Fungal Structure (Lab 6)

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Lab 6

- Introduction.
- Characteristics of Fungi.
- Fungal Body Structure.
- The Four Groups of Fungi.
- Morphology of Molds.

Introduction

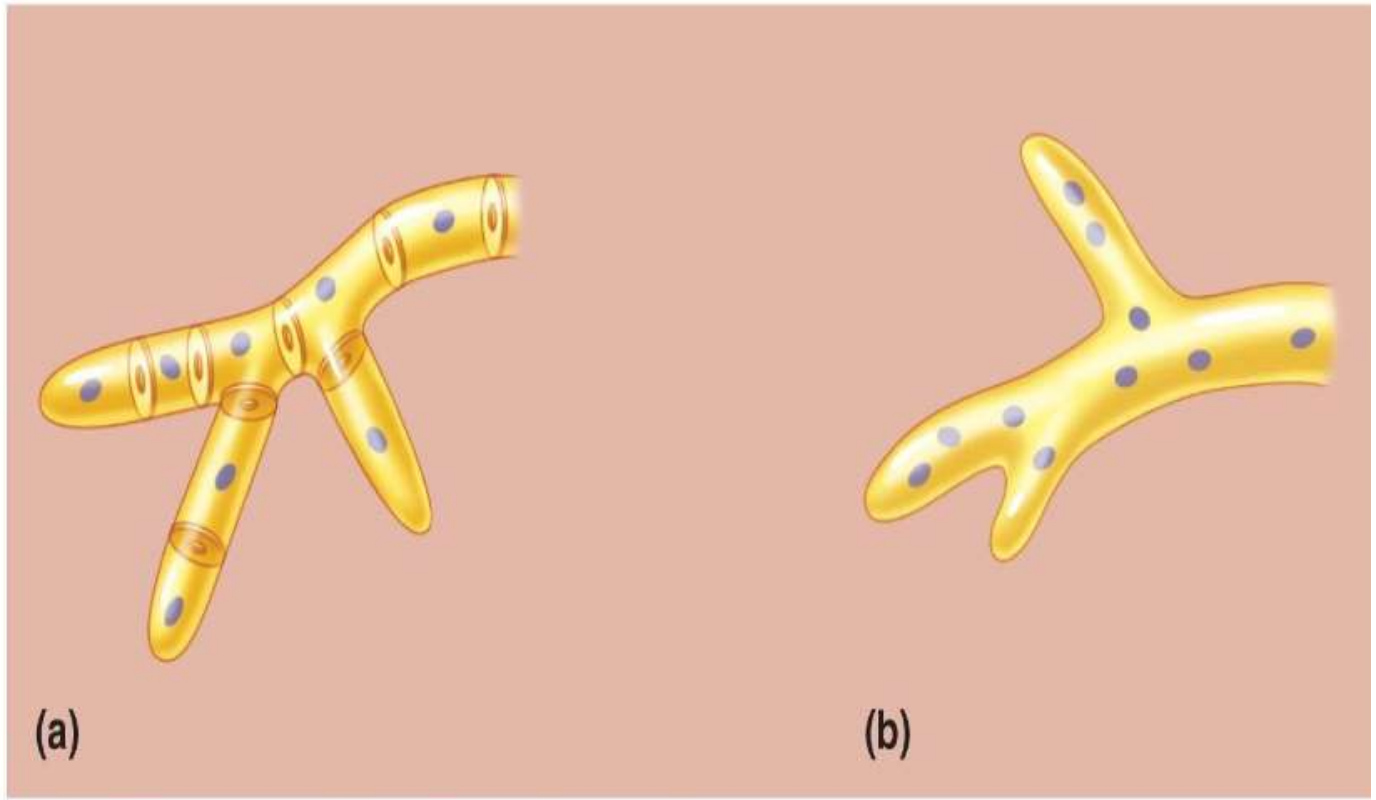
- The branch of microbiology that deals with the study of fungi (yeasts and molds) is called Mycology.

Characteristics of Fungi

- Eukaryotic.
- Heterotrophic.
- enzymatically capable of metabolizing a wide variety of organic substrates.
- Spore-bearing.

Fungal Body Structure

- Molds are the major fungal organisms that can be seen by the naked eye. We have all seen them growing on foods such as bread or citrus fruit as a cottony, fuzzy, black, green, or orange growth, or as a mushroom with a visible cap attached to a stalk.
- Examination with a simple hand lens shows that these organisms are composed of an intertwining branching mat called a mycelium. The filaments that make up this **mycelial** mat are called **hyphae**.
- Hyphae divide into septate hyphae or Non-Septate Hyphae(coenocyte)
- Most of the mat grows on or in the surface of the nutrient medium so that it can extract nutrients; the mat is therefore called **vegetative mycelium.**
- Some of the mycelium mat rises upward from the mat and is referred to as **aerial mycelium**.
- Specialized hyphae are produced from the aerial mycelium and give rise to spores that are the reproductive elements of the mold.



The effect of Fungi on humans lifestyle

- <u>fungi can have beneficial or detrimental effects on humans.:</u>
  - Those inhabit the soil play a vital role in decomposing dead plant and animal tissues, thereby maintaining a fertile soil environment.
  - The fermentative fungi are of industrial importance in producing, bakery products, cheeses, industrial enzymes, and antibiotics.
  - A few fungal species are of medical significance because of their capacities to produce diseases in humans.
  - Many of the pathogenic fungi are deuteromycetes and can be divided into two groups based on site of infection. The **superficial mycoses** cause infections of the skin, hair, and nails (for example, ringworm infections). The **systemic mycoses** cause infections of the subcutaneous and deeper tissues such as those of the lungs, and nervous system.

