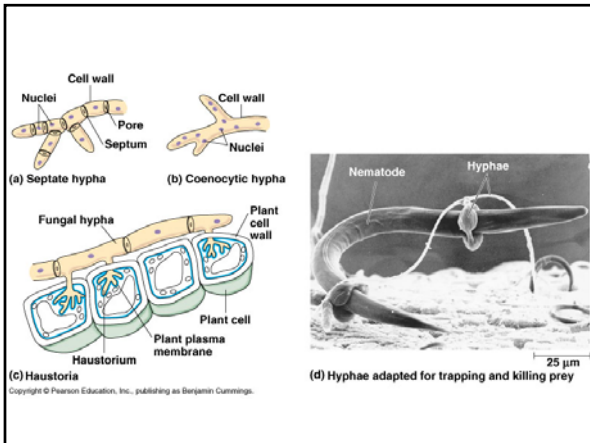




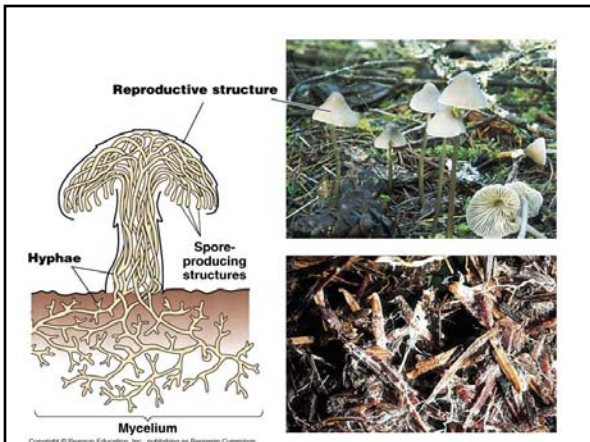
What are Fungi?

- Eukaryotes
 - Most multicellular
 - Absorptive feeders: saprobes, parasites, and mutualistic forms
 - Diffuse fungal bodies made of hypha
 - Some hyphae are coenocytic some are septate.
 - No flagellated stages (true fungi)
 - Cell walls of chitin

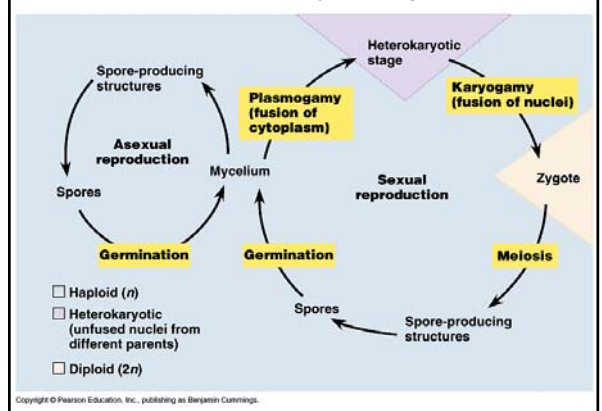


Unusual Features

- Nuclear envelope remains intact during mitosis
- Spindle within the envelope
- Nucleus pinches in two during anaphase
- Spores can be produced asexually (mitosis) or sexually (meiosis)
- Sexual or asexual production dependent on environment

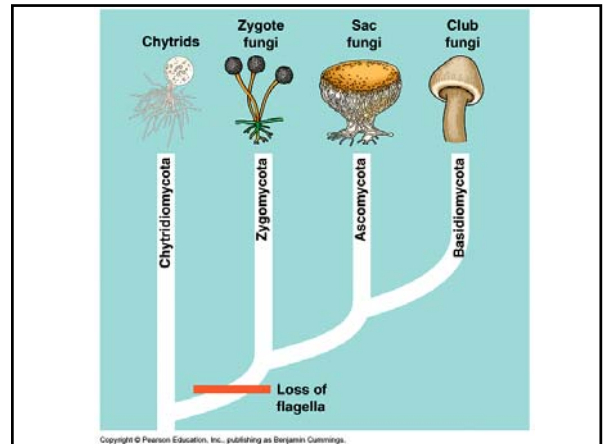


Generalized life cycle of fungi



Diversity

- Four Divisions or Phylums:
 - chytridiomycota
 - zygomycota
 - ascomycota
 - basidiomycota
- Differ in plasmogamy, time as a dikaryon, location of karyogamy



Phylum Chytridiomycota

- Was previously a part of the Protist Kingdom
- Probably share a common ancestor with the rest of the Fungi
- Numerous characteristics common to fungi:
 - cell walls of chitin
 - absorptive feeder
 - hyphae
 - DNA and protein similarities



Phylum Zygomycota

- Common black bread mold
- Some form mycorrhizae
- Decomposers

The common mold *Rhizopus* decomposing strawberries



- The zygosporangia are resistant to freezing and drying.
- When conditions improve, the zygosporangia release haploid spores that colonize new substrates.
 - Some zygomycetes, such as *Pilobolus*, can actually aim their spores.

