
Phycology
(Biol. 2030)
Welcome



Phycology

Biol. 211

Misrakneh bezabih

hawassa University

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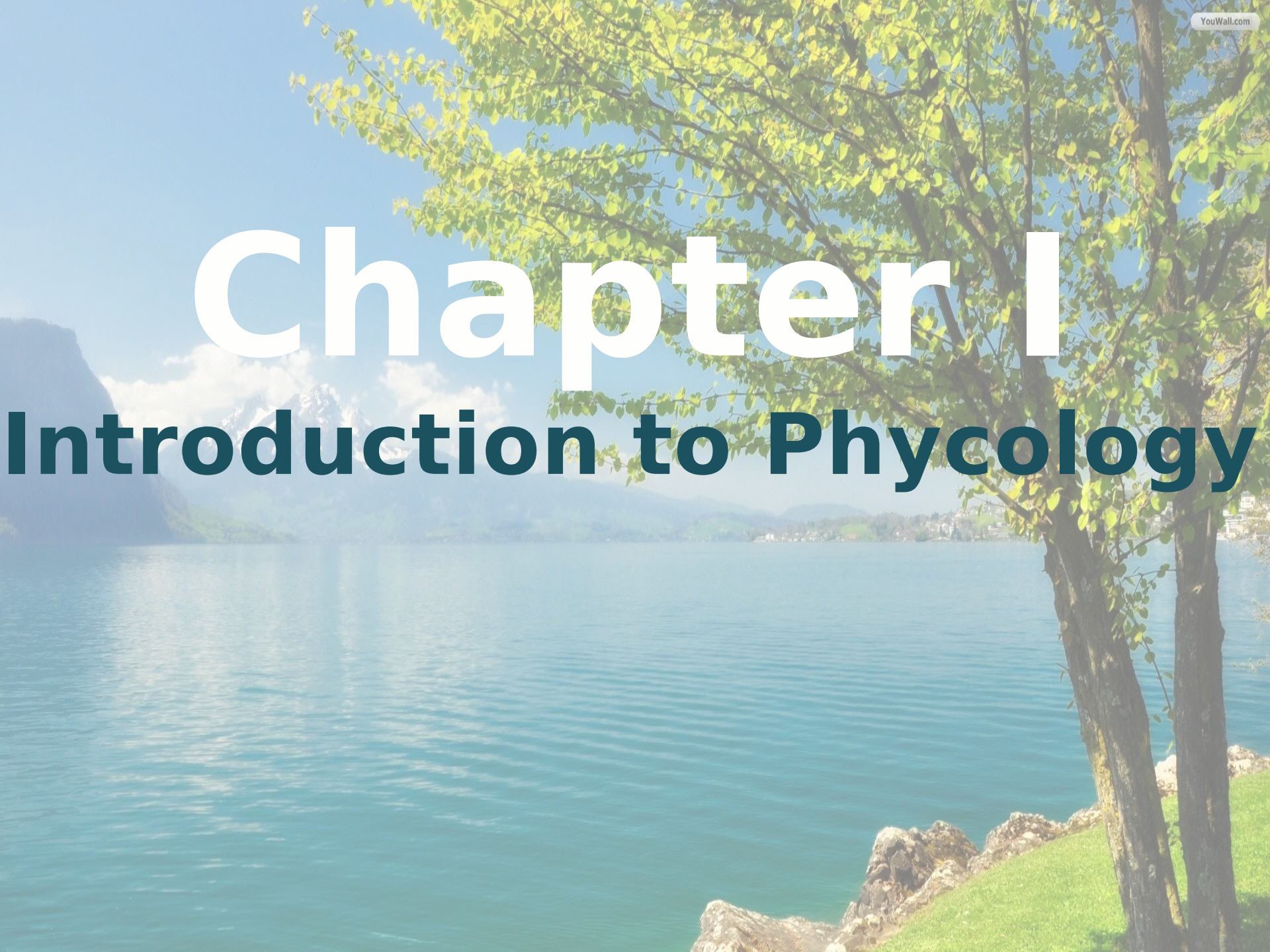
Course Objectives

At the end of the course, a student will be able to:

