

Phycology

For 2nd Year Biology & Geology

BY

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CHLOROPHYTA:
Green Algae



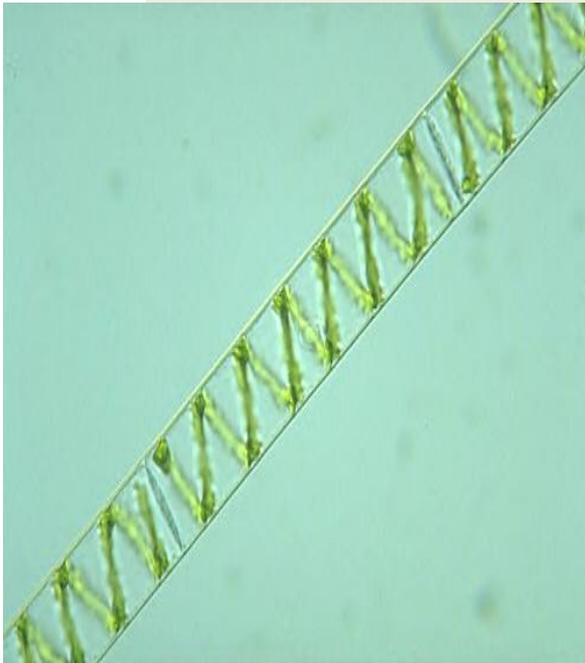
Salient Features of Chlorophyta

- ❖ **Chlorophyta** is a division of green algae
- ❖ Grass green in colour owing to the preponderance of chlorophyll a and b over carotene and xanthophyll.
- ❖ The pigments are localised in the green plastids known as **chloroplasts**.
- ❖ The reserve carbohydrate food is stored as starch.
- ❖ The chloroplasts normally contain the pyrenoids.
- ❖ The cell has a well defined nucleus and in the higher forms a central sap cavity in addition.



