# Department of biology

## 2025-2026

# ((Plant groups))

## Stage ( 2 )

## ((Second lecture))

## Cyanobacteria (blue-green algae) part1

**By**

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# Algology

**Definition of algae**: They are simple non-flowering plants (Thallophytes) that do not form flowers (non-vascular) and do not have vessels of Xylem and phloem (they also lack roots, stems and leaves). They perform photosynthesis (autotrophic) because they contain the pigment chlorophyll (a). It also has simple reproductive organs.

# Environment and presence

- 1- Some species are found in marine waters either suspended or attached.
- 2-Some species can live in polar environments, such as the genus Phormidium.
- 3-Some species spread on land, attached to soil, rocks, and damp walls.
- 4-Some species can live in polluted water and soil.

# General characteristics of algae

- **1-** All algae are eukaryotic except for algae Blue-green.
- **2-** Contains chlorophyll pigment, so it is autotrophic.
- **3-** Algae are devoid of vessels and flowers.
- **4-** Algae live in different structures, they may live in salt or fresh water, or on the surface of the soil.

- **5-** Regarding movement, some types of algae move automatically and others do not move.

# Algae divisions

| | |
|---|---|
| Blue-green algae<br>Division : Cyanophyta | Golden algae<br>Division :Chriysophyta |
| Green algae<br>Division :Chlorophyta | Pyrophyll algae<br>Division :Pyrrophyta |
| Brown algae<br>Division :Phaeophyta | Euglena algae<br>Division: Euglenophyta |
| Red algae<br>Division :Rhodophyta | Karite algae<br>Division :Charophyta |

# Principles of Classification of Algae

## 1- Cell wall structure

After cell wall composition, one of the basic characteristics in classifying algal groups is that algae differ in the chemical composition of their wall. In blue-green algae, mucopeptide components are the main components of cell walls, while cellulose fibrils and hemicellulose are the main components of green algae cell walls. In brown algae, in addition to cellulose, there are other components, including alginic acid and sulfur polysaccharide compounds.

## 2- Plastids and synthetic pigments

The shape and internal structure of plastids are among the basic taxonomic characteristics of algae. Their shapes include cup-shaped, discoid, stellar, net-like, and others. They may also be central or practical. In blue-green algae, there are no plastids, but individual photosynthetic plates are scattered in the peripheral cytoplasm, and phycobilosomes, pigment granules of bioproteins, are attached to the thylakoids. In green, red, and Kilic algae, plastids are surrounded by a

bilayer membrane. In euglenoid algae, plastids are surrounded externally by a single membrane of the endoplasmic reticulum.

## 3- Storage Products

Or after stored food, it is also one of the principles adopted in classifying algal groups. In blue-green algae, food is stored in the form of starch of the type Cyanophycean starch Myxophycean starch, while food is stored in red algae in the form of Floridian starch (similar in composition to the starch of higher plants and known as) Amylose and

Amylopectin, while food is stored in the form of Amylose in green and karyophyte algae. As for brown algae, food is stored in the form of Laminarin and Mannitol's in the form of liquid, oil-like granules outside the plastid.

## 4- Flagella

The presence or absence of flagella, their nature, location, and number are important points for classifying algal groups. All algae phyla, with the exception of blue-green algae and red algae, contain flagella, whether in mature cells or in reproductive stages.

## 5- Cell structure

Cell structure varies according to the algal divisions in some forms. For example, it is noted that the cells of blue-green algae are prokaryotic, as there are no true nuclei or plastids, and the cell organelles are not surrounded by specific membranes, while other algae are eukaryotes, as they have a true nucleus surrounded by a membrane, as well as other cell organelles.

## Growth in algae

1. **Diffuse or generalized growth** (In this type of growth, all cells of the algal body (multicellular) divide, thus increasing the size of the algae, as in ***Ulva***.

**2. Localized growth** (This type of growth is the most widespread in algae, as the cells in which growth occurs are located in specific locations in the algae's body. These cells divide to add new cells to the body).

**3. Trichothallic growth**

It is observed in some genera of brown algae, such as ***Ectocarpus***, where the filament grows through division of a number of the cells that make up that filament.

# Types of Localized growth

- A. Apical growth EX / (*Chara and Cladophora*).
- B. Basal growth EX / (*Bulbochaete*).
- C. Intercalary growth EX (*Oedogonium and Laminaria*).

