

Fungi

- What are the key features of fungi?
- Classification
- Fungi & the environment



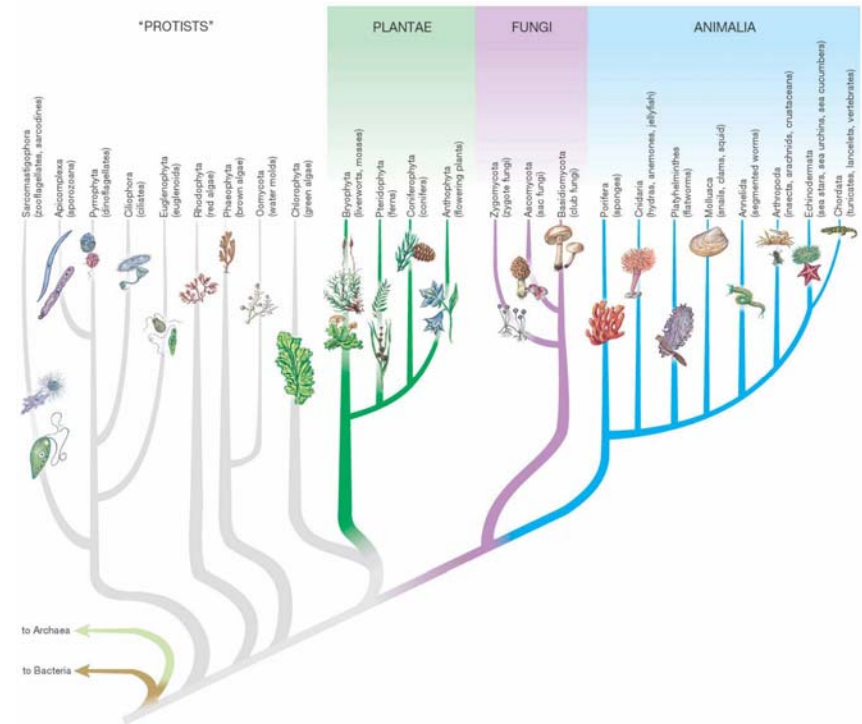
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Key Features

- Not closely related to plants.
- Unicellular or multicellular
- Absorb food: secrete enzymes to digest complex molecules
- Propagate by spores
- Asexual or sexual reproduction
- Haploid
- Can be multinucleated



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Fungal Structure

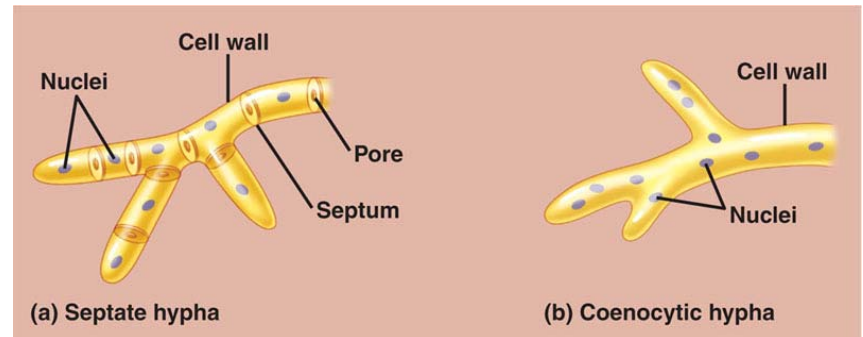
(a)



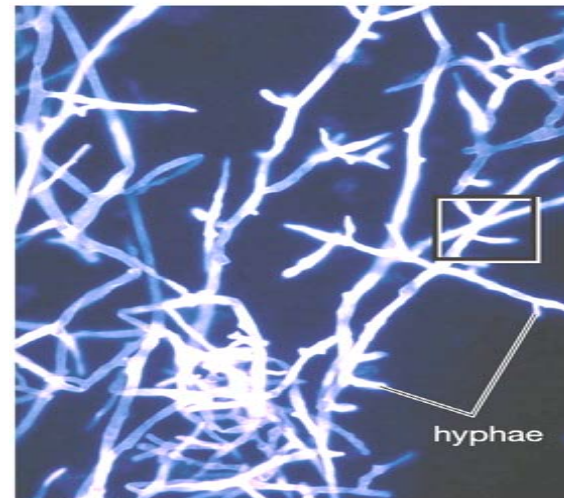
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Mycellium = mass of hyphae