Common Chloroplasts Shapes include

Cup Filament Star Reticulate (Net) Banded

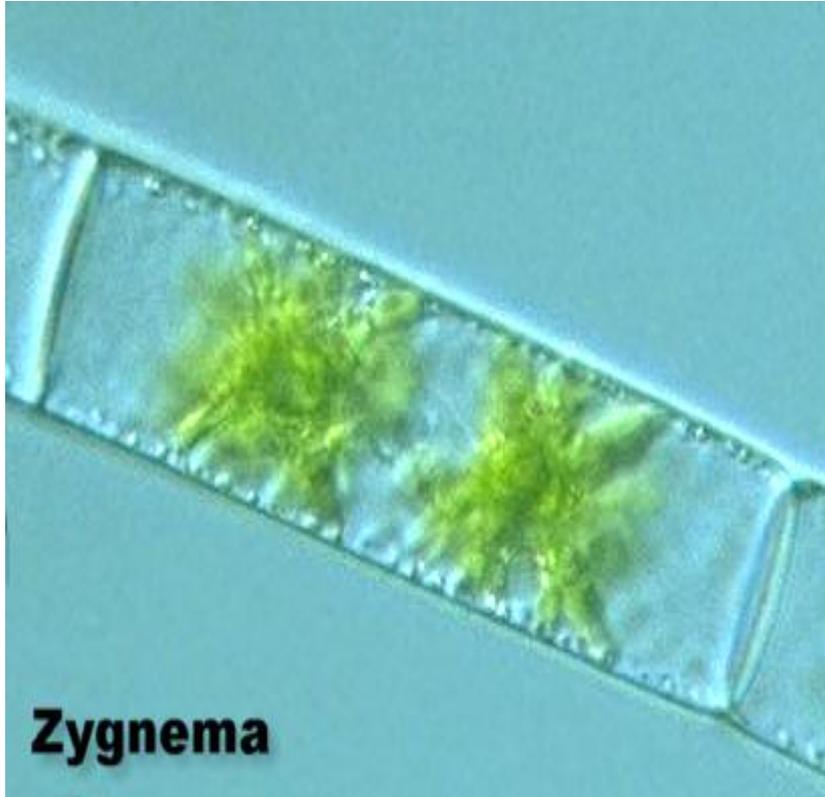


Spirogyra has spiral Chloroplasts



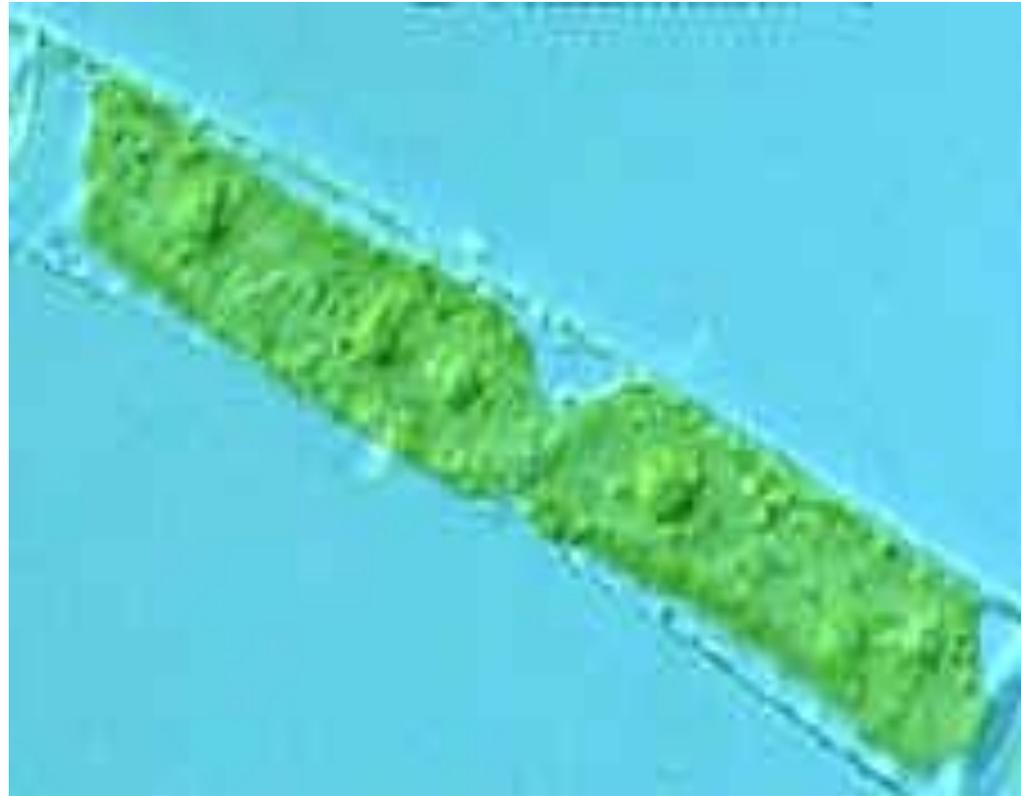
Ulothrix has band-shaped Chloroplasts





Zygnema

Zygnema has Star-shaped Chloroplasts

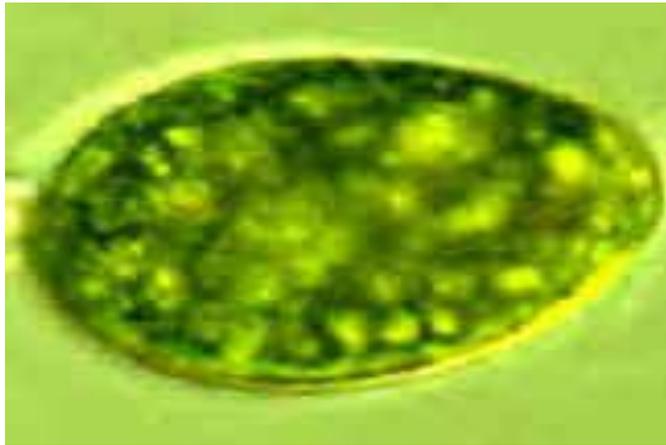


***Mougeotia* has a flat Chloroplast.
The disk-like areas are Pyrenoids**



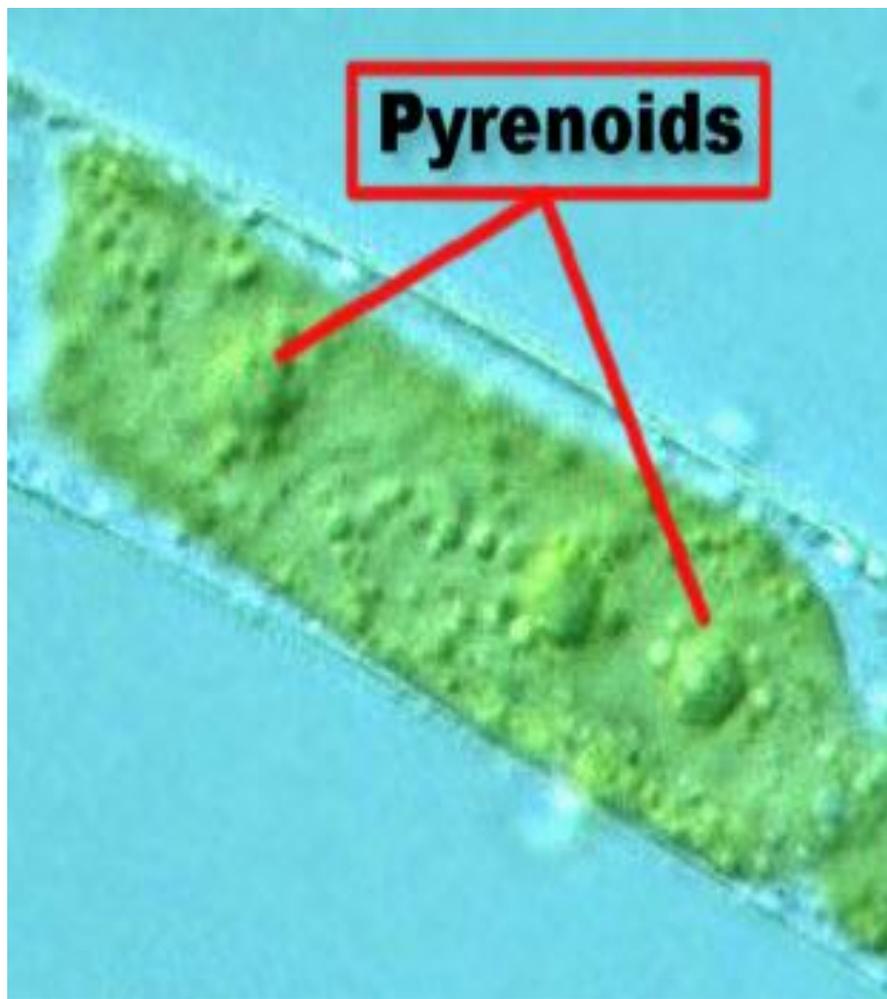


***Cladophora* has many small oval
Chloroplasts**

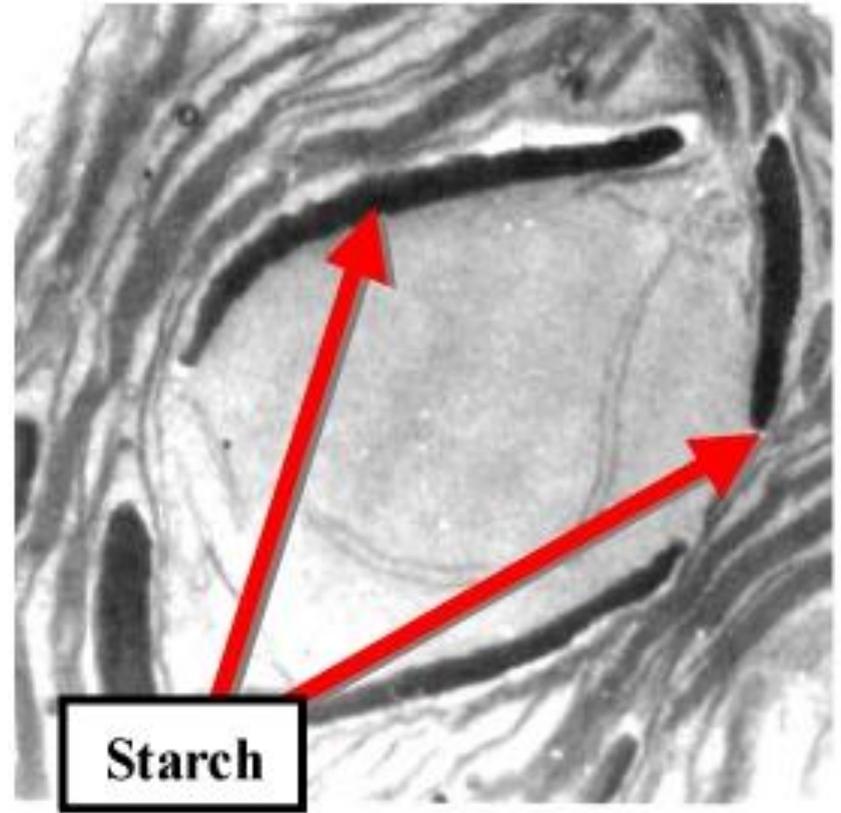


***Chlamydomonas* has one cup-shaped
Chloroplast**





Light Microscope Photo of Pyrenoids
in *Mougeotia* Chloroplast

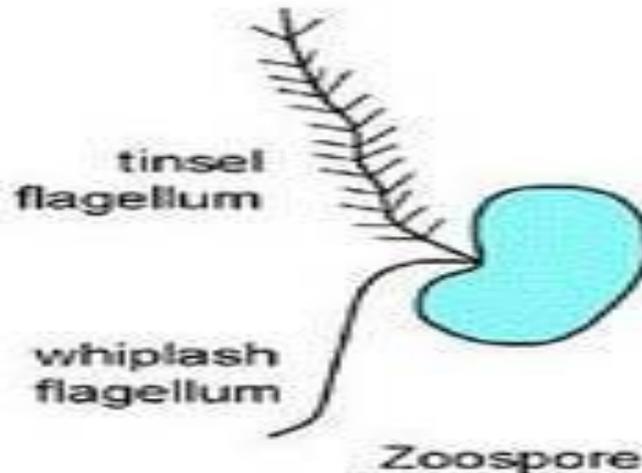


EM Photo of a Pyrenoid in
Chlamydomonas



Salient Features of Chlorophyta

- ❖ The cell wall is stable and invariably contains cellulose.
- ❖ The majority produce motile reproductive cells which may be bi-or quadriflagellate rarely with a ring of flagella as in oedogoniales.
- ❖ The flagella are of equal length and of whiplash type inserted at the anterior end.



Salient Features of Chlorophyta

- ❖ Sexual reproduction ranges from isogamy to oogamy.
 - ❖ The sex organs are always **unicellular**.
- 10. Zygote generally is the only diploid structure in the life cycle.**



Reproduction in Chlorophyta

Reproduction In green algae it takes place by all the **three** methods, namely, **vegetative**, **asexual** and **sexual**.

