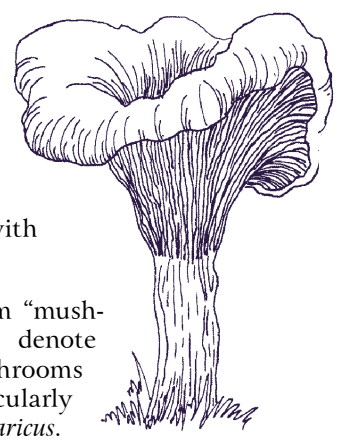
# Mushrooms of West Virginia

WVDNR WILDLIFE RESOURCES SECTION

## Introduction to Mushrooms

To many people, mushrooms are mysterious organisms that seem to appear sporadically without rhyme or reason and then disappear in a matter of days or hours. They come in a vast array of colors and bewildering shapes, and they have no obvious means of reproduction. Some are edible, some are poisonous, and others produce unworldly hallucinations when consumed. It is not surprising that pre-scientific cultures associated mushrooms with the supernatural.



In times past, the term "mushroom" was used to denote edible stalked mushrooms having gills, particularly those in the genus *Agaricus*. The cultivated white button mushrooms and portobello mushrooms that are sold in supermarkets are typical examples. Similar species having an umbrella-like form and radiating plate-like "gills" beneath the cap were called toadstools and were considered to be inedible or poisonous. More recently those who study these fascinating organisms have adopted a broader definition of mushrooms. In addition to the familiar gilled mushrooms, these include coral mushrooms, polypores, boletes, spine fungi, bracket fungi (also known as tree conks), puffballs, morels and others. Together these larger fungi are referred to as macrofungi.

All forms of macrofungi have two things in common. They have fruiting bodies large enough to be seen without magnification, and their function is to produce and disseminate reproductive spores. Spores are to fungi what seeds are to green plants, but unlike plant seeds, fungus spores are microscopic and cannot be seen individually by the naked eye. Fungi also differ from plants in that they lack the green pigment chlorophyll that allows plants to manufacture their own food through the process of photosynthesis. Fungi must obtain their food from pre-existing living or dead organic matter.

When a mushroom spore germinates, it sends forth a thread-like filament called a hypha (plural hyphae), which in a suitable environment will then branch and expand into a network called mycelium. The mycelium is normally concealed within soil, leaf litter, wood or other substrate. The hyphae secrete digestive enzymes that break down organic matter and then absorb the released nutrients. Given a sufficient food resource, a mycelium may live for many years, and periodically when conditions of moisture and temperature are favorable, it will produce spore-bearing fruiting bodies thus completing its life cycle. Some fungi have more complicated life histories but most of the macrofungi that we think of as mushrooms work in this way.

## Ecology of Mushrooms and Fungi

Fungi that "feed" on dead organic matter are called saprotrophs. These are nature's pre-eminent recyclers. They decompose plant and animal remains, and release their carbon for use by successive generations of organisms. These fungi are as essential to life on earth as air and water. Fungi are the principal decomposers of cellulose and lignin, the basic components of wood. If not for saprotrophic fungi that continuously recycle the yearly accumulation of leaves, fruits, fallen branches and trees, our forests would soon become impenetrable.

Decay fungi also soften the heartwood in trees, which enables woodpeckers and other cavity nesting birds to more easily excavate their nest sites. Once

*Oyster Mushrooms on a log.*

*Larch Bolete*

abandoned, these nest cavities are used as homes by other birds and animals. Living trees and downed logs that become hollow from the action of wood decay fungi provide many years of shelter for wildlife. In addition, the fruiting bodies of macrofungi are an important food item in the diet of numerous insects, mollusks (especially snails) and many mammals. Deer, squirrels, chipmunks and woodrats are particularly fond of various mushrooms.

Some macrofungi are parasitic on living plants and animals. Those that cause harm to their hosts are called pathogens. Few of the gilled mushrooms are serious pathogens but the common Honey Mushroom (see illustration) is one that kills trees.

Most of the fleshier gilled mushrooms and boletes that grow on soil in forests have a relationship with trees that benefits both organisms. In this association, called mycorrhiza, the fungus mycelium attaches to the tree's roots and permeates into the soil well beyond the normal reach of the root system. This greatly increases the tree's ability to absorb moisture and essential nutrients such as nitrogen and phosphorus. In return, the tree provides the fungus with photosynthesized carbohydrates. Occasionally the relationship is quite specific where a given species of mushroom will only associate with a single species of tree. For instance, the Larch Bolete *(Suillus grevillei)* will only grow in association with larch trees. Most trees, however, have multiple fungus partners, and many mushrooms form mycorrhiza with several kinds of trees.


Lincoff, G. H. 1981. *The Audubon Society Field Guide to North American Mushrooms.* New York, NY: Alfred A. Knopf.

McKnight, K.H., McKnight, V.B. 1987. *A field Guide to Mushrooms of North America.* Boston, MA: Houghton Mifflin.

