

IDENTIFICATION OF COMMON AQUATIC FLORA AND FAUNA

For the desired architecturing of our environment through biological agencies a thorough understanding of the plant and animal species and their role in the natural balance is indispensable. Hence, it is imperative to identify the various aquatic organisms. In the following pages identification key for the common aquatic communities is given. The algal component (phytoplankton and periphyton etc.) mainly consists of: members of Chlorophyta, Euglenophyta, Chrysophyta, Pyrrophyta, Bacillariophyta, Thallophyta and Cyanophyta. Zooplankton consists of members of Protozoa, Rotifera, Cladocera and Copepoda.

FRESHWATER FLORA AND FAUNA

BACILLARIOPHYTA (Diatoms)

Melosira

Cells united to form long unbranched filaments; girdle sculptured; valves circular in vertical view; ornamentation in two parts, concentric; cylindrical in girdle view; polar margins with denticulations; chromatophores many, discoidal; planktonic. (Fig. 01)

CHLOROPHYTA (Green Algae)

Ankistrodesmus

Cells acircular or crescent shaped; solitary or in small loose groups; usually not enclosed in a mucilaginous envelope; cells straight to curved, often twisted around one another, wall smooth, with gradually tapering ends; spines lacking; chloroplast single, parietal with or without pyrenoid; reproduction by autospores; planktonic. (Fig. 02)

Chaetophora

Globular, hemispherical, macroscopic mucilaginous colonies of definite shape; chloroplast single, parietal band, completely covers the lateral walls in upper cells; pyrenoids one or more; reproduction by quadriflagellate zoospores; periphytonic (Fig. 03).

Chlamydomonas

Unicellular; cells motile, spherical-oval to spindle shaped; cell wall cellulosic, without lorica; flagella two, anterior, arising close to papilla; chloroplast cup-shaped, parietal or variable; eye spot generally present; contractile vacuoles two to four; single axial nucleus; planktonic (Fig. 04).

Chlorella

Cells spherical to ellipsoidal, solitary or aggregated, small, smooth walled; chloroplast single parietal, cup-shaped or laminate, with or without a pyrenoid; reproduction by autospores; free living or symbiotic. (Fig. 05)

Coelastrum

Colony hollow sphere, rarely polygonal to pyramidal; cells 4 to 128, radiately arranged, spherical, ovoid or pyramidal, closely adjoined and interconnected by narrow processes forming intercellular spaces; chloroplast cup shaped to diffuse with a pyrenoid; reproduction by autocolonies; planktonic. (Fig. 06)

Closteridium

Cells solitary or in loose aggregates; semicircular to lunate or cylindrical and involuted with a short stout spine at either pole; gelatinous sheath absent; cell wall relatively thick; chloroplast single, large and usually with a pyrenoid; reproduction unknown; planktonic. (Fig. 07)

Closterium

Cells solitary, elongate, without a median constriction; poles distinctly attenuated but without spines; chloroplast two, sickle shaped, with or without longitudinal ridges; pyrenoids mostly few. (Fig. 08).

Eudorina

Colony spherical to obovoid with 16, 32, 64 or 128 cells arranged at the periphery in distinct tiers; all cells similar in size, not close to each other; cells spherical; gelatinous envelope double layered; both the flagella of each cell project out from the colonial matrix through separate canals; planktonic. (Fig. 09)

Microspora

Filaments unbranched, usually sessile when young or free floating; cells uninucleate with a central vacuole; chloroplast in young cells irregularly expanded and perforate and reticulate sheet, without pyrenoid; zoospores bi-or quadriflagellate. (Fig. 10).

