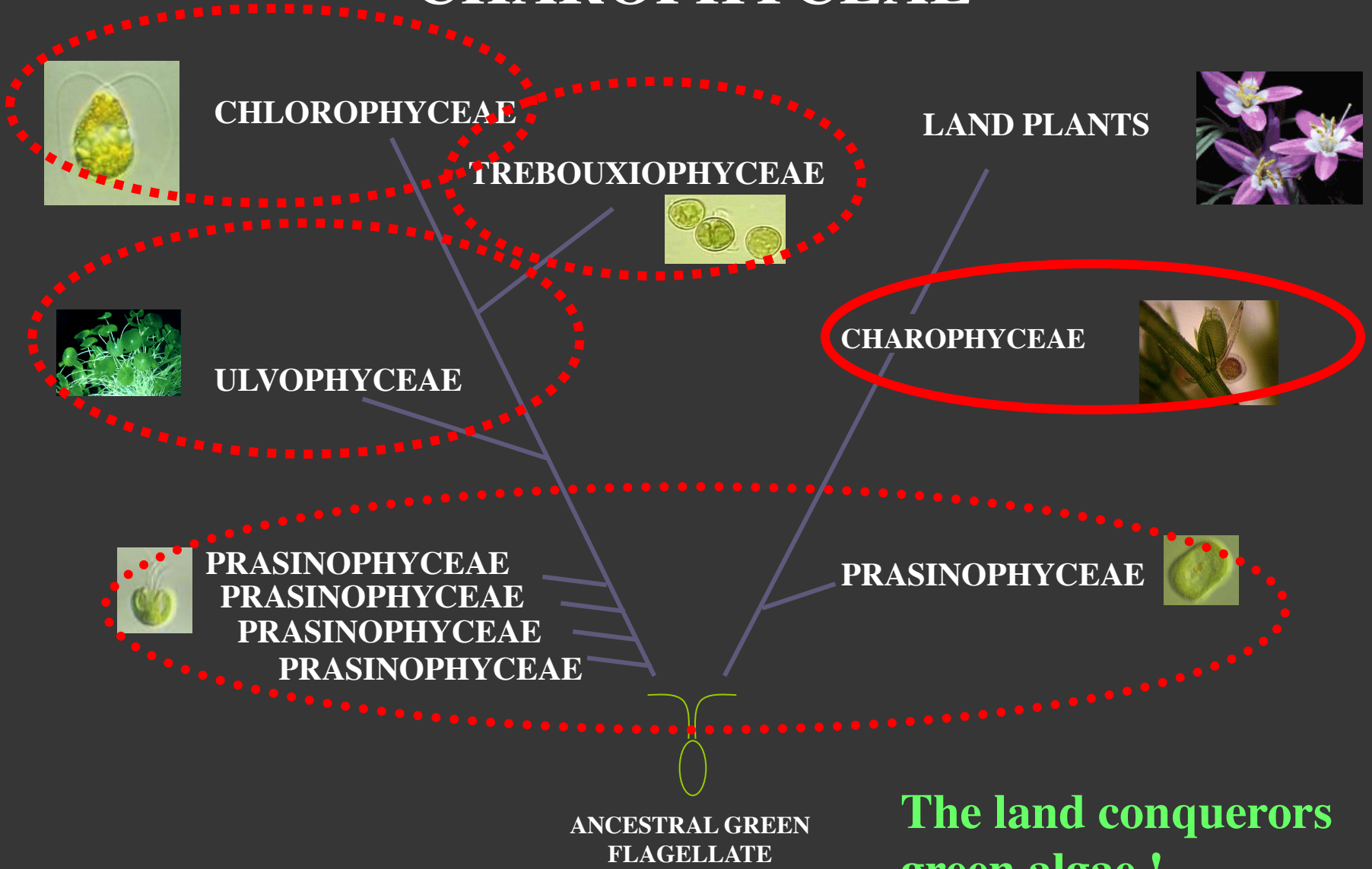


CHAROPHYCEAE



**The land conquerors
green algae !**

1. Freshwater (and terrestrial)
2. Unicells, filaments, heterotrichous filaments
3. Some with **phragmoplast** cell division
4. **Parallel** basal bodies
5. Multilayered structures can be present (**MLSs**)
6. Advanced sexual reproduction
7. Complex morphology
8. Sleeping zygotes (hypnozygotes) produced
9. Life cycles with **zygotic meiosis**
10. Some of the most beautiful green algae!!!!

Seven lineages of Charophycean algae:

1. *Mesostigma*: unicells, freshwater biflagellate

2. Chlorokybales: Unicells in terrestrial/freshwater habitats

3. Klebsormidiales: unicells, aggregations, unbranched filaments

4. Zygnematales: unicells (sacoderm desmids) or unbranched filaments (*Spirogyra*), no flagellated cells, sex by conjugation (amoeboid gametes); outer walls lacking pores

