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Salahaddin University - Erbil,  
Kurdistan region - Iraq**



# **Division: Chlorophyta**

## **Green Algae**

### **Lab-8**

**Practical Phycology**

**Division: Chlorophyta**

**Class: Chlorophyceae**

**Order: Conjugales**

**1-Family: Zygnemaceae**

**Genus: Zygnema Sp.**

**Genus: Spirogera Sp.**

**Genus: Mougeotia Sp.**

# Order: Conjugales

- Filaments are **unbranched** and **all the cells have similar structure.**
- Sexual reproduction is by **conjugation.**

# Genus: *Zygnema Sp.*

**Common habitats** Approximately 100 species are found in fresh water ponds and pools .



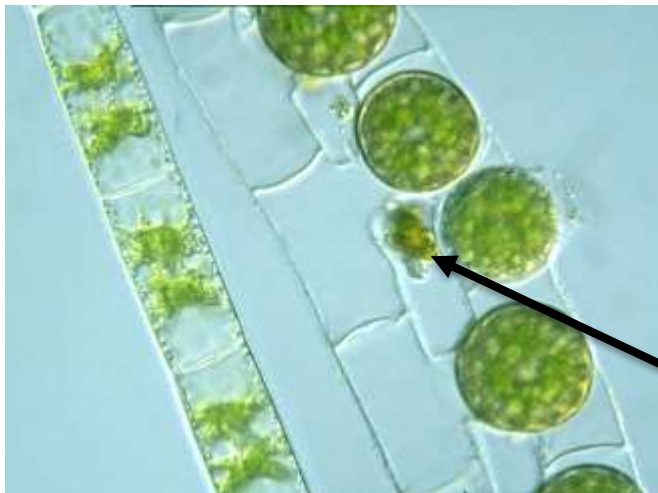
## External traits

- ❖ It is **un branched** filamentous algae.
- ❖ They may be attached to a substrate by **rhizoids**.
- ❖ Cell wall consists of two layers (**outer layer is thicker than inner layer**).
- ❖ Each cell contains **one nucleus** and two star shaped chloroplast.
- ❖ Each chloroplast possesses a single pyrenoid.
- ❖ Zygospores are **not present in the conjugation tubes**.



