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# Mushrooms From The Forest Floor



MICHIGAN STATE UNIVERSITY  
COOPERATIVE EXTENSION SERVICE

50 CENTS

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# Before You Harvest Woodland Mushrooms

## *Know the Amanitas*

Every amateur who plans to pick and eat wild mushrooms growing from the soil in woodland areas must learn to identify toxic mushrooms in the genus *Amanita*. Ninety five percent of fatal mushroom poisonings are caused by mistaking an *Amanita* for an edible species. *Amanitas* normally grow on the ground under trees, so when collecting mushrooms for food, consider woodland areas as dangerous territory. To help prevent a fatal mistake, we will review the anatomy of the *Amanitas*.

The *Amanita* mushroom begins to form as a small nodule on the **mycelium** which is hidden in the duff and soil. When the tiny fruit body first develops from the mycelium, it looks much like an egg. This is called the **button** stage. All young mushrooms are called buttons just as young flowers are called buds.

The entire mushroom is encased in a tissue covering much like a soft egg shell. The tissue is called a **universal veil** because it encases the whole mushroom. At this early stage, the mushroom does not always penetrate through the soil surface.

As the *Amanita* button grows, the cap breaks through the encasing **universal veil**. In some species the cap pushes a hole through the top of the enclosing shell and grows up to its full height, leaving a cup-like **volva** at the base. In other *Amanita* species, the universal veil tissue is soft. As the cap ruptures the veil, some of the veil sticks to the cap as patches, warts or freckle-like speckles. The remainder forms folds or rings of tissue at the bulbous base of the mushroom.

As the cap and stalk of the *Amanita* emerge and become taller, a second type of veil is apparent. This is a membrane covering the **gills** on the underside of the cap. The membrane is attached to the stalk and extends out to the edge of the cap, forming what is called a **partial veil**. As growth continues, the cap expands, causing the partial veil to break from its attachment. The veil of an *Amanita* usually breaks away at the edge of the cap but stays attached to the stalk, forming an **annulus** (ring) or

skirt on the upper part of the stalk just beneath the cap in most species. All poisonous *Amanitas* have an annulus.

After the partial veil breaks away, the **gills**, where the spores are produced, become visible. The gills are the blade-like structures radiating from the stalk out to the edge of the cap like spokes of a wheel. It is important in identification to study whether and/or how the gills join the stalk. *Amanita* gills are not attached to the stalk. They grow up to it but typically remain free from the stalk. They are held in place by their full-length attachment to the underside of the cup.

When the *Amanita* fruiting body is mature, it has grown to its full height. The cap has enlarged from its cushion shape to a large, basically flat circle.

Another indication of maturity is the ripening of the **spores**. Ripe spores are discharged from the gills by the millions and are carried away by the wind. Even though they are extremely tiny, the spores provide important clues to mushroom identity. Their shape and size can be determined only with a high-power microscope. But the color of the spores, a most important clue, can be determined by collecting them in great enough quantity on a piece of white paper to determine the color. This collection is called a **spore print**.

Spore color of mushrooms, as determined by viewing a spore print, varies from white through the color spectrum to black. Because spore color is constant, it is a reliable feature in identification. **An *Amanita* spore print is white.** Always check the spore color of an unidentified mushroom by making a spore print according to the following procedure.

To make a spore print, you will need a mature mushroom and a piece of white (always use white) paper. In the case of a gilled mushroom, cut the cap off the stalk and set the cap on the paper with the gill surface down—the same direction as when the mushroom is growing. It helps to place a bowl over the whole thing so the cap and gills do not dry out and the spores are not disturbed as they fall on the paper. A wrap of wax paper works well in the field. After some time (2 to 12 hours) lift the cap off the paper and observe the color. The mass of spores that fell make the spore print. If the mushroom is an *Amanita*, the spore print will always be white or nearly so.

Colors of other parts of *Amanita* mushrooms vary greatly. Cap color varies from white to shades of gray, lavender, yellow, brown, red and green. Some are in-

tensely yellow, orange or red. The white ones usually have smooth tops, or, like the colored ones, may be decorated with patches or freckles of the universal veil tissue.

