

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

Topic - Classification and Life Cycle of -
Oedogonium

Classification and Life Cycle of - *Oedogonium*

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Genus- *Oedogonium*

Oedogonium is a widespread **freshwater epiphytic algae** that grows in ponds, pools, and shallow tanks.



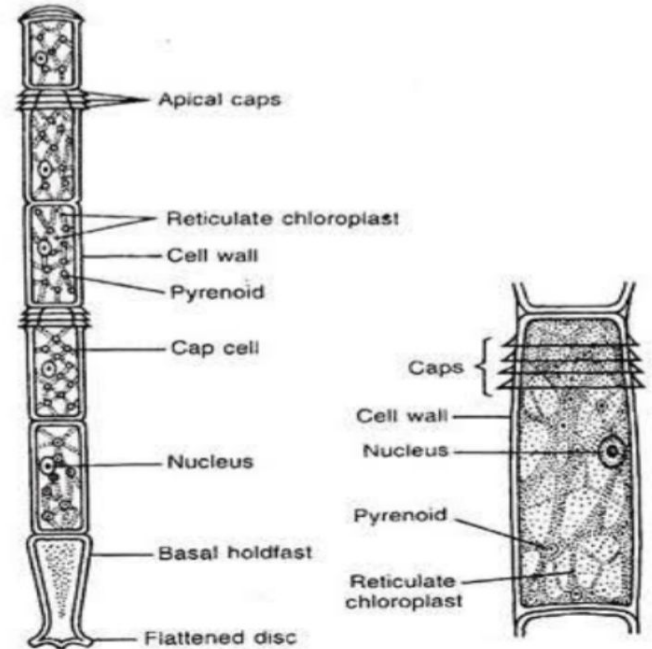
https://commons.wikimedia.org/wiki/File:Oedogonium_species.jpg

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The **unbranched filaments** consist of cylindrical cells. Basal cell is modified into a **holdfast**.

The **terminal cells** of the filaments are **rounded or acuminate**.

The filament shows **apical-basal polarity**.



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Cell wall is thick and differentiated into an inner **cellulosic**, middle **pectic** and an outer **chitinous** layer.

Some cells have parallel striations or annular scars and are known as **cap cells**.

Cells are uninucleate and contain a reticulate chloroplast containing many pyrenoids .

A sheath of starch granules surrounds each pyrenoid.

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Vegetative Cell Division -

As the cell enters the division phase, the **nucleus moves to the centre**.

Soon a **transverse ring of wall material** appears on the inner face of the lateral wall just below the apical end of the cell.

Nucleus divides and an **unattached floating septum** is formed between the **two daughter nuclei**.

The middle and outer wall layers external to the groove then rupture, permitting further **elongation of the ring which forms a new piece of cell wall**.

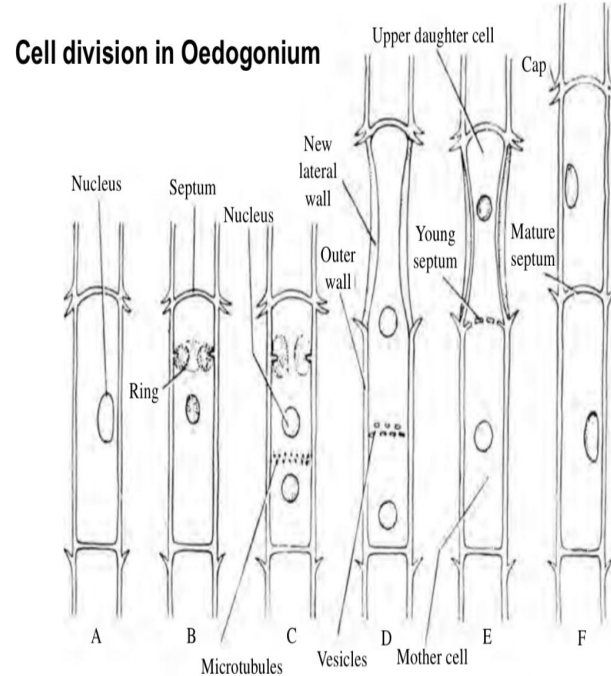
Ultimately, the **floating septum moves upward and becomes fixed** near the terminus of the old cell wall.

