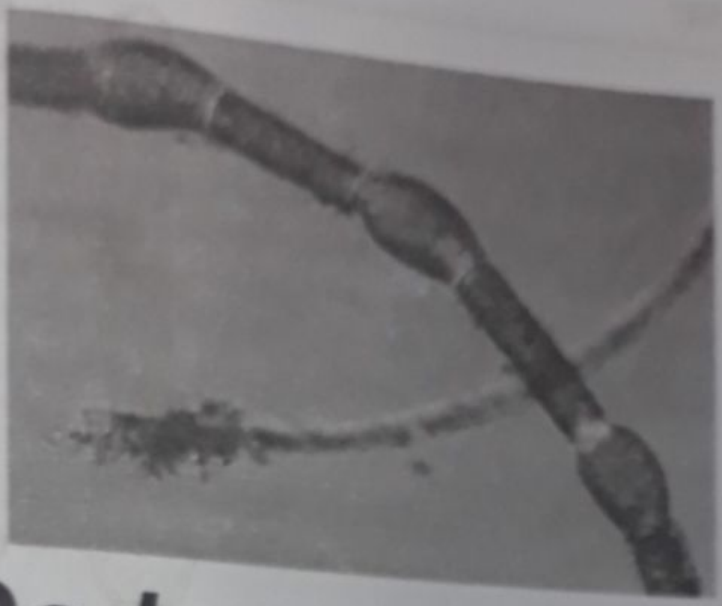

35 Oedogonium

Class : *Chlorophyceae*
Order : *Oedogoniales*
Family : *Oedogoniaceae*
Genus : *Oedogonium*

Oedogonium is a ***green alga.*** It is placed in the class ***Chlorophyceae***. This genus was named by ***Link***.

Occurrence

Oedogonium is widely distributed in ***freshwater habitats*** such as *ponds, lakes, tanks, rivers*, etc.

The mature filaments are ***free-floating*** but the ***younger ones*** are ***attached***.

They are found attached to *stones, woods* and to *large algae* and *aquatic angiosperms*.

There are about 285 species in *Oedogonium*. Of these, 144 species are found in India.

The common Indian species are:

Oedogonium nodulosum — *Oedogonium aquaticum*
Oedogonium fragile — *Oedogonium gracilius*.

Structure

Oedogonium is a unbranched filamentous ***green alga***.
It is included in the class ***Chlorophyceae***.
It is cosmopolitan in distribution.
The plant is a ***haploid gametophyte.***
It is a ***freshwater alga***.
It is an ***attached form***.
It is a ***filamentous alga***.
The thallus consists of a long ***filament*** and a ***holdfast***.
The filament is ***unbranched***.

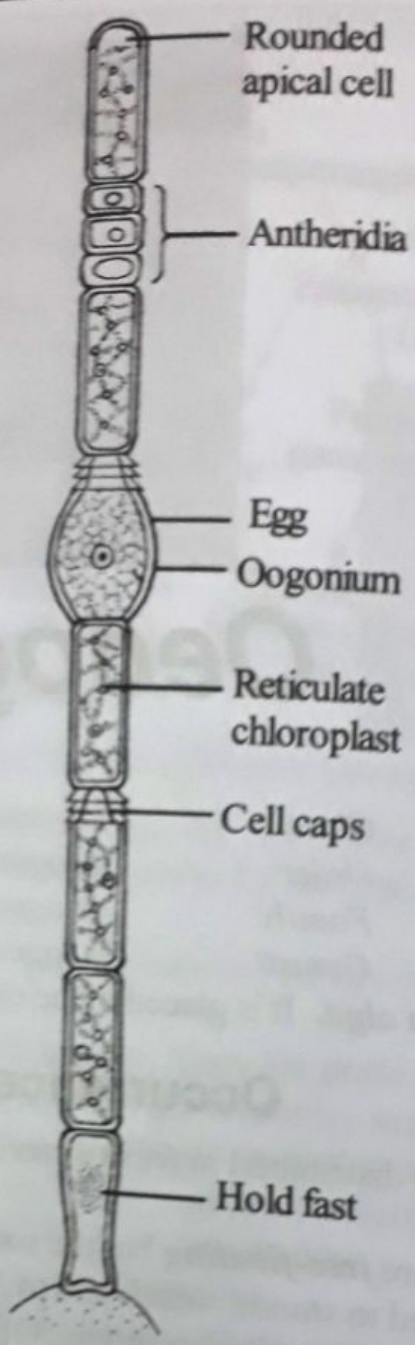

Fig.35.1: Oedogonium - Thallus structure.

The filament is ***uniseriate*** and it consists of ***elongated*** and ***cylindrical cells*** arra
end to end.

The basal cell of the filament is modified into the ***holdfast*** or ***hapteron***.

The holdfast is devoid of chloroplast.

The holdfast attaches the filament with the substratum by its lobed base.

The free end of the filament is ***acute*** or ***round***.

Some cells have ring-like thickenings called ***cell caps***.

The cells with caps are called ***cap cells***.

The mature filament has a few swollen ***oogonia*** and ***antheridia***.

The cell has an outer ***cell wall,*** a middle ***plasma membrane*** and an inner ***protoplas***

The cell wall consists of ***three layers***, namely an outer ***chitinous layer,*** a middle ***pec***
layer and an inner ***cellulose layer***.

The cell wall has ring-like thickenings called ***cell caps***.

The plasma membrane lies below the cell wall.

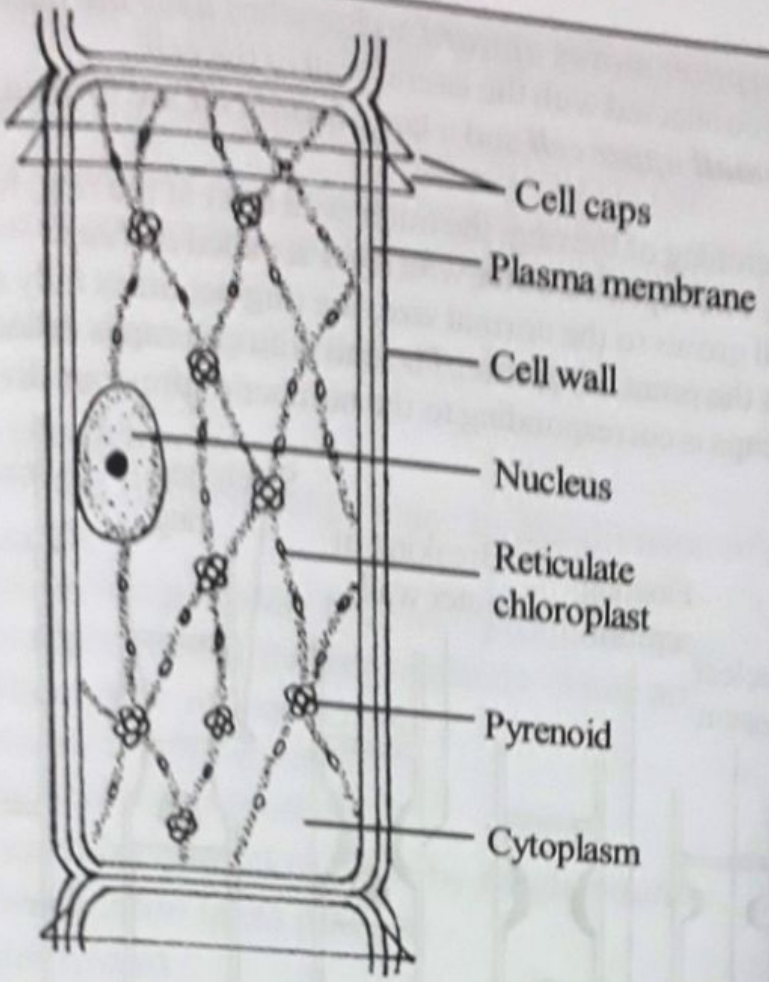

Fig.35.2: Oedogonium - Structure of cell.

The protoplasm contains a single ***reticulate chloroplast*** with many ***pyrenoids***, a ***nucleus*** and ***vacuole***.

The nucleus is ***large*** and ***eukaryotic***.