5. Desmidiaceae: aka placoderm desmids, cell walls with pores, constricted in the middle, sex by conjugation

6. Coleochaetales: heterotrichous filaments, advanced oogamy

7. Charales: large thalli, heterotrichous filaments with apical growth, and a magnificent, advanced sexual reproduction

1. *Mesostigma*: unicellular freshwater biflagellate

One species: *Mesostigma viridis*

Two layers of scales covering the cell

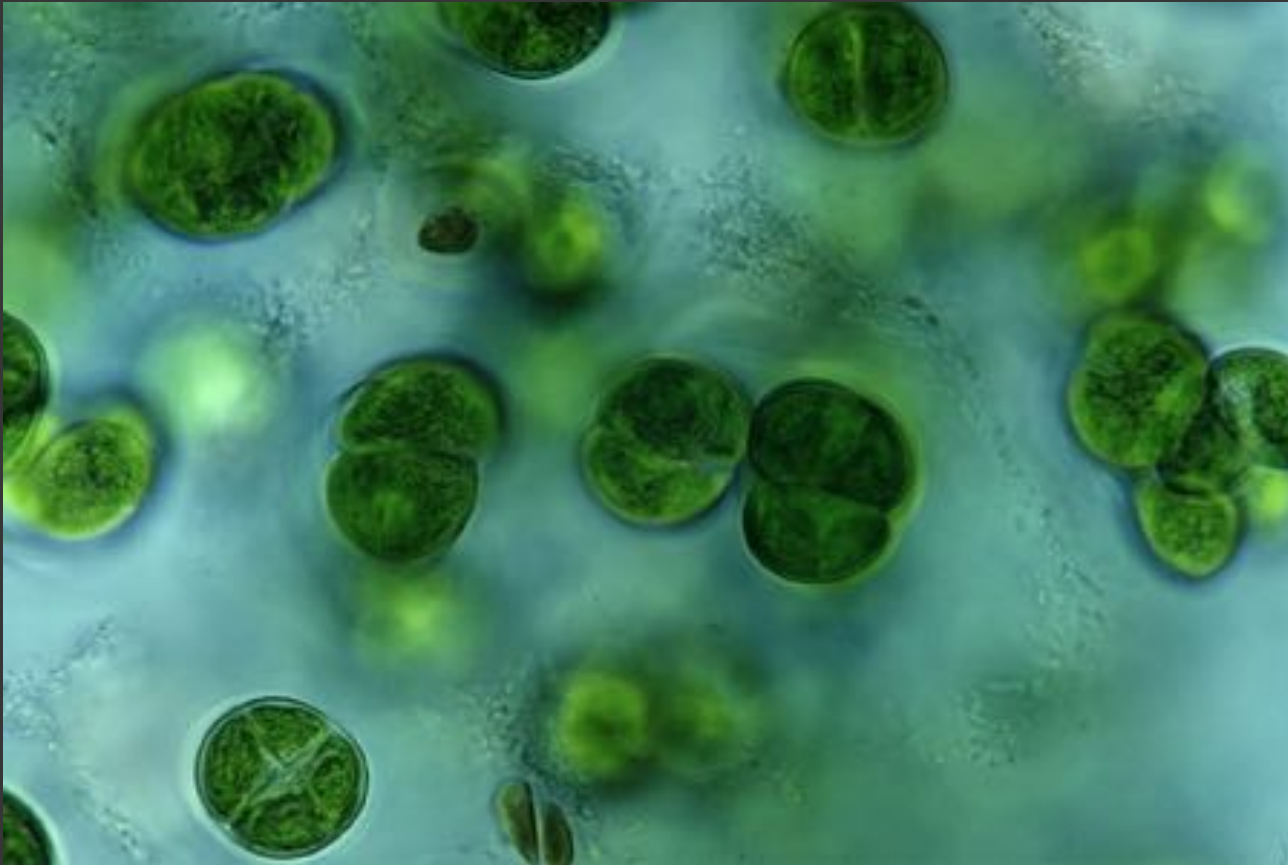
Basal to the charophycean lineage!



2. **CHLOROKYBALES** (1 species)

Chlorokybus atmophyticus

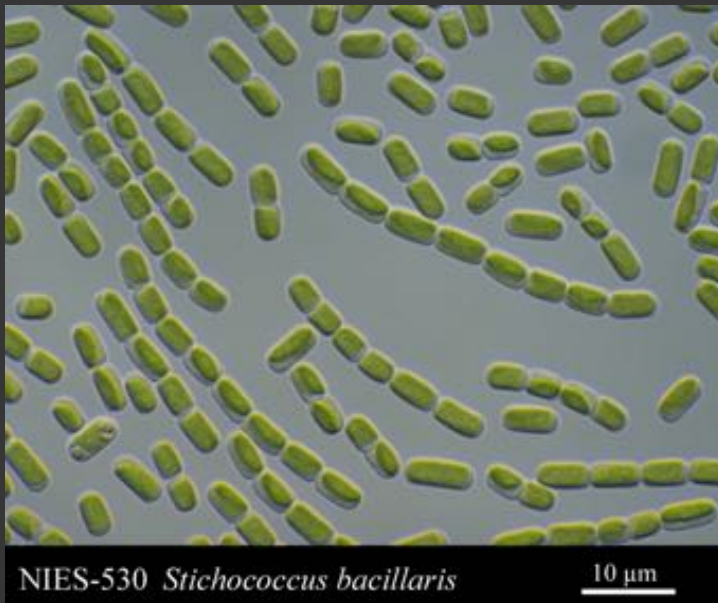
Rare soil alga forming sarcinoid colonies



