

## Major Plant Categories and Associated Groups

- Algae
- Fungi
- Lichens
- Ferns, horsetails and club mosses
- Mosses and liverwoets
- Conifers (gymnosperms)
- Flowering plants (angiosperms)

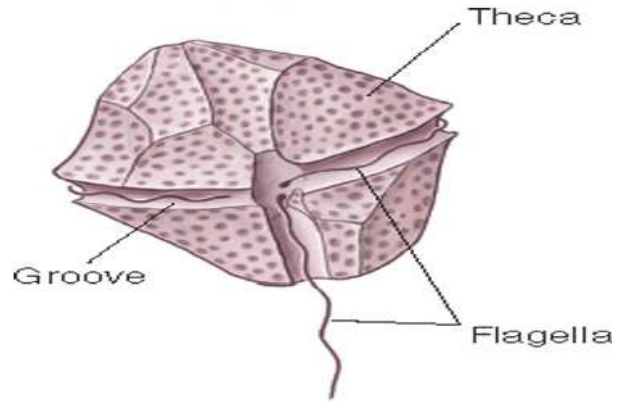
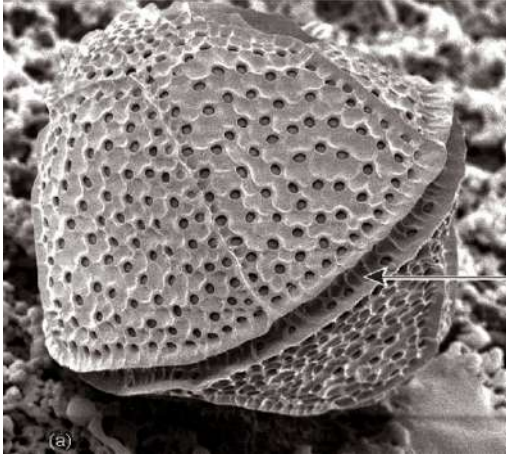
- **Algae**

The algae include both the smallest and simplest of green plants as well as the giant kelps, which are among the largest of plants. Algae can be green, red, brown, yellowish, or purple, depending on the pigments in their cells. The green algae are grass green in color, may be one-celled, colonial, or filamentous, and are among the most widely distributed of all the algae, with species usually inhabiting fresh water and forming large colonies on the surface. They are important as a source of food for fish and other aquatic animals. Sometimes they become so abundant that they pollute waters, give off vile odors, choke streams, and clog filters in water purifying facilities.

- The yellow-green and golden-brown algae are found most often in cold brooks, mountain streams, and springs. The related diatoms are important food for fish, and are so abundant in marine waters that they are called the “grass of the sea.” The empty, beautifully ornamented siliceous walls of dead diatoms settle in marine waters and often accumulate, forming diatomaceous earth, which is used as a mild abrasive in polishes, cleansers, and toothpaste, and in insulation.
- The blue-green algae have blue and red pigments as well as chlorophyll and are found in a variety of habitats, with most species in fresh water, although a

few are marine and some thrive in damp and shaded places, such as on the surfaces of soil, rocks, and flower pots. Some blue-green algae have the ability to “fix” atmospheric nitrogen into organic compounds. The brown algae, which include the giant kelps, have yellow, orange, or brown pigments and are almost entirely marine. They prefer cool water and are especially abundant in the Arctic and Antarctic oceans and along the coasts of the North Atlantic and North Pacific. Brown algae are important food for fish, are used in cattle feed, and are eaten by many people in Asia. Some brown algae are harvested for their abundant gelatinous compounds, which are used in ice cream, laxatives, and cosmetics. The red algae have a unique reddish pigment and are mostly marine, although a few species occur in fresh water.

- 1- Dinoflagellate: Two flagella (longitudinal and transverse flagella): one wrapped along a groove along the middle of the cell, the other trailing free.
  - Cells are covered by a theca (sheath) that can be smooth or ornamented. The theca is made of cellulose plates
  - Are unicellular plankton.
  - Move in whirling motion caused by transverse flagellum.
  - All dinoflagellate are autotrophs
  - 90% of dinoflagellate lives in oceans



**2- Diatoms:** silica shells

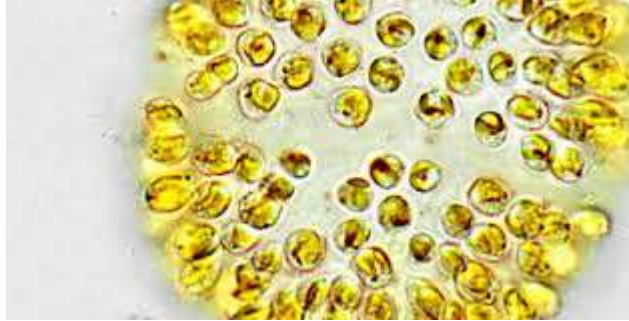
are single-celled algae. **Diatoms** are algae that live in houses made of glass. They are the only organism on the planet with cell walls composed of transparent, opaline silica. **Diatom** cell walls are ornamented by intricate and striking patterns of silica.