# Reproduction in Algae

## 1. Vegetative Reproduction

Some unicellular algae reproduce by simple cell division. This cell division may be repeated sequentially and is sometimes called binary fission, as in the algae ***Gleocapsa***. In simple filamentous genera, aggregate colonies, and some multicellular and thallus genera, they may sometimes reproduce by fragmentation, the growth of

separate parts into new individuals, as in the algae Microcystis.

## 2. Asexual Reproduction

Among the reproductive cells that grow into new algae without uniting with other cells are spores. They are single cells that are considered a means of asexual reproduction and are formed in the vast majority of algae.

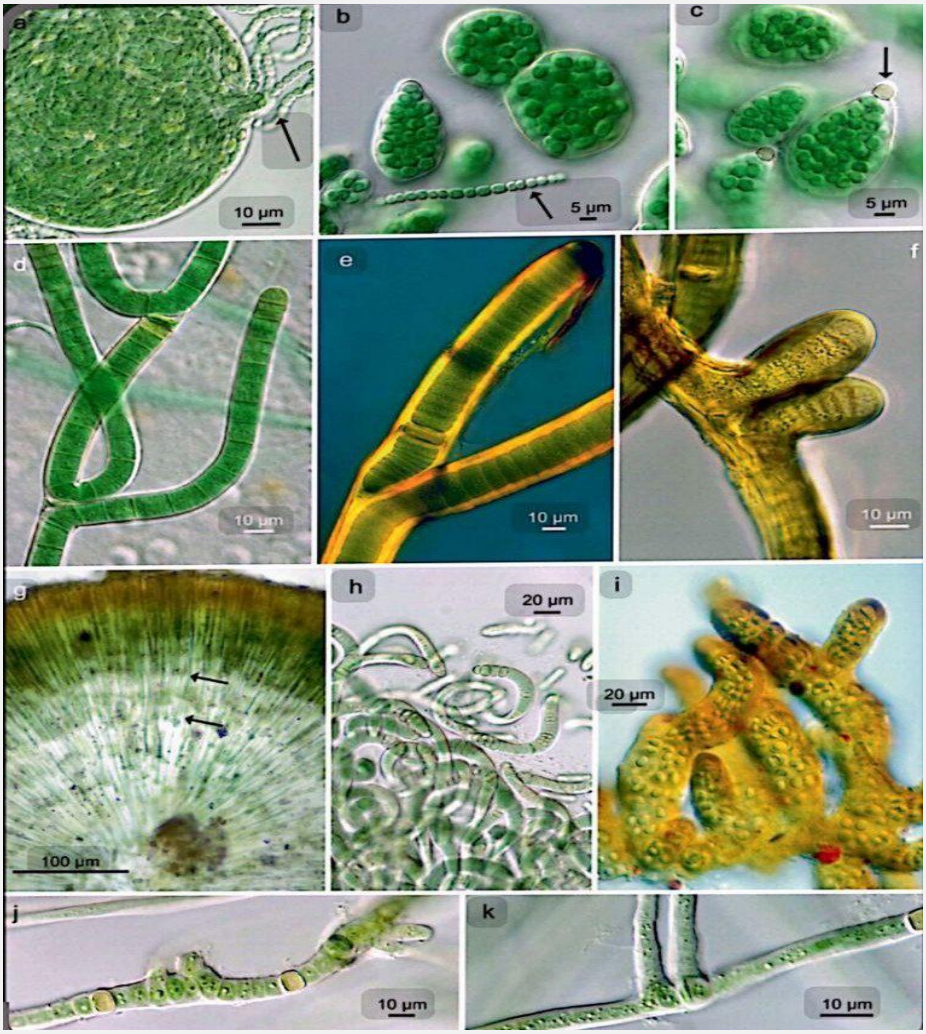
## 3. Sexual Reproduction

Sexual reproduction occurs by the union of two cells. The protoplast unites in a process called plasmogamy, followed by the union of the two nuclei (karyogamy). The sexual

reproductive cells are called gametes. They may form inside ordinary vegetative cells or inside specialized cells (gametangia).

## Cyanobacteria (Blue-green algae)

- Blue-Green Algae are a type of photosynthetic bacteria consisting either of single cells or colonies which is also known as the Cyanobacteria.
- Cyanobacteria contain only one type of chlorophyll, Chlorophyll a, a green pigment. In addition, they also contain pigments such as carotenoids, phycobilin.




# Shape of Cyanobacteria

# Environment and presence

1- Some species are found in marine waters either suspended or attached.

2- Some species can live in polar environments.

3- Some species can live in polluted water and soil.

4- Some of its species are spread on land, attached to soil, rocks and wet walls.