Fungi (source Wikipedia & Dr. Faletra)

A fungus (plural fungi) is any member of a large group of eukaryotic (cells with nuclei) organisms that includes microorganisms such as yeasts and molds as well as the more familiar mushrooms. These organisms are classified as a kingdom, Fungi, which is separate from plants, animals, protists (single celled organisms), and bacteria (cells with no nuclei). One major difference is that fungal cells have cell walls that contain a polysaccharide called chitin, unlike the cell walls of plants and some protists, which contain cellulose, and unlike the cell walls of bacteria. These and other differences show that the fungi form a single group of related organisms, named the Eumycota (true fungi or Eumycetes), that share a common ancestor (is a monophyletic group).

The discipline of biology devoted to the study of fungi is known as mycology (from the Greek μύκης, mukēs, meaning "fungus"). Mycology has often been regarded as a branch of botany, even though it is a separate kingdom in biological taxonomy. Genetic studies (looking at the genes that are shared among organisms) have shown that fungi are more closely related (share more genes) to animals than to plants…hmmm…that's a surprise

Abundant worldwide, most fungi are inconspicuous because of the small size of their structures, and their cryptic lifestyles in soil, on dead matter, and as symbionts of plants, animals, or other fungi. They may become noticeable when fruiting, either as mushrooms or as molds. Fungi perform an essential role in the decomposition of organic matter and have fundamental roles in nutrient cycling and exchange. A forest depends on fungi for its life; if the fungi of a forest is not healthy the forest will suffer until it is not a forest.

Fungi have long been used as a direct source of food, such as mushrooms and truffles, as a leavening agent for bread, and in fermentation of various food products, such as wine, beer, and soy sauce. Since the 1940s, fungi have been used for the production of antibiotics (penicillin is a white bread mold), and, more recently, various enzymes produced by fungi are used industrially to produce drugs and hormones and in detergents. Fungi are also used as biological pesticides to control weeds, plant diseases and insect pests. Many species produce bioactive compounds called mycotoxins, such as alkaloids and polyketides, which are toxic to animals including humans. The fruiting structures of a few species contain psychotropic compounds. Fungi can break down manufactured materials and buildings, and become significant pathogens of humans and other animals. Losses of crops due to fungal diseases (e.g. rice blast disease) or food spoilage can have a large impact on human food supplies and local economies such as smut in corn.

The fungus kingdom encompasses an enormous diversity of taxa with varied ecologies, life cycle strategies, and morphologies ranging from unicellular aquatic chytrids to large mushrooms. However, little is known of the true biodiversity of Kingdom Fungi, which has been estimated at 1.5 million to 5 million species, with about 5% of these having been formally classified. Ever since the pioneering 18th and 19th century taxonomical

works of Carl Linnaeus, Christian Hendrik Persoon, and Elias Magnus Fries, fungi have been classified according to their morphology (e.g., characteristics such as spore color or microscopic features) or physiology. Advances in molecular genetics have opened the way for DNA analysis to be incorporated into taxonomy, which has sometimes challenged the historical groupings based on morphology and other traits.

A group of all the fungi present in a particular area or geographic region is known as mycobiota (plural noun, no singular), e.g. "the mycobiota of Ireland".

The 7 Phyla of Fungi

Ascomycota, Ascomycetes
Basidiomycota, Mushrooms
Chytridiomycota, Chytrids
Glomeromycota, Arbuscular mycorrhizal fungi
Hyphochytriomycota
Microsporida
Zygomycota, Bread molds

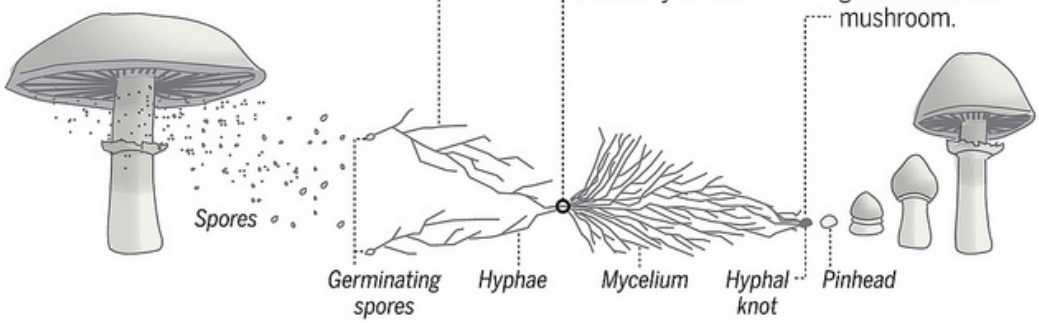
Life cycle of a mushroom

A mushroom releases millions of tiny spores into the air, each one with half the genetic code necessary for a new mushroom.

In the right conditions, a spore germinates, growing thread-like structures, called hyphae, through the soil.