1- Vegetative

It may take place by cell division, fragmentation or akinetete formation.



Reproduction in Chlorophyta

Asexual reproduction

- ❖ **Spore** formation is common method of asexual reproduction.
- ❖ **They produce different types of spores:**
 - Zoospore:** These are motile spores.
 - They have 2-4 flagella.
 - They may be bi-or quadric-flagellate (*Ulothrix*), with a ring of flagella and thus multiflagellate (*Oedogonim*)
 - These spores are produced in zoosporangia.



Zoospores Formation

- They are usually formed during **night** and develop either in any of the **vegetative cells**
- or in **specialized cells called the zoosporangia**.

The protoplast of the cell may develop into a single zoospore (*Oedogonim*) or it may **divisions resulting in the formation of several zoospores** (*Ulothrix*).

They escape in the **morning** from the parent cell **through a pore in the surrounding cell wall** or by **rupturing of the cell wall**.

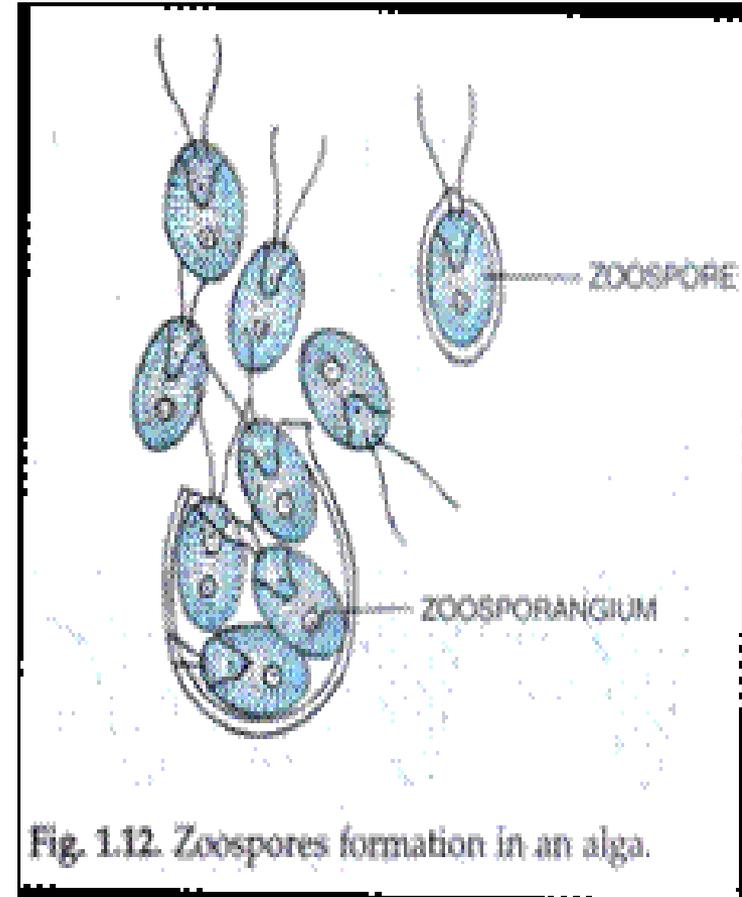
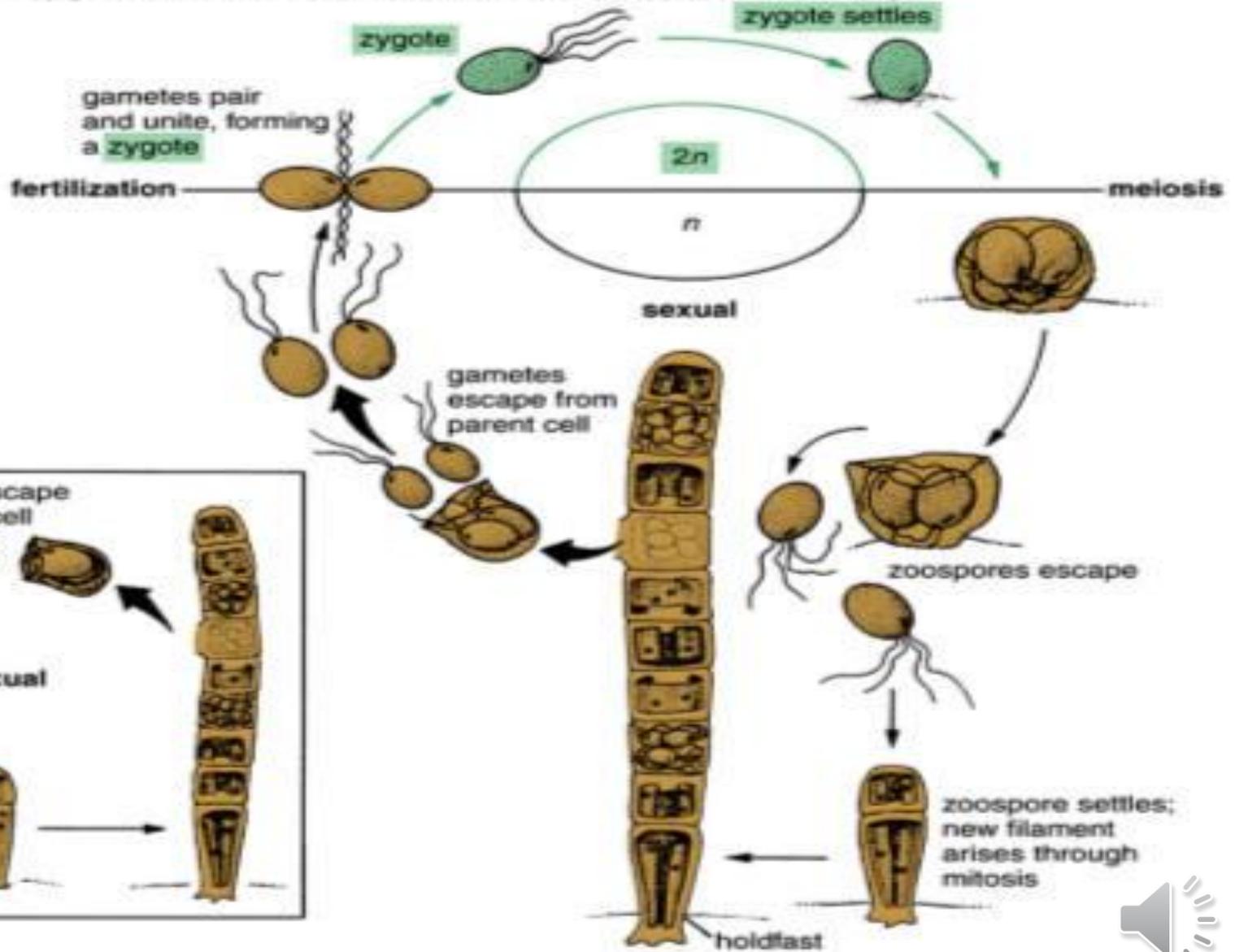


Fig. 1.12. Zoospores formation in an alga.



Ulothrix Life Cycle

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❖ (ii) **By aplanospores:**

- When motile phase of zoospores is eliminated, the bodies are called aplanospores.
- The aplanospore are produce when there is a lack of sufficient water.
- These are covered by a thin wall but do not possess flagella like the zoospores.
- The also germinate directly to give rise to new plant .



Akinetes



Aplanospores



(b) Aplanospores: These are non-motile spores. They have thin wall.