3. **Klebsormidiales:** unicells, aggregations, unbranched filaments



Klebsormidium



Stichococcus



Raphidonema

4. Zygnematales

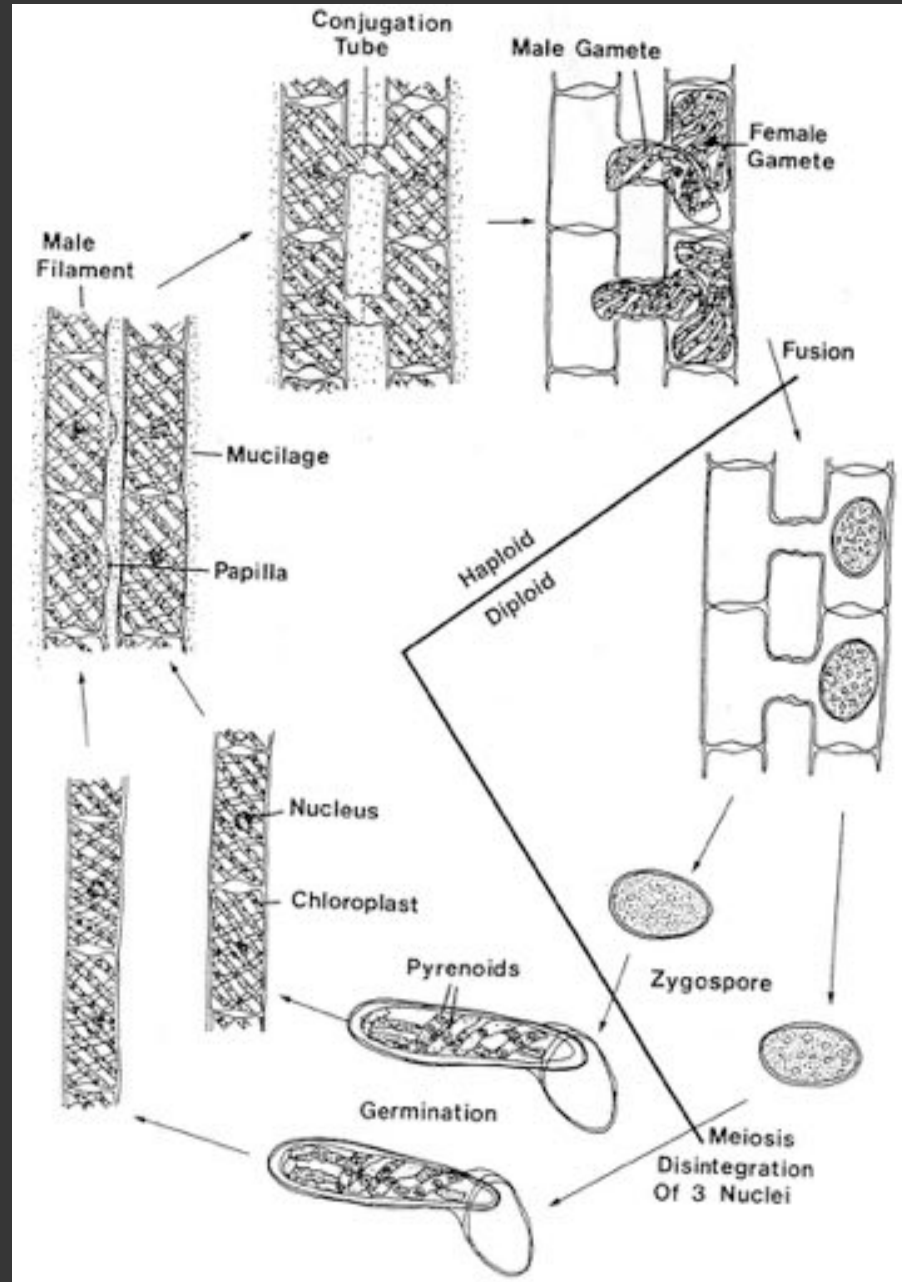
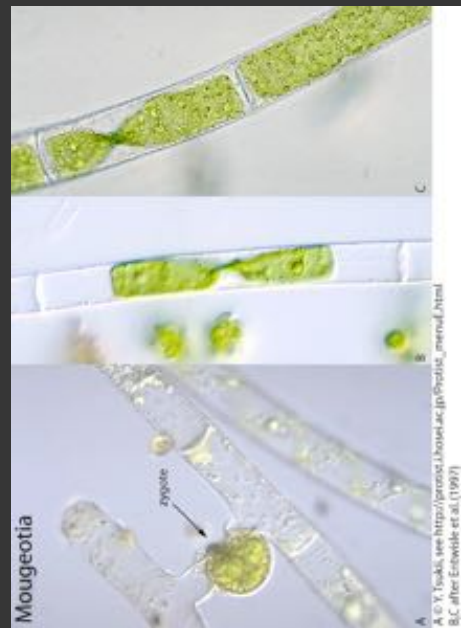
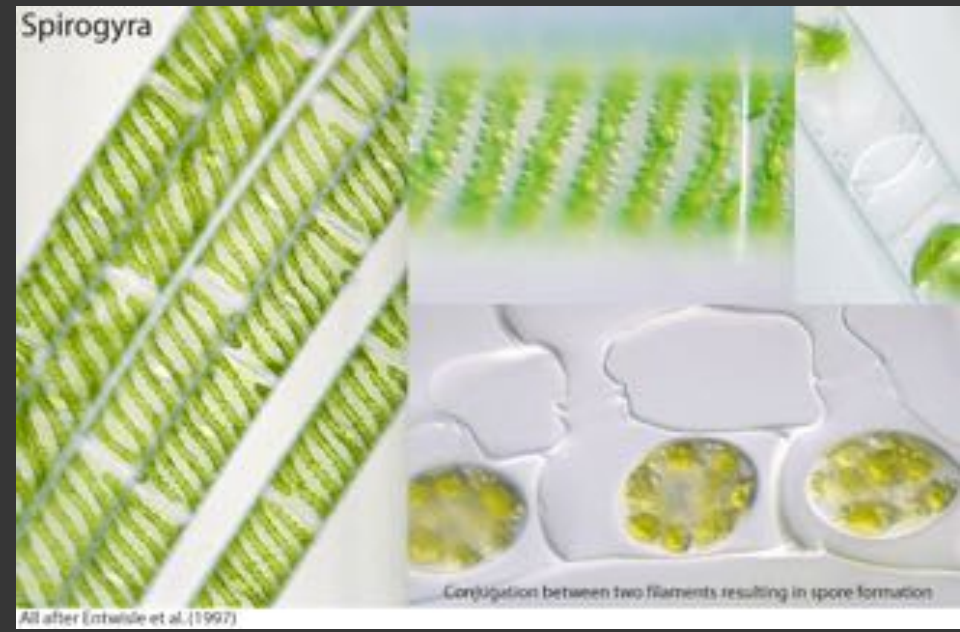
- Unicells or unbranched filaments
- no flagellated cells EVER (NOT EVER),
- sex by conjugation (amoeboid gametes)
- Usually classified in 2 groups:

