Class- B.Sc.
Semester I
Subject- Botany
Unit III - Phycology

Topic - **Classification and Life Cycle of -**
Volvox

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Volvox

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Genus *Volvox*

Classification

Class- Chlorophyceae

Order- Volvocales

Family- Volvocaceae

Genus- *Volvox*

Volvox - Coenobium

https://commons.wikimedia.org/wiki/File:Mikrofoto.de-volvox-8.jpg

Genus *Volvox*

Occurrence

Volvox is a freshwater planktonic alga, occurring as green balls of pin-head size in pools and ponds. Active vegetative growth occurs in the spring and rainy seasons.

Genus - *Volvox*

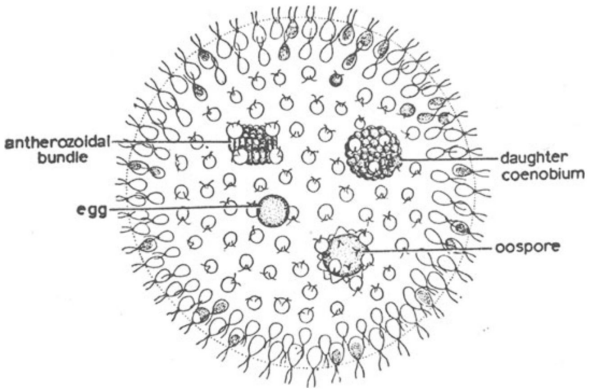
Motile spherical or ellipsoidal coenobium.

The movement of coenobia is brought about by the joint action of the flagella of individual cells.

In the coenobium cells occur in a single layer and the central portion of the colony is hollow and filled with mucilaginous substance.

Each individual cell has its own mucilaginous sheath.

The coenobia of *V. aureus* are composed of 500-3000 cells whereas those of *V. globalor* have up to about 20,000 cells. Other species may have 500-50,000 cells per coenobium.



Genus - *Volvox*

Cells are eukaryotic and resemble Chlamydomonas and Sphaerella.

A cell has a two anteriorly inserted whiplash type flagella and a cup-shaped chloroplast containing one or more pyrenoids.

Two or more contractile vacuoles and an eyespot are found in the anterior region.

The cells in the posterior region of the coenobium are usually larger than those in the anterior region.

Most species have prominent cytoplasmic strands connecting the cells of a colony.

Genus - *Volvox*

Asexual reproduction

Few cells (2 to 50) in the posterior region are reproductive, enlarge and lose their flagella and form gonidia

The first two divisions in the gonidium are in planes perpendicular to each other but subsequent divisions are longitudinal.

Thc daughter protoplasts at the 8-celled stage are in the form of a curved plate called the Plakea stage .

At the 16-celled stage, cells are arranged within the periphery of a hollow sphere with an opening known as phialopore toward the anterior end.

The cell division phase in the developing coenobium continues until it attains a specific number of cells.

Genus - *Volvox*

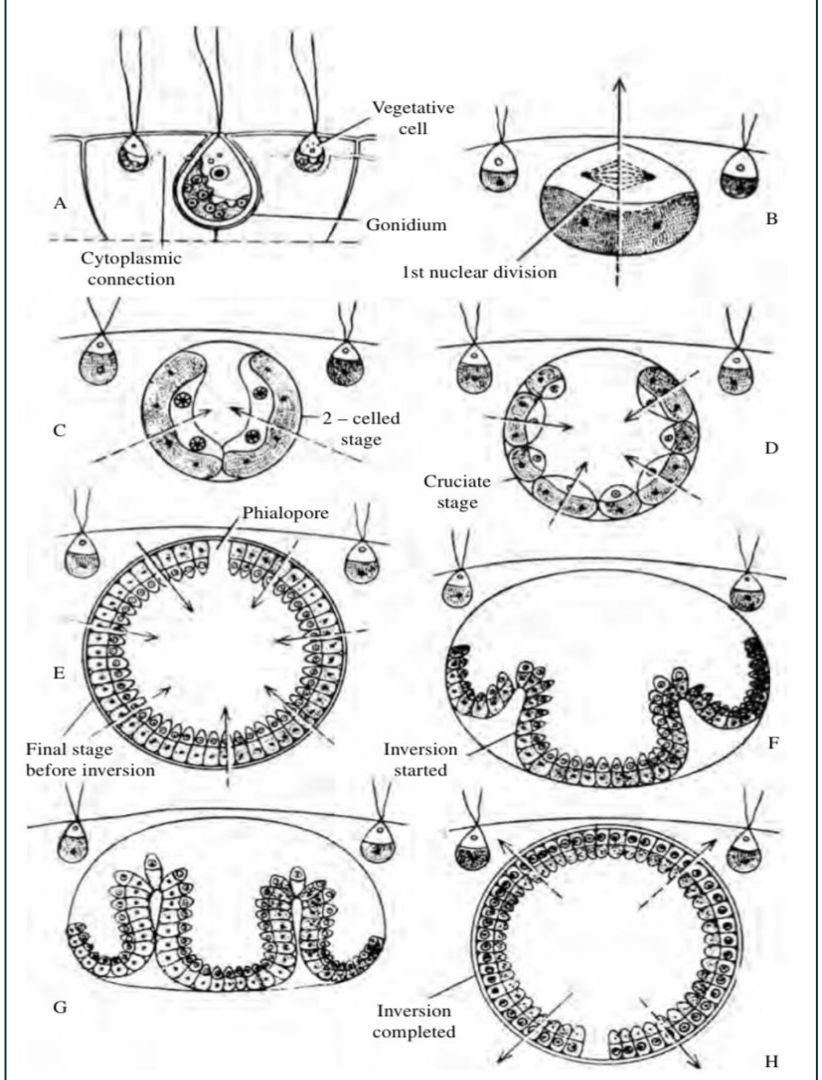
Asexual reproduction

At the end of this phase, cells have their anterior ends pointing towards the centre of the developing coenobium.