Types of Aplanospores

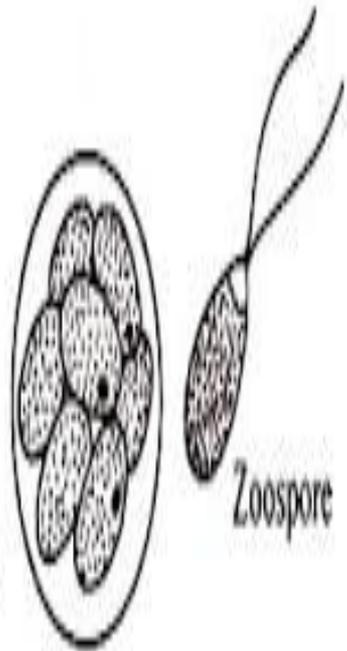
(1) Hypnospore: The non-motile spores with thick wall are called aplanospore.

2) Autospores

when the non-motile spores produced appear identical to the parent cell, they are autospores (*Chlorella*).

The protoplast of the cell may form a single aplanospore (*Microspora*) or more than one.

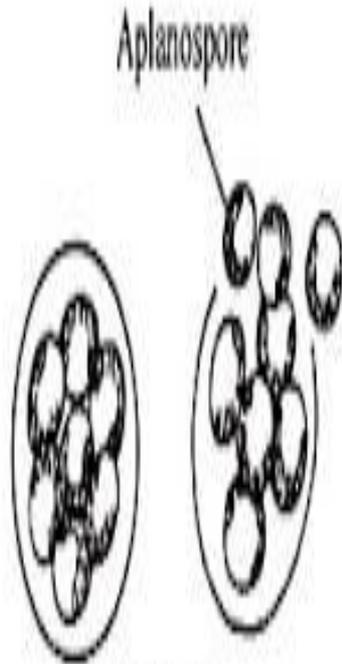




Zoospore

Chlorococcum

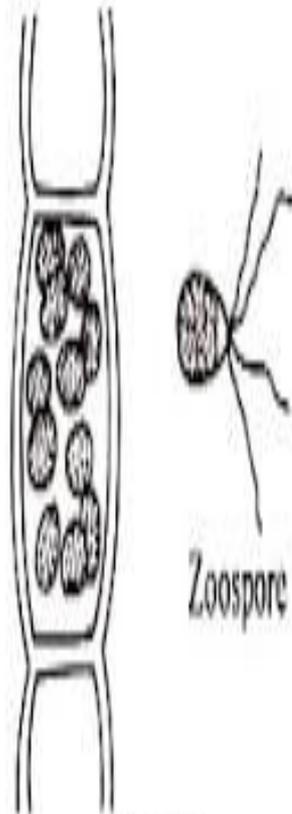
(Protoplast divides to form eight zoospores which have an eye spot and two equal flagella)



Aplanospore

Chlorella

(Protoplast divides to form eight aplanospores)



Zoospore

Ulothrix

(Formation of quadriflagellate zoospores)

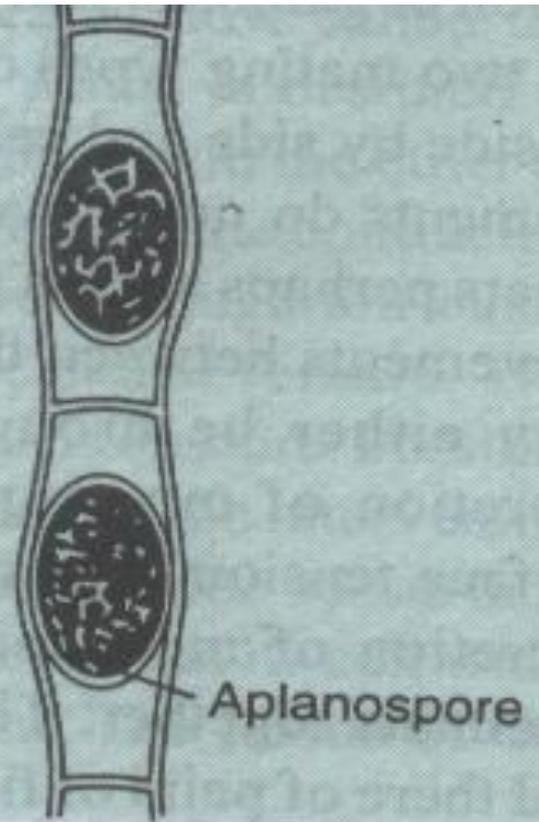


Fig. 11.19. *Spirogyra karnalae*. Aplanospore formation (After Randhawa).



Sexual reproduction

❖ Sexual reproduction may be

- ✓ -Isogamy, (gametes both motile and same size) –
- ✓ Anisogamous (both motile and different sizes - female bigger) or
- ✓ Oogamous (female non-motile and egg-like; male motile)

Gametes are produced in **gametangia**.

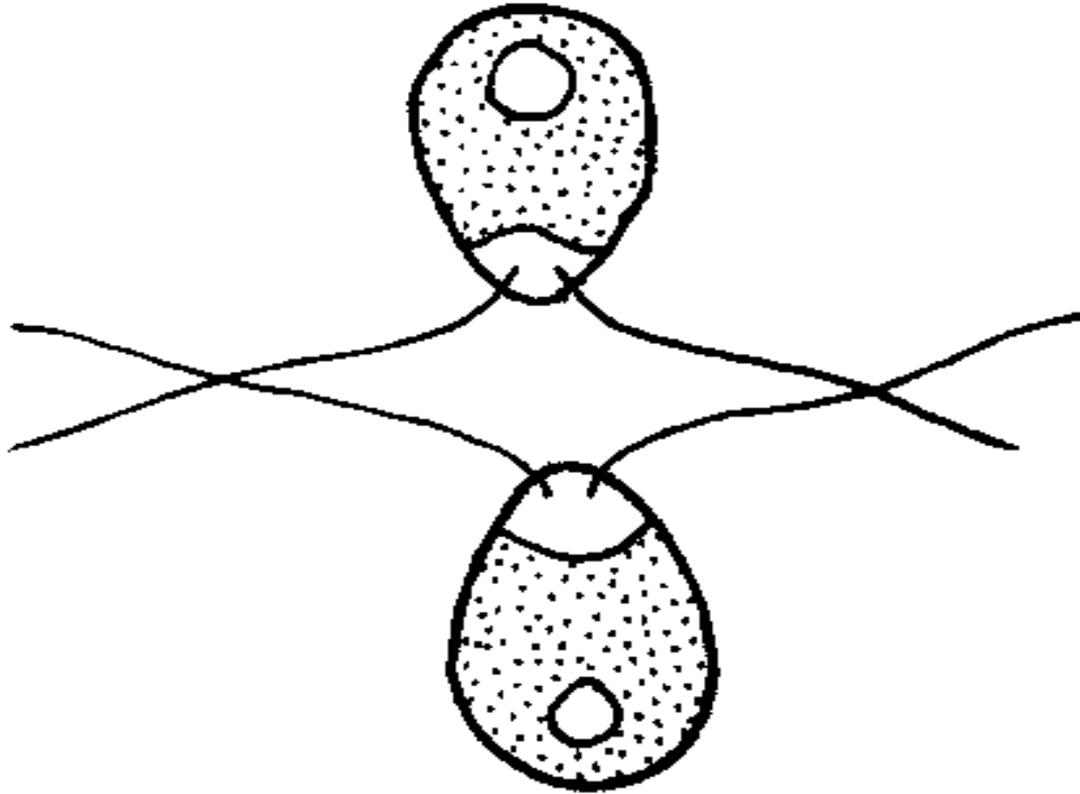


- ✓ When two gametes meet, **fertilization** takes place and a **diploid zygote** is formed.
- ✓ The zygote then germinates, undergoes **meiosis** and forms **haploid spores**.
- ✓ **Zygotes** secrete thick wall to become **zygospore**.

