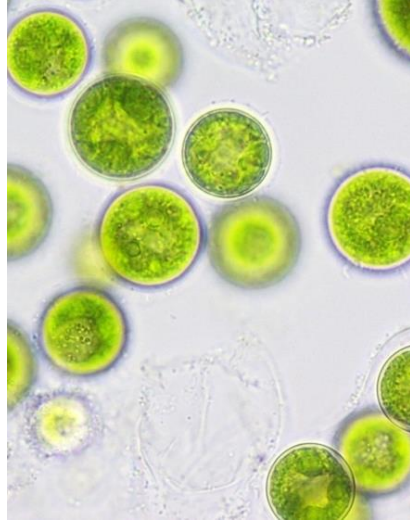




# Lab 8: Introduction to the ALGAE

---



# Definition

---

- **Algae** are eukaryotic organisms, Some algae Prokaryotic (cyanobacteria).
- Most algae are photoautotrophic and carry on photosynthetic (meaning they use sunlight and chlorophyll to make food).
- At one time, algae were thought to be plants, but are not because they lack roots, stems and leaves.



# Characteristics

---

- Range in **size** from **microscopic to single celled organisms to large seaweed.**
- Most are free-living in fresh and marine water – **plankton.**
- May or may not have flagella.
- Contain **chloroplasts** with **chlorophyll** and other **pigments.**
- Often contain **pyrenoids**, organelles that **synthesize and store starch.**

# Reproduction in Algae

## Vegetative

1. Fragmentation: *Cyanophyceae*, *Ulotrichales*
2. Fission: *Diatoms*
3. Akinetes: *Pithophora*, *Oedogonium*
4. Tubers: *Chara*
5. Hormogonia: *Myxophyceae*
6. Adventitious thalli : in *Fucus*

## Asexual

1. Zoospores: *Chlamydomonas*, *Cladophora*
2. Synzoospore: *Vaucheria*
3. Aplanospore: *Vaucheria*, *Chlamydomonas*
4. Hypnospore: *Vaucheria*
5. Autospores: *Chlorella*
6. Tetraspores: *Rhodophyceae* nad some *Phaeophyceae*

## Sexual

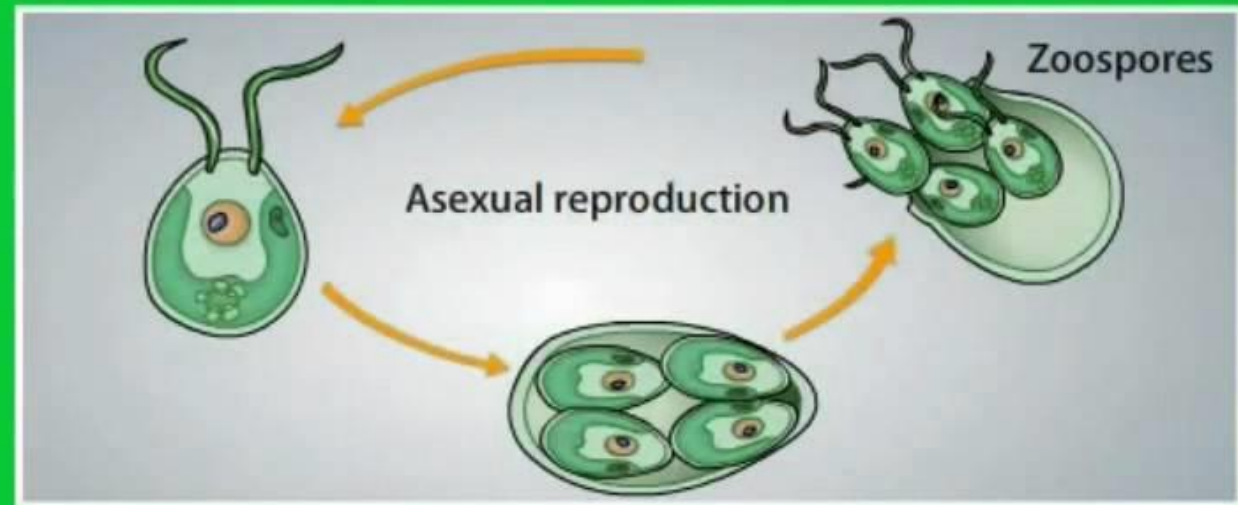
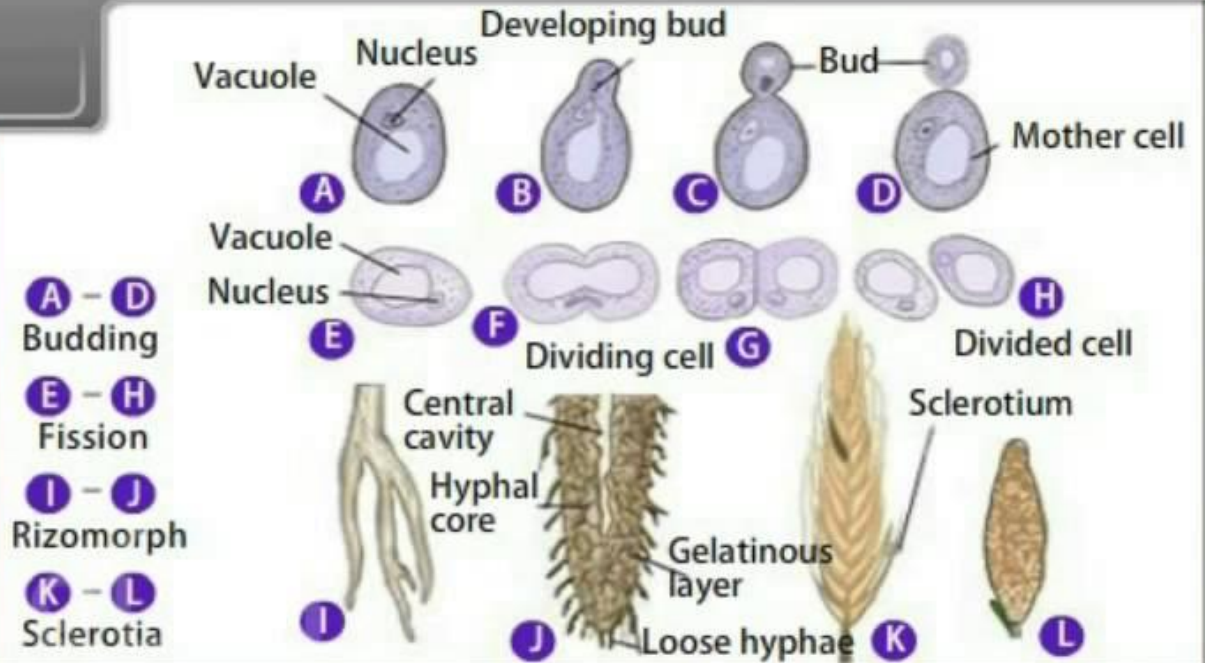
1. Isogamy: *Spirogyra*, *Zygnema*
2. Anisogamy: *C. braunii*
3. Oogamy: *Volvox*, *Fucus*