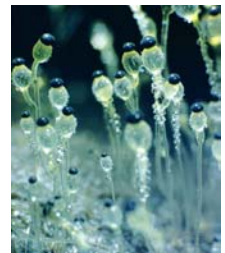
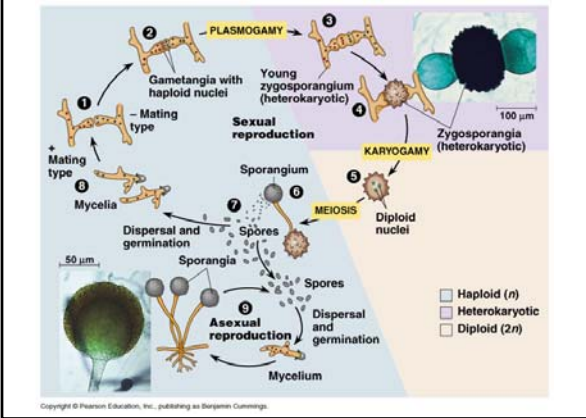


Fig. 31.8

The life cycle of the zygomycete *Rhizopus* (black bread mold)



Phylum Basidiomycota

- Mushrooms, puffballs, shelf fungi



Basidiomycetes (club fungi):

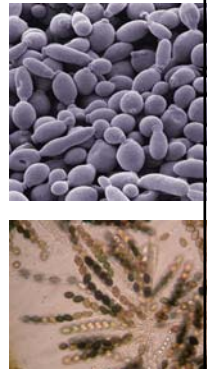
Greville's bolete (top left), turkey tail (bottom left), stinkhorn (right)

A Fairy Ring



Phylum Ascomycota

- Sac fungi
 - Produce sexual spores in saclike asci
- Yeasts and sordaria
- Mutualistic and parasitic forms
- Numerous decomposers



- Over 60,000 species of ascomycetes, or **sac fungi**.
- They range in size and complexity from unicellular yeasts to elaborate cup fungi and morels.



Table 31.1 Review of Fungal Phyla

Phylum	Key Reproductive Feature
Chytridiomycota (chytrids)	Motile spores with flagella
Zygomycota (zygote fungi)	Resistant zygosporangium as sexual stage
Ascomycota (sac fungi)	Sexual spores borne internally in sacs called asci
Basidiomycota (club fungi)	Sexual spores borne externally on club-shaped structures called basidia

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Unique Lifestyles

Molds

- only asexual, found in zygomycetes, ascomycetes, and basidiomycetes

Penicillium

- important mold

Yeasts

- unicellular, pathogenic and economically important forms

Lichens

- mutualistic form of algal cells and a fungal hyphal mass

Deuteromycetes

• Imperfect fungi

- Molds that cannot be classified as zygomycetes, ascomycetes or basidiomycetes because they have no known sexual stages.
- produce asexually
- *Perfect* referring to sexual stages of life cycles
- When sexual stages discovered they are moved from imperfect category to a particular phylum

Ecological Impact

- Decomposers and symbionts
- Pathogens (athlete's foot, ringworm, Dutch elm disease)
- Ergot - found on rye, causes gangrene, hallucinations (produces lysergic acid)
- Some produce toxins that are used for treating high blood pressure
- Food source for humans and animals

Mycorrhizae

- Important to natural ecosystems and agriculture
- Almost all vascular plants have mycorrhizae
- Periodically form fruiting bodies

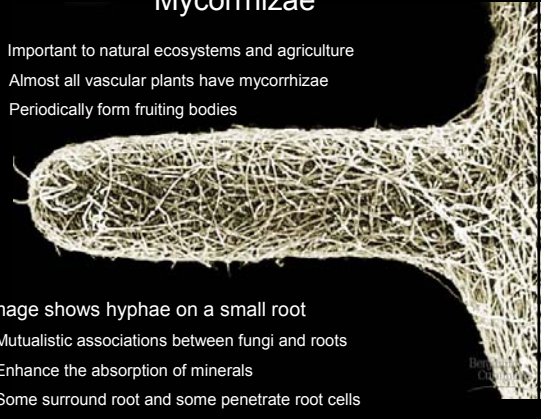


Image shows hyphae on a small root

- Mutualistic associations between fungi and roots
- Enhance the absorption of minerals
- Some surround root and some penetrate root cells

Fungal production of an antibiotic



Coprinus comatus, Shaggy Mane



Geastrum triplex



Tremella mesenterica, Witch's Butter



Amanita



Gills



Lichens



Examples of fungal diseases of plants:
Black stem rust on wheat (left), ergots on rye (right)