Pandorina

Colonies ovate to spherical, 4, 8, 16 or 32 celled; cells biflagellate, forming a compact sphere, flattened due to mutual compression or arranged around the rim of the sphere; cells all alike in size, broader at their anterior ends; colonial envelope homogeneous; eye spot smaller in the posterior cells; all cells fertile; planktonic. (Fig. 11)

Pediastrum

Colonies stellate to disc-shaped, monostromatic disc entire or perforate; cells 4 to 128, polygonal; marginal cells mostly with one, two or four processes; cells multinucleate; reproduction by zoospores and isogametes ; planktonic. (Fig. 12)

Scenedesmus

Colonies flat plate like, 2-4-8 (rarely 16-32) celled; cells in one plane; cells acicular, ellipsoid ovoid or cylindrical; cells arranged in a single or double series of alternating cells with long axis parallel to one another; cell wall smooth or granulate, with or without lateral ridges, teeth or spines; chloroplast single, laminate with a pyrenoid; cells uninucleate; autospores form autocolonies; planktonic. (Fig. 13)

Selenastrum

Colonies without an outer mucilaginous envelope, consist of 4, 8 or 16 cells; cells arcuate to lunate with convex faces apposed, apices acute; chloroplast single, parietal, lying along the convex wall, with a pyrenoid; reproduction by autospores; planktonic. (Fig. 14)

Sirogonium

Filaments slender with long cylindrical cells; chloroplasts many, more or less straight, usually with half spiral; cell wall without outer pectose layer; distinct conjugation tube lacking. (Fig.15)

Spirogyra

Filaments long, unbranched; cells as long as broad or several times the breadth; chloroplast 1 to 16, parietal, ribbon shaped, rare with 1 to 3 or 8 left hand spirals. (Fig. 16)

Ulothrix

Simple unbranched filaments of indefinite length; basal cell present; cells uninucleate, mostly cylindrical, often broader than long and never in pairs; terminal cell never pointed; chloroplast single, girdle shaped parietal band, partially or fully encircling the protoplast; planktonic (Fig. 17).

Volvox

Colonies hollow sphere, with 500-50,000~ cells arranged at the periphery and with antero-posterior differentiation; cells globose to pyriform, each with a distinct or confluent gelatinous envelope, with or without cytoplasmic connections; sexual reproduction oogamous ; planktonic (Fig. 18).

CYANOPHYTA (Blue-Green Algae)

Anabaena

Trichomes solitary or aggregated in a soft amorphous mucilaginous mass, never contorted like Nostoc; thickness of trichome usually the same throughout; trichome with watery and inconspicuous sheath; heterocysts intercalary; akinetes single or in series (Fig. 19).

Aphanizomenon

Colonies macroscopic, free floating, plate or scale like; trichomes straight or curved with very delicate and confluent sheath, laterally joined to one another to form colonies; cell cylindrical or barrel shaped, equal to or greater than breadth; end cells attenuated, hair like, colourless; heterocysts generally intercalary; akinetes cylindrical, never close to heterocyst; planktonic (Fig. 20).

Lyngbya

Trichomes many celled, cylindrical, occur singly or interwoven, with thin but firm colourless or brownish sheath (Fig. 21).

Microcystis

Colonies many celled, microscopic or macroscopic, spherical to irregular or net like, cells spherical, densely aggregated, without evident sheaths and even distribution; pseudovacuoles often present; mostly planktonic (Fig. 22).

Nostoc

Trichomes within a definite sheath; contorted; colonial matrix firm with a definite shape; heterocyst intercalary; akinete solitary or in chains (Fig. 23).

Oscillatoria

Trichome unbranched, and without a distinct sheath; solitary and scattered or form expanded masses, trichomes may dissociate easily; mostly straight or in irregular spirals; ends distinctly marked, attenuated, rounded, bent or coiled and with or without calyptra; cells discoidal or cylindrical; hormogonia may have a thin sheath (Fig. 24).

Spirulina

Trichomes unicellular, without sheath and lack dissepiments; cell terminals round, usually not tapering; trichome regularly spirally coiled; spirals broad or narrow; planktonic (Fig. 25).

