- *The Biology and Cultivation of Mushrooms*

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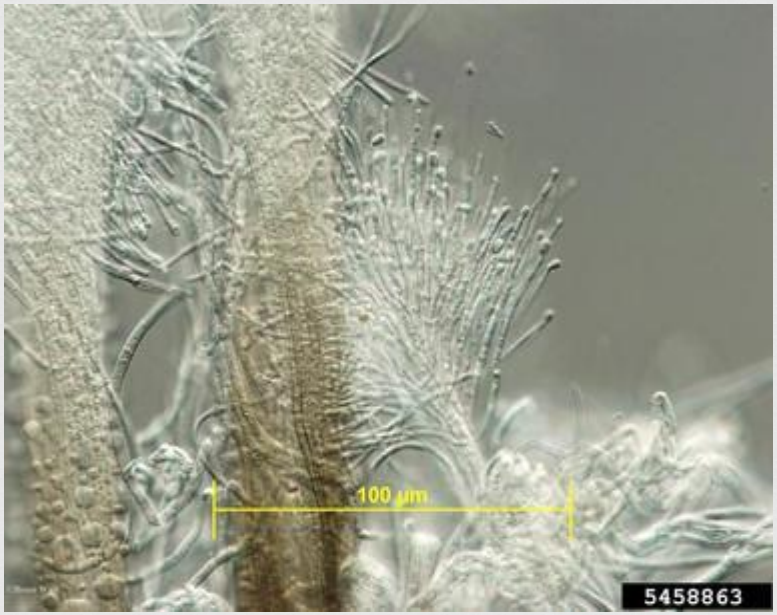
How would the world fare without fungi?

Fungi's Influence on Us

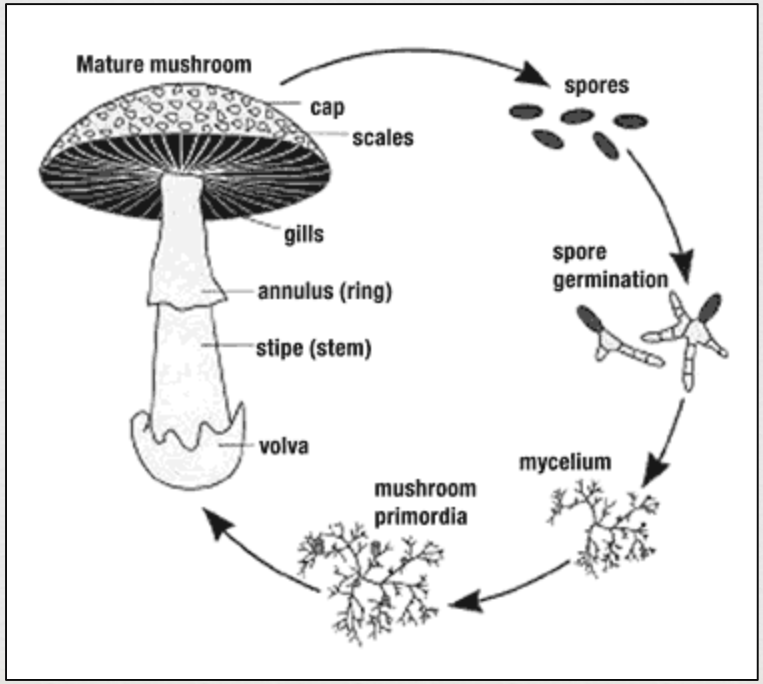
Fungal pathogens are responsible for great economic loss in agriculture.