The coenobium then undergoes the process of inversion, i.e., inside-out turning, through the opening known as phialopore. The anterior ends of the cell of daughter coenobium now face towards periphery.

Each cell of the daughter coenobium finally acquires a cell wall and a pair of flagella at its anterior end.

The daughter coenobia are ultimately released after the disintegration of the parent coenobium.



***Volvox*- Asexual reproduction (formation of daughter coenobium)**

A.Gonidium

B. 1st nuclear division,

C. 2 celled stage,

D. 8 celled Plakea stage,

E. Final stage of division, colony showing phialopore,

F., G. Stages of inversion of colony,

H. Daughter colony

Genus - *Volvox*

Sexual -

This is oogamous. Species may be monoecious (V. globator) or dioecious (V. aureus). Monoecious forms are commonly protandrous.

The male and female cells are respectively called antheridia and oogonia.

Each antheridium undergoes repeated cell divisions in a way similar to that in the development of an asexual gonidium into a daughter eoenobium.

A mass (16 to 512) of naked, biflagellate fusiform antherozoids is produced .

Vegetative cells destined to become oogonia enlarge, lose their flagella and become rounded or flask-shaped.

The entire contents of the oogonium finally form a single non-flagellate egg with a beak- like protrusion through which the antherozoid enters the oogonium.

Genus - *Volvox*

During fertilization the antherozoids are released as a bundle.

The individual antherozoids are set free and one of them fuses with the egg forming an oospore .

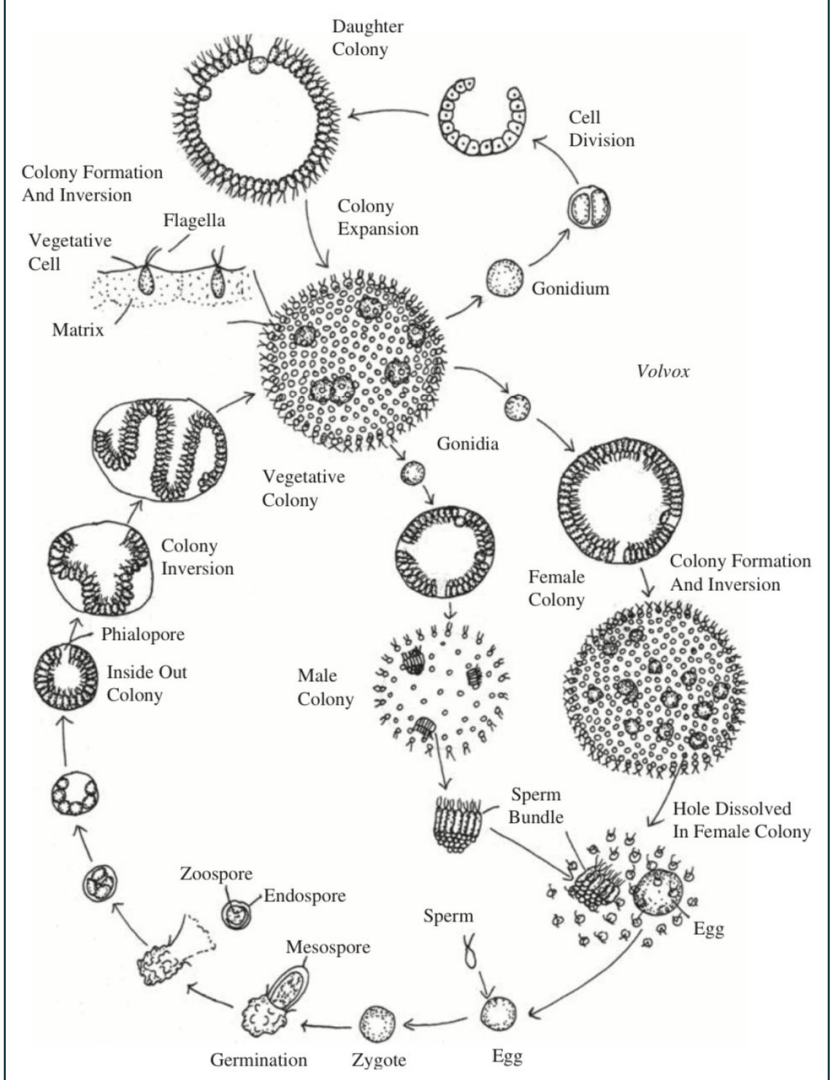
The oospore secretes a smooth or spiny wall of three layers and becomes orange red due to accumulation of haematochrome.

The oospore is the perennating stage in the life history of Volvox.

During oospore germination, the two outer wall layers gelatinize and the inner layer forms a vesicle in which the zygote protoplast migrates.

The zygote nucleus divides meiotically and of the resulting 4 nuclei, three degenerate but the fourth uninucleate protoplast develops into a coenobium through asexual reproduction.

The alga is haploid with its diploid phase restricted to the zygote (haplontic life cycle)



Life cycle of *Volvox*

Let’s revise

Q.1 What is a coenobium?

Q.2 Describe the thallus structure of Volvox.

Q.4 Describe the stages of asexual reproduction with the help of labelled diagrams only.

Q.3 With the help of labelled diagrams, describe the life cycle of Volvox.