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The **new cell** has the **wall** formed from the **thickened ring** and the **newly synthesized piece**.

The **membranous striation** of the ruptured parental wall at the anterior region of the upper daughter cell is the **cap** and the cell bearing it is known as a cap cell.

The **number of caps** on a cell indicates the **number of cell divisions** that have taken place .



<https://comenius.susqu.edu/biol/202/archaeplastida/viridiplantae/green%20algae/chlorophyta/oedogonium.htm>

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Reproduction

Vegetative. **Fragmentation** is the usual method of propagation but under certain conditions the alga may also propagate by **akinete** formation.

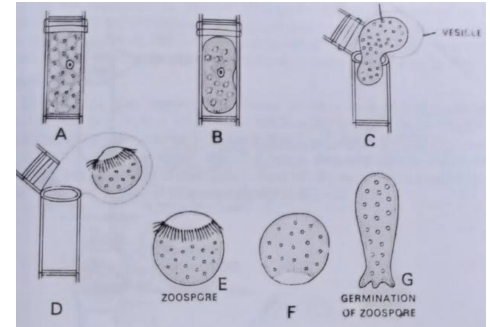
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Asexual- It occurs by the formation of **multiflagellate zoospores** produced singly within a zoosporangium.

Single zoospore is liberated in a **mucilaginous vesicle** which soon gets dissolved liberating the zoospore .

The zoospore settles down and attaches itself on a substratum with its hyaline flagellar end.

Later the flagella are withdrawn and the zoospore divides to form the filament.



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Sexual reproduction- Reproduction is oogamous and is of two kinds:

- (1) macrandrous, and
- (2) nannandrous

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Macrandrous forms may be **monoecious** producing antheridia and oogonia on the same plant or **dioecious**, producing antheridia and oogonia on different individuals.

In **Nannandrous forms** the **sexual plants are dimorphic**-

- oogonia are formed in filaments of normal size
- antheridia are produced in filaments, known as **dwarf males or nannandria**.

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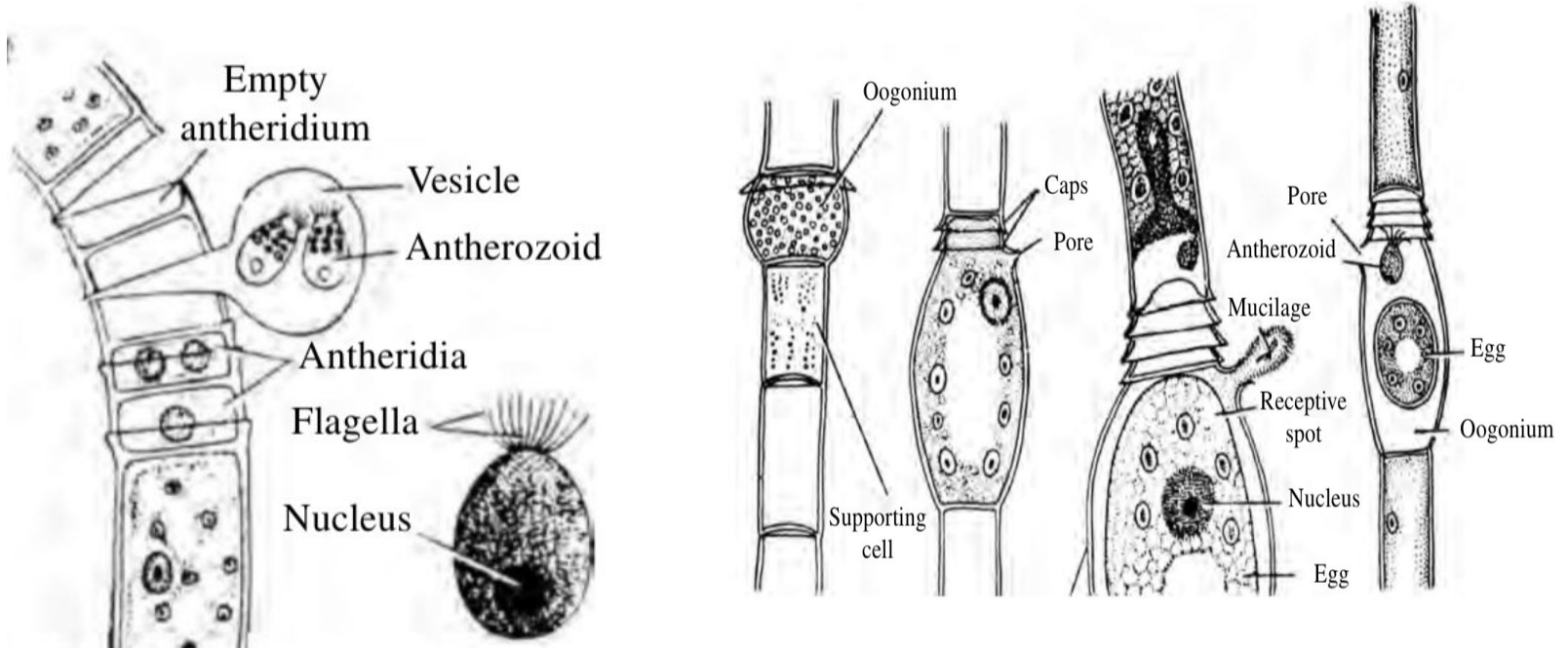
Macrandrous Forms The antheridial mother cell may be terminal or intercalary and produces a **row of two to many antheridia**.

