

# **Kingdom Protista**

Lecture 10, 18/10/2015

# Kingdom Protista

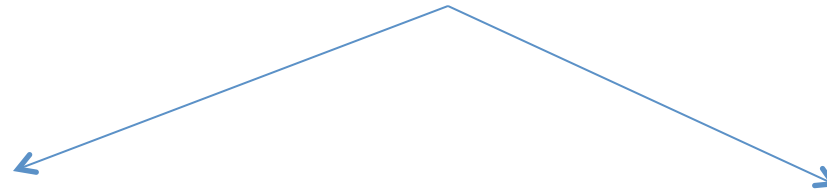
## مملكة الطلائعيات (البروتيستا)

### Characteristics of Protista:

- All are eukaryotic.
- All have cells with nuclei.
- All live in moist environments.
- Can be unicellular or multicellular.
- Can be microscopic or over 100 meters long.
- Some are heterotrophs, while others are autotrophs.

الطلائعيات تصنف إلى:

*Protista are classified to:*



الطلائعيات الشبيهة بالنبات  
تسمى الطحالب الحقيقية

*Plant-like protista  
called True-algae*

الطلائعيات الشبيهة  
بالحيوان تسمى الأوليات

*Animal-like protista  
called protozoa*

# **Introduction to Algae** **(Phycology)**

# Characteristics of algae

1. Algae have a **widespread** occurrence:

- **Aquatic habitat:** marine, freshwater
- **Terrestrial habitat:** deserts, soils, trees, rocks, etc
- Some are **symbiotic**

e.g. lichen is a symbiotic alliance between a fungus and an alga.

e.g. Green Algae live within reef building corals.

“ Plant-like” seaweeds

4. **Lack** true **leaves**, stems & roots

5. May be filamentous, grow in **mats** or **crusts**, sheets, or **kelp**

6. **Growth forms of algae:**

Algae take on a variety of forms both **microscopic** and **macroscopic**

Unicellular; Colonies; Filaments; Multicellular thallus

# **Major groups of algae:**

- **Bacillariophyta** (Diatoms)
- **Euglenophyta**
- **Rhodophyta** (Red algae)
- **Phaeophyta** (Brown algae)
- **Chlorophyta** (Green algae)

# Division: *Bacillariophyta* (Diatoms)

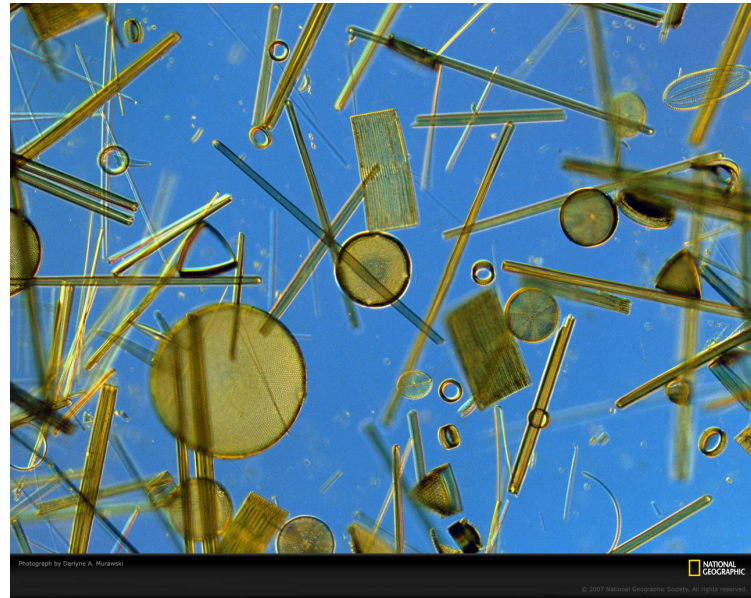
- Unicellular organisms.
- They have silica in their cell walls.
- Autotrophs.
- They can live in marine or freshwater environments.
- They contain chlorophyll a and c as well as pigments called carotenoids (fucoxanthin), which give them an orange-yellow colour.
- Their shells resemble small boxes with lids. These shells are covered with grooves and pores, giving them a decorated appearance.
- Diatoms reproduce asexually, the two halves of the shell separate, each producing a new shell that fits inside the original half.

