

PHYCO-DIVERSITY ASSESSMENT OF BAHUDA RIVER MOUTH AREAS OF EAST COAST OF ODISHA, INDIA

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Abstract

A total of 31 algal samples were collected from 5 sampling sites of various water bodies of Bahuda river mouth areas of Orissa during a collection trip in the month of January 2010. Altogether 36 algal taxa were reported belonging to Cyanobacteria/Cyanoprokaryota, Chlorophyta, Euglenozoa and Bacillariophyta. The species distribution indicates the dominance of green algae followed diatoms and blue green algae. The occurrence of species with respect to trophic status of these water bodies indicate that ditch is more eutrophicated in comparison to mesotrophic pond and oligotrophic river.

Keywords: Phyco-diversity, Bahuda River, Odisha

Introduction

Odisha has a long coastline of 480 km with several major rivers, distributaries and channels which drain into the Bay of Bengal and provides a variety of ecological niches and habitats for rich and diverse algal growth. Bahuda is one of the major rivers of the southern part of India. Though several studies have been carried out on algal diversity of different river systems of India (Biswas 1949, Iyengar & Venkataraman 1951, Singh 1963, Gupta 1964, Prasad 1965, Venkateswarlu 1976, Barhate & Tarar 1981, Rana & Parlia 1988, Habib & Pandey 1990, Nautial *et al.* 1995, 1996, 1997, Habib & Chaturvedi 1999, 2000, 2001, Habib 2002), assessment of phyco-diversity in this typical location of the tropical east coast region is few (Padhi & Padhi 1999, Adhikary 2000, Jena *et al.* 2005, 2008). However, the Phyco-diversity assessment of these area not yet been carried out. Hence, the present study was carried out with the future prospective of screening of potential micro-algae for biodiesel production.

Materials and Methods

Study area

Bahuda river which originates in Gajapati district of the Eastern Ghat region of Odisha joins the Bay of Bengal in Odisha-Andhra Pradesh border, spanning a length of 73 km with of 1250 km² catchment area. (Fig 1; site map). The tidal effect and anthropogenic activity made this

habitat suitable for the growth of various group of algae in and around this region.

Sampling and observation

Algal samples were collected randomly from 5 sampling sites of Bahuda river mouth and its adjoining areas during January 2010 (Figure-1). The temperature of the water bodies of these collection sited varies from 25-28°C and pH ranges from 6.5-8.5 (Table-1). The tidal effect at these areas support the occurrence of algae in various forms e.g. epilithic biofilms, benthic, planktonic, epipellic, epizoic and epiphytic. A total of 31 algal samples were collected from these sites and the voucher numbers were preserved in pre-sterilized specimen bottles with 4% formaldehyde solution. Sample collections were made using forceps and needle and/or plankton net (45 μ m pore size). Epilithic samples were scraped using a tooth brush. Planktonic samples were fixed with Lugol's Iodine on spot and brought to the laboratory at Institute of Minerals and Materials Technology (CSIR), Bhubaneswar for analysis. Measurement of cell dimension was carried out by micrometry and microphotograph of each specimen was taken using a Meiji ML-TH-05 Trinocular research microscope fitted with Nikon Coolpix 4500 digital camera. The organisms were identified following monographs for various algal groups (Kützing 1865, Turner 1892, Desikachary 1959, 1989, Philipose 1967, Komárek & Anagnostidis 1998, 2005).

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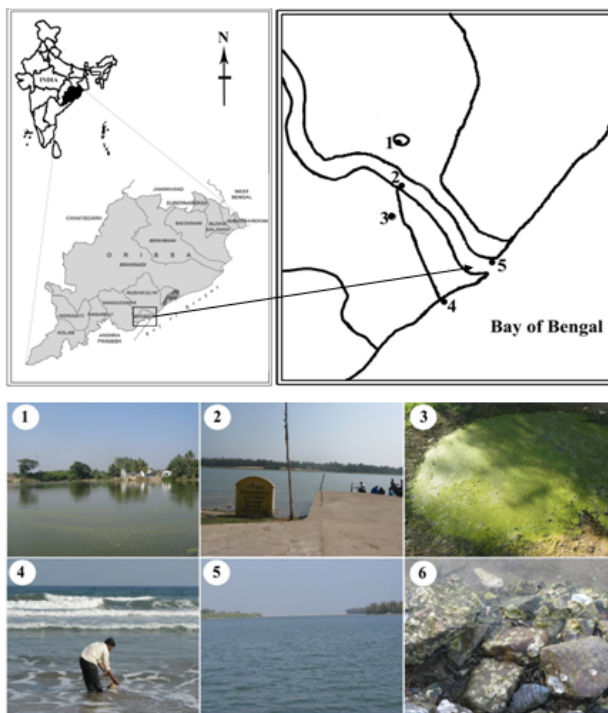