3-



**Chrysophytes:** golden algae –photosynthetic, fresh water genus *Dinobryon*

4-



pigments, *Laminaria*

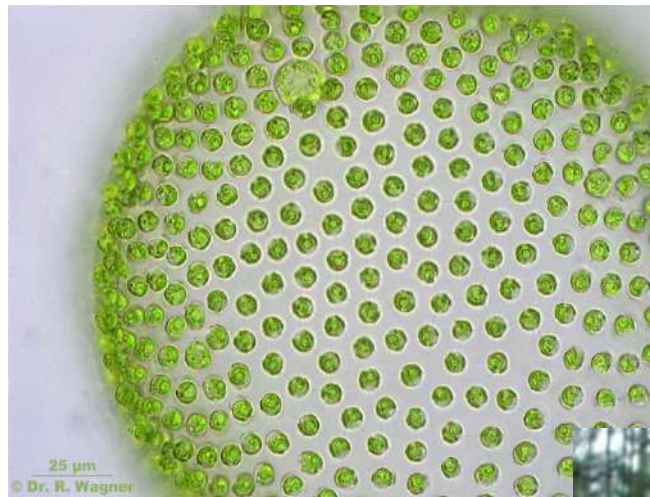
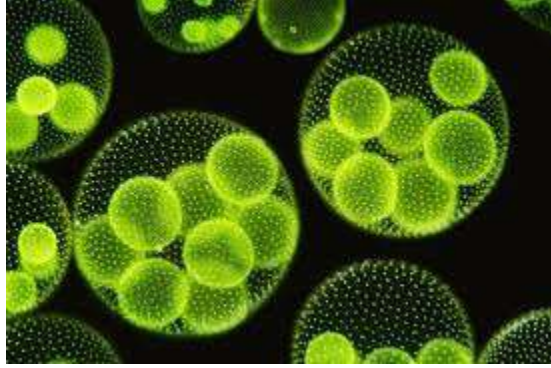
**Phaeophytes:** brown algae, fucoxanthin



- 5- **Rhodophyta:** Red algae- have photosynthetic pigments called phycobilins which include a red form (phycoerythrin) and a blue form (phycocyanin) enable them to photosynthesize at great depths  
Ex: *Bossiella*



- 6- **Chlorophytes:** Green algae- use chlorophyll, it has a cell wall of cellulose, store starch, gametophyte (N) and saprophyte (2N), unlike plants, maybe unicellular, presence of pyrenoids which are protein rich regions in the chloroplasts that are center for starch formation, e.g. *Spirogyra* (filamentous), *Chlamydomonas* and *Volvox*.



## **What are fungi???**

Fungi are a diverse group of organisms that are in their own kingdom (Fungi), separate from plants. Fungi do not contain chlorophyll or any other means of producing their own food so they rely on other organisms for nutrition. Fungi are widely known for their role in the decomposition of organic matter. They are also necessary for the survival of the ecosystem around them, such as partnering with plants and trees for nutrients and survival.

### **Eumycophyta**

Charaterastic of eyomycota

- Many reproduce both sexually and asexually, resulting in the production of spores
- Nuclei mostly haploid, some diploid
- Achlorophyllous – lack chlorophyll pigments and incapable of photosynthesis