# Division: *Bacillariophyta* (Diatoms)

- Each new generation, therefore, produces offspring that are smaller than the parent.
- When diatoms die, their shells form deposits called diatomaceous earth.
- These deposits can be collected and used as an additive to give certain paints their sparkle.
- Diatoms store their foods as oils or leucosine



# Forms of diatoms



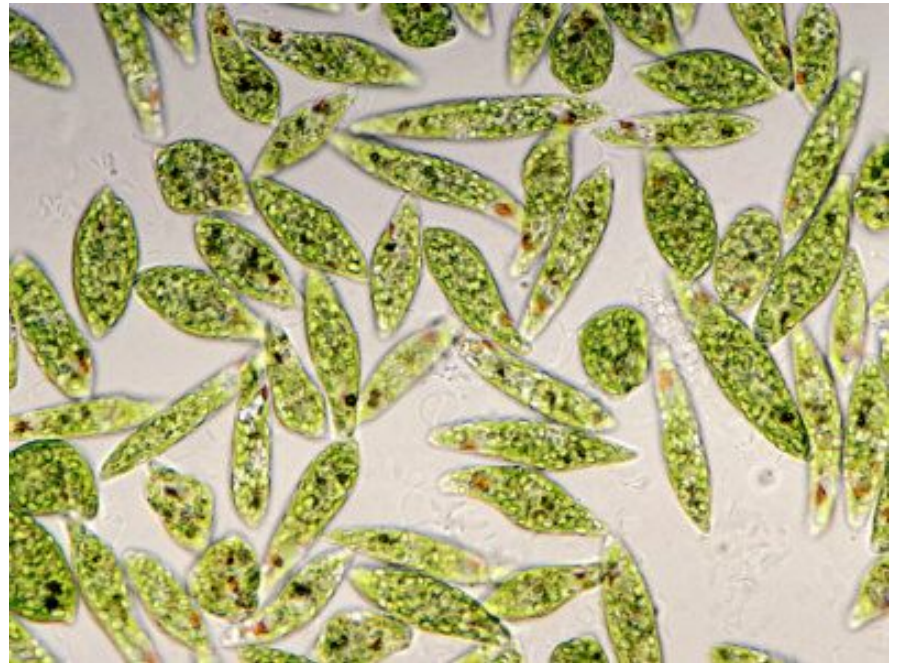
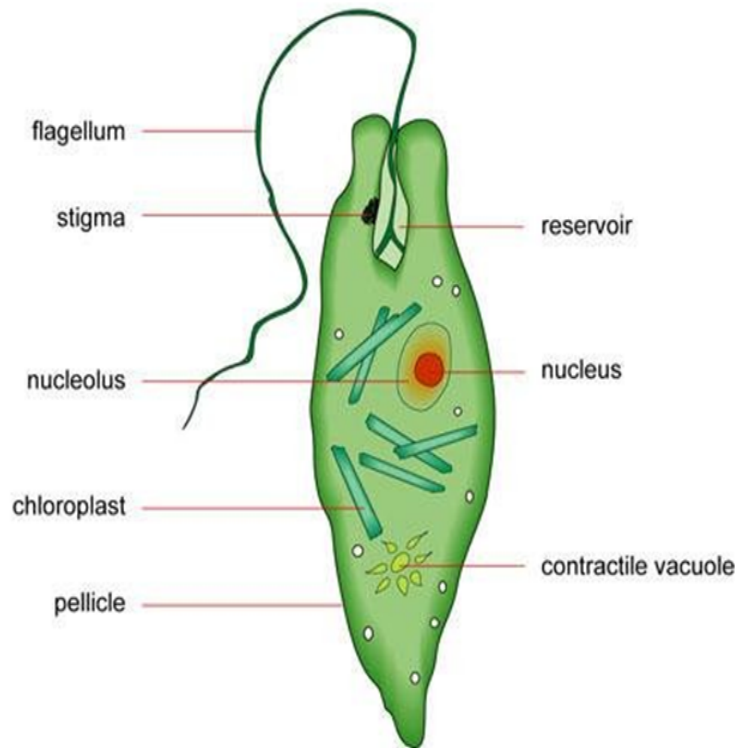
# الطحالب اليوجلينية