- *Explain the **main characteristics** of algae.*
- *Identify the **different groups** of algae.*
- *Explain the **physiology and ecology of algae**.*
- *Explain the **mode of reproduction** of each group of algae.*
- *Describe the **economic benefit of algae** in real life situation.*
- *Discuss the **importance of algae as bio-indicators** of water pollution in aquatic systems.*
- *Describe the **evolutionary position** of algae.*



Chapter I

Introduction to Phycology

Introduction to Phycology

- **Phycology** is a Greek word:
  - **Phykos** 'seaweed'
  - **Logy** 'study' = **is the scientific study of algae.**

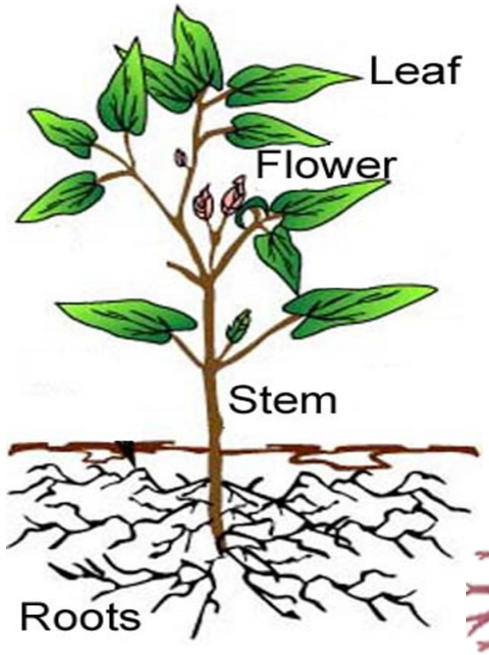
- Phycology is a branch of life science and often is regarded as a **sub-discipline of botany.**

Algae:

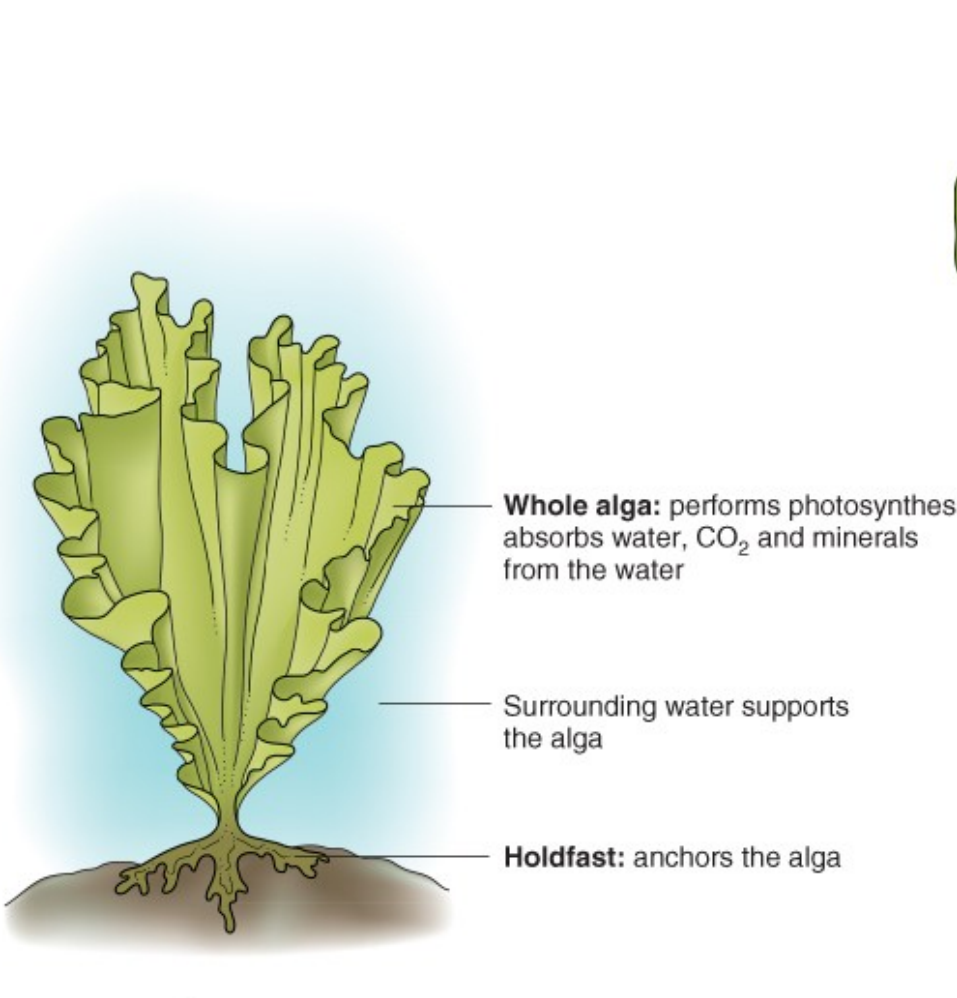
- Algae are important organism as **primary producers** in aquatic ecosystems
- Most algae are **eukaryotic, photosynthetic organisms** that live in a wet environment.
- They are distinguished from the higher plants by a lack of true roots, stems or leaves.

