

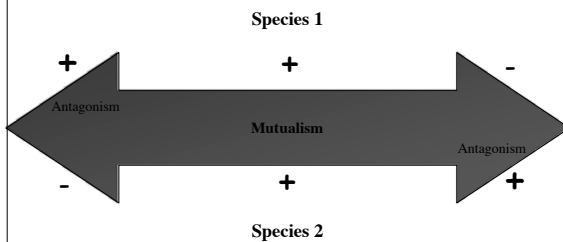
Mycorrhizal Ecology

Introduction with some mycology

Symbiosis

- Symbiosis = living together
 - Mutualism
 - Parasitism
 - Commensalism

Reciprocal parasitism?



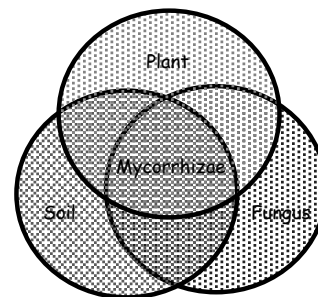
88%

- 88% of plants belong to families that are commonly mycorrhizal
- 12% of plants belong to families that are not mycorrhizal
 - Brassicaceae, Chenopodiaceae, Proteaceae, etc.
 - Often these are nasty weeds

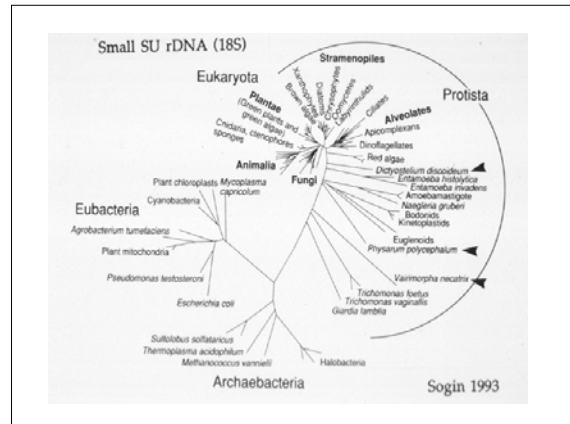
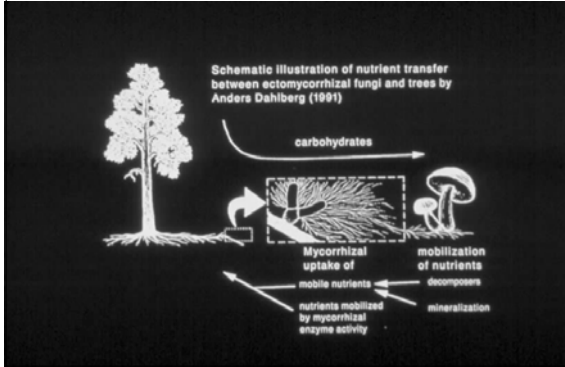
Types of mycor-rhizae

- AM = arbuscular mycorrhiza (70% of plant spp.)
- EM = Ectomycorrhiza (10-14% of plant spp.)
- Mycorrhizae of Ericaceae (1% of plant spp.)
- Mycorrhizae of Orchid
- Root endophytes

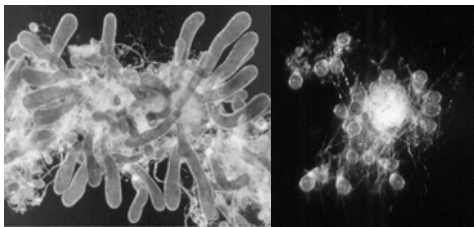
3-components of mycor-rhizae



Who Gets What??



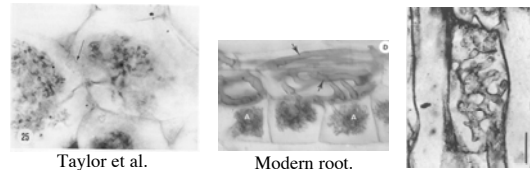
Geosiphon pyriforme - an AMF Associated with Algae



photos by Arthur Schlüßler

“No mycorrhizae, no land plants”

Rhynie chert formation, 400-460 million years old.



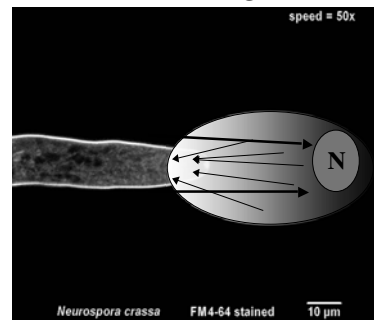
Taylor et al.

Modern root.

