

Mushrooms Grow On Stumps

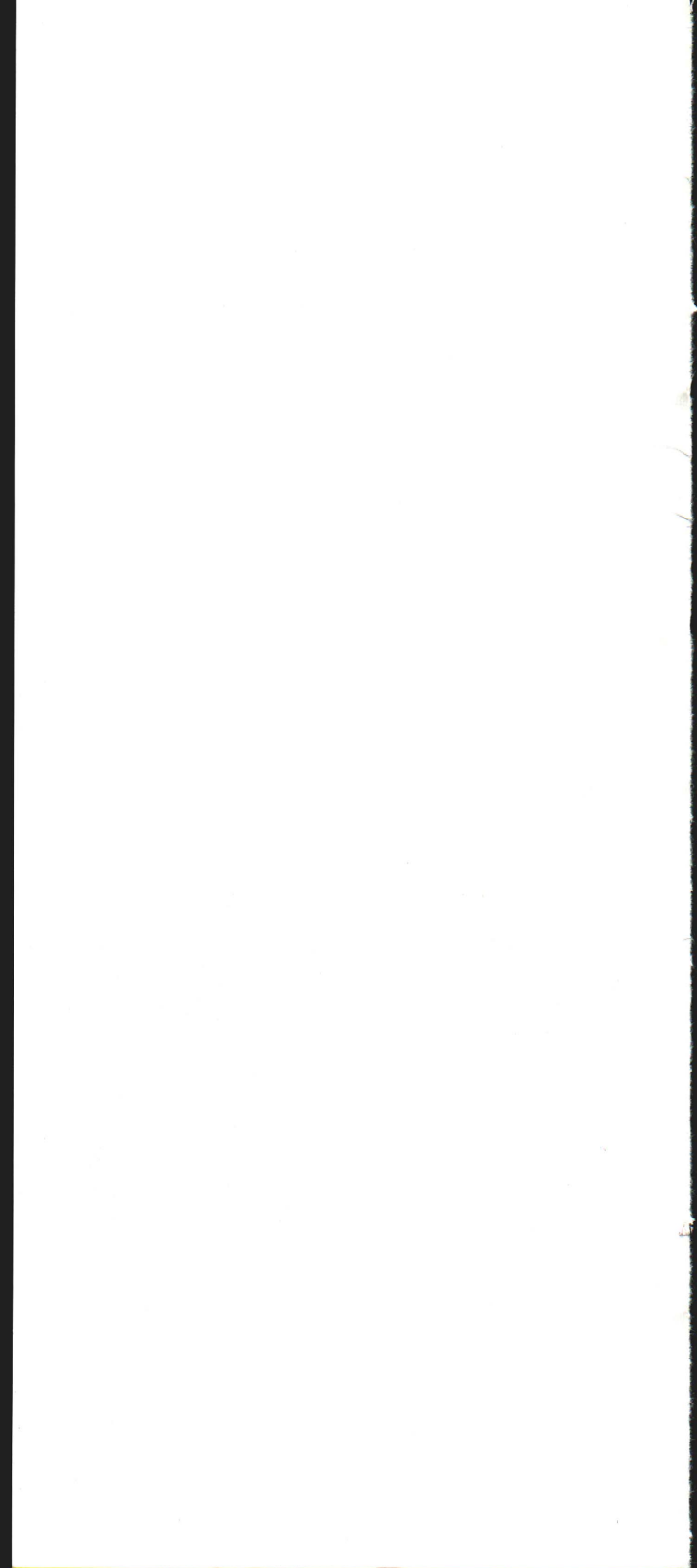
A guide to collecting for food

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Foreword

THERE ARE A GREAT many popular, clearly written and well-illustrated books dealing with mushrooms in the United States and foreign countries. Written by eminently knowledgeable authors, they're fine for the person who has some knowledge of fungi. For the novice, much of the existing literature is completely bewildering. It is the purpose of this publication to present information in a most elementary fashion so the uninitiated student can learn to safely collect for food a few of the more easily recognized species that grow on wood. A learn-them-one-at-a-time, beginning with a known habitat, approach, is taken. A fairly detailed, nontechnical description of a selected few of the wood-inhabiting, edible species follows rather than a sketchy description of numerous species. Reference to additional mushrooms, other than those described, is made by technical name — not to confuse you but to provide a lead to further study in more advanced literature.