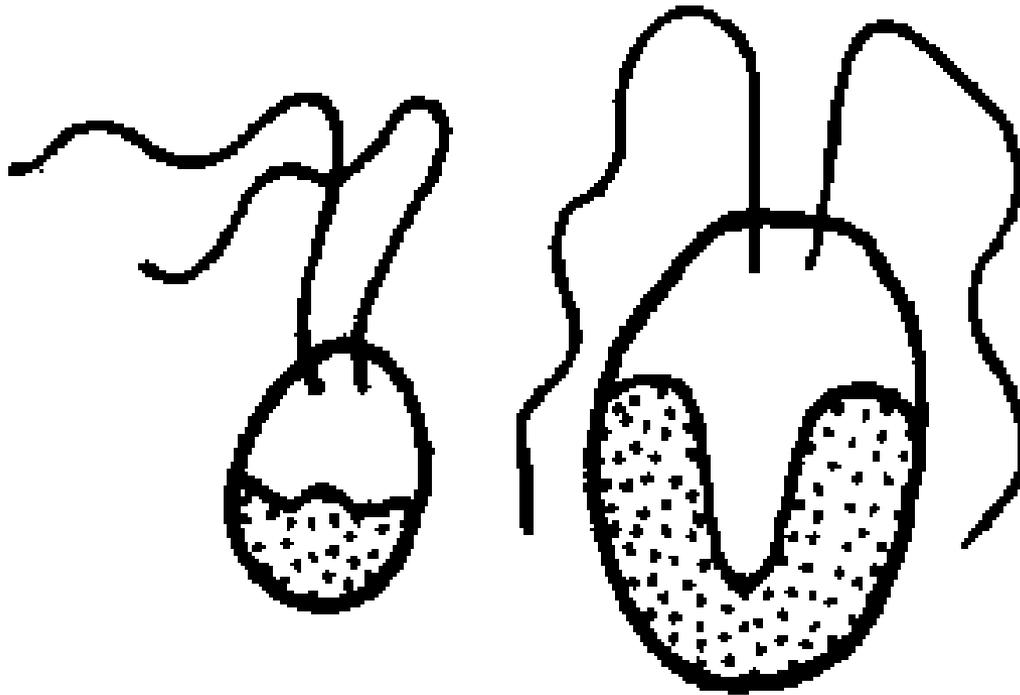


Sexual reproduction

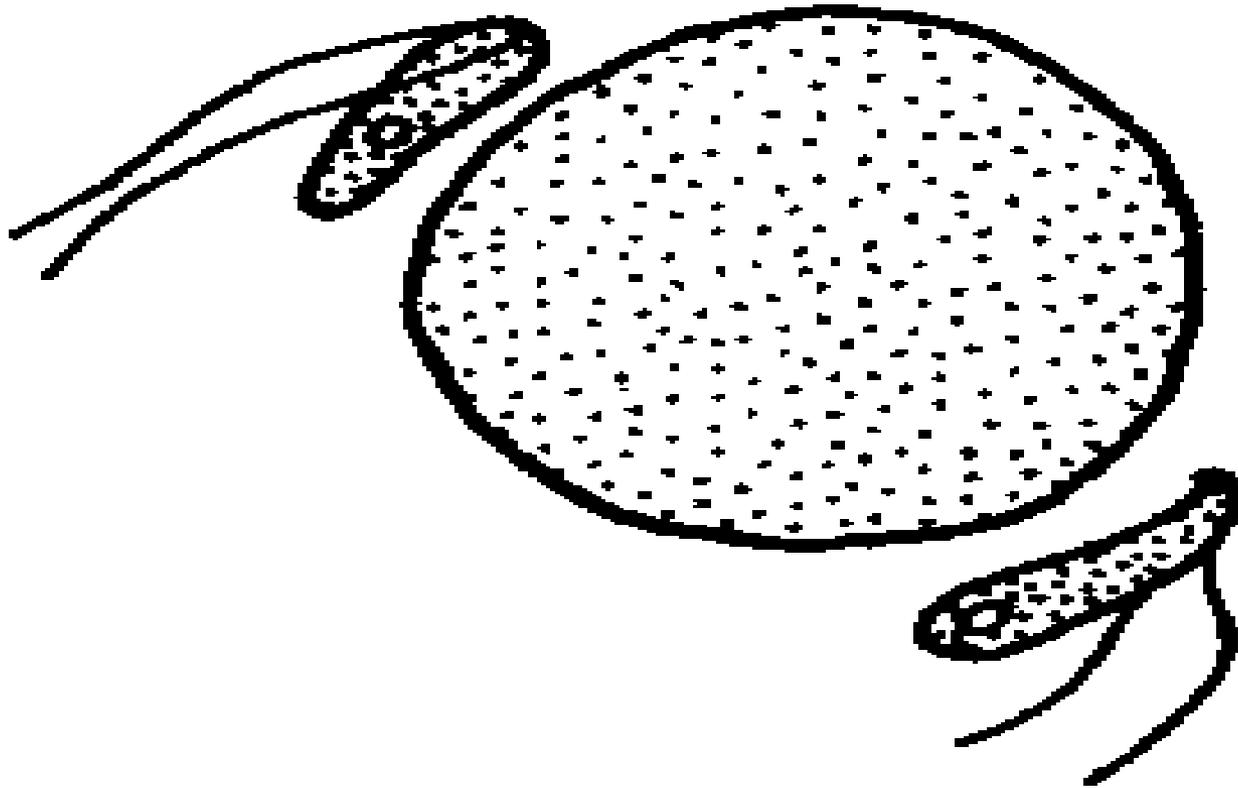
A- Isogamy



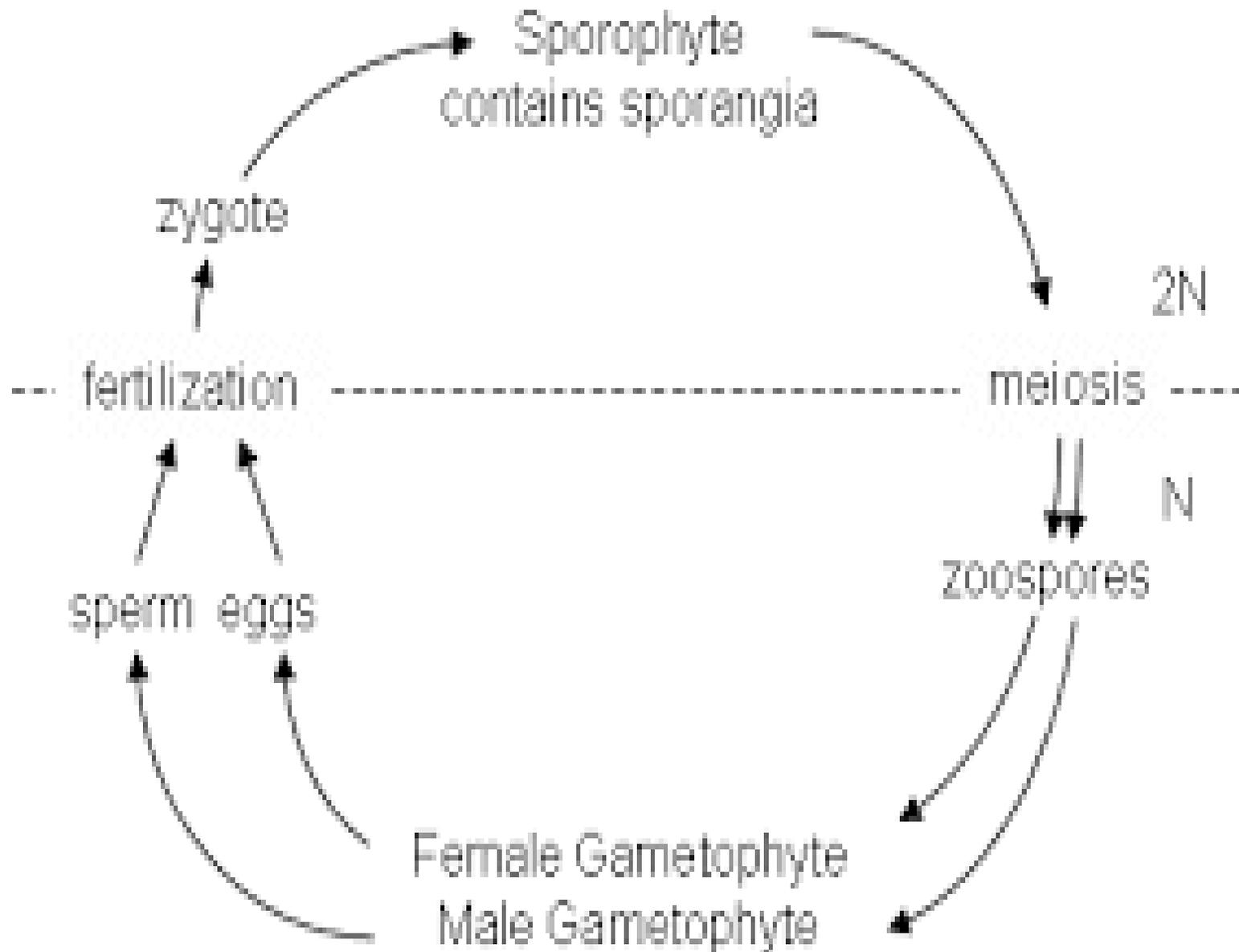
B- Anisogamy



C- Oogamy



Alternation of Generation in green algae



The alternation of generations allows algae to reproduce both sexually and asexually.

1- Sporophyte (2n.