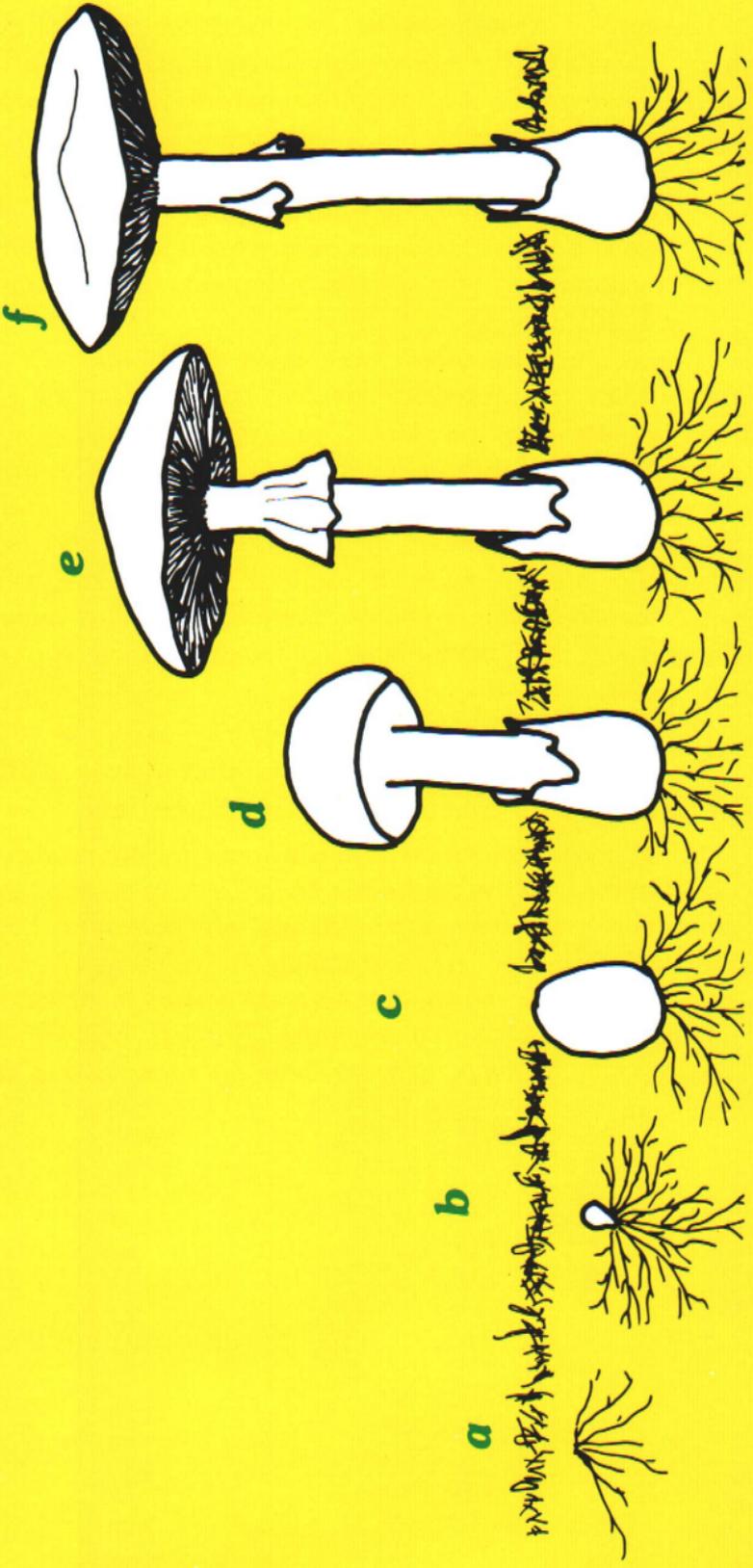
The size of *Amanitas* varies. Some are 2 or 3 inches high, others a foot or more. Even with all these variations, all *Amanitas* have the common characteristics already discussed: a universal veil; a volva at the base of the stalk, or zones or folds of tissue on the bulbous base of the stalk, and/or freckles, warts or patches clinging on the surface of the cap; a partial veil; gills; and white spore deposit. The development of these parts is shown in drawings on pages 4 and 5.

The characteristics are there if we look. Too often mushrooms are picked like daisies, and no attention is paid to the base of the plant. You may have to dig away several inches of duff or soil to observe the volva at the base of the *Amanita* fruiting body. Because the tissue of the partial veil is tender, the ring on the stalk may be washed or brushed away. If you look carefully, you will see evidence of ring remnants. Certainly you must study the gills and their attachment. To determine the color of the spores, make a spore print.

### **Learn to identify and avoid the most deadly of all poisonous wild mushrooms – the Amanitas.**

Some species of *Amanita* mushrooms are not poisonous. Others, like the big freckled orange *A. muscaria*, so abundant in Michigan aspen stands, are poisonous but not always deadly. The most deadly are *A. verna*, *A. bisporigera* and *A. virosa*. All three are white mushrooms common in Michigan woodlands. Another poisonous variety, *A. phalloides*, with a pale green tinge, is rare in Michigan.

# Amanita Anatomy



## White Amanita Mushrooms

(*Amanita verna*, *Amanita bisporigera*,  
*Amanita virosa* and *Amanita phalloides*)  
are poisonous at all stages

- a. A spore of a white *Amanita* lands on a supply of food in a suitable environment. It germinates and produces within the soil a vegetative growth called **spawn** or **mycelium**. The mycelium is composed of many fine hair-like threads called **hyphae**.
- b. A concentration of tissue develops in the mycelium which will grow into the button and eventually form the **fruiting body** (mushroom) of the plant.
- c. The egg-shaped button of the *Amanita* is encased in a thick membrane called a **universal veil**.
- d. The developing mushroom pushes a hole through the top of the universal veil membrane, leaving a cup-like structure called a **volva** at the base of the stalk at or just beneath the soil surface. As the stalk grows, another membrane, called a **partial veil**, is evident. It covers the gills beneath the cap, reaching from its attachment around the stalk to its attachment at the cap margin.
- e. When the cushion-shaped cap expands and begins to flatten, the partial veil breaks away at the margin of the cap but remains attached to the stalk. The soft membrane forms a skirt called an **annulus**, or **ring**, on the stalk.