It will help you tremendously if you learn to identify the trees growing in your collecting area.

No literature is completely meaningful until descriptions are related to a living plant in its natural habitat. Even then, confidence comes only when a knowledgeable authority confirms your identification. This pamphlet may help you recognize a few edible species and hopefully encourage further study of this fascinating group of plants.

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



Courtesy of George Grimes

They're all "Stumpers"

A multitude of mushrooms will grow on a single stump, a few of which are edible; others are poisonous. Therefore, the name "stump mushroom" becomes meaningless and dangerous to use.

George Grimes is a public-spirited mushroom enthusiast of the Denver Mycological Society. He has shared his talent and skill with us by portraying on this fresh cut stump some of the larger of the hundred or more mushrooms that may live on this stump during the years it will take it to decompose.

In addition to these large mushrooms, this stump will host myriad small and microscopic fungi which, with the assistance of bacteria, wind and weather, will transform the wood in this stump back to soil from which it came.

Among the mushrooms portrayed in this illustration, some are good to eat and some are definitely poisonous. They include species of *Mycena*, *Hericium*, *Clavicornia*, *Lentinus*, *Collybia*, *Lentinellus*, *Laetiporus*, *Crepidotus*, *Pluteus*, *Galerina*, *Pholiota*, *Armillaria*, *Flammulina*, *Pleurotus*, *Lycoperdon*, *Entoloma*, *Naematoloma*, *Gymnopilus*, and *Omphalotus*.

An impressive sounding list of names, is it not? That's why it is so much easier to call them all "stump" mushrooms. And that is also why the term "stump" mushroom becomes meaningless. It can refer to any of several dozen mushrooms that grow on stumps. Therefore, painful as it may seem, we must learn to make positive identification by its own Latin name of each of the mushrooms we plan to eat. There is no easier or safer way. It is hoped this publication will make it possible for you to identify and safely collect some of the wood-inhabiting mushrooms that are suitable for food.

ACKNOWLEDGEMENT

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Start With A Stump

EVERYONE RECOGNIZES A STUMP—the tombstone of the living tree that once stood on that spot. The tree most likely fell to a lumberman's axe, a screaming power saw or a monster timber-harvesting machine. Rarely, in this era of economic development, does a tree die because of old age, fire or insect damage. Wind, weather and disease take a greater toll.

Tree tombstones vary in size, shape and longevity just as do the marble and granite "stumps" in cemeteries. The life of a stump depends on the type of wood in it and the preference of a fungus for the food in it. Aspen stumps and dead wood are short-lived because the wood is soft and a favorite host of a fast-inhabiting, primary rotting mushroom called *Pleurotus ostreatus*. In a year or two after a popple tree has been cut or injured, the popular edible oyster mushroom appears.

It may take a hardwood stump 50 or 100 years to return to humus from the action of a succession of different species of mushrooms growing on it. The mushrooms grow as long as the stump provides food for them. In the process, they decompose the wood to humus which can support the growth of moss and green plants, and even new tree seedlings.

Some pine stumps may take several hundred years to decompose. They are not preferred hosts for fungi. The persistent stump monuments of the tremendous, white pine forests of one or two centuries ago are apparent all over Superiorland. On the Kingston Plains, near the Pictured Rocks National Park, there is a virtual sea of white pine stumps—the silent tombstones of a natural splendor that was sacrificed to progress and prosperity. Some of the old pine stumps stand higher than a man's head because the trees were cut in a winter of heavy snowfall. Most are three or four feet high—a comfortable work height for saw and axe.

There are several theories regarding modern timber harvest. One is to cut the tree off at ground level, leaving no stump and utilizing all of the tree, in addition to logs, for paper pulp, pressed wood, mulch or other forest products. To leave no refuse may prove the most economical approach, but it raises questions. What effect will such stripping have on the fertility of the forest soil? Will it be able

to support another significant growth of trees?

To cut a tree, removing only the saw log lengths, leaving a two-or three-foot stump and all the top and branches laying in the woods, is a horrendous sight. Wasteful, certainly, if total wood utilization is a consideration. But proponents of this manner of timber harvest theorize that there is something left to decompose and replenish the soil.

Also disastrous, economically speaking, is the damage done to saplings and young trees by heavy machinery used in modern timber harvest. Each bruise and wound becomes an open door for fungal infection.