Unicells	Saccoderm Desmids
Filamentous	Zygnemataceae

a) Saccoderm desmids (homogenous cell walls without pores)



c) Zygnemataceae: filamentous forms

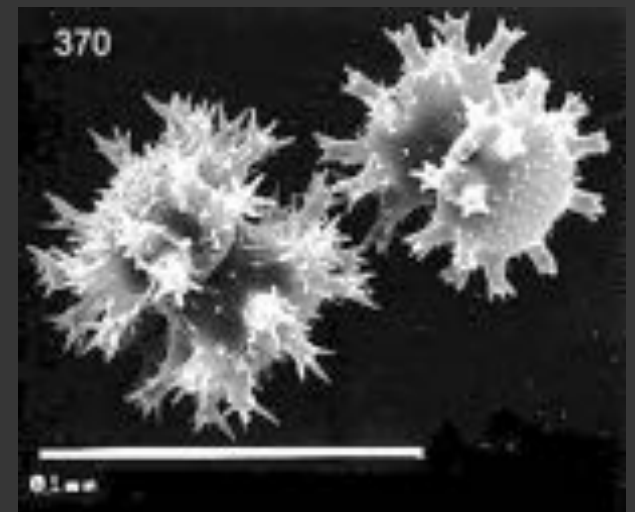
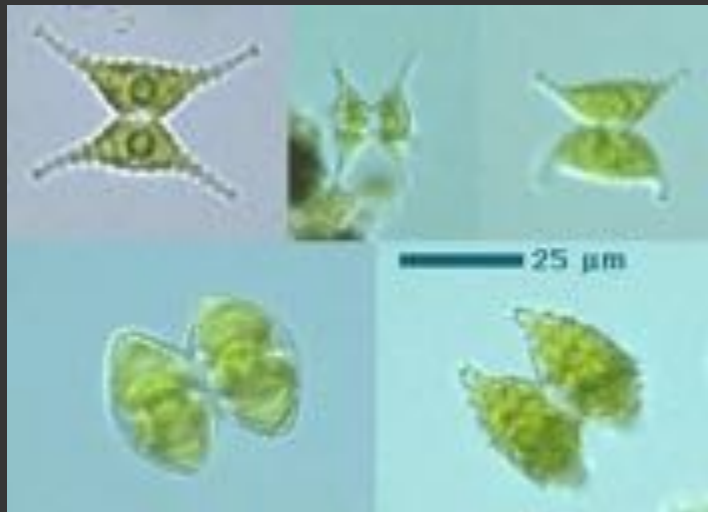


