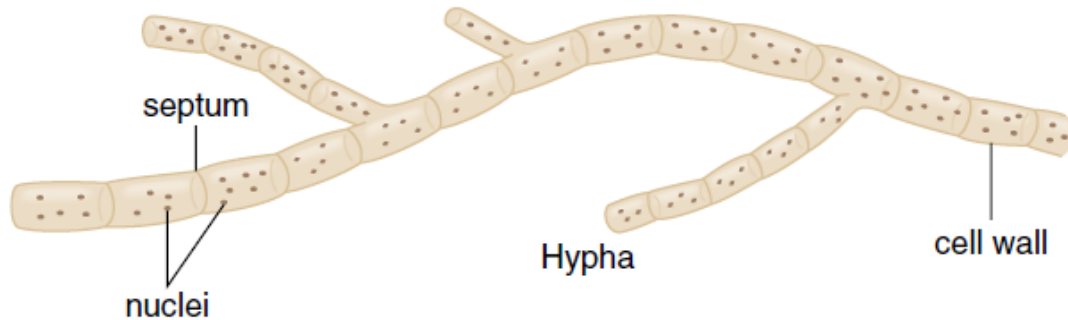


Kingdom Fungi

Fungi are multicellular eukaryotes that are heterotrophic by absorption. They send out digestive enzymes into the immediate environment, and then, when organic matter is broken down, they absorb nutrient molecules. The body of a fungus is usually a multicellular structure known as a mycelium. A mycelium is a network of filaments called hyphae (sing., hypha):



Fungal cells are quite different from plant cells not only by lacking chloroplasts but also by having a cell wall that contains *chitin* and not cellulose. Fungi produce non-flagellate spores during both sexual and asexual reproduction, which are dispersed by the wind.

Fungi Classification

Zygospor fungi	<i>Rhizopus</i>
Sac fungi	<i>Saccaromyces</i>
Club fungi	Mushrooms, shelf fungi
Coral fungi	Plant parasites

Zygospor Fungi

The zygospor fungi live off plant and animal remain in the soil and also bakery goods in our kitchens. Some, however, are parasites of small soil protists or worms, and even insects such as the housefly. In *Rhizopus stolonifer*, black bread mold, stolons are horizontal hyphae that exist on the surface of the bread; rhizoids grow into the bread, and *sporangiophores* are stalks that bear sporangia. A sporangium is a capsule that produces spores, more properly called sporangiospores. During asexual reproduction all structures involved are haploid; during sexual reproduction there is a

diploid zygospore for which the phylum is named. Hyphae of opposite mating types, termed plus (+) and minus (-), grow toward each other until they touch. *Gametangia* form and merge, producing a large cell in which nuclei of the two mating types pair and then fuse. A thick wall develops around the cell, which is now called a **zygospore**. Upon germination, sporangiophores develop, and many spores are produced by meiosis. By now, you will have no trouble in identifying this cycle as a haplontic life cycle.

Sac Fungi

Sac fungi include red bread molds (e.g., *Neurospora*) and cup fungi. Also, morels and truffles are sac fungi highly prized as gourmet delicacies. A large number of sac fungi are parasitic on plants; powdery mildews grow on leaves, as do leaf curl fungi; chestnut blight and Dutch elm disease destroy the trees named. Ergot is a parasitic sac fungus that infects rye and (less commonly) other grains. The division name for sac fungi, Ascomycota, refers to the **ascus**, a fingerlike sac that develops after hyphae from two mating strains merge, producing dikaryotic (each cell has two nuclei) hyphae. In an ascus, a zygote forms and undergoes meiosis to produce eight haploid nuclei that become eight ascospores. The asci are usually surrounded and protected by sterile hyphae within a **fruiting body**. Asexual reproduction, which is the norm among ascomycetes, involves the production of spores called **conidiospores**.



Club Fungi

Club fungi include shelf or bracket fungi on dead trees and mushrooms in lawns and forests. Less well known are puffballs, bird's nest fungi, and stinkhorns. These structures are all fruiting bodies that contain **basidia**, club-shaped structures that give this phylum its name. Club fungi usually reproduce sexually (Fig. 28.25). Hyphae from two different mating types meet, and cytoplasmic fusion occurs. The resulting dikaryotic mycelium periodically produces fruiting bodies, which are composed of tightly packed hyphae. The fruiting body of a mushroom has a stalk and a cap. The cap of a gilled mushroom contains radiating lamellae lined by basidia where nuclear fusion, meiosis, and spore production occur. A basidium has four projections into which cytoplasm and a haploid nucleus enter. The spores are windblown and germinate to give a haploid mycelium.