- It is characterized by the **diploid number** of chromosomes in the nuclei of its cells.
- The diploid sporophyte is concerned with the production of **haploid spores called the meiospores.**

2- Gametophyte (1n.

- It is characterised by the **haploid number** of chromosomes in the nuclei of its cells.

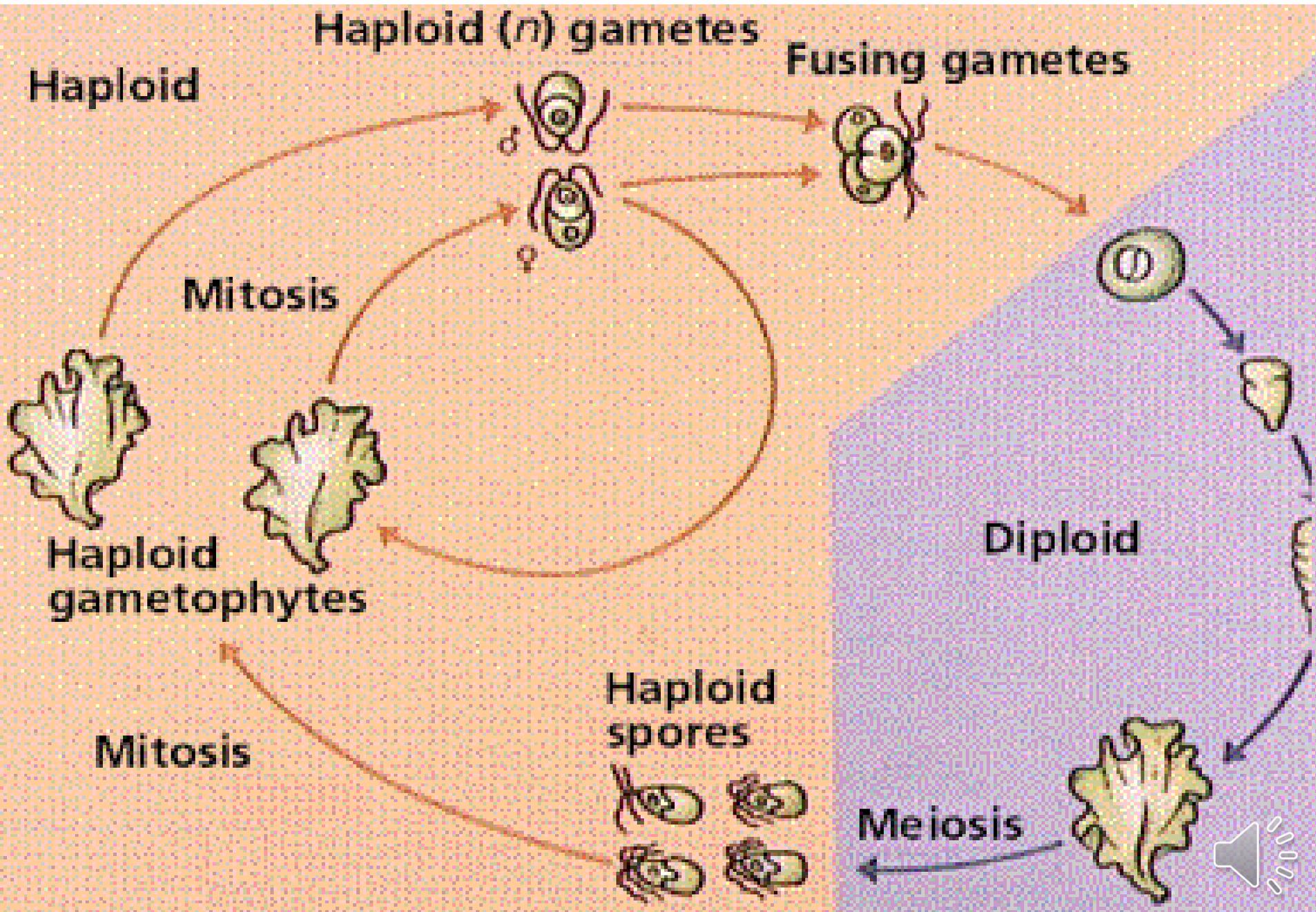
it is responsible for **sexual reproduction.**