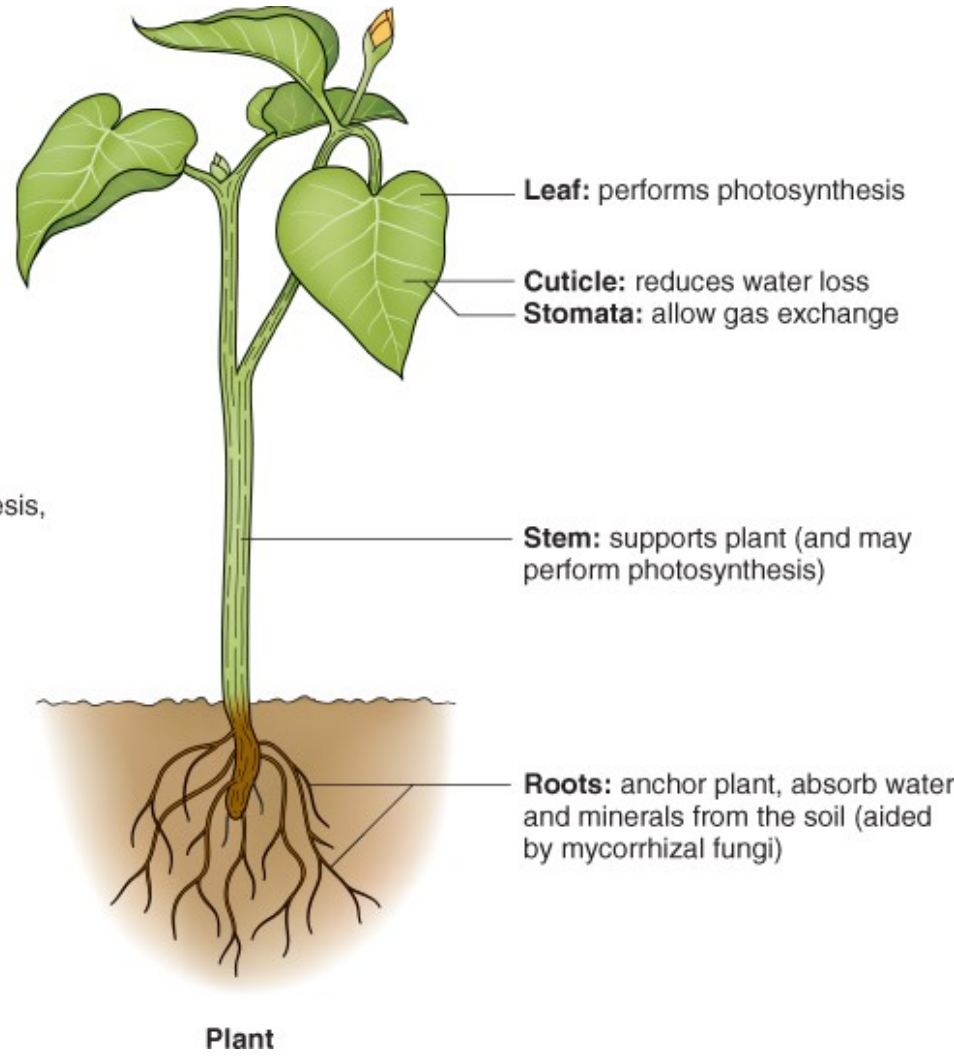
- They are distinguished from the higher plants

They lack true roots, stems or leaves.