The chloroplast contains ***chlorophyll-a*** and ***-b, carotenes*** and ***xanthophylls. Starch*** is the ***reserve food.***

Growth

The growth of the filament takes place by the division of ***terminal cell*** or ***intercalary cell.*** The cell division is a peculiar type and it results in the formation of ***cap cells.***

Cell Division and Formation of Cap Cells

The cell division in *Oedogonium* is a ***peculiar type***. This type of cell division is not seen in other families. All cells of the filament, except the holdfast, are capable of cell division. The important events of cell division are given below:

1. Just before the cell division, the ***nucleus moves to the centre*** from the periphery of the cell.

2. The nucleus divides ***mitotically*** into ***two daughter nuclei.*** At the same time, a ***concentric ring*** of hemicellulose develops on the inner surface of the lateral wall just below the upper transverse wall. It develops by invagination of inner and middle layers of the cell wall.

3. The concentric ring becomes ***thickened*** by the addition of hemicellulose. Now a floating ***septum*** develops between the two daughter nuclei.

4. The floating ***septum moves upward*** and reaches ***near the base of the ring.***
5. The septum is connected with the lateral wall of the cell.
6. As a result a ***small upper cell*** and a large ***basal cell*** are formed. In the meantime, the ring stretches slightly.
7. Due to the stretching of the ring, the outer wall layer at the ring, ruptures and appears as a ring around the cell. The ruptured outer wall layer is called ***cell cap.***
8. The upper cell grows to the normal size, the ring becomes fully stretched and an outer wall layer develops at the point of rupture. The cell with cell cap is called ***cap cell.***

The number of caps is corresponding to the number of previous divisions of the cap cell.

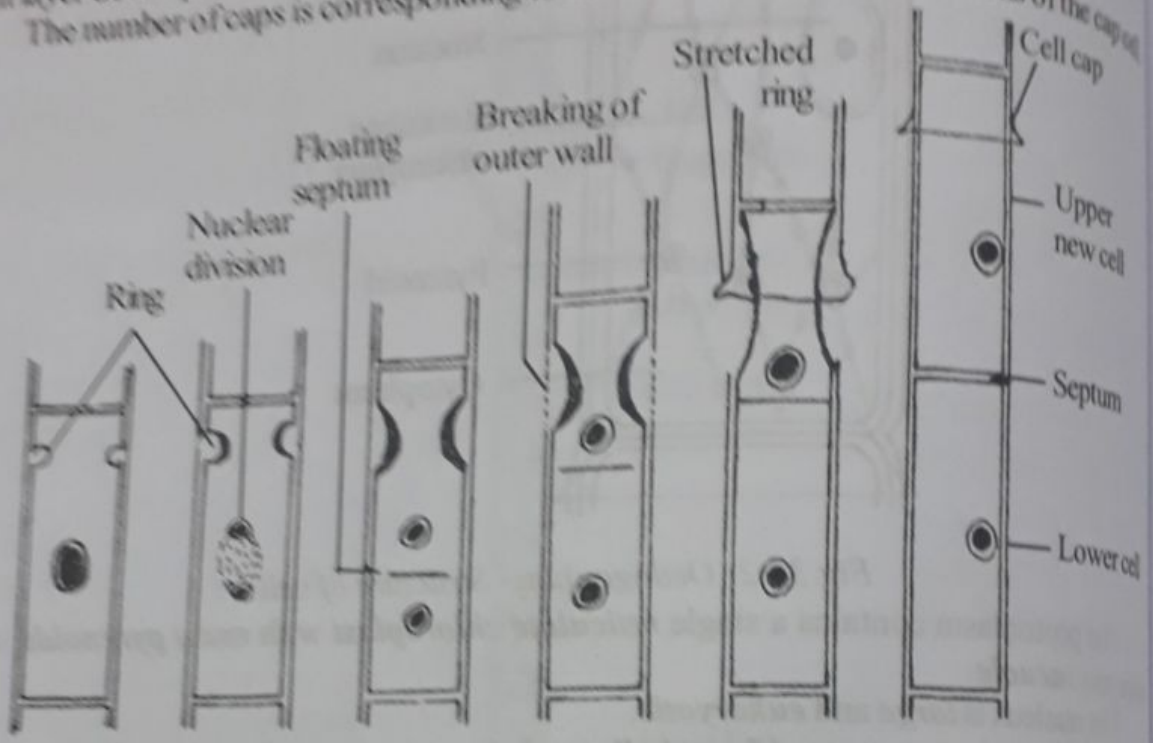

Fig.35.3: Oedogonium - Cell division.

Highlights

Oedogonium

- *Oedogonium* is a ***sedentary, unbranched filamentous green alga.***
- It is included in the class ***Chlorophyceae.***
- It is a ***freshwater*** alga.
- The plant is a ***haploid gametophyte***.
- The thallus consists of a long ***filament*** and a ***holdfast***.
- The filament is attached to the substratum by ***holdflast***.
- All cells of the filament except the basal and apical cells, are cylindrical and alike.
- The apical cell of the filament is rounded.
- Some intercalary cells have ***caps*** at their upper end. These cells are called ***cap cells***.
- In the mature filament, some cells are converted into ***antheridia*** and ***oogonia***

- The cell consists of an outer ***cell wall,*** a middle ***plasma membrane*** and inner ***protoplasm.***
- The ***cell wall*** has ring-like thickenings called ***cell caps.***
- The ***plasma membrane*** lies below the cell wall.
- The ***protoplasm*** contains a single ***reticulate chloroplast,*** a ***nucleus*** and ***vacuole.***
- The ***chloroplast*** contains ***pigments*** and many ***pyrenoids.***
- ***Starch*** is the reserve food.
- The nucleus is ***eukaryotic.***
- The ***growth*** of the filament takes place by the division of ***terminal cell*** or ***intercalary cells.***
- The cell division is a ***peculiar*** type as it produces a ***cap.***
- *Oedogonium* reproduces by ***three*** methods. They are:
  - *Vegetative reproduction*
  - *Asexual reproduction*
  - *Sexual reproduction.*
- ***Vegetative reproduction*** takes place by ***fragmentation.***
- ***Asexual reproduction*** takes place by -
  - *Zoospores*
  - *Aplanospores*
  - *Akinetes.*
- ***Zoospores*** are motile, uninucleate, multiflagellate spores produced in ***zoosporangia***. They germinate into ***haploid gametophytes.***
- The ***sexual reproduction*** is ***oogamous type.***
- The male sex organ is called ***antheridium*** and the female sex organ is called ***oogonium.***
- Antheridium produces ***sperm*** and oogonium produces ***egg.***
- The motile sperm fuses with the non-motile egg to form a ***diploid zygote.***
- The zygote secretes a thick wall to form an ***oospore.***
- Oospore divides ***meiotically*** into four ***haploid zoospores.***
- Haploid zoospores germinate into ***haploid gametophytes.***
- Depending upon the distribution of sex organ, species of *Oedogonium* are divided into ***two*** groups. They are:
  - *Macrandrous species* → *Homothallic*, *Heterothallic*
  - *Nannandrous species* → *Gynandrosporous species*, *Idiandrosporous species*
- *Oedogonium* that produces antheridia and oogonia in ***normal filament*** is called

macrandrous species.

- *Oedogonium* that produces oogonium in normal filament and antheridia small ***dwarf filament*** is called ***nannandrous species***.
- The life cycle is ***haplontic type***.

Reproduction

The reproduction in *Oedogonium* takes place by ***three*** methods. They are:

* *Vegetative reproduction*
* *Asexual reproduction*
* *Sexual reproduction.*

Vegetative Reproduction

The vegetative reproduction takes place by ***fragmentation***. The filament breaks into small fragments by mechanical actions. Each fragment grows into a new filament. This method called ***fragmentation***.

Asexual Reproduction

In *Oedogonium,* asexual reproduction takes place by ***three*** kinds of ***asexual spores***. They are:

1. *Zoospores*
2. *Aplanospores*
3. *Akinetes.*

Zoospores

Asexual reproduction takes place by means of ***multiflagellate zoospores***.

The zoospores are formed ***singly*** from any cap cells.

The cell producing the zoospore is known as ***zoosporangium***.

The protoplast of the zoosporangium contracts from the cell wall and becomes a rounded ***mass***. It gradually becomes ***oval*** in shape and green in colour with a ***hyaline*** anterior part.

Around this hyaline part a ring of about ***120 flagella*** arise and now it is called zoospore. This type of flagella arrangement is called ***stephanokont type***.

The zoospore with stephanokont arrangement of flagella is called ***stephanokont***.

Each zoospore has a ***reticulate chloroplast***, a haploid ***nucleus*** and plenty of reserve ***food.***

The cross wall at the upper end of the cell separates as a ***lid***. The zoospore, enclosed within a ***vesicle***, comes out of the ***zoosporangium***. Then the vesicle disappears and the zoospore swims freely in the water.

The released zoospore becomes upside down and loses its flagella.