## Euglenophyta

- Found mostly in stagnant water (pond) that is full of organic compounds
- Unicellular
- Autotrophs = photosynthesis ,when there is light
- When there is no light = no photosynthesis they can be heterotrophs and can ingest food
- No cell wall = pellicle made up of protein
- They are like animals, i.e are motile having flagellum.
- They store their foods as paramylon (type of polysaccharide).
- i.e: *Euglena*

# *Euglena*

STRUCTURE OF A EUGLENA



## **Division: Phaeophyta (brown algae)**

- The majority are live in marine environments, on rocks in cool waters.
- They contain **chlorophyll** (a and c) as well as a yellow-brown carotenoid called **fucoxanthin**.
- They have **cellulose** and **algin** in their cell walls.
- The largest of the brown algae are the kelp.
- Brown algae store their foods as **laminarin**



# Division: Phaeophyta (brown algae)

- The body of a kelp is called a **thallus**, which can grow as long as 180 ft (60 m).
- The **thallus** is composed of three sections, the **holdfast**, the **stipe**, and the **blade**.
- Some species have **air bladders** to keep the thallus floating at the surface of the water, where more light is available for photosynthesis.



ومن الأمثلة طحلب الفيوكس

An example is *Fucus*



# Division: Rhodophyta (Red algae)

- **Body forms:** Unicellular, simple filaments or complex filamentous aggregations
- All of species are multicellular, they live in marine environments.
- They live attached to rocks by a structure called a holdfast.
- Their cell walls contain **cellulose** (thick polysaccharides).
- Some species incorporate calcium carbonate from the ocean into their cell walls as well.



# Division: Rhodophyta (Red algae)

- Red algae contain chlorophyll (a) as well as phycobilins, red and blue pigments involved in photosynthesis. The red pigment is called phycoerythrin and the blue pigment is called phycocyanin.
- Phycobilins absorb the green, violet, and blue light waves that can penetrate deep water. These pigments allow the red algae to photosynthesize in deep water with little light available.
- Reproduction in these organisms is a complex process of sexual and asexual phases.
- Red algae store their foods as floridean starch.
- Source of **carrageenan** & **agar** (emulsifiers & gel thickeners)