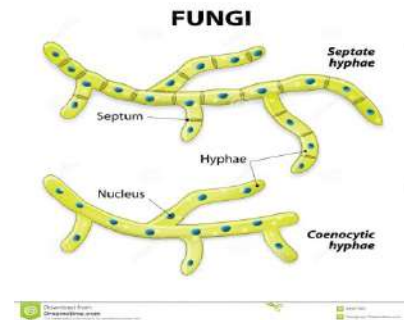
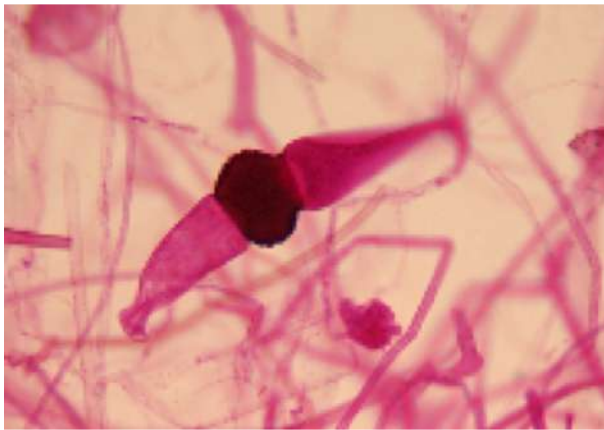
- All chemoheterotrophic – use energy from chemical reactions to synthesize the organic compounds they require for growth and energy
- May be free-living or may form mutualistic or symbiotic relationship with other organisms

### Classification of Eumycota

True fungi are grouped into five classes based on their method of reproduction, these classes are :

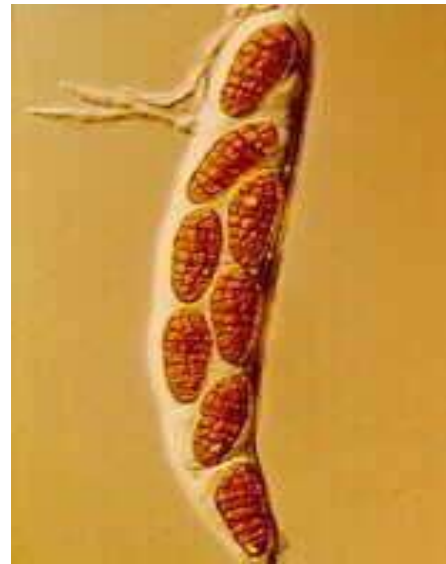
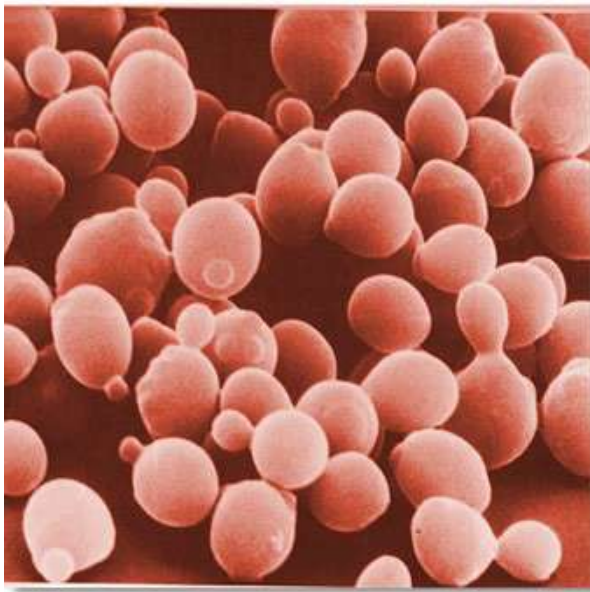
#### 1- Zygomycetes

- Sexual gametangia are similar
- Hyphae are coenocytic.



#### 2- Ascomystes( spores enclosed in sacs)

- Spores are endogenous, i.e. produced inside special sacs called asci.
- Hyphae are septated.

