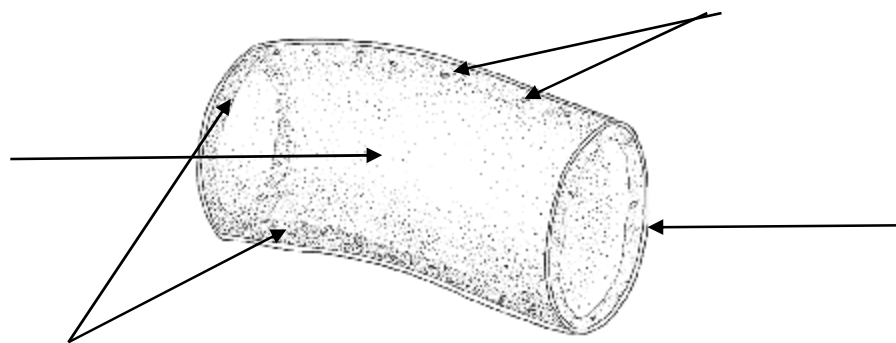


Fungi



The basic structural features of fungi are not cells but hyphae. Hyphae are microscopic branching filaments filled with cytoplasm and nuclei. Each thread consists of a tube formed from a wall enclosing cytoplasm and a vacuole. The hyphal walls are not made of cellulose but of a substance called chitin, also found in the exoskeletons of arthropods. The hyphae contain many nuclei distributed throughout the cytoplasm. Sometimes the hyphae are divided into compartments by cross walls called septa. Fungi with cross walls are called septate fungi, while fungi without cross walls are called coenocytic fungi.

Label the parts of the hyphae: cytoplasm, vacuole, nuclei, and cell wall.



Label the two types of hyphae: coenocytic fungi and septate fungi.

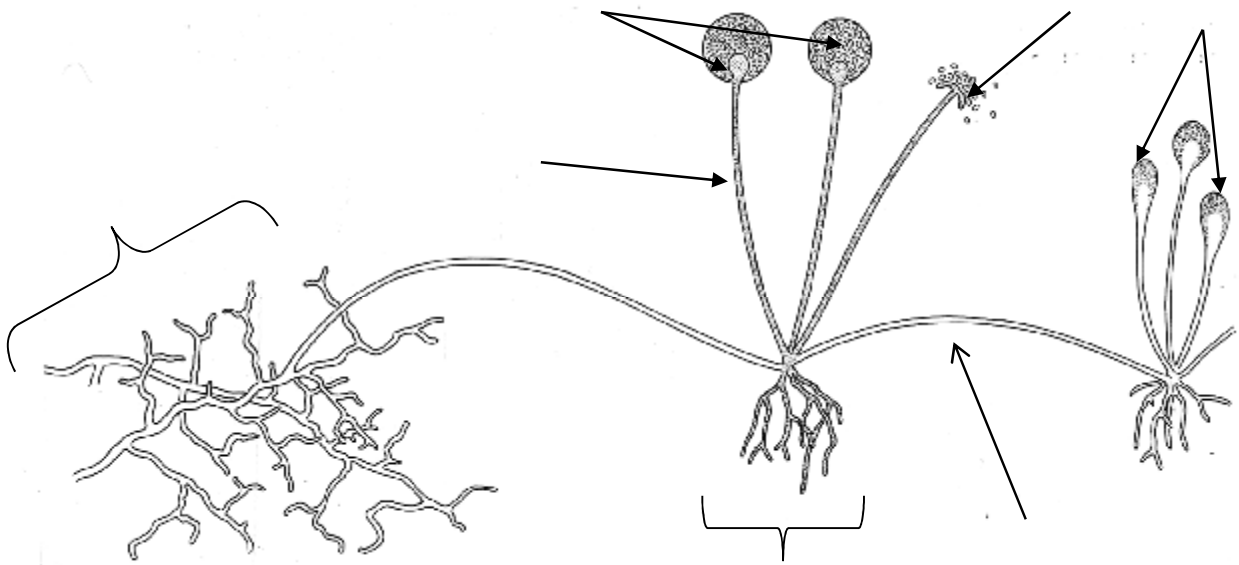


The fungi do not have chlorophyll so they cannot make their food in the way that plants do. Fungi, like animals are heterotrophs. However, fungi are absorptive, not ingestive heterotrophs (digest food after they eat it) like animals. They feed on dead or decaying organic matter and are classified as saprophytes. Their hyphae penetrate the dead material and form a branching network called a mycelium. The tips of the growing hyphae produce enzymes which digest the organic material. The soluble products are absorbed into the hyphae. Because fungi digest food first and then absorb it, they are absorptive heterotrophs.