When mature, the cap has expanded to a flat cushion shape. The **gills** are exposed and the spores, which have developed and ripened on the gills, can drop freely into air currents to be carried off and begin the cycle again. The partial veil hangs as a ring on the stalk, and the universal veil forms the cup or volva at the base of the stalk, which may be hidden beneath the soil surface. These beautiful pure white mushrooms have earned the titles **Angel of Death** and **Destroying Angel**.

- f. When overmature, the edges of the cap turn upward; decomposition discolors the cap surface and the ring on the stalk may disintegrate and fall off.

## **Other Toxic Woodland Species**

*Galerina autumnalis* produces the same toxic effects as the deadly white Amanitas. *G. autumnalis*, a small brown mushroom, usually grows on wood, possibly from buried wood, but rarely from the soils.

Some species of *Gymnopilus* have been mistaken for the edible chanterelles (see page 9). *Gymnopilus* species commonly grow on wood and have a bright rusty orange spore.

Some *Entoloma* species are also toxic. They have a pinkish spore deposit and can be avoided if you take the time to make a spore print (directions on page 2).

### **Be Very Sure!**

If you are certain of the identity of the edible mushroom you seek, you are not apt to pick a poisonous one. **Never collect a mushroom for food unless you can positively identify it as an edible species.**

A few of the edible woodland species in Michigan are discussed in this bulletin. Selection of species was made on ease of identification and reputation of edibility. The list includes *Cantharellus cibarius*, *Rozites caperata*, *Armillaria ponderosa*, *Dentinum repandum*, *Clavaria cinerea*, *Lactarius deliciosus* and *Tricholoma flavovirens*. Toxic look-alikes are also discussed.

Boletes, which fruit prolifically in Michigan woodlands and include some excellent edible species, are discussed in Extension Bulletin E-926, *Best of the Boletes*. Woodland mushrooms growing on wood rather than from the soil are discussed in Extension Bulletin E-924, *Mushrooms Grow on Stumps*. E-925, *Wood Waste Makes Wonderful Mushrooms*, covers those growing in abandoned sawmill or timber decking yards. Grassland Mushrooms are the subject of Extension Bulletin E-1272.

## **Food from the Forest Floor**

### ***Cantharellus cibarius***

This mushroom has earned a gourmet reputation and a popular name, the chanterelle, which seems to imply royalty among edible mushrooms, particularly in Europe. The distinctive color and odor of some forms of *C. cibarius* suggest apricots.

The chanterelle is easy to identify and abundant enough to be on the list of wild mushrooms safe for amateur collecting in Michigan.

Personally, I could never get too excited about the chanterelle. Rather than "fruity," the odor resembles fresh cut lawn grass, and it tastes about as I would imagine lawn grass might taste. Though not at all objectionable, the flavor seems to resemble asparagus.

*C. cibarius* preserves well by drying. Dried chanterelles may be used whole, sliced or ground. After the chanterelles are thoroughly dry (I use a food drier), put them through a meat grinder, using the coarsest blade. Then sift the ground mushrooms in a colander. Use the fine siftings as seasoning in cream sauces, meat loaves, gravy, poultry dressings, etc. Use the larger pieces that won't go through the colander as chips in soups, Chinese dishes and gravies. The flakes and chips add both color and flavor to food.

### **When and where to look**

When blueberries ripen in late July and early August, it's time to look for chanterelles. If you pick blueberries in jack pine stands in Michigan, you'll see chanterelles growing in the same places during the same season.

Chanterelles fruit both in mixed hardwood and conifer stands. The most prolific fruitings the author has found were around edges of dried-up water puddles in thick balsam fir stands. Some of the largest single specimens were collected in moist aspen stands.

Look for *C. cibarius* after midsummer rains through early fall. They grow on the ground under tree cover, singly or in groups or clusters of two or three fruiting bodies.



Courtesy C. Ourebo

***Cantharellus cibarius***

## **What to look for**

*C. cibarius* looks different than the traditional mushroom that has a stalk with a cushion-shaped cap sitting on it. It looks as though it tried to be like a traditional mushroom as it pushed up through the ground but didn't quite make it. It flares out at the top to resemble a cap, but the cap is merely an extension of the stalk. There is no separation between the stalk and the cap. The entire fruiting body is of similar texture and all of it is edible.