Taylor et al.

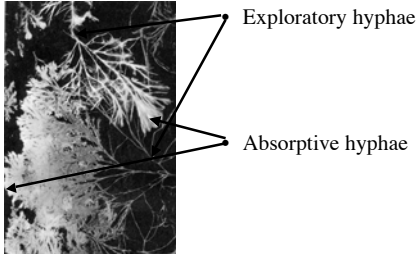
Kingdom fungi

Extracellular digestion

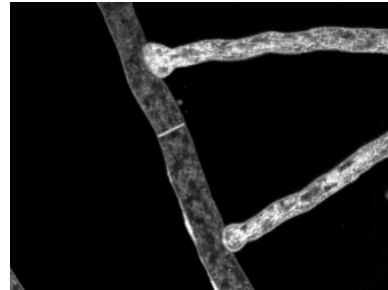


Jacobson, Hickey, Glass & Read

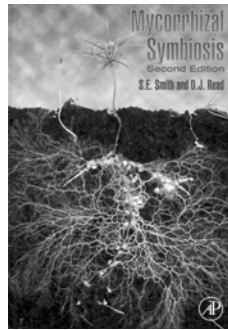
Mycelial fans



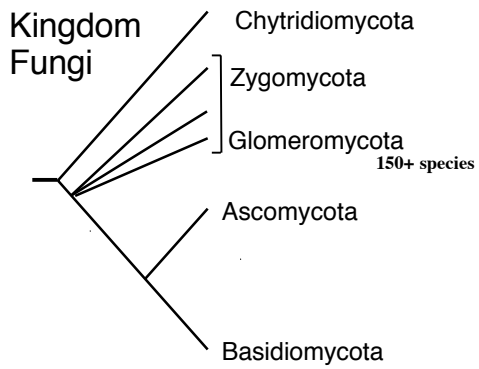
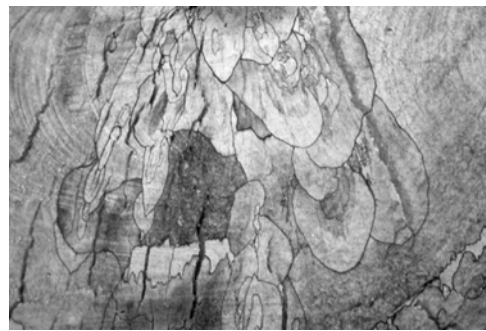
Hyphae of the *Same* Individual Fuse