Fig. 1: Site map and respective photographs of each sampling site at Bahuda river mouth and its adjoining areas: 1- Community pond (19°06'35.34"N; 84°46'31.86"E; Altitude-14ft) , 2- Boating station (19°06'26.98"N; 84°46'37.34"E; Altitude- 9ft), 3- Temporary ditch (19°06'20.76"N; 84°46'42.11"E; Altitude- 23ft), 4- Sea (19°06'12.61"N; 84°46'49.63"E; Altitude-15ft), 5- River mouth (19°07'32.00"N; 84°47'44.06"E; Altitude-0ft), and Photo no.6- Occurrence of algae on rock and shell surface

Enumeration of algal taxa

Phylum – Cyanobacteria
(Cyanophyta/Cyanoprokaryota)
Class - Cyanophyceae
Order – Chroococcales
Family - Microcystaceae
Genus – *Microcystis* Kützing ex Lemmermann

1. *Microcystis aeruginosa* (Kützing) Kützing (Pl. 1, Fig. 4)

(Basionym – *Micraloa aeruginosa* Kützing)
(Synonym – *Clathrocystia aeruginosa* var. *major*, *Microcystis aeruginosa* f. *aeruginosa* Kützing, *Micraloa aeruginosa* Kützing, *Diplocystis aeruginosa* (Kützing) Trevisan, *Clathrocystia aeruginosa* (Kützing) Henfrey)
Colonies mucilaginous, microscopic, rounded, mucilage colourless, structureless, diffluent, cells spherical, pale blue green to brown in colour, with numerous aerotopes, 3.5 µm in diameter.

Habitat –Planktonic in river near estuary;
Voucher number – 16; Date of collection – 21.01.2010.

2. *Planktothrix compressa* (Utermöhl) Anagnostidis et Komárek (Pl. 1, Fig. 3)

(Basionym – *Lyngbya compressa* Utermöhl)

(Synonym - *Lyngbya compressa* Utermöhl, *Oscillatoria compressa* (Utermöhl) Geitler)

Filaments solitary, slightly visible sheaths, trichomes cylindrical, sometimes or little complanate from sides, grey green, 4.7 µm wide, slightly constricted at cross walls, not attenuated towards the ends, cells usually shorter than wide, 1.6-2.6 µm long, with membranous aerotopes, apical cell widely rounded.

Habitat – Planktonic in river; Voucher number –27;
Date of collection - 21.01.2010.

3. *Planktothrix planktonica* (Elenkin) Anagnostidis et Komárek (Pl. 1, Fig. 2)

(Basionym – *Oscillatoria ornata* f. *planktonica* Elenkin)

(Synonym - *Oscillatoria ornata* f. *planktonica* Elenkin)

Trichomes solitary, cylindrical, 12.5 µm wide, fine and distinctly constricted at the cross walls, cells 7.5 µm long, with densely arranged aerotopes which causes a brown to blackish colour of the trichomes, apical cell convex, wide rounded, without calyptra.

Habitat – Epilithic and planktonic in river; Voucher number – 29, 31; Date of collection - 21.01.2010.

4. *Phormidium chalybeum* (Mertens ex Gomont) Komárek & Anagnostidis (Pl. 1, Fig. 1)

(Synonym- *Oscillatoria princeps* Vaucher, *Trichophorus princeps* (Vaucher) Desvaux, *Oscillatoria princeps* (Vaucher) Gaillon, *Lyngbya princeps* (Vaucher) Hansgirg)

Thallus bluish green, trichomes mostly straight, not constricted at the cross walls, 8.5 µm broad, slightly or briefly attenuated at the apices and bent, cells 3-4 µm long.

Habitat – Epilithic bluish green biofilms in river; Voucher number – 16; Date of collection - 21.01.2010.