The cell then divides transversely into a ***lower cell*** and an ***upper cell***.

The lower cell becomes the ***holdfast*** and the upper cell forms the ***uniseriate filament***.

2. Aplanospores

Aplanospores are ***non-motile, non-flagellate, uninucleate cells***.

The cell of the filament producing the aplanospore is called ***aplanosporangium***.

The aplanospore is produced during the dry season.

When favourable season comes, the aplanospore comes out of the aplanosporangium and germinates into a new plant.

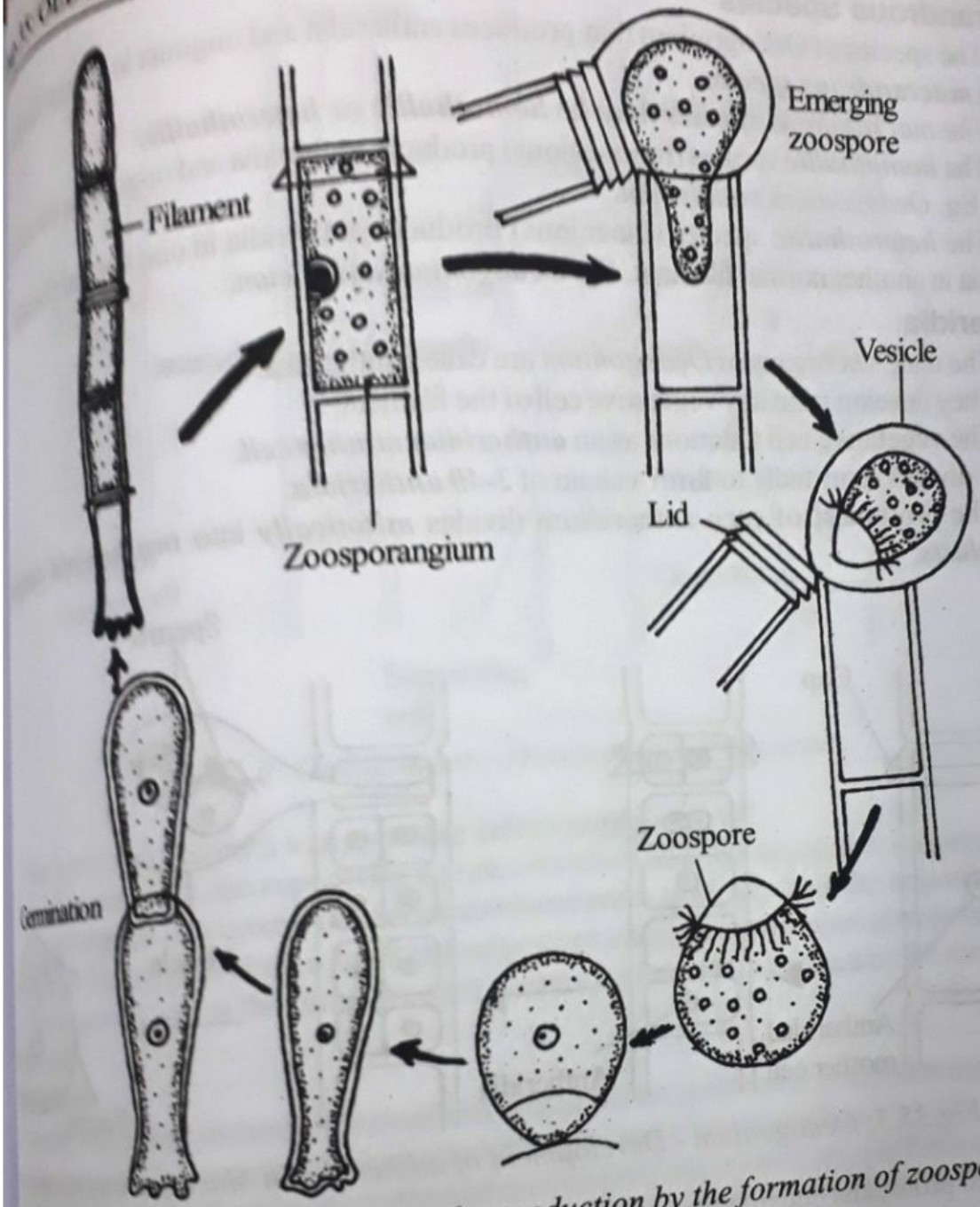

Fig.35.4: Oedogonium - Asexual reproduction by the formation of zoospore.

Akinetes

Akinetes are thick-walled vegetative cells of *Oedogonium*.

Sometimes, the vegetative cell stores plenty of reserve food and develops a thick wall round it. This thick walled cell is called ***akinete***.

During the favourable season, it germinates into a new filament.

Sexual Reproduction

The sexual reproduction in *Oedogonium* is ***oogamous type***. The male sex organ is called ***antheridium*** and the female sex organ is called ***oogonium***.

Depending upon the distribution of sex organs, all species of *Oedogonium* are divided into two groups. They are:

1. *Macrandrous species*
2. *Nannandrous species*.

Macrandrous Species

The species of Oedogonium that produces antheridia and oogonia in normal fi called ***macrandrous species***.

The macrandrous species may be ***homothallic*** or ***heterothallic***.

The ***homothallic*** species (monoecious) produces antheridia and oogonia in the ment. Eg. *Oedogonium nodulosum*.

The ***heterothallic*** species (dioecious) produces antheridia in one normal fil oogonia in another normal filament. Eg. *Oedogonium aquaticum*.

Antheridia

The male sex organs of *Oedogonium* are called antheridia.

They develop from any vegetative cell of the filament.

The vegetative cell functions as an ***antheridial mother cell***.

It divides repeatedly to form a chain of ***2-40 antheridia***.

The protoplast of each antheridium divides ***mitotically*** into ***two haploid*** ***protoplasts***.

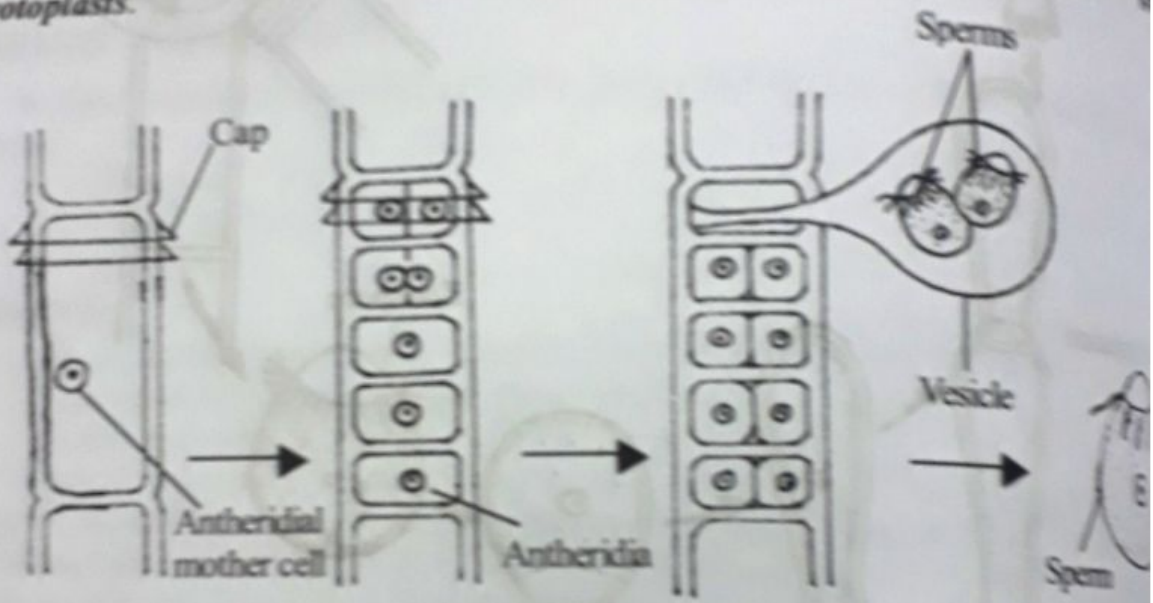

Fig.35.5: Oedogonium - Development of antheridia in Macrandrous spec

Each protoplast becomes pear-shaped and develops a ring of many flagella arou ourless portion at its one end. This becomes a ***sperm***. Thus two sperms are produc each antheridium.

The wall of the mature antheridium ruptures transversely to form a gap.

The two sperms secrete a common ***mucilage vesicle*** around them.

The vesicle comes out through the gap. Later, the sperms come out of the vesicle freely in the water in search of an oogonium.