Miller, Orson K., Miller, Hope H. 2006. *North American Mushrooms.* Guilford, CT: Globe Pequot Press.

Phillips, Roger. 1991. *Mushrooms of North America.* Boston, MA: Little, Brown and Company. (reprinted in 2005 by Firefly Books, Buffalo NY).

Roody, William C. 2003. *Mushrooms of West Virginia and the Central Appalachians.* Lexington: University Press of Kentucky.



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*Amanita muscaria or Fly Amanita*


All text and photos are by Bill Roody, a West Virginia Division of Natural Resources biologist and author of *Mushrooms of West Virginia and the Central Appalachians*, University Press of Kentucky. The cover photo is a true morel, *Morchella esculenta.*

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## Recommended Resources

Mushroom identification guidebooks and organizations useful for eastern North America:


Barron, George. 1999. *Mushrooms of Northeast North America.* Renton, WA: Lone Pine Publishing.

Bessette, Alan E., Bessette Arleen R., Fischer, David W. 1997. *Mushrooms of Northeastern North America.* Syracuse, NY: Syracuse University Press.

Bessette, Alan E., Roody, William C., Bessette, Arleen R. 2000. *North American Boletes.* Syracuse, NY: Syracuse University Press.


## Edible and Poisonous Mushrooms

Macrofungi are present in all terrestrial environments but the majority are in one way or another associated with trees. Because West Virginia is a forested state that also has extensive parklands and other natural habitats, the mycoflora of the state is exceptionally rich. Several hundred species have been recorded in the state, including some of the world's most prized edible mushrooms.

There are also a number of poisonous mushrooms that occur in West Virginia, a few of which are dangerously poisonous. Unfortunately, there are no general rules or easy tests to distinguish edible from poisonous species. Those who gather wild mushrooms for food should be absolutely certain of their identifications.

*Deadly Galerina, a very poisonous mushroom.*

This brochure is intended to provide general information only. Do not use the information and illustrations as a guide to identification or edibility of wild mushrooms. See the recommended resources below for more detailed and comprehensive information on this aspect of mushrooms.

# West Virginia's Diverse Mushrooms and Macrofungi

### Leatherback Milkcap *(Lactarius volemus)*

Gilled mushrooms make up the largest and most familiar group of macrofungi. Members of the genus Lactarius are called "milk mushrooms" because they exude white, clear, or colored droplets (called latex) from the cut or broken flesh. They include both edible and poisonous species. The Leatherback Milkcap, also known as Bradley, is a popular edible mushroom. It is recognized by its brownish orange cap, pronounced fishy odor, and flesh that "leaks" abundant mild-tasting white latex that quickly stains broken tissue (and fingers) dark brown. The Leatherback Milkcap forms mycorrhiza with oaks and other broadleaf trees.

### Satyr's Beard *(Hericium erinaceum)*

Satyr's Beard is as distinctive as it is beautiful. It belongs to a group of macrofungi that produce spores on pendent spines or teeth. The Satyr's Beard forms a dense, more or less roundish mass of whitish hanging spines on living trees, sometimes high up and out of reach. It is easily recognized, and when young and tender, it is a very good edible.

Cultivated varieties are called Monkey-head or Lion's Mane Mushroom. In a natural environment, the Satyr's Beard causes heartwood decay of living trees but can also be found occasionally on cut stumps. It most often grows on oak, but also occurs on beech and other broadleaf trees.

### Honey Mushroom *(Armillaria mellea)*

Honey mushrooms are one of the few gilled mushrooms that are harmful to trees. This fungus often becomes established as a saprotroph on decaying tree stumps. It then spreads to the roots of nearby living trees by underground runners called rhizomorphs, and eventually kills the newly infected tree. A network of the black cord-like rhizomorphs can often be seen beneath the loose bark of the dead or dying trees. Some foresters know this as the "bootlace fungus." Honey mushrooms often grow in dense clusters. They are edible only when thoroughly cooked, but care must be taken not to confuse them with the dangerously poisonous Deadly Galerina (*Galerina autumnalis*), a similar species that can inhabit the same woody substrate.

### Purple Coral Mushroom *(Clavaria zollingeri)*

The coral mushrooms are among the most alluring forms of macrofungi. They exhibit a wide range of colors and many resemble marine corals. Most grow on the ground and form mycorrhiza with trees, but a few are saprotrophs that live on decaying wood. Coral mushrooms may be simple finger or club-shaped, or they can be extensively branched and shrub-like. The spores are formed on the uppermost part of the clubs or erect branches. Although some coral mushrooms are edible, others are known to be poisonous. Because they are notoriously difficult to distinguish in the field, none can be recommended for eating. The Purple Coral is a distinctive member of this group.