*C. cibarius* grows to be 1 to 4 inches broad and 2 to 3 inches high. The shape resembles a top or a funnel with the stalk flaring out at the top to form a cap. The margin of the cap is inrolled at first, flaring at maturity. The cap margin is usually irregular, lobed and wavy. The center of the cap is often depressed at maturity. The surface is smooth and dry.

*C. cibarius* is egg yolk yellow in young specimens. It fades with age to pale yellow and then often turns yellow green as it disintegrates. Except for the base of the stalk, which is usually paler, the fruiting body is all the same yellow color.

The interior flesh of the cap is white, sometimes tinged with yellow. Both cap and stalk have the same texture.

Chanterelle gills are not as well developed as those of a traditional gilled mushroom. The gills of *C. cibarius* are shallow, rather far apart, often irregular, forking frequently with numerous cross veins between the gills. The gill edges are blunt and often cracked. The gills extend down the stalk (decurrent) about half its length before diminishing to nothing. The color of the gills is the same as that of the stalk or paler in some Michigan forms.

When observed in mass, spores are basically white with a pale yellow tinge.

The stalk below the gill attachment is equal in width or narrows toward the base, 1/2 to 1 inch in width. The color is the same as the cap, or paler. The stalk is solid with firm white context like that of the cap.

*C. cibarius* is an important edible species for the amateur collector because it is easy to identify and rather abundant.

## **Dangerous Look-alikes**

***Clitocybe illudens***—This toxic, jack-o-lantern fungus has been confused with *Cantharellus cibarius*. It is similar in color and also has decurrent gills. But the gills of

*Clitocybe illudens* are thin and distinct, close together and deeper than the blunt, thick, veined gills of *Cantharellus cibarius*.

*Clitocybe illudens* is much larger and grows in dense clusters on wood, usually from the base of an oak tree. The chanterelle grows from soil.

***Hygrophoropsis aurantiacus***—Another mushroom that might be confused with *Cantharellus cibarius* is *Hygrophoropsis aurantiacus*. The decurrent, forked gills of *H. aurantiacus* are thin, close together and more orange than yellow as compared with the decurrent, blunt, distant pale yellow gills of *C. cibarius*. The orange or apricot cap of *H. aurantiacus* may instead be a rather dark brown or show a tinge of dark brown. The stalk is usually attached to the cap off to one side (eccentric) rather than at the center.

Though it sometimes grows from soil rich in wood debris, *H. aurantiacus* most often grows from or near old conifer logs and stumps, especially spruce and balsam, according to my observations. It is not recommended for table use.

***Gymnopilus Species***—Often during the chanterelle fruiting season, some yellow-orange mushrooms can be observed growing on dead wood or from stumps of jack pine. They are only half to one-fourth the size of a chanterelle and have a distinct cap, stalk and gills. The spore is bright rusty orange. Some *Gymnopilus* species are toxic, but they should cause no confusion since they grow on wood, and *C. cibarius* grows on the ground.

## **Other *Cantharellus Edibles***

Several other species related to *C. cibarius* are edible, including the black trumpet of death (*Craterellus cornucopioides*), pig's ears (*C. clavatus*) and the vermilion chanterelle (*C. cinnabarinus*). They deserve investigation but only after the beginning collector has mastered the identification of *C. cibarius*.

## ***Rozites caperata***

In Michigan's Upper Peninsula, *R. caperata* has two common names—"the gypsy" and "the pigeon." The favorite habitat is beneath the canopy of a jack pine tree. They grow like a band of gypsies that have set up camp. The name pigeon refers to the feather-like sheen on the surface of the cap.

*R. caperata* is a clean, good-flavored mushroom that grows profusely in the jack pine barrens of northern Michigan. Any person interested in gathering mushrooms for food should learn to identify this species.

### **When and where to look**

After late summer rains into early fall, *R. caperata* fruits abundantly along the south shore of Lake Superior. It reportedly grows in mixed woodlands, but I've seldom found it other than beneath jack pine trees; and then it does not usually grow beyond the perimeter of the branches.

### **What to look for**

From a distance, *R. caperata* looks pale. It grows singly but in thick patches, so look for a patch of pale-colored mushrooms growing under a jack pine. **Beware, however, of a whitish *Amanita* that might be growing among *R. caperata* patches. *A. citrina* fruits heavily in the same areas at the same time. Review again the anatomy of an *Amanita*.**

*R. caperata* grows to be 2 to 4 inches across and 3 to 5 inches high.

When it emerges, the cap looks like a round pale-colored knob sitting on top of a broad straight post-like stalk. The margin of the cap is attached to the stalk by a membrane.

The surface of the cap is finely wrinkled from the center toward the margin. In the early button stage a thin silky,



Courtesy A. H. Smith

***Rozites caperata***

appressed, hair-like covering gives the cap a whitish, pearly luster much like that of a pearl button made from a sea shell. The luster resembles the sheen of a pigeon's feathers. Usually some tan or brownish ground color is apparent beneath the frosted pearly sheen.

