UNIT-2

ALGAE

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DEPARTMENT OF BOTANY

PANIHATI MAHAVIDYALAYA

Kingdom Protista

Division Phycophyta (Algae)

Phycology is the science that deals with the morphology, taxonomy, biology, and ecology of algae in all ecosystem.

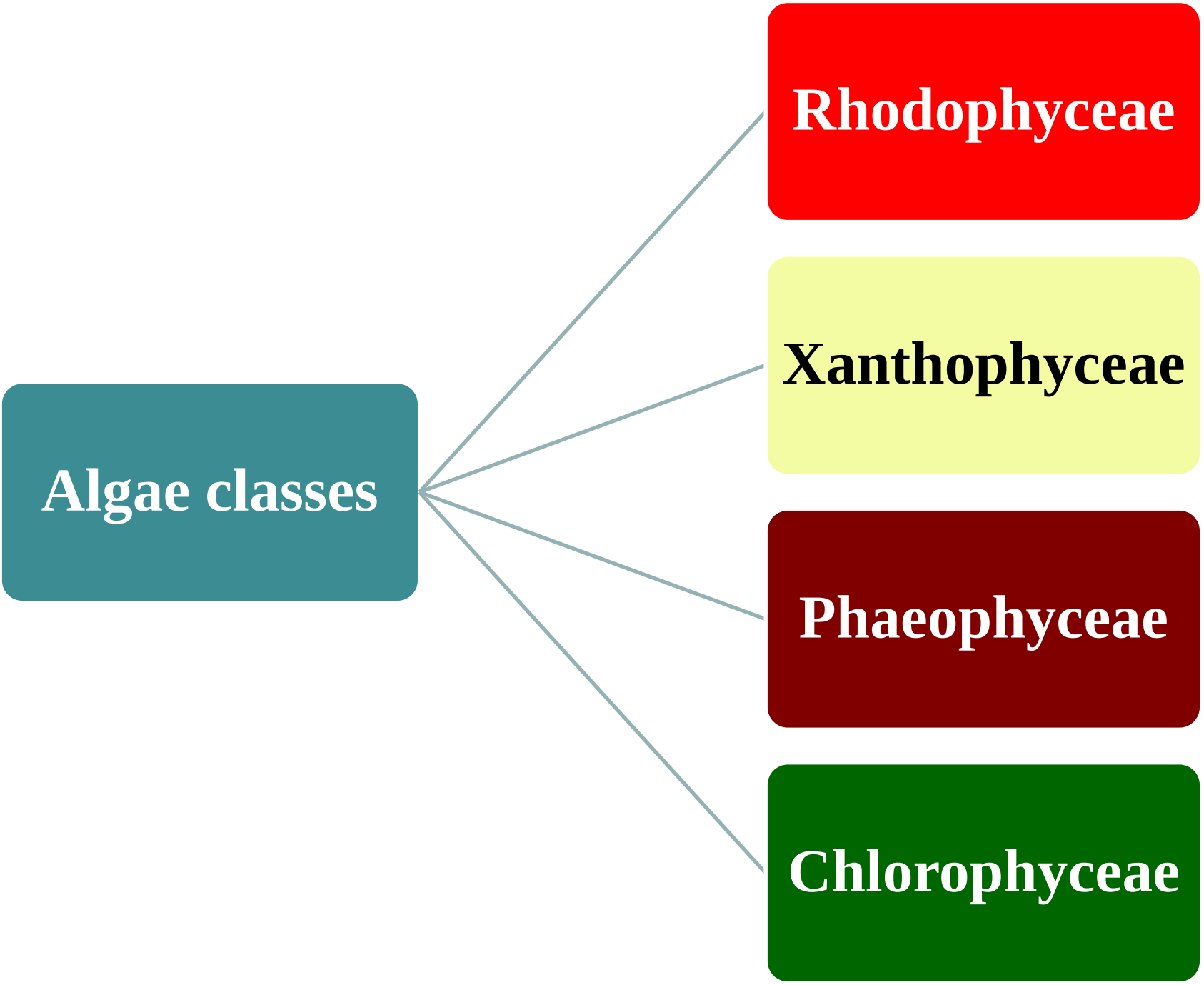
Characteristics of protists (algae) plant-like

- Algae are called plant-like because they make photosynthesis, they contain chlorophyll and they produce their own carbohydrates given off oxygen.
- Algae differs from protozoa which are also classified in the kingdom protista in **manufacturing their food through the process of photosynthesis.**
- Algae are **autotrophic** protists.
- Most algae are Aquatic (fresh water or sea).

- Although many species of algae are unicellular, some are large multicellular organisms.
- Algae range in size from single-celled **to** large **seaweeds (> 100 m).**
- Many of them show **alternation** of **generations.**
- Most of them have **flagella at** some stages.
- Algae vary from plants because they:

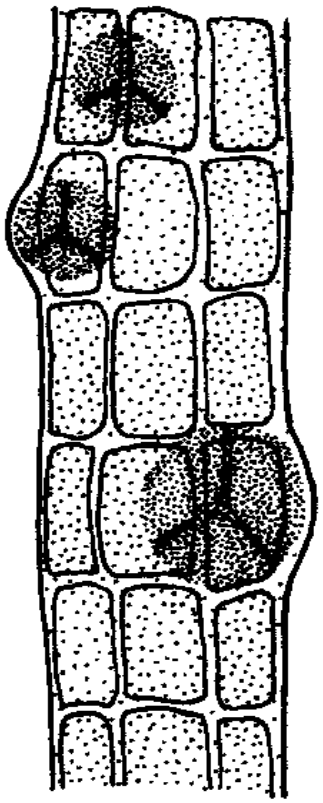
  - Lack well-organized **tissues**
  - Lack true **roots**, **leaves** or **stems**
  - Lack **cuticle** on epidermis

- Algae are classified based on predominating **pigments.**


Algae classes
Rhodophyceae
Xanthophyceae
Phaeophyceae
Chlorophyceae

	Class Rhodophyceae
Color	Mostly **pink** to **dark red**
Nutrition	**Photosynthetic** & few are parasitic
Pigments	**Chlorophyll** a **carotenoid** and **phycoerythrin**
Stored food	**Floridean** starch
Morphology	Many are branched multicellular thalli, Few are unicellular or colonial.
Structure	Cell wall with **cellulose** or **pectic** compound. Many contain **calcium carbonate**. **No flagellate** cell at all the life cycles
Reproduction	Sexual reproduction is **oogamous** (with no motile male and female gametes). Some reproduce asexually.
Genera	*Polysiphonia*
Ecology	Mainly marine, few fresh water Live at greater depth than other photosynthetic organisms. Few number are parasite.
Importance	Source of useful chemicals Rich in proteins, vitamins, and minerals for food and medicinal purposes. Agar (polysaccharide used in capsules, culture and gels) Agarose: gels used in gel electrophoresis. Carageenan: used in paints, ice cream and as smoothing agent.

