

TP 01 : Algae

Algae are a diverse group of photosynthetic organisms found in various aquatic environments, including freshwater, marine, and even terrestrial habitats. They can be unicellular (such as *Chlorella*) or multicellular (such as *Ulva lactuca*). Algae play a crucial role in ecosystems as primary producers, forming the base of aquatic food chains.

Major Groups of Algae :

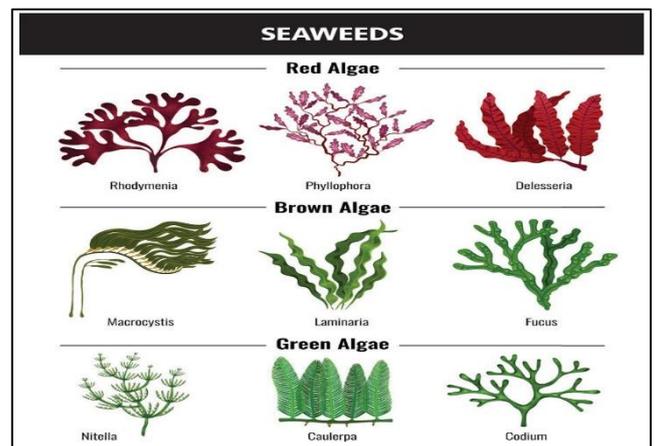
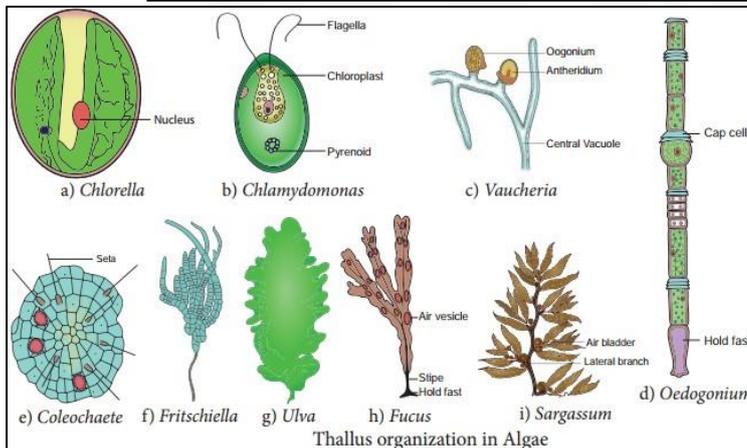
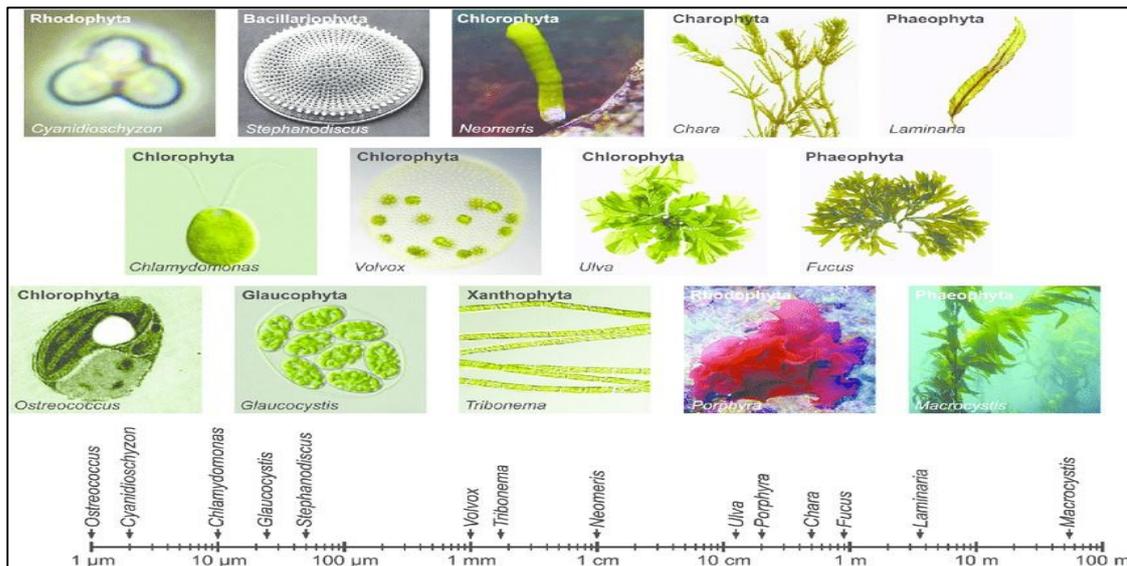
Green Algae (Chlorophyta) : Includes *Ulva*, *Chlorella*, and *Spirogyra*; found in freshwater and marine environments.