### Destroying Angel *(Amanita bisporigera)*

This common gilled mushroom forms mycorrhiza with broadleaf trees, especially oak. *Amanita virosa* and *Amanita verna* differ microscopically, but are otherwise nearly identical. Together they form a "species complex" of highly toxic mushrooms that if eaten will damage the liver and kidneys. Members of this group are responsible for most mushroom-related fatalities in North America. All parts of the Destroying Angel are white. The stalk rises from a sac-like base that is often buried and not obvious. Every mushroom hunter should learn to recognize the Destroying Angel and its close relatives.

### Gem-studded Puffball *(Lycoperdon perlatum)*

Puffballs and their relatives (earthstars, bird's nest fungi, and stinkhorns) are referred to as gasteromycetes or "stomach fungi." They differ from other macrofungi in that their spores develop and ripen within an enclosed fruitbody, and then by various means, expose the mature spores to the elements. The Gem-studded Puffball forms a small pore-like opening at the top of the pear-shaped fruitbody through which the spores are expelled when raindrops land on it (like a bellows). Other puffballs, such as the Giant Puffball (*Calvatia gigantea*), so called because it can grow up to 2 feet across, release their spores as the entire outer wall decomposes. The Gem-studded Puffball is about the size of a golf ball. It typically grows in small clusters in woods, pastures or other grassy areas. Most puffballs are edible when immature and completely white on the inside, but inexperienced collectors could confuse edible puffballs with poisonous "earthballs," which are in the genus Scleroderma.

### Frost's Bolete *(Boletus frostii)*

Boletes are similar in stature to many gilled mushrooms but they have a sponge-like layer of tubes beneath the cap rather than gills. The spores are produced on the inner walls of the tubes. When mature, the spores fall through the tube openings (pores) and are carried by wind currents to new locations. There are nearly 100 species of boletes known to occur in West Virginia. Most of these form mycorrhiza with trees. Many boletes bruise or stain blue when handled or if the flesh is cut. Contrary to popular belief, the blue staining is not an indication of toxicity and cannot be used to distinguish edible from poisonous species. With its candy-apple colored cap and deeply netted red stalk, Frost's Bolete is surely one of the most beautiful boletes in our woods. It forms mycorrhiza with various oaks.

### Scarlet Cup *(Sarcoscypha austriaca)*

Cup fungi are so named because of their cup or saucer shape. Their spores are formed on the inner surface of the cup, which is actually composed of a layer of spore-bearing cells, each of which usually contains eight spores. Sometimes when cup fungi are handled or blown on, these cells "explode" in unison and shoot out a cloud of spores that is easily observed and can sometimes even be heard as a soft hiss. The rich red Scarlet Cup is one of the first conspicuous macrofungi to appear in early spring. Although related to morels, it is not edible.

### Sulphur Shelf *(Laetiporus sulphureus)*

The Sulphur Shelf, also known as Chicken of the Woods, belongs to a diverse group of macrofungi called polypores. They are somewhat like boletes in that the underside is made up of a layer of tubes in which the spores are produced. Polypores are saprotrophs or parasites that grow on wood. Many, such as the Sulphur Shelf, do not have a stalk but are shelf or bracket-shaped and grow in clusters on standing or fallen trees, or stumps. The Sulphur Shelf is easily recognized by its bright orange caps and sulphur yellow underside. The closely related White-pored Chicken of the Woods (*Laetiporus cincinnatus*) is similar but has a white to buff-colored pore surface on the underside, and it usually grows in the form of a rosette at the base of trees and stumps. Both species are good edibles when young and tender. However, some people are allergic to them, especially when consumed at the same meal with alcohol.

### Conifer False Morel *(Gyromitra esculenta)*

False morels appear in early spring about the same time as true morels. Mushroom hunters should learn to recognize the difference between true morels, which are edible and false morels, which are poisonous. Although some people can eat false morels with impunity, they contain dangerous toxins and have been known to cause fatalities. The caps of typical false morels have convoluted brain-like lobes, and the interior of the stalk is chambered. The caps of true morels (see cover) are composed of pits that are separated by distinct ridges, and they have hollow stalks. The Conifer False Morel is most often found beneath white pine (*Pinus strobus*).

### Tinder Polypore *(Fomes fomentarius)*

Unlike the Sulphur Shelf, the fruiting body of the Tinder Polypore is perennial and can be found at any time of year. This wood decay fungus usually infects trees that are already weakened from other causes, especially birch and beech. It produces hard, durable hoof-shaped fruitbodies that increase in size each year as a fresh fertile layer of tubes on the underside is added. The common name Tinder Polypore is derived from its use as punk to catch a spark and to transport a smoldering ember for primitive fire making.

### Witches' Butter *(Tremella mesenterica)*

As a group the jelly fungi are easy to recognize in the field. With few exceptions, their fruiting bodies are soft, gelatinous or rubbery. Witches' Butter is one of the more conspicuous jelly fungi. It is especially noticeable in wet weather early in the season. Its spores are formed on the surface of yellow lobes that appear on small branches of broadleaf trees. Although edible, Witches' Butter is 90 percent water and has little substance or flavor.