5. Desmidiiales or Placcoderm Desmids

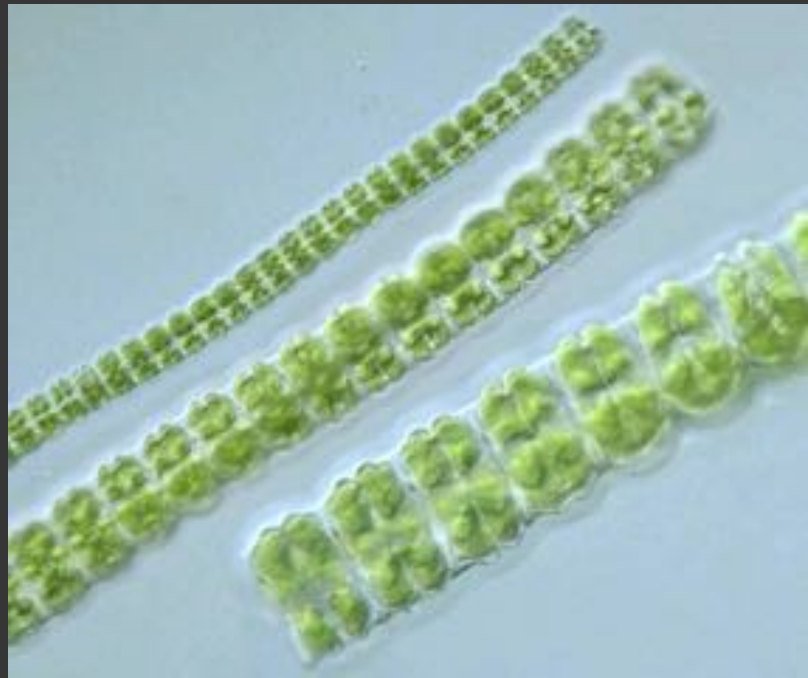
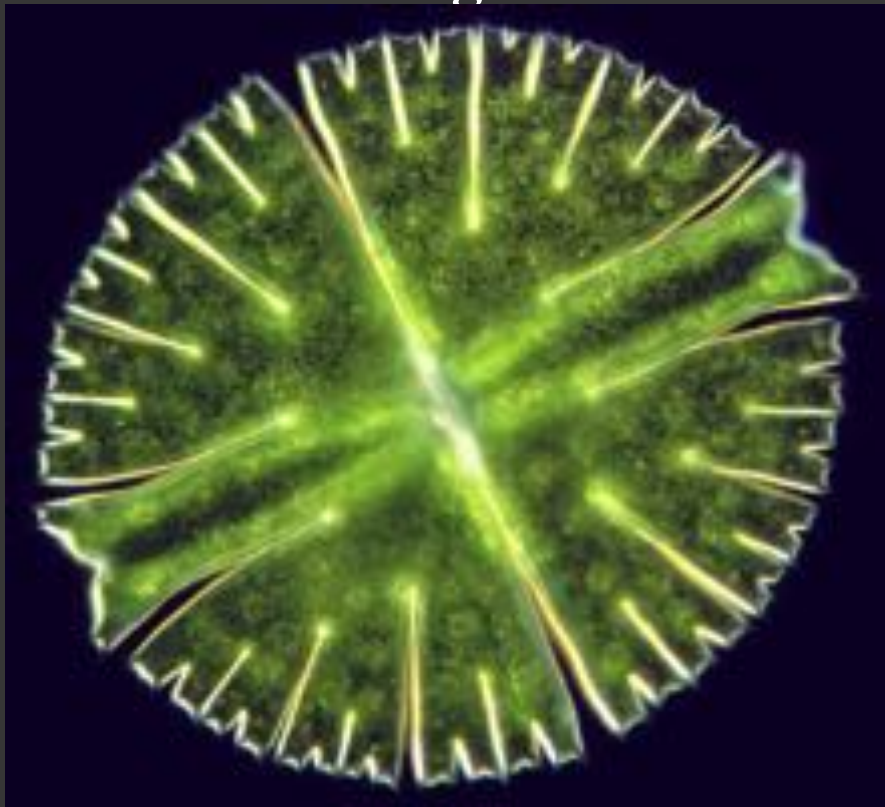
Unicellular and pseudofilamentous forms

Cell walls with pores and highly ornamented

Cells divided in two semicells united by an isthmus

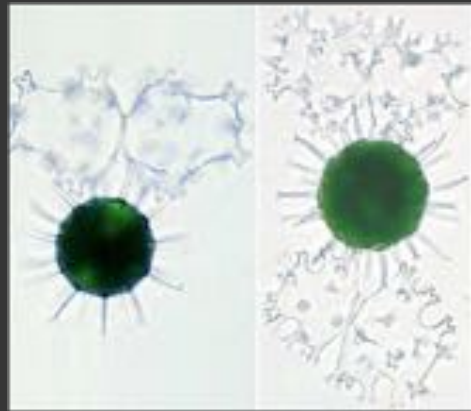
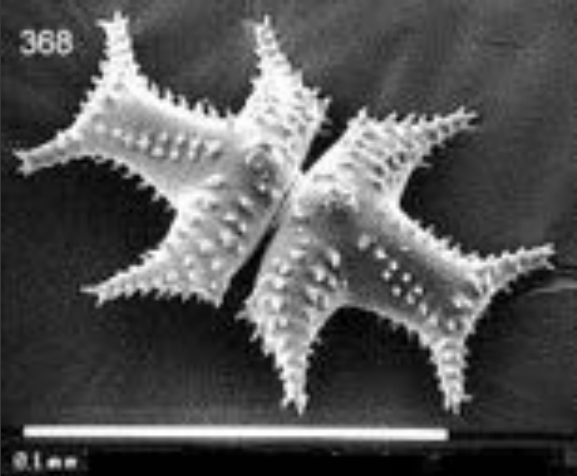


More Desmids galore!!!



