For B.Sc. Part I (Hons.) Students (Paper- 1group A (Algae))

Algae: Range of thallus structure Part -a

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Lecture No.16

❖ The vegitative structure of algae shows a wide variety and its ranges in form from unicellular to complex multicellular thalli.

❖ Size ranges from one micron to several meters.

❖ On the basis of thallus organization algae are divided into the following five groups

1. Unicelluar forms
2. Colonial forms
3. Filamentous forms
4. Siphonaceous forms
5. Parenchymatous form

➢ Multicellular forms have been derived by repeated division of unicellular forms.

➢ Colonial forms are developed by the aggregation of the products of cell division with in a mucilage mass.

➢ Filamentous form are formed by repeated transverse division of cells without separation of daughter cells.

Repeated nuclear divisions , without cross wall formation gives rise to siphonaceous forms. Parenchymatous forms thalli are formed by the division of cells of a filament in two or more planes.

1. Unicellular forms

- Simple unicellular forms are found in all groups of algae accept charophyceae and phaeophyceae.
- Sometimes unicellular forms are referred to as acellular since they function as complete living unit without any cellular differentiation.
- Unicellular forms are divided into following subgroups

i. Rhizopodial unicells:

- These forms lack rigid cell wall
- Possess cytoplasmic projection that helps in the amoeboid movement.

e.g., *Rhizocrysis* (Chrysophyceae), *Rhizochloris* (Xanthophyceae)

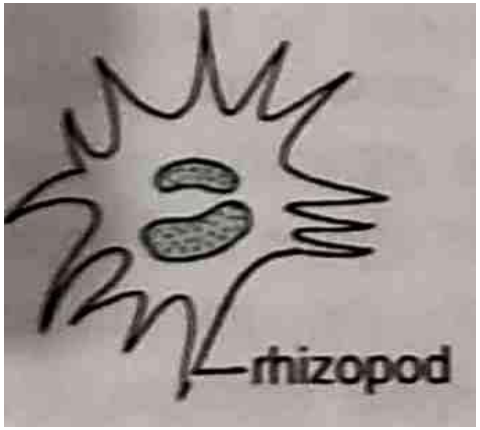


Fig.: ***Chrysamoeba***

ii.) **Flagellated unicells:**

➢The flagellated unicellular forms are found in all group of algae except Cyanophyceae , Phaeophyceae and Rhodophyceae.

➢Flagellated unicells may be periplastic without cell wall (e.g. *Euglena*) or with distinct cell wall (e.g. *Chlamydomonas*).

➢ In most of the Chlorophyceae members, the flagella are usually two or in multiples of two in number, equal in size, of whiplash type and anteriorly attached.

➢In Phacotus (chlorophyceae) there is a thick calcareous covering (capsule) around the cell wall.