ZYGOMYCOTA (bread Mold)

When bread mold fungi, such as *Rhizopus stolonifer*, grow on stale bread or rotting fruit, the mycelium can be seen as gray colored "fuzz". *Rhizopus* reproduces asexually by sending up vertical hyphae called sporangiophores. The underground part of sporangiophore is called rhizoid. Horizontal hyphae called stolons connect sporangiophores to each other. Each of these hyphae swells at the tip to produce a sporangium. A sporangium is a type of spore case. The cytoplasm in the sporangium divides repeatedly to produce a mass of spores, each with a nucleus. When the sporangium breaks open, the spores are dispersed in the air, and each can grow to form a new mycelium if it lands on suitable material. This is an asexual type of reproduction, but the mold can also reproduce sexually.

Label the parts of *Rhizopus stolonifera*: mycelium, hyphae, mature sporangium, sporangium releasing spores, sporangiophores, rhizoid, stolon and an immature sporangium.

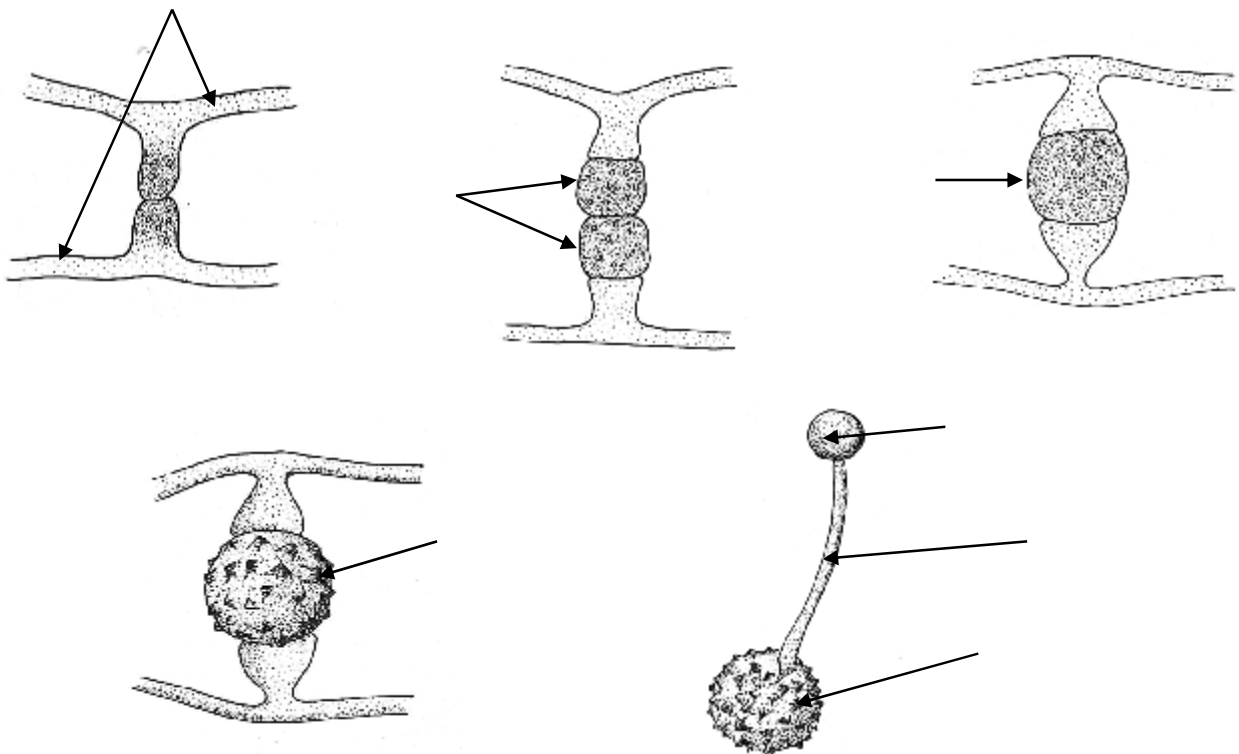


SEXUAL REPRODUCTION IN ZYGOMYCOTA

Sexual reproduction takes place only between two different *strains* of *Rhizopus*. The strains are visually indistinguishable but may have differences in their physiology, e.g. one may be able to digest organic matter better than the other. In sexual reproduction, beneficial characteristics like this may be combined, leading to a more successful strain of the fungus.

Sexual reproduction in molds like the Zygomycetes occurs when hyphae called "+" and "-" start growing toward each other. When they meet, their tips swell and are cut off by septa. The nuclei divide rapidly in the tips and then fuse when the cross walls break down. These fused nuclei form a zygospore. The cell wall of the zygospore thickens as the hyphae break down. The zygospore can remain dormant for a long time surviving drought or extreme temperatures. When conditions become good, the zygospore germinates and forms a single hyphae and sporangium that release spore.

Label the sexual reproduction structures in *Rhizopus*: hyphae, fused nuclei, rapidly dividing nuclei, zygospore with thick cell wall, germinating spore, growing sporangiophore, and sporangium.

