Fungi 101 workshop

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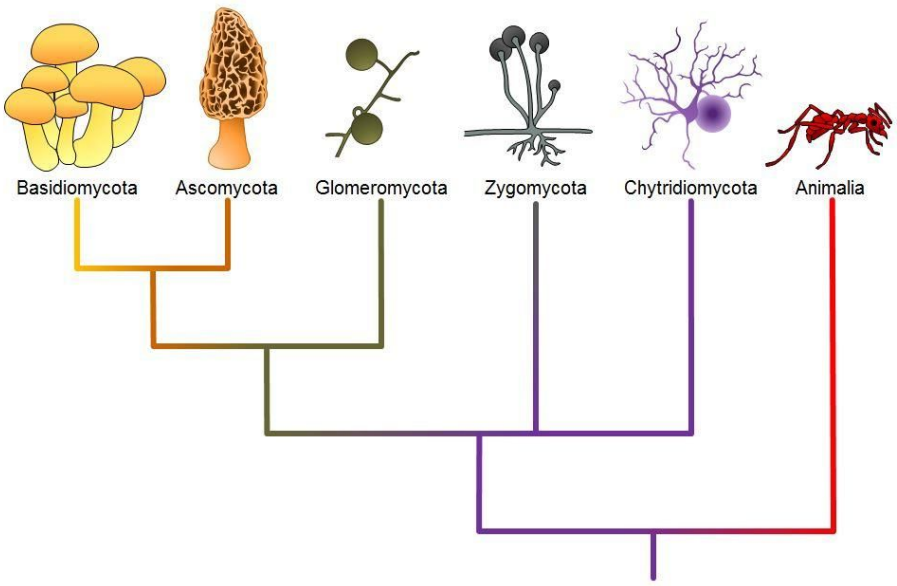