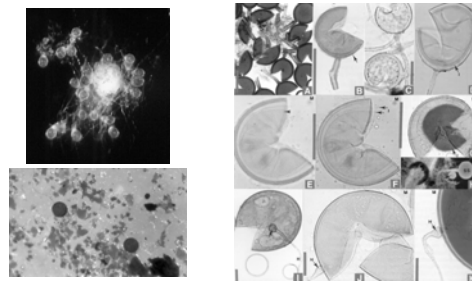
Mycorrhizal Networks

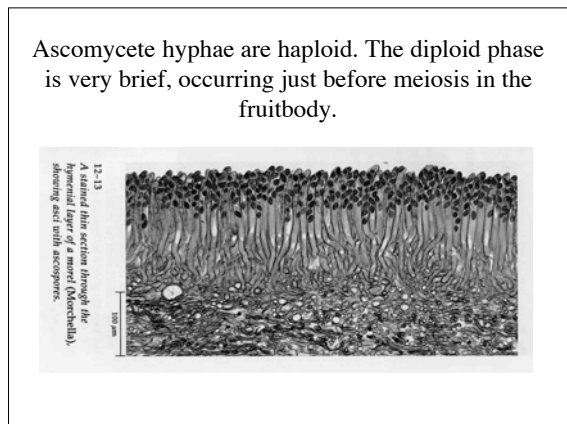
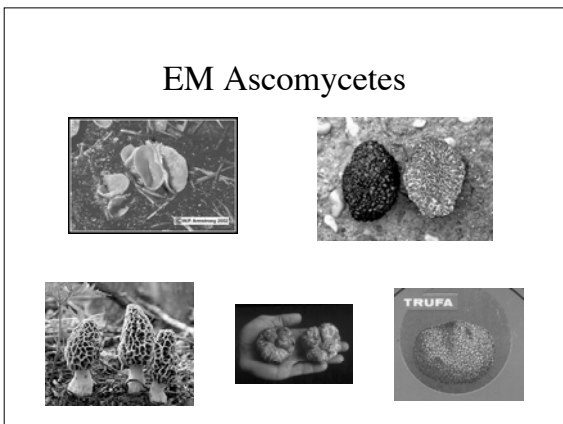
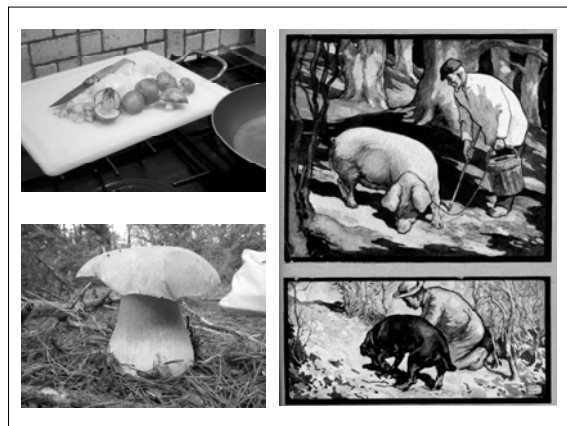
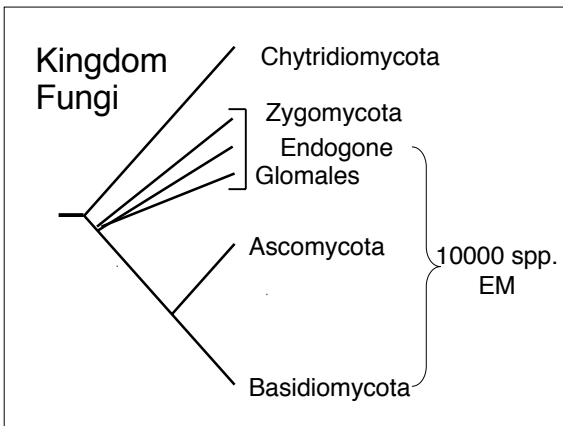
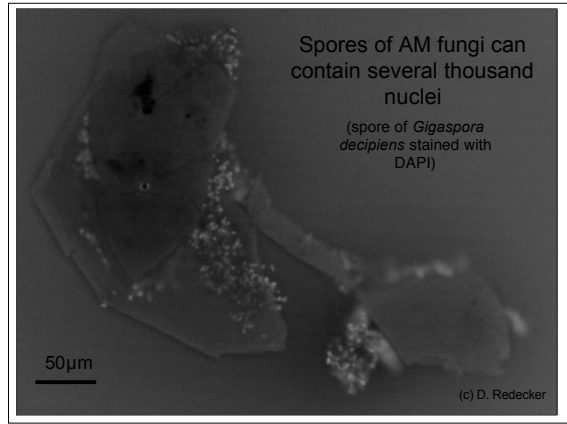
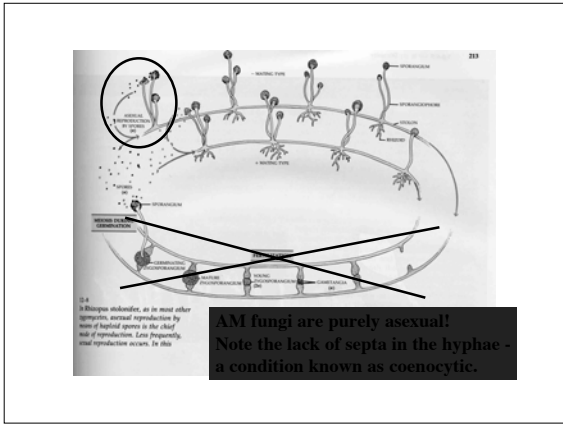


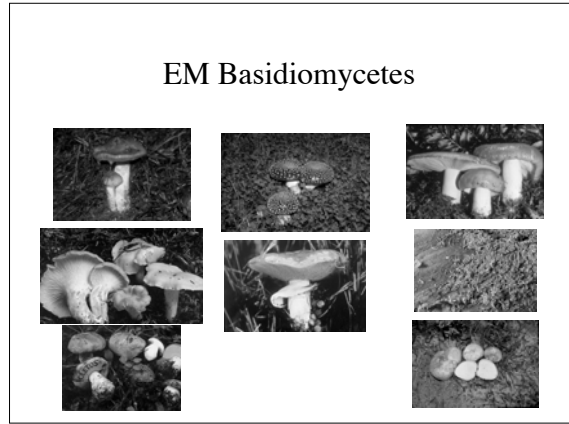
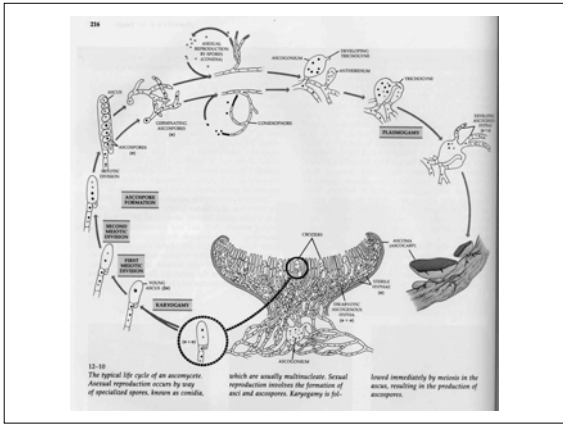
Hyphae of Different Individuals Reject Each Other