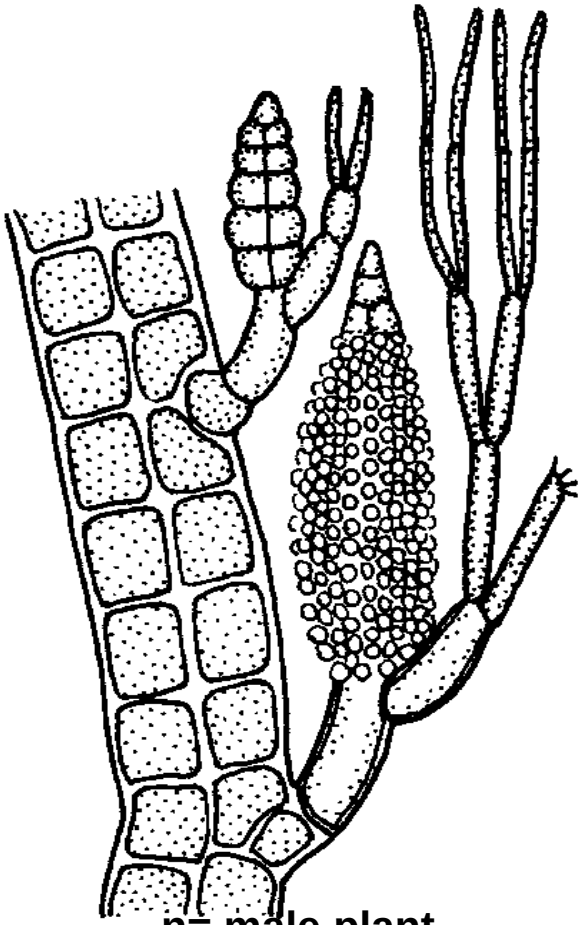
Polysiphonia



2n –plant

Makes

N tetraspores

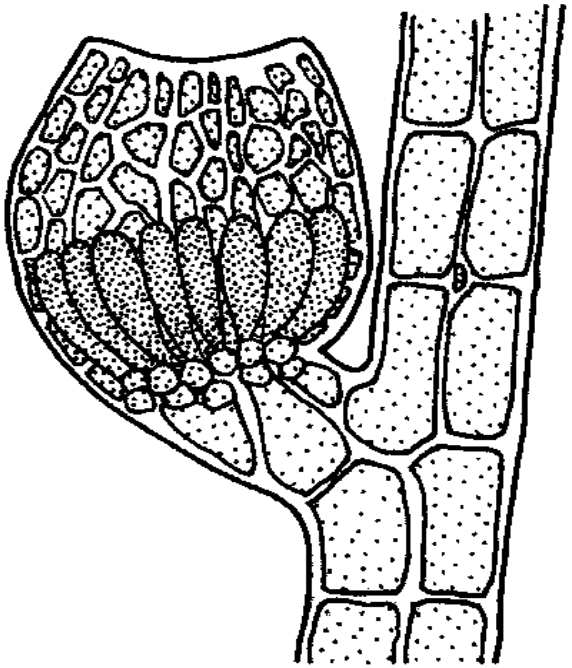


n= male plant

Makes n spermatia

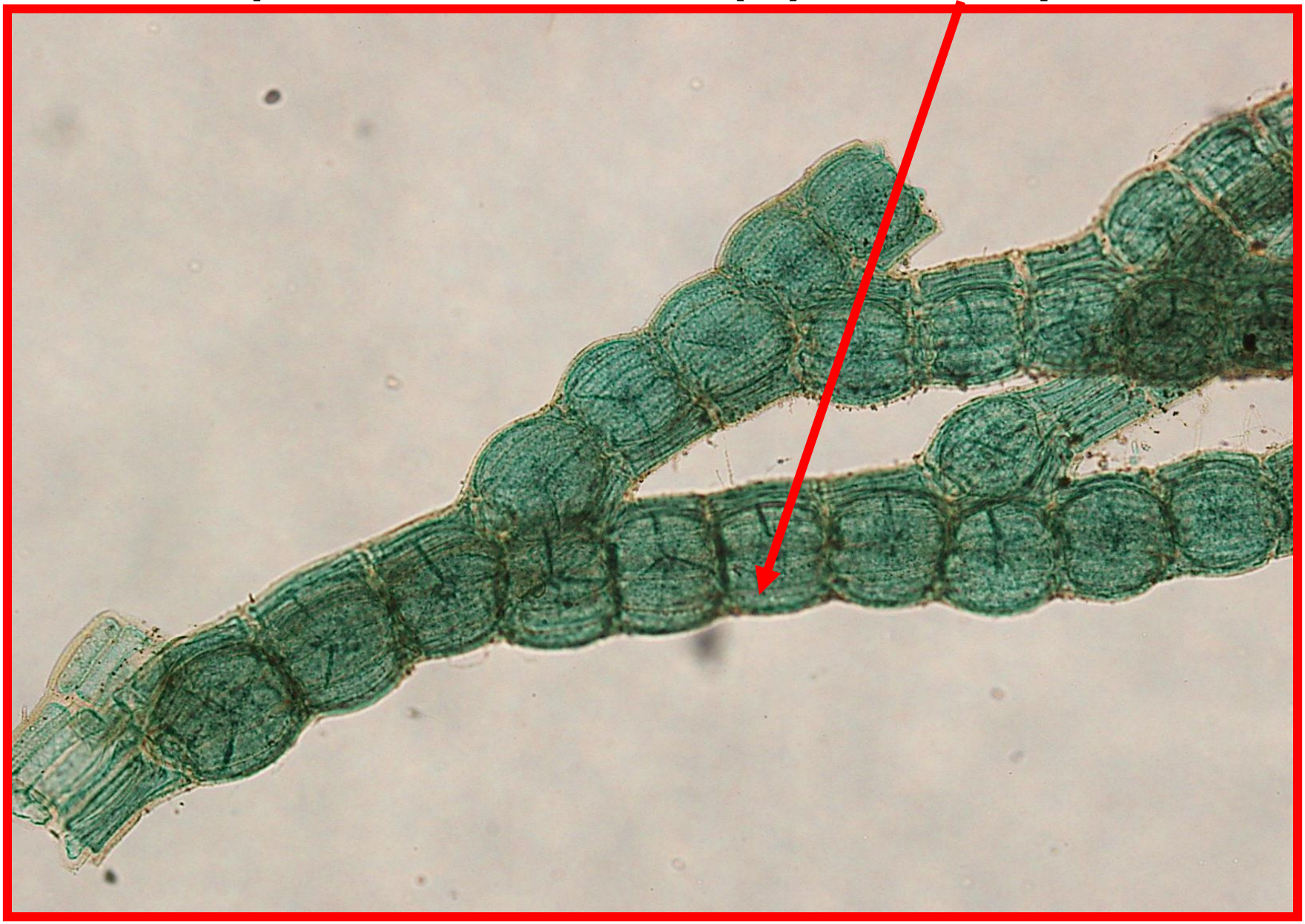
n= female plant

Makes n carpospres that become 2n zygotes



Bec/02

2n – plant makes (n) tetraspores



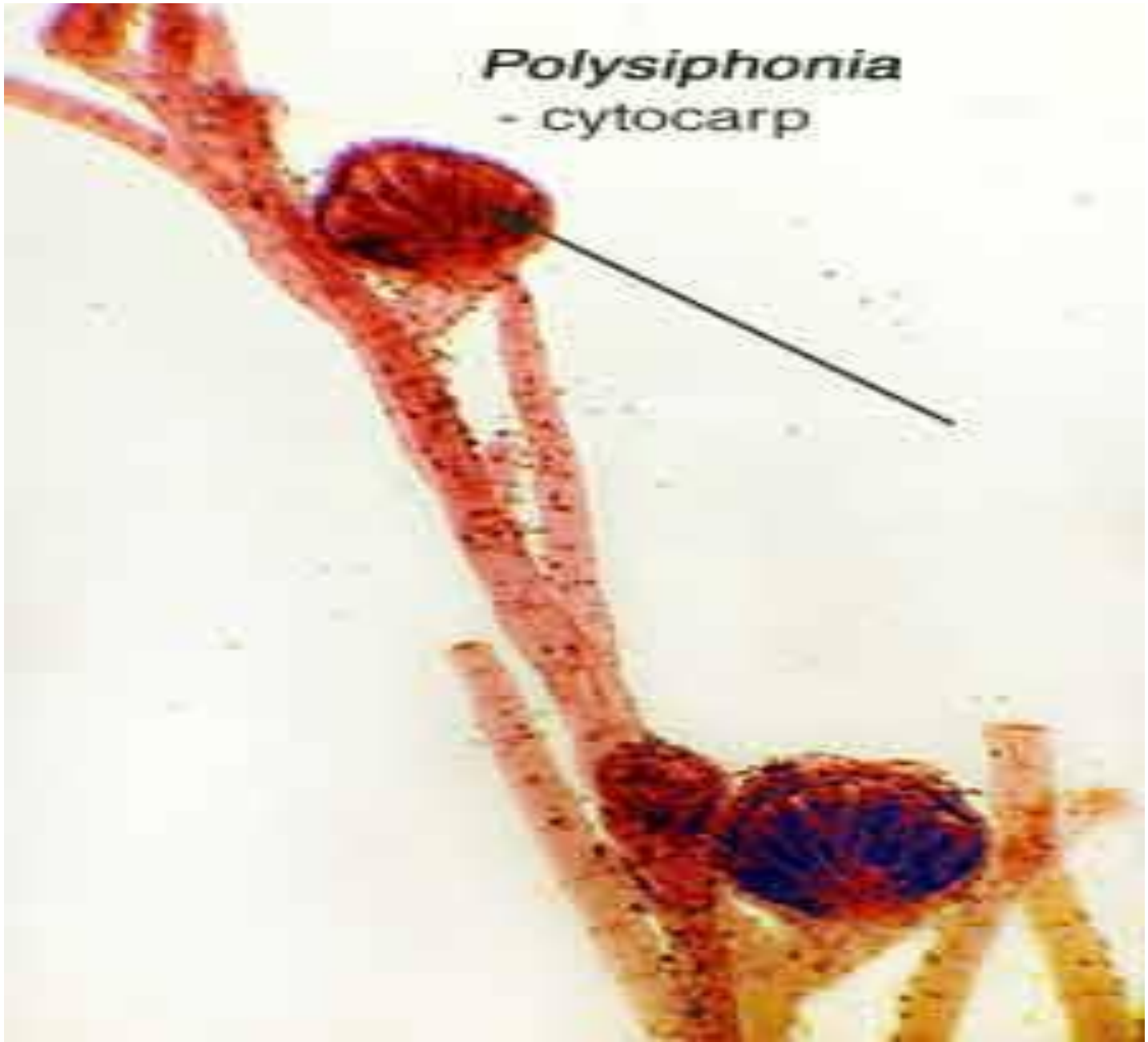
female plant (n)

makes carpospores that

become 2n zygotes

male plant (n)
makes spermatia

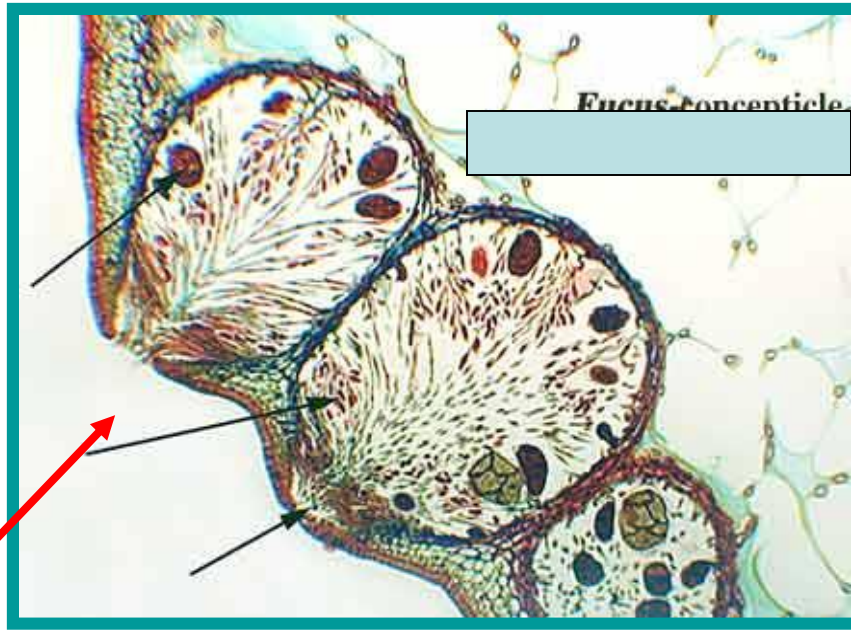
Cystocarp



	Class Phaeophyceae (brown algae)
Color	**Brown** largest algae "**seaweeds**"
Nutrition	**Photosynthetic**
Pigments	**Chlorophyll a and c carotenes** and **fucoxanthin**
Stored food	**Laminarin** (oily carbohydrates), **mannitol**, **glycerol** and sometimes **fats**.
Morphology	Most are large **multicellular** compose of root-like, stem-like and leaf like organs (holdfast, stipe and blade respectively). Few are microscopic
Structure	Cell wall with **cellulose layer** surrounded by **alginate.** Many have some tissue specialization (some species contain sieve tube and meristematic)
Reproduction	Asexual and sexual (**isogamous, anisogamous and oogamous)** Most forms have **alternation of generation:** **Diploid sporophytes** which produce **spores** within **sporngia &** **Haploid gametophytes** which form **motile** (with 2 flagella) **male** and **female gametes** within **gametangia.**
Genera	*Ectocarpus, Fucus & Sargassum*
Ecology	Almost are marine species.
Importance	Fertilizer Source of commercial Iodine food in Japan Agar (polysaccharide used in capsules culture and gels) Source of poly sacchride algin (used as thickner in many products as ice cream, paint, toothpaste, shampoo, processing of natural and synthetic rubber)