Phylum - Chlorophycophyta

Class - Chlorophyceae

Order - Sphaeropleales

Family - Hydrodictyaceae

Genus – *Pediastrum*

5. *Pediastrum tetras* (Ehrenberg) Ralfs (Pl. 1, Fig. 17)

(Basionym – *Micrasterias tetras* Ehrenberg)

(Synonym – *Pediastrum ehrenbergii* (Corda) A. Braun)

Coenobia 8 celled, circular, 22 µm in diameter, cells with intercellular spaces, marginal cells divided into 2 lobes with a deep single linear incision, inner cell with 6 sided with a single linear incision, cells 8.5 µm wide at middle and 10 µm long.

Habitat – Planktonic in pond; Voucher number – 18; Date of collection - 21.01.2010.

Family – Scenedesmaceae

Genus – *Desmodesmus*

6. *Desmodesmus armatus* (Chodat) var. *spinosus* (Fritsch et Ritsch) Hegewald (Pl. 1, Fig. 16)

(Basionym: *Scenedesmus armatus* (Chodat) var. *spinosus* (Fritsch et Ritsch) 1929)

(Synonym: *Scenedesmus armatus* var.

brevicaudatus (L. Piterfi) Hegewald 1982;

Scenedesmus armatus var. *boglariensis* f.

brevicaudatus L. Piterfi 1961)

Coenobia 4 celled, radially arranged from a common center, cells spindle shaped, middle of the cell slightly broad to parallel, apices slightly attenuated, lateral cells with spines at both ends, chloroplast single, parietal with pyrenoid, cell 4.5 µm broad and 12 µm long.

Habitat – Planktonic in pond; Voucher number – 18, 21; Date of collection - 21.01.2010.

7. *Scenedesmus acunae* Comas (Pl. 1, Fig. 19)

Coenobia slightly curved, 4 celled, arranged in a single linear series, cells oblong-ellipsoid, or long cylindrical with the ends broadly rounded, chloroplasts single, parietal with a pyrenoid at the centre, cells 8.5 µm long and 3.5 µm broad.

Habitat – Planktonic in pond; Voucher number – 18; Date of collection - 21.01.2010.

8. *Scenedesmus acutus* f. *alterans* Hortobagyi (Pl. 1, Fig. 7)

Coenobia 8 celled, arranged in a single linear series, cells ellipsoid with attenuated to both ends, chloroplasts granular, without a pyrenoid, cells 21µm long and 8.5 µm broad.

Habitat – Planktonic in pond; Voucher number – 19, 20; Date of collection - 21.01.2010.

9. *Scenedesmus dimorphus* (Turpin) Kützing (Pl. 1, Fig. 8)

(Basionym – *Achnantes dimorphus* Turpin)

(Synonym - *Achnantes dimorphus* Turpin, *Scenedesmus antennatus* Brébisson in Ralfs, *Scenedesmus obliquus* var. *dimorphus* (Turpin) Hansgirg, *Scenedesmus costulatus* Chodat, *Scenedesmus acutus* var. *dimorphus* (Turpin) Rabenhorst, *Scenedesmus acutus* var. *obliquus* Rabenhorst)

Colonies 7-8 celled, with the cells arranged in linear way, outer cells more or less lunate with the apices attenuated, cells 22 µm long and 4.4 µm broad.

Habitat – Planktonic near ferry station of river; Voucher number – 36, 39; Date of collection - 21.01.2010.

10. *Scenedesmus ecornis* (Ehr.) Chodat var. *ecornis* (Pl. 1, Fig. 9)

Coenobia slightly curved, 4 celled, arranged in a single linear series, cells oblong, with the ends broadly rounded, chloroplasts single, parietal with a pyrenoid at the centre, cells 13 µm long and 7 µm broad.

Habitat – Planktonic in pond; Voucher number – 21; Date of collection - 21.01.2010.

11. *Scenedesmus quadricauda* (Turpin) Brébisson var. *quadrispina* (Chodat) G.M. Smith (Pl. 1, Fig. 20)

Coenobia 4 celled, cells 13-16µm long and 4.4-5.5µm broad, obtuse end, short spines are present on both the poles of the terminal cells, cells cylindrical

Habitat – Planktonic in pond; Voucher number – 18; Date of collection - 21.01.2010.

