

Illinois

Mushrooms



wood ear *Auricularia auricula* © Andrew S. Methven



spotted bolete *Boletus affinis* © Walter J. Sundberg



orange *Mycena* *Mycena leaiana*
© Andrew N. Miller



indigo milky *Lactarius indigo* © Gregory M. Mueller



turkey tail fungus *Trametes versicolor*
© Andrew S. Methven



bird's nest or splash cup
Cyathus striatus © Andrew S. Methven



chanterelle *Cantharellus cibarius*
© Andrew N. Miller



jack-o-lantern *Omphalotus illudens* © Walter J. Sundberg



dryad's saddle *Polyporus squamosus* © Andrew S. Methven



green-gilled *Lepiota* *Chlorophyllum molybdites* © Andrew S. Methven



giant puffball *Calvatia gigantea*
© Andrew S. Methven



sulphur shelf or chicken of the woods *Laetiporus sulphureus* © Andrew S. Methven



yellow morel *Morchella esculenta*
© Andrew S. Methven



oyster mushroom *Pleurotus ostreatus* © John A. Richardson



malodorous *Lepiota*
Lepiota cristata © Walter J. Sundberg



shaggy mane *Coprinus comatus* © Andrew S. Methven



crown-tipped coral *Clavicornia pyxidata* © Andrew S. Methven



rounded earthstar *Geastrum saccatum*
© Walter J. Sundberg



bear's head *Hericium erinaceus*
© Andrew S. Methven



stalked scarlet cup
Sarcoscypha occidentalis
© Andrew S. Methven



yellow-orange fly agaric *Amanita muscaria*
variety *formosa* © Andrew S. Methven



elegant stinkhorn *Mutinus elegans* © Walter J. Sundberg



split-gill *Schizophyllum commune* © Walter J. Sundberg



emetic *Russula* *Russula emetica* © Walter J. Sundberg



fawn or deer mushroom *Pluteus cervinus*
© Andrew S. Methven

Mushrooms are members of the Kingdom **Fungi**, one of the largest and most diverse groups of organisms. Fungi are second only to insects in the number of species that occur on earth. It has been estimated that more than 10,000 species of mushrooms are found in the United States and at least 2,000 species occur in Illinois. The 25 species illustrated here are commonly found throughout Illinois and were selected to represent the diversity of mushrooms in our state. Unlike organisms such as butterflies, trees, or turtles, little is known about the number and distribution of mushrooms because so few people study them. The study of fungi is called **mycology**, and the people who study them are known as **mycologists**. Fungi are important components of all ecosystems because they play critical roles in nutrient recycling by breaking down organic matter. While some fungi are destructive plant **pathogens**, others enhance plant growth through the formation of **mycorrhizae**. Despite their ecological and economic importance, no mushrooms are listed on the U.S. Fish and Wildlife Service federally endangered and threatened species list probably because so little is known about them due to their cryptic habitat and short-lived nature.

Species List

Ascomycetes (sac fungi)
stalked scarlet cup
yellow morel

Sarcoscypha occidentalis
Morchella esculenta

Basidiomycetes (club fungi)

bear's head
bird's nest or splash cup
chanterelle
crown-tipped coral
dryad's saddle
elegant stinkhorn
emetic *Russula*
fawn or deer mushroom
giant puffball
green-gilled *Lepiota*
indigo milky
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malodorous *Lepiota*
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oyster mushroom
rounded earthstar
shaggy mane
split-gill
spotted bolete
sulphur shell or
chicken of the woods
turkey tail fungus
wood ear
yellow-orange fly agaric

Hericium erinaceus
Cyathus striatus
Cantharellus cibarius
Clavicornia pyxidata
Polyporus squamosus
Mutinus elegans
Russula emetica
Pluteus cervinus
Calvatia gigantea
Chlorophyllum molybdites
Lactarius indigo
Omphalotus illudens
Lepiota cristata
Mycena leaiana
Pleurotus ostreatus
Geastrum saccatum
Coprinus comatus
Schizophyllum commune
Boletus affinis