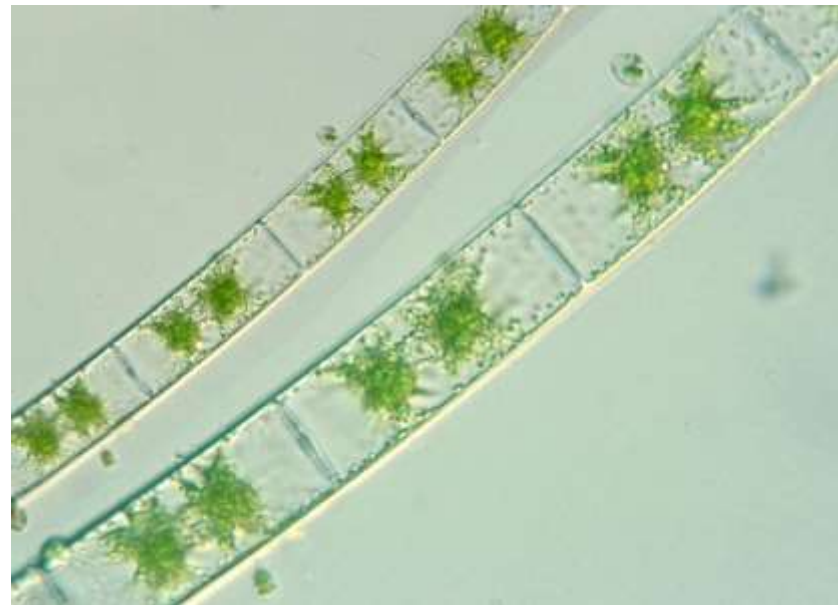
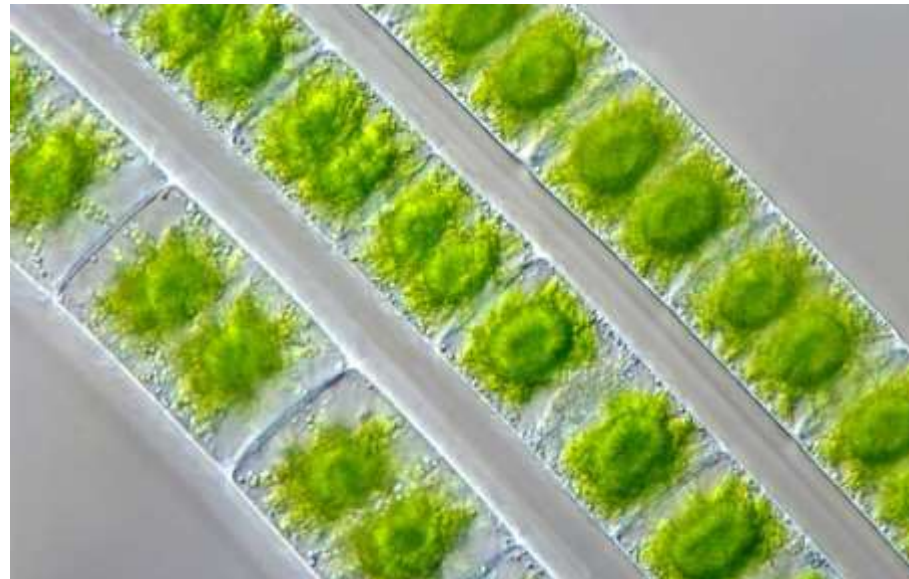
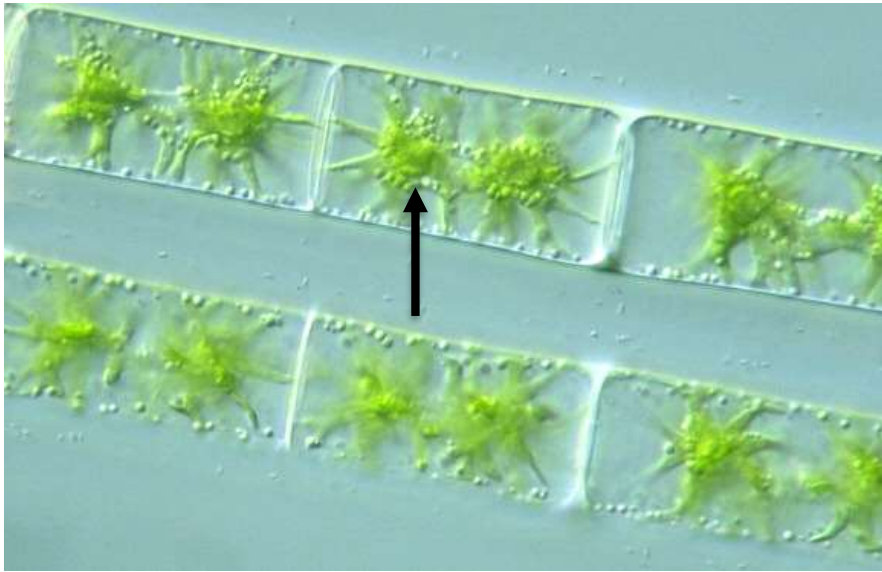
# Reproductive structures

- ❖ **Vegetative reproduction:** occurs by fragmentation.
- ❖ **A sexula reproduction:** Takes place by the formation of akinetes and aplanospores.
- ❖ **Sexual reproduction:** Takes place by conjugation. In this process two filaments come and lie side by side or parallel to one another through their entire length. One cell behaves as female gamete and another as male gamete. Male gamete and female gamete union via the tube known as conjugation tube.