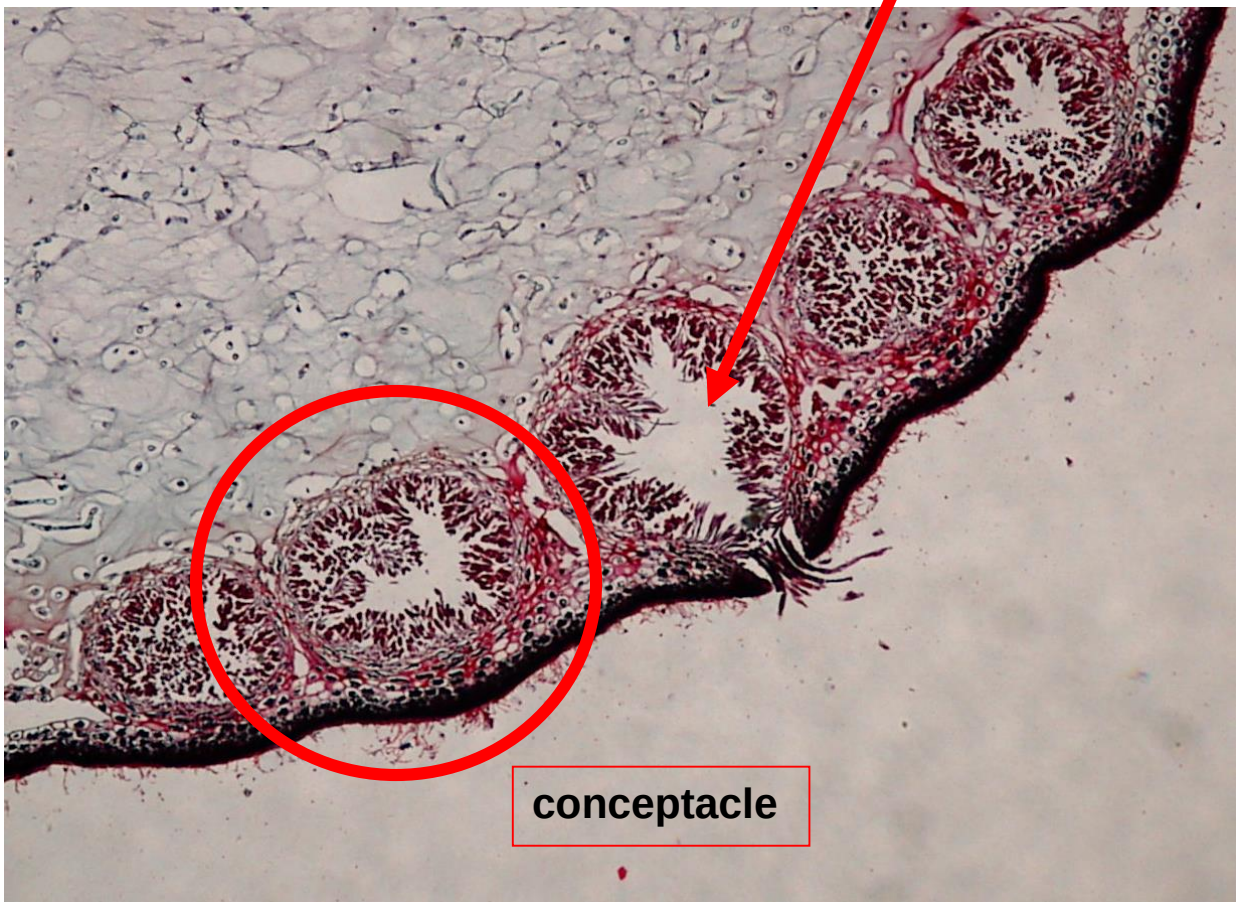
Fucus

Gas Bladder

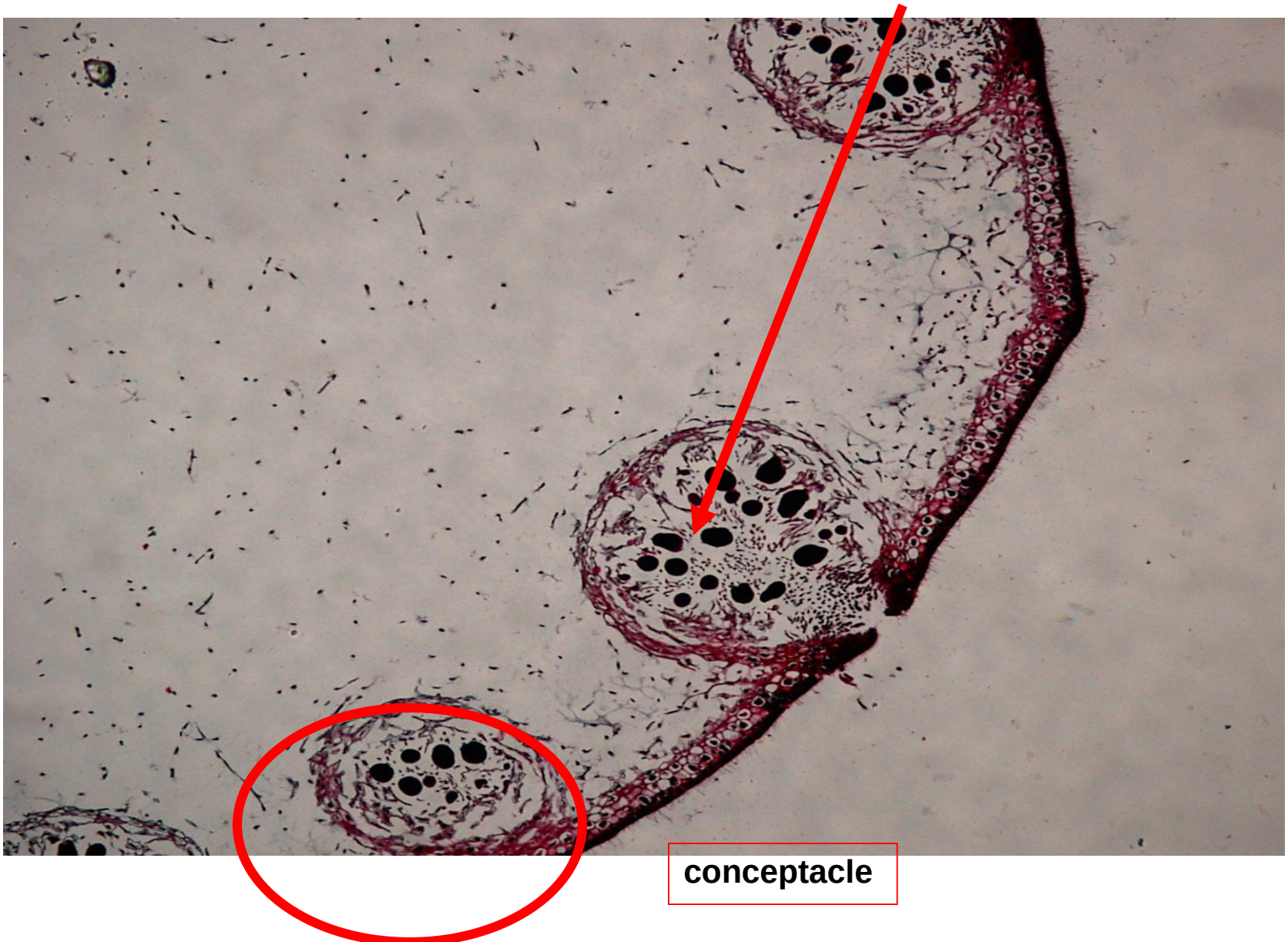


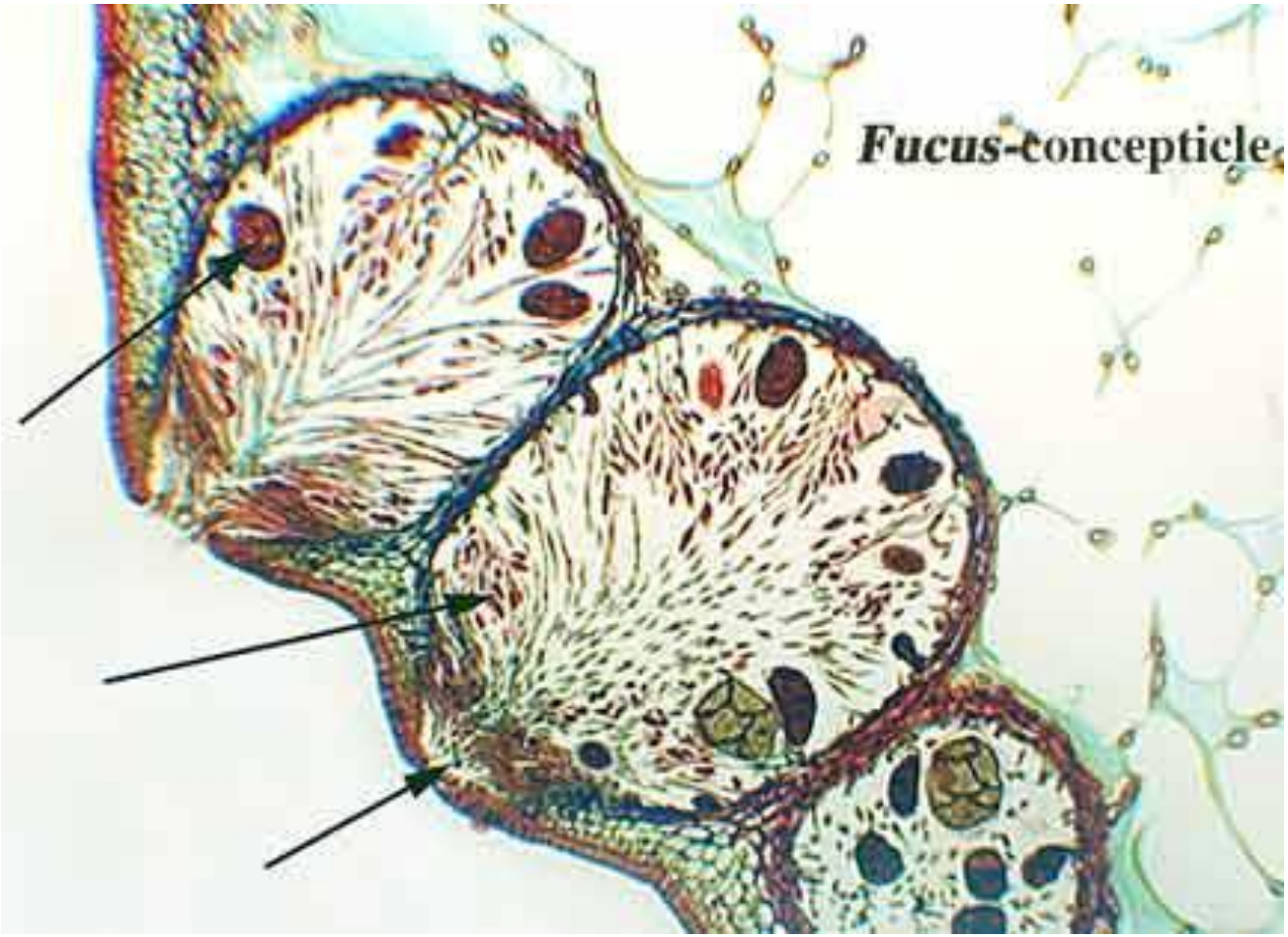
Male Plant with Antheridia

- *Fucus*



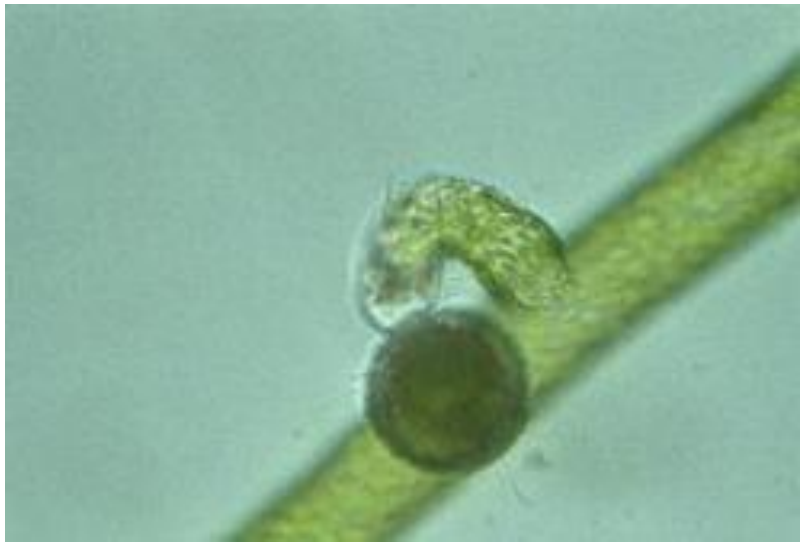
Female Plant with Oogonia

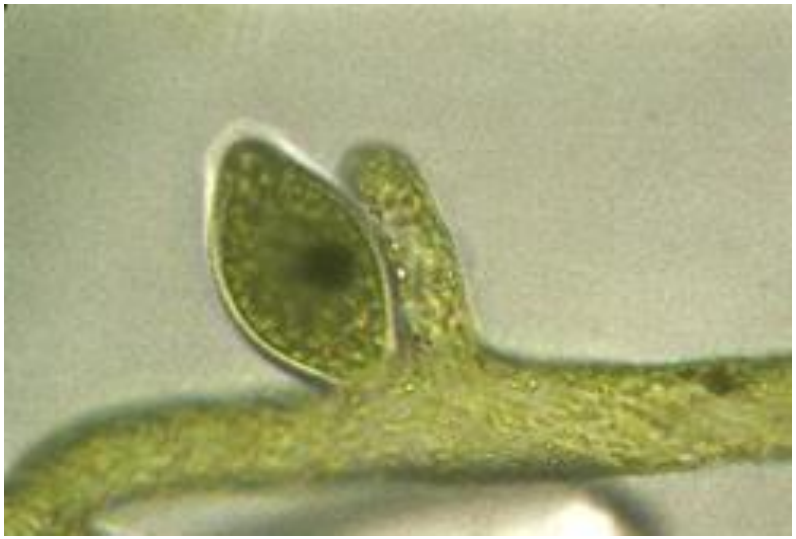


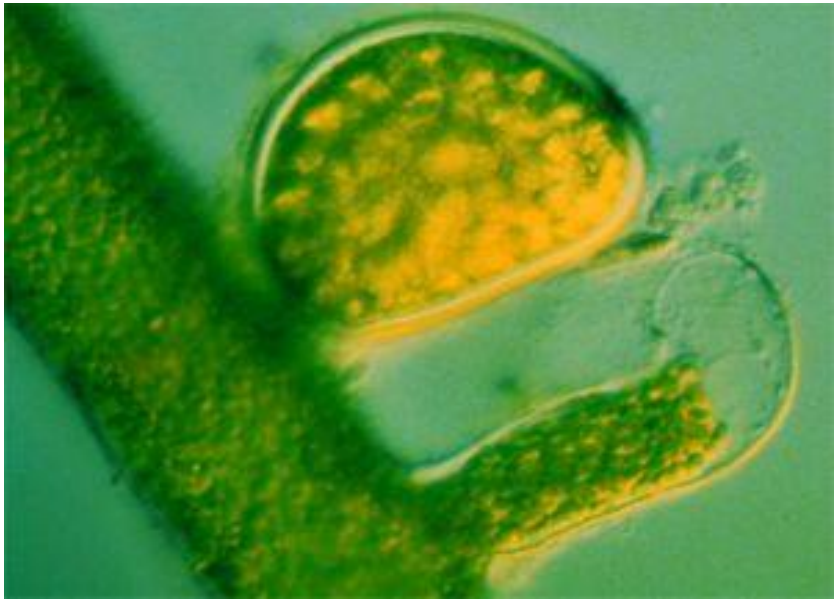

Fucus-concepticle

	Class Xanthophyceae
Color	Yeallow-green
Nutrition	**Photosynthetic**
Pigments	**Chlorophyll** a and c, **carotenes**
Stored food	**Leucosin** (oily carbohydrates), **fats** (cytoplasmic droplets).
Morphology	Unicellular flagellates (unequal flagella), colonial, filamentous or coenocytic.
Structure	Cell wall contains **cellulose**, **hemicellulose**, **silica**.
Reproduction	**Mainly asexual** (formation of cysts or aplanospores or vegetative by fragmentation). **Occasionally sexual** by **oogamy** *e. g. Vaucheria* **Antheridia** are developed by transverse septa formed at the tip of lateral branches with many nuclei but few plastids. **Oogonium** is formed on the same filament or closely adjacent branch.
Genera	*Vaucheria*
Ecology	Mainly fresh water, wet soil and tree trunks.