EUGLENOPHYTA (Euglenoids)

Euglena

Cells unflagellate, fusiform to acicular, flexible, constantly change their shape; posterior end more or less pointed; gullet and eye spot anterior, contractile vacuoles 1 to many; chloroplasts many, discoid to band shaped (Fig. 26)

BRACKISHWATER AND MARINE FLORA AND FAUNA

BACILLARIOPHYTA

Asterionella

Colonies stellate, cells in one plane; ends of valves flat, dissimilar in size, broader ends joined by gelatinous cushions; indistinct pseudoraphe and transverse ornamentation present; planktonic (Fig. 27)

Bacillaria

Valves linear rectangular temporarily united to form a mat like chain; live cells show characteristic gliding movements; transapical striae fine 20 – 22 in 10 μm (Fig. 28).

Bacteriastrum

Cell longer than broad forming chains setae; numbering 6 – 12 perpendicular to chain axis; setae fuse at base and go apart as branches; terminal setae bent over chain; diameter is 6 – 14 μm (Fig. 29).

Biddulphia

Cells moderately squarish and slender; horns at corner of valves and two long and thin spines near to horns, length of cell 82 – 215 μm (Fig. 30).

Chaetoceros

Cells form straight chains; apertures of varying sizes; terminal setae thicker and shorter than other setae and run parallel to chain axis; inner setae longer and interlocking; setae four sided; cell length is 18 – 61 μm (Fig. 31).

Campylodiscus

Cells orange shaped in valve view; rays curved in lines radiating from a lanceolate median space; rays four in 10 μm (Fig. 32).

Corethron

Cell cylindrical with convex valves; valve margins with a crown of long thin spines; spines of the two valves directed in the same direction (Fig. 33).

Coscinodiscus

Cells solitary, girdle unsculptured; valves circular to elliptical in valve view, irregularly ornamented with minute forking rows of punctate to coarse areolae; valve surface without radiate hyaline areas; denticulation at margin may be present; rectangular in girdle view; planktonic (Fig. 34).

Cyclotella

Cell disc shaped with a number of regularly arranged striae which do not reach centre; diameter is 17 – 24 μm (Fig. 35).

Diploneis

Frustules elliptical in valve view; rectangular in girdle view; central nodule somewhat quadrate, laterally prolonged to form horns on either side of the raphe; longitudinal blank spaces near the axial field, planktonic (Fig. 36).

Ditylum

Cells prism shaped with three cornered valvar plane; valve margin wavy; a circlet of short spines on valves ends and a long hollow spine at centre of the valve (Fig. 37).

Fragilaria

Cells attached side by side to form ribbon shaped colonies (rarely flat stellate); linear to fusiform in valve view and rectangular in girdle view; bilaterally symmetrical in both axis; pseudoraphe present; valves with transverse striae or punctae; planktonic (Fig. 38)

Gyrosigma

Valves convex, sigmoid, gradually attenuated; poles acute or rounded; axial field and raphe sigmoid; punctae in transverse and longitudinal rows making a pattern of intersections; planktonic (Fig. 39).

Lauderia

Cells form straight chain; cells cylindrical with convex valves; valves with a depression in middle and raised at margin; adjacent cells touch raised portions; valves with numerous spines and varying length; diameter is 53 - 83 μm (Fig. 40).

Leptocylindrus

Cells cylindrical and form chains; cells flattened at ends; numerous disc shaped chromatophores; diameter is 3 – 16 μm and length is 10 – 91 μm (Fig. 41).

Navicula

Frustules symmetrical, rectangular in girdle view; raphe and axial field straight, latter is narrow and without any expansion, planktonic. (Fig. 42)

Nitzschia

Frustules with transverse septa; keel single, excentric, raphe lies within it; keeled margin of one valve faces the unkeeled margin of the other valve; rapheal fissure with uniseriate row of circular pores (carinal dots), planktonic (Fig. 43).

Planktonella

Cells small, disc shaped with flat valves; a characteristic wing like expansion with weakly silicified and radial rays on the upper valve; diameter is 65 – 73 μm (Fig. 44).

Pleurosigma

Similar to Gyrosigma; valves with one transverse and two oblique rows of punctae to the axial field. (Fig. 45).