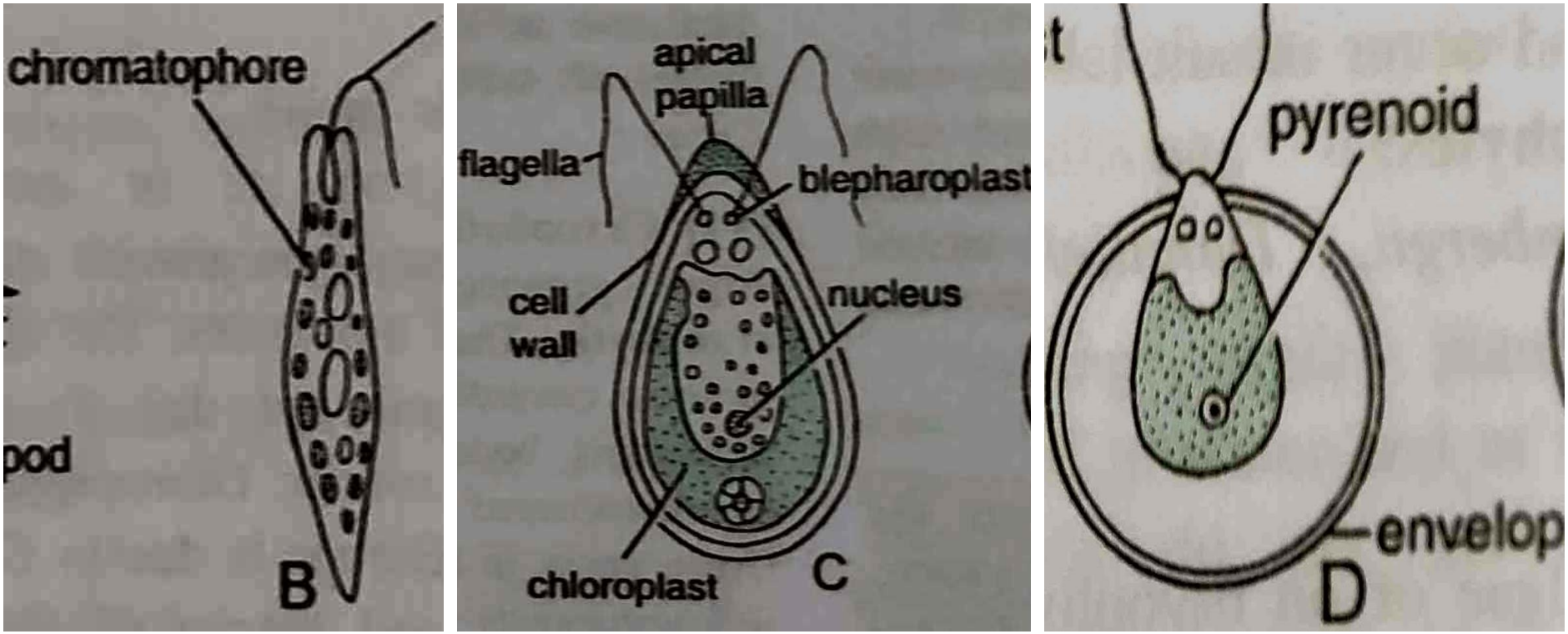


Fig: (B) ***Euglena*** **(C)** ***Chlamydomonas*** **(D)*Phacotus***

iii) Spiral or filamentous unicells

- Some unicellular algae form spiral or coiled structures e.g. *Spirulina* (cyanophyceae).

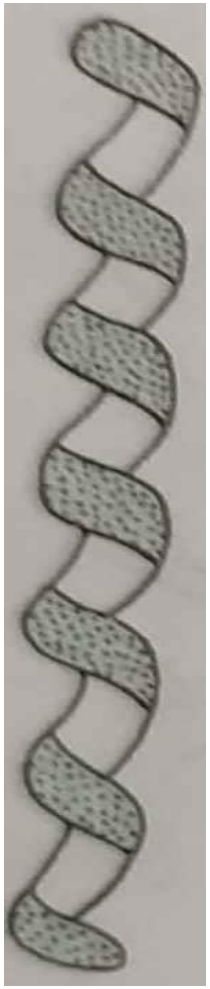


Figure: Spiral uincells *Spirulina*

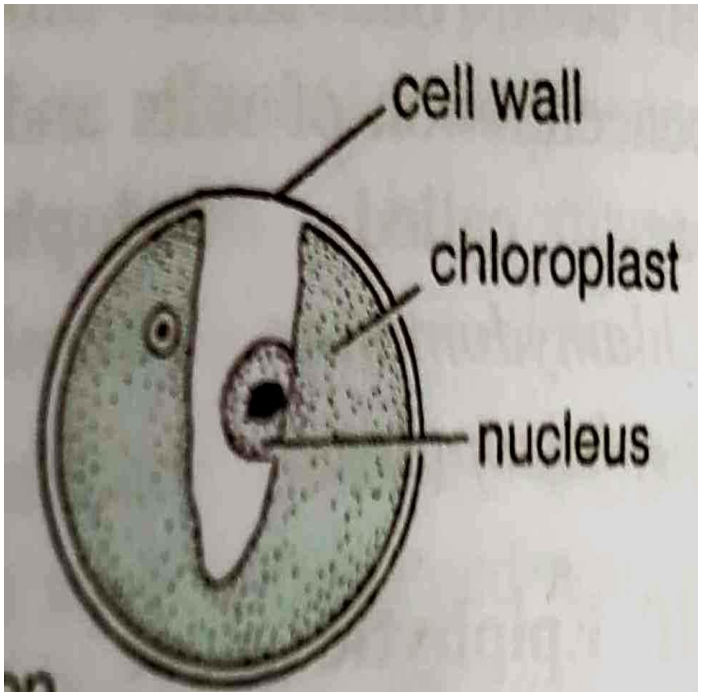
iv) Non motile unicells

➢They are non motile coccidial algae which do not posses flagella, eye spot meant for locomotion