At any rate, in the vast woodland areas of Superiorland (about 88 percent of the Upper Peninsula of Michigan is woodland area), when timber harvest is so important to our economy, we have more stumps than trees. And most of the tops and wood waste lay where the tree fell. All of this makes for an abundance of wood-inhabiting fungi, many of which are considered excellent edible species.

We also have a widely diverse population of conifer (those with evergreen needles) and deciduous (broad leaf) trees in Superiorland, resulting in a wide variety of wood-inhabiting fungi.

A beginning mushroom student is repulsed by strange sounding, impossible-to-pronounce, Latin names of mushrooms. Don't let them throw you. They're as necessary as is your given name, and they'll soon become as familiar as John Doe. The following list of names may sound completely foreign to you.

The first of edible mushrooms to appear on damaged aspen and aspen refuse is *Pleurotus ostreatus*, followed a year or two later by the species of *Hericium* and *Clavaria pyxidata*. *Flammulina velutipes* will almost certainly be found on elm remnants.

Hardwood and some conifer stumps are hosts to such edible species as *Armillaria mellea* (commonly referred to as the "stumper" or "button" mushroom), *Naematoloma sublateritium* (brick cap), *Polyporus sulphureus* (sulfur shelf) and *Lycoperdon* (small, wood-inhabiting puffball). There are other less popular edibles occurring on hardwood stumps—species of *Hericium*, *Pluteus*, *Pholiota*, *Entoloma* and colored species of *Pleurotus*.

There are mushrooms which grow on wood that are positively poisonous; for example, *Clitocybe illudens*, *Galerina autumnalis*, and many others that

should be avoided, such as *Pholiota* and *Lentinellus*.

Then there are a lot of "junk" species either too small or too tough for food and those about which little is known regarding their edible qualities. The tough, large conks; the leathery, tough layers of fan-shaped polypores; the small species of *Crepidotus*, *Mycena*, *Marasmius*, *Psathyrella* and *Gymnopilus*—these and many other species growing on wood can be considered junk species if it's edible mushrooms we're after.

It is not unusual to find one or two dozen different mushrooms fruiting on a single stump all at the same time. Rather than learning to identify each one, we shall be selective and concentrate our efforts first on the "big three"; namely, *Armillaria mellea*, *Pleurotus ostreatus* and *Polyporus sulphureus*.

We shall try to become familiar with the technical name which is in Latin and is used and understood throughout the world. A dozen different mushrooms are called "stumpers" in popular terminology which makes that name meaningless.

Learn To See When You Look

THERE ARE A FEW THINGS we must be able to recognize in order to identify a mushroom correctly.

The color of the spores or "seeds" is critical for identification. The color of the mushroom spores is always the same for a single species but varies from white through the color spectrum for different species. We don't need a microscope to detect the difference in color if we learn to make a spore print. This is an accumulation of millions of the tiny microscopic spores. Spores in mass resemble an extremely fine powder. In order to make a spore print we must know where the spores are produced.

The spore-bearing anatomy varies among fungi. It is not difficult to separate mushrooms according to the manner in which the spores are produced. This is the first giant step in learning to classify mushrooms.

The majority of mushrooms have gills under the cap, in which case the spores are produced on the sides of the gills.

Sometimes spores grow on pointed teeth under the cap, or the whole fruiting body may be a mass of teeth hanging down much like an overgrown head of cauliflower adorned with tiny tooth-like icicles, all pointing toward the ground.

Some mushrooms grow like coral with upright branches. The spores grow along the limbs up to the tip of the branches.

Other mushrooms are basically round with the spores contained inside the mushrooms; these are the puffballs familiar to most of us.

Many of the mushrooms found on wood have tiny holes or pores on the smooth-looking undersurface of the cap where the spores are produced.

Another group of mushrooms produces its spores within small tubes up to an inch long, packed together in a layer under the cap with an open end oriented to the ground.

To repeat—the first thing we must discover about the mushroom in hand is where the spores are produced.

MAKE A SPORE PRINT

Remember that spores are so tiny that they're not visible to the naked eye unless they're piled up by the millions, we must learn how to make the spore print. This makes it possible to detect the color of the spore fall — a first step in positive identification.