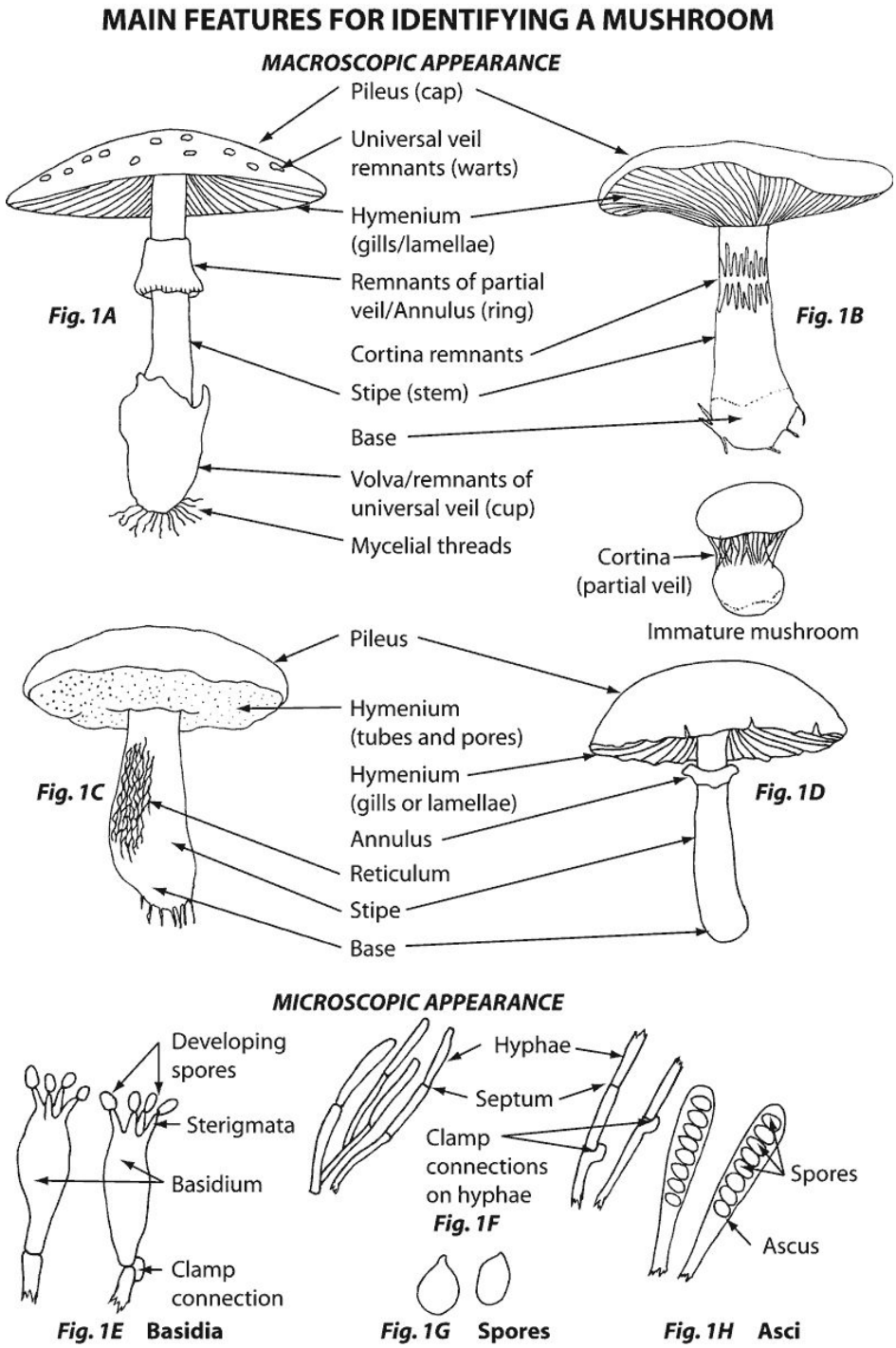
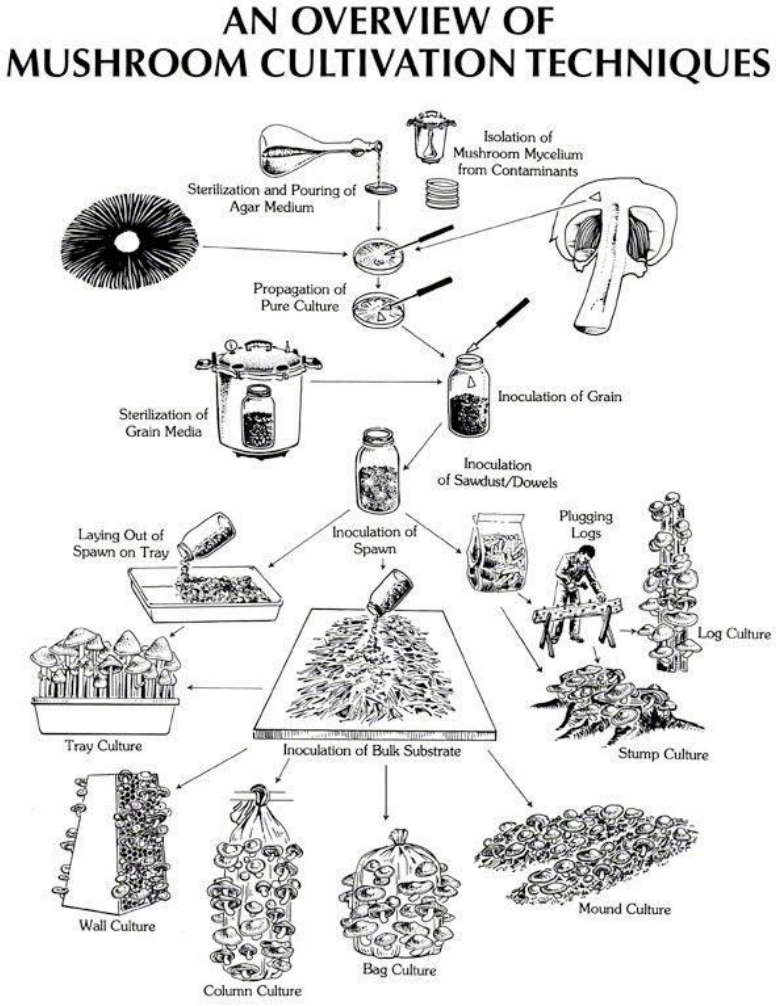