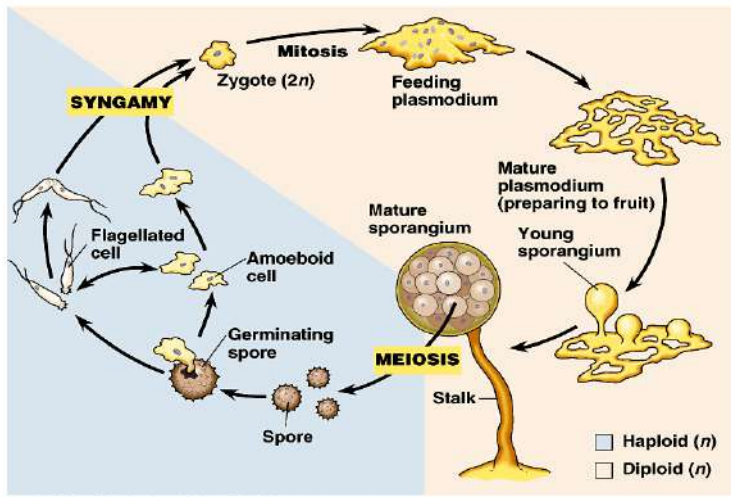


3- Oomycetes

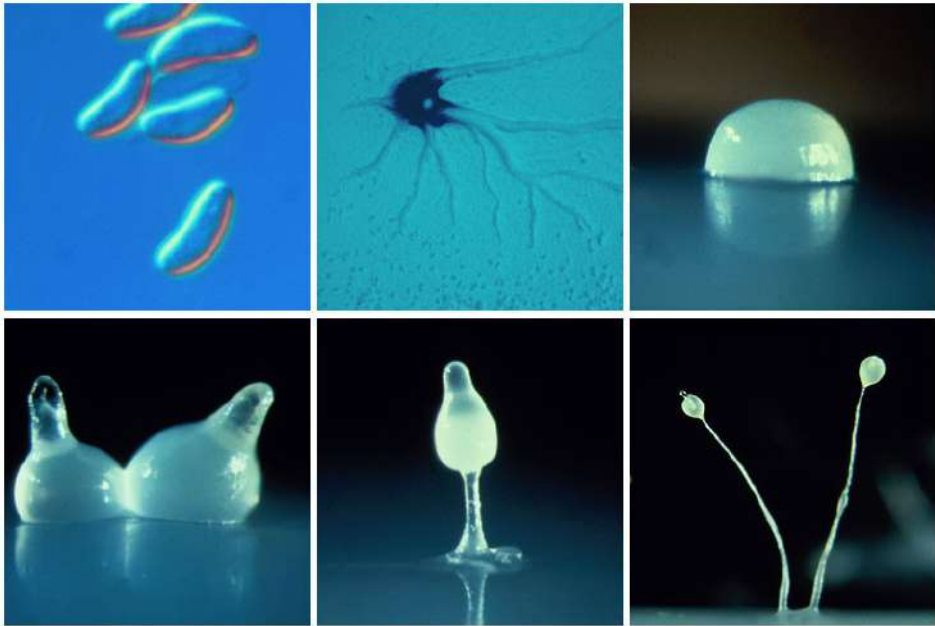
- Sexual gametangia are dissimilar, being distinguished into female gametangia or oogonia and male gametangia or antheridia.
- Hyphae are coenocytic.

### 1- Slime molds:

- Have both fungal and animal characteristic
  - a- Free living (amoeboid) stage, (Feeding stage): Single mass of cytoplasm undivided by membranes and have lots of nuclei, Eats by phagocytosis by extending pseudopodia through soil/leaf mulch/logs( mean branches and tree trunks greater than 6" (six inches) in diameter).Cytoplasm streams back and forth in pulsing flows called cytoplasmic streaming; helps distribute nutrients and oxygen
  - b- Reproductive stage (Sporangia):Fruiting bodies used in asexual reproduction:When out of food, it then functions like a unitCells maintain identity and are separated by membranes.Haploid (only zygote is diploid).Fruiting bodies used in asexual reproduction.No flagellated stages
- Are often brightly colored (Yellow or Orange)
- Live in cool damp place
- Bi-flagellate cells
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molds:



Water



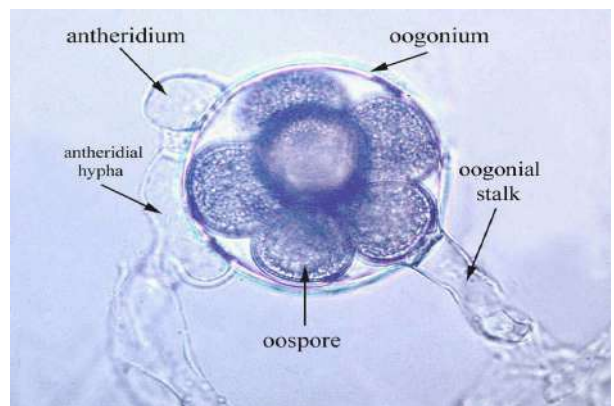
The water molds are better known as the **MILDEWS**. Fish tank fuzz is an example. Protist-like mold because share common characteristics with plant-like protists, such as the cell wall.