# Algae

Reproduction in algae is by vegetative, asexual and sexual methods.

Vegetative reproduction takes place by fragmentation. Each fragment develops into a thallus.

Asexual reproduction is by the production of different types of spores, the most common being the zoospores. Zoospores are flagellated (motile) and on germination gives rise to new plants.



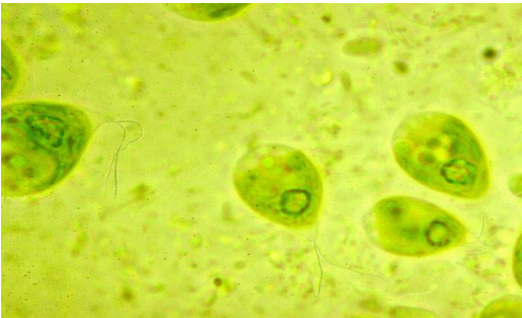
# STRUCTURE

---

## - Four types of algae

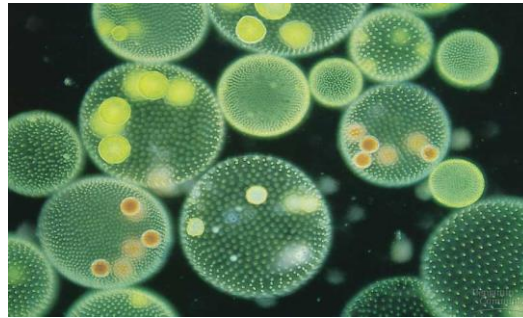
Unicellular

Chlamydomonas •



Colonial

Volvox •



Filamentous

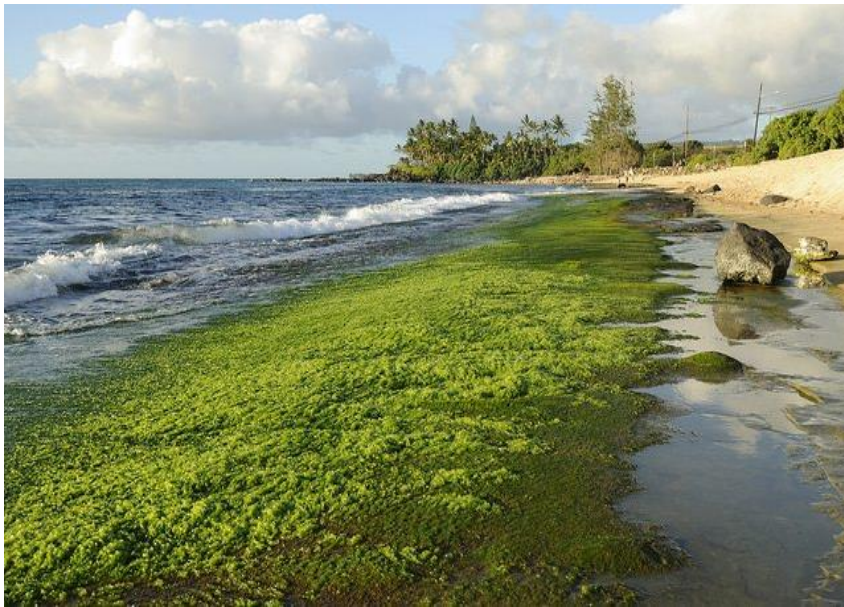
Spirogyra •



multicellular

Ulva sp. •





# Where can Algae live ?

---

- Soil → *Nostoc sp.*
- Sea water → Diatoms
- Fresh water → *Volvox sp*



# Algae Classification

---

- According to five kingdoms classification system which was suggested by Ropert wittaker in 1969. the 5 kingdoms were ( monera , protista , plants ,animals ,fungi).
- So algae included in kingdom monera which contains cyanophyta or blue green algae and kingdom protista which contains all other groups of algae.