Conjugation tube



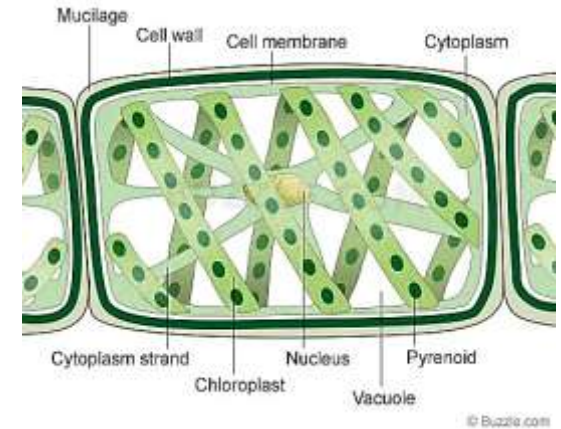


***Zygnema***. End of filament showing cells with two typical stellate chloroplasts.

# Genus: *Spirogera* Sp.

Common habitats: About 290 species are found in fresh water , ponds and lakes

## External traits

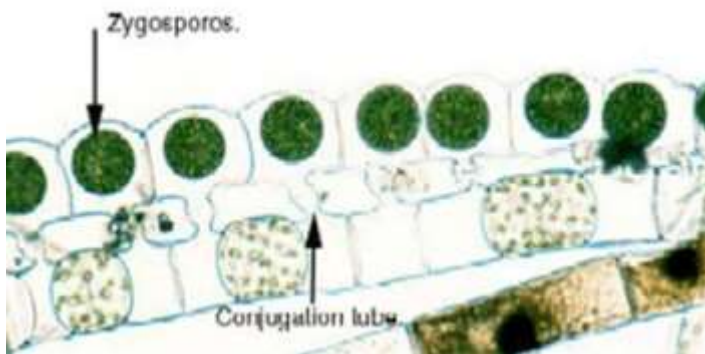


Filaments are **free floating** but some species are **attached to the rock** layers by **hold fast**.