The sperms are similar to the zoospores but smaller in size.

Oogonia

The female sex organs are called ***oogonia***.

Any cell of the filament, functions as ***oogonial mother cell***.

This cell divides transversely into an ***upper cell*** with cell cap and a ***lower cel***

The upper cell develops into an ***oogonium***.

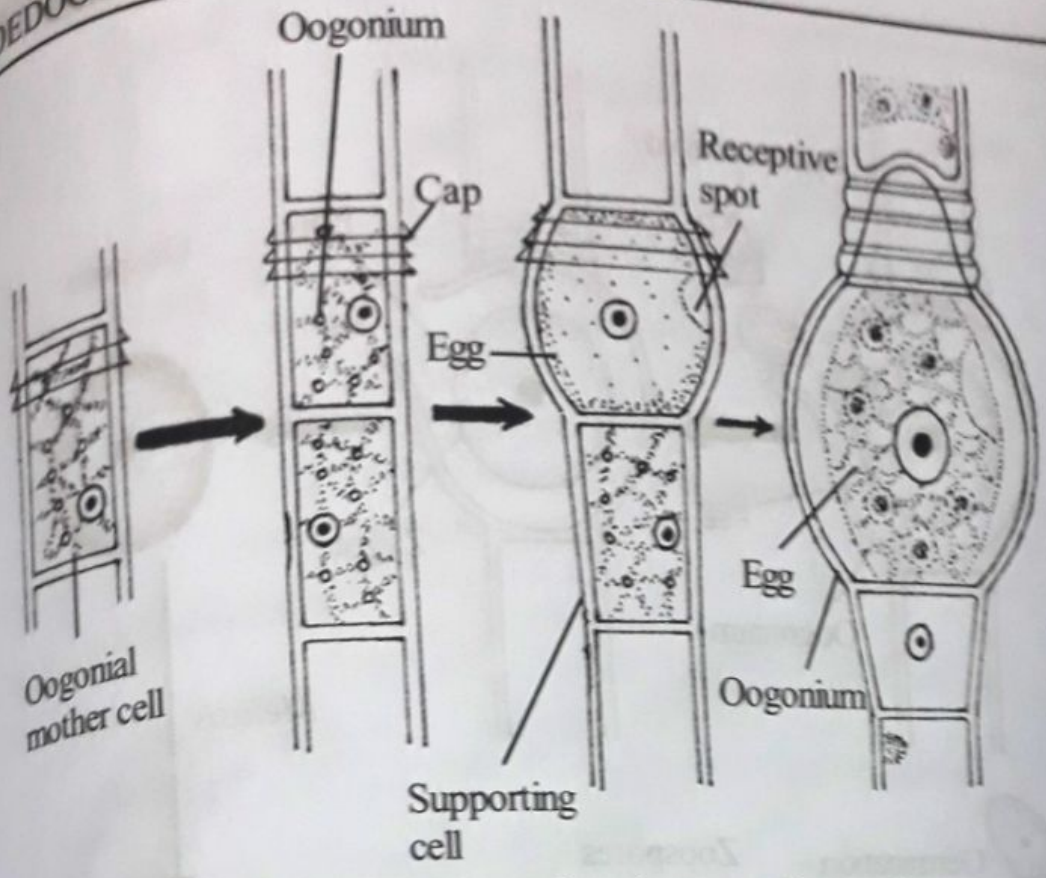

Fig.35.6: Oedogonium - Development of oogonium.

The lower cell becomes a ***supporting cell*** or ***suffultory cell.***

In some rare cases, the supporting cell also divides and forms one or few oogonia.

The protoplast of oogonial cell becomes ***round*** and it contracts from the oogonial wall to rm an ***egg***. The egg develops a small colourless part called ***receptive spot*** at its lateral side.

The oogonial wall at the receptive spot forms a ***pore*** or ***slit*** to give a way for the entry of e sperms.

ertilization

As the oogonium matures, the oogonial wall at the receptive spot gelatinises and forms a ucilage ***mount***. This mucilage attracts the sperms towards the oogonium.

One sperm enters the oogonium through the slit and fuses with the egg to form a ***zygote***.

The zygote is ***diploid***.

The zygote secretes a thick wall to form an ***oospore***.

ermination of Oospore

After a period of rest, the diploid nucleus of the oospore divides ***meiotically*** into ***four*** ploid ***nuclei***.

Each nucleus with the cytoplasm develops many fla ella to form a ***zoospore***.

The oospore wall ruptures and releases the ***four zoospores*** in water. The zoospores are ploid.

The zoospores swim in water and germinate into haploid *Oedogonium* plants.

annandrous Species

The species of Oedogonium that produces oogonium in normal filament and nheridium *in small* ***dwarf*** *filament is called* ***nannandrous species.***

Here, the normal filament produces a special type of zoospore called ***androspore***. The

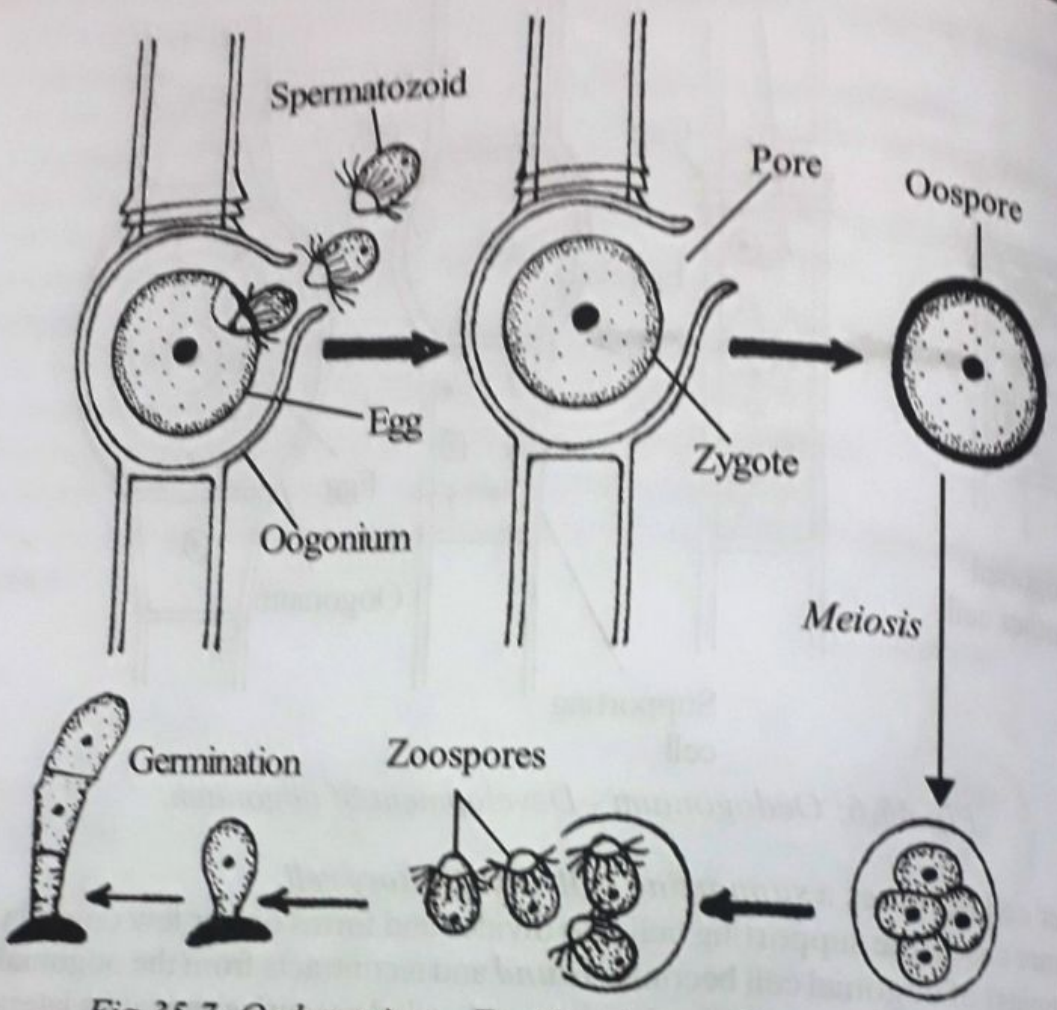

Fig.35.7: Oedogonium - Fertilization and germination of oospore.

androspores are produced in ***androsporangia***. The androsporangia are similar to the antheri of macrandrous species.

The androspores settle either on the oogonium or on the supporting cell. They germin into short filaments called ***dwarf males*** or ***nannandria***.