Family – Ankistrodesmaceae

Genus – *Monoraphidium*

12. *Monoraphidium contortum* (Thuret in Brébisson) Komárková-Legnerová

Cell solitary, unicellular, elongated, fusiform, sigmoid or twisted, tapering towards both ends, ends are sharply pointed, homogenous, without pyrenoid, cells are 18.5 µm long and 2 µm wide at middle.

Habitat – Planktonic in river; Voucher number – 39; Date of collection - 21.01.2010.

13. *Monoraphidium griffithii* (Berkeley) Komárek-Legnerova (Pl. 1, Fig. 13)

(Synonym – *Ankistrodesmus falcatus* var. *acicularis* (Braun) G.S. West, *Closterium griffithii* Berkeley)

Straight or moderately bent fusiform cells, gradually tapered from the center towards the ends, pointed end, cells are 71µm long and 3.5 µm broad.

Habitat – Planktonic in river; Voucher number – 39; Date of collection - 21.01.2010.

14. *Monoraphidium minutum* (Nägeli) Komárek - Legnerova (Pl. 1, Fig. 21)

(Basionym – *Raphidium minutum* Nägeli)

(Synonym - *Raphidium minutum* Nägeli, *Ankistrodesmus minutissimus* Korshikov, *Raphidium convolutum* var. *minutum* (Nägeli) Rabenhorst, *Selenastrum minutum* (Nägeli) Collins, *Ankistrodesmus lunulatus* Belcher & Swale)

Cell is solitary, slightly sigmoid or kidney shaped obtuse tip, 11 µm long and 5.5 µm broad, central area is broad.

Habitat – Planktonic in both pond and river; Voucher number – 21, 29; Date of collection - 21.01.2010.

15. *Monoraphidium indicum* Hindák (Pl. 1, Fig. 12)

Cell solitary, bent, cells broader at middle, gradually tapered from the center towards the ends, pointed end with 2 parietal chloroplast, cells are 92µm long and 6 µm broad.

Habitat – Planktonic in pond; Voucher number – 18; Date of collection - 21.01.2010.

Order – Sphaeropleales

Family – Ankistrodesmaceae

Genus – *Kirchneriella*

16. *Kirchneriella rotunda* (Koršikov) Hindák (Pl. 1, Fig. 11)

Cells solitary, twisted, fusiform with attenuated tip, chloroplast single, parietal, without pyrenoid, cells 10-13 µm long and 2.5 µm broad.

Habitat – Planktonic in pond; Voucher number – 16; Date of collection - 21.01.2010.

Order – Chlorococcales

Family – Scenedesmaceae

Genus – *Coelastrum*

17. *Coelastrum indicum* Turner (Pl. 1, Fig. 18)

Coenobia spherical, colonial, mostly 16 celled, cells globose, cell wall slightly thickened at the poles, openings between the cells triangular, cells 14 µm in diameter.

Habitat – Planktonic in pond; Voucher number – 18; Date of collection - 21.01.2010.

Order – Chaetophorales

Family – Chaetophoraceae

Genus – *Stigeoclonium* Kützing

18. *Stigeoclonium attenuatum* (Hazen) Collins (Pl. 1, Fig. 5)

(Basionym – *Myxonema attenuatum* Hazen)

(Synonym - *Myxonema attenuatum* Hazen)

Filaments elongate with upper branching mostly alternate but dichotomously branched below, the branches either short or spine like or long and tapering, terminating in a sharply pointed cell or series of cells forming a hyaline seta, cells cylindrical with little or no connection at the crosswalls, cells in the main axis is 3-8.5µm, 10-30 µm long.

Habitat – Epilithic near estuary; Voucher number – 13; Date of collection - 21.01.2010.

19. *Enteromorpha clathrata* (Roth) Greville (Pl. 1, Fig. 6)

Basionym - *Conferva clathrata* Roth

Thallus filamentous, branched, floating in masses, plant body tubular, composed of multiseriate cells with thick cell walls and parietal chloroplasts, cells 8µm long.

Habitat- Epilithic, submerged floating in river near estuary, Voucher number- 14, Date of collection- 06.01.2009

Phylum – Euglenozoa

Order – Euglenales

Family – Euglenaceae

Genus – *Euglena* Ehrenberg

20. *Euglena cuneata* Pringsheim (Pl. 1, Fig. 15)

Cell reniform with ribbon like chloroplasts, radial, arranged around the center, 23.5 µm long and 7 µm broad, narrowed at anterior end with red eye spot and blunt rounded at posterior end.