Desmidium

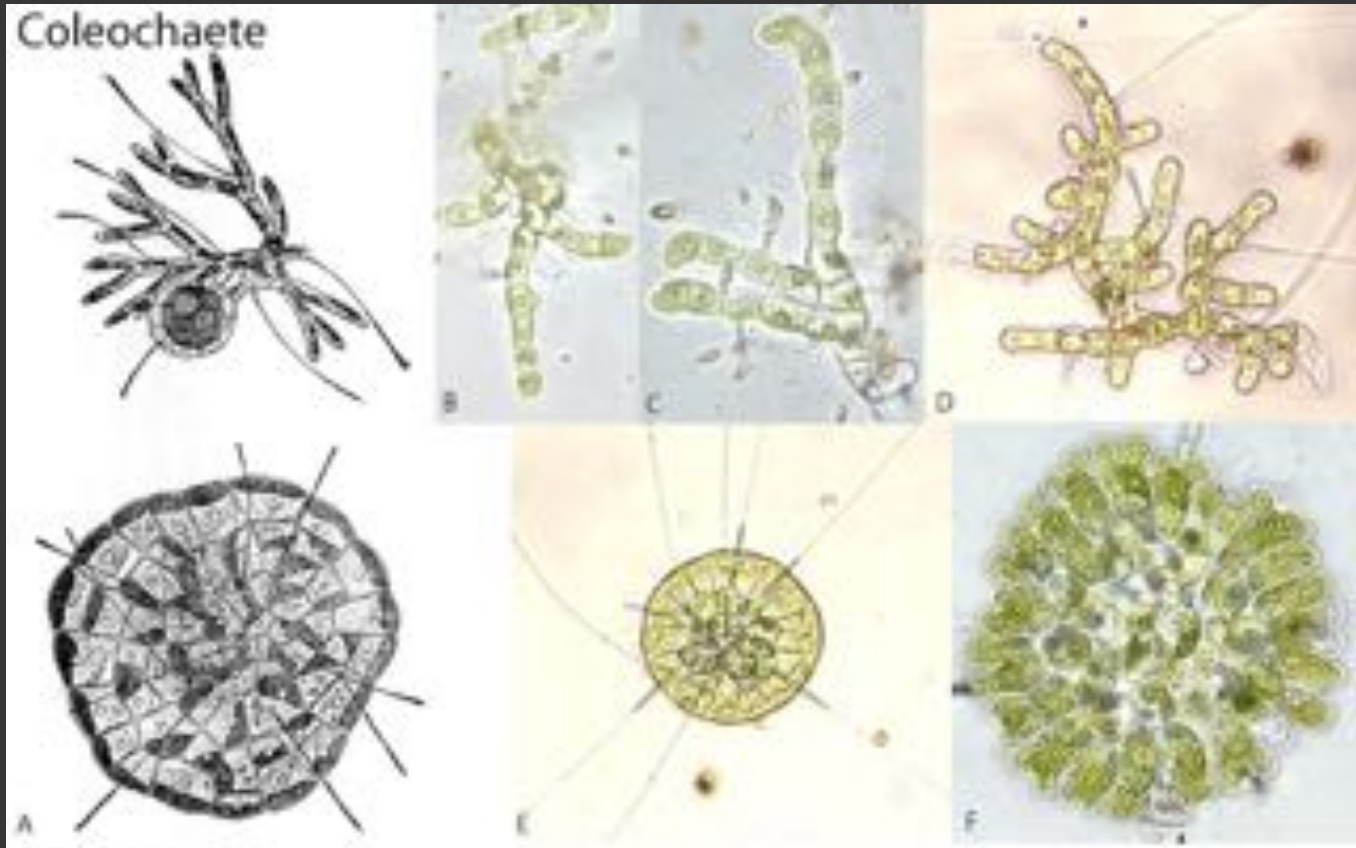
Micrasterias
The snow-flake
green alga!



Hypnozygotes

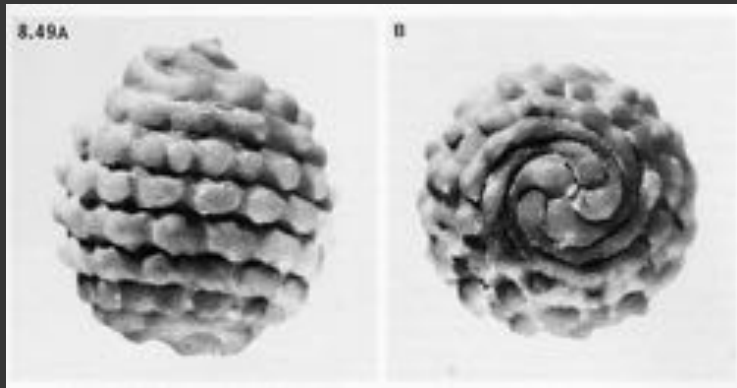
6. **Coleochaetales:** *The genus Coleochaete*

- *Coleochaete* grows as an epiphyte on larger algae and freshwater plants
- Heterotrichous filaments and parenchyma forming a discoid thallus
- Hair cells common
- Advanced oogamy with retention of zygote inside a protective covering



7. Charales (stoneworts, muskgrass, bassweeds, or brittleworts)

- Large thallus, up to 50 cm or more, in lakes or ponds
- Heterotrichous filaments with apical growth
- Some with calcified thallus
- Magnificent, advanced sexual reproduction!



Fossil gyragonites



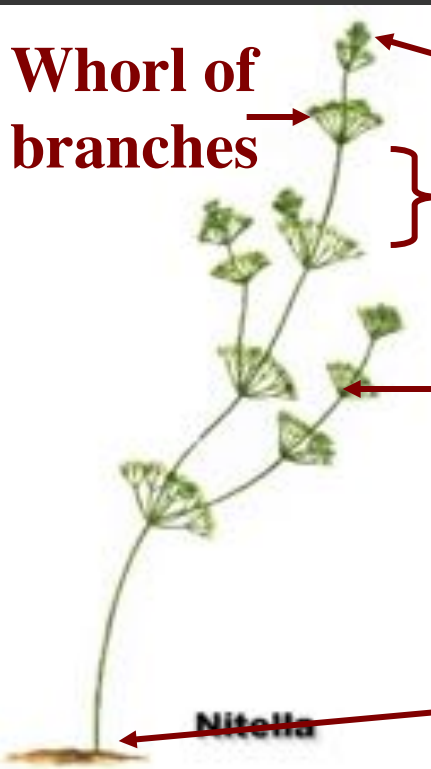
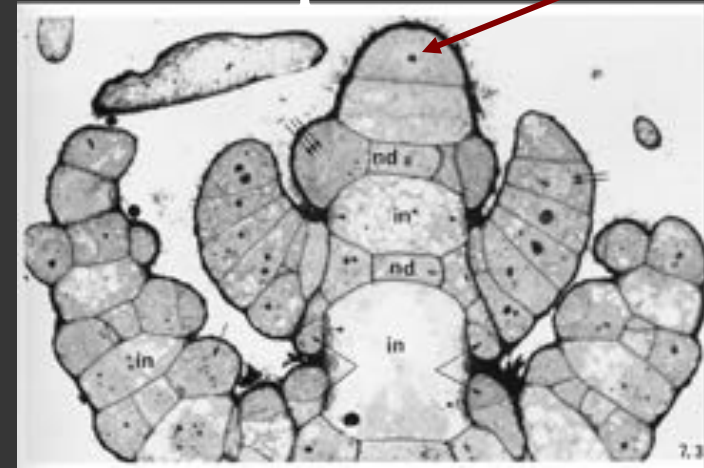
**Sperm or
Antherozoid**