Whole alga: performs photosynthesis, absorbs water, CO_2 and minerals from the water
Surrounding water supports the alga
Holdfast: anchors the alga
Alga


Leaf: performs photosynthesis
Cuticle: reduces water loss
Stomata: allow gas exchange
Stem: supports plant (and may perform photosynthesis)
Roots: anchor plant, absorb water and minerals from the soil (aided by mycorrhizal fungi)
Plant

Algae - What are they?



- Primitive plants
- No true roots, only attachment structures (Holdfasts)
- Produce spores (not seeds)– motile or non-motile
- Most have sexual and asexual reproduction
- Non-vascular, do not possess an internal transport system.



- Many species are **single-celled** and **microscopic** (including phytoplankton and other microalgae)

- Many others are **multicellular** to one degree or another, some of these growing to large size (for example, seaweeds such as **kelp**





Phycologist:

- **is a person who studies a**



Algae:

- Are a large and diverse group of simple, typically autotrophic organisms,
- Size ranging from unicellular to multicellular forms, such as the giant **kelps** that grow to 65 meters in length.
- The largest and most complex marine forms are called **seaweeds.**
- They are photosynthetic, like plants, and "simple" because they lack the many distinct organs found in land plants.
- The term algae are now restricted to eukaryotic organisms. All true algae therefore have a nucleus enclosed within a membrane and plastids bound in

- They exhibit **a wide range of reproductive strategies**, from simple, asexual cell division to complex forms of sexual reproduction.

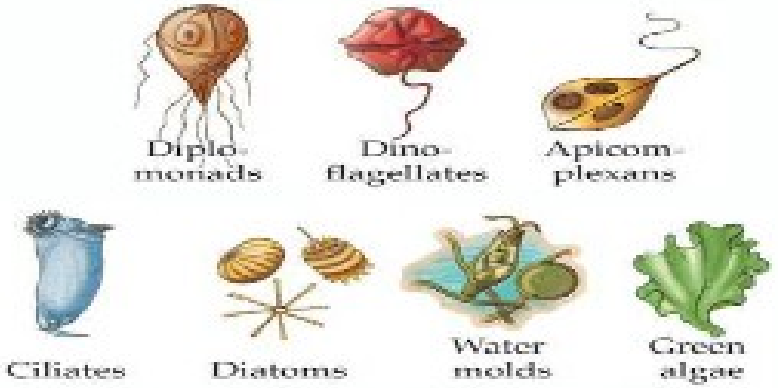
- Algae **lack the various structures that characterize land plants**, such as phyllids (leaves) and rhizoids in nonvascular plants, or leaves, roots, and other organs that are found in tracheophytes (vascular plants).

- Many are **photoautotrophic**, although some groups contain members that are **mixotrophic**, deriving energy both from photosynthesis and uptake of organic carbon either by **osmotrophy, myzotrophy, or phagotrophy**.

1.1 Forms of Algae

- The body of algae is called **Thallus**.
- The thallus can be:
  - **Unicellular forms**
  - **Colonial algae**
  - **Filaments form**
  - **Siphonaceaous form**
  - **Parenchymatous form**