As the cap expands from its round shape to that of a bell, the margin breaks away, leaving the persistent ring of veil tissue that joined the margin and the stalk to remain as a ring on the stalk. The uneven, lopsided surface of the cap becomes apparent as it expands; rarely is the cap perfectly symmetrical. As the mushroom matures, the cap flattens and usually cracks at the margin. The cap is dry to the touch, never sticky.

The color of the cap is frosted whitish at first, becoming straw-colored and eventually an orange tinted to dingy pale brown. When wet, it appears darker. The flesh of the cap is white, thick and firm.

The gills are whitish at first, gradually turning to tan and then orange-brown as the spores mature. The gills are close together and attached to the stalk.

When collected in mass, the spores are rusty brown. In contrast, *Amanita* spores are white.

The stalk is solid and thick, about 1/2 inch wide. It is white or whitish with a persistent ring near the upper third of the stalk. The stalk is almost always straight up and down like a fence post. Above the annulus, the white stalk has wavy silk bands, like skin stretch marks familiar to any woman who has given birth to a child. The stalk below the annulus may be somewhat scurfy and streaked brownish in age.

Another distinctive characteristic becomes apparent after handling enough *R. caperata* mushrooms—their heft. They are comparatively lightweight, especially compared with a *Boletus* button of the same size. The texture is firm but somewhat brittle.

This mushroom can be collected for food from jack pine forests in as large quantities as the stump mushroom (*Armillaria mellea*) collected from hardwood forests.

## ***Dentinum repandum***

This fungus was known as *Hydnum repandum*. The genus *Dentinum* has white spores, and the genus *Hydnum* has brown spores. *D. repandum* has white spores, which makes the name valid. It is a fairly common mush-

room, considered an excellent edible species but not widely collected.

### **When and where to find it**

*D. repandum* grows from humus-rich soil in mixed woodlands. I find the best picking in the duff and debris along the paths of the spring snowmelt runoff. It fruits from midsummer into the fall, sometimes singly but more often in patches.

### **What to look for**

*D. repandum* is a wide, squat mushroom hugging the ground. The cap varies from 3 to 12 inches across. It is irregular in shape with a wavy surface, particularly near the margin. The margin is neatly turned down around the lumpy flat cushion-shaped cap, which is often depressed in the center.

The color is usually whitish at first, becoming tinged with pinkish buff and later rusty brown.

The surface of the cap is dry and feels like velvet or chamois. The flesh is white, tender and brittle. It is easy to crumble the caps of *D. repandum* while harvesting and transporting them.

The heft of a cap is distinctive. If soggy and wet, a 10-inch broad cap would be heavy, but not *D. repandum*. It is light in weight, dry, firm-feeling but brittle and crumbly.

Surprise! An amateur collecting and inspecting this mushroom for the first time is surprised to find no gills beneath the cap but many crowded spine-like teeth in their place. The presence of teeth, rather than gills, indicates you have found a member of the Hydnaceae (hedgehog) family of mushrooms. You'll find others from



Ingrid Bartelli

### ***Dentinum repandum***

this family, especially in conifer stands, during late fall. Most of them are dark and dingy, have brown spore deposits, are intergrown with brush and duff, and are not edible.

The teeth beneath the cap of *D. repandum* are short, soft, rounded to slightly flattened and creamy white. The teeth usually grow down the stalk for a short distance. Both teeth and stalk stain yellow when bruised. Spores, produced on the teeth, are white.

The stalk is the same color as the cap—rather short, 1/2 to 2 1/2 inches tall, and 1/2 to 1 inch thick. It is solid, smooth and dry. Once you find, identify and taste it, *D. repandum* will surely be on your to-look-for list.

## **The Family Clavariaceae— THE CORAL MUSHROOMS**

Mushrooms of the genus *Clavaria* are commonly called coral mushrooms because of the way they grow. They may be single, club-shaped, upright, or intricately branched as are many larger species. Some bring to mind miniature, compact, pruned cedar trees. They grow from the ground or on decaying wood.

Heaviest fruitings occur in late summer and fall, with a few species fruiting in spring and summer. Most species are edible though not particularly choice. Some are repulsively bitter.

*C. formosa* is regarded as poisonous. It is called *Ramaria formosa* in modern literature and grows from the soil under mixed woodland cover. Color is an important clue. *C. formosa* is salmon-pink when viewed from a dis-



Courtesy C. Ourebo

***Clavaria cinerea***

tance. Close inspection reveals the yellow tips on the branches and white base below the ground line.

*C. formosa* is a robust species, 3 to 6 inches wide and tall. It fruits in late summer and fall in moist weather.

When collecting for food, **avoid any *Clavaria* with pink, salmon or orange coloring. Also avoid those with a gelatinous consistency.**

## ***Clavaria cinerea***

*C. cinerea* is one of the safest of this genus for the amateur to collect for food.

### ***When and where to find it***

It fruits abundantly in late summer and fall under conifer trees during wet weather. It grows singly and in patches.