➢Non motile unicells of Chlorophyceae possess nucleus and plastid (e.g., *Chlorella*)

➢They are simple spherical or elongated cells e.g., *Microcystis*, *Pinnularia* (Bacillariophyceae); triangular as in *Tetragonidium* (Cryptophyceae) and *Triceratium* (Bacillariophyceae).

(A)



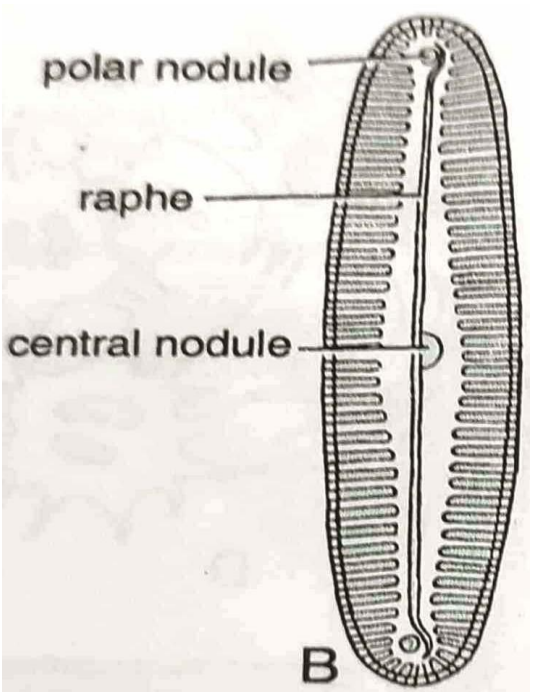


Figure: (A) *Chlorella* (B) *Pinnularia*

2. Colonial forms

- The colonial habit is achieved by the aggregation of the products of cell divisions with in a mucilaginous mass by aggregation of motile cells.
- All members of colony have similar structure .
- These associations are usually loose , such colony may break into smaller pieces.
- In some colonial forms all members of colony were connected by cytoplasmic connection, hence they can not break into segments(e.g. *Volvox*).
- On the basis of morphology, colonial forms may be divided into four types

i) Coenobial

ii) Palmelloid

iii) Dendroid

iv) Rhizopodial

i) Coenobial

- A colony with definite size, shape and arrangement of cells is known as coenobium.
- Number of cells in a coenobium is determined at juvenile stage, subsequently colony increases only in size.
- Coenobia may be motile or non motile.

  e.g., *Pandorina*, *Volvox*, *Eudorina* (Cells are flagellated in all these three algal species), *Hydrodictyon* (Cells are non flagellated).