1.Unicellular forms

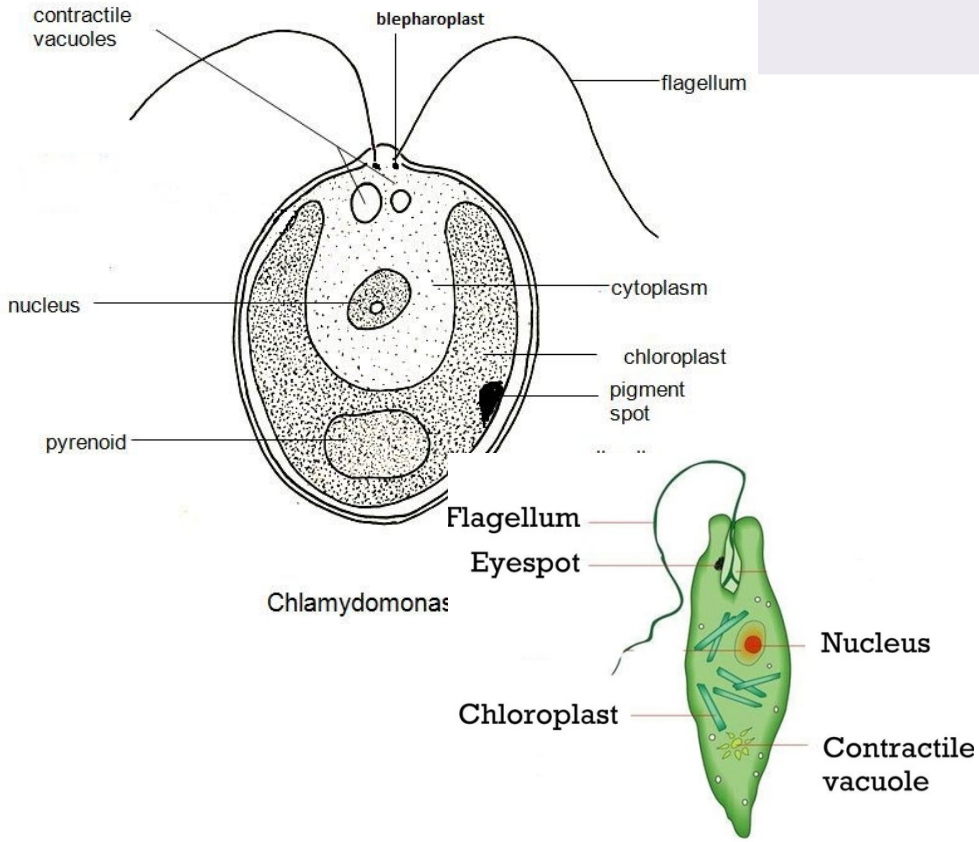


- Motile (flagellated) or none mo
- Diverse group
- Each cell is independent organ
- Mostly aquatic
- Are also called phytoplankton- algae like which simply float in aquatic environment
- Are producers and release oxygen in aquatic environment

Unicellular algal forms

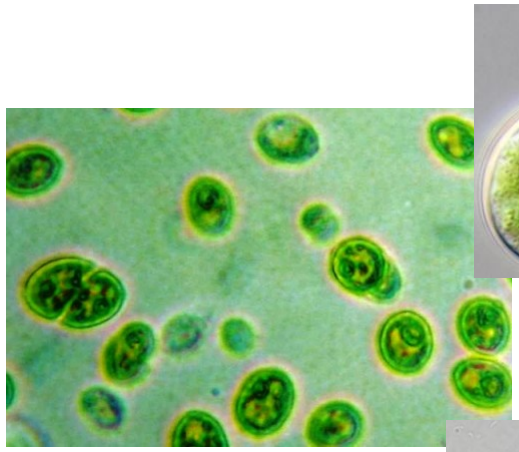
Motile forms

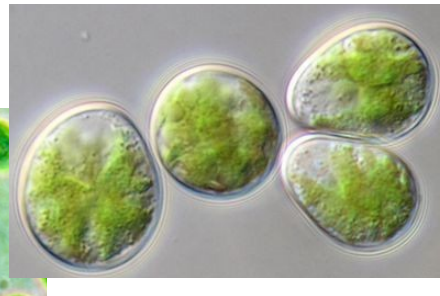
Euglenophycea: **euglena & phacus**
Cryptophycea: **cryptomonas & chromonas**
Chrysophycea: **chrysococcus**
Chlorophycea: **chlamydomonas**

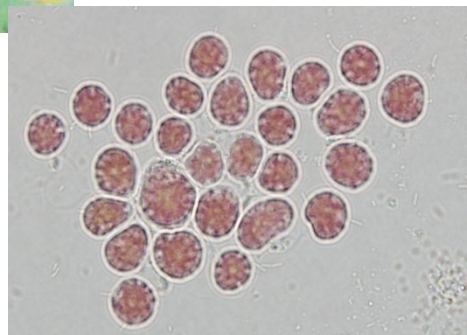


Non-motile forms

Myxophycea: **Synechococcus**
Chlorophycea: **Chlorella & Chlorococcum**
Crysophycea: **Chrysophaera**
Dinophycea: **Cystodinium**
Rhodophycea: **Porphyridium**







