The "fungus amongus"

- Ecosystems would be in trouble without fungi to decompose dead organisms, fallen leaves, feces, and other organic materials.
- Most plants depend on mutualistic fungi that 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 are *eukaryotes* and most are multicellular.
- While once grouped with plants, fungi generally differ from other eukaryotes in nutritional mode, structural organization, growth, and reproduction.
- Molecular studies indicate that ***animals***, not plants, are the ***closest relatives of fungi***.

Fungi live as decomposers and symbionts because of their ability to absorb nutrients

- Fungi are heterotrophs that get their nutrients by **absorption** ***(There is no such thing as an autotrophic fungi).***
  - They absorb small organic molecules from the surrounding environment upon which they live.
  - **Exoenzymes**, powerful hydrolytic enzymes secreted by the fungus, digest food *outside of the body* into simpler compounds that the fungus can then absorb and use.
- This absorptive mode of nutrition is associated with the ecological roles of fungi as decomposers (saprobes), parasites, or mutualistic symbionts.
  - Saprobic fungi absorb nutrients from ***nonliving organisms.*** ***("sapro" means dead)***
  - Parasitic fungi absorb nutrients from the cells of ***living hosts.***
  - Some parasitic fungi, including some that infect humans and plants, are ***pathogenic***.
  - Mutualistic fungi also absorb nutrients from a host organism, but they also help the host by providing functions that benefit it in some way.

Both extensive surface area and rapid growth adapt fungi to their absorptive mode of nutrition

- The vegetative bodies of most fungi are built of tiny filaments called **hyphae** that form an interwoven mat called a **mycelium**.
- Fungal mycelia can be quite large, but they usually escape notice because they are subterranean.
  - One giant mycelia of *Armillaria ostoyae* in Oregon is 3.4 miles in diameter and covers 2,200 acres of forest.
  - It is at least 2,400 years old, and weighs hundreds of tons.
- Fungal hyphae have cell walls.
  - They are built mainly of ***chitin***, a strong but flexible nitrogen-containing polysaccharide, identical to that found in ***arthropods***.
- Most fungi are multicellular with hyphae divided into cells by cross walls, or **septa**.
  - These generally have pores large enough for ribosomes, mitochondria, and even nuclei to flow from cell to cell.
- Fungi that lack septa, **coenocytic** fungi, consist of a continuous cytoplasmic mass with hundreds or thousands of nuclei.
- This results from repeated nuclear division without cytoplasmic division.
- The filamentous structure of the mycelium provides an extensive surface area that suits the absorptive nutrition of fungi.

Fungi disperse and reproduce by releasing spores that are produced sexually or asexually

- Fungi reproduce by releasing spores that are produced either sexually or asexually.
  - The output of spores from one reproductive structure is enormous, with the number reaching into the trillions.
- Dispersed widely by wind or water, spores germinate to produce mycelia if they land in a moist place where there is food.