Habitat – Planktonic in pond and ditch; Voucher number – 18, 21 and 24; Date of collection - 21.01.2010.

21. *Euglena sanguinea* Ehrenberg (Pl. 1, Fig. 14)

(Synonym – *Euglena viridis* var. *sanguinea* (Ehrenberg) Playfair, *Oscillatoria sanguinea* (Ehrenberg) Itzigsohn & Rothe)

Cells cylindrical to broadly spindle shaped, 97.5µm long and 15µm broad, red with haematochrome, chloroplasts numerous, thickly packed, each with pyrenoid.

Habitat – Bloom in ditch; Voucher number – 22; Date of collection - 21.01.2010.

Genus – *Trachelomonas* Ehrenberg

22. *Trachelomonas volvocina* Ehrenberg var. *punctata* Playfair (Pl. 2, Fig. 1)

Cells reddish brown, lorica oval, membrane thick, cells 22 µm long and 21.3 µm broad

Habitat – Planktonic in pond and ditch; Voucher number – 20, 26; Date of collection - 21.01.2010.



PLATE-I

Figs. (1-21): 1- *Phormidium chalybeum*, 2- *Planktothrix planktonica*, 3- *Planktothrix compressa*, 4- *Microcystis aeruginosa*, 5- *Stigeoclonium attenuatum*, 6- *Enteromorpha clathrata*, 7- *Scenedesmus acutus* f. *alterans*, 8- *Scenedesmus dimorphus*, 9- *Scenedesmus ecornis* var. *ecornis*, 10- *Monoraphidium contortum*, 11- *Kirchneriella rotunda*, 12- *Monoraphidium indicum*, 13- *Monoraphidium griffithii*, 14- *Euglena sanguinea*, 15- *Euglena cuneata*, 16- *Desmodesmus armatus* var. *spinosa*, 17- *Pediastrum tetras*, 18- *Coelastrum indicum*, 19- *Scenedesmus acunae*, 20- *Scenedesmus quadricauda* var. *quadrispina*, 21- *Monoraphidium minutum*. Scale bar figs. 1, 4-21=10 μ m & 2, 3=20 μ m

Phylum – Bacillariophyta
Order – Thalassiosirales
Family – Stephanodiscaceae
Genus – *Cyclotella*

Habitat – Benthic from ferry station; Voucher number – 37; Date of collection - 21.01.2010.
Order – Fragilariales
Family – Fragilariaceae
Genus – *Synedra*

23. *Cyclotella meneghiniana* Kützing (Pl. 2, Fig. 2)
Frustules circular out line in valve view, rectangular and undulate in girdle view, rim well defined, striated, large hyaline centre bounded by a circle of cuneate areolae, 18 μ m in diameter.
Habitat – Planktonic in river near ferry station; Voucher number – 32; Date of collection - 21.01.2010.
Order – Striatellales
Family – Striatellaceae
Genus – *Grammatophora*

24. *Grammatophora undulata* Ehrenberg (Pl. 2, Fig. 4)
Frustules quadrangular with rounded angles, septa slightly undulate, valves linear oblong, ends capitulate, 42 μ m long and 20 μ m broad, striation visible at the axial area margin, transverse, but not visible towards end, striae 6-8 in 10 μ m.

25. *Synedra ulna* (Nitzsch) Ehrenberg var. *aequalis* (Kützing) Hustedt (Pl. 2, Fig. 5)
Valve slender, linear, straight, end attenuated in valve view, striation linear, parallel almost through out the valve, striation uniformly placed, 14-16 in 10 μ m, many times longer than broad, 202 μ m long and 5 μ m broad.
Habitat – Epilithic, benthic both from ferry station and estuary; Voucher number – 33, 35, 16; Date of collection - 21.01.2010.
Order – Achnanthes
Family – Achnanthesaceae
Genus – *Achnanthes*

26. *Achnanthes coarctata* Brébisson var. *parallela* Venkataraman (Pl. 2, Fig. 7)
Valves linear with broad, rounded ends, margin almost parallel in the middle, raphe straight, axial area

broad, reaching the margins, striae fine, 30 µm long and 10 µm broad.

Habitat – Benthic from ferry station; Voucher number – 39; Date of collection - 21.01.2010.