An antheridium may give rise to a **one or two multiflagellate antherozoid** which are similar to the zoospores but are smaller and may have fewer flagella.

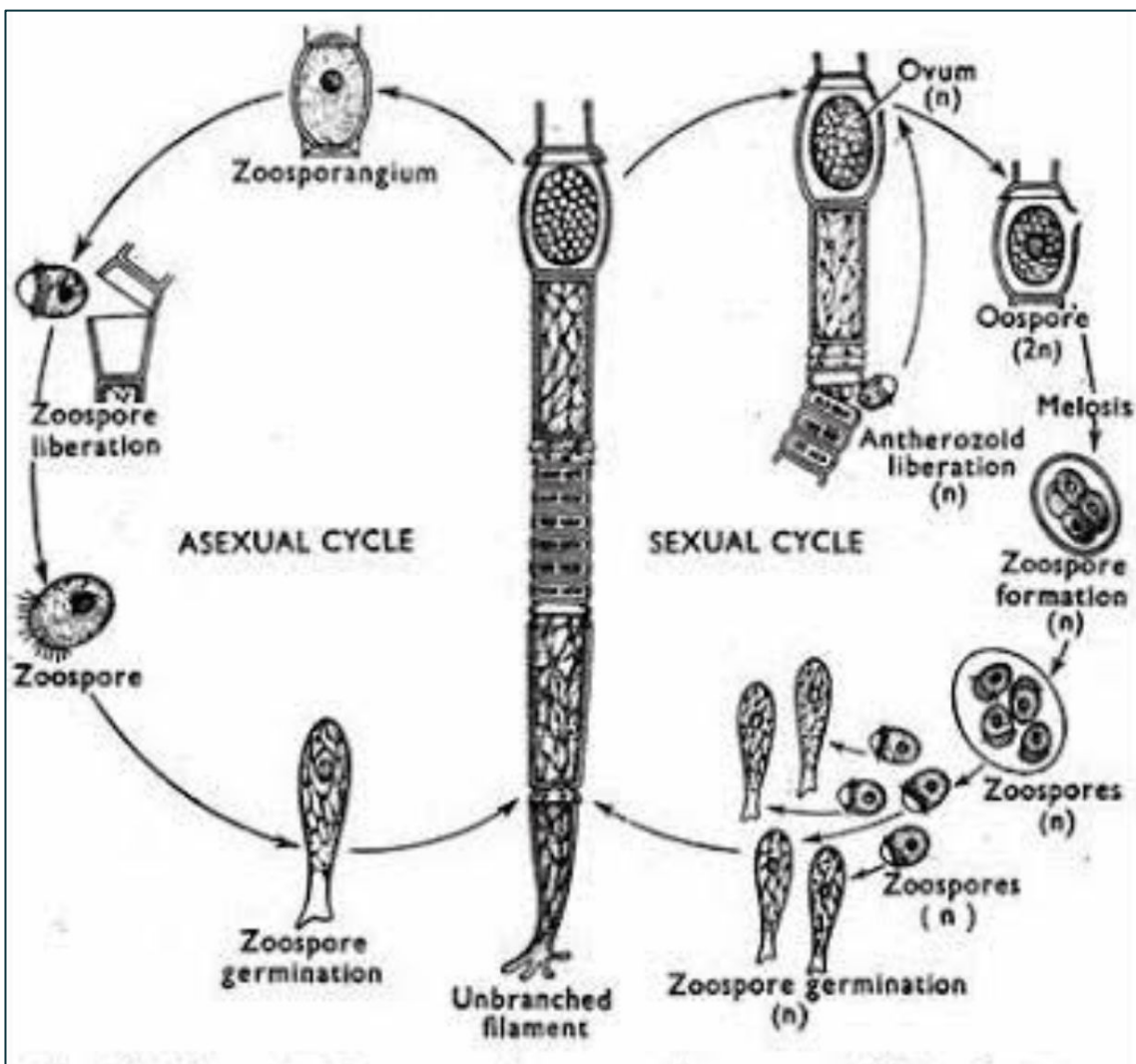
Oogonial mother cells divides into an upper cap cell functioning as **oogonium proper**, and a **lower supporting cell**.