# Classification of algal division based on:

---

## 1-Biochemical criteria:

A-pigments.

B-storage products.

C- cell wall composition.

## 2-Morphological criteria.

## 3-genetic differences.

## 4-many can survive desiccation for several years

# Kingdome

**Monera**

(Cyanobacteria)  
Cyanophyta.

Division

**Protista**

- A. Euglenophyta
- B. Chlorophyta (Green algae)
- C. Chrysophyta (yellow-green)
- D. Bacillariophyta (diatoms)
- E. Phaeophyta (brown algae)
- F. Rhodophyta (red algae)

# Cyanobacteria or Blue-green algae

-Cyanobacteria are prokaryotic, Prokaryotic means they don't have a membrane-bound nucleus, mitochondria or other type of membrane-bound organelle (like true algae do).

-Cyanobacteria also contain other pigments such as the phycobiliproteins which include **phycocyanin (blue)**, allophycocyanin (blue) and sometimes phycoerythrine (red).

-Cyanobacteria also has the ability to **fix nitrogen**, therefore, the bacteria plays a significant role in the nitrogen cycle as well as in the cycles of oxygen and carbon.



# - Example:

## E.X; Nostoc Sp.

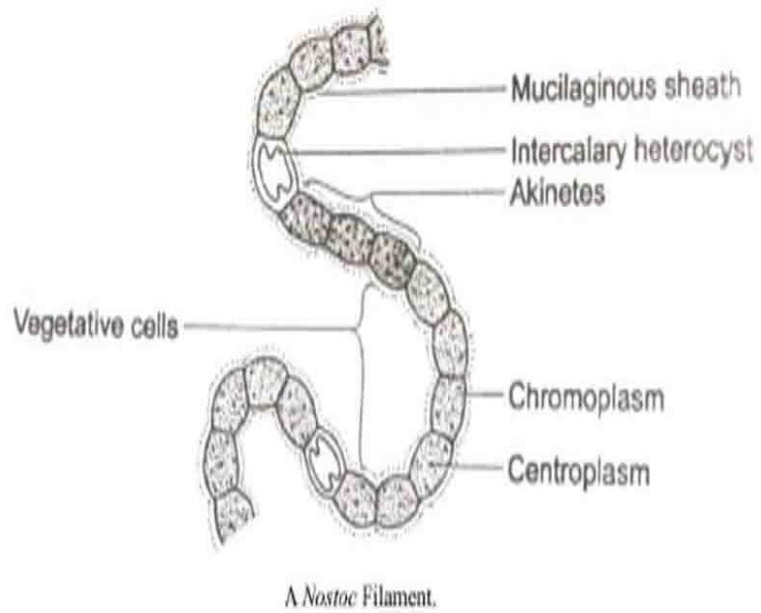
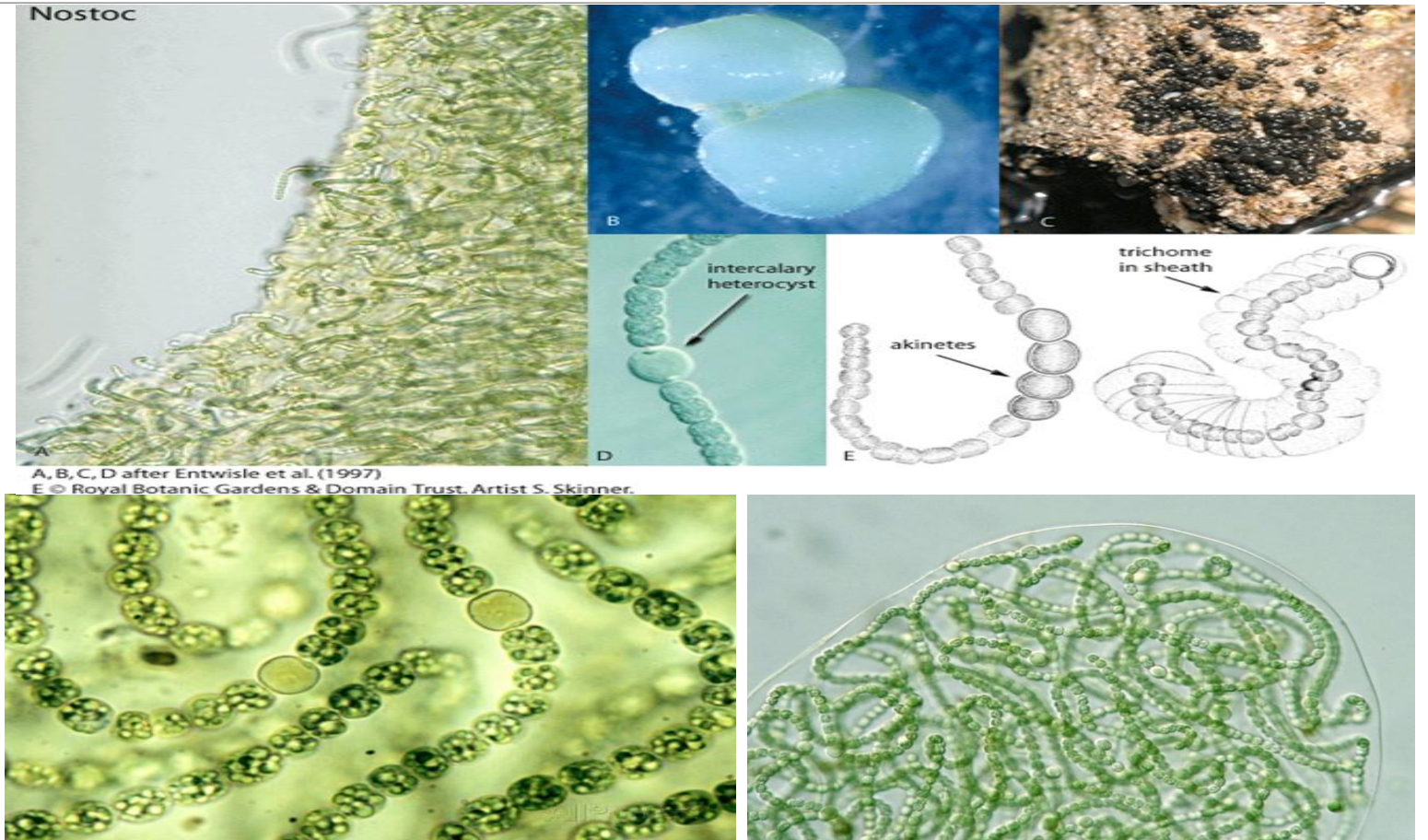
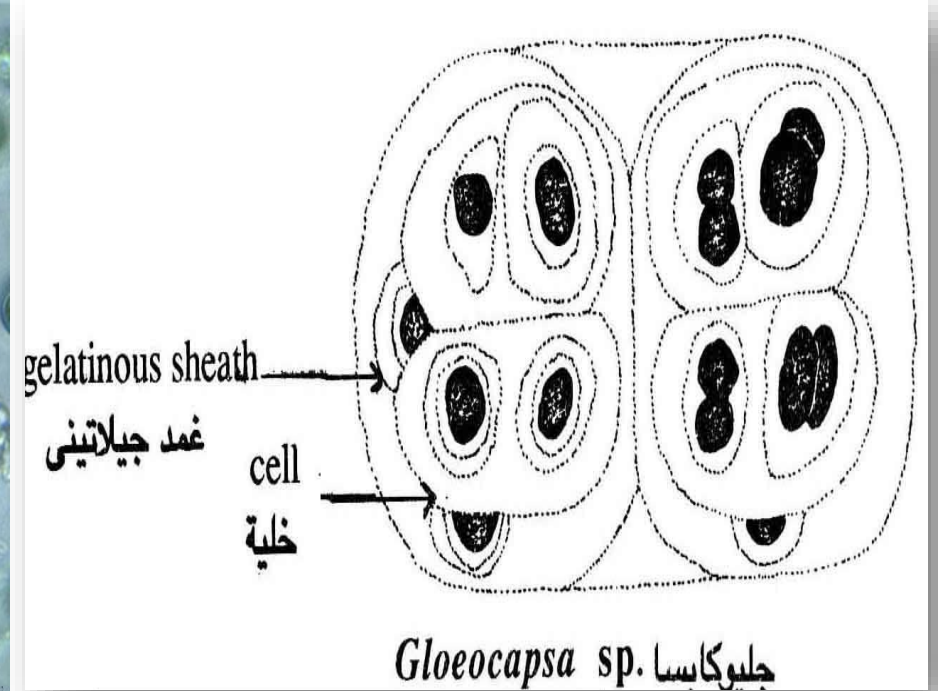
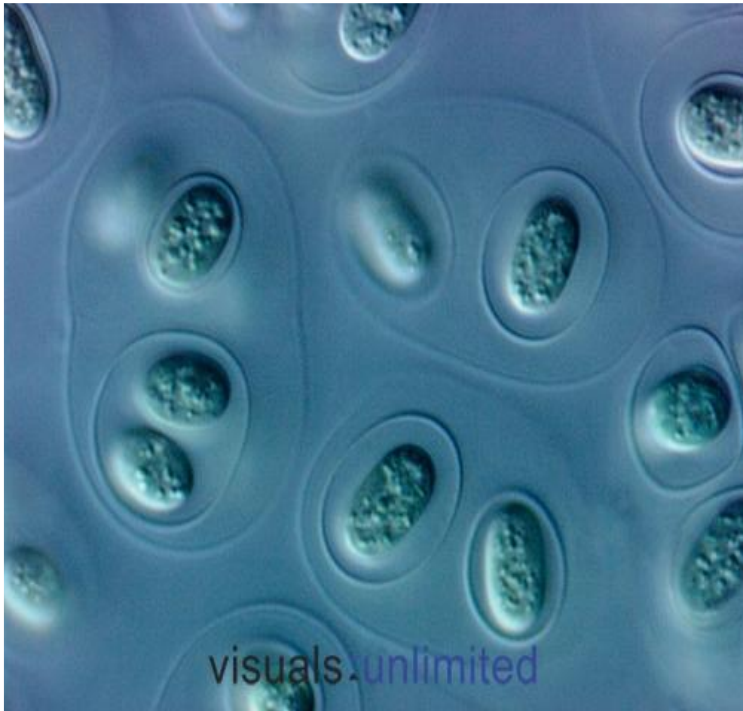