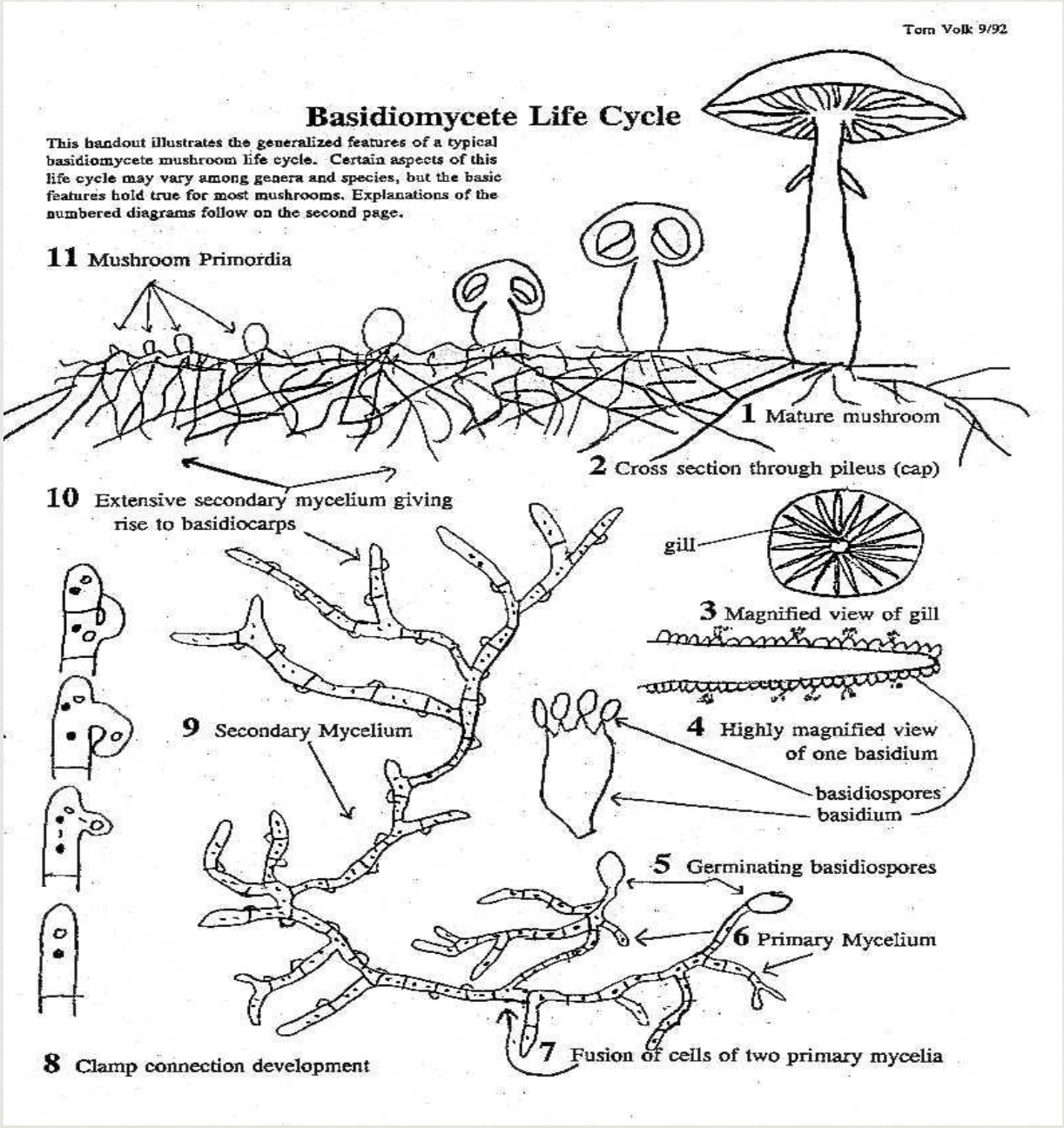
Fungal pathogens are responsible for landscape wide changes in forested ecosystems.



