

1-3 RANGE OF THALLUS STRUCTURE

The thallus structure is basically of two types, the unicellular and multicellular forms. The algae exhibit variations as a result of modification or elaborations of these types. The following are the main types of thallus organisation.

1. Unicellular forms : The thallus is a single cell and the cell may be motile or non motile.

(a) **Motile Unicellular :** Unicellular motile forms are found in all classes except Bacillariophyceae, Phaeophyceae, Rhodophyceae and Myxophyceae. The flagella may be one (*Chromulina*) or two. The two flagella may be equal (*Chlamydomonas*) or unequal (*Cryptomonas*). In some forms fine protoplasmic projections called **rhizopodia** are present (*Chrysamoeba*). In some flagellates, external to the periplast there is a calcareous envelope and they are called encapsulated forms (*Chrysococcus*).

(b) **Non motile or coccoid forms :** These forms are without flagella and are sedentary. They are of several shapes. The non motile forms occur in several classes of algae like Chlorophyceae (*Chlorella*), Cyanophyceae (*Synechocystis*, *Spirulina*), Bacillariophyceae, Xanthophyceae (*Characiopsis*) and Rhodophyceae (*Porphyridium*). The smallest known eucaryotic alga is *Micromonas pusilla*.

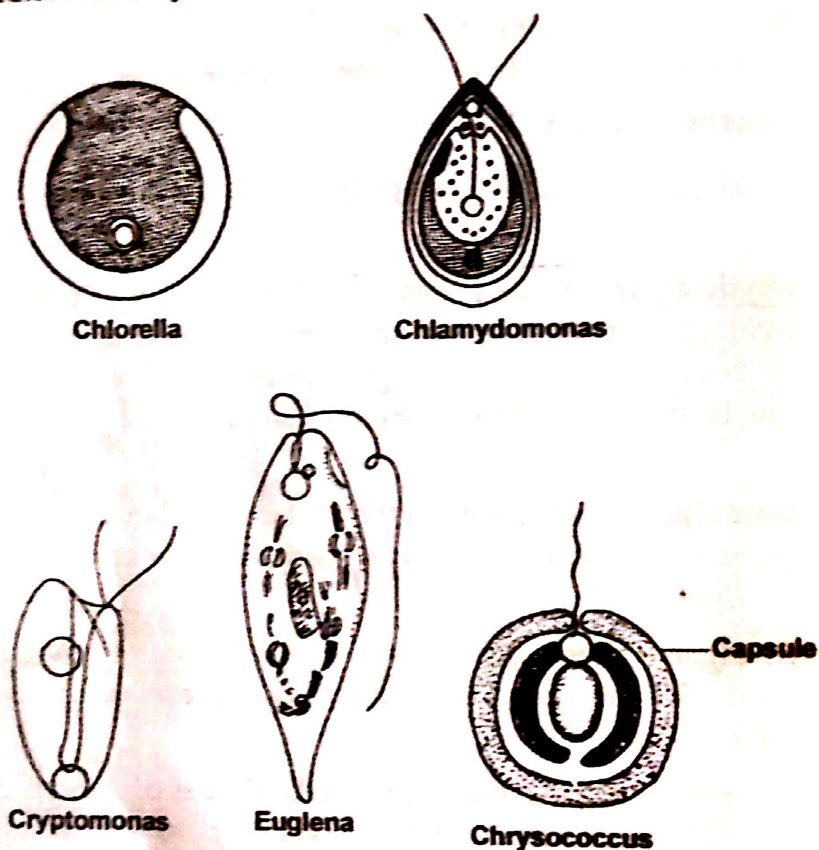


Fig. 1.1 : Unicellular algae

2. Colonial forms : A colony is an aggregate of cells enclosed in a mucilage envelope. There are four types of colonial algae - coenobial, palmelloid, dendroid and rhizopodial.

(a) **Coenobium :** A colony with definite number of cells and having a constant shape and size is called coenobium. The coenobium may be motile and having flagella (*Volvox*) or nonmotile (*Hydrodictyon*).

(b) **Palmelloid colony :** The colony in which there is no fixed number of cells and the non motile cells are embedded in an amorphous mucilagenous covering is called a palmelloid colony. e.g. *Aphanotheca* of Cyanophyceae and *Tetraspora* of Chlorophyceae.