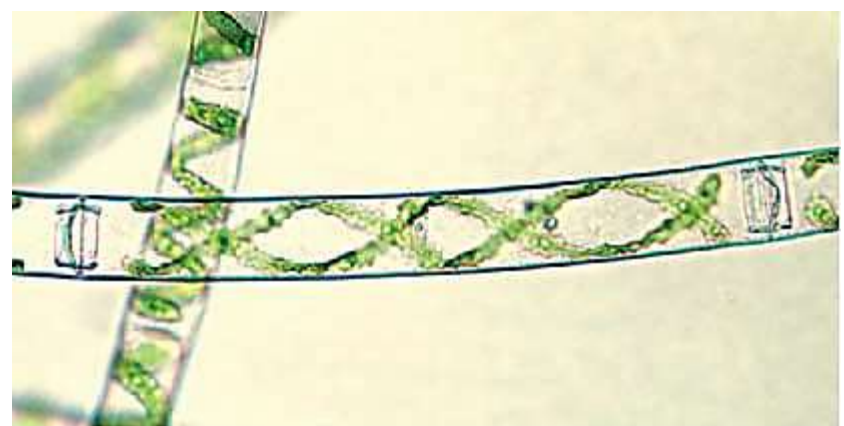
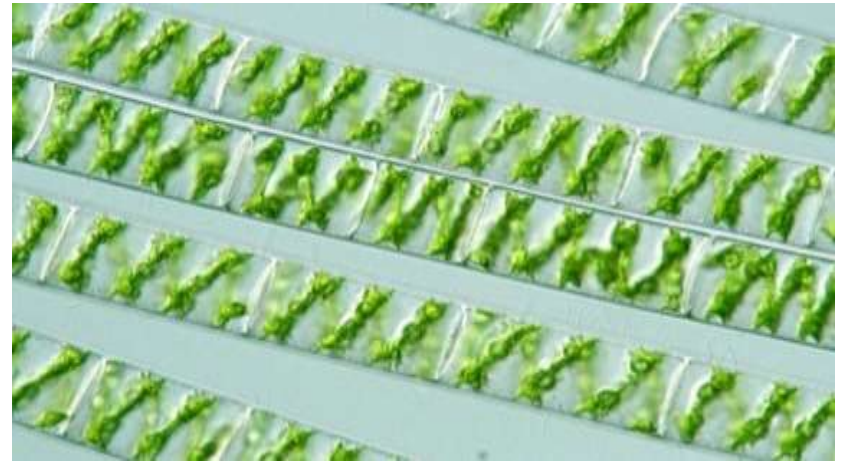
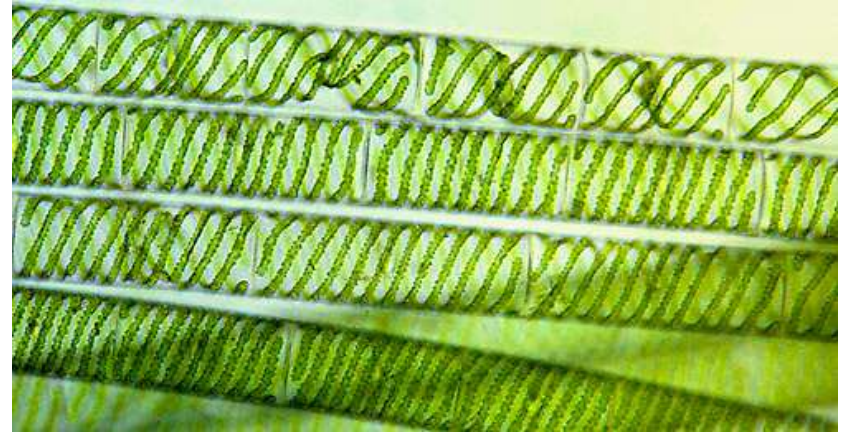
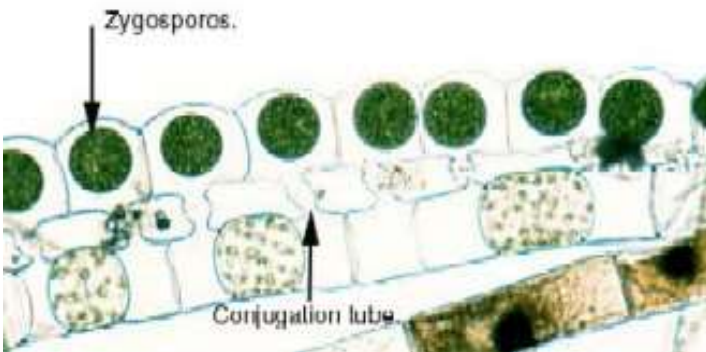
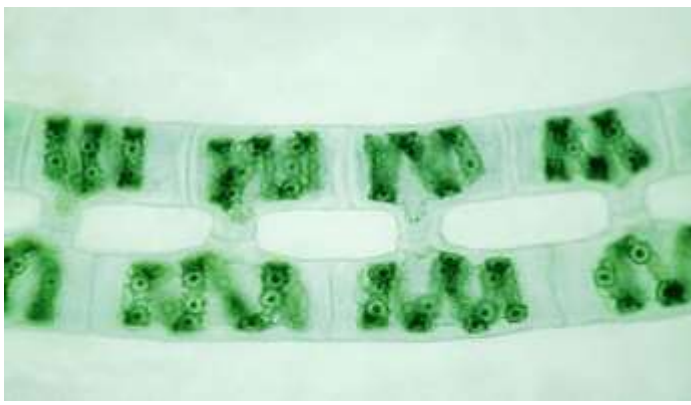
- Cell wall consists of two layers (**outer layer is pectin and inner cellulose** ).
- **Single nucleus** and **spiral shaped chloroplast** are present.
- Chloroplast bears many Pyrenoids.
- Zygospore is **ornamented or smooth** and **consistes of three layers**.

# Reproductive structures

- **Vegetative reproduction** Occurs by fragmentation.
- **Sexual reproduction** Takes place by conjugation.