fig: nostoc filament

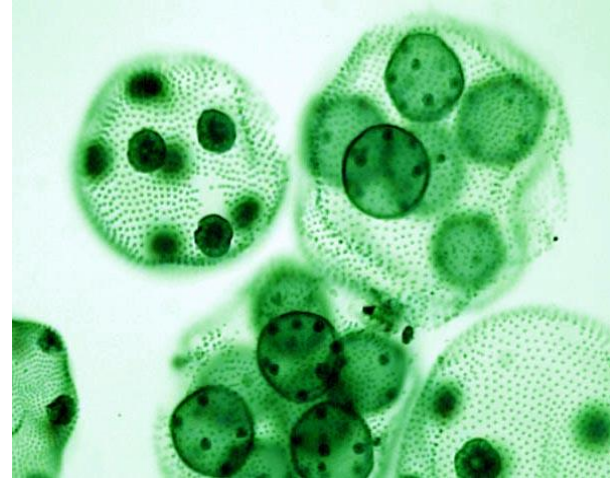


# Gloeocapsa sp.



## 2- Kingdom: Protista

- 1- Division: Euglenophyta
- 2- Division: Chlorophyta
- 3- Division: Bacillariophyta
- 4- Division: Xanthophyta
- 5- Division: Charophyta
- 6- Division: Phaeophyta
- 7- Division: Rhodophyta



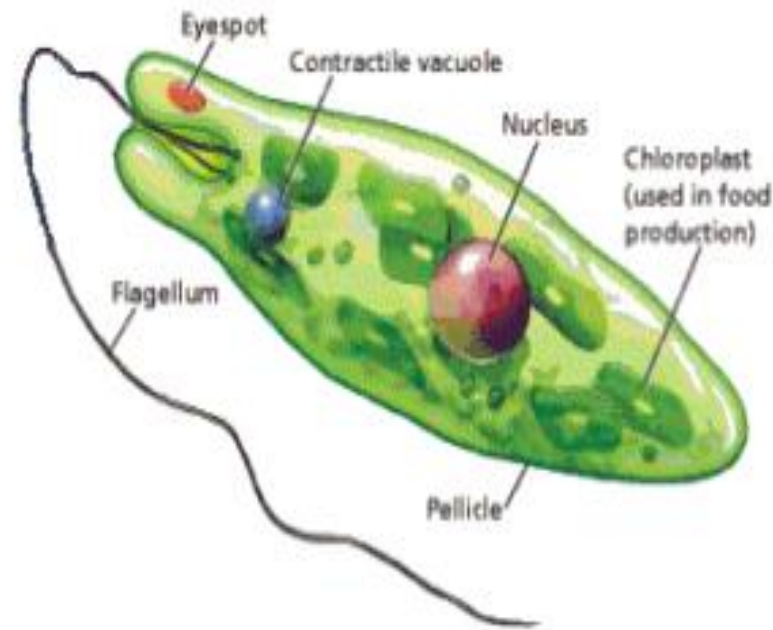
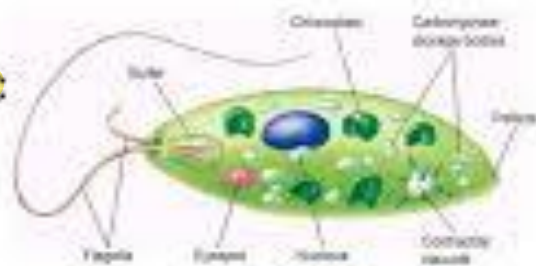
# Euglenophyta

## Phylum Euglenophyta

- **2 Flagella** - Live in Ponds
- **Unicellular**
- No Cell Wall
- Autotrophs
- Heterotrophs - when sun is not available

**Unique characteristic**

**Red Eye Spot**

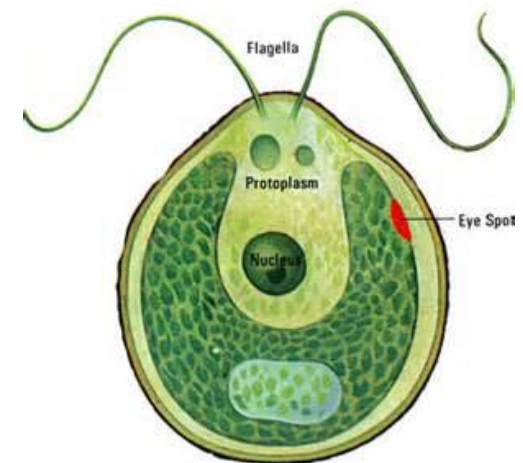
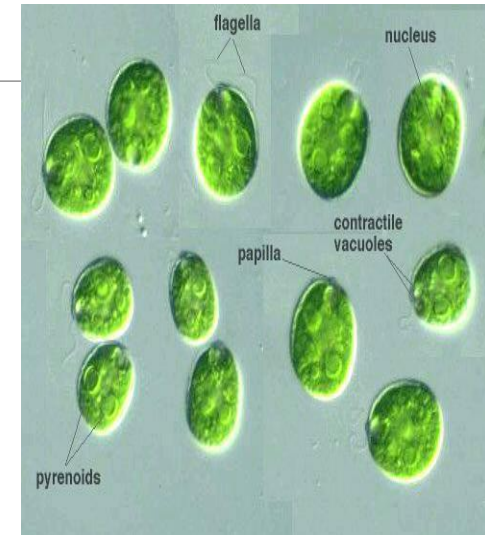