Laetiporus sulphureus
Trametes versicolor
Auricularia auricula
Amanita muscaria variety *formosa*

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Illinois Department of Natural Resources

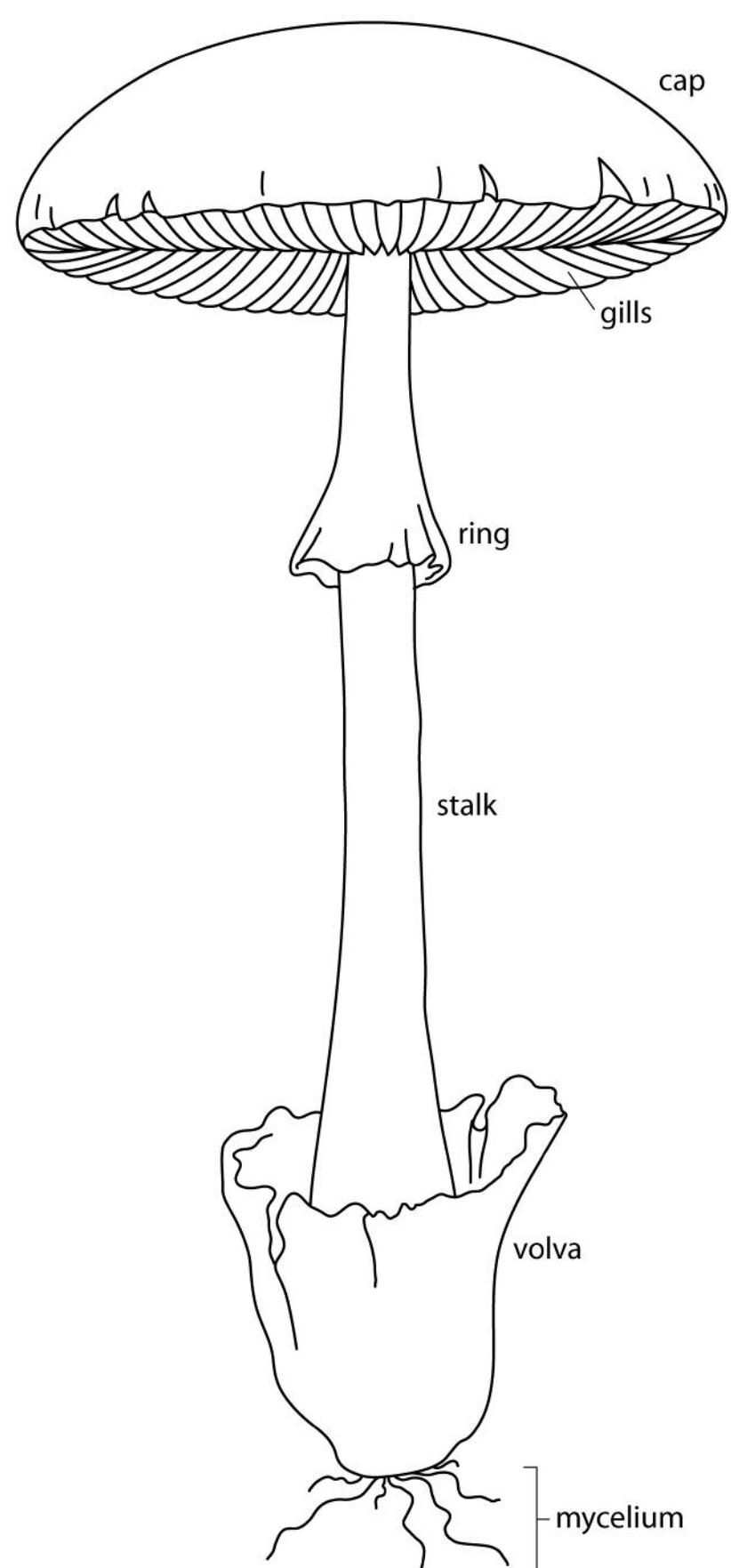


Division of Education
Illinois Natural History Survey

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This poster should not be used as an identification guide to mushrooms. While some mushrooms are edible, some are poisonous and a few are deadly poisonous. No mushroom should be eaten until it has been properly identified by an expert. Neither the authors nor their agencies or institutions accept responsibility for any adverse effects that may arise from eating wild mushrooms.

Anatomy



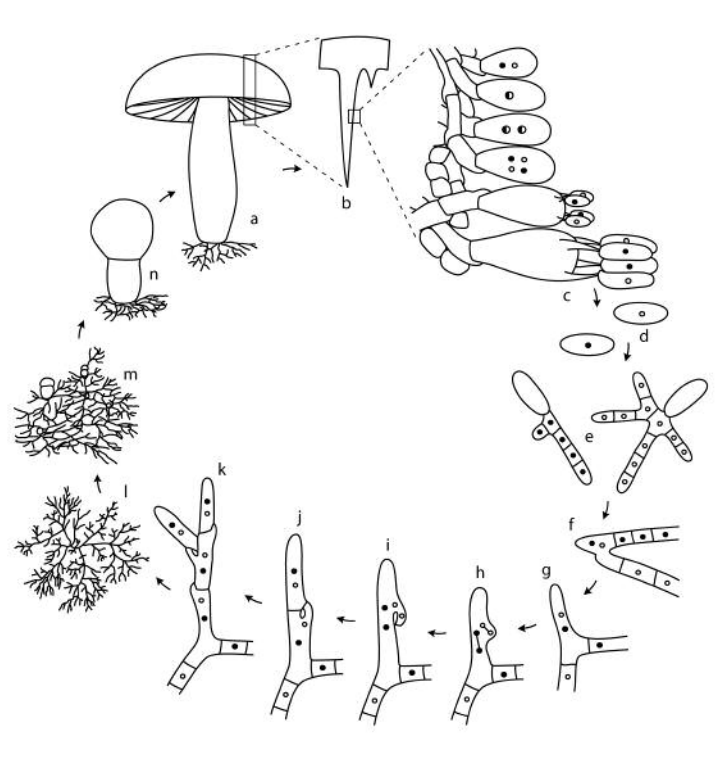
The term "mushroom" is used here in a very broad sense to refer to **fungi** that have large, fleshy **fruiting bodies** that can easily be seen without magnification. This definition includes fungi commonly referred to as agarics, bird's nest fungi, boletes, chanterelles, coral fungi, cup fungi, earthstars, morels, polypores or shelf fungi, puffballs, stinkhorns, tooth fungi, and toadstools.