Family – Cocconeidiaceae

Genus – *Cocconeis*

27. *Cocconeis pediculus* Ehrenberg (Pl. 2, Fig. 3)

(Synonym – *Cocconeis communis* f. *pediculus* (Ehrenberg) Chemielewski, *Encyonema caespitosum* var. *pediculus* (Ehrenberg) De Toni)

Frustules ovoid to ellipsoid, with marginal bend, lanceolate outline, rounded end, striation transverse, fine 10-12 in 10 µm, raphe straight with polar nodule at each end, valve 18.5µm long and 12.5µm broad.

Habitat – Benthic from ferry station; Voucher number – 39; Date of collection - 21.01.2010.

Order – Naviculales

Family – Pinnulariaceae

Genus – *Pinnularia*

28. *Pinnularia microstauron* (Ehrenberg) Cleve (Pl. 2, Fig. 6)

(Synonym - *Pinnularia viridis* var. *caudata* Boyer)

Valve linear, girdle rectangular, almost parallel, slightly attenuated towards end, obtusely rounded ends, striation transverse with central area, striae fine, raphe thin, straight, central nodules unilaterally bent, valve 40 µm long and 9 µm broad.

Habitat – Benthic from ferry station; Voucher number – 34; Date of collection - 21.01.2010.

29. *Navicula cuspidata* Kützing (Pl. 2, Fig. 8)

(Basionym – *Frustulia cuspidata* Kützing)

Frustules lanceolate, wide at the middle, axial area broad, attenuated towards apices and obtuse end, raphe at the middle, straight, striation barely distinct in fresh material, longer than broad, 37.5 µm long and 9 µm broad.

Habitat – Benthic from ferry station; Voucher number – 35; Date of collection - 21.01.2010.

Order – Cymbellales

Family – Gomphonemataceae

Genus - *Gomphonema*

30. *Gomphonema sp* (Pl. 2, Fig. 9)

Frustule lanceolate, narrow, linear, isopolar and broadly rounded ends, raphe central, straight, striation fine, transverse, cells 50 µm long and 14µm broad.

Habitat – Epilithic from both ferry station and estuary; Voucher number – 30,10; Date of collection - 21.01.2010.

31. *Gomphonema lanceolatum* Ehrenberg (Pl. 2, Fig. 10)

Frustules clubshaped to lanceolate club, shaped with obtuse apex, axial area broad, raphe not clear, striation coarse, transverse, slightly radial at the ends, striae 8-10 in 10 µm, 40 µm long and 11 µm broad, having long stalk attached to aquatic plant surface.

Habitat – Epilithic from ferry station; Voucher number – 37; Date of collection - 21.01.2010.

32. *Gomphonema micropus* Kützing (Pl. 2, Fig. 11)

Frustules small, linear, cuneate, asymmetrical, end truncate, but base obtuse, striation marginal, parallel, 8-10 in 10 µm, 50 µm long, 9 µm broad.

Habitat – Epilithic from ferry station; Voucher number – 37; Date of collection - 21.01.2010.

33. *Gomphonema vibrio* Ehrenberg (Pl. 2, Fig. 12)

Frustules linear-lanceolate, elongated, attenuated to long, sub acute, rostrate end, raphe thin, median, striation transverse, parallel, striae 10-12 in 10 µm, 45 µm long and 11.5 µm broad.

Habitat – Planktonic in pond; Voucher number – 18; Date of collection - 21.01.2010.

34. *Gyrosigma scalproides* (Rabenhorst) Cleve var. *exima* (Thwait) Cleve (Pl. 2, Fig. 13)

Valve lanceolate, sigmoid, wider at middle, attenuated towards acute rounded ends, striation and raphe not so clear in fresh sample, frustule 65 µm long and 13 µm broad.

Habitat – Planktonic from estuary; Voucher number – 16; Date of collection - 21.01.2010.

Order – Bacillariales

Family – Bacillariaceae

Genus – *Nitzschia*

35. *Nitzschia obtusa* Wm. Smith (Pl. 2, Fig. 14)

Frustules linear, with end obliquely truncate obtuse, striation thin, striae 7-10 in 10 µm, 45 µm long and 7 µm broad.

Habitat – Planktonic from estuary and from ferry station; Voucher number – 12, 35; Date of collection - 21.01.2010.