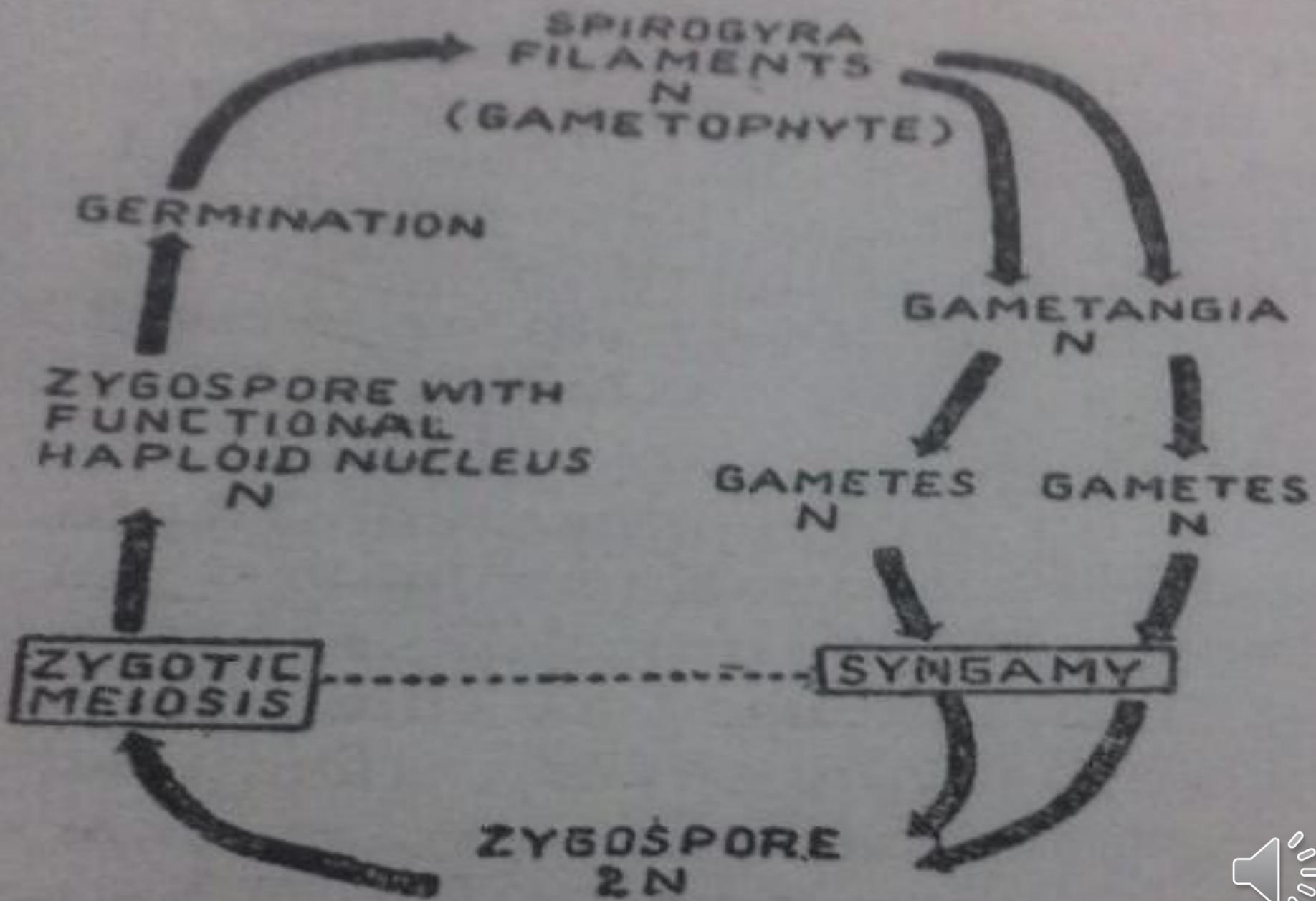
It bears the **haploid gametes.**

These two individuals normal follow each other.

- **In algae, the dominant phase is gametophyte (1n).**







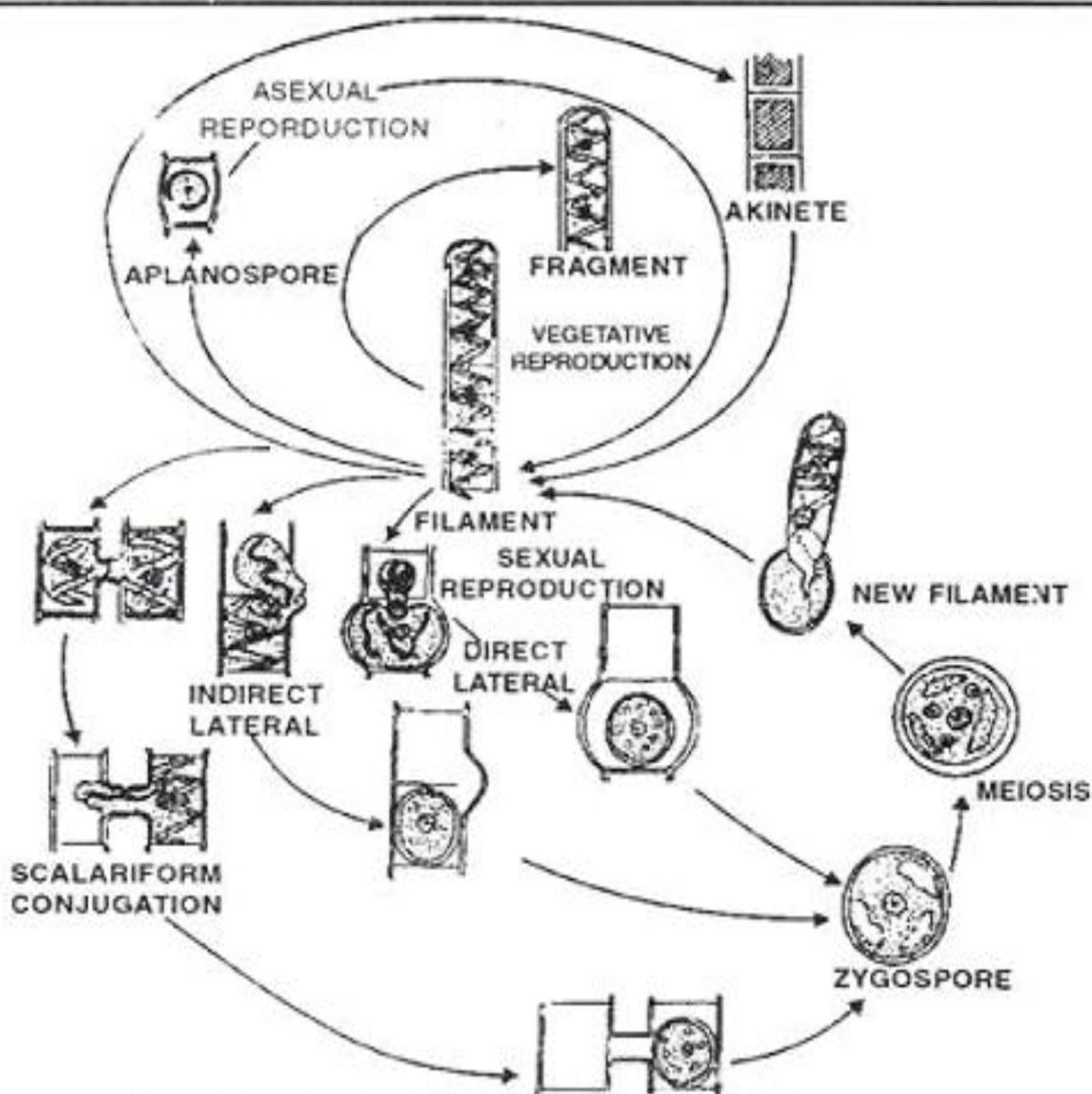


Figure 5.11 Diagrammatic life cycle of *Spirogyra*.