**E.X: Euglena Sp.**

## Chlorophyta (Green Algae)

- The green algae include unicellular and multicellular algae. They have cell walls made of cellulose and pectin.
- Pigments: Chlorophylls *a*, and *b*.
- They are mostly fresh water.
- Food is reserve starch which is stored in pyrenoids.

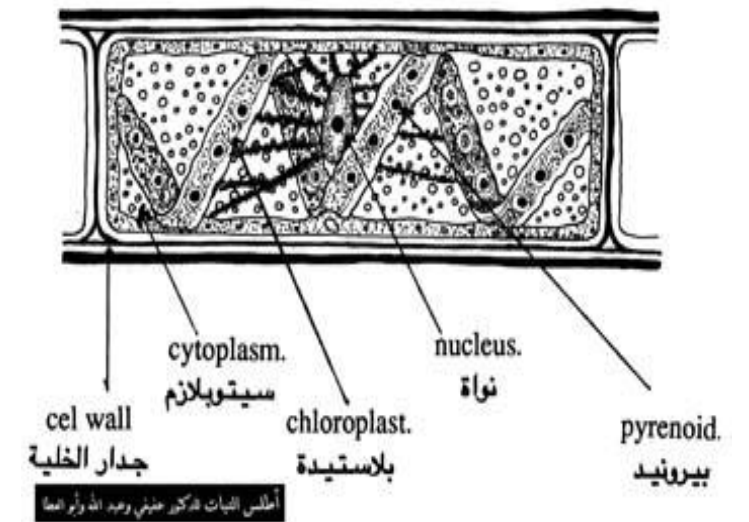
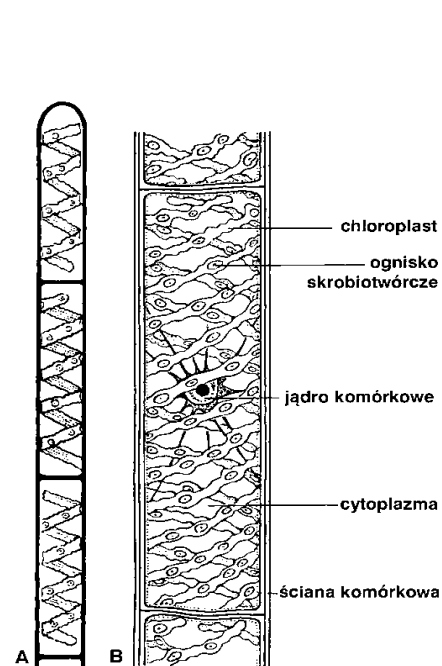
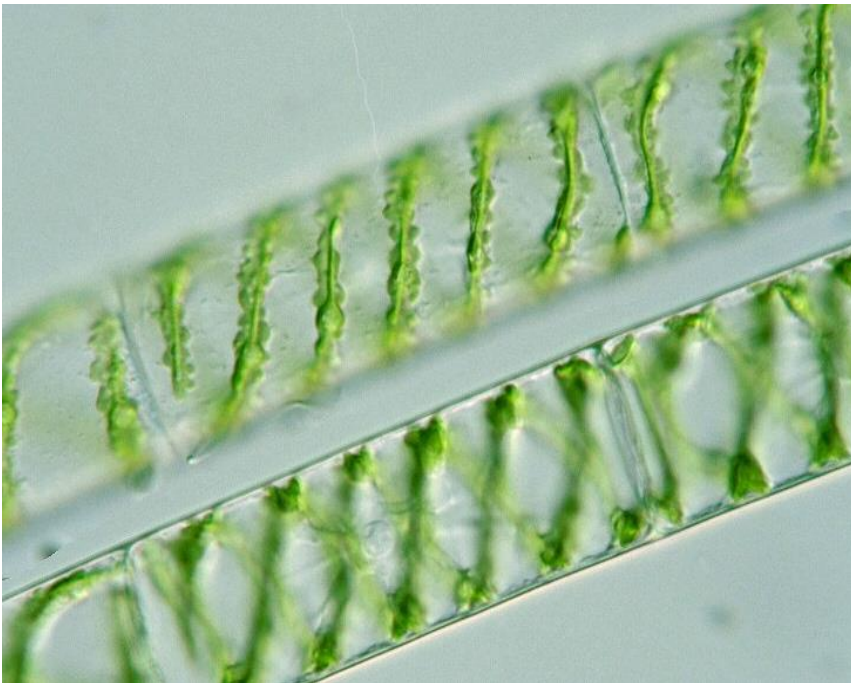
Example: Chlamydomonas sp.