The nannandrous species are often known as ***androspore - forming species***. T nannandrous species are of ***two*** types:

1. *Gynandrosporous species (monoecious)*
2. *Idiandrosporous species (dioecious).*

In the ***gynandrosporous*** species, androsporangia and oogonia are produced in the sa filament (i.e, monoecious) Eg.*Oedogonium concatenatum*.

In ***idiandrosporous*** species androsporangia and oogonia are produced in separate fi ments (i.e., dioecious) Eg. *Oedogonium iyengarii*.

The androspores are liberated from the androsporangia. Each androspore develops int few celled filament known as ***dwarf male*** or ***nannandrium***.

Nannandrium

The nannandrium is the ***male filament*** of *Oedogonium*.

It is a short filament and it produces male gametes. So it is known as ***dwarf male fi ment***. It develops from androspore. It is found attached to the supporting cell or the oogo

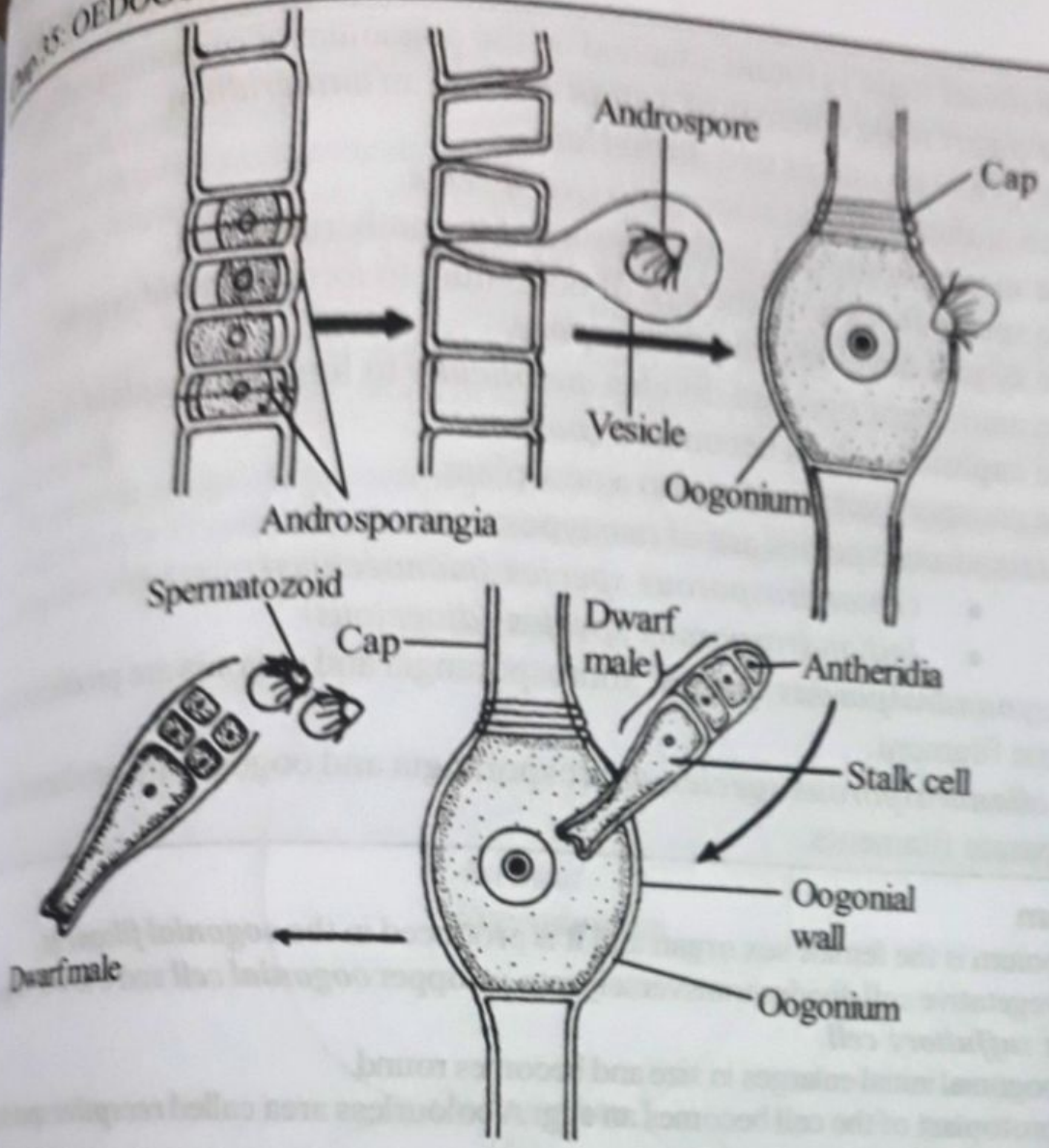

Fig.35.8: Oedogonium - Development of nannandrium and formation of sperms.

Each nannandrium consists of a basal ***stalk cell*** and one or two ***antheridia***.

The protoplast of the antheridium divides ***mitotically*** into two daughter protoplasts.

Each daughter protoplast develops a ring of many flagella at one end and forms a ***multiflagellate sperm*** or ***antherozoid***.

The sperms come out of the antheridium by the rupture of antheridial wall. They swim in water in search of an oogonium.

Highlights

Nannandrous Species

- *The species of Oedogonium that produces antheridium in small dwarf male filament is called* ***nannandrous species***.
- The dwarf male filament is called ***nannandrium***.
- It develops from the ***androspore***, formed in ***androsporangium*** of normal filament.
- The androspore gets attached either with ***oogonium*** or ***supporting cells***. Here the androspore germinates into the dwarf male filament.

- The dwarf male is found attached on the oogonium or supporting cells.
- The dwarf male consists of a ***stalk cell*** and an ***antheridium***.
- There may be one or two ***antheridia***.
- Each antheridium develops into two ***sperms***.
- The sperms come out by the rupture of the antheridial wall.
- The sperm fuses with the egg of oogonium to form a ***diploid zygote.***
- The zygote develops into the ***oospore.***
- The nucleus of oospore divides ***meiotically*** to form four ***haploid*** nuclei.
- The haploid nucleus becomes a ***zoospore***.
- The zoospore germinates into a new plant.
- Nannandrous species are of ***two*** types:
  - *Gynandrosporous species (monoecious)*
  - *Indiandrosporous species (dioecious)*
- In ***gynandrosporous species***, androsporangia and oogonia are produced in the same filament.
- In ***idiandrosporous species***, androsporangia and oogonia are produced in separate filaments.

Oogonium

Oogonium is the female sex organ and it is produced in the ***oogonial filament***.

The vegetative cell divides transversely into an upper ***oogonial cell*** and a lower ***supporting cell*** or ***suffultory cell***.

The oogonial initial enlarges in size and becomes round.

The protoplast of the cell becomes an egg. A colourless area called ***receptive spot*** develops at the lateral side of the oogonium.

Towards maturity, the oogonial wall at the receptive spot produces a ***mucilage mount***.

Fertilization

The sperms coming from the nannandrium move towards the oogonium and enter the oogonium through a pore of oogonial wall. One sperm fuses with the egg to form a ***diploid zygote***. The zygote secretes a thick wall to form an ***oospore***.

Germination of Oospore

After a period of rest, the diploid nucleus of the oospore undergoes ***meiosis*** to form ***four haploid nuclei.***

Each nucleus is surrounded by cytoplasm to form a ***haploid, multiflagellate zoospore***.

The zoospores germinate into new ***haploid filaments.***

Conclusion

The life cycle of *Oedogonium* is ***haplontic type***.

The plant is ***haploid***. It reproduces vegetatively by ***fragmentation***. Asexually it reproduces by ***multiflagellate zoospores, aplanospores*** and ***akinetes.***

The zoospores are ***haploid*** and they develop into haploid *Oedogonium* filaments.

Sexually it reproduces by gametes called ***sperms*** and ***egg***.

The sperms and eggs are ***haploid***. The sperm and egg fuse together to form a ***diploid***

zygote.

The zygote undergoes ***meiosis*** to form four ***haploid zoospores***. These zoospores germinate into ***haploid filaments***.

Here the ***haploid*** plant is the dominant phase and the ***diploid phase*** is represented only by the ***zygote***. Therefore, the life cycle of *Oedogonium* is called ***haplontic type***.

Life Cycle of *Oedogonium*

Oedogonium is a ***green alga.*** It is placed in the class ***Chlorophyceae***. It is widely distributed in ***fresh water habitats*** like *ponds, lakes, tanks* and *rivers*.