Charales: Vegetative Morphology

- Apical meristematic cell
- Axis with Nodes and Internodes
- Internodal cell large sometimes covered with Cortical cells
- Basal colorless rhizoids

Apical Cell



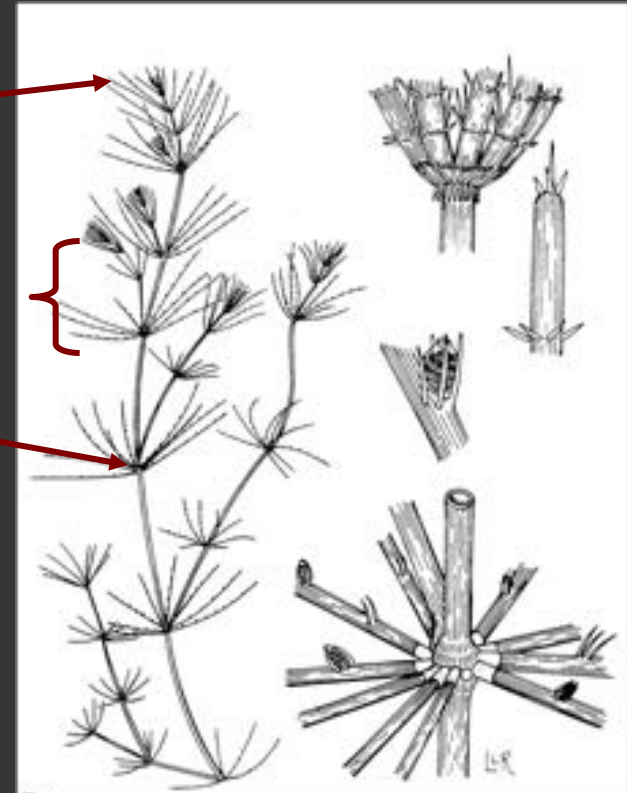
Whorl of branches

apex

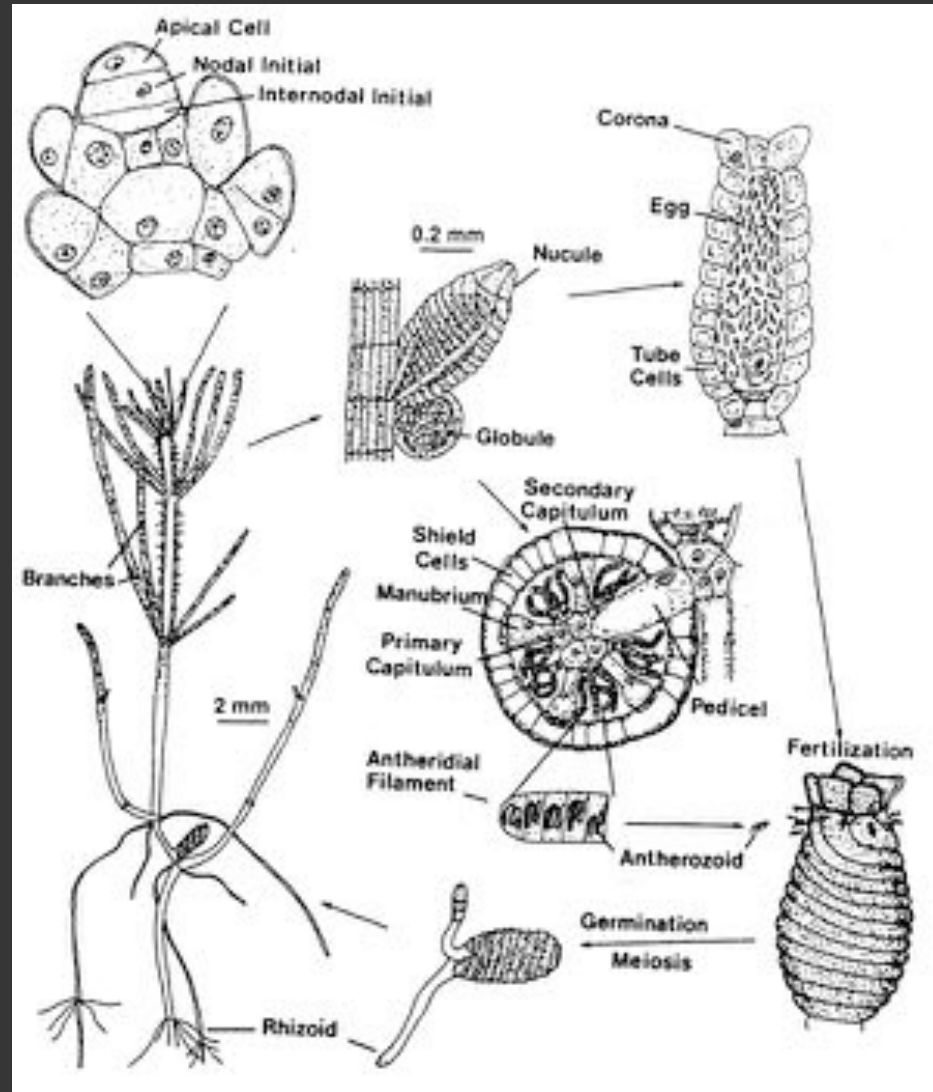
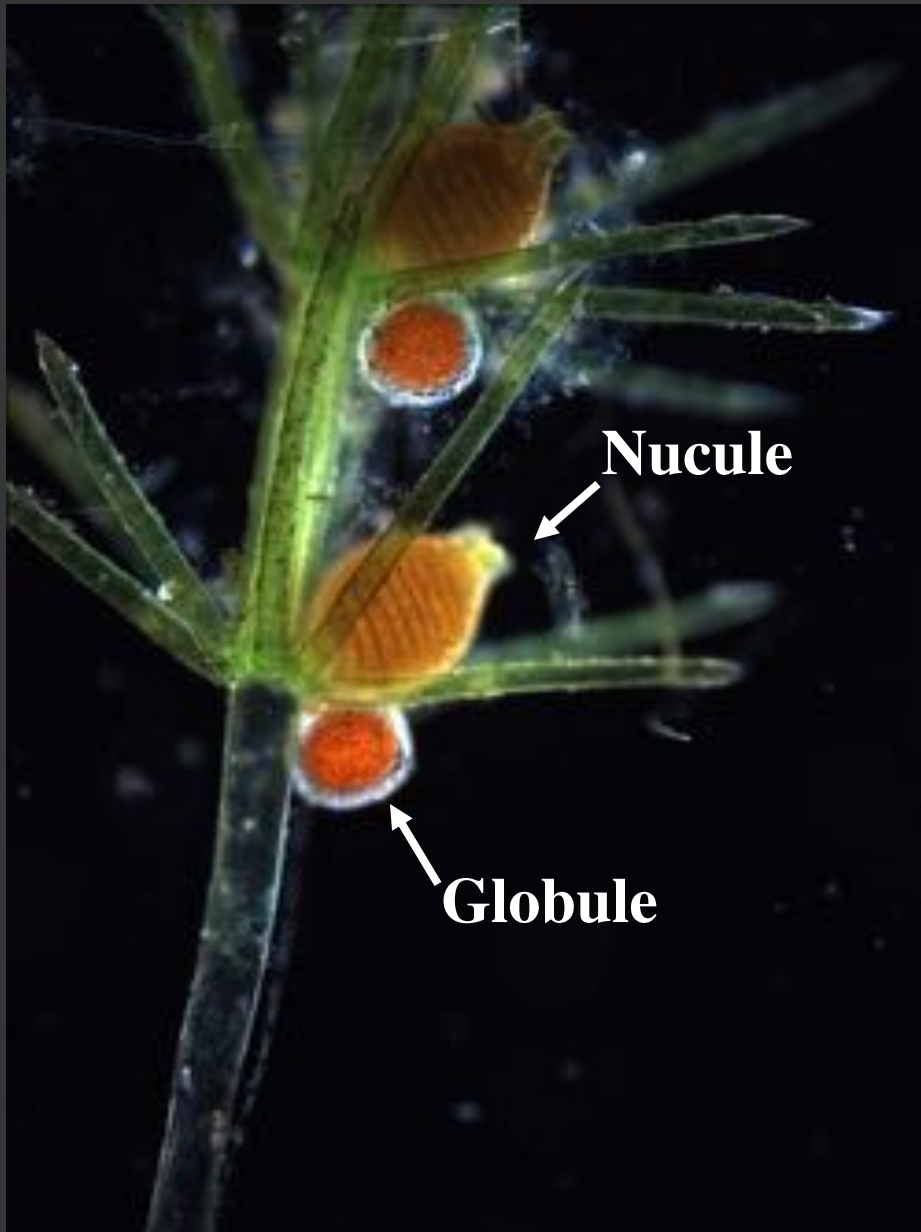
internode

node

rhizoids



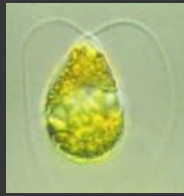
Charales: Reproduction



THE BIG FOUR FOR CHLOROPHYTA

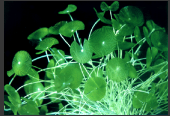
- 1. Pigments: Chlorophylls *a* and *b***
- 2. Storage products: Starch**
- 3. Cell wall: Cellulose, scales, calcified, or naked**
- 4. Flagella: Multiples of 2, isokont, acrokont, and acronematic, or stephanokont**

CHLOROPHYTA



CHLOROPHYCEAE

TREBOUXIOPHYCEAE



ULVOPHYCEAE



PRASINOPHYCEAE
PRASINOPHYCEAE
PRASINOPHYCEAE
PRASINOPHYCEAE

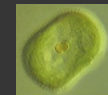
LAND PLANTS



CHAROPHYCEAE



PRASINOPHYCEAE



ANCESTRAL GREEN
FLAGELLATE

Character evolution of:

Habitat

Flagella

Mitosis

Cytokinesis