

Lecture-15

Microbial diversity and groups

Content

○ Archaeobacteria

○ **Fungi**

○ Algae

○ Viruses.

Fungi

Fungi

- Fungi are important microorganisms in food chain , they decompose dead plant and animal matter, recycling vital elements. They use extracellular enzymes.
- Nearly all plants depend on symbiotic fungi known as mycorrhizae , which help their roots absorb minerals and water from soil .
- Fungi can cause serious fungal infections (human, animal and plants) .
- Fungi are used by humans for food (mushrooms) ,to produce foods(bread and citric acid)and drugs (penicillin).
- Study of fungi is called **Mycology** .

Fungal Physiology and structure

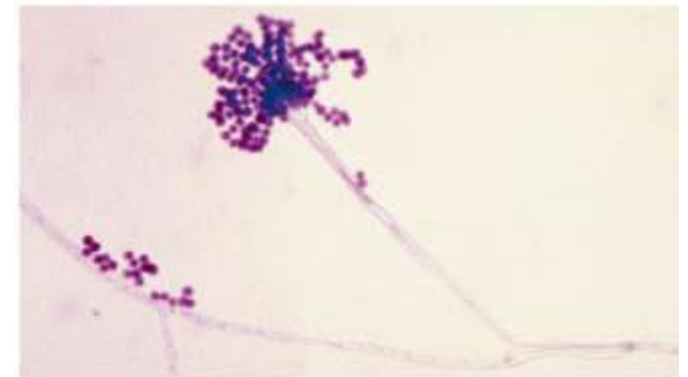
- Most fungi are multicellular and some of them unicellular (yeast)
- Fungal colonies are described as **vegetative** structures because they are composed of the cells involved in catabolism and growth.
- The **thallus** (body) of fungus consists of long filaments of cells joined together and forming a network and called **Hyphae** .
- In most molds , the hyphae contain cross-walls called **septate hyphae** which divide them into distinct **uninucleate** cell- like unit.
- In few classes of fungi, the hyphae contain no septa and appear as long continuous sells with many nuclei and called **coenocytic** hyphae.

Fungal Physiology and structure

- Hyphae grow by elongation at the tips. And each part capable to growth .
- Hyphae that extend above the surface can produce **asexual** spores called conidia.
- Conidia are often pigmented and resistant to drying
- Hyphae form compact tufts called mycelia.
- Most fungal cell walls are made of chitin



(a)