### ***What to look for***

Color is the important clue. Look for a gray mushroom ranging from pale tannish gray to dark thundercloud gray to a bluish gray. When *C. cinerea* is overmature and no longer fit for food, it turns brownish gray. The base below the duff line is whitish.

The branched fruiting body grows 2 to 4 inches tall and almost as wide. The central portion is more stalky than most *Clavaria* species, composing about half the total mass. It is covered on the upper and outside parts by a dense mat of many short, tangled, thin branches often toothed at the tips.

The spores growing on the outside of all the branches produce a white spore print.

Because of its snarled, branched structure, *C. cinerea* is hard to clean for eating. Sand is a problem when harvesting in jack pine stands. Try to pick them clean and keep them as clean as possible.

## **Genus *Armillaria***

The first member of the genus *Armillaria* to become familiar to the amateur is usually *Armillariella mellea*. (*Armillaria mellea* is its former name.) This popular stump mushroom grows in clusters on wood.

About the only similarities between *Armillariella mellea* and *Armillaria ponderosa* apparent to an amateur are the ring on the stalk and the white spores.

## ***Armillaria ponderosa*** **(*Tricholoma ponderosum*)**

*A. ponderosa* varies in abundance in Michigan from one season to the next. In a favorable season, large quantities can be harvested along the south shore of Lake Superior in jack pine stands—if you can beat the deer to them. Deer are so fond of these mushrooms they dig them out of the ground.

### ***When and where to look***

There's not much point in hunting for them except in a late fall. Look for them in jack pine stands of Michigan's Upper Peninsula. In Western states, they grow beneath other two-needled pine trees.

### ***What to look for***

Look for large, heavy, white mushrooms growing singly or in clusters of two or three fruiting bodies. They grow in arcs or circles, so if you can find the direction of the arc, you are apt to find more buttons beneath the pine duff.

*A. ponderosa* develops slowly and persists for a long time. If the weather is dry, the mushroom dries in place rather than decomposing.

*A. ponderosa* is white in the button stage, developing cinnamon brown stains and hairy streaks on the cap and stalk as it ages. The symmetrical caps are round and



*Courtesy A. H. Smith*

***Armillaria ponderosa***

cushion-shaped with the margin rolled inward when young. The cap becomes nearly flat when mature.

*A. ponderosa* is usually firm, hard and heavy; hence, the species name *ponderosa*. If you wish to harvest it commercially, as is done on the West Coast for the Oriental trade, you'll gain the most by selling it by the pound rather than by volume. It becomes less heavy at maturity if the weather is dry.

The surface of the smooth cap feels tacky unless the weather is very dry—then it has a varnished feel.

The caps of *A. ponderosa* growing in Michigan average 3 to 8 inches in diameter, about half the size of West Coast varieties.

The gills are notched at their attachment to the stalk. They are crowded close together, white at first, becoming a pinkish cinnamon at maturity.

The spores are white when observed in a spore print.

The stalk is 2 to 4 inches long, 1/2 to 1 1/2 inches wide. It is widest at the top, tapering to a blunt point at the base. The lower half of the stalk rarely emerges above the sandy duff, and the sand and duff that cling to it when harvested cause cleaning problems, especially if the dirt falls between the gills.

There is a distinct ring on the upper part of the stalk coming from the veil that covers the gills in early stages. The stalk above the ring is white. Below the ring it is similar in color to the cap.

*A. ponderosa* has a slightly medicinal, sweet, spicy odor, reminiscent of apple pie or spice cake.

It slices and dries well for easy preservation. Always cook all wild mushrooms even though they have been dried. When one enthusiast ate another *Armillaria*, *Armillariella mellea*, like popcorn after it had been dried, she became desperately ill.

## **The Family Russulaceae**

Most of the attractive, often bright-colored (red, orange, yellow, purple) mushrooms observed fruiting in summer and early fall could well be members of the large Russulaceae family.

There are two genera in this family—*Russula* and *Lactarius*. They are similar in form and texture except for one obvious difference: when young, fresh specimens of *Lactarius* are cut or bruised on the cap, gills or upper part of

the stalk, a liquid juice oozes from the wound in droplets. It is not as prolific as blood oozing from a cut on your finger, but almost as much in a few species. The genus *Russula* forms no droplets on wounds.

This often milky colored liquid is called **latex**. In some species the latex is watery, more like skim milk.

Latex from some mushrooms of the genus *Lactarius* has a unique ability to change color upon exposure to air. For example, in the suspected species *L. chrysorheus* (not to be eaten) the latex is milky white as it bleeds from a fresh wound, but turns yellow within seconds on exposure to air. In other species, the latex turns blue or lavender, while in some the color remains the same.

The original color and changes in the color of latex are important characteristics in determining species of *Lactarius*.

The genus *Russula* is similar in size, shape and texture to *Lactarius* but has no latex. The texture is dry and brittle. Species of both *Russula* and *Lactarius* fruit abundantly in Michigan. They grow singly, in patches, from the soil in wooded areas during summer and fall with a few species fruiting in the spring.