The majority of mushrooms belong to the fungus group known as **Basidiomycetes** (club fungi), while many others are included in the **Ascomycetes** (sac fungi). Basidiomycetes are spore droppers because they produce their spores on the outside of club-shaped structures known as **basidia**. **Basidiospores** are generally shot off a short distance and then dispersed by wind, water, or insects. Ascomycetes are spore shooters since they produce their spores inside sac-like structures called **asci**. **Ascospores** must be shot out of the asci for the mushroom to disperse its spores.

The fruiting body of a mushroom is composed of several parts. The cap, or **pileus**, is the structure that supports the spore-producing surface (**hymenophore**), which can be composed of gills (**lamellae**), downwardly directed tubes with pores, spines, or veins. The term agaric typically refers to mushrooms that have gills on the underside of their caps, while boletes and polypores possess tubes with pores, tooth fungi have spines or teeth, and chanterelles have veins. The hymenophore can be covered by a protective layer (**partial veil**) that initially connects the cap edge to the stalk but which breaks apart at maturity leaving a ring, or **annulus**, around the stalk. The stalk, or **stipe**, extends the cap and hymenophore into the air, allowing the mushroom to better disperse its spores. When young, the entire mushroom can be covered by an **universal veil**. As the cap and stalk expand, the universal veil tears open near the base of the stipe leaving a **volva**.