Brown Algae (Phaeophyta) : Includes *kelps* and *Fucus*; mostly marine and multicellular.

Red Algae (Rhodophyta) : Includes *Porphyra* ; often found in deeper marine waters.

What is a thallus ?

A thallus is the vegetative body of algae, fungi, and some non-vascular plants. Unlike the body structures of higher plants, a thallus lacks **true roots, stems, or leaves** and is composed of undifferentiated tissue.



Algae diversity

Description of some species of Algae:

Ulva lactuca (Sea Lettuce)

Ulva lactuca, commonly known as **sea lettuce**, is a species of green algae belonging to the **Chlorophyta** phylum. It is a truly cosmopolitan alga, found almost everywhere on the planet in **marine environments**.

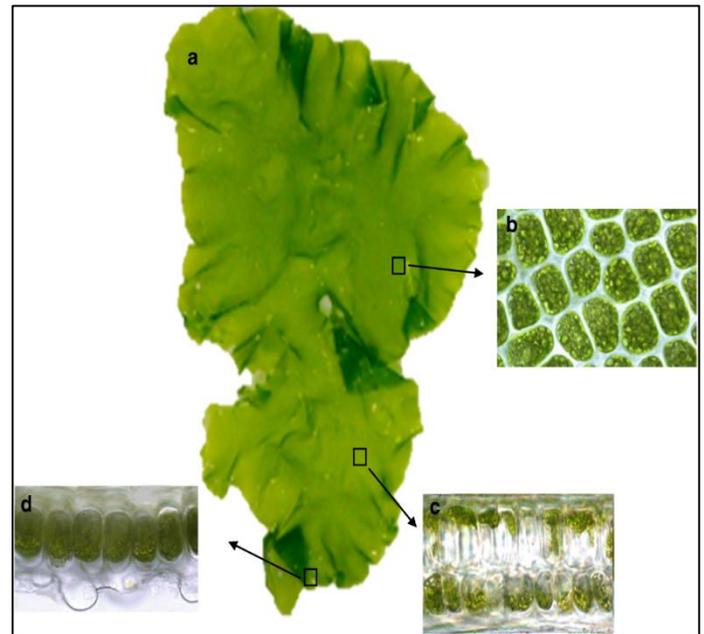


Morphology

- **Thallus Structure:** Thin, flat, and translucent green sheets.
- **Size:** Generally **20–60 cm**, but can grow up to **1 meter** in nutrient-rich waters.
- **Color:** Varies from **dark green to light green**.
- **Layers:** The thallus consists of **two layers of cells** separated by a gelatinous substance.
- **Attachment:** Fixed to rocks or substrates via a **holdfast (crampon)**.

Habitat & Distribution

- Found in **shallow waters** (up to **10 meters deep**).
- Grows in **temperate and tropical seas**, including the **Atlantic, Pacific, Mediterranean, and Indian Oceans**.
- Tolerates **pollution and high nutrient levels**, making it common in **ports and runoff areas**.



Reproduction

- **Alternation of Generations:** Has both **haploid (gametophyte)** and **diploid (sporophyte)** stages.
- **Asexual Reproduction:** Fragmentation, where broken pieces regenerate into new individuals.
- **Sexual Reproduction:** Gametes are released into the water for fertilization.

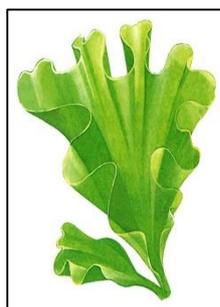
Ecological & Economic Importance

- **Primary Producer:** Supports marine food chains.
- **Bioindicator:** Grows in polluted waters, indicating nutrient imbalances.
- **Edibility:** Consumed in some cultures, rich in **vitamins, minerals, and proteins**.
- **Aquaculture & Biotechnology:** Used in fertilizers, animal feed, and biofuel research.



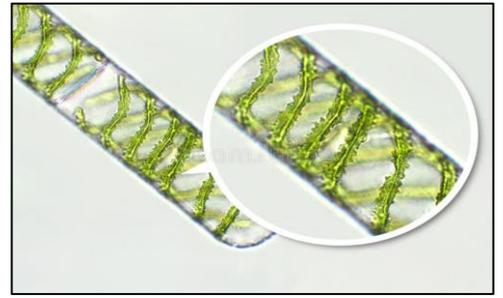
Classification of *Ulva lactuca*

- **Kingdom:** Plantae
- **Phylum:** Chlorophyta
- **Class:** Ulvophyceae
- **Order:** Ulvales
- **Family:** Ulvaceae
- **Genus:** *Ulva*
- **Species:** *Ulva lactuca*



Spirogyra

Spirogyra is a genus of filamentous **green algae** belonging to the **Chlorophyta** phylum. It is known for its **spiral-shaped chloroplasts**, which give it its name. *Spirogyra* is commonly found in **freshwater environments**, forming slimy, green masses in ponds, lakes, and slow-moving streams.