The oogonium is spherical and filled with reserve food. Oogonium has a colourless region, called the **receptive spot** through which an antherozoid finds its way into the egg.

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Oogamous type of sexual reproduction in Macrandrous species)



Life cycle of Macrandrous monoecious species of *Oedogonium*

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Nannandrous Forms

Dwarf males are derived from antherozoid-like zoospores, known as androspores, which are formed singly within antheridia-like cells called androsporangia.

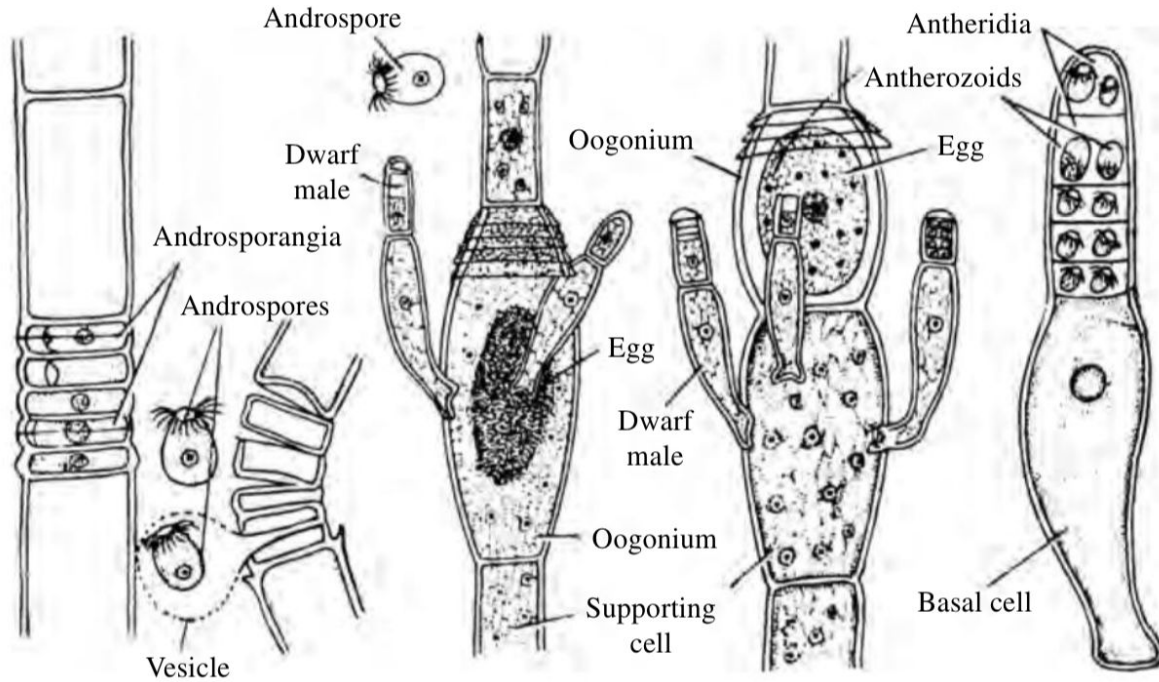
Each dwarf male or nannandrium is a few-celled filament with a basal stalk cell and two to three antheridial cells.