Fungi are composed of microscopic strands called **hyphae**, which are collectively known as a **mycelium**. Fungi can be thought of as having their stomachs on the outside of their bodies since they must digest their food before it can pass through their cell walls. The mycelium secretes enzymes that break down surrounding organic material into simple soluble molecules, which are then absorbed through the cell walls.

Life History



Much in the same way that apples are the seed-bearing parts of an apple tree, mushrooms are the spore-bearing, or reproductive parts, of a **fungus**. The **fruiting body** of a mushroom (a) is generally the only phase seen since the **mycelium** occurs hidden in the substrate. If a piece of gill section (b) is removed and observed under a microscope, a layer of **basidia** in various stages of development can be seen (c). As shown in the developmental sequence, the uppermost (youngest) basidium contains two nuclei, which are shown here as white and black dots to indicate two different types of nuclei. These nuclei fuse and then undergo a two-step division resulting in four nuclei. Each nucleus migrates into one of the four **basidiospores**, which are produced at the tips of the basidia. After the basidiospores are released (d), they germinate to form **hyphae** (e). If hyphae with two different types of nuclei meet, they fuse and form a mycelium with both types of nuclei (f, g). As the mycelium grows, the nuclei divide so that each new cell has the same type of nuclei as the original cell (h-k). A small **clamp connection** is often formed between adjacent cells. In time, a large growth of mycelium will form (l) and when suitable environmental conditions (humidity, temperature, water, and light) are met, a small mushroom termed a **button** will develop (m). This button will grow to form a young fruiting body (n), which will develop into a mature mushroom, and the life cycle is repeated.

Glossary

annulus	remnant of the partial veil that surrounds the stipe after expansion of the pileus
ascus (singular)/ asci (plural)	saclike cells characteristic of the Ascomycetes inside which ascospores are produced
Ascomycetes	group of fungi which reproduce by forming asci and ascospores
ascospores	spores produced in an ascus
basidium (singular)/ basidia (plural)	clublike cells characteristic of the Basidiomycetes on which basidiospores are produced
Basidiomycetes	group of fungi which reproduce by forming basidia and basidiospores
basidiospores	spores produced on a basidium
bioluminescent	organism capable of producing light
button	young mushroom before the pileus has expanded and stipe has elongated
chitin	structural carbohydrate found in the cell walls of fungi
conifer/coniferous	cone-bearing, evergreen trees, such as pines
clamp connection	outgrowth from the tip cell of a hypha , which, at cell division, makes a connection by fusion between the tip cell and subterminal cell (See "Life History," h, i, and j.)
deciduous	trees that lose their leaves annually
fruiting body	general term for spore-bearing structures in fungi
fungus (singular)/ fungi (plural)	filamentous, eukaryotic (cells contain nuclei) organisms which lack chloroplasts, absorb their food, and have chitin in their cell walls
humus	dark, nutrient-laden material in soil resulting from decay of formerly living things
hymenophore	spore-bearing structure or surface
hypha (singular)/ hyphae (plural)	one or more of the filaments of a mycelium
lamellae	vertical plates on the underside of the pileus ; gills
mycelium	mass of hyphae
mycologist	one engaged in the study of mycology
mycology	scientific study of fungi
mycorrhizae	symbiotic association of a fungus and the roots of a plant
mycophagist	an eater of fungi
partial veil	layer of tissue which, when young, joins the stipe to the pileus edge; later becomes an annulus
pathogen	disease-causing organism
pileus	hymenophore -supporting part of a fruiting body; the cap
stipe	stalk
universal veil	layer of tissue covering the entire fruiting body while early development takes place
volva	cuplike lower part of the universal veil found at the base of the elongated stipe