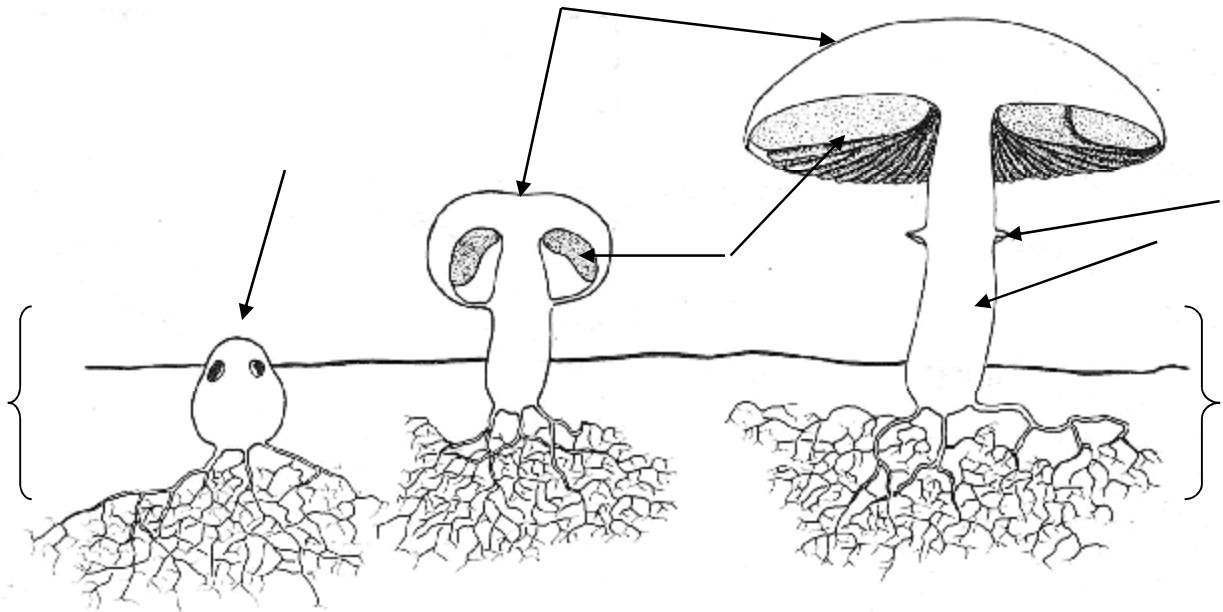


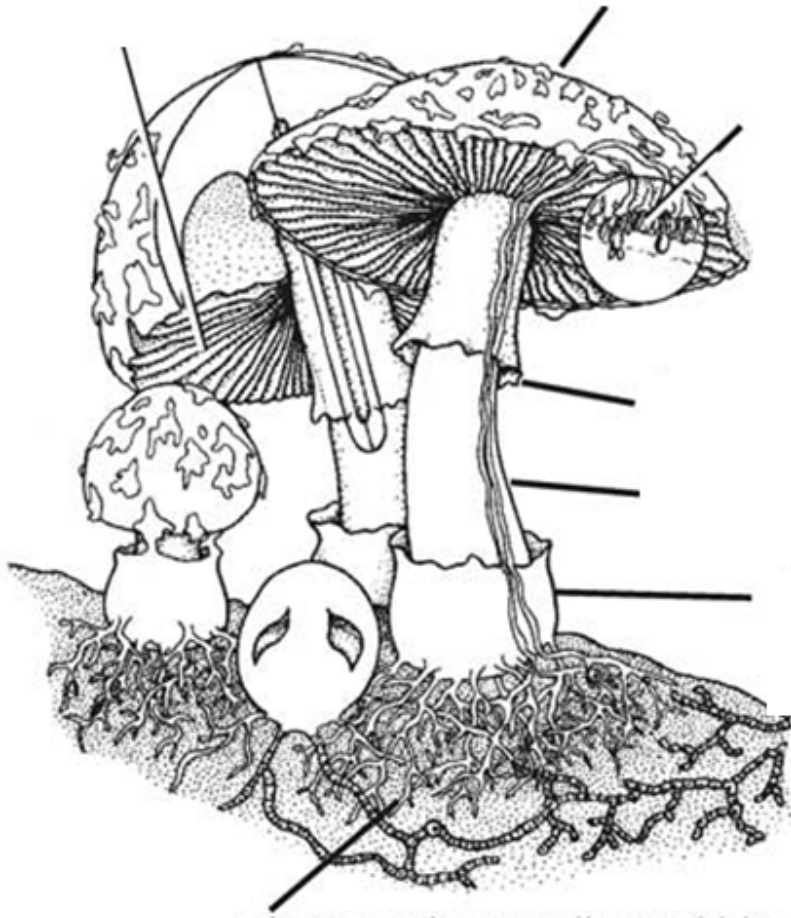
BASIDIOMYCOTA (Mushrooms and Toadstools)

Mushrooms and toadstools form a large group of fungi which live in the soil or in rotting wood. Their mycelia (plural of mycelium) spread through the soil or the dead wood, dissolving and absorbing the organic substances. The fruiting bodies (part of the organism seen above ground) of *Psalliota campestris* (field mushroom) and *Psalliota arvensis* (horse mushroom) are edible. The fruiting bodies of toadstools are mostly inedible or even poisonous.

Under favorable conditions some of the hyphae just below the soil, mass together into mycelia and form a spherical body that grows rapidly and pushes above the surface. This is what is called the fruiting body. As this body grows, it develops three distinct regions: a stalk called the stipe, a cap or pileus, and gills under the cap. Spores develop on these gills on structures called basidia under the cap. At first, the cap is joined all round its edge to the stalk but later, as a result of the rapid growth of stalk and cap, the cap breaks free leaving a ring of tissue, the annulus or ring, round the stalk. Some fungi also have a sack like structure at their base called the volva.

Label drawing as follows: *forming fruiting body, mycelia, cap, gills, annulus, and stipe.*





1. What are hyphae?
2. What surrounds the hyphae and what compound is it made of?
3. What are hyphal cross walls called? Are they always present?
4. Fungi aren't classified with plants. Explain why?
5. Why are fungi classified as heterotrophs like animals?
6. Why are fungi considered as saprobes?
7. Explain how an absorptive heterotroph feeds?
8. What is the scientific name for a common mold that grows on bread?
9. Vertical hyphae produce what structures? What is the function of these structures?
10. When spores spread and land in a suitable place, what do they form?
11. What type of benefit can there be for the new strain?
12. What are the two hyphae called that are involved in sexual reproduction?
13. Describe what happens when the tips grow together.
14. What happens to the nuclei in the tips of the hyphae?
15. What is an advantage of the zygospores if it is extremely dry or hot?
16. What happens when a zygospore germinates?
17. What does the fruiting body form from underground?
18. What is another name for the stalk?
19. What is another name for the cap?
20. What is the ring around the stalk called and what causes it to form?
21. Where do spores form & what are the spore-forming structures called?