2. Colonial forms

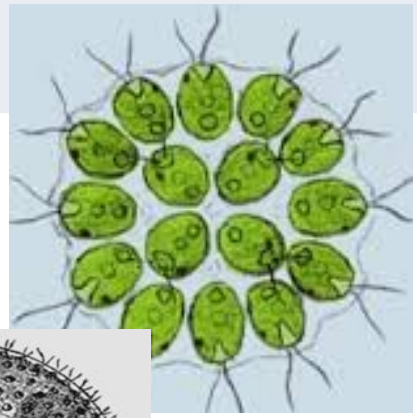
- A group of algae embedded by an amorphous or mucilaginous substances
- Move and function as a **unit***
- Constant or variable cell number
  - **Coenobium**: Colony with constant number of cells, which cannot survive alone; specific tasks among groups of cells is common

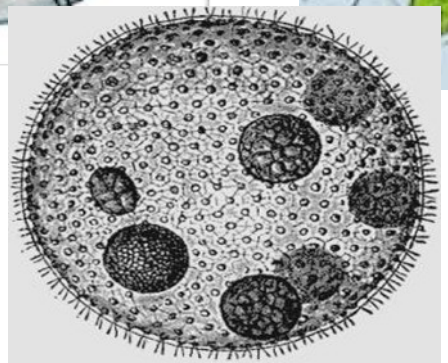
- The assemblage allows the **colony to move, feed and reproduce efficiently:**
  - in the assemblage cells act as in a **coordinated manner**, but no level of organization.
- The colony can be motile and none motile

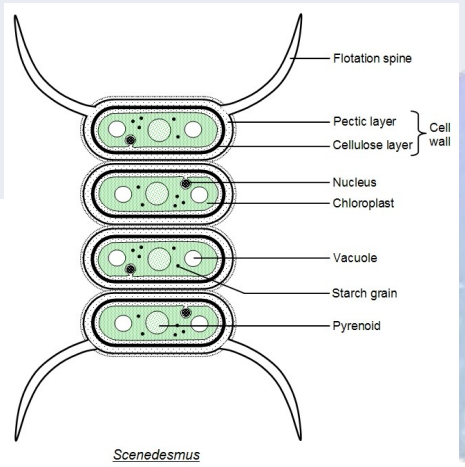
Colonial algae

Motile colonial form	None motile colony form (are coenobium)
Dinophycea: Ceratium, Gonyaulax Chrysophycea: Synura, Chlorodesmus Chlorophycea: Volvox, Pandoria,	Chlorophycea: Scenedesmus, Pediastrum, Coelastrum

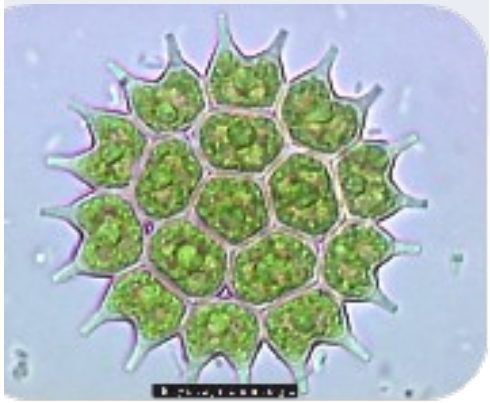


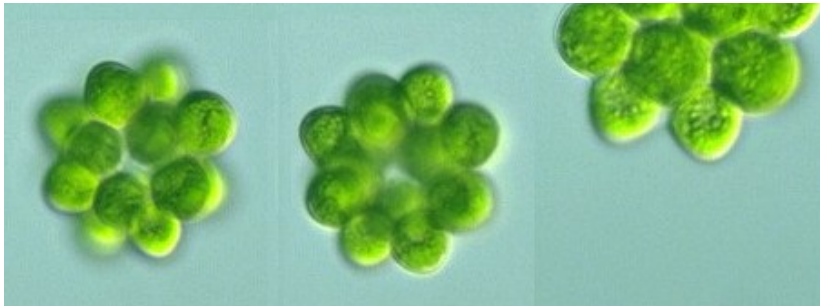






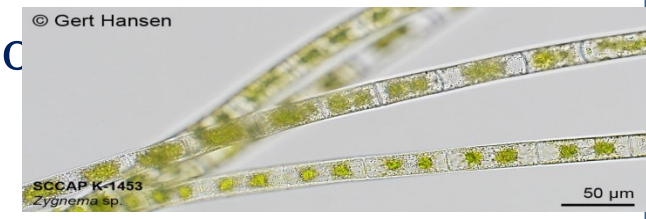
Scenedesmus





3. Filaments form:

- Composed of a row of cells in a **linear arrangement**
- Daughter cells remain attached after cell division and f chain
- Adjacent cells share cell wall (different from linear colony)
- Most filaments have structures that anchor to the bottom of substratum
- Can be unbranched filaments (uniseriate) c (multiseriate)