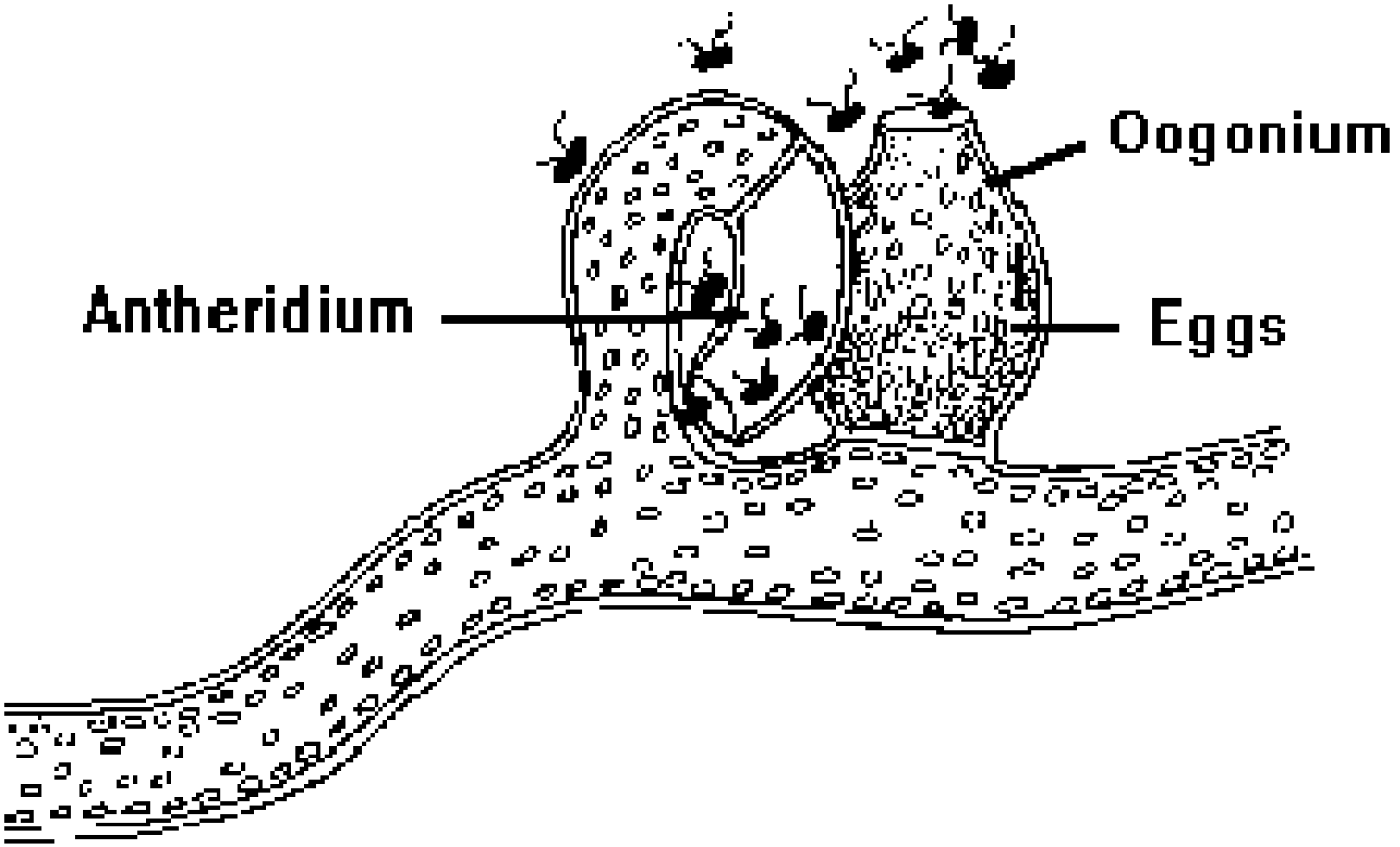
Vaucheria sp.







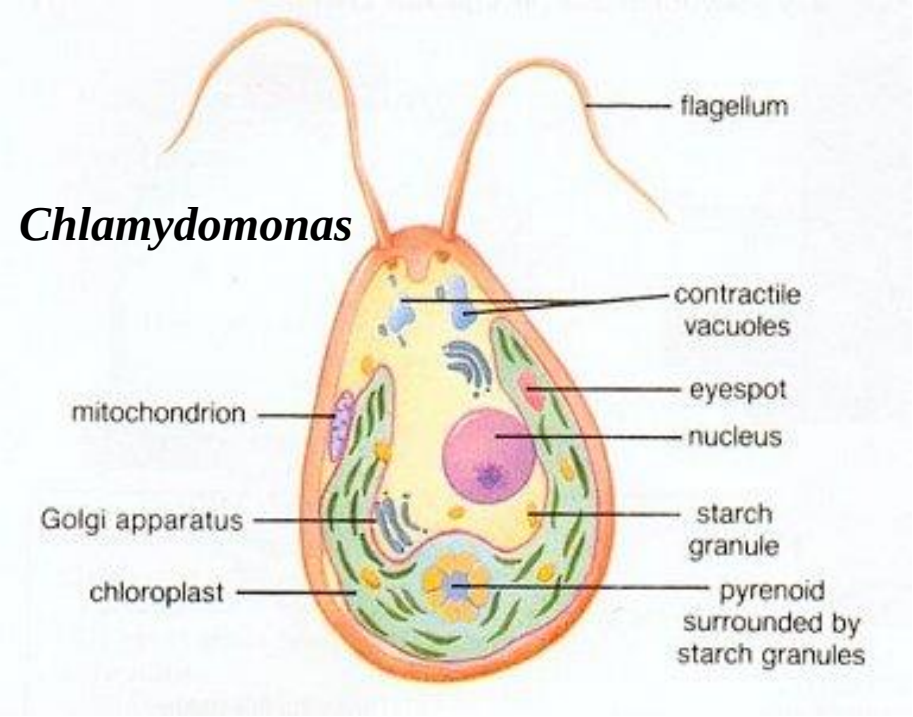
Vaucheria reproduction



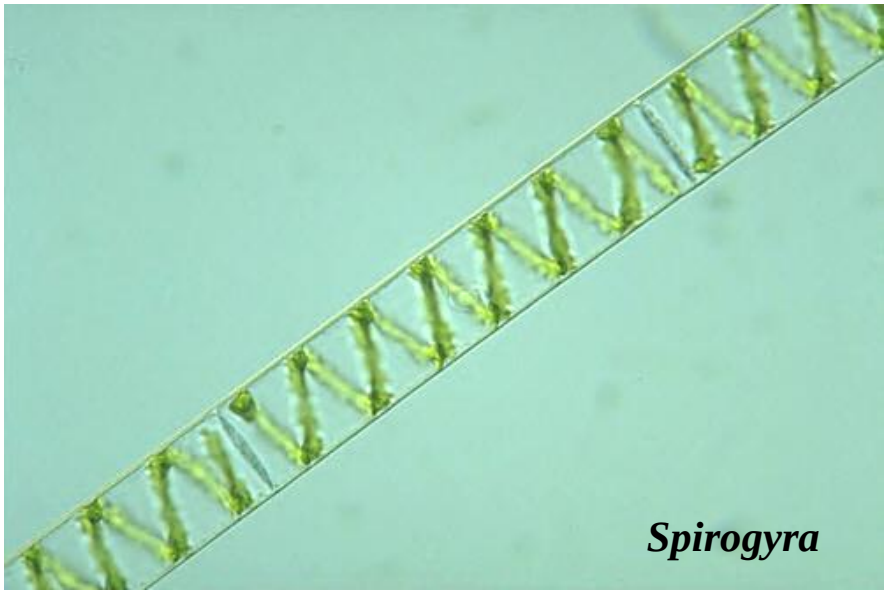
Vaucheria sex organs

	Class Chlorophyceae
Color	Mostly **bright green**
Nutrition	**Photosynthetic**
Pigments	**Chlorophylls a and b carotenoid**
Stored food	Starch
Morphology	Unicellular, colonial, filamentous, multicellular.
Structure	C**ellulosic** cell wall Form biflagellate gametes Have vegetative growth in most cases chloroplast vary in shape Chloroplast may contain pyrenoids (center of stachaccumulation)
Reproduction	Asexual (by fission, fragmentation or formation of motile spores) Sexual (isogamy, anisogamy or **oogamy.**
Genera	Unicellular *Chlamydomonas* colonial *Volvox* Flamentous *Spirogyra* multicellular *ulva*
Ecology	Most are fresh water some are marine few are terrestrial
Importance	Biological tools for detection of water pollution Production of organic compounds Some types are used as human food supplements