Conservation

During the past few years, there has been increasing concern about the decline of mushroom species. Surveys indicate that populations of some mushroom species have decreased in Illinois, especially those associated with forests. It is generally accepted that the primary cause for this reduction is habitat degradation and destruction from urbanization and agriculture. To conserve our remaining mushrooms, we must continue to manage our public and private natural areas and forests in ways that protect and maintain mushroom populations. Research should continue to be conducted: a) to determine what species remain; b) to better define habitat requirements; and c) to make recommendations, based on our best information, for management policies that can be adopted by land managers.

There are many ways we can expand our knowledge of mushrooms and support their conservation. Amateur **mycologists** make significant contributions to **mycology** by studying and properly documenting the locations, distributions, and habitats of mushrooms. While collections of mushrooms are necessary for scientists to study and the focus of many passionate **mycophagists**, there are other ways to enjoy these amazing organisms.

- Learn to identify common mushrooms in the field using one of the many field guides available to help you with identification.
- Keep a journal of your mushroom observations including items such as location, habitat type, and plant associates.
- Photograph mushrooms.
- Join or form a mushroom club. For more information contact the Illinois Mycological Association (<http://www.ilmyco.gen.chicago.il.us/>) or the North American Mycological Association (<http://www.namycology.org/>).

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Mushroom Facts

- The early Greeks believed mushrooms were the result of Zeus's lightning because they would suddenly appear after a thunderstorm.
- Although an estimated 1.5 million species of **fungi** are believed to exist on earth, only about 80,000 have been discovered and described.
- The largest living organism in the world is a honey mushroom (*Armillaria ostoyae*). It occurs in the Malheur National Forest in eastern Oregon where it grows hidden underground. It stretches 3.5 miles across, covers an area larger than 1,665 football fields and is believed to be more than 2,400 years old!
- A giant puffball (*Calvatia gigantea*) can contain more than 7,000,000,000,000 (7 trillion) spores. If every spore actually germinated and grew into a puffball, the puffballs produced would weigh more than the earth.
- Although spores are extremely small (about 1/100th of a millimeter long), they can be observed in mass by making a spore print. After removing the stalk from a fresh mushroom, place the cap on a sheet of white paper (gill side touching the paper) and cover it with a bowl. The spores should drop onto the paper after six to 12 hours and form a colored "print" on the paper.
- Mushrooms contain **chitin** in their cell walls. This hard material is also found in the brittle outer covering of insects and crustaceans (crabs, lobsters, and shrimp).
- Some mushrooms are **bioluminescent** and emit light in a manner similar to fireflies and jellyfish. Wood that when broken apart "glows in the dark," the phenomenon known as foxfire, does so because it is colonized by bioluminescent fungi.
- Six million tons of cultivated mushrooms are consumed each year. Cultivated mushrooms are the fifth largest crop produced in the United States.
- Scientists have recently discovered that fungi are more closely related to animals than to plants. Unlike plants, fungi do not have chlorophyll and cannot make their own food. They depend on other organisms to provide them with food.
- Of the thousands of mushrooms in Illinois, a dozen or two are good to eat and several are poisonous and deadly if eaten!
- Although Illinois has a state tree, a state flower, a state prairie grass, and a state insect, it does not have a state mushroom.

