Fungi

Objectives:

- Be able to explain how fungi acquire their nutrients.
- Be able to explain the structural role that **chitin** (a substance also found in the exoskeletons of arthropods!) plays in fungi.
- Gain an appreciation for the fact that fungi can be enormous even though the majority of their mass remains hidden to us.
- Be able to classify fungi into the major group to which they belong (**Chytrids, Zygomycetes, Glomeromycetes, Ascomycetes,** or **Basidiomycetes**)
- Be able to identify and understand the functions of **hyphae, yeasts, mycelia,** and **spores**.
- Be able to explain the process of **plasmogamy** and **karyogamy,** and explain the role that each of these plays in sexual reproduction of fungi.
- Be able to define the term **dikaryotic**.
- Be able to illustrate the **life cycles** (both the **sexual** and **asexual** components where applicable) for **Zygomycetes**, **Ascomycetes**, and **Basidiomycetes**.
- In **Zygomycetes** be able to identify **zygosporangia**, **sporangia**, and **spores**.
- In **Ascomycetes** be able to identify the **ascocarp, asci**, and **spores**.
- In **Basidiomycetes** be able to identify **basidia,** and **basidiospores.**
- Be able to give examples of the many mutualistic relationships fungi have with other organisms (especially in the form of **lichens**, and in their association with **plant roots** to form **mycorrhizae**).
- Be able to identify the fungal pathogens you see in the lab.

Introduction:

For today's lab, please draw as many specimens as you examine.
After lab, read all the information in your textbook on fungi, then answer the additional questions on these instruction sheets and fill in the additional diagrams, e.g., of life cycles.

General Fungal Structure:

Use your textbook as a resource to answer the following questions:

- **What is a yeast?**

- **Where is chitin found in fungi?**

- **Illustrate the general structure of a multicellular fungus. Label the threadlike hyphae that together make up a tuftlike mycelium; also label the fruiting body (reproductive structure) and its spore producing structure (which has a different structure in each fungal group). Explain the role each of these labeled structures plays.**

Fungal Diversity:

Using your textbook as your guide, answer the following questions:

- **For each of the five major groups of fungi: (A) describe some of the main features of each group, and (B) indicate if they are considered monophyletic or paraphyletic,.**
    - **Chytrids**
    - **Zygomycetes**
    - **Glomeromycetes--** these are the fungi that associate with plant roots to form symbiotic associations known as **mycorrhizae.**
    - **Ascomycetes**
    - **Basidiomycetes**

Fungal Life Cycles:

Use your textbook and laboratory wall charts to help answer the following:

- **Illustrate the general fungal life cycle (both asexual and sexual components; note: some fungi are only known to do one or the other, but most go through both of these components of the life cycle).**

- **Explain what <u>plasmogamy</u> is and what role it plays in the life cycle of fungi.**

- **Explain what <u>karyogamy</u> is and what role it plays in the life cycle of fungi.**

- **Illustrate a typical life cycle for a zygomycete, and indicate where the process of karyogamy occurs.**

- **Illustrate the typical life cycle for an ascomycete and indicate where the process of karyogamy occurs.**

- **Illustrate the typical life cycle for a basidiomycete and indicate where the process of karyogamy occurs.**

Observation of Prepared Slides:

Chytrids:

- **Observe *Synchytrium endobioticum* (cause of potato wart disease) and draw your observations below.**

Zygomycetes:

- **Observe *Rhizopus* (bread mold) and draw what you see below. In your drawing label the zygosporangia, sporangia, and spores.**

Ascomycetes:

For each of the slides you observe in this group identify the ascocarp, asci and spores.

- ***Morchella* (Morel)**
- ***Rhytisma* (Tar spot – plant pathogen)**
- ***Microsphaera* (Powdery Mildew – plant pathogen)**
- ***Penicillium* - source of penicillin**
- ***Venturia inaequalis* (Apple Scab – plant pathogen)**
- ***Aspergillus* (Mold)**
- ***Peziza* (found on ground rotting wood or dung)**

Basidiomycetes:

For each of the slides you observe in this group identify the basidia and basidiospores.

- ***Gymnosporangium aecia* (Pathogen of *Juniperus* that causes gall formation)**
- ***Boletus* (has a "typical" mushroom shape, and many members of this genus are edible).**
- ***Puccinia graminis* (Black rust/Cereal rust – plant pathogen)**
- ***Cronartium ribicola* (White pine rust – plant pathogen)**

- *Polyporus* **(contains many pores or tubes instead of gills)**

- *Coprinus*

Observations of live material: Observe all the live and preserved material available to you in the lab, including the lichens, and be able to identify which major group they belong to.

Lichens: A **lichen** is a symbiotic association of a fungus with a photosynthetic partner. Most often, the photosynthetic partner is a green alga, but sometimes it can be another type of alga or a Cyanobacteria. Some lichens have an additional third species participating; this third symbiotic species is usually a type of bacteria.