AM Fungi are Classified by Spore Morphology

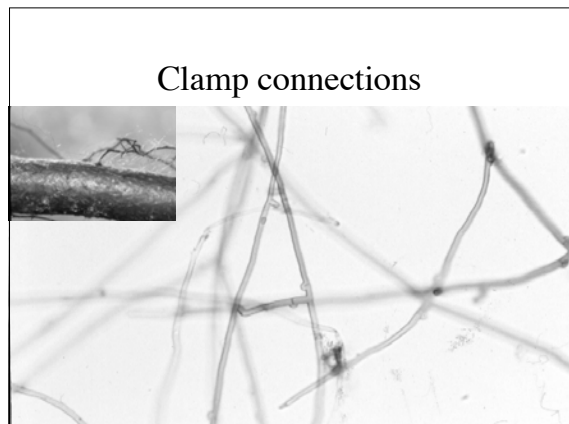
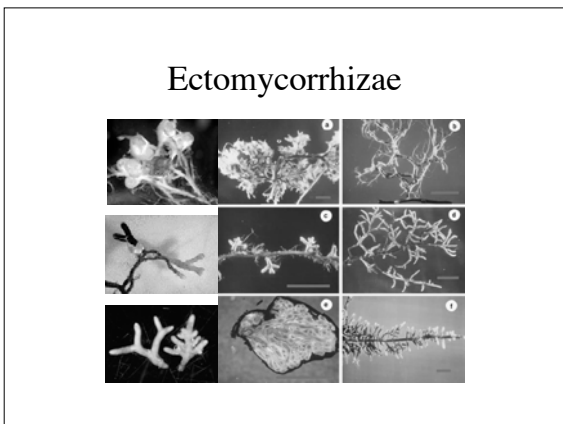
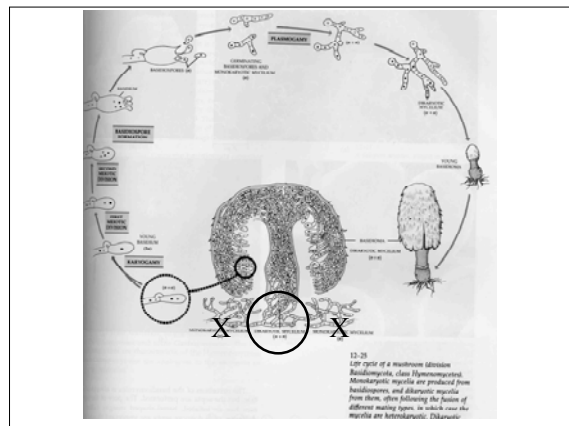




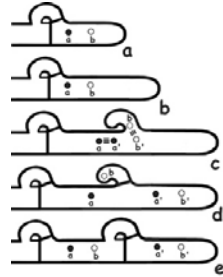


Basidiomycetes are dikaryotic. The individual is functionally a diploid, but the nuclei remain separate until just before meiosis in the basidium.

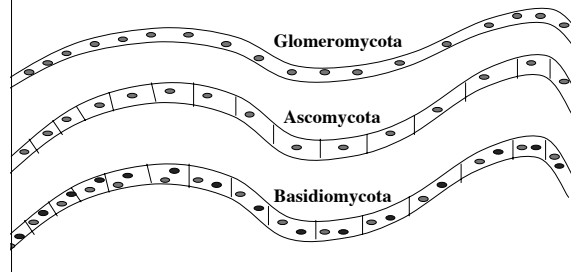
(b) 10 μm



Clamps = Basidiomycetes



3 Different Hyphal Types



Mutualisms

- Classic examples
 - Acacia ants, Yucca moths, plant pollinators, cleaner fish, N-fixing root nodules (*Rhizobium* and *Legumes*), lichens
 - All kind of special cases to ecologists
- Neoclassic examples
 - Chloroplasts, mitochondria, mycorrhizal associations, gut bacteria
 - All anything but special cases!