

## BIOL 1030 – TOPIC 3 LECTURE NOTES

### Topic 3: Fungi (Kingdom Fungi – Ch. 31)

#### KINGDOM FUNGI

##### A. General characteristics

- Fungi are diverse and widespread.
- Ten thousand species of fungi have been described, but it is estimated that there are actually up to 1.5 million species of fungi.
- Fungi play an important role in ecosystems, decomposing dead organisms, fallen leaves, feces, and other organic materials.
  - This decomposition recycles vital chemical elements back to the environment in forms other organisms can assimilate.
- Most plants depend on mutualistic fungi to help their roots absorb minerals and water from the soil.
- Humans have cultivated fungi for centuries for food, to produce antibiotics and other drugs, to make bread rise, and to ferment beer and wine
- Fungi play ecological diverse roles - they are decomposers (saprobes), parasites, and mutualistic symbionts.
  - Saprobic fungi absorb nutrients from nonliving organisms.
  - Parasitic fungi absorb nutrients from the cells of living hosts.
    - Some parasitic fungi, including some that infect humans and plants, are pathogenic.
    - Fungi cause 80% of plant diseases.
  - Mutualistic fungi also absorb nutrients from a host organism, but they reciprocate with functions that benefit their partner in some way.
- Fungi are a **monophyletic** group, and all fungi share certain key characteristics.

##### B. Morphology of Fungi

1. heterotrophs - digest food with secreted enzymes “**exoenzymes**” (external digestion)
  
  
  
  
  
  
  
  
  
  
2. have cell walls made of **chitin**
  
  
  
  
  
  
  
  
  
  
3. most are multicellular, with slender filamentous units called **hyphae** (Label the diagram below – Use Textbook figure 31.3)



**Septate hyphae**

**Coenocytic hyphae**

hyphae may be divided into cells by crosswalls called **septa**; typically, cytoplasm flows through septa

- hyphae can form specialized structures for things such as feeding, and even for food capture

4. **Mycelium** - interwoven mat-like network of hyphae

filaments can be packed tightly together (ex: mushroom)

mycelia can be huge, but they usually escape notice because they are subterranean.

visible parts usually reproductive structures – mushrooms, morels, etc.

5. **Haustoria** are specialized hyphae that penetrate cells (for feeding or other purposes)

6. Most fungi have **nuclear mitosis** (nuclear membrane remains intact during mitosis)

7. No motile stages for most (no swimming cells – lack cilia and flagella)

### C. Fungal Reproduction

1. reproduce by spores

- sexual spores are **meiospores** (formed by meiosis)
- asexual spores are **mitospores** (formed by mitosis)

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2. sexual reproduction for most by *zygotic meiosis*, but sometimes in a weird way

- haploid phase predominates
- BUT, syngamy (fertilization) has 2 steps
  - **plasmogamy**: union of gamete cells
  - **karyogamy**: union of gamete nuclei
- some fungi do plasmogamy but delay karyogamy, forming cells that each have two separate haploid nuclei; these hyphae are called **dikaryotic**
  
- example of fungal life cycle with dikaryotic hyphae: mushroom
  - dikaryotic mycelium is major phase
  - only when mushroom is formed does karyogamy occur, followed by meiosis

Complete the life cycle to explain the generalized life cycle of fungi (use textbook Figure 31.5):