Fungi

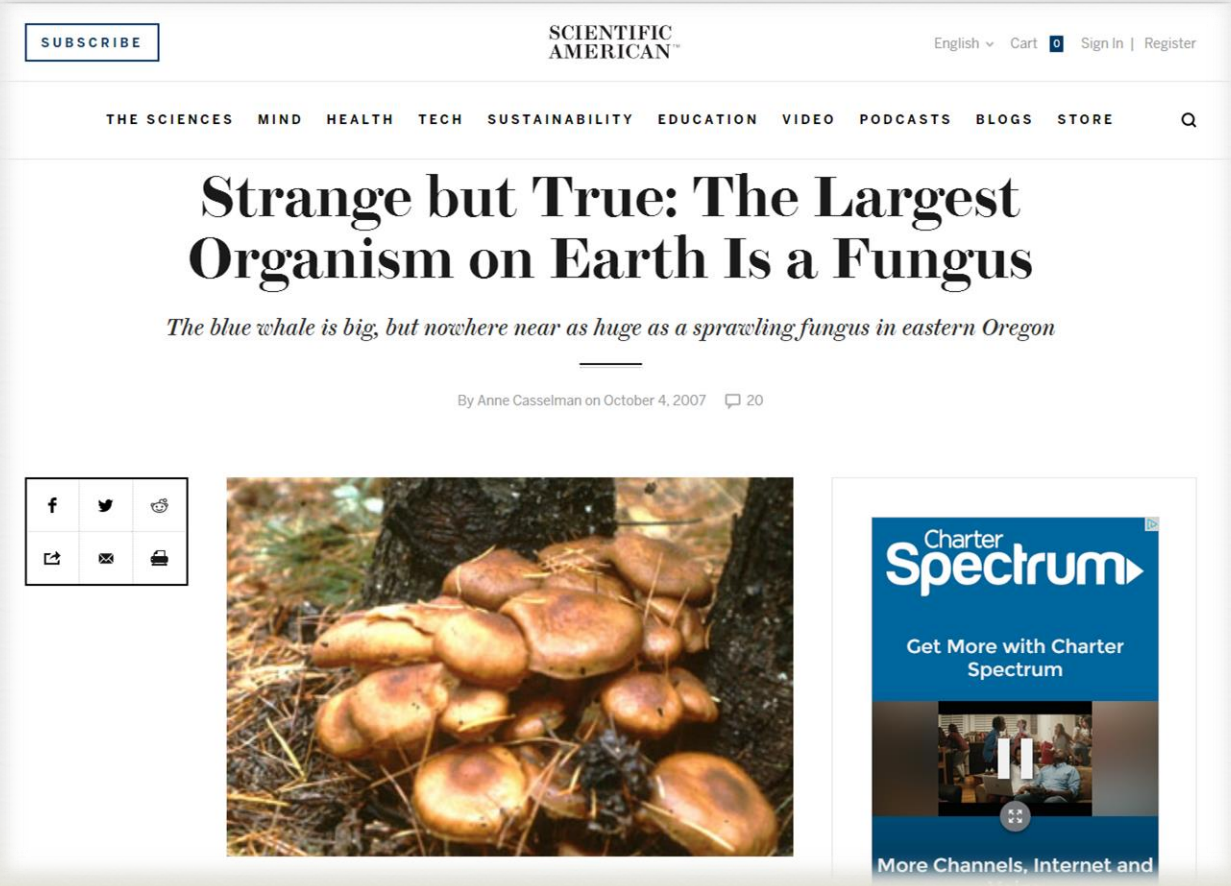
- Huge group of organisms with a lot of variation
- Most fungi have a complex life cycle!




Tom Volk 9/92
Basidiomycete Life Cycle
This handout illustrates the generalized features of a typical basidiomycete mushroom life cycle. Certain aspects of this life cycle may vary among genera and species, but the basic features hold true for most mushrooms. Explanations of the numbered diagrams follow on the second page.
11 Mushroom Primordia
1 Mature mushroom
2 Cross section through pileus (cap)
10 Extensive secondary mycelium giving rise to basidiocarps
gill
3 Magnified view of gill
9 Secondary Mycelium
4 Highly magnified view of one basidium
basidiospores
basidium
5 Germinating basidiospores
6 Primary Mycelium
7 Fusion of cells of two primary mycelia
8 Clamp connection development