Reproductive Structure

- Asexual Reproduction
  - Fragmentation: hyphae simply break off.
  - Budding: small outgrowth of hyphae pinches off
  - Formation Asexual spores :are formed by the hyphae of one organism. Once they germinate they become organism that are genetically identical to the parent.
  - Ex: Sporangiospores: produced in sporangia located on a sporangiophore.
  - Conidiospores: produced at the tips of specialized hyphae

Types of spores

- Zoospores:
  - Motile spores.
- Sporangiospores:
  - Non-motile spores.
  - Develop inside sporangia.
  - Dispersed by air.
- Chlamydospores:
  - Thick walled spores.
- Oidia:
  - Formed under adverse condition.

Types of spores

- **Conidia:**
  - Non-motile exogenous spores.
  - Develop at the sides of special hyphae conidiophore
- **Ascospores:**
  - Non-motile spores.
  - Produced inside sacs called asci .
- **Basidiospores:**
  - Non-motile meiospores formed on short outgrowths of club shaped structures called basidium.

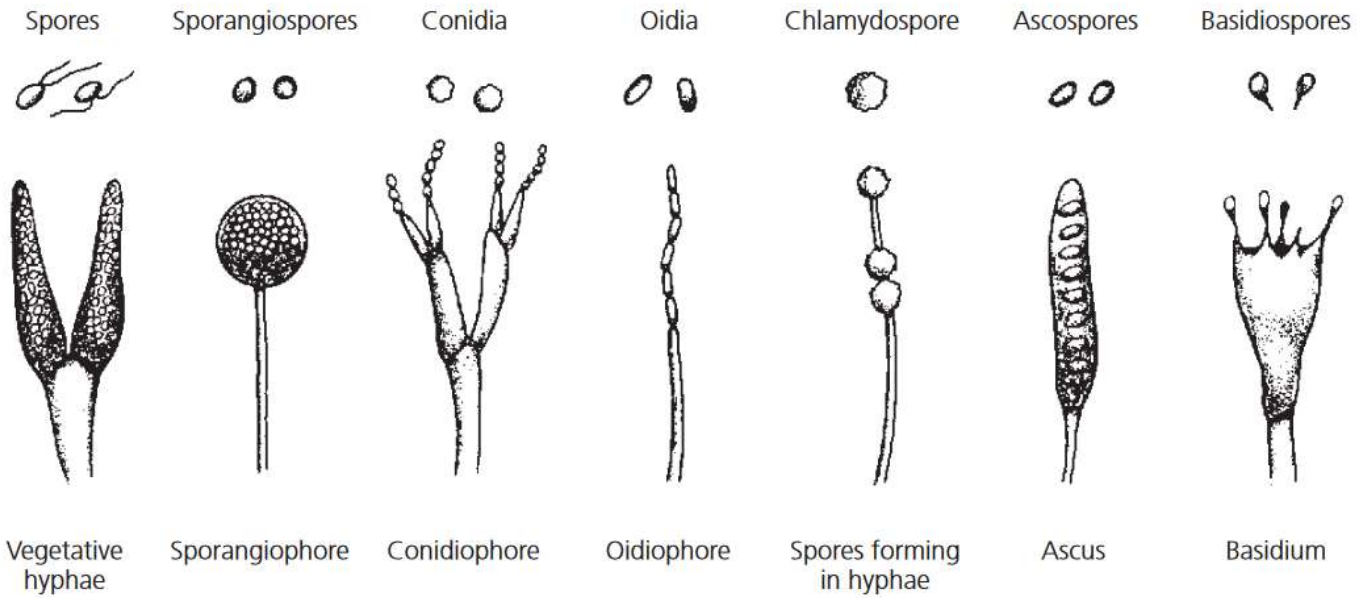


Figure 36.1 **Spore and sporangia types**

Reproductive Structure

- Sexual Reproduction
  - Sexual spore are result from the fusion of nuclei from two opposite mating strains of the same species of fungus.
  - Ex: Zygospore, Oospore, Ascospore and Basidiospore.

The Four group of Fungi

- True fungi are separated into the following four groups on the basis of their sexual modes of reproduction:

1. **Zygomycetes**
2. **Ascomycetes**
3. **Basidiomycetes**
4. **Deuteromycetes**

TABLE P7.1 Major Characteristics of the Four Groups of Fungi

	GROUP			
CHARACTERISTICS	**ZYGOMYCETES**	**ASCOMYCETES**	**BASIDIOMYCETES**	**DEUTEROMYCETES**
Mycelium	Nonseptate	Septate	Septate	Septate
Asexual spores	Found in sporangium; sporangiospores (nonmotile)	Formed on tip of conidiophore; conidia (nonmotile)	Same as the ascomycetes	Same as the ascomycetes
Sexual spores	Zygospores (motile), found in terrestrial forms; oospores, found in aquatic forms	Ascospores, contained in a saclike structure called the ascus	Basidiospores, carried on the outer surface of a club-shaped cell called the basidium	Fungi Imperfecti—no sexual reproductive phase observed; some members of the ascomycetes and basidiomycetes are Fungi Imperfecti
Common species	Bread molds, mildews, potato blight, *Rhizopus* species	Cup fungi, ergot, Dutch elm, yeast species	Smuts, rusts, puffballs, toadstools, mushrooms	*Aspergillus, Candida, Trichophyton, Cryptococcus, Blastomyces, Histoplasma, Microsporum,* and *Sporothrix*

Reference

- **James G. Cappuccino, Natalie Sherman. 2014. Microbiology a laboratory manual. 10th ed.**
- https://fac.ksu.edu.sa/sites/default/files/fungal_cell_structure_lab_6_0.pdf
- Lecture By: Mr. Pushpendu Mondal, Tutorials Point India Private Limited.