Cell wall = Chitin



(b)



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Reproduction

- Asexual by spores from sporangia
- Sexual reproduction by fusing hyphae
- Dispersal mechanisms



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Types of fungi

- Almost 100,000 species of fungus
- Classified by reproductive mode
- Zygoter fungi
- Sac fungi
- Club fungi
- Imperfect fungi
- Lichens

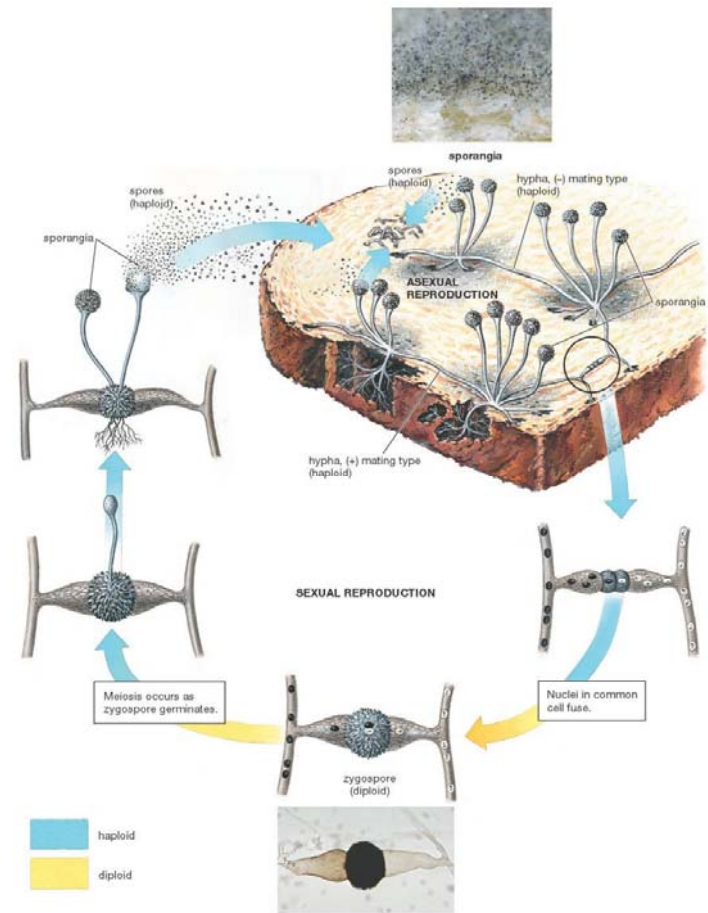
Table 20-1 The Phyla of Fungi

Common Name (Phylum)	Reproductive Structures	Cellular Characteristics	Economic and Health Impacts	Representative Genera
Chytrids (Chytridiomycota)	Flagellated spores	Cell walls contain chitin; septa are absent	Contribute to decline of frog populations	<i>Batrachochytrium</i> (frog pathogen)
Zygoter fungi (Zygomycota)	Produce sexual diploid zygospores	Cell walls contain chitin; septa are absent	Cause soft fruit rot and black bread mold	<i>Rhizopus</i> (causes black bread mold); <i>Pilobolus</i> (dung fungus)
Sac fungi (Ascomycota)	Sexual spores formed in saclike ascus	Cell walls contain chitin; septa are present	Cause molds on fruit; can damage textiles; cause Dutch elm disease and chestnut blight; include yeasts and morels	<i>Saccharomyces</i> (yeast); <i>Ophiostoma</i> (causes Dutch elm disease)
Club fungi (Basidiomycota)	Sexual reproduction involves production of haploid basidiospores on club-shaped basidia	Cell walls contain chitin; septa are present	Cause smuts and rusts on crops; include some edible mushrooms	<i>Amanita</i> (poisonous mushroom); <i>Polyporus</i> (shelf fungus)