Important freshwater decomposers

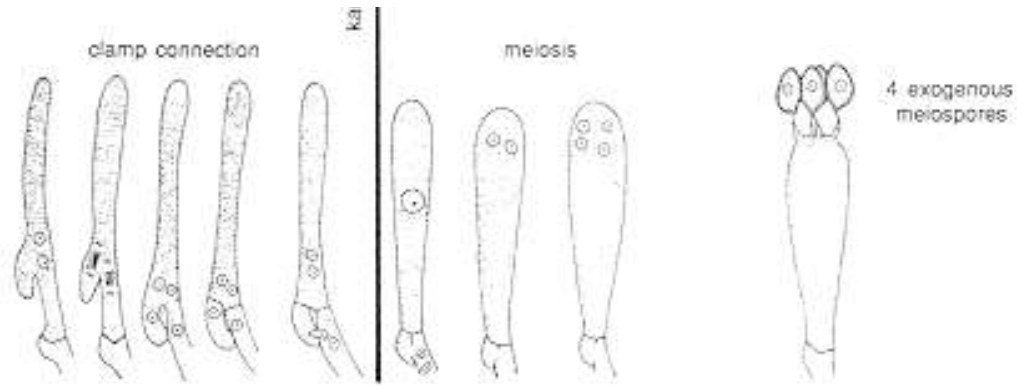
- **Asexual reproduction:** in asexual reproduction portions of the hyphae develop in spore case or zoosporangia. Each zoosporangium create a flagellated spores that swim away to loock for food.
  - Sexual reproduction Produce Oospore in sexual reproduction.
  - have multiple nuclei Because the cell walls do not fully close off.
- Sexual reproduction occure when the connecting tube is formed

- thallus.
- Spore swims away like a flagellate, which is why it is protist like (think of Euglena)
- Ex. Saprolegnia (Fish mold)
- *Phytophthora infestans*(causative agent of late bright disease of potatoes)



#### 4- Basidiomycetes

- Spores are exogenous, i.e. produced externally on basidia. Hyphae are septated. spores on a club-shaped structure called a basidium



## BASIDIUM

### 5- Deuteromycetes (Imperfect fungi)

- Its perfect stage or its mode of sexual reproduction is not yet known until now.
- Hyphae are septated .

## Lichens What is lichens ?

### What is a Lichen?

You can think of lichens as fungi that have discovered farming. Instead of parasitizing or scavenging other organisms for a living (such as molds, mildews, mushrooms), lichen fungi cultivate tiny algae and/or blue-green bacteria (called cyanobacteria) within the fabric of interwoven fungal threads that form the lichen body (or **thallus**). The algae and cyanobacteria produce food for the fungus by converting the sun's energy into sugars through photosynthesis. Perhaps the most important contribution of the fungus is to provide a protective habitat for the algae or cyanobacteria. Thus, lichens are a combination of two or three organisms that live together intimately. The green or blue-green photosynthetic layer is often visible between two white fungal layers if a piece of lichen thallus is torn off. In some cases, the fungus and the photosynthetic partner that together make the lichen may be found living separately in nature. However, many lichen-forming fungi cannot exist by themselves because they have become dependent on their photosynthetic partners for survival. But in all cases, a fungus looks quite different in the lichenized form compared to its free-living form.

How

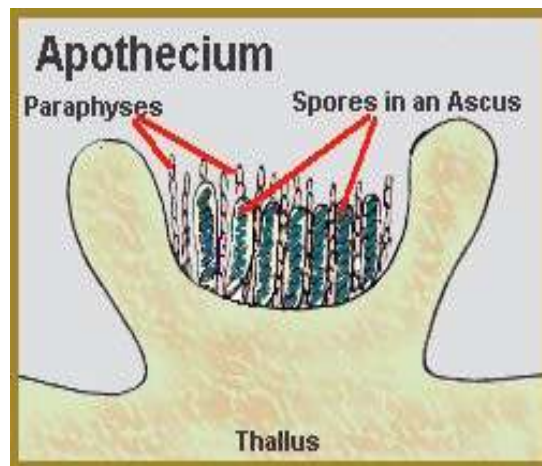


do



### Lichens Reproduce?

Lichens sexually reproduce with fruiting bodies of various colors that can look like miniature mushrooms. These are called **apothecia** and contain spores that germinate and grow into the fungus. This fungus must find the right photosynthetic partner in order to become a lichen. Lichens reproduce asexually in several ways. Some lichens have openings on the thallus surface called **soralia**. Inside, tiny dust-like granules called **soredia** (Fig. 3) are produced. Soredia contain algae and fungal cells that escape from the parent lichen and grow into a new lichen thallus. Other lichens produce outgrowths that break off and grow into the same lichen they came from. These are called **isidia** (tiny, cylindrical projections, or **lobules** (little flaps of tissue,)). These structures are often very important for the proper identification of lichens.



Each soredium consists of an algal body and fungal filaments (hyphae).