Chlamydomonas

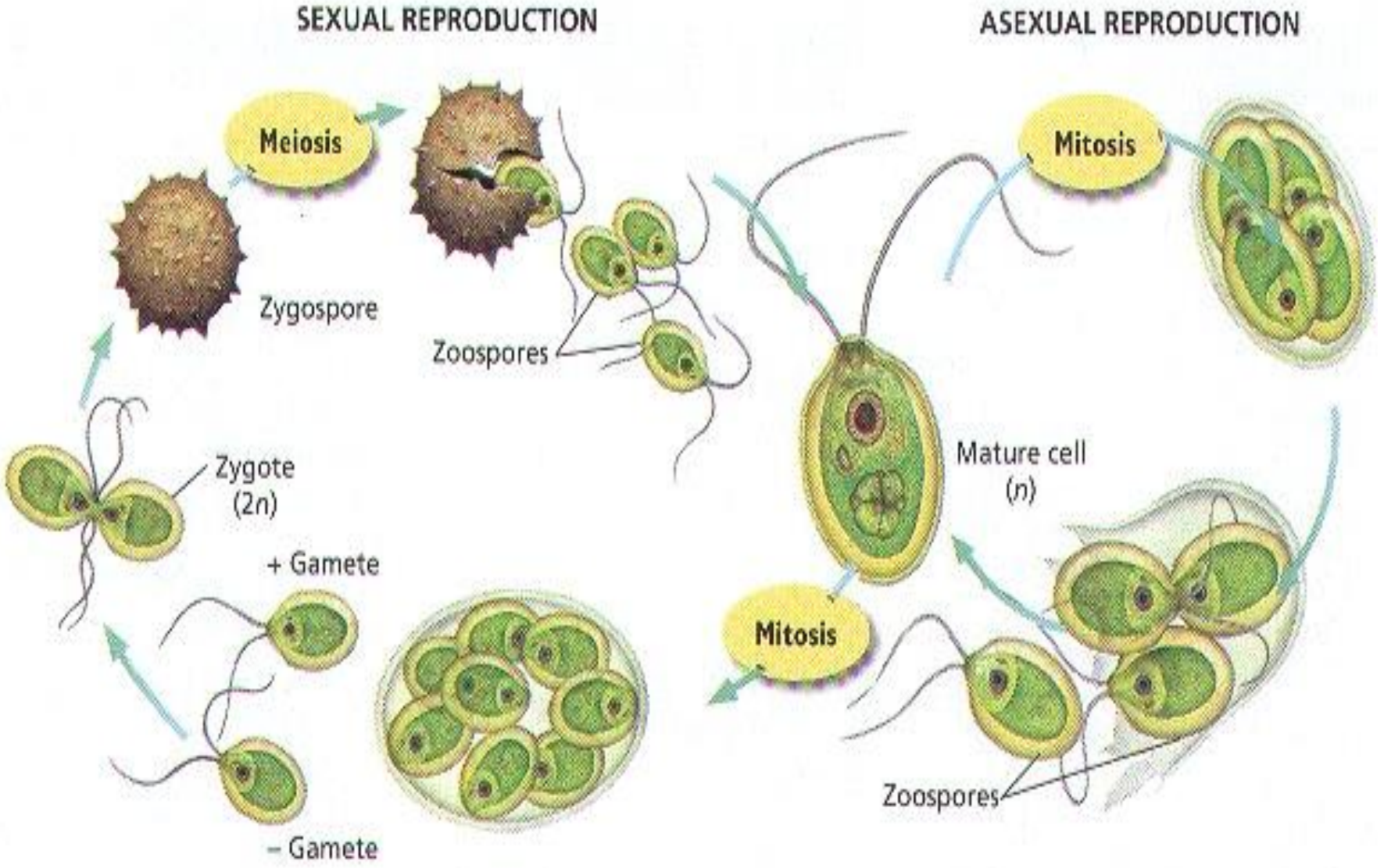


Volvox

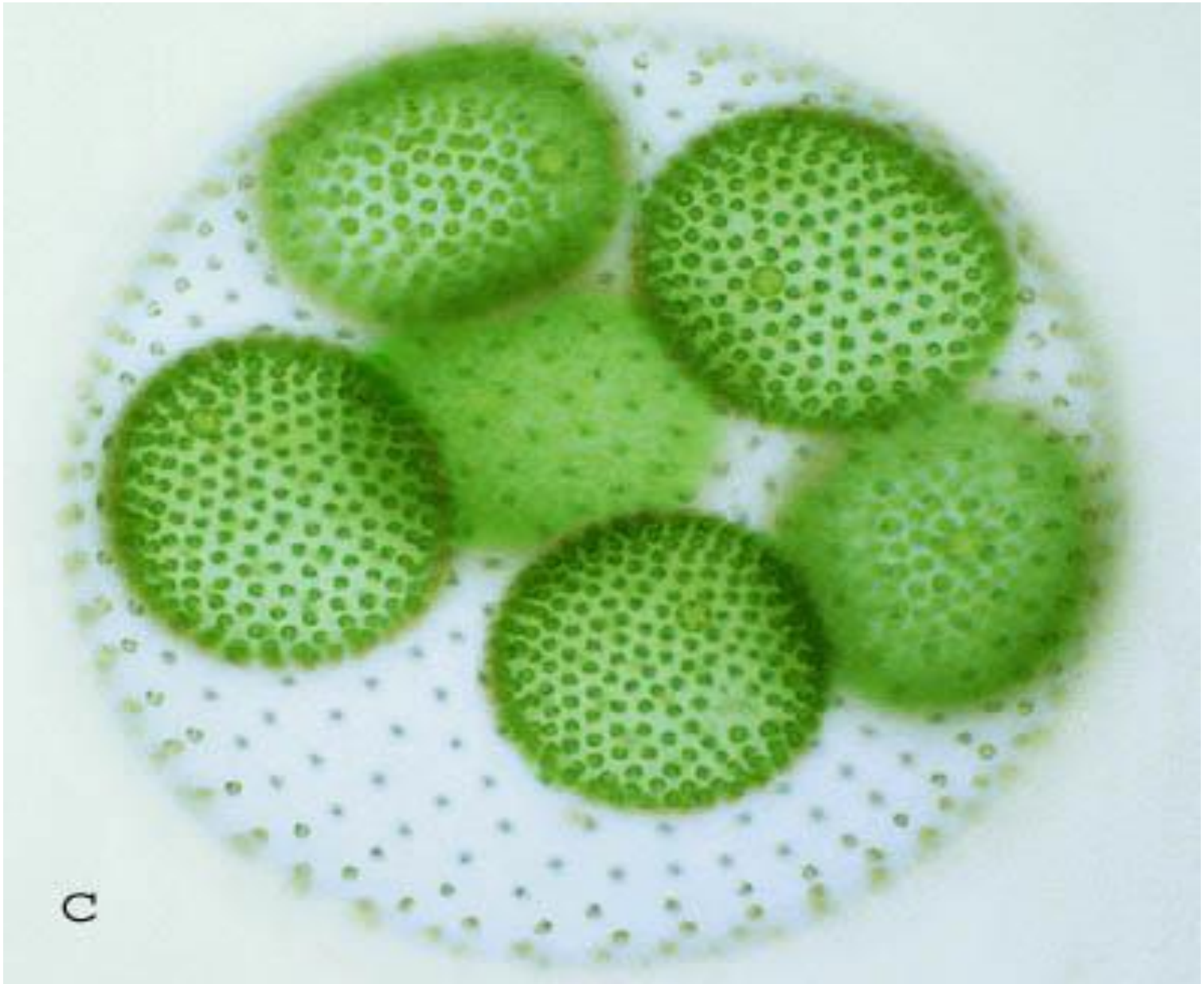


Spirogyra

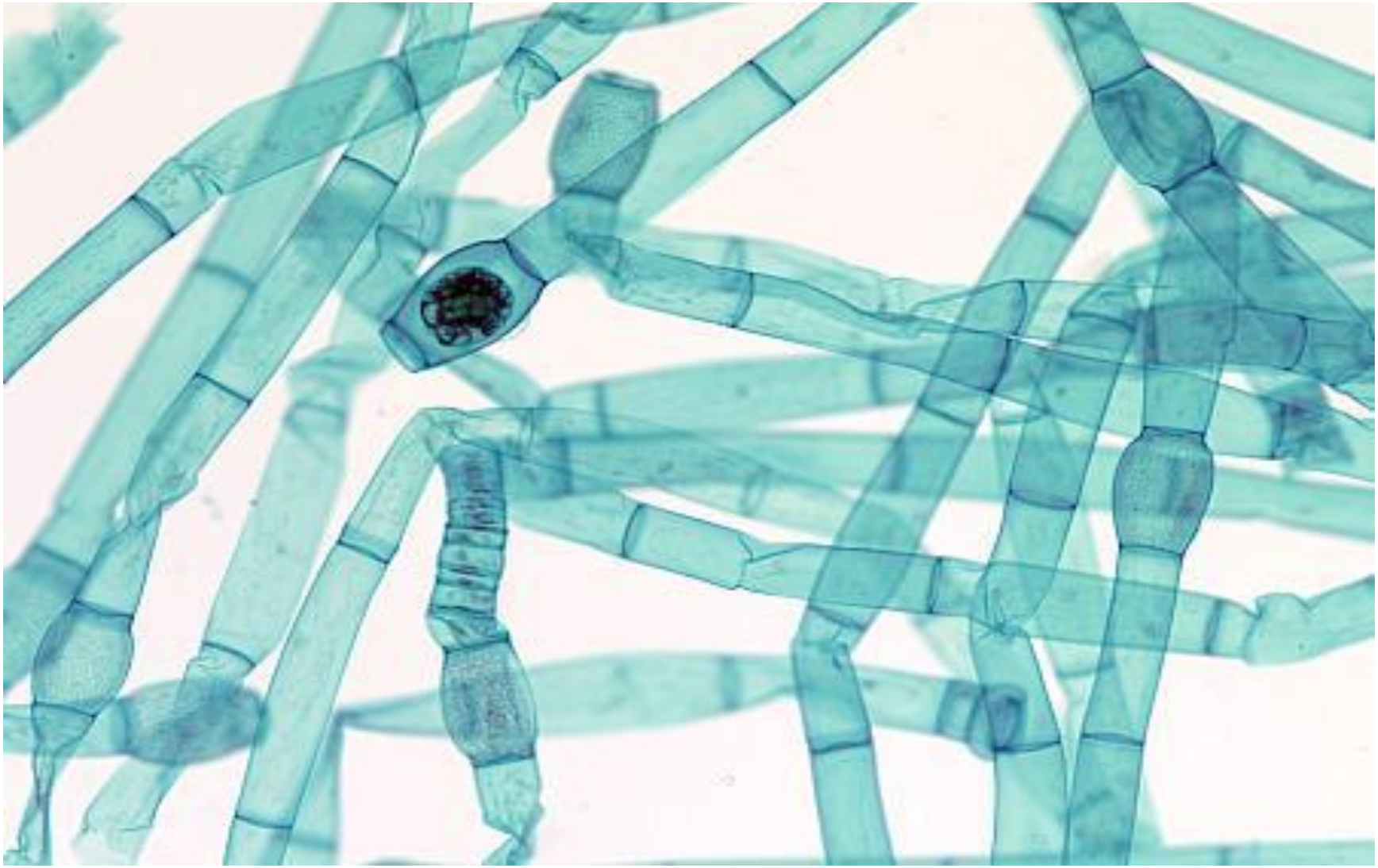