It is found attached to *rock, wood* or *aquatic* plants. The mature thalli float freely on the surface of water.

The plant is a ***haploid gametophyte*** (N). It is an ***unbranched uniseriate filament*** consisting of a row of ***cylindrical cells***. These cells are longer than the breadth. Some cells have ***ring-like thickenings*** called ***cell caps.***

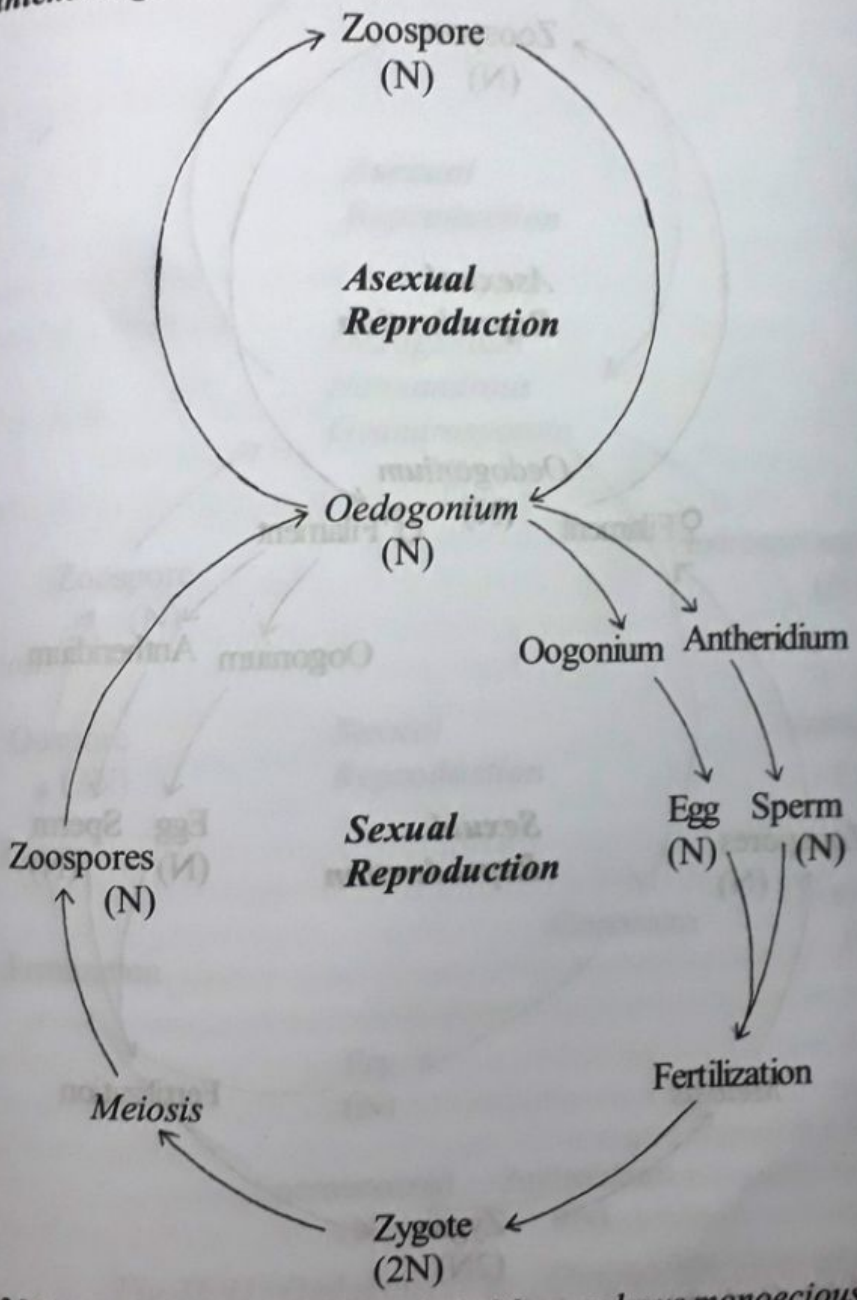

Fig.35.9: Oedogonium - Life cycle in Macrandrous monoecious species.

The apical cell is ***acute*** or ***rounded***. The basal cell of the filament is modified into a ***holdfast***. The holdfast has many finger-like projections called ***haptera*** at its lower end. It anchors the filament on the substratum. The mature filament has a few ***swollen oogonia*** and a few ***antheridia***.

The cell is ***eukaryotic*** and ***cylindrical***. The protoplasm contains a ***reticulate chloroplast***, a ***nucleus*** and a ***vacuole***. The intersections of the reticulate chloroplast have a single ***pyrenoid***.

The nucleus is ***large*** and ***spherical***. It has one or a few ***nucleoli***.

The chloroplast contains ***chlorophyll -a*** and ***-b***, ***carotenes*** and ***xanthophylls***. ***Starch*** is the reserve food. It occurs as starch plates around the pyrenoids.

The growth takes place by the ***division of intercalary cells*** of the filament. A cell cap is formed on one of the daughter cells in each division. This is a peculiar feature of *Oedogonium*.

Oedogonium reproduces by ***three*** methods:

Vegetative reproduction

Asexual reproduction

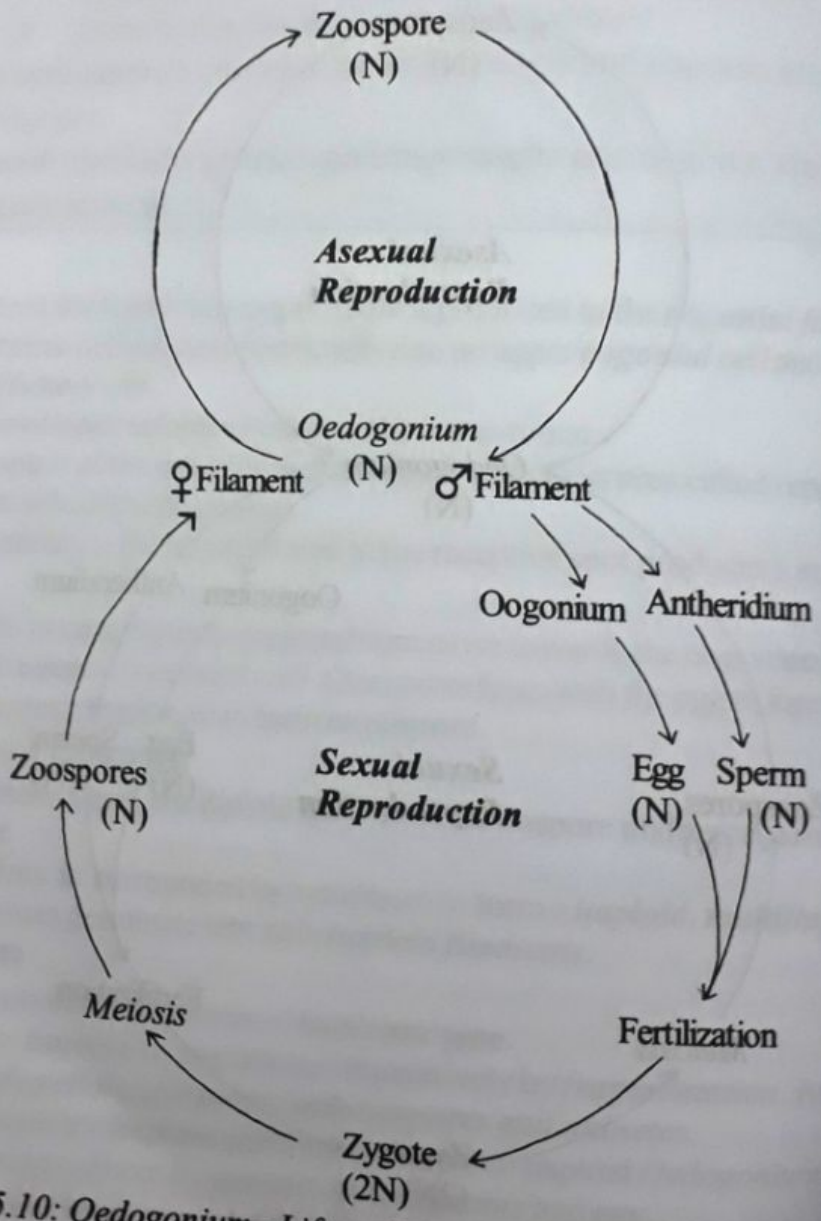

Fig.35.10: Oedogonium - Life cycle in Macrandrous monoecious species.

Sexual reproduction.