To make a spore print, you will need a mature mushroom and a piece of white (always use white) paper. In case of a gilled mushroom, cut the cap off the stalk and set the cap on the paper with the gills down—the same direction as they are when the mushroom is growing. It will help 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 if you're working in the field. After a period of time (say, overnight) lift the cap off the paper and observe the color of the mass of spores that fell.

This same general method works for mushrooms that produce spores underneath the cap in pores, tubes or teeth. In case of some of the branched coral-like mushrooms or those that resemble a toothed cauliflower, it works best to wrap the white paper around the mushroom, then lay it on its side to collect spores.

In addition to determining the color of the spores, we must observe other characteristics of the mushroom. Its composition; its size, shape and heft; its internal texture as well as character of outside surfaces; its color at all stages of growth, and its odor are all important in identification.

We are interested in collecting mushrooms for food. We know there is no way to separate poisonous mushrooms from edible ones other than by positive identification of the mushroom. Therefore, we must learn to study critically each part of the mushroom until we learn what characteristics make it different from the thousands of others. We learn to positively identify first one, then another, of the edible species only if we see when we *look*.

Until it becomes routine practice, study a mushroom in this manner:

1. *Look at the top or cap.*

Is the surface smooth, rough, wrinkled, hairy, scaly, moist, sticky, slimy, dry, watermarked?

What shape is it when young in the button stage, when mature and in old specimens?

What color is it at all stages of growth?

Is the margin of the cap even, broken, lobed, wavy, incurved, uplifted, marked with striations, pock marked?

Is the cap attached securely to the stalk or does it lift off easily?

2. *Then look under the cap.*

First observe the color in young as compared to older specimens.

What is the nature of the spore-producing surface (gills, spines, pores, tubes)?

Is there evidence of any tissue (veil) covering the underside of the cap in young specimens? It is attached to the stalk and to the edge of the cap.

If so, how does it rupture when the cap expands? Does the tissue stick to the stalk, forming a ring or annulus on the stalk? Do parts of the veil tissue tear off and adhere to the margin of the cap?

3. *In case of a gilled mushroom, are the gills crowded or far apart (distant)?*

How are the gills attached to the stalk? Are they notched, squarely attached? Do they run down the

stalk? Or are they completely free of the stalk?

Are the edges of the gills broken, jagged like a saw, even, wavy? Are the gills all the same length or are there short ones interspersed between the entire ones? Do gills fork? Are there veins between them?

4. Then study the stalk.

Observe its size, shape, surface, color and texture. Is it hollow, stuffed, cartilaginous, fibrous, solid?

Does it have an annulus or ring? What is at the base of the stalk? A cup, bulb? How far below the surface of the soil must you dig to find the entire base of the mushroom?

At first it will seem most tedious and time-consuming to study each mushroom so thoroughly. It's a good idea to make notes so you remember. Even then it is often necessary to resort to microscopic study for positive identification.

If you are collecting mushrooms for food, there is no room for error. One mistake can be the last one you'll make.

It is said about mushroom hunters, "There are old ones and bold ones, but no old, bold mushroom hunters."

Armillaria Mellea

IF A VOTE WERE TAKEN to determine which of the wood-inhabiting mushrooms is most commonly called the "stump" mushroom, *Armillaria mellea* would be declared the winner in the country along the south shore of Lake Superior. It is harvested and preserved for food in greater quantity than all other species combined. The preponderance of stumps upon which to collect makes this possible. In fact, the popularity of collecting *A. mellea* for food is the reason many natives of the Upper Peninsula of Michigan are referred to as "stump jumpers."

A. mellea is also referred to as the "button" mushroom because the preferred size for collecting is at the button stage of development. The name "button" is completely meaningless for identification because



Courtesy A. H. Smith

Armillaria mellea - edible

This is the common, late-fruiting form. Note the "velvet" scales on the chubby buttons, the veil tissue which forms a persistent ring on the upper part of the stalk, and the darkening of the stalk in the mature specimen.

every mushroom is a button in its early development just as every flower is a bud.

The "honey mushroom" is another name used to designate *A. mellea* more frequently in areas where oak trees are abundant. "Honey" refers to the color of the mushroom, especially the form that often grows on oak. In the maple, birch, elm, hemlock forest cover of Superiorland there is a much greater diversity of color in *A. mellea*.