Life cycle of *Chlamydomonas*



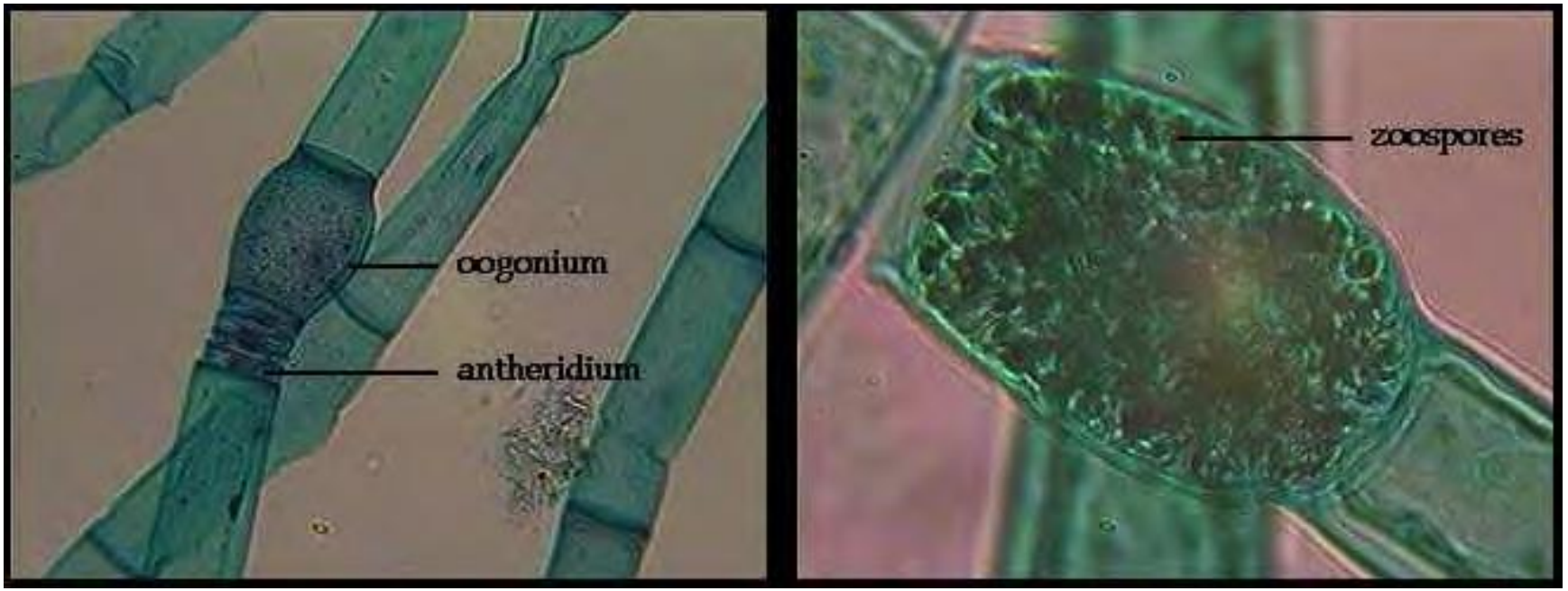
Volvox sp.

- 

Oedogonium sp.



Oedogonium



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THANK YOU