Current data and analytical techniques support a conclusion that Kingdom Animalia and Kingdom Fungi arose from a common ancestor.

Note: This diagram depicts the life cycle of a *Basidiomycete* fungi.



In order to properly identify and understand the diversity of fungi, it is crucial to learn the proper terminology of fungal anatomy and taxonomy.



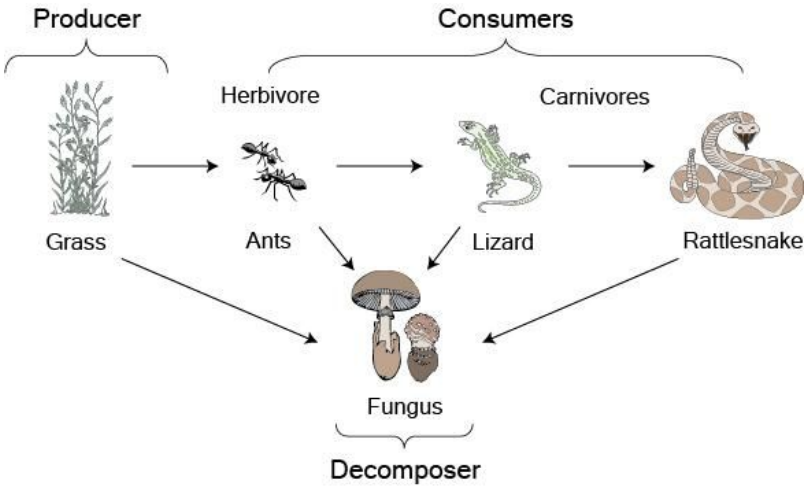
Fungi have been found to grow on a wide variety of substrates! Studies show success on diverse materials, including:

- Wood wastes, paper products
- Cereal straws and grain hulls
- Coconut fibers
- Corncobs
- Coffee plants and waste
- Tea leaves
- Sugarcane bagasse
- Banana fronds
- Seed hulls (cottonseed, sunflower, and oil-rich seeds)
- Almond, walnut, pecan, peanut hulls
- Soybean meal, roughage (Okara) and soy waste
- Artichoke waste
- Cactus waste: saguaro and prickly pear, yucca, agave

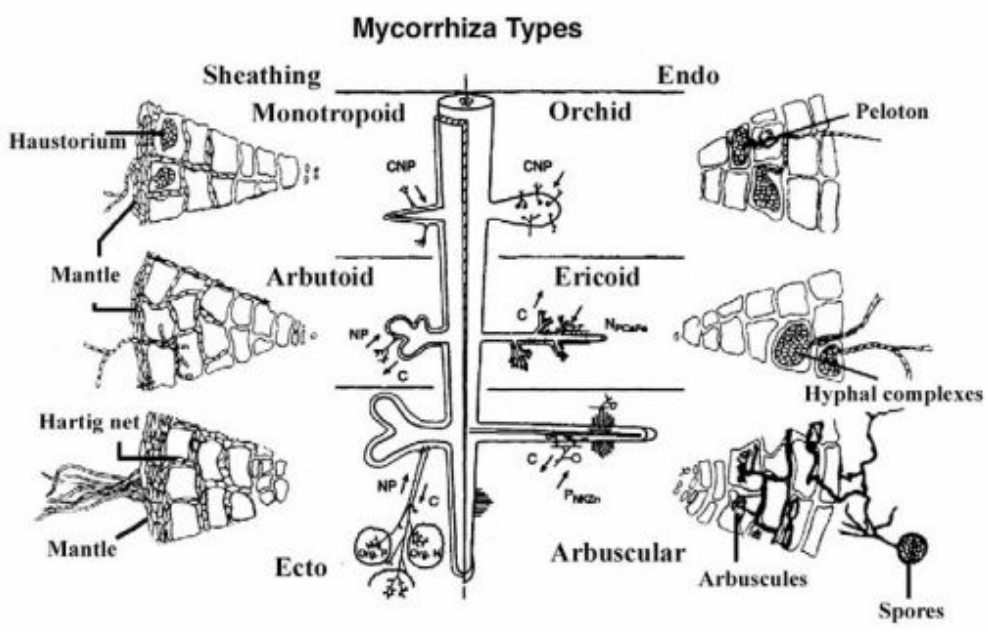
The field is wide open for new discoveries and experimentation! Get creative and work with resources that are locally abundant to you and perhaps are currently only a waste-stream. You could easily compile new cultivation

data to the field and actively create new bioremediation solutions! Also, thinking in terms of co-cultivation of fungi and plants!