The hyphae fuse with hyphae from a compatible spore to form a thread with a complete genetic code called mycelium.

The fused hyphae eventually form a hyphal knot that develops into a pinhead, then sprouts and grows into a new mushroom.



Source: allaboutmushrooms.com

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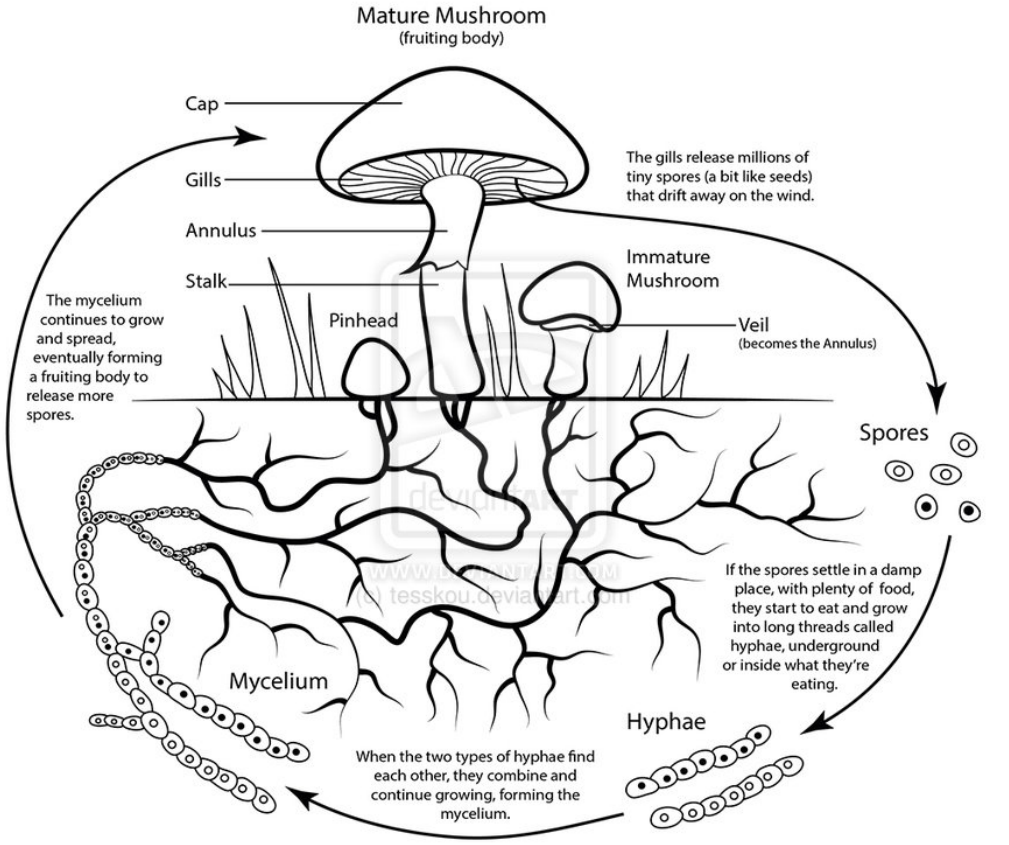

The Life Cycle of a Mushroom
Step by step life cycle of a mushroom with infographic

1) Haploid 1n basidiospores germinate and grow into short-lived haploid mycelia.
2) Undifferentiated (primitive simple cells) hyphae from two haploid mycelia (threadlike fungal structure) of opposite mating type (mushrooms have no male or female but do have opposite sex or mating types) undergo plasmogamy (the cells fuse but the nuclei remain separate),
3) creating a dikaryotic mycelium (each cell with two (di) nuclei) that grows faster than, and ultimately crowds out, the parent haploid mycelium. The mycelium of the mushroom illustrated here forms mycorrhizae (singular: mycorrhiza) with trees. Mycorrhizae are the mutualistic symbiotic relationship or fungi mycelia with plant roots. Environmental cues such as rain, temperature changes, and, for mycorrhizal species, seasonal changes in the plant host,
4) induce the dikaryotic mycelium to form compact masses that develop into mushrooms. Cytoplasm streaming in from the mycelium and from the attached mycorrhizae swells the hyphae of mushrooms, causing them to "pop up" overnight. The dikaryons of basidiomycetes are long-lived, generally producing a new crop of basiocarps (mushrooms, in this case) each year.
5) Karyogamy (nuclear fusion producing 2n nuclei) occurs in the terminal dikaryotic cells that line the surfaces of the gills (SEM at bottom left of figure).
6) Each cell swells to form a diploid basidium, which rapidly undergoes meiosis and yields four haploid nuclei.
7) The basidium then grows four appendages, and one haploid nucleus enters each appendage and develops into a basidiospore.
8) When mature, the basidiospores are propelled slightly (by electrostatic forces) into the spaces between the gills. After the spores drop below the cap. they are dispersed by the wind.