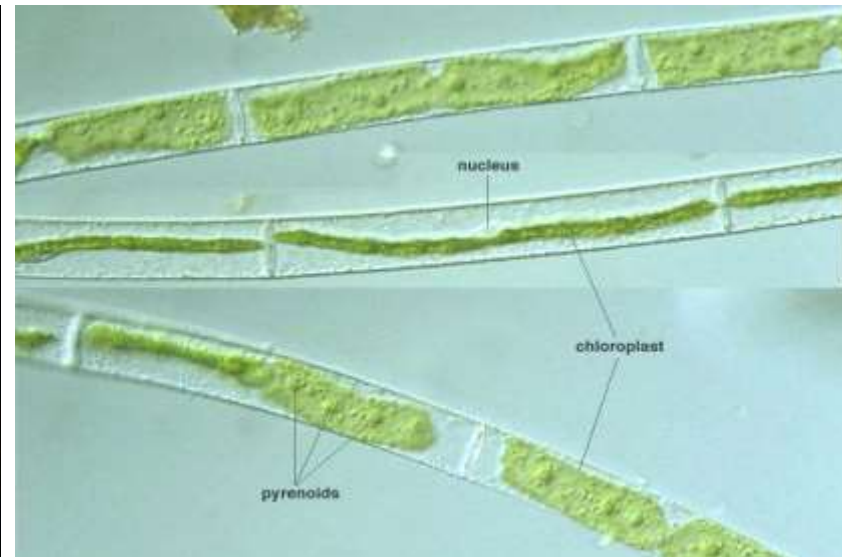


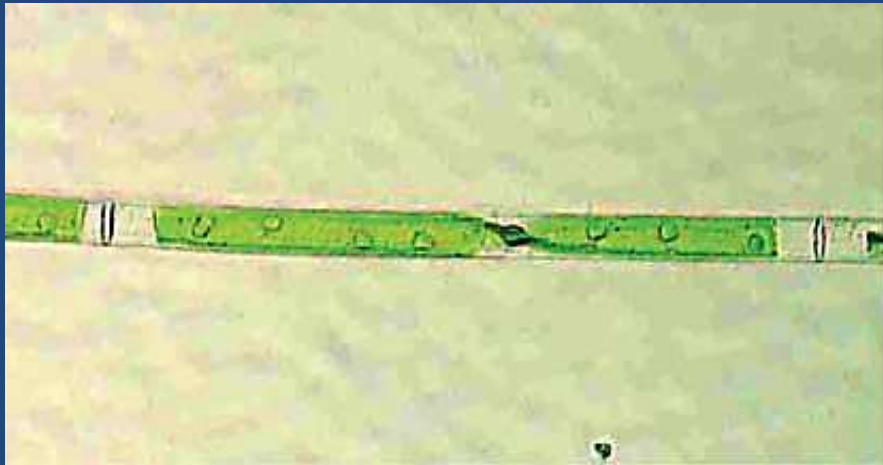
## Spirogyra conjugation

The chloroplasts have numerous pyrenoids (small dots). Bottom: Species with two chloroplasts and complex (replicate) cross walls

# Genus: *Mougeotia* Sp.

- It is bright unbranched filaments.
- Plate shaped chloroplast and **many pyrenoids** are found in the cells.
- Cell wall consists of **two layers** (outer is thicker than inner layer).
- **Ring septum** is found between two cells.
- **Central conjugation** takes place by the process of conjugation.





*Mougeotia.*

# Reproductive Structures

- Asexual reproduction: **Fragmentation.**
- Sexual reproduction: Takes place by **conjugation.**
- In *Mougeotia* species, **central conjugation** is taken place.



**Division: Charophyta**

**Class: Charophyceae**

**Order: Charales**

**Family: Characeae**

**Genus: *Chara sp.***

**Genus: *Nitella sp.***

# Order: Charales

1. Are actually a form of algae & grow in **fresh water**.
2. About 400 species worldwide.
3. Have large, **macroscopic thalli** growing up to **120 cm long**.
4. The plant body **erect** and differentiated into nodes and inter nodes.
5. Are **branched and multicellular**.
6. They have **chlorophyll a and b**.
7. Lacking asexual reproduction.
8. Sexual reproduction highly advanced (**Oogamos type**).

# *Chara* sp. and *Nitella* sp.

## Similarities

- Are common in ponds and lakes.
- Both *Chara* and *Nitella* look like rooted & aquatic plants.
- Both have whorls of branchlets coming off the main stem.