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Zygote fungi

- Zygomycetes
- Rhizopus: bread mold





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Ascomycetes: Sac fungi



(a)

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Scarlet cup fungus



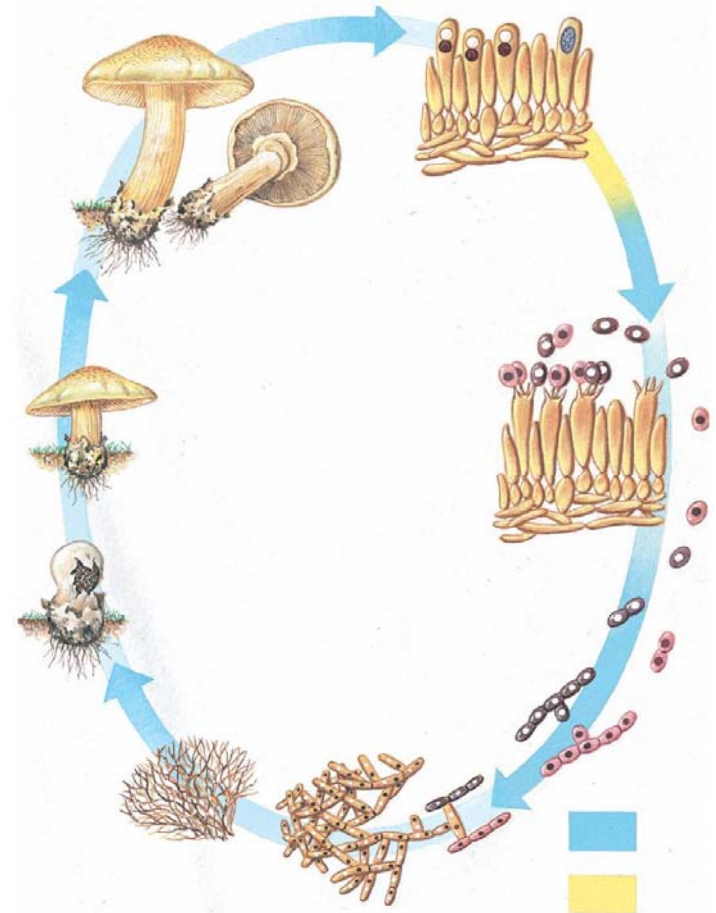
(b)

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Morel

Basidiomycete: Club fungi

- Cap
- Gills: spores



Examples

Puffballs



(a)

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Shelf fungus



(b)

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(c)