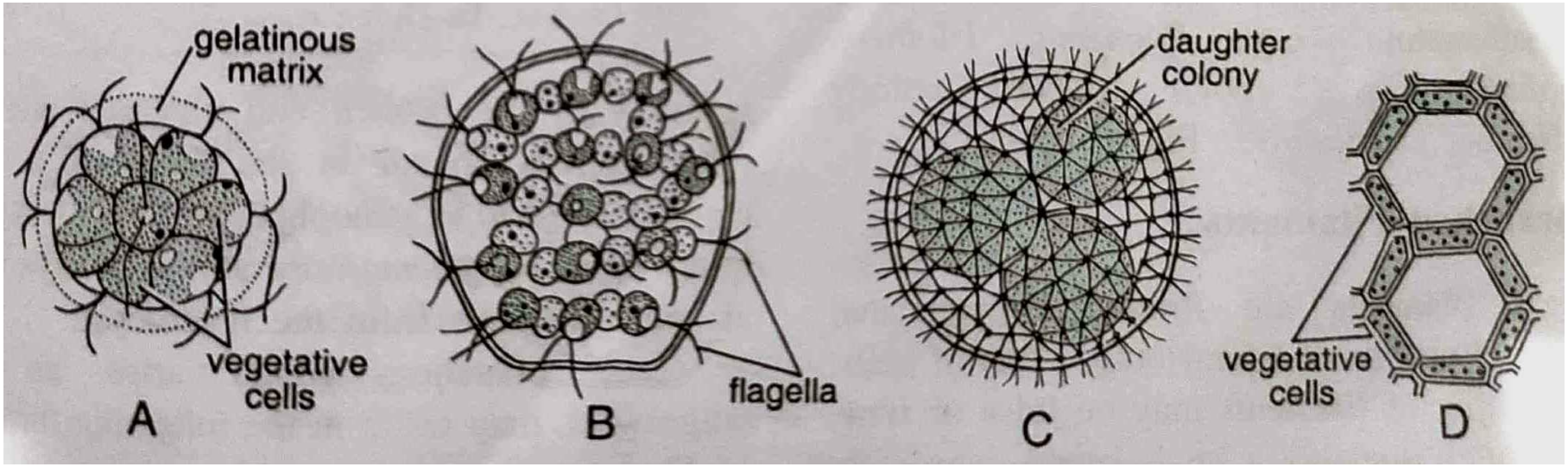


Figure: (A) *Pandorina* (B) *Eudorina* (C) *Volvox* (D) *Hydrodictyon*

ii) Palmelloid

- In plamelloid colony the number of cells, size and shape is not definite
- The cells remain irregularly aggregated and function as individual.
- In some palmelloid form it is permanent feature e.g., *Tetraspora* (Chlorophyceae), *Aphanotheca* (Cyanophyceae) *Phaeocystis* (Chrysophyceae) and it is a temporary phase, in the life-cycle e.g., *Chlamydomonas.*

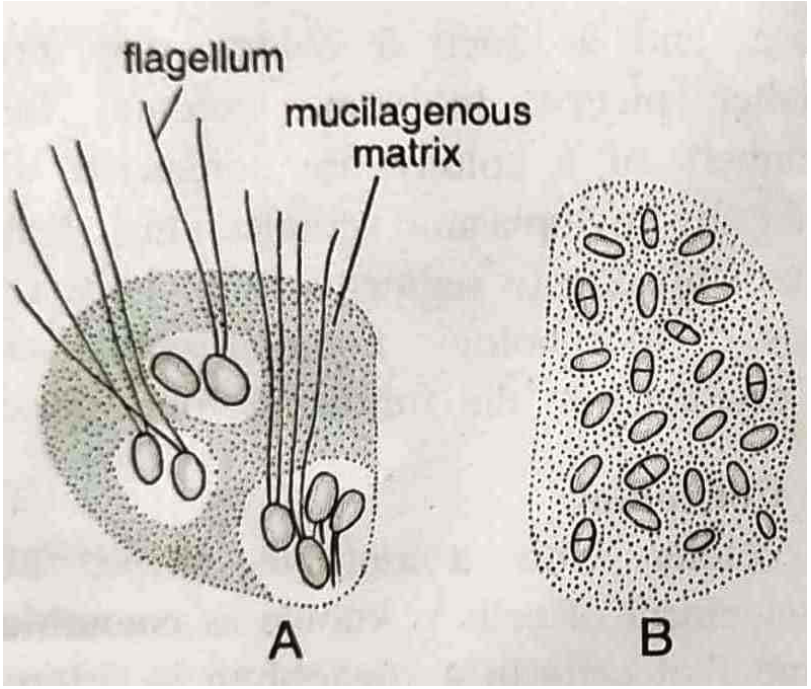


Figure: (A) *Tetraspora* (B) *Aphanotheca*

iii) Dendroid

- Colony looks like microscopic tree.
- The number size and shape is not fixed in dendroid colonies.
- A mucilaginous thread is present at base of each cells.
- Thread of each cell is united to form a branched structure that gives tree like appearance to whole colony. e.g., *Chrysodendron*

