

NAME \_\_\_\_\_

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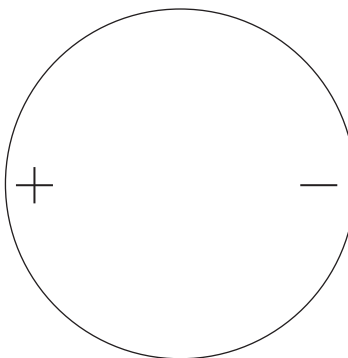
## Introduction to Fungi

The fungi comprise a major kingdom of eukaryotic organisms. Characteristics include cell walls made of chitin (as opposed to the cellulose walls of plant cells). Also unlike plants, fungi are heterotrophs rather than autotrophs. Fungi release digestive enzymes into their environment and then absorb food. They are most often saprophytes, parasites, or symbiotes. In this activity, you will observe some basic characteristics of fungi by studying a relatively primitive fungus and a highly advanced one.

Traditionally, fungi are divided into phyla according to details of the sexual stage of their life cycles.

### Phylum Zygomycota

You will work with + and – strains of *Phycomyces*. Pick up a potato dextrose agar plate. With a marker, make a + and a – sign on opposite sides of the bottom of a petri dish. Also label the plate with your initials or group number.



Use sterile technique in the following procedure.

Go to a workstation that has a plate culture of *Phycomyces*. Note whether it is a “+” strain or a “–” strain. Flame a scalpel to sterilize it. Slightly lift the cover of the *Phycomyces* culture and use the scalpel to transfer a block of agar to the appropriate side of your labeled plate. Place the block upside down so that the fungal growth makes direct contact with the agar in your plate. Flame the scalpel again and go to the workstation that has the other mating strain and repeat this procedure. Leave the completed plate for incubation in the area indicated by your instructor.

### Observing the growth

Make your observations using a stereomicroscope or hand lens. You will need to remove the lid from the culture to make your observations. The filaments of cells are called hyphae. The total mass of hyphae forms the mycelium, which can be thought of as the body of the fungus. Do you see any physical difference in the two strains of *Phycomyces*? \_\_\_\_\_

Continue to observe the middle of the plate as the two strains meet. Beginning on about the third day after inoculation, you will see the hyphae of the two strains fuse, initiating the sexual phase of the life cycle. The fusion produces a dark zygospore, which constitutes the entire diploid (2n) stage of the life cycle. Meiosis within the zygospore restores the haploid state at germination. The zygospore is unique to this phylum.

After 4 to 7 days you will see hyphae that grow upward (sporangiophores) and develop a dark dot at their tip. The dark structures are sporangia that contain asexual spores produced by mitotic divisions. Thus *Phycomyces* can incorporate both sexual and asexual reproduction by spores in its life cycle.

## Phylum Basidiomycota

These fungi are characterized by spores borne on top of a cell or mass of cells called the basidium. The phylum includes a number of plant parasites and fungi responsible for wood rot. The phylum also includes the mushrooms.

Examine a mushroom, noting the stalk and cap (pileus). A typical mushroom is technically a basidiocarp, an above-ground structure for producing and disseminating spores. Most of the fungal body, or mycelium, grows in the soil or wood from which the mushroom emerges. As in the case of *Phycomyces*, there usually are + and – strains. The hyphae of two strains must fuse before mushrooms form. The nuclei from the two strains remain separate, such that each cell has two nuclei (i.e., it is a dikaryon,  $n + n$ ) until shortly before spore formation. Fusion of the nuclei produces a diploid cell (zygote) that undergoes meiosis to produce four haploid spores. Examine the undersurface of the mushroom cap and locate the gills. The surface of each gill is covered with basidia, each bearing spores. These will not be visible due to their small size. Examine a cross-section of *Coprinus* mushroom and observe the basidia (in this case the basidia are single cells) and the spores borne on top of each basidium.

## Summation

On the basis of your work in this lab investigation, list at least two features characteristic of many, though not necessarily all fungi.

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