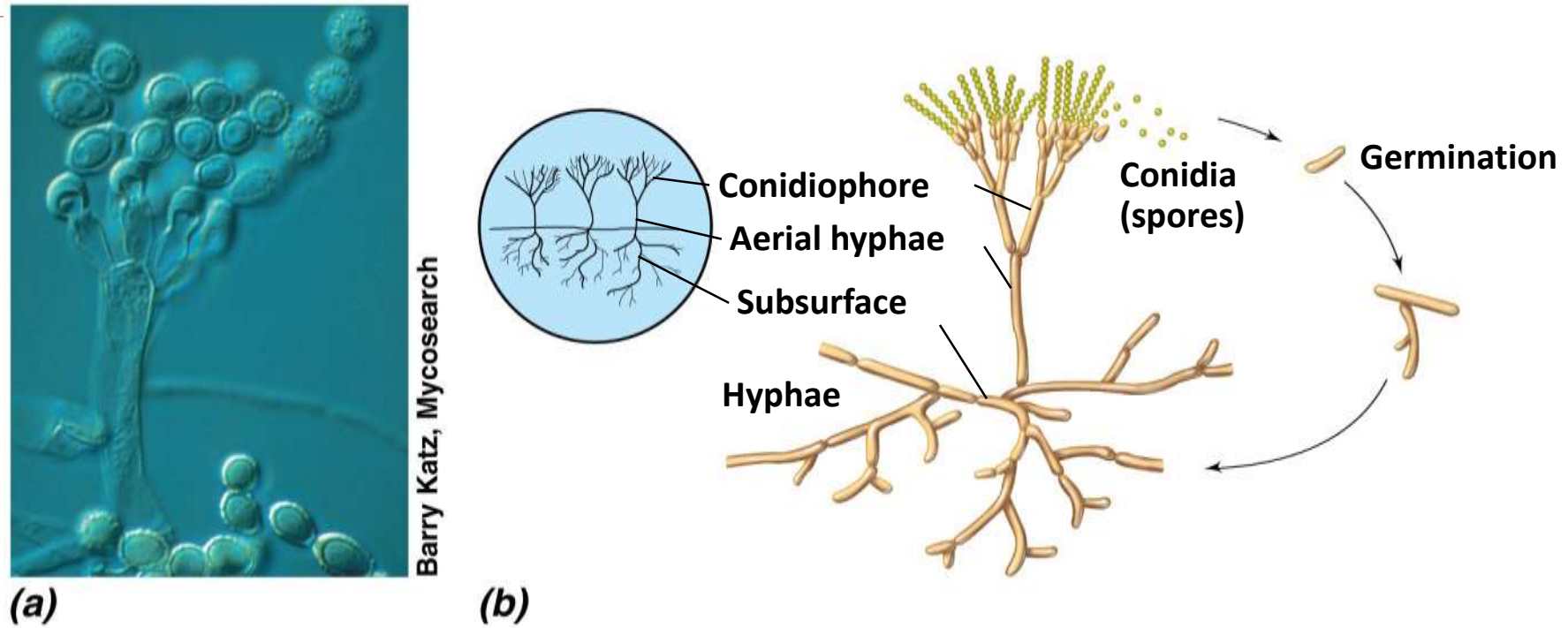


(b)

Fungal Physiology and structure

- **Most fungi reproduce by asexual means** (three forms)
 - Growth and spread of hyphal filaments
 - Asexual production of spores
 - Simple cell division
- Some fungi produce spores as a result of **sexual reproduction**
- Sexual spores can originate from the fusion of two haploid cells to form a diploid cell (ascospores, basidiospores, zygospores)
- Spores are resistant to drying, heating, freezing, chemicals