36. *Nitzschia vasnii* Gandhi (Pl. 2, Fig. 15)

Valve narrow lanceolate or linear lanceolate, very small, valve margins almost parallel with cuneate ends, valve 40 µm long and 9 µm broad

Habitat – Epilithic from ferry station; Voucher number – 31; Date of collection - 21.01.2010.

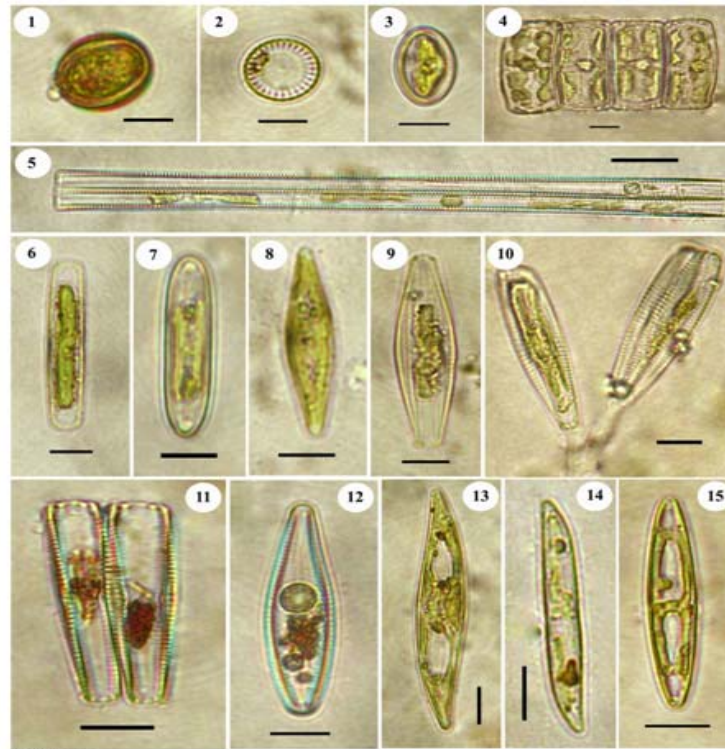


PLATE-2

Figs(1-15): 1- *Trachelomonas volvocina* var. *subglobosa*, 2- *Cyclotella meneghiniana*, 3- *Cocconeis pediculus*, 4- *Gramatophora undulate*, 5- *Synedra ulna* var. *aequalis*, 6- *Pinnularia microstauron*, 7- *Achnanthes coarctata* var. *parallela*, 8- *Navicula cuspidata*, 9- *Gomphonema* sp., 10- *Gomphonema lanceolatum*, 11- *Gomphonema micropus*, 12- *Gomphonema vibrio*, 13- *Gyrosigma scalproides* var. *exima*, 14- *Nitzschia obtusa*, 15- *Nitzschia vasnii*. Scale bar figs. 1-15=10 µm

Table-1. Algal taxa collected from river estuaries of Orissa coast, India

Sl. No.	Organisms	Community pond. pH-7.5 Temp. - 28°C	Boating station. pH-7.5 Temp. - 26°C	Temporary ditch. pH-8.5 Temp. - 28°C	Bay of Bengal. pH-6.5 Temp. - 25°C	River mouth. pH-7.5 Temp. - 28°C
	Cyanoprokaryota/ Cyanobacteria					
1	<i>Microcystis aeruginosa</i> (Kützing) Kützing	-	-	-	-	+
2	<i>Planktothrix compressa</i> (Utermöhl) Anagnostidis et Komárek	-	+	-	-	-
3	<i>Planktothrix planktonica</i> (Elenkin) Anagnostidis et Komárek	-	+	-	-	-
4	<i>Phormidium chalybeum</i> (Mertens ex Gomont) Anagnostidis et Komárek	-	+	-	-	-
5	Chlorophyta					
	<i>Pediastrum tetras</i> (Ehr.) Rafts.	+	-	-	-	-
6	<i>Desmodesmus armatus</i> (Chodat) var. <i>spinosus</i> (Fritsch et Ritch) Hegewald	+	-	-	-	-
7	<i>Scenedesmus acunae</i> Comas	+	-	-	-	-
8	<i>Scenedesmus acutus</i> f. <i>alterans</i> Hortobagyi	+	-	-	-	-
9	<i>Scenedesmus dimorphus</i> (Turpin) Kützing	-	+	-	-	+
10	<i>Scenedesmus ecornis</i> (Ehr.) Chodat var. <i>ecornis</i>	+	-	-	-	-
11	<i>Scenedesmus quadricauda</i> (Turpin) Brébisson var. <i>quadrispina</i> (Chodat) Smith	+	-	-	-	-
12	<i>Monoraphidium contortum</i> (Thuret in Brébisson) Komárková-Legnerová	+	-	-	-	-
13	<i>Monoraphidium griffithii</i> (Berkeley) Komárková-	-	+	-	-	+