Morphology

- **Filamentous Structure** : Composed of **long, unbranched chains of cylindrical cells**.
- **Chloroplasts**: Arranged in a **spiral shape** inside the cells.
- **Cell Wall**: Composed of **two layers**—the outer layer contains **pectin**, which gives *Spirogyra* a slimy texture.
- **Cytoplasm & Nucleus**: The cytoplasm surrounds a large **central vacuole**, with the **nucleus suspended** in strands of cytoplasm.

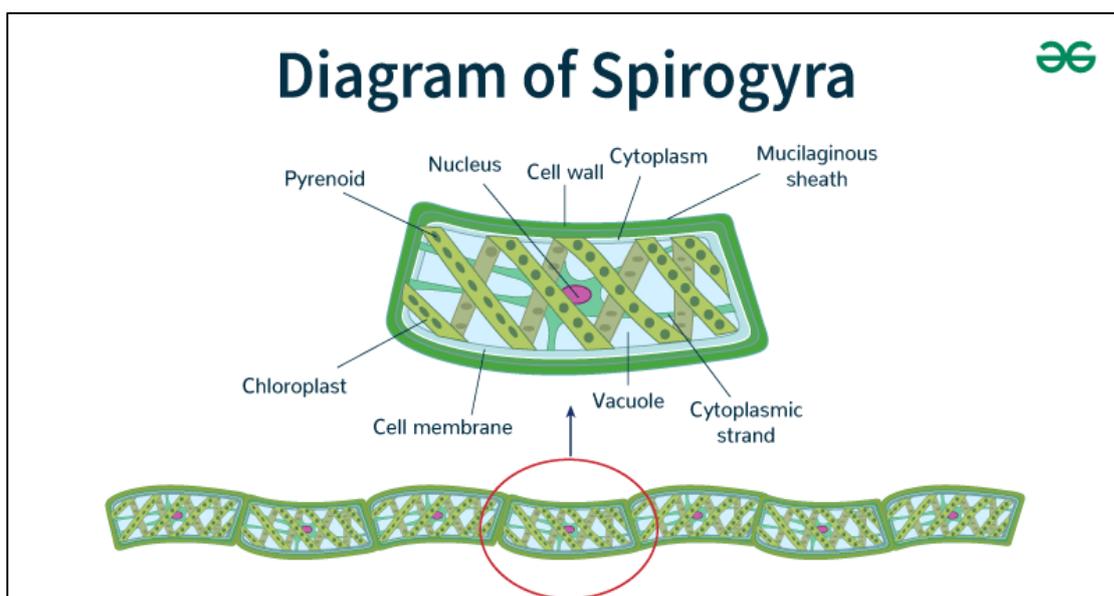


Habitat & Distribution

- Found in **freshwater environments** such as ponds, ditches, lakes, and slow-moving streams.
- Prefers **clear, nutrient-rich waters** and often forms **floating mats** on the water surface.
- Some species may attach to rocks or sediments.

Reproduction

1. **Asexual reproduction**:
 - Occurs through **fragmentation**, where filaments break and grow into new individuals.
2. **Sexual Reproduction (Conjugation)**:
 - Two filaments align and form **conjugation tubes**.
 - One filament transfers genetic material to another, forming a **zygospore**.
 - The zygospore **germinates** under favorable conditions to produce a new filament.



Ecological & Economic Importance

- **Oxygen Production** : Contributes to **oxygen levels** in freshwater ecosystems through **photosynthesis**.
- **Food Source** : Forms part of the **food chain**, supporting aquatic life.
- **Water Quality Indicator**: Presence of *Spirogyra* may indicate **nutrient-rich** or **polluted** water.
- **Biofuel & Biotechnology**: Studied for its potential use in **biofuel production**.

Classification of *Spirogyra*

- **Kingdom**: Plantae
- **Phylum** : Chlorophyta
- **Class** : Zygnematophyceae
- **Order**: Zygnematales
- **Family**: Zygnemataceae
- **Genus**: *Spirogyra*

Tasks to complete :

Observe some species of algae (*Ulva*, *Spirogyra*, ...) under a microscope and draw its morphology.

Add labels and a title to the drawings.

Include the magnification used for observations under the loupe or microscope.

Always use the same format for scientific names (underlined).