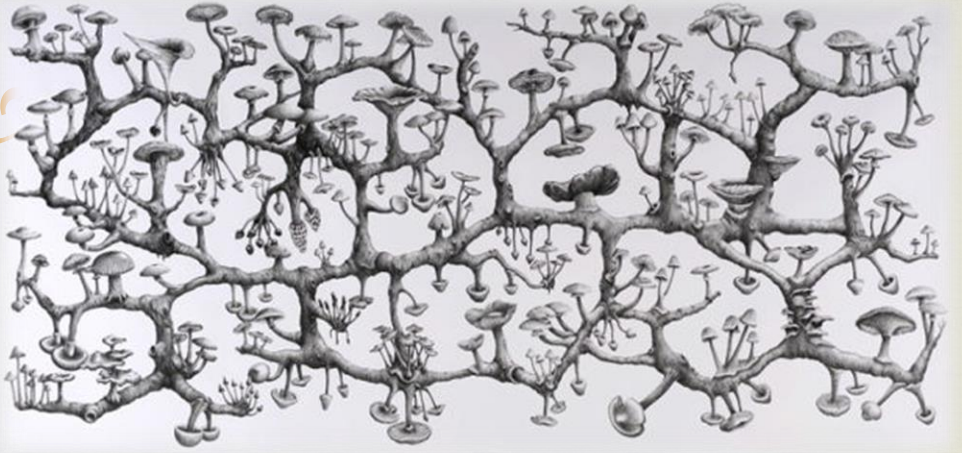
Largest organism on Earth

- http://www.scientificamerican.com/article/strange-but-true-largest-organism-is-fungus/



Largest organism on Earth

http://www.maine.gov/dacf/mfs/images/armillaria_root_rot_rhizomorphs.jpg



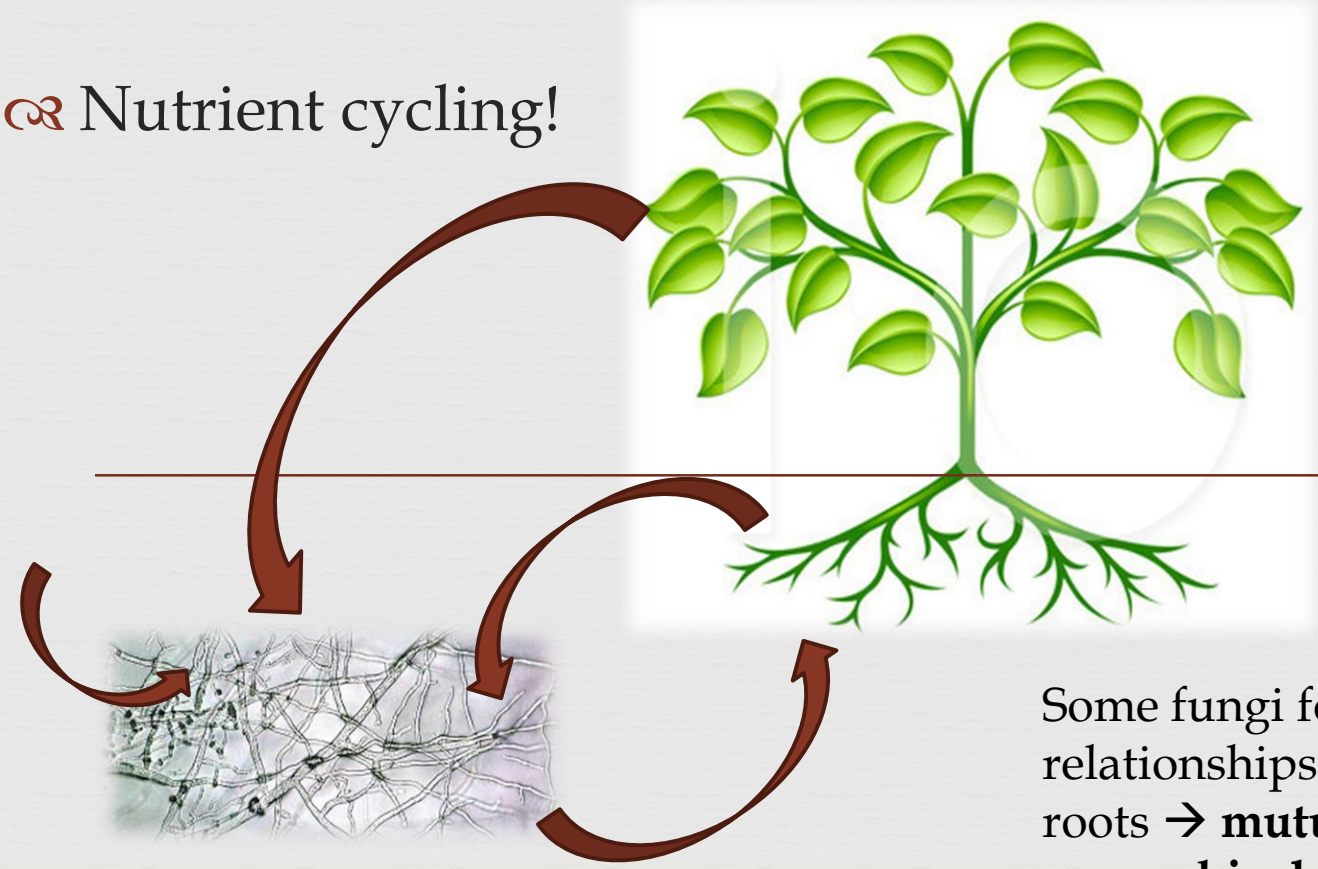
http://www.zmescience.com/other/science-abc/largest-organism-world-mushroom/