	Legnerová					
14	<i>Monoraphidium minutum</i> (Nägeli) Komárková-Legnerová	+	+	-	-	-
15	<i>Monoraphidium indicum</i> Hindák	-	-	-	-	+
16	<i>Kirchneriella rotunda</i> (Koršikov) Hindák	-	+	-	-	-
17	<i>Coelastrum indicum</i> Turner	+	-	-	-	-
18	<i>Stigeoclonium attenuatum</i> (Hazen) Collins	-	-	-	-	+
19	<i>Enteromorpha clathrata</i> (Roth) Greville	-	+	-	+	+
	Euglenozoa					
20	<i>Euglena cuneata</i> Pringsheim	-	-	+	-	-
21	<i>Euglena sanguinea</i> Ehrenberg	-	-	+	-	-
22	<i>Trachelomonas volvocina</i> Her. var. <i>subglobosa</i> Lemmermann	+	-	+	-	-
	Bacillariophyceae					
23	<i>Cyclotella meneghiniana</i> (Kützing) Lange-Bertalot	-	+	-	-	-
24	<i>Cocconeis pediculus</i> Ehrenberg	-	+	-	-	-
25	<i>Gramatophora undulata</i> Ehrenberg	-	+	-	-	-
26	<i>Synedra ulna</i> (Nitzsch) Ehr. var. <i>aequalis</i> (Kütz.) Hustedt	-	+	-	+	+
27	<i>Pinnularia microstauron</i> (Ehrenberg) Cleve	-	+	-	+	+
28	<i>Achnanthes coarctata</i> Brébisson var. <i>parallela</i> Venkatraman	-	-	-	-	+
29	<i>Navicula cuspidata</i> Kützing	-	-	-	-	+
30	<i>Gomphonema</i> sp.	+	+	-	+	-
31	<i>Gomphonema lanceolatum</i> Ehrenberg	-	-	-	-	+
32	<i>Gomphonema micropus</i> Kützing	-	+	-	-	+
33	<i>Gomphonema vibrio</i> Ehrenberg	+	+	-	-	-
34	<i>Gyrosigma scalpoides</i> (Rabenhorst) Cleve var. <i>exima</i> (Thwait) Cleve	-	+	-	-	+
35	<i>Nitzschia obtusa</i> Wm. Smith	-	-	-	+	+
36	<i>Nitzschia vasnii</i> Gandhi	+	+	-	-	-

Discussion

Data analysis revealed that a total of 36 algal taxa includes 4 taxa of Cyanobacteria/Cyanoprokaryota of species *Phormidium chalybeum*, *Planktothrix planktonica*, *Planktothrix compressa* and *Microcystis aeruginosa*, 15 species Chlorophyta of genera, viz.,

Pediastrum, *Desmodesmus*, *Scenedesmus*, *Monoraphidium*, *Coelastrum*, *Kirchneriella*, *Stigeoclonium* and *Enteromorpha*, of which *Scenedesmus* and *Monoraphidium* representing four species each being the dominant genera, 3 Euglenozoa species viz., *Euglena cuneata*, *Euglena*

sanguine and *Trachelomonas volvocina* var. *subglobosa* occurred only in ditch indicating the water body as eutrophic. Bacillariophyta with 14 taxa including genera *Cyclotella*, *Cocconeis*, *Gramatophora*, *Synedra*, *Pinnularia*, *Achnanthes*, *Navicula*, *Gomphonema*, *Gyrosigma* and *Nitzschia* were found to occur from the boating station and estuary region, thus indicating the oligotrophic status of the water body. Diatoms were found to be the dominant group of algae found in river estuary, sea and boating station, whereas green algae were predominant in community ponds along with few diatoms.

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