Fungi Ecology



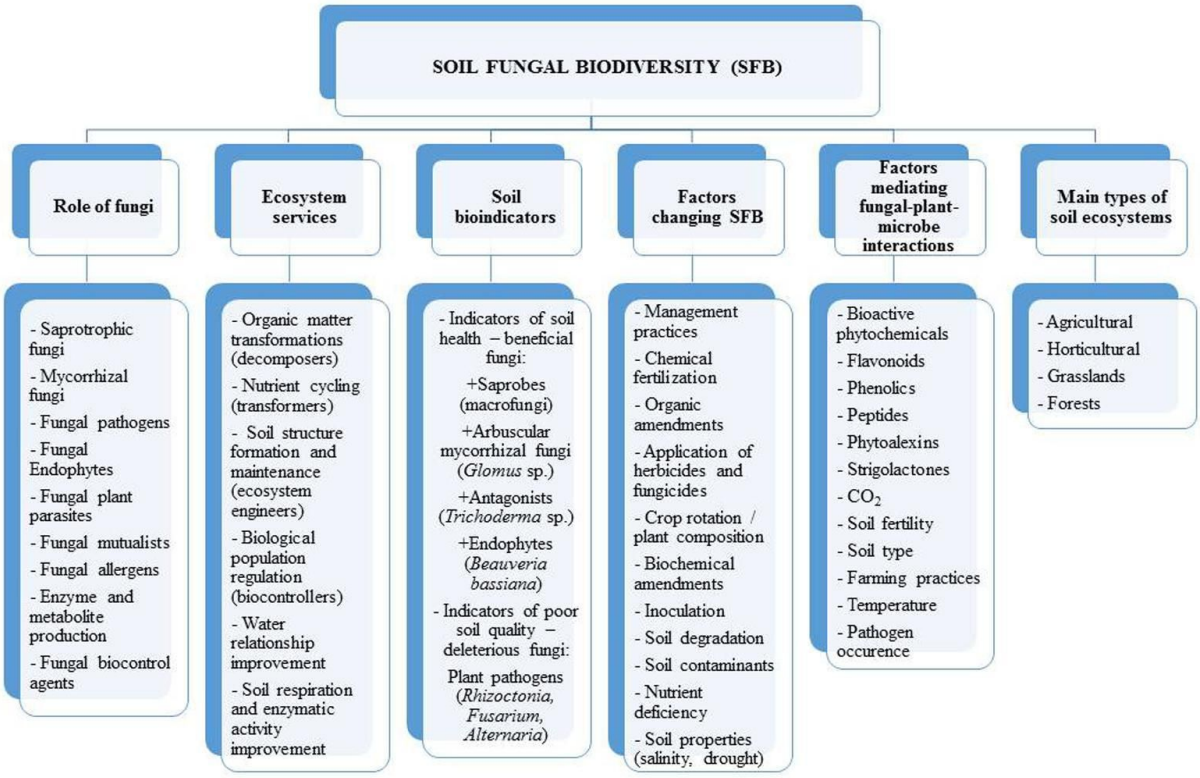
Fungi, together with bacteria, are the principal decomposers (**saprophytes**) in the biosphere. Fungi are virtually the only organisms capable of breaking down lignin in wood. Fungi, by breaking down substances, release critical building blocks from the bodies of dead organisms and make them available to other organisms.



Mycorrhiza is a symbiotic relationship between fungi and plant roots. In most mycorrhizae, the fungal hyphae actually penetrate the outer cells of the plant root and extend far out into the soil (**endomycorrhizae**). In some mycorrhizae, the fungal cells grow between but do not penetrate the roots (**ectomycorrhizae**). Benefits of this complex yet harmonious relationship include:

- Enhanced plant efficiency in absorbing water and nutrients from soil.
- Reducing fertility and irrigation requirements.
- Increased drought resistance

- Increased pathogen resistance/protection
- Enhancing plant health and vigor, minimizing stress
- Enhanced seedling growth
- Enhanced rooting of cuttings
- Enhanced plant transplant establishment
- Improved phytoremediation of petroleum and heavy metal contaminated sites