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Stinkhorns

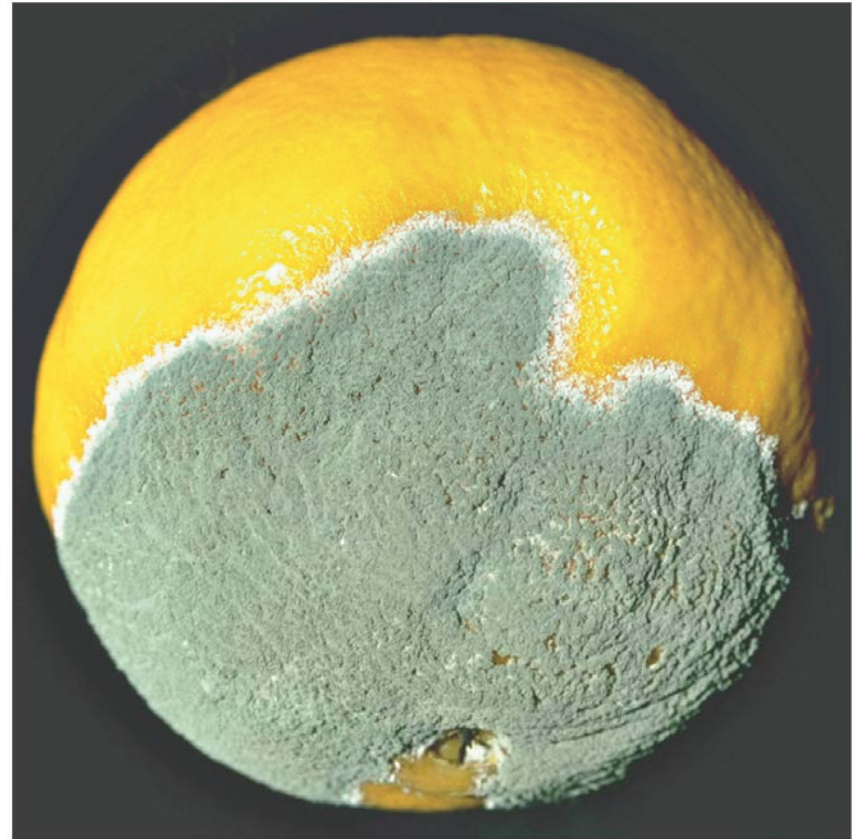


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Fairy rings

Imperfect fungi

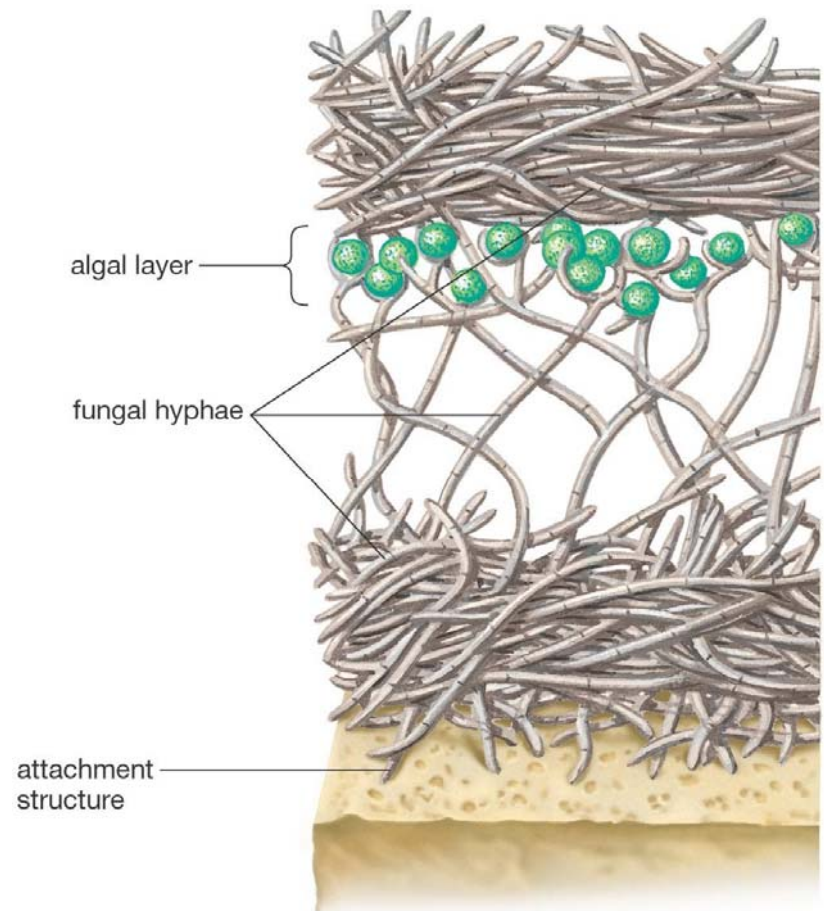
- We do not know how their sexual reproduction takes place.
- *Penicillium* spp.



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Lichens

- Symbiotic relationship with algae or cyanobacteria and a fungus
- Usually a cup fungus



Examples



(a) A fruticose (shrub-like) lichen



(b) A foliose (leaf-like) lichen



(c) Crustose (crust-like) lichens

Mycorrhizae

- Fungal roots
- Hyphae grow into root
- Help to deliver nutrients to the plant
- Fungus gets sugar and other molecules

EXPERIMENT

Researchers grew soybean plants in soil treated with fungicide (poison that kills fungi) to prevent the formation of mycorrhizae in the experimental group. A control group was exposed to fungi that formed mycorrhizae in the soybean plants' roots.