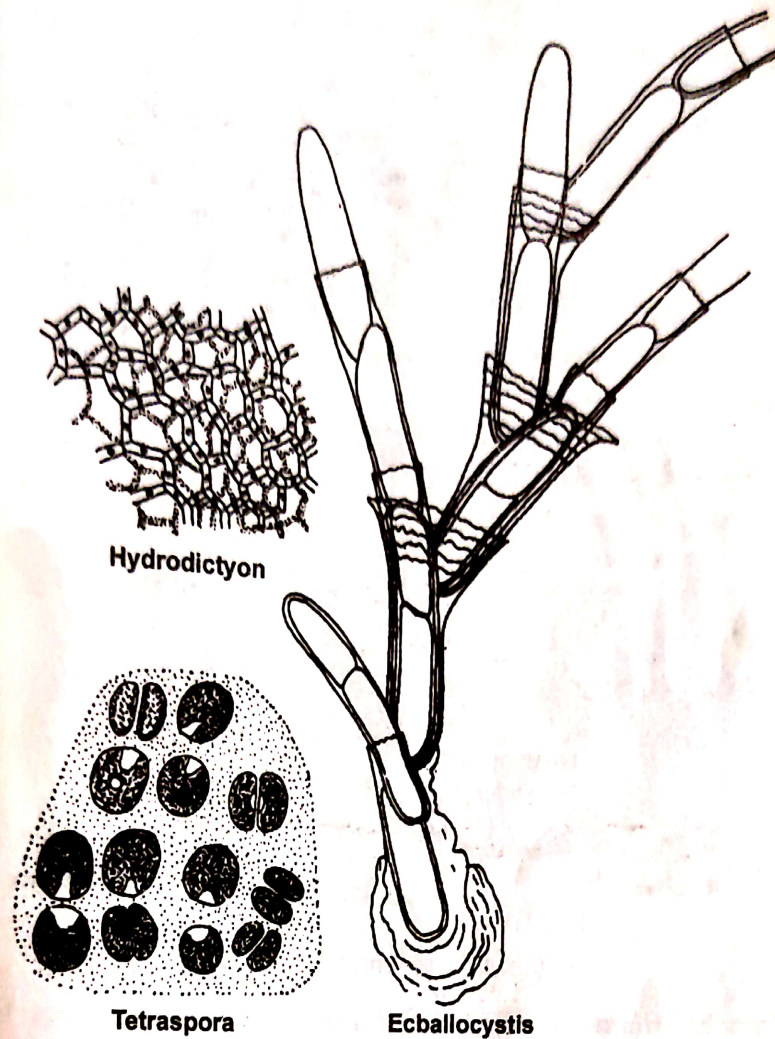


Fig. 1.2 : Colonial algae

(c) **Dendroid colony** : Dendroid means tree like and the cells are joined in a branch like manner by localised production of mucilage at the base of each cell. e.g. *Ecballocystis* of Chlorophyceae, *Mischococcus* of Xanthophyceae and *Cyanostylon* of Cyanophyceae.

(d) **Rhizopodial colony** : The cells of rhizopodial colony are joined by rhizopodia. e.g. *Chrysidiastrium*.

3. Filamentous forms : Filamentous forms are common in algae. In a filament the cells are joined end to end. In Cyanophyceae, a filament consists of a trichome of uniseriate cells and a mucilage sheath. The filaments may be unbranched, simple branched or heterotrichous.

(a) **Unbranched filaments** : In the filament, cells are arranged in a single row (uniseriate). All the cells are capable of cell division, growth and reproduction. They are common in Chlorophyceae, Xanthophyceae and Cyanophyceae. They may be attached to the substratum with the basal cell called **hapteron** or **holdfast**.

(*Oedogonium*) or free floating (*Spirogyra*). Some filamentous forms exhibit distinct polarity with the trichome tapering towards the tip e.g. *Rivularia*.