- **Unbranched filaments (uniseriate)**:
  - Spirogyra, Ulothrix, Spirulina, Nostoc, Oscillatoria, Anabena, Phor Chlorophycea, Myxophycea and Xan

- **Branched forms**:
  - Cladophora, Pithophora, Phaeotham

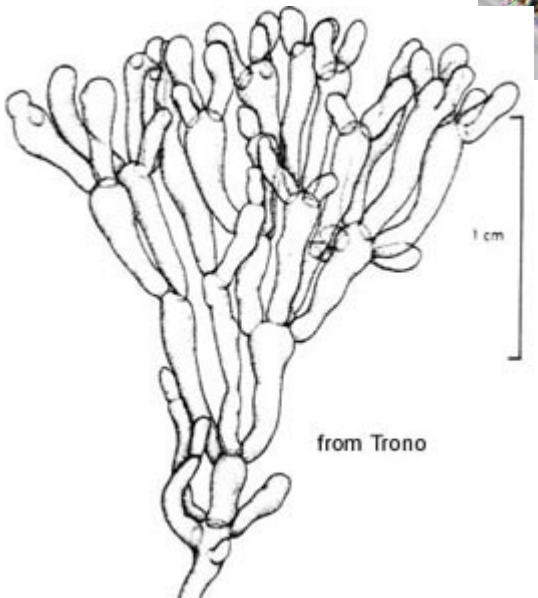


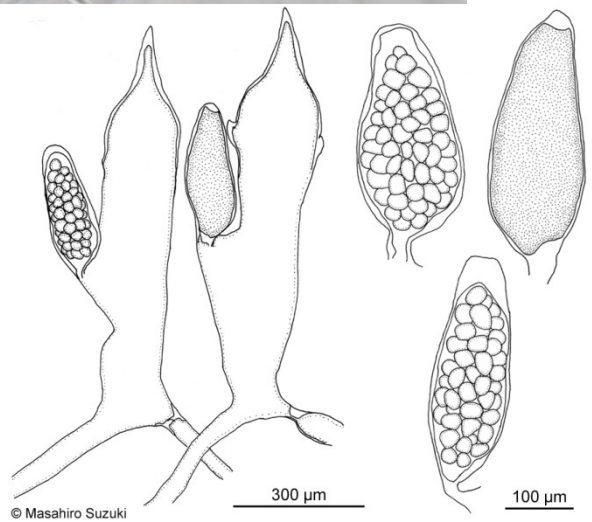
Siphonaceaous form

- a **large central siphon** like vacuole present
- one **large, multinucleated cell without cross wall (septa)**
- found only in Chlorophycea and Xanthophycea
- Eg. Vaucheria, Codium, Batrydium, Valonia









Parenchymatous form

- are **macroscopic** algae
- have **tissue of undifferentiated cells**
- growth originated from a meristem with cell division in three dimension
- Eg. Ulva, Sargasum, Kelb, Enteromorpha



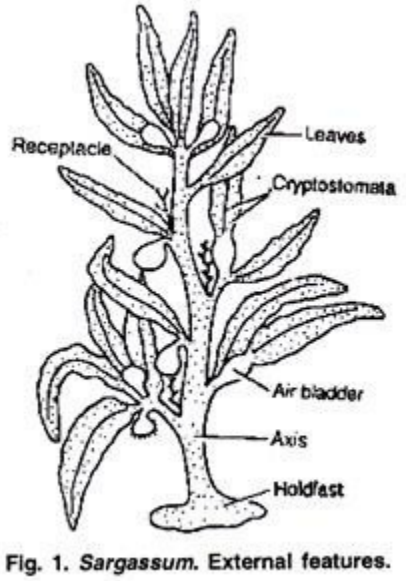


Fig. 1. *Sargassum*. External features.







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