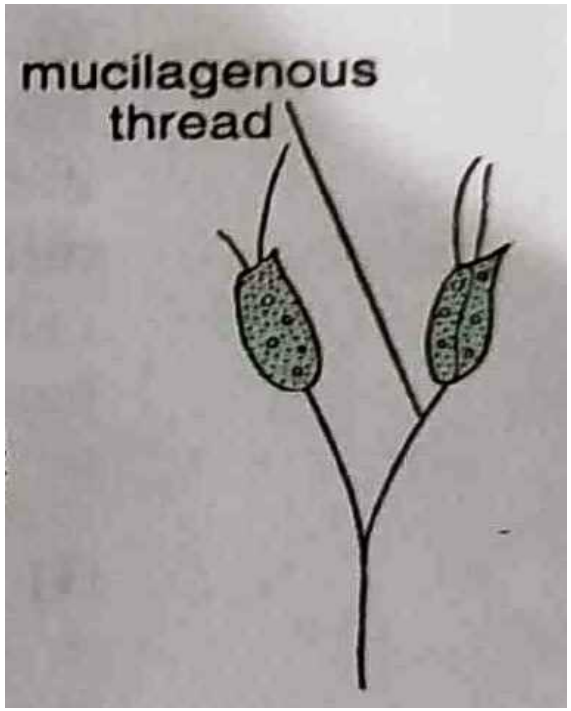


Figure: *Chrysodendron*

iv) Rhizopodial

In rhizopodial colonies cells are united through rhizopodia. e.g., *Chrysidiastrum*