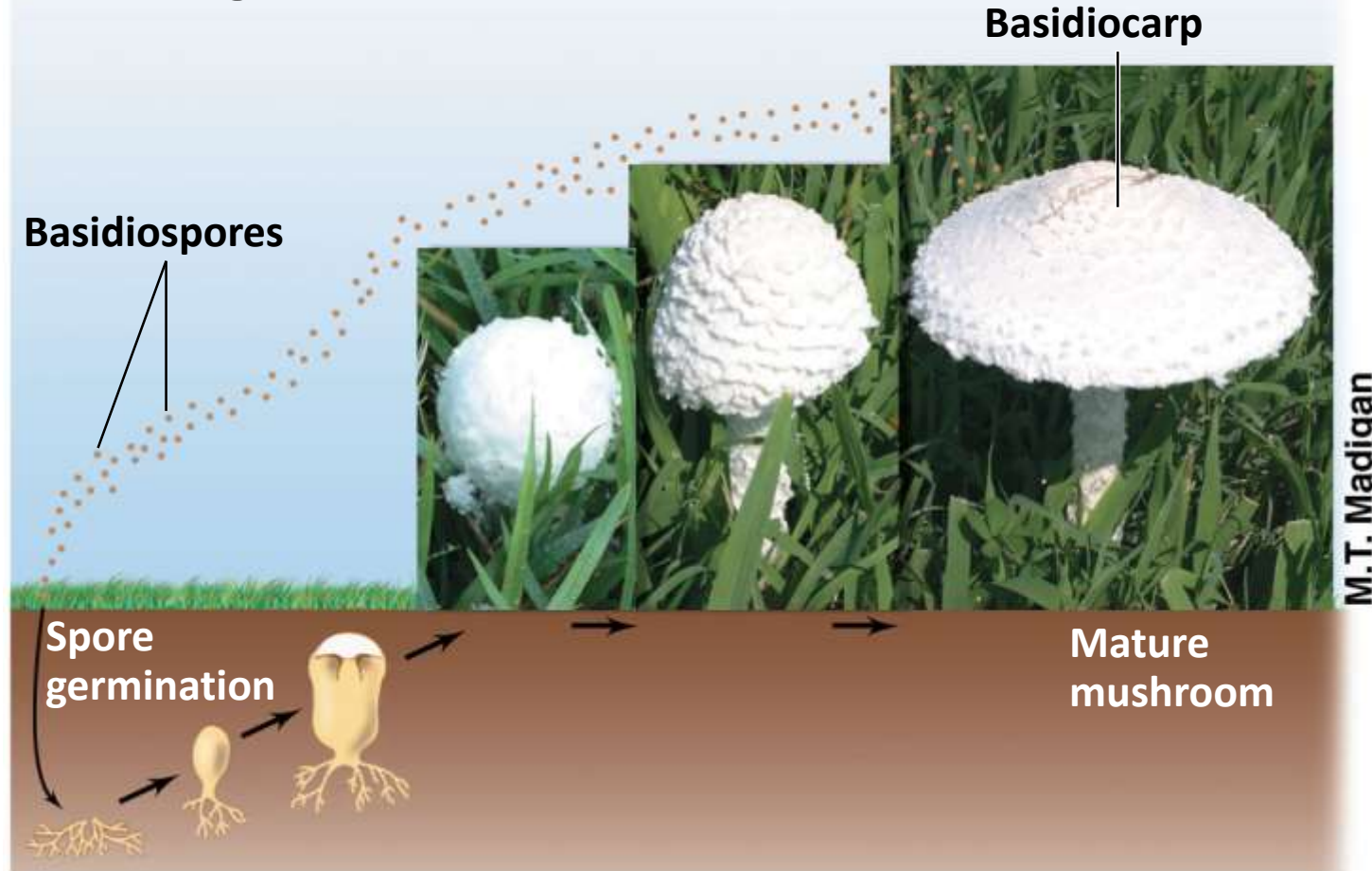
Figure 20.27



Penicillium sp.

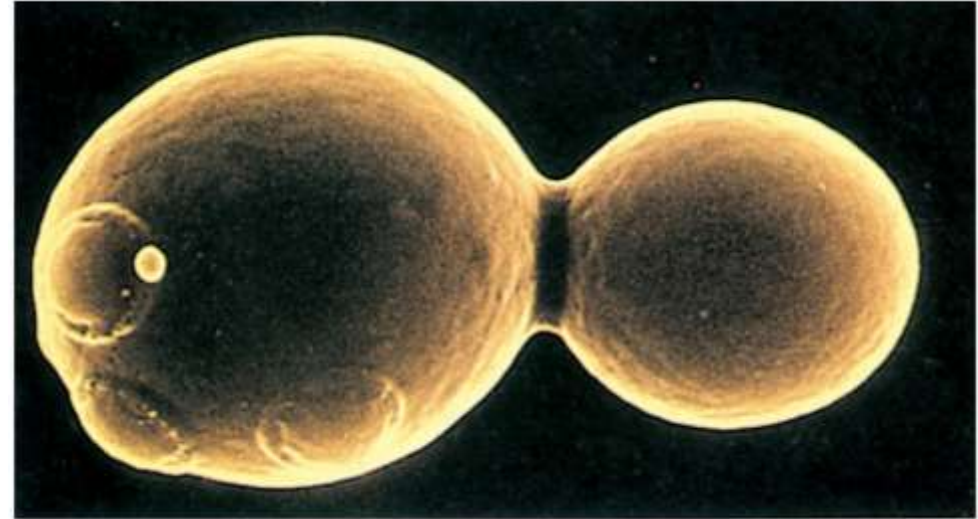
Some fungi produce macroscopic reproductive structures called *fruiting bodies* .

Mushrooms and puffballs are fruiting bodies



- Yeast are non filamentous, unicellular fungi that are typically spherical or oval.

One yeast cell can reproduce by budding.



J. Forsdyke/SPL/Photo Researchers

Algae

Algae

- Algae are mostly aquatic , some are found in soil or trees .
- Algae are eukaryotic photoautotrophs that lack tissues (roots, stem and leaves) of plants.
- The identification of unicellular and filamentous algae requires microscopic examination .
- Algae are an important part of any aquatic food chain because they fix carbon dioxide into organic molecules that can be consumed by chemoheterotrophs, and O₂ is a by-product of their photosynthesis.