Rhizosolenia

Cells cylindrical and valves with fairly truncated ends; presence of large and bent spines; cell wall hyaline; diameter is 21 - 24 μm (Fig. 46).

Skeletonema

Valves small, lens shaped with rounded cell and form long and slender chains with the help of marginal spines; space between cells larger than cell; dia. 12- 15 μm (Fig. 47).

Synedra

Frustules usually narrow, many times longer than broad, solitary or in radiate fan shaped free-floating or epiphytic colonies; needle shaped in both views or with slightly capitate poles; valves linear to lanceolate, straight to curved; pseudo raphe and transverse ornamentation present; apices truncate in girdle view; bilaterally symmetrical in both views; epiphytic or planktonic (Fig. 48).

Thalassionema

Cells form zigzag chains and linear rectangular in girdles view, cells rest at protoplasmic cushions at junctions (Fig. 49).

Triceratium

Cells possess three cornered valvar plane and with short perivalvar axis; corners rounded with blunt processes; valve strongly sculptured with regularly arranged hexagonal areolae, chamber openings clear (Fig. 50).

CYANOPHYTA

Trichodesmium

It is a planktonic and filamented blue green algae inhabiting warmer seas - > 25⁰C and 35 ppm; the filaments form bundles of 3 – 4 mm each and cells have without well defined nucleus, nucleolus, nuclear membrane and mitochondria; the cell wall made up of cellulose with pectin an mucilaginous layer; pigment is the blue green phycocyanin; cells capable of fixing atmospheric nitrogen (Fig. 51).

Richelia

It is a colonial and endemic or symbiotic species living inside the frustules of diatom species like Rhizosolenia, Chaetoceros, etc. Nothing is known about the life cycle of this species (Fig. 52).

PYRROPHYTA

Ceratium

Cells broadly fusiform; hypotheca with 5 postcingular and 2 antapical plates which terminate in posterior horns; epitheca with a series of 4 precingular and 4 apical plates; apical plates form an apical horn; girdle transverse; ventral plate large, membranaceous and articulated with pre- and postcingular plates; planktonic. (Fig. 53)

Dinophysis

Cells compressed laterally; epitheca small or rudimentary with oblique set girdle lists; upper list funnel shaped projecting beyond epitheca and strengthened by radial ribs; left sulcal list not well developed; hypotheca with distinctive protuberances but without posterior sail; length 65 – 115 μm (Fig. 54).

Gonyaulax

Cells not flattened dorsoventrally; girdle helicoid; epitheca with 6 precingular, 1 to 3 anterior intercalary and 1 to 6 apical plates; hypotheca with 6 postcingular, 1 posterior intercalary and 1 antapical plates; planktonic (Fig. 55).

Noctiluca

Body spherical; filled with gelatinous substance; protoplasm strands radiate from centre, nucleus at centre; flagella are greatly reduced and lie in a deep groove on one side of the body; mouth at the bottom of the groove; a thick prehensile tentacle at one end of the groove; tentacle used for seizing prey; feeds on bacteria, diatoms and even copepod larvae; brilliantly phosphorescent (Fig. 56).

Ornithoceros

Resembles *Dinophysis*, body circular to ovate; compressed laterally; anterior girdle list with 7 – 9 complete and distally branched ribs and posterior list with 10 – 19 complete and simple ribs; left sulcal list with four equidistant fairly rounded posterior lobes, viz., posteroventral, mid ventral, mid dorsal and posterodorsal; length 55 – 70 μm (Fig. 57).

Peridinium

Cells slightly flattened dorsoventrally; hypotheca with 5 postcingular and 2 antapical plates; epitheca with 6 to 7 precingular, none to 8 intercalary and 3 to 5 apical plates; plates usually ornamented with spines or reticulum of small ridges; sutures broad, with striations which are often longitudinal or transverse; planktonic (Fig. 58).

Prorocentrum

Cells variously shaped from oval to almost circular and compressed laterally; apical teeth and protrusions may or may not be present; however, apical platelet; valves with poroids (pits) pores, reticulations, spines or other surface markings (Fig. 59).