# Differences

- *Chara* prefers alkaline hard water ponds, while *Nitella* prefers more acidic ponds with soft sediments.
- Branches on *Chara* are ridged & encrusted with calcium carbonate, while *Nitella* branches are very smooth and translucent green.
- *Chara* also has a musty odor when crushed, giving it the common name of "musk grass." whereas *Nitella* has not this.
- Oogonium (Nucule) contained egg in *Chara* locates above antheridium, in *Nitella* located below or beside the antheridium



# Reproduction

1. Vegetative reproduction by (Amylum Stars and Bulbils)

2. Sexual Reproduction.

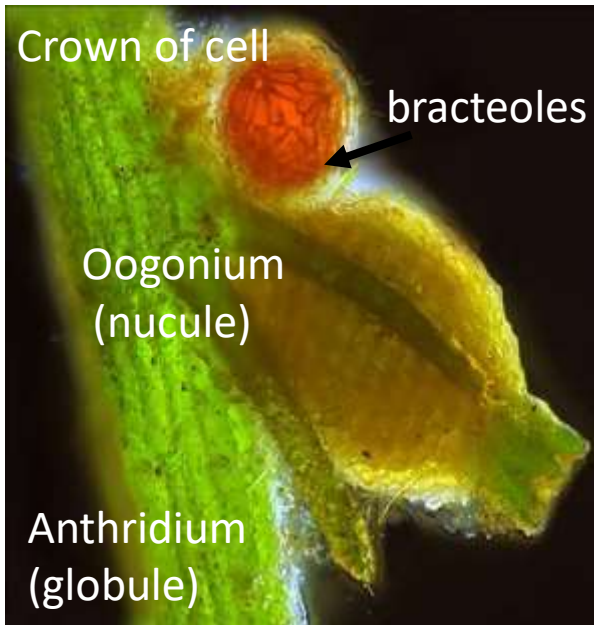
- Reproductive structures are highly advanced type and the sexual reproduction is Oogamous.
- Male reproductive bodies called **antheridia or globules**.
- Female reproductive bodies called **Oogonia or nucules**.
- Most of the species are **homothallic** except a few.
- Sex organs are present on the **nodes of primary laterals**.