Characteristics of Selected phyla of Algae

	Brown Algae	Red Algae	Green Algae	Diatoms	Dinoflagellates	Water Molds
Phylum	Phaeophyta	Rhodophyta	Chlorophyta	Bacillariophyta	Dinoflagellata	Oomycota
Color	Brownish	Reddish	Green	Brownish	Brownish	Colorless, white
Cell Wall	Cellulose and alginic acid	Cellulose	Cellulose	Pectin and silica	Cellulose in membrane	Cellulose
Cell Arrangement	Multicellular	Most are multicellular	Unicellular and multicellular	Unicellular	Unicellular	Multicellular
Photosynthetic Pigments	Chlorophyll <i>a</i> and <i>c</i> , xanthophylls	Chlorophyll <i>a</i> and <i>d</i> , phycobiliproteins	Chlorophyll <i>a</i> and <i>b</i>	Chlorophyll <i>a</i> and <i>c</i> , carotene, xanthophylls	Chlorophyll <i>a</i> and <i>c</i> , carotene, xanthins	None
Sexual Reproduction	Yes	Yes	Yes	Yes	In a few (?)	Yes (similar to the Zygomycota)
Storage Material	Carbohydrate	Glucose polymer	Glucose polymer	Oil	Starch	None

Red and Green Algae

- Red Algae
- Green Algae

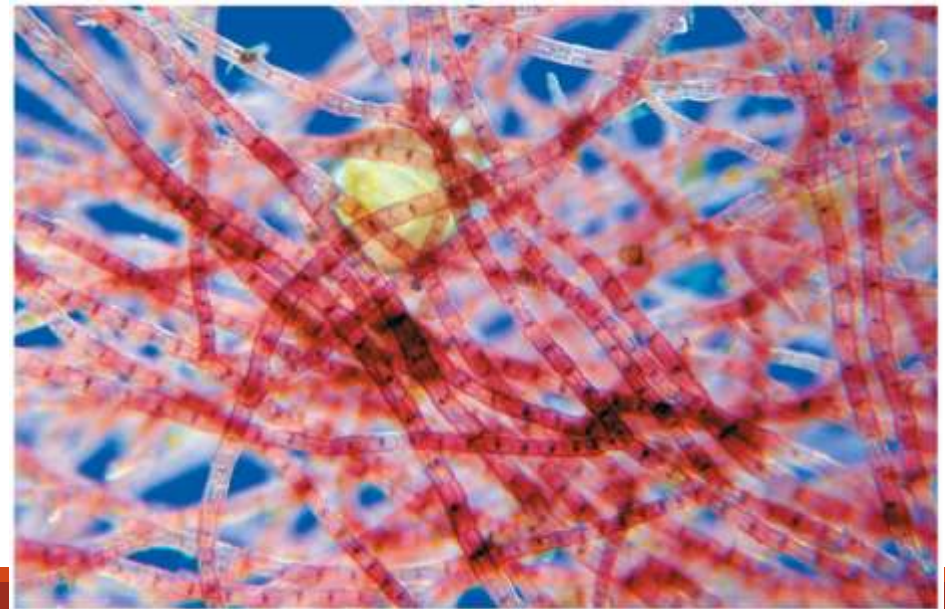
Red Algae

Red algae are also called *Rhodophyta*

- Mostly marine, but some freshwater and terrestrial

Red color is from *phycoerythrin*, a secondary pigment.