A characteristic shape is a cushion-shaped cap that flattens with age, resting on a stout central stalk about as high as the cap is wide. Another characteristic shape of young specimens of both *Lactarius* and *Russula* species is a heavy, squat, wide funnel with edges rolled under.

Most species of *Lactarius* and *Russula* prefer to grow under a specific type of tree.

## ***Russulas* – Edible and Not**

Some species of this genus are edible—most are not. So, *Russulas* are for the amateur to study, **not to eat**. It is extremely difficult to identify edible species. A dark purple, gray and green (concentric circles of these colors) species that grows under Norway pine in the early fall (probably *R. variata*) is the only species I have seen collected in northern Michigan for food.

Many species of *Russula* taste hot, peppery or acrid. Sometimes it takes a few minutes for the taste to develop, and then you wish you could scrape off part of your tongue.

## The Genus *Lactarius*

Some *Lactarius* species are edible, and others are not. Eating poisonous species of *Lactarius* causes severe gastrointestinal distress.

Color of the latex is the most important identifying characteristic for the amateur to use if collecting for food.

### *Lactarius deliciosus*

The amateur, using caution, can safely collect a few species of *Lactarius* that have similar characteristics. *L. deliciosus*, *L. thyinos* and *L. rubrilacteus* (a Western species) are edible. They can be distinguished in the field by the color of the latex. The latex of *L. deliciosus* and *L. thyinos* (both grow in Michigan) is yellow-orange (carrot-colored), at first, with wounds slowly staining green. **Do not confuse it with the latex of nonedible *L. chrysorheus*, which is milky white at first, soon changing to sulphur yellow.**

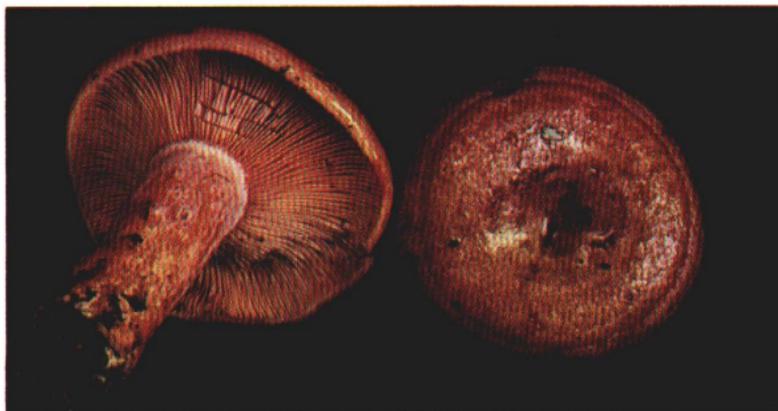
The latex of the western species *L. rubrilacteus* is a deep, blood red.

### When and where to look

*L. deliciosus* grows singly, in patches or scattered from moist humus-rich soil in bog or seepage areas and usually under conifers. Fruiting season begins in July, continuing through early fall.

### What to look for

*L. deliciosus* grows about as high as the cap is wide, 2 to 5 inches. The cap is flat, symmetrical and cushion-



Courtesy A. H. Smith

***Lactarius deliciosus***

shaped with a depression in the middle. The margin, in-rolled when young, is uplifted in age. The cap color appears in zones (zonate); that is, in concentric circles of different hues, beginning at the center and becoming increasingly larger as the circles reach the margin, like ripples caused by dropping a pebble in still water. The zones are lighter and darker shades of reddish orange, sometimes mixed with or fading to a grayish green.

The surface of the cap feels sticky in moist weather. The flesh of the cap is orange tinged, eventually staining greenish.

The gills of *L. deliciosus* are bright orange, becoming greenish when bruised or as they age. There are several tiers of short gills, beginning at the margin, that do not reach the stalk. The entire gills are firmly attached to the stalk with a fine tooth extending down the stalk for a short distance.

The spores in mass are faintly yellowish, pale tan.

The stalk is straight, narrowing at the base, 2 to 4 inches high and  $\frac{1}{2}$  to  $\frac{3}{4}$  inches thick. The color is similar to the cap, sometimes spotted with orange or greenish orange.

All cooking directions for *Lactarius* species dictate **thorough**, slow, moist cooking.

## **The Genus Tricholoma**

It is difficult to distinguish among the many species in the genus *Tricholoma*. This large genus includes edible species, poisonous species and many questionable species. Beginners should study and admire Tricholomas, but not eat them. Yet, each fall numerous collectors, especially those whose ancestral homes were in southern Europe, congregate in the jack pine barrens along the south shore of Lake Superior to gather and preserve what they call the "horse" mushroom or the "greening." The technical name is *T. flavovirens*, formerly called *T. equestre*.