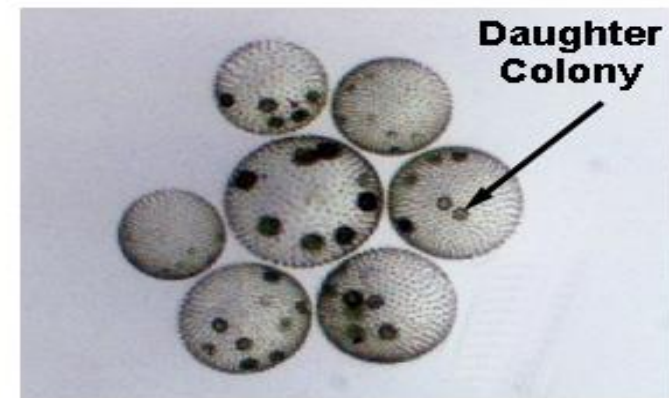
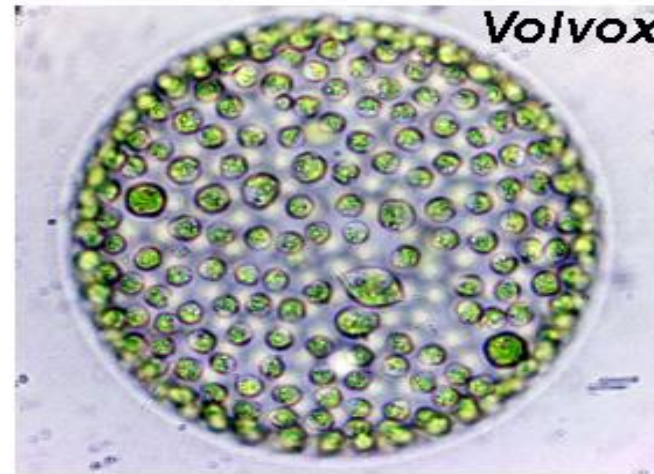
# Chlorophyta (Green Algae)

## Spirogyra sp



# Chlorophyta (Green Algae)

## Volvox sp.



## Chlorophyta (Green Algae)

### Hydrodictyon sp.



## Chryophyta (Xanthophyceae or yellow-green algae)

- Chrysophytes (Chrysophyceae, Heterokontophyta) are mainly unicellular or colonial golden-brown algae.
- most of them are found in fresh waters.
- chloroplasts contain large amounts of the pigment fucoxanthin.
- Vaucheria sp. species are characterized by multinucleate **tubular** branches that lack cross walls.



# Diatoms

## Bacillariophyceae- diatoms

- Characteristics
  - Unicellular, colonial.
  - Chlorophylls A & C, fucoxanthin.
  - Food reserve- chrysolaminarin in vesicles.
  - Thylakoids in 3.
  - Eukaryotic nucleus.
  - No flagella, or 1 tinsel on male gamete.
  - Cell wall is silica and made of 2 frustules.
- Habitat- **marine** and freshwater.
- 100,000 species.
- Examples- Acnanthes, Bacillaria, Licmophora, Navicula, Coscinodiscus.

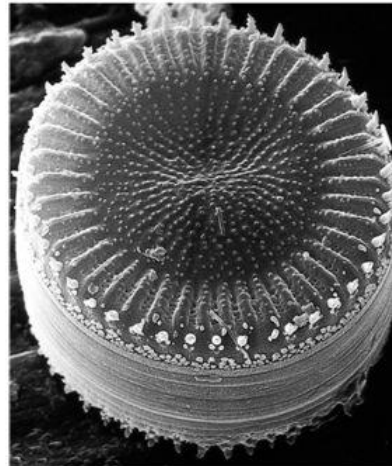
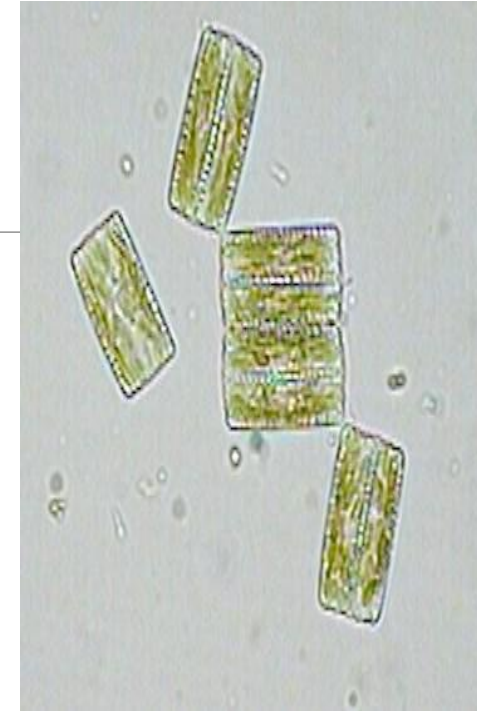
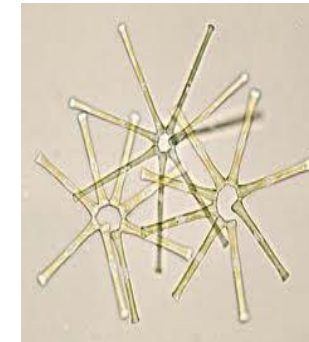