http://cdn.zmescience.com/wp-content/uploads/2015/01/a9ltpez5bptc3epxmspk.jpg

http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev3_033146.pdf

What is the main role of fungi in the environment?

- Nutrient cycling!

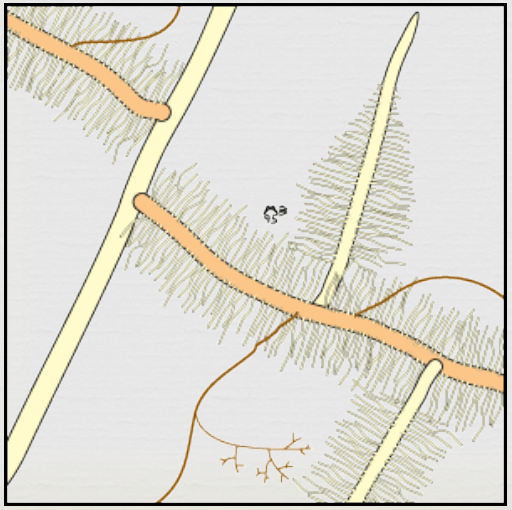


Some fungi form very close relationships with plant roots → **mutualistic mycorrhizal associations**

Why Can't I Grow….

Mycorrhizal Associations

- There are multiple kinds of mycorrhizal relationships
- Roughly 95% of all plant families form these relationships to some degree



The Decay Process

- Primary Decomposers

Can break down raw food sources like wood.

Primary Decomposers

-Brown Rot Fungi

degrades cellulose, hemicellulose and other smaller carbohydrates

Primary Decomposers

- White Rot Fungi
- Degrades lignin, as well as cellulose and hemicellulose and other smaller carbohydrates

First one, then another.

- Secondary Decomposers
  - Cannot break down raw, complex food sources.
  - Digest the leftovers from the primary decay fungi
  - Found in soil, rotting wood or compost

A few more relevant terms

- Saprophytic

Obtaining nourishment from the products of decay

- Parasite

  an organism living in, with, or on another organism without benefit to the host species.

How do we utilize fungal functions?

- Increase soil organic matter and plant health
- Food production
- Medicinal benefits
- Mycoremediation
- Profit
- Connection with nature

Nutrient Cycling:
Current FFP Research

- Using Wine Cap to increase soil organic matter and plant health

Food Production

Bioremediation

- Mycoremediation – the process of using fungi to degrade or sequester contaminants in the environment.

How do we utilize fungal functions?

Health Benefits

- Medicinal benefits

How do we utilize fungal functions?

Profit

- Profit

How do we utilize fungal functions?
Connecting with Nature

- Connection with nature

How This Information Relates To Cultivation

- By knowing the niche the fungus occupies in the ecosystem will determine if it can or cannot be cultivated.

Log based Cultivation

- Primary wood decay fungi that are grown on logs:
  - -Shiitake
  - -Oyster
  - -Lion's Mane
  - -Maitake
  - -Olive Oysterling
  - -Nameko, et al

Detritus Decomposers

- Primary wood decay fungi that grow on woodchips and forest floor litter:

  -Wine Cap

  -Blewit

  -Bleu Foot

Compost Decomposers

- Secondary Decay fungi that grow on composted substrates:

  -Almond Agaricus

  -Button Mushrooms

  -Portabella Mushrooms

Middle Ground Organisms