Species Descriptions

Use the following descriptions to learn more about the 25 mushroom species shown on the front of this poster. Further information can be obtained from the mushroom field guides listed in the Bibliography.

bear's head *Herichium erinaceus* - The **fruiting body** of this species looks like a solid mass of downward-pointing spines. Each spine may be up to 6 cm long. Spines are white to dull yellow. The bear's head may be seen in late summer and fall on living and dead deciduous trees and logs.

bird's nest or splash cup *Cyathus striatus* - The bird's nest mushroom gets its common name from its vase-shaped fruiting body that has the appearance of a miniature bird's nest (5-15 mm high, 4-8 mm wide). The inner surface of the "nest" has distinct, dark brown lines. The "eggs" in the nest are gray to black and contain the spores. The bird's nest mushroom may appear on sawdust and wood chips in summer and fall.

chanterelle *Cantharellus cibarius* - The chanterelle grows in summer in **deciduous** forests. The yellow-orange fruiting body is trumpet-shaped with a cap 3-10 cm wide. The **lamellae** are thick and forked. The stalk is 3-10 cm long and 5-15 mm wide.

crown-tipped coral *Clavicornia pyxidata* - This pale yellow mushroom has a fruiting body that is erect and branched like coral (6-10 cm high, 2-6 cm wide). It can be seen on rotting, deciduous logs in summer.

dryad's saddle *Polyporus squamosus* - This polypore may be seen on living or dead deciduous trees in spring and summer. The fruiting body has tubes with pores on the underside of the cap (5-30 cm wide). The cap is pale yellow with distinct brown scales. The stalk (1-4 cm wide) is lateral to eccentric (off-center) and black at the base.

elegant stinkhorn *Mutinus elegans* - The "stinkhorn" name is applied to this species due to its pungent odor and shape like a horn (wide at the middle tapering to the tip). The pink-red fruiting body is 10-20 cm high with an olive-brown, slimy, spore mass at the tip. It grows on soil or in **humus** in summer and fall.

emetic *Russula Russula emetica* - This mushroom has a bright red cap (5-15 cm wide), white gills, and a white **stipe** (5-10 cm, 10-20 mm wide). The fruiting body has a typical mushroom shape. The emetic *Russula* grows in sphagnum bogs or under **conifers** in summer and fall.

fawn or deer mushroom *Pluteus cervinus* - The fawn mushroom grows on dead deciduous trees in spring, summer, and fall. The fruiting body has a typical mushroom shape. The cap (3-12 cm wide) is gray-brown, the gills are pink, and the stipe (5-15 cm long, 5-15 mm wide) is white.

giant puffball *Calvatia gigantea* - The large (10-50 cm wide), white fruiting body of the giant puffball is smooth on the surface and breaks apart to release spores at maturity. It grows in woods, meadows, and drainage ditches in late summer and fall. It makes a great summer snowman.

green-gilled *Lepiota Chlorophyllum molybdites* - This species has a typical mushroom shape. Its cap (10-30 cm wide) is tan and covered with flattened scales. Gills are initially white but change to dull green. The bulbous stalk (10-25 cm long, 10-25 mm wide) is pale tan and has a large **annulus** (ring). The green-gilled *Lepiota* forms fairy rings in lawns, meadows, and pastures in summer and early fall.

indigo milky *Lactarius indigo* - The indigo milky's fruiting body has a typical mushroom shape. Its cap (5-15 cm wide), gills, and stipe (3-10 cm long, 1-2 cm wide) are various shades of blue. The latex (milky liquid) is deep indigo blue. This fungus grows under deciduous and **coniferous** trees in the fall.

jack-o-lantern *Omphalotus illudens* - The entire fruiting body of this species is orange. It has a typical mushroom shape with cap (5-15 cm wide), gills, and stalk (10-20 cm long, 2-4 cm wide). The gills are **bioluminescent**. Jack-o-lantern mushrooms grow in dense clusters on stumps of deciduous trees in late summer and fall.

malodorous *Lepiota Lepiota cristata* - The malodorous *Lepiota* has a typical mushroom shape. It has a white cap (1-5 cm wide) with brown scales and white gills. The stalk (2-8 cm long, 2-5 mm wide) is white to pale pink. An annulus, or ring, is present on the stalk. This species grows in mixed deciduous-coniferous forests in summer and fall.