Figure 15-20d  
Biology of Plants, Seventh Edition  
© 2005 W. H. Freeman and Company



Figure 15-20c  
Biology of Plants, Seventh Edition  
© 2005 W. H. Freeman and Company

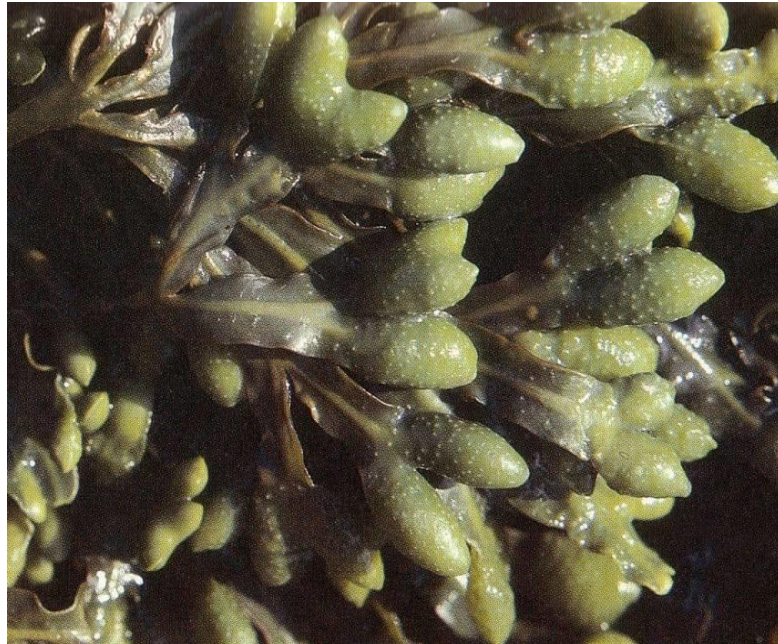
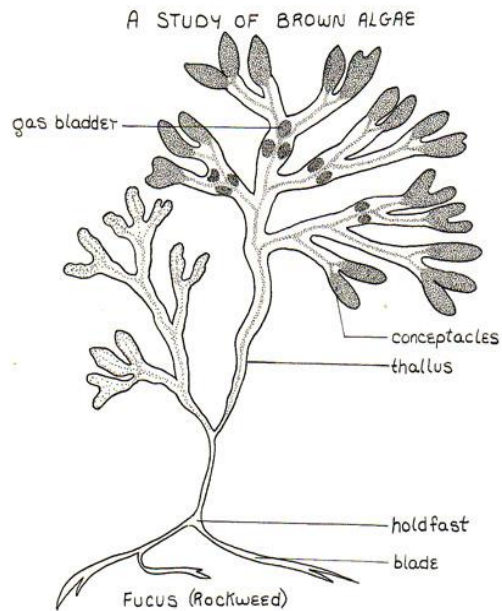


## Phaeophyta (Brown Algae)

---

- Brown algae are multicellular.
- They grow on rocks in shallow water of the sea.
- Large brown algae are called **kelps**. Kelps may grow densely in the sea and form kelp forests. They form important food sources for fish and invertebrates.
- The brown algae growing on rocks are known as rockweed.
- Example of rockweed is *Sargassum*. Algin is a substance derived from some algae which is used in making ice cream, lotion and plastics.

# Phaeophyta (Brown Algae)



E.X: Fucus sp.

## Phaeophyta (Brown Algae)



Sargassum sp.

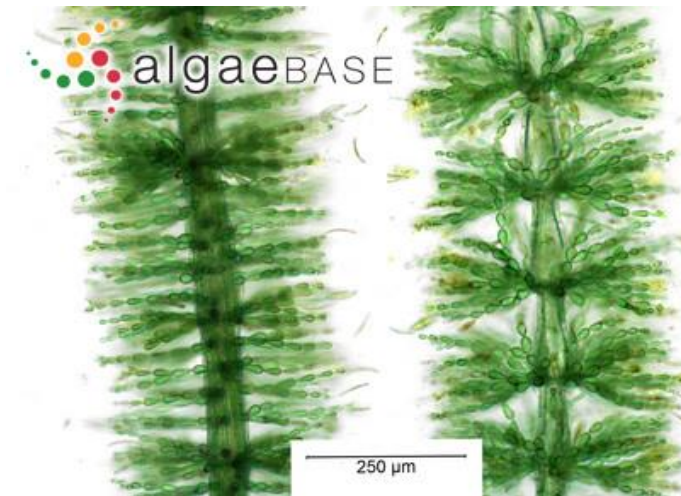




## Rhodophyta (Red Algae)

- Red algae are mostly large and multicellular.
- They grow in oceans.
- Carragean and agar are glue-like substances in red-algae. Agar is used as a medium used for growing bacteria and other organisms under laboratory conditions.
- Agar is also used to make gelatin capsules. and a base for cosmetics.
- Carragean is used as a stabilizer and thickener in dairy products. It is also used to give toothpaste its creamy texture

**E.X: Batrachospermum sp.**



**Observe** a variety of Algae under the microscope.

---

Draw a labelled diagram of each slide observed in the class.  
(Take the help of the book or different websites)