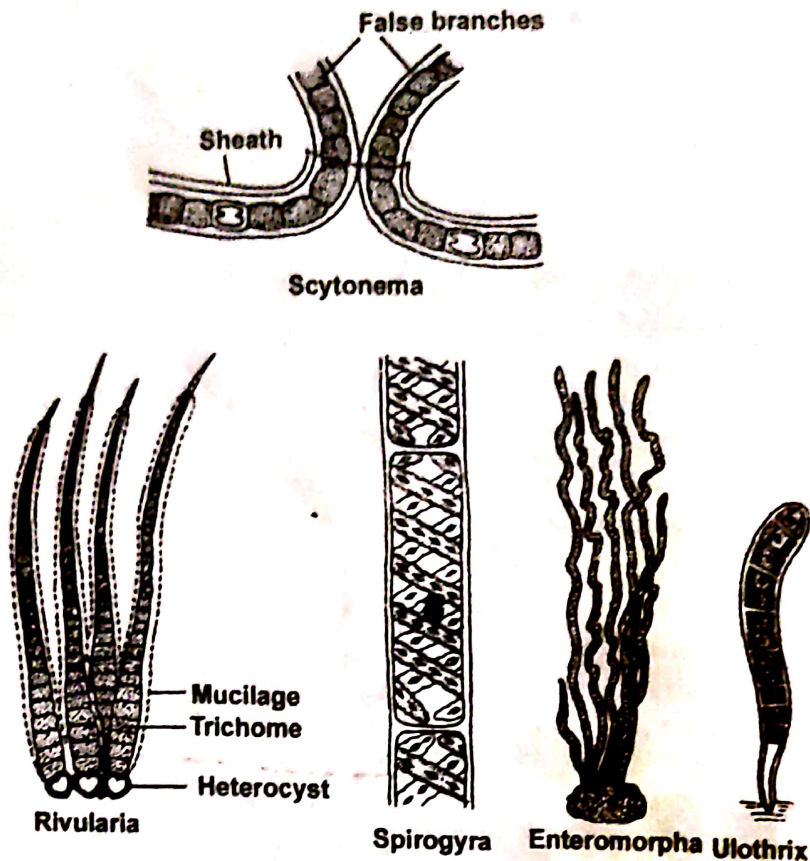


Fig. 1.3 : Filamentous algae

(b) **Branched filaments** : Branched filaments are of two types: true and false branching. In most of the forms true branching is due to lateral out growths developing into branches. During growth, the lateral branch is pushed aside. This is called **evection** and due to evection the branching looks like dichotomous (*Cladophora*). False branching occurs in Scytonemtaceae of Cyanophyceae where the trichome breaks due to degeneration of an intercalary cell and the broken ends grow out of the mucilage sheath and appear like branches.

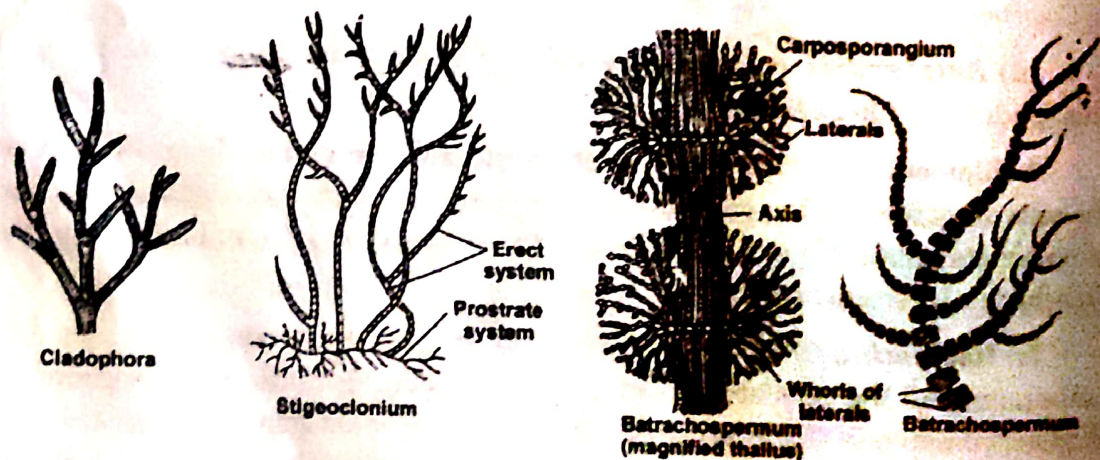


Fig. 1.4 : Branched filamentous algae

(c) **Heterotrichous forms** : The heterotrichous habit is the most highly evolved type of filamentous forms in algae. The thallus is differentiated into two parts – a prostrate system of creeping filaments and an erect system of several branched filaments. e.g. *Coleochaete*, *Fritschella* of Chlorophyceae, *Ectocarpus* of Phaeophyceae, *Batrachospermum* of Rhodophyceae and *Stigonema* of Cyanophyceae. In some forms the erect system is eliminated and the prostrate system forms a discoid thallus (*Coleochaete scutata*). In forms like *Draparnaldiopsis* the prostrate system is eliminated and the erect system is well developed. Fritsch considered that the first land plants might have arisen from the algae exhibiting heterotrichous habit.

(d) **Siphonous forms** : The thallus is non septate, multinucleate with a large central vacuole. It is coenocytic as there are no septa. Siphonaceous forms are found in Chlorophyceae and Xanthophyceae. The simplest siphonaceous thallus is represented by *Protosiphon* consisting of vesicle and a rhizoid. In *Vaucheria* there is a branched tubular thallus which is coenocytic and aseptate.