"Fox fire" is a name used by foresters and others who are familiar with the phosphorescent property of the spawn (vegetative part of the plant) of *A. mellea*. As kids, little did we realize that the punky wood from an old, rotted birch log, which we rubbed into our sweaters on Halloween because it made us glow in the dark, possessed its phosphorescent quality because of the *A. mellea* plant growing in that old birch log.

It is certain that there are many other popular local names for this edible mushroom, all of which should make it apparent that, if we are going to learn something about a mushroom by studying the literature, we'd best learn the scientifically correct name, *Armillaria mellea*, in this instance.

WHERE TO LOOK FOR *A. MELLEA*

As the popular name implies, the best place to find it is on or beside stumps. Mushrooms cannot produce their own food as do plants containing chlorophyll. Once a mushroom plant establishes itself, it will continue to grow in that same place as long as there is a food supply and a suitable environment (temperature, humidity, etc.).

It takes about three years after a tree has been cut for the *A. mellea* plant to establish itself and become ready to produce its fruit—the mushroom itself. So you'll have the greatest success collecting in slash at least three years after the time of cutting. Hemlock and soft wood stumps most always produce after the third year, while it may take four years for the fungus to establish itself on maple, oak and birch.

Because *A. mellea* is both a parasite (it attacks living trees) and a saprophyte (it lives on dead wood) it can be found in limited quantities on almost any type of tree or shrub when fruiting conditions are suitable. It is a hazard in cultivated orchards.

In the Upper Peninsula of Michigan, I have found *A. mellea* fruiting on every kind of tree remains with the exception of cedar and old white pine stumps. However, the heaviest fruitings have consistently been on yellow birch.

Another observation is that this mushroom is most prolific on the stump itself and along the root system of the stump as compared to top wood. A producing tree or stub might still be standing but dead or dying, probably because *A. mellea* has parasitized the roots of the tree. On such tree remnants you may find fruitings up the entire trunk of the tree.

A. mellea often appears to be growing on the ground. Upon closer inspection, you'll find that there is a buried root just under the soil. You soon learn to look for this mushroom at the base of trees, on the stump itself and then all along the root system of that stump.

WHEN TO LOOK

I have found *A. mellea* fruiting from midsummer in July until snow cover in November in the Upper Peninsula of Michigan. The heaviest fruitings have usually occurred during the first week of October. The earliest fruitings are most apt to come in exposed areas such as along tree-cleared road right-of-

ways and under power lines. A week or more later, fruitings develop in brush-protected logging slashings. Fruiting in a given area usually lasts about two weeks.

From my observations, I'd have to conclude that fruiting is stimulated by a frost or near freezing temperatures whether in July, August, September, October or November, especially if the cold snap is followed by rainfall. I've seen heavy fruitings in late summer, the week following an early frost. Late September and early October is the time to bring bushel baskets or even a pickup truck to contain your collections.

WHAT TO LOOK FOR

The "stump-watch" is a ritual of the fall season in northern Michigan and word of fruiting time travels as fast as though the message were carried on the wind.

"The stumps-are-in-the-velvet," is the first signal to be heard, often relayed by the bird hunter who spends as much time watching for mushroom signs as for grouse. Bird season usually coincides with fruiting time of *A. mellea*.

"Stumps-in-the-velvet" refers to the first appearance of *A. mellea*. The tiny round buttons (1/8 to 1/4 inch in diameter) appear in dense masses along the roots and at the base of stumps as well as in almost every crevice and crack in the bark of the stump.

The tiny buttons are usually some shade of brown though there is a wide range of color variance. Some appear to be rosy-tinged, others pale tan and some have a bronzy-green tint. The difference in color has been attributed to light exposure or is related to host material. Regardless of color, the buttons have a velvety appearance and a firm suede-like or fine, scaly feel.

Whether it takes a few days or a week for the buttons to grow into mature mushrooms depends entirely on the weather. Frequently, frosts, snow and cold set in and that's the end.

The masses of buttons develop into clusters or clumps of mature mushrooms. Occasionally you'll find single specimens.

As the *A. mellea* buttons grow to maturity, the color of the cap fades. The velvet of the button becomes less dense as the cap expands and takes on

the appearance of bristles or hair-like scales concentrated more on the center of the cap rather than towards the edges. The fine bristles are darker in color than the near-white flesh of the cap.