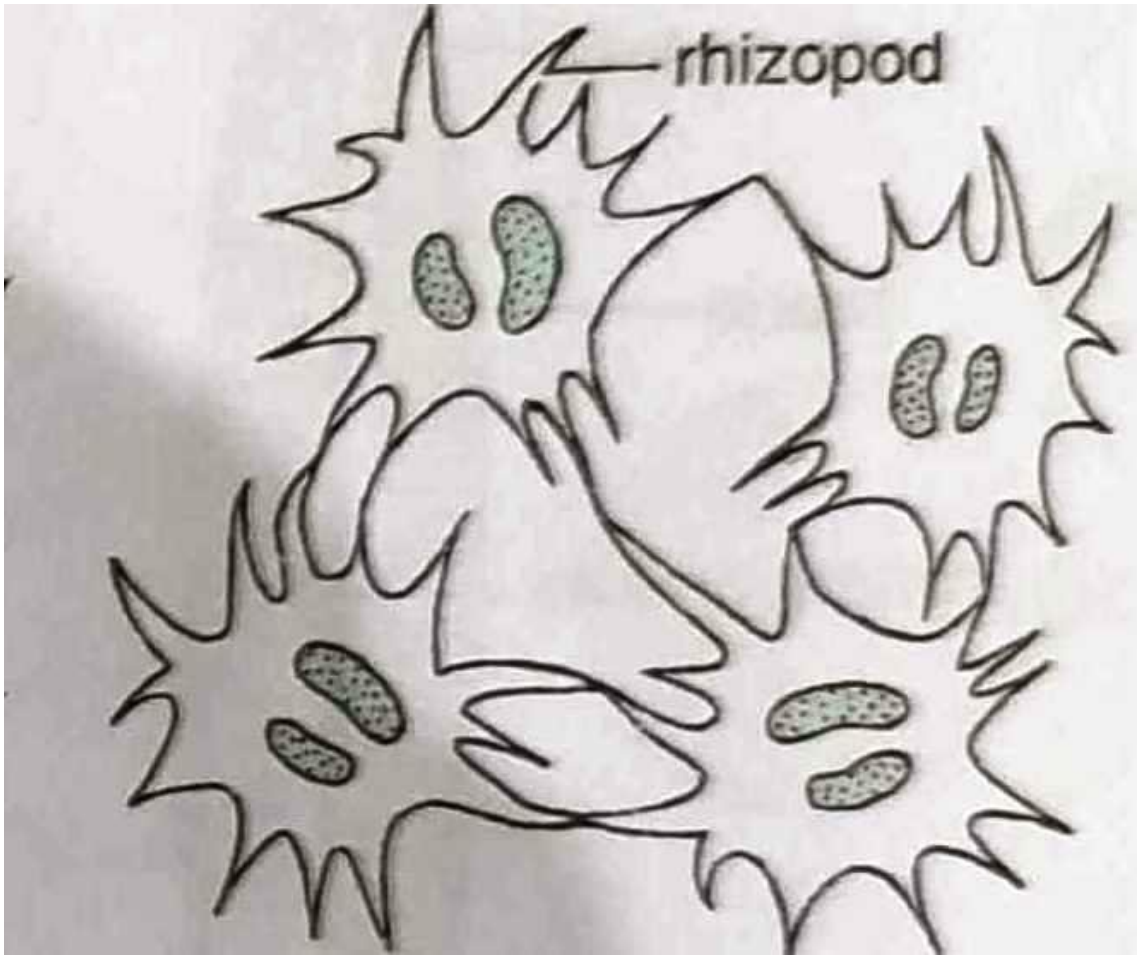


Figure: *Chrysidiastrum*

3. Filamentous Forms

➢A further development would involve a more closely knit structure, i.e., the division of the single cell into many daughter cells with septa between the divided cells and common lateral walls derived from the mother cell.

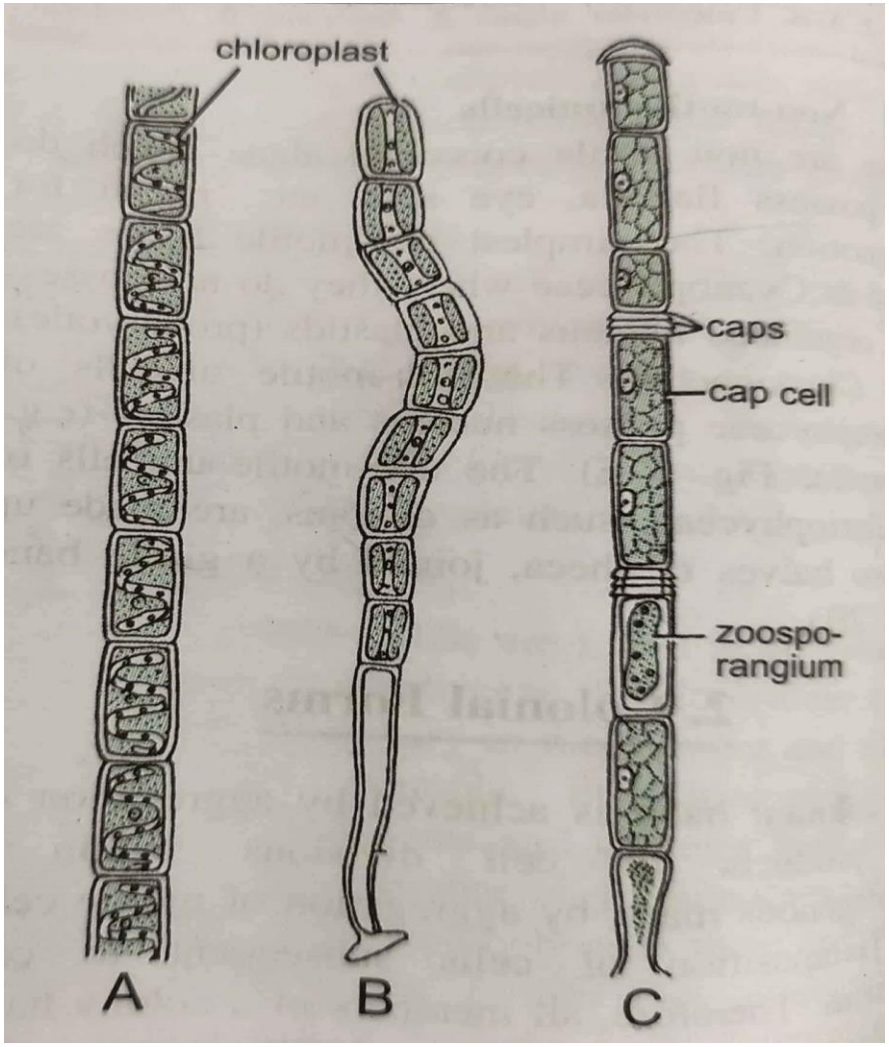
➢The daughter cells do not separate and they remain attached one upon the other in a definite sequence.