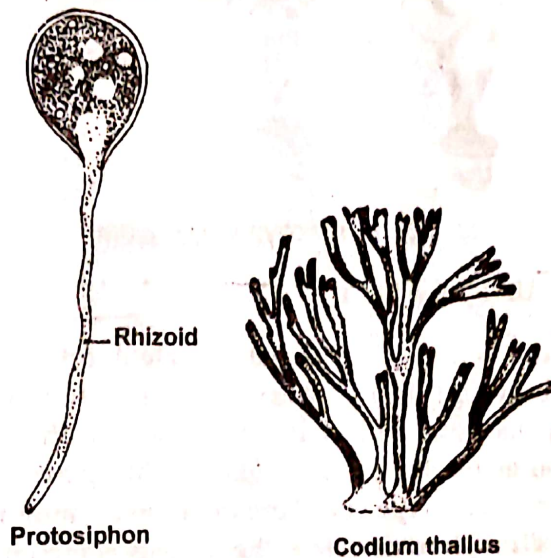


Fig. 1-5 : Siphonaceous algae

5. Pseudoparenchymatous forms : The pseudoparenchymatous habit develops from close juxtaposition of a single main filament and a number of such lateral filaments. In uniaxial pseudoparenchyma, there is a close apposition of branches of a single filament e.g. *Batrachospermum*. In *Dumortia*, the thallus is so compact, its uniaxial construction can be seen only in the section of the thallus. During the course of evolution filamentous forms gave rise to uniaxial types.

In multiaxial pseudoparenchyma, the branches of many axial filaments aggregate in juxtaposition. e.g. *Nemalion*. The central filaments give rise to lateral branches. These branches become compact and is called cortex e.g. *Codium*, *Polysiphonia*.

6. Parenchymatous forms : The parenchymatous habit is derived from the filamentous thallus as a result of vegetative divisions taking place in more than one plane. The thallus may be foliose and flat (*Ulva*) or tubular (*Enteromorpha*). In

brown algae the parenchymatous habit is well developed. The thallus is differentiated into central medulla, middle cortex and outer meristoderm. Some other examples are *Laminaria*, *Macrocystis*, *Fucus* and *Dictyota*. Foliaceous plant body is also found in *Porphyra* of Rhodophyta.

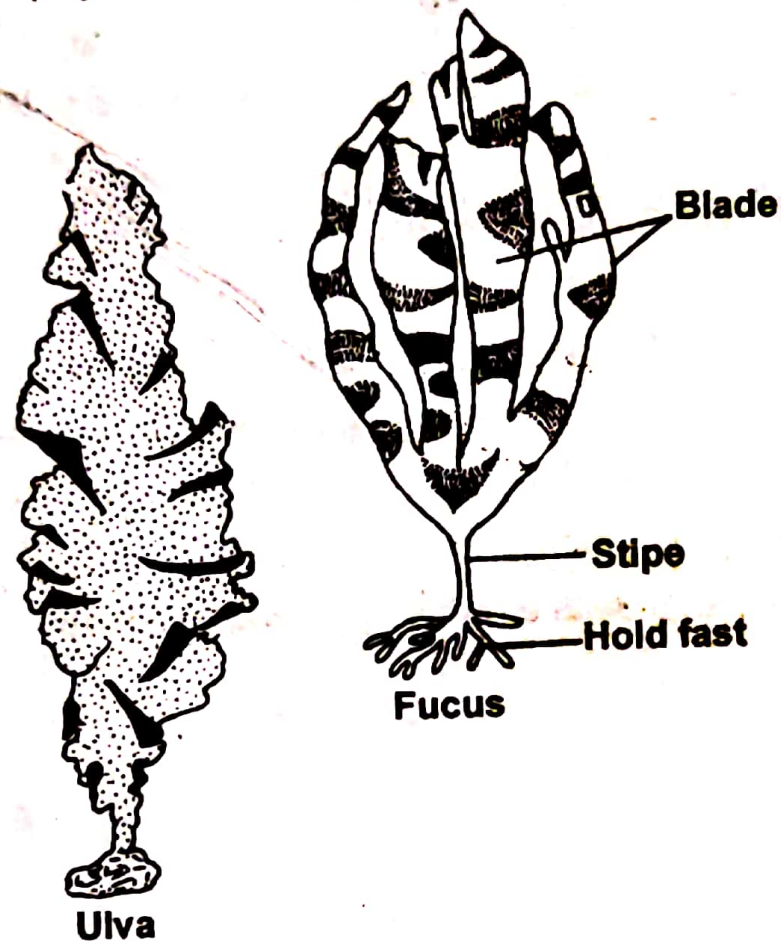


Fig. 1-6 : Parenchymatous algae