The vegetative reproduction takes place by ***fragmentation***. The filament breaks into small segments, each of which then develops into a new plant.

The asexual reproduction takes place by:

Zoospores
Aplanospores
Akinetes.

The zoospores are ***motile, uninucleate*** and ***multiflagellate.*** They are produced in ***sporangia***. The protoplast of the zoosporangium ***contracts*** slightly and becomes ***pear-shaped.***

A colourless ***cytoplasmic dome*** develops at one end of the protoplast.

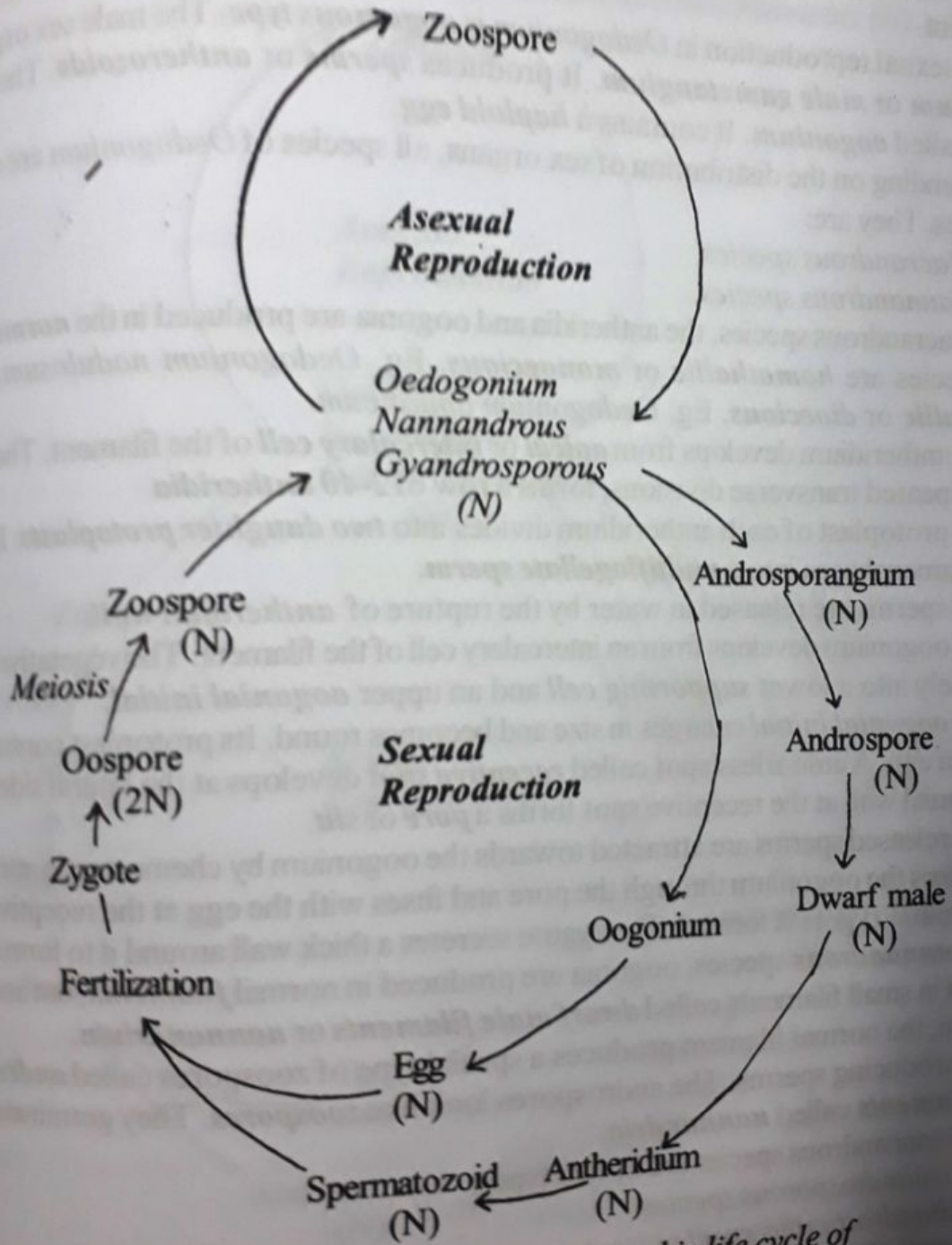

Fig.35.11: Oedogonium sp.: Graphic life cycle of nannandrous gynandrosporous species.

Then a ring of many flagella develops around the cytoplasmic dome. This type of flagellar arrangement is called ***stephanokont type***. The resulting ***multiflagellate cell*** is called ***zoospore*** or ***stephanokonton***.

Each zoospore contains a ***reticulate chloroplast,*** a ***haploid nucleus*** and plenty of ***reserve food***. As the wall of the zoosporangium ruptures, the zoospore comes out and swims in water, later it ***germinates*** into new gametophytic plant (N).

Aplanospores are ***non-motile, non-flagellate spore*** produced in ***aplanosporangia***. They are produced during dry season. During the favourable season, they germinate into new plants.

Sometimes, the vegetative cell ***stores plenty*** of ***reserve foods*** and ***secretes a thick wall*** around it. This thick walled cell is called ***akinete***. During favourable season, it germinates into a new filament.

The sexual reproduction in *Oedogonium* is ***oogamous type***. The male sex organ is called ***antheridium*** or ***male gametangium***. It produces ***sperms*** or ***antherozoids***. The female sex organ is called ***oogonium***. It contains a ***haploid egg***.

Depending on the distribution of sex organs, all species of *Oedogonium* are divided into two groups. They are:

Macrandrous species
Nannandrous species.

In macrandrous species, the antheridia and oogonia are produced in the ***normal filament***. Some species are ***homothallic*** or ***monoecious***. Eg. *Oedogonium nodulosum*. A few are ***heterothallic*** or ***dioecious***. Eg. *Oedogonium aquaticum.*

The antheridium develops from ***apical*** or ***intercalary cell*** of the filament. The vegetative cell, by repeated transverse divisions, forms a row of ***2-40 antheridia***.

The protoplast of each antheridium divides into ***two daughter protoplasts***. Each protoplast metamorphoses into a ***multiflagellate sperm.***

The sperms are released in water by the rupture of ***antheridial wall.***

The oogonium develops from an intercalary cell of the filament. The vegetative cell divides transversely into a lower ***supporting cell*** and an upper ***oogonial initial***.

The ***oogonial initial*** enlarges in size and becomes round. Its protoplast contracts slightly to form an egg. A colourless spot called ***receptive spot*** develops at the lateral side of the egg. The oogonial wall at the receptive spot forms a ***pore*** or ***slit***.

The released sperms are attracted towards the oogonium by chemostactic attraction. One sperm enters the oogonium through the pore and fuses with the egg at the receptive spot. As a result a diploid zygote is formed. The zygote secretes a thick wall around it to form an ***oospore***.

In ***nannandrous*** species, oogonia are produced in normal ***filaments***, but antheridia are produced in small filaments called ***dwarf male filaments*** or ***nannandrium***.

Here, the normal filament produces a special type of zoospores called ***androspores***, instead of producing sperms. The androspores look like ***zoospores***. They germinate into small ***dwarf filaments*** called ***nannandria***.

The nannandrous species are of two types:

Gynandrosporous species
Idiandrosporous species.

In ***gynandrosporous*** species, androsporangia and oogonia are produced in the same filament. Eg. *Oedogonium concatenatum*.

In ***idiandrosporous*** species, androsporangia and oogonia are produced in two separate filaments. Eg. *Oedogonium iyengarii*.

The androspore germinates into a ***nannandrium***. The nannandrium consists of a ***few-celled filament*** and a basal ***rhizoidal cell***.

The cells of the filament are ***smaller*** in size. The protoplast of the vegetative cell divides into ***two daughter protoplasts***. These protoplasts metamorphose into ***multiflagellate sperms***. The sperms are released free in water.

The structure and the development of oogonium are similar to those of oogonium of macrandrous species. The released sperms enter the oogonium and fuses with the egg to form a diploid ***zygote*** (2N). The zygote secretes a thick wall to form an ***oospore***.

After a period of rest, the protoplast of oospore divides ***meiotically*** into four ***haploid, multiflagellate zoospores***. These zoospores germinate into ***new filaments (N)***.