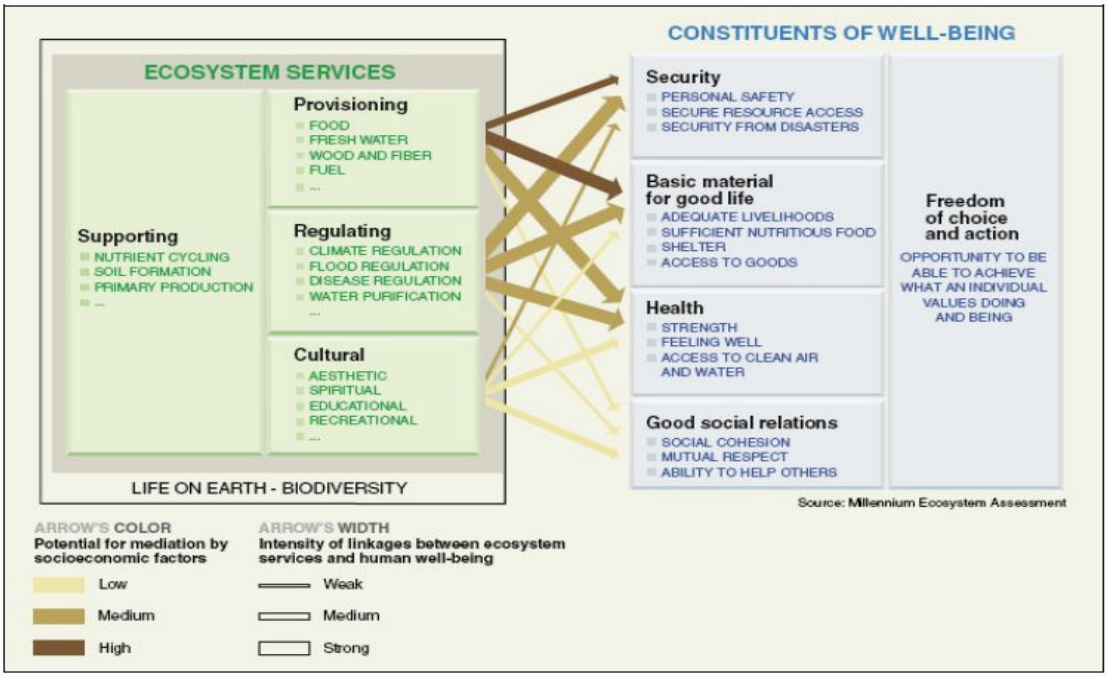
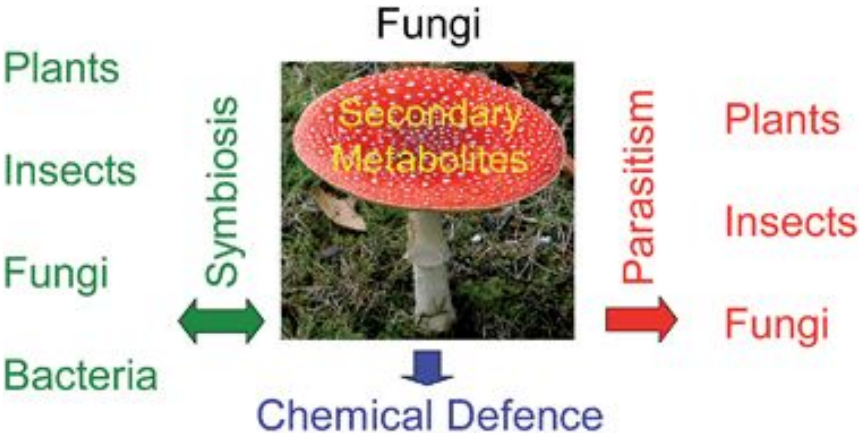


Figure 1 Linkages between Ecosystem services and human well-being (MEA 2005c)

Color of arrows show potential for substitution – example, a water purification plant can replace natural water filtration/purification process.

Soil degradation reduces its ability to provide ecosystem services. Ecosystem services are mostly provided by soils biotic community. Biodiversity is critical to ecosystem functioning and sustainable land management. Naturally biodiverse populations of soil biota and/or artificial inoculation of the soil with specific antagonistic bacteria, fungi and nematodes are known to effectively control a variety of pests and diseases.

One teaspoon of highly productive soil = 40+ miles of fungal hyphae and 20 million – 2 billion bacterial bodies



Fungi are widespread in nature and have conquered nearly every ecological niche. Fungi occur not only in terrestrial but also in freshwater and marine environments. Moreover, fungi are known as a rich source of secondary metabolites. Despite these facts, the ecological role of many of these metabolites is still unknown and the chemical ecology of fungi has not been investigated systematically so far.