- At greater depth, more phycoerythrin is produced by cells



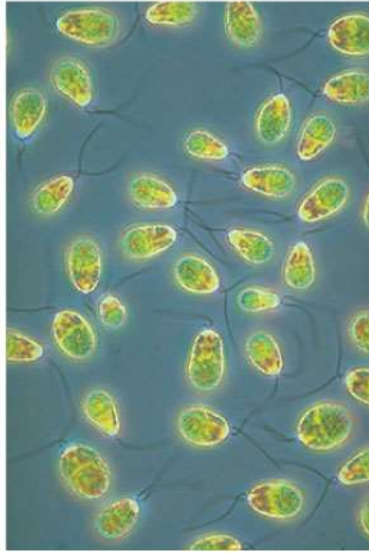
Green Algae

Key genera: *Chlamydomonas*, *Volvox*

Green algae are also called *Chlorophyta*

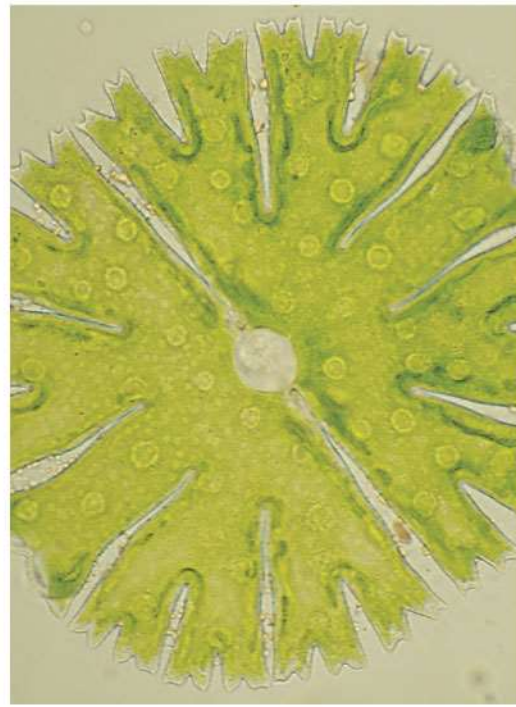
- Closely related to plants
- Most green algae inhabit freshwater, but some are marine or terrestrial
- Can be unicellular to multicellular
- Have sexual and asexual reproduction
- Endolithic algae grow inside porous rocks

Figure 20.41



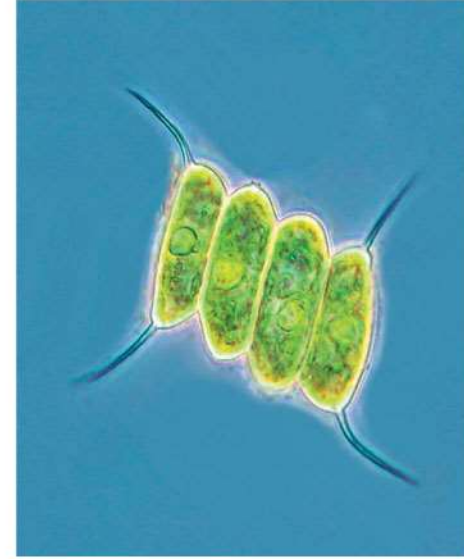
(a)

Arthur M. Nonomura

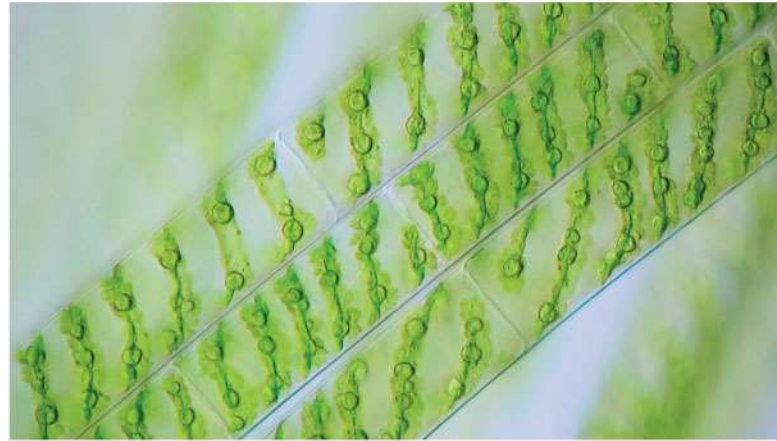


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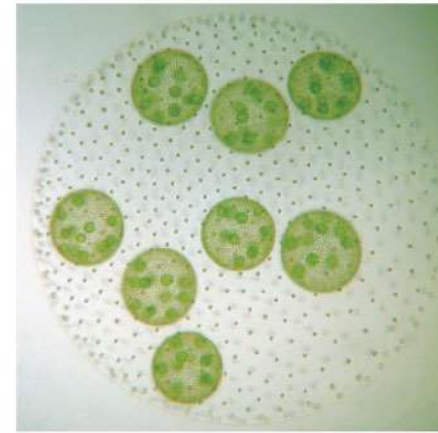
T.D. Brock



(c)



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Aurora Nedelcu