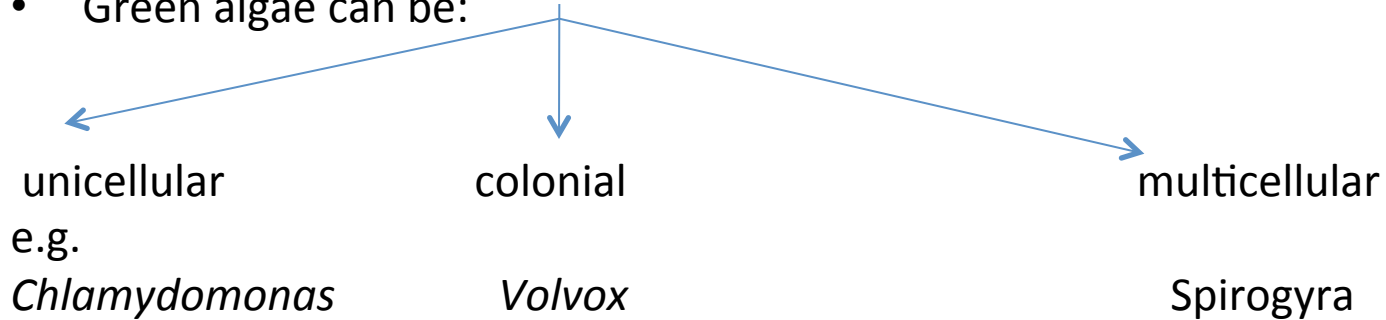
ومن الامثلة عليها هي طحلب البوليسيفونيا

An example is *Polysiphonia*

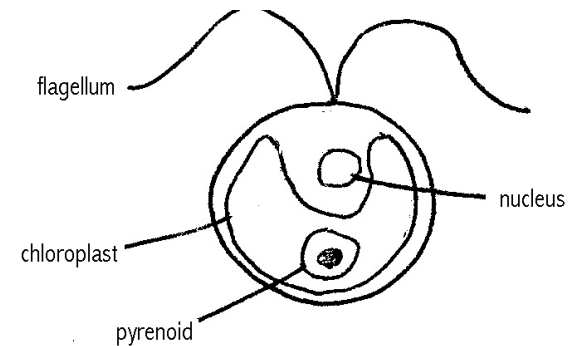
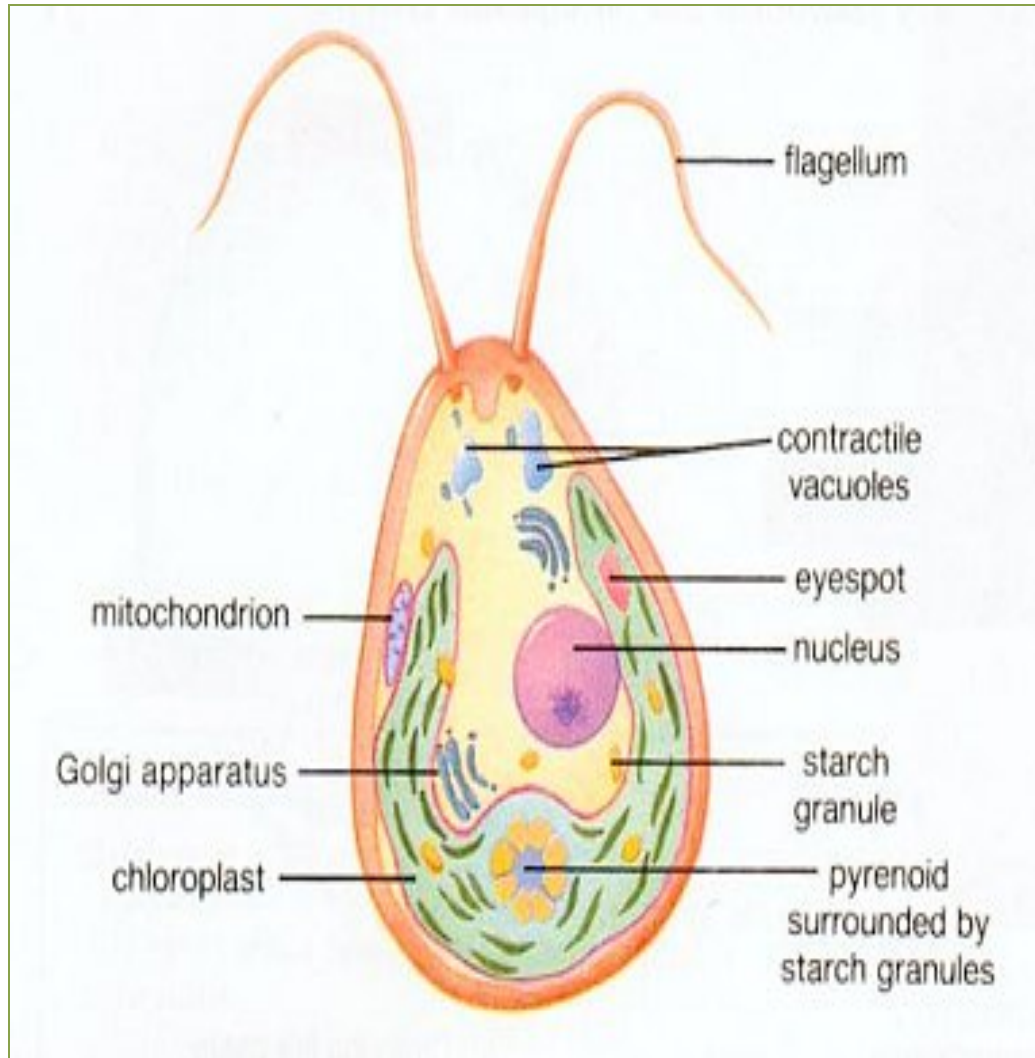