**Beginners should not eat any *Tricholoma* until they become expert in identifying the species.**

### ***Tricholoma flavovirens***

This mushroom is firm, fleshy and of good flavor but almost impossible to clean. Sand is the problem. The

fruiting body rarely pushes all the way up through the sand. The cap is sticky in moist weather, so sand sticks to it and to the stalk and root-like base. If you make the mistake of turning the mushroom upside down and sand falls between the gills, it will be virtually impossible to remove the sand. Yet folks drive hundreds of miles to collect *T. flavovirens* and spend long hours cleaning it. Some avid collectors close shop and fly to the north country within hours after their spies alert them that the "horse mushrooms are starting."

### **When and where to look**

In Michigan's Upper Peninsula, search the sandy jack pine barrens along Superior's south shore.

Fruiting begins in mid-fall and continues through to killing frosts. During early and mid-fall, unbelievably heavy fruitings of hundreds of different mushrooms abound in the sandy conifer woodlands that are crisp, dry and barren until fall rains begin. You can hardly put a foot down without stepping on a mushroom. To identify the mushrooms or to seek out the species you are pursuing becomes a bewildering and frustrating experience. **You must positively identify the mushroom you plan to eat.**

### **What to look for**

*T. flavovirens* is a squat, robust mushroom that grows in sandy soil singly but more often in clusters of 2 to 4 fruiting bodies. They usually grow in an arc or circle. Investigate any bulge in the sand, as it may be caused by a group of *T. flavovirens* buttons pushing up to daylight.



Courtesy A. H. Smith

***Tricholoma flavovirens***

Cap color varies from yellow to green-tinged brassy tan to reddish brown. Avoid all the gray-tinged, greenish, dingy *Tricholoma* species growing in the same places at the same time. The cap of *T. flavovirens* turns brassy tan or brown rather than dingy gray or green.

The cap is 2 to 4 inches wide, a rounded but often irregular cushion shape, with an inrolled margin at first, gradually broadening and becoming flat with an upturned margin in age. The surface of the cap is somewhat sticky in moist weather but feels dry and looks varnished during dry weather. At maturity, the center of the cap may become scaly.

The flesh of the cap is firm and white or tinged yellow. There is no distinct separation between the flesh of the cap and stalk.

The most distinctive clue for identifying *T. flavovirens* is the color of the gills. They are a bright clean primrose to sulphur yellow, turning chartreuse (bright green tinged with yellow) at maturity. They are not the dingy, grayish-green of suspect species. The gills are notched to almost free at their juncture with the stalk. The gills do not stain when bruised but often crack and crumble at the edges at maturity.

The spores are white in a spore print.

The stalk of *T. flavovirens* is short and stout, 1 to 2½ inches high and ½ to ¾ inches wide, equal in width, with a slightly enlarged base.

The stalk is white to pale yellow. It is solid in young specimens but may become hollow with age. The entire stalk is usually embedded in, or covered with, sand. There is no ring on the stalk nor volva at the base.

Many similar species of *Tricholoma* fruit in the fall; some are poisonous and some are suspect; the edibility of some is yet unknown, and some are considered edible. **If you choose to collect *T. flavovirens*, be very sure of its identification.**

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## FOR YOUR PROTECTION

The ultimate decision whether or not to eat a mushroom is yours. Michigan State University, the Michigan Department of Health, the author and others involved with this publication assume no responsibility for the safety and well-being of any mushroom collector.

## Should You Collect Wild Mushrooms For Food?

1. Not unless you study and learn to positively identify the mushroom you seek and become selective in your collecting.
2. Not unless you assume responsibility for your own safety and well-being. Are you properly dressed? Do you know how to use the compass you carry? Have you overcome any foolish fears you might have had of the "woods" and the creatures that live in it?
3. Not unless you are a responsible citizen who respects "no trespassing," "private property," "no littering," and posted land signs.
4. Certainly not unless you have the same respect for every living plant, bird or animal that shares the mushroom hunting area that you do for yourself as a person.
5. Then, **not unless you are absolutely certain the mushroom is safe to eat.** Collect carefully. (A shallow flat box or basket is best—**never use plastic bags.**) Promptly clean, refrigerate, cook or preserve your collections upon returning home. Unless you intend to eat the mushrooms, don't pick them.
6. Finally, not unless you guard against becoming an "instant" expert, thereby endangering the lives of folks you choose to advise.

Other Extension publications in this series are:

*May is Morel Month in Michigan,*  
Extension Bulletin E-614. (25 cents)

*Mushrooms Grow On Stumps,*  
Extension Bulletin E-924. (75 cents)

*Wood Waste Makes Wonderful Mushroom Collecting,*  
Extension Bulletin E-925. (60 cents)

*Best Of The Boletes,*  
Extension Bulletin E-926. (60 cents)

*Don't Pick Poison! When Gathering Mushrooms for Food  
in Michigan,* Extension Bulletin E-1080, (75 cents)

*Collecting Grassland Mushrooms for Food,*  
Extension Bulletin E-1272. (50 cents)

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