orange *Mycena Mycena leianota* - The mushroom-shaped fruiting body has a sticky, bright orange cap (1-4 cm wide). Gills are pink-orange while the stalk (2-5 cm long, 2-4 mm wide) is bright orange. The orange *Mycena* grows on deciduous logs in summer and fall.

oyster mushroom *Pleurotus ostreatus* - The oyster mushroom has a fan-shaped fruiting body. Its white to gray-brown cap is 5-15 cm wide. The gills and stalk are white. This species grows on decaying deciduous logs from spring through late fall.

rounded earthstar *Gastromyces saccatum* - The fruiting body (2-5 cm wide) is shaped like a star, and its outer layer splits into rays that curve backward in a starlike pattern. The rays are pale tan while the spore case is brown with a central pore. The rounded earthstar grows on **humus** in late summer.

shaggy mane *Coprinus comatus* - The shaggy mane can be found growing along road sides and in lawns in summer and fall. Its fruiting body has a typical mushroom shape. The white cap (5-10 cm wide) is covered with scales. Gills are initially white, then become black and dissolve into a black liquid. The stalk is white and has an annulus (ring).

split-gill *Schizophyllum commune* - The split-gill mushroom has a fan-shaped fruiting body. The cap (1-3 cm wide) is gray and hairy. The gills are split along the margin, and the edges curve back. There is no stalk. This **fungus** grows on dead branches and logs in summer and fall.

spotted bolete *Boletus affinis* - The spotted bolete's fruiting body has a typical mushroom shape. There are tubes with pores (yellow) on the underside of the red-brown cap (5-10 cm wide). The pink-brown stalk is 5-10 cm long and 1-2 cm wide. This mushroom may be found in deciduous forests in summer and early fall.

stalked scarlet cup *Sarcocypha occidentalis* - The scarlet-red fruiting body is cup-shaped and up to 1 cm wide. The stalk is about 1-3 cm long. The stalked scarlet cup grows on deciduous sticks and twigs in early spring.

sulphur shelf or chicken of the woods *Laetiporus sulphureus* - The fruiting body grows in a shelf shape, with tubes with pores on the underside of the cap. Growing 15-50 cm broad, the cap is bright orange, while the pores are sulphur yellow. The sulphur shelf grows on stumps, logs, and dead trees in summer and fall.

turkey tail fungus *Trametes versicolor* - The turkey tail fungus grows on dead deciduous trees in summer and fall. Its fruiting body is fan-shaped and grows flat, like a shelf. Tubes with pores are present on the underside of the cap. The cap (3-7 cm wide) is variable in color but usually has concentric zones of brown, red, blue, black, or yellow. Pores are white to yellow.

wood ear *Auricularia auricula* - The wood ear mushroom has a jellylike fruiting body that is ear-shaped, 2-10 cm wide, rubbery, tough, laterally attached, and brown. It grows on deciduous trees in summer and fall.

yellow morel *Morchella esculenta* - The yellow morel appears in early spring in old orchards and forests. The fruiting body of this species can be 7-15 cm tall. The cap is pitted, or spongelike, and yellow to gray-brown in color.

yellow-orange fly agaric *Amanita muscaria* variety *formosa* - The fruiting body of this species has a typical mushroom shape. The cap is 7-15 cm wide, pale yellow-orange in color and covered with white "warts" when fresh. The gills are white. The stalk is 10-15 cm long, 1-3 cm wide, and white to pale yellow. An annulus, or ring, is present on the stalk. This mushroom grows under conifers in summer and fall.

Agency Resources

More information about mushrooms is available from the Illinois Department of Natural Resources (IDNR). Illinois Natural History Survey scientists study mushrooms and maintain a collection of mushroom specimens. The IDNR Division of Education provides educational materials and programs on a variety of topics, including mushrooms. The Division's *Biodiversity of Illinois* CD-ROM series contains images, information, and range maps of numerous mushroom species that grow in Illinois.

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