3. **No asexual reproduction**

# *Chara sp.*



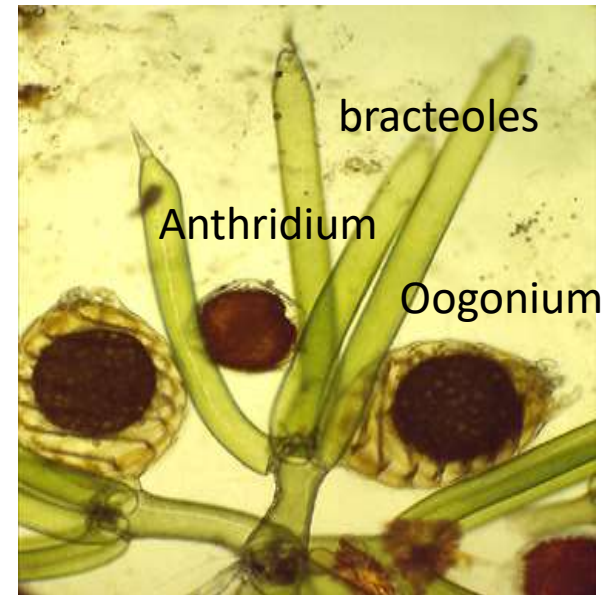
Alkaline hard water ponds



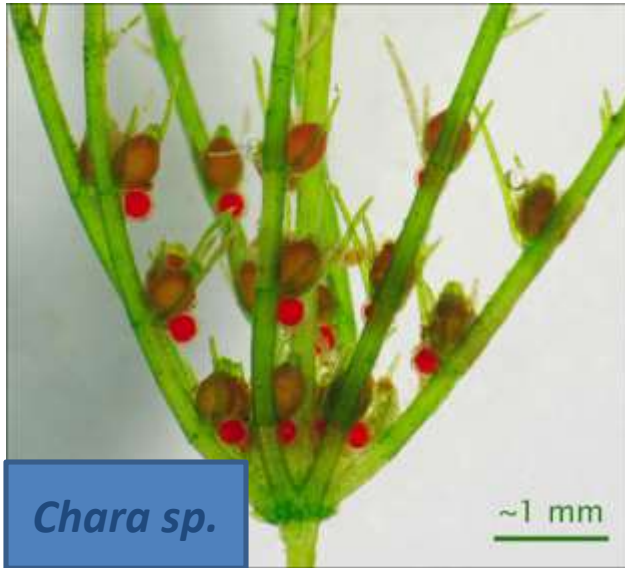
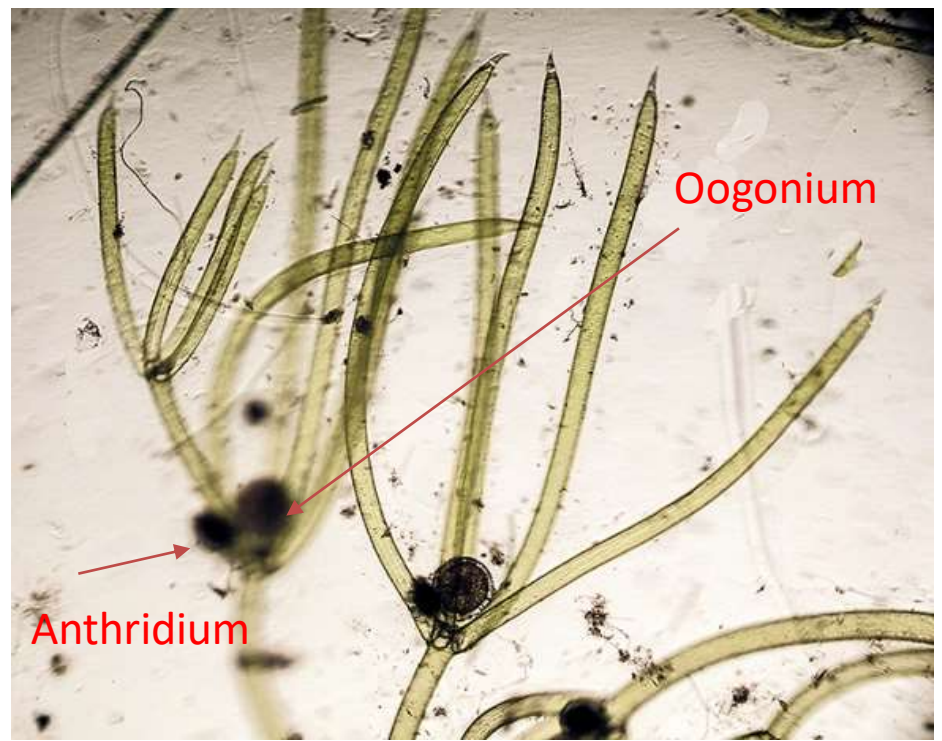
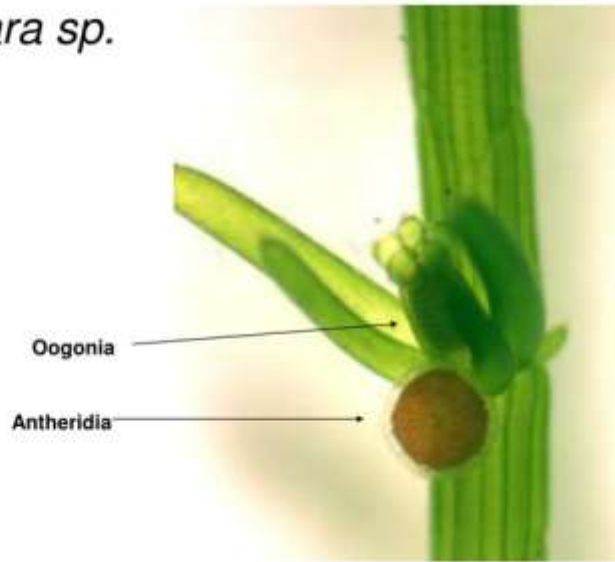
# *Nitella sp.*



Acidic ponds



*Chara sp.*



*Nitella sp.*