RESULTS

The soybean plant on the left is typical of the experimental group. Its stunted growth is probably due to a phosphorus deficiency. The taller, healthier plant on the right is typical of the control group and has mycorrhizae.



CONCLUSION

These results indicate that the presence of mycorrhizae benefits a soybean plant and support the hypothesis that mycorrhizae enhance the plant's ability to take up phosphate and other needed minerals.

Fungus and health



(a) Corn smut on corn



(b) Tar spot fungus on maple leaves

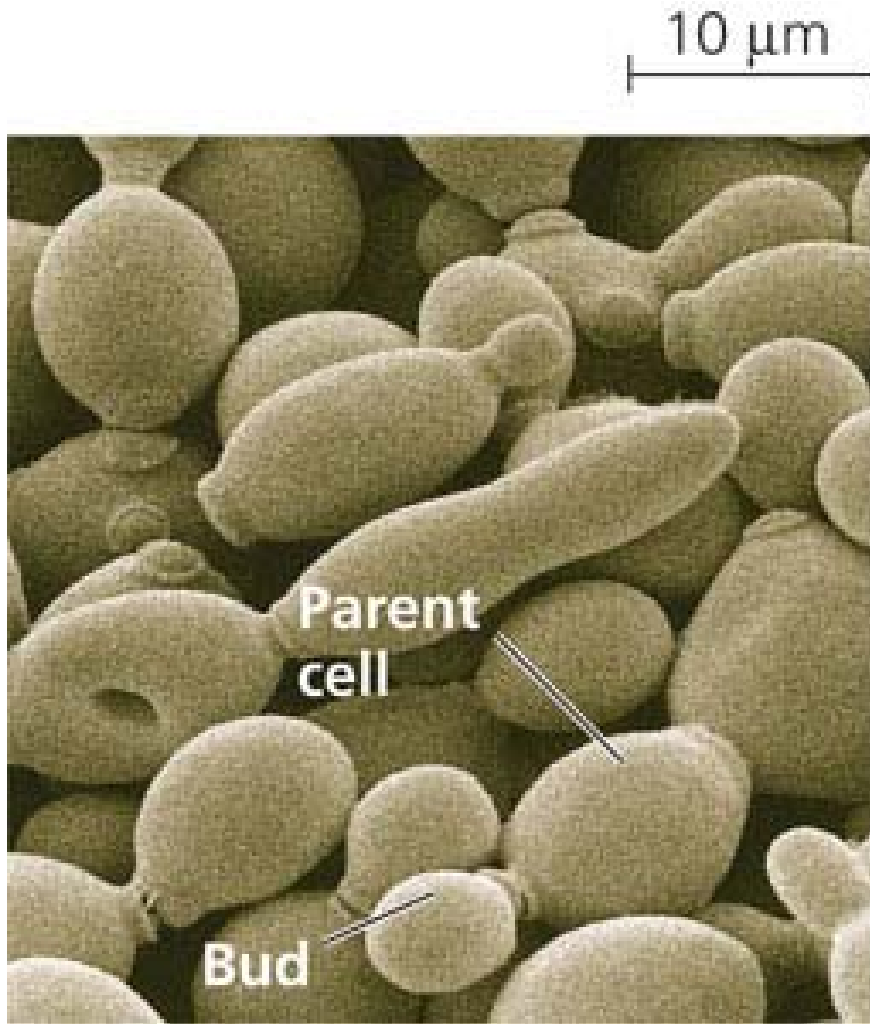


(c) Ergots on rye



- Treatment fungal diseases uses Azoles
- Ergosterol biosynthesis in fungi and in cholesterol biosynthesis

Yeast



- Unicellular
- Fermentation
- Alcohol
- Carbon dioxide