➢Filaments may be branched or un-branched.

➢The cells in filament may arrange in single row (uniaxial) or more than one row (multiaxial)

(A) Un-branched Filaments

- Simple un-branched filaments are found in only few groups of algae.
- They are either free floating e.g., *Spirogyra* or attached, to substratum e.g., *Oedogonium Ulothrix*, *Zygnema* , or aggregated in colonies *Nostoc*, *Oscillatoria*



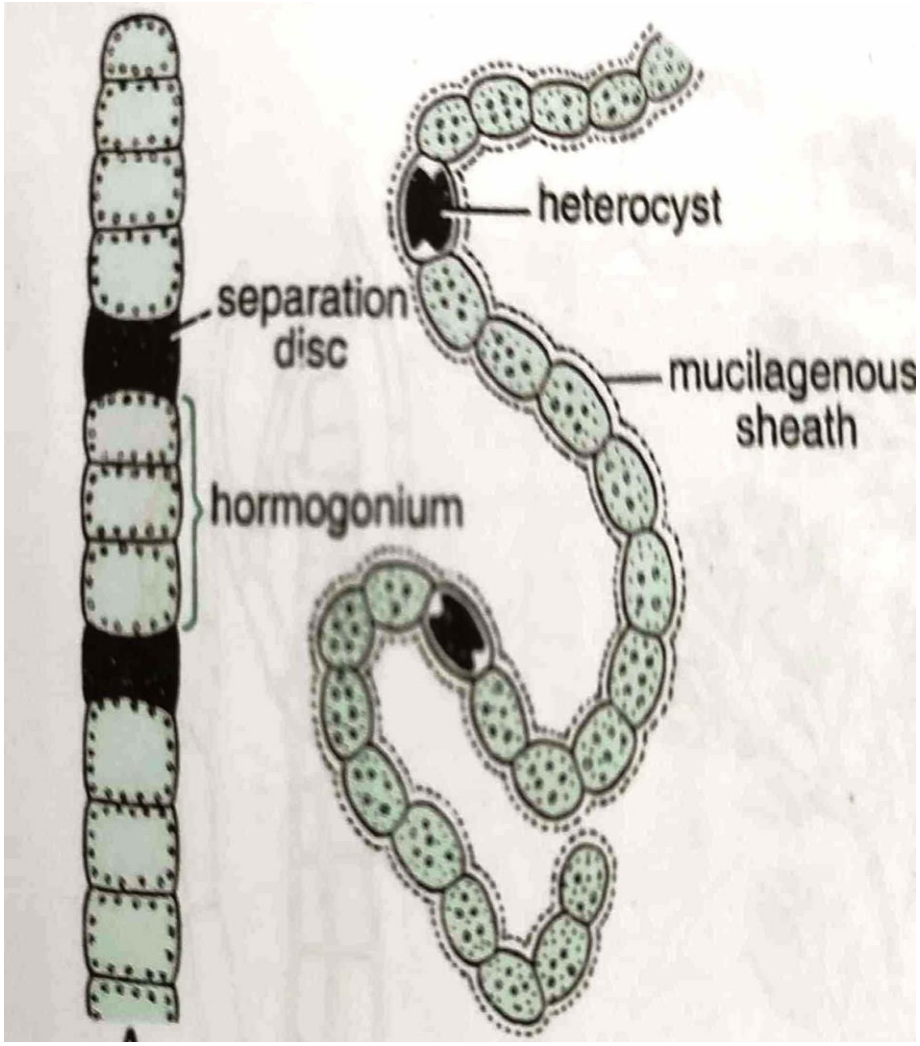


Figure: (A) *Spirogyra* , (B) *Ulothrix* , (C) *Oedogonium*, (D) *Oscillatoria*, (E) *Nosctoc*

Reference : All the figures were taken from the A Text Book of Botany by Singh, Pande , Jain. Fifth edition

(B) Branched filaments…….

Remaining parts will be presented in Lecture No. 17

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Thank You!!!