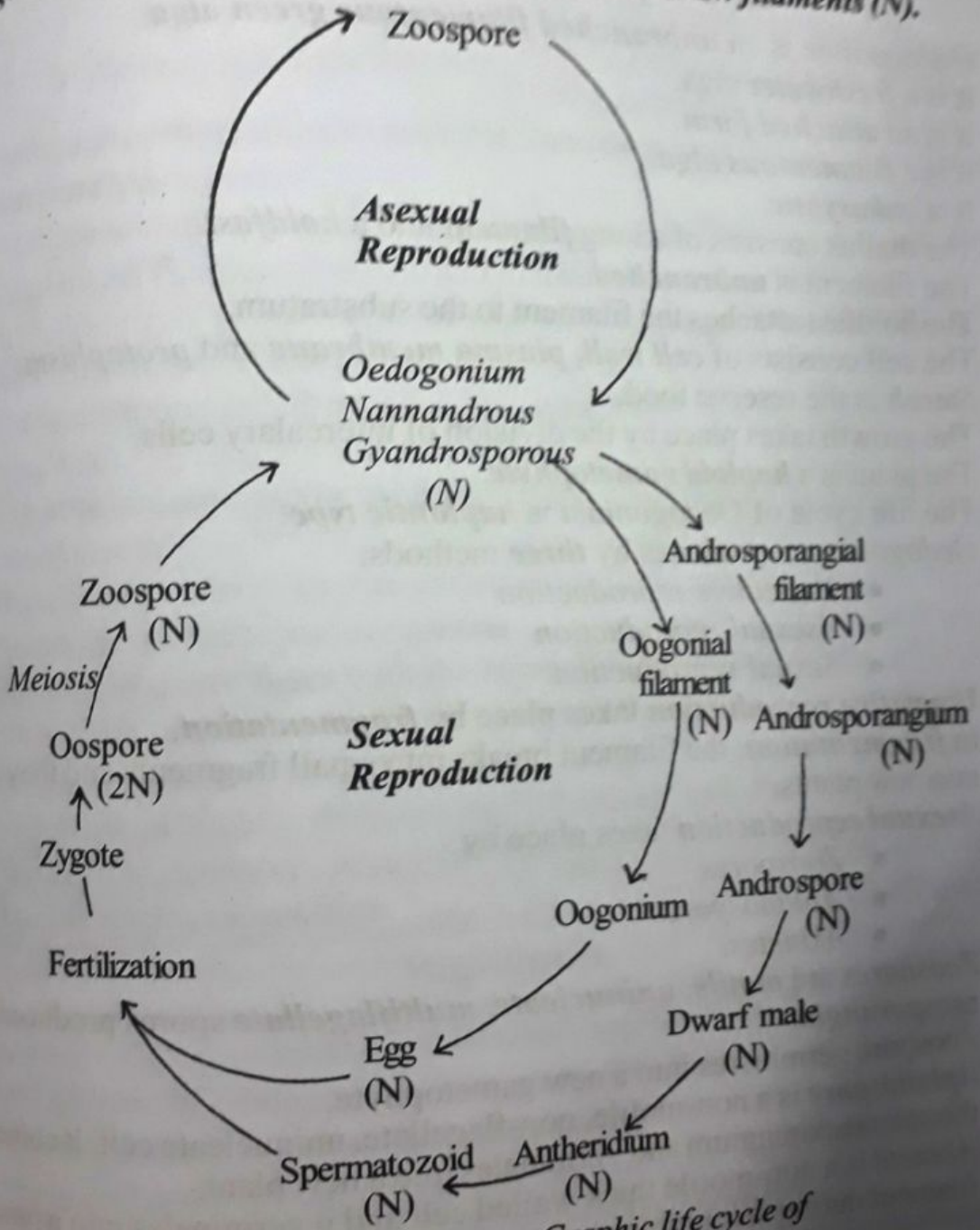

Fig.35.12: Oedogonium sp.: Graphic life cycle of nannandrous idioandrosporous species.

Conclusion

The life cycle of *Oedogonium* is ***haplontic type***. The vegetative thallus is haploid. Vegetatively, it reproduces by ***fragmentation***. Asexually, it reproduces by zoospores, ***aplanospores*** and ***akinetes***. Sexually, it reproduces by means of gametes called antherozoids and ***eggs***. As a result of the fusion of these gametes, a ***diploid zygote*** (2N) is formed. The zygote undergoes ***meiosis*** and forms ***four haploid zoospores***. These zoospores germinate into haploid filaments.

Here, the haploid phase is dominant and the diploid phase is represented only by zygote. The life cycle of *Oedogonium* is called ***haplontic type.***

Highlights

Life Cycle of *Oedogonium*

- *Oedogonium* is an ***unbranched filamentous green alga***.
- It is a ***freshwater*** alga.
- It is an ***attached form***.
- It is a ***filamentous alga***.
- It is ***eukaryotic***.
- The thallus consists of a long ***filament*** and a ***holdfast***.
- The filament is ***unbranched***.
- The holdfast attaches the filament to the substratum.
- The cell consists of ***cell wall, plasma membrane*** and ***protoplasm***.
- ***Starch*** is the reserve food.
- The growth takes place by the division of intercalary cells.
- The plant is a ***haploid gametophyte***.
- The life cycle of *Oedogonium* is ***haplontic type***.
- *Oedogonium* reproduces by ***three*** methods:
    - *Vegetative reproduction*
    - *Asexual reproduction*
    - *Sexual reproduction.*
- ***Vegetative reproduction*** takes place by ***fragmentation***.
- In ***fragmentation***, the filament breaks into small fragments and they grow into new plants.
- ***Asexual reproduction*** takes place by -
    - *Zoospores*
    - *Aplanospores*
    - *Akinetes.*
- ***Zoospores*** are ***motile, uninucleate, multiflagellate*** spores produced in ***zoosporangia***.
- Zoospore germinates into a new gametophyte.
- ***Aplanospore*** is a non-motile, non-flagellate, uninucleate cell. It comes out of the aplanosporangium and germinates into a new plant.
- ***Akinete*** is a non-motile thick walled cell and it germinates into a new filament during favourable season.

- Sexual reproduction is ***oogamous type***.
- The male sex organ is called ***antheridium*** and the female sex organ is called ***oogonium***.
- Antheridium produces ***sperm*** and oogonium produces ***egg***.
- The motile sperm fuses with the non-motile egg to form a ***diploid zygote***.
- The zygote secretes a thick wall to form an ***oospore***.
- Oospore divides ***meiotically*** into four ***haploid zoospores***.
- Haploid zoospores germinate into ***haploid filaments***.
- Depending upon the distribution of sex organ, species of *Oedogonium* are divided into ***two*** groups. They are:
  - *Macrandrous species* → *Homothallic species*, *Heterothallic species*
  - *Nannandrous species* → *Gynandrosporous species*, *Idiandrosporous species*
- *Oedogonium* that produces antheridia and oogonia in normal filament is called ***macrandrous species***.
- *Oedogonium* that produces oogonium in normal filament and antheridium in small dwarf filament is called ***nannandrous species.***
- In the life cycle of ***nannandrous species, androspores*** are produced singly within ***androsporangium***.
- The androspores are liberated and are attached either with ***oogonium*** or ***supporting cell***.
- The attached androspore then germinates into a ***dwarf filament*** called ***nanandrium***.
- Dwarf male consists of one or two ***antheridia***.
- Antheridia produce, motile ***sperms***.
- The motile sperm fuses with the egg to form a ***diploid zygote.***
- The zygote secretes a thick wall to form an ***oospore***.
- Oospore divides ***meiotically*** into four ***haploid nuclei***.
- Each haploid nucleus develops into a ***haploid zoospore***.
- The haploid zoospores germinate into haploid ***gametophytes***.
- The life cycle is ***haplontic***.

Highlights

Macrandrous Species

- *The species of Oedogonium that produces antheridia and oogonia in normal filament is called* ***macrandrous species***.
- The antheridium develops from any vegetative cell of the filament.
- It divides repeatedly to form a chain of ***2-40 antheridia***.
- The protoplast of each antheridium divides ***mitotically*** into two ***haploid***

daughter protoplast.

- Each protoplast becomes a ***sperm***. Thus two sperms are produced inside each antheridium.
- The sperms are released in water by the rupture of antheridial wall.
- ***Oogonium*** develops from any vegetative cell of the filament.
- It divides into an upper ***oogonium*** and a lower ***supporting cell***.
- Oogonium develops an ***egg***.
- The sperm fuses with the egg to form a diploid ***zygote***.
- The zygote secretes a thick wall to form an ***oospore***.
- Oospore divides ***meiotically*** into four ***haploid nuclei***.
- Each haploid nucleus develops into a ***haploid zoospore***.
- The zoospore germinates into a ***new gametophyte***.