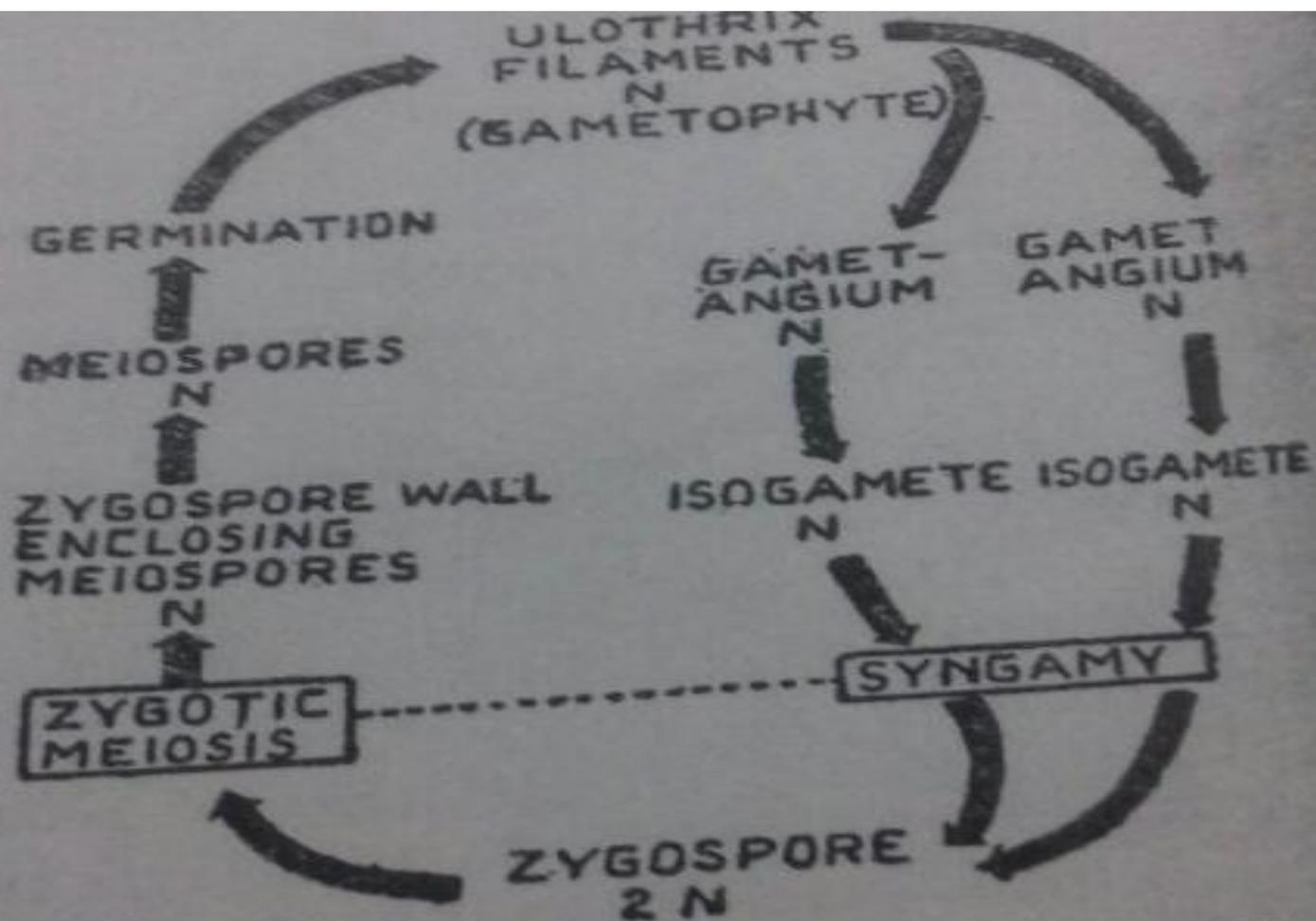
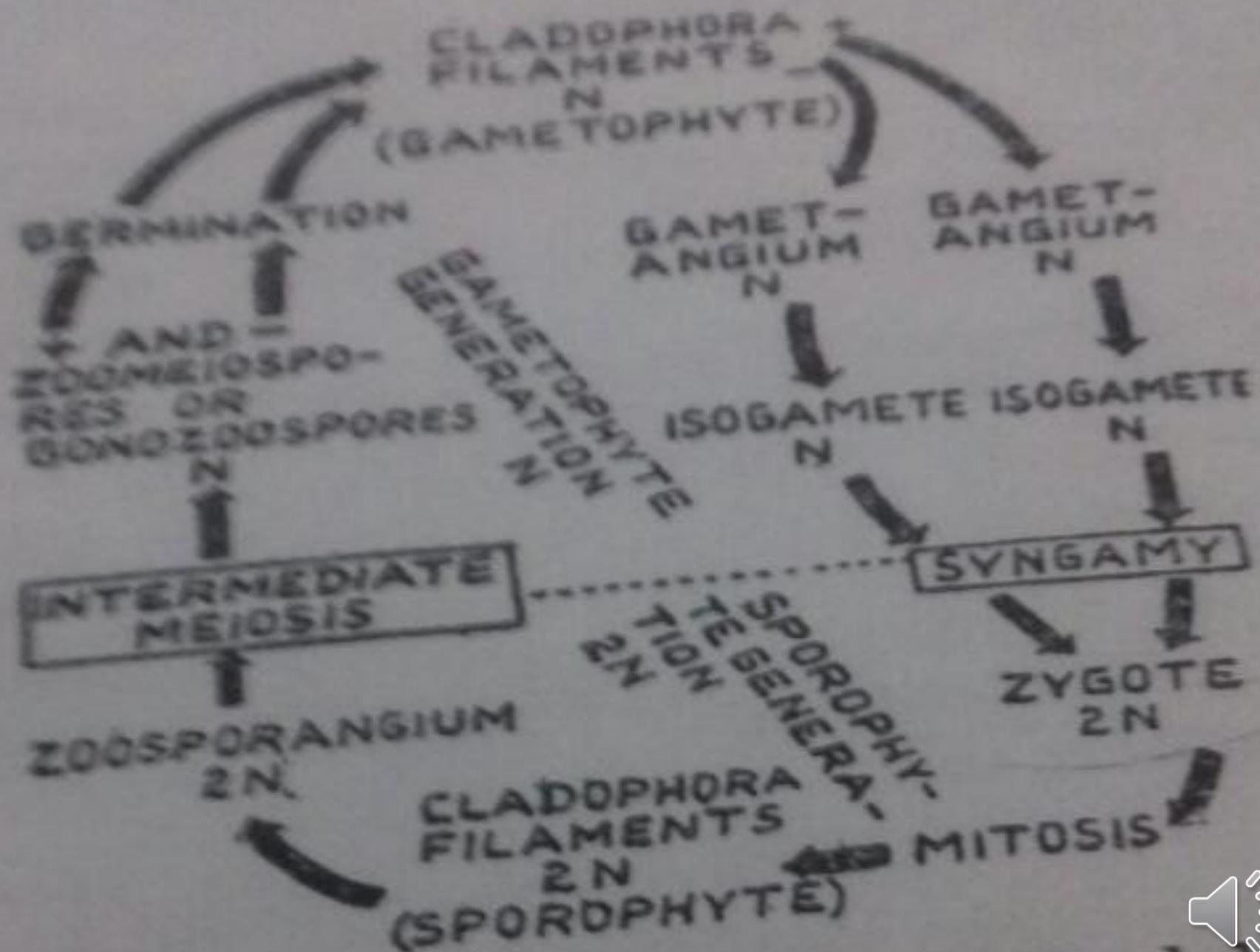


Fig. 3.24. Chlorophyceae. Word diagram of the haplontic life cycle of *Ulothrix*.





WITH MY BEST WISHES

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