Nannandrous species may be

Gynandrosporous- species that bears both oogonia and androsporangia on the same filament

Idioandrosporous- species that bears both oogonia and androsporangia on different filaments.

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Oogamous sexual reproduction in Nannandrous species

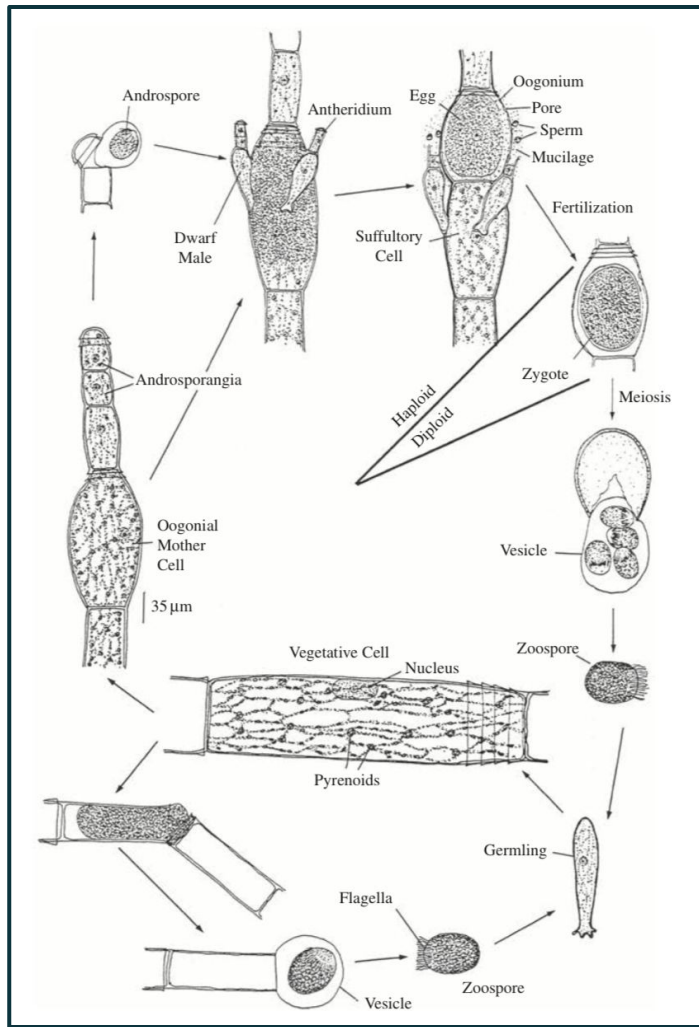
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Antherozoid enters through the receptive spot and fertilizes the egg . The **oospore** becomes thick-walled and remain dormant for some time .

On germination, the **oospore nucleus divides by meiosis to produce four multiflagellate zoospores** which grows into a new haploid Oedogonium plant.

In **heterothallic species two of the four zoospores** develop into **male filaments** whereas the other two develop into **female filaments**.

Life cycle in Oedogonium is **haplontic** (all the phases in the life cycle are haploid and only the zygote/ oospore is diploid).



Life cycle of Oedogonium

Let's revise

Q.1 Describe the thallus structure of Oedogonium.

Q.2 How cap cells are formed in Oedogonium?

Q.3 Differentiate between Macrandrous and Nannandrous species of Oedogonium.

Q.4 Write a note on Nannandrium.

Q.5 Describe the life cycle of Oedogonium.