. Coll. No. 434, Sept. 2010.

21. *C. sieboldii* A Braun ex. Kuetz. (Pl. I, Fig. 21; Pl. III, Fig. 6)

Cell oblanceolate, narrowed anteriorly to form a short acuminate beak; stalk very short, furnished with simple thickening. Cell 14 µm broad and 35.9 µm long.

Habitat : Epiphytic on *Oedogonium*, Savkheda Tal. Amalner Coll. No. 257, Jan. 2008.

22. *Characiosiphon rivularis* Iyengar var. *obtusum* var. nov. (Pl. I, Fig. 22; Pl. III, Fig. 1)

Cell short, straight, lobed, fairly thick, tip broadly rounded anteriorly and furnished with an apical thickened plug, tapering posteriorly rather abruptly to form rounded base with a basal attaching disc. Chloroplast single, parietal and with one pyrenoid. Nucleus situated close to lobe. Cell. 23.4 µm broad and 37.1 µm long.

Habitat : Sticks on decaying wood in stagnant water near Tandalwadi Tal. Raver. Coll. No. 451, Nov. 2010.

23. *Rhopalosolen saccatus* (Fillars) Fott. (Pl. I, Fig. 23; Pl. III, Fig. 3)

Philipose, 1967, pp. 27, fig. XII

Colonies 7-11 celled. Cells jointed together to form radiating colony. Cells elongate, club-shaped with broadly rounded apex and gradually attenuated base. Basal region without any clear attaching disc. Colony 8.2 µm in diameter and cells 35.1-50.7 µm long and 7.8-10.1 µm broad.

Habitat : Attached on decaying debris, Hatnur Tal. Bhusawal. Coll. No. 315, Sept. 2009.

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