# Division: Chlorophyta (Green algae)

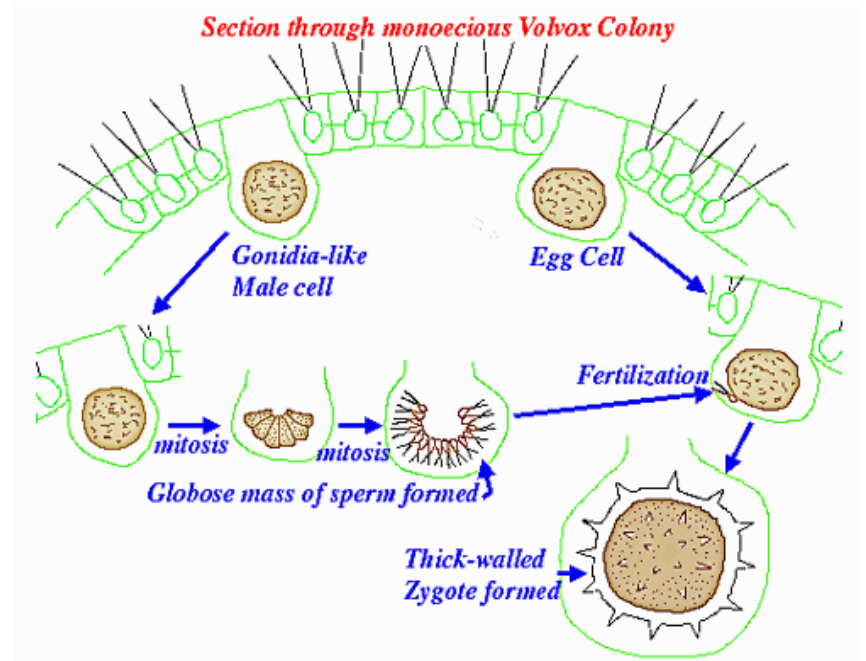
- chlorophyll                      main pigment.
- Most live in fresh water, although some marine species exist.
- Cell walls are composed of cellulose.
- Green algae can be:



# *Chlamydomonas* (unicellular alga)

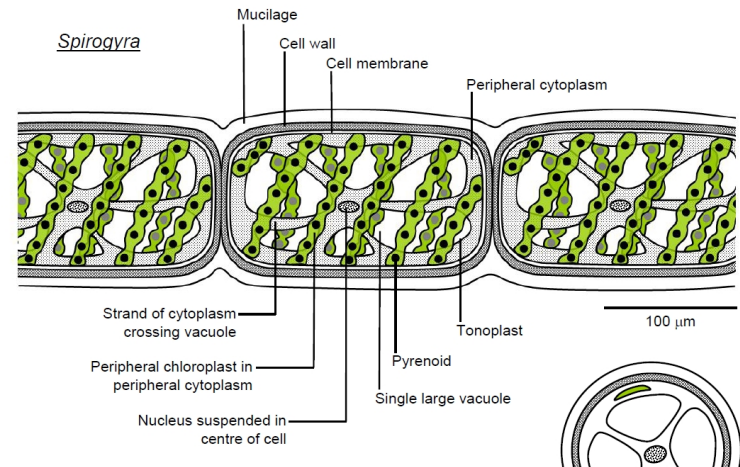
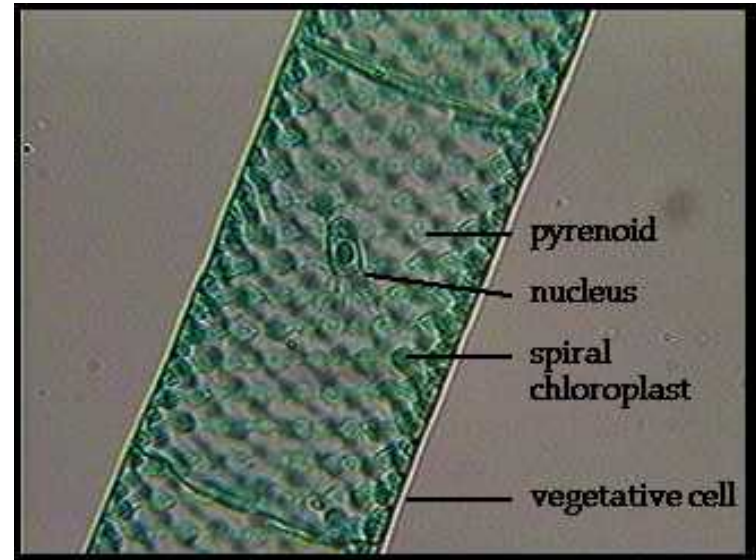
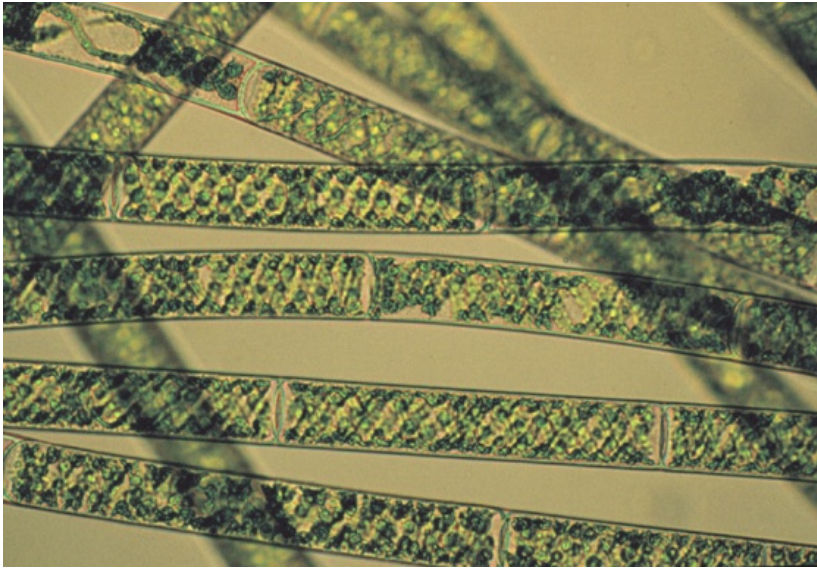


# *Volvox* (colonial alga)





# *Spirogyra*



## Uses of Algae as Energy source, Fertilizer, Food and Pollution control

1. **Agar**, a gelatinous substance derived from red algae, has a number of commercial uses. It is a good medium for bacteria and fungi as most microorganisms cannot digest agar.
2. Algae can be used to **make Biodiesel ,bioethanol and biobutanol** and by some estimates can produce vastly superior amounts of vegetable oil, compared to terrestrial crops grown for the same purpose.
3. Algae can be grown to produce hydrogen. observed that the algae he was studying, *Chlamydomonas reinhardtii* (a green-algae).

4. Algae can be grown to produce biomass, which can be burned to produce heat and electricity.
5. It is a complete protein with essential amino acids (unlike most plant foods) that are involved in major metabolic processes such as energy and enzyme production.
6. It contains high amounts of simple and complex carbohydrates which provide the body with a source of additional fuel. In particular, the sulfated complex carbohydrates are thought to enhance the immune system's regulatory response.
7. It contains an extensive fatty acid profile, including Omega 3 and Omega 6. These essential fatty acids also play a key role in the production of energy.

8. It has an abundance of vitamins, minerals, and trace elements
9. Pet foods, toothpaste, ice-creams, lotions and creams.
10. Algae are used as fertilizers, soil conditioners and are a source of livestock feed.
11. Algae are used in “wastewater treatment” facilities, reducing the need for greater amounts of toxic chemicals.

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