The various parts of a mushroom grow in spurts. The cap of *A. mellea* is most apparent in very early stages. Then the stalk develops at a more rapid pace than the cap. The stalk (stipe as it is properly called) is usually thicker than the cap at an early stage of development, becoming more slender as it grows in length.

The dense masses of tiny velvet buttons develop into clusters or clumps with stems 1 to 4 inches long and caps 1 to 2 inches across. The cap by this time has a rather broad bump on top. If you look at the underside of this larger but still button-sized cap, you'll see no evidence of gills. The area between the stem and cap margin is covered by a whitish, cottony tissue. Very often there are 5 to 7 sulfur-yellow dots near the perimeter of this veil tissue. At this stage of development, *A. mellea* is in prime condition for harvesting for food. The signal is shouted across the land, "The stumpers are ready!" and folks head for the woodlands to collect "buttons."

As the mushroom continues to develop, the cap expands to become almost flat and sometimes to have upturned, wavy edges. When the cap expands, the veil tissue underneath the cap ruptures. The point of least resistance is the juncture of the outer edge of the veil with the margin of the cap. The veil seems to be firmly attached to the stalk to which it clings, forming a ring or annulus on the stalk.

As the cap expands, breaks away from the veil tissue and then grows beyond the annulus veil remnant, the gills become visible. The gills are whitish at first. They are firmly and squarely attached to the stalk. The gill or a fine line (tooth) may run down the stalk a short way beyond the point of a square attachment. Gills with an attachment that run down the stalk are called decurrent.

When *A. mellea* has grown to maturity, the cap is usually 2 to 4 inches broad, flat to slightly upturned, basically creamy-tan in color with darker minute hair-like scales near the center of the cap. If the cap were broken apart, the color of the flesh or context would be white. The context would be thickest at the center and be continuous with the flesh of the stalk.

The gills at maturity take on a deeper tan color, often rosy-tinged. Upon close inspection you may find small, rusty-colored stains appearing on the gills.

The annulus remains on the stalk attached on the upper fourth of its length. The stalk grows to be 4 to 6 inches long and almost equal in width from top to bottom, rather than possessing the chubby, broad, club-shaped base of the button stage.

The color of the stalk has darkened toward the base to a deeper brown, sometimes almost black. If you were to try to break the stalk, you'd find it tough with a fibrous exterior that shreds or separates lengthwise much more easily than it breaks crosswise. The inside of the stalk is stuffed with white cottony tissue.

When the mushroom has reached maturity, spores ripen on the sides of the gills. Ripe spores are discharged, falling away from the gills. In the case of *A. mellea* the spores are white or nearly so. This will be readily apparent when you make a spore print according to directions given on page 4. The white spore fall is often apparent in the field. Because *A. mellea* grows in such close clusters, there is a concentration of spores from many caps in a small area. The spores of the uppermost caps in the cluster falling on caps beneath them make it appear as though someone had thrown a cup of flour on the mushrooms. The dull white spore color of our common late form of *A. mellea* is a very important character in identification.

The mature mushroom stops growing in size, becomes darker, withers and finally disintegrates. The life of the mushroom from velvet buttons to maturity, to disintegration usually takes about two weeks in northern Michigan.

TWO DISTINCT FORMS

When you study this mushroom you'll soon discover that there are two distinct forms, both bearing the name *Armillaria mellea*.

The larger, early fruiting form is smooth-capped, honey-yellow in color, abundant in areas more southerly but rare in Superiorland. It is the common type on stumps of oak trees. The spore fall is creamy. This form has a more pointed root as compared with the smaller, late fruiting, blunt-rooted, variously



Armillaria mellea - edible

This is the early-fruiting, large, yellow, smooth-capped form that is comparatively rare in the Upper Peninsula. This popularly called "honey" mushroom prefers an oak stump habitat.

colored, velvet-bristle-capped form most frequently found in the northlands.

On the two occasions in 20 years when I have observed the large, smooth-capped, honey-colored form fruiting in Superiorland, it came a month earlier than the usual form and grew only on old (30 to 60 years) yellow birch stumps. There were tremendously heavy fruitings on these two occasions in early September. An early frost, followed by warm rains, seemed to set the stage. The mushrooms were insect-riddled (small flies and maggots) and had completely rotted by the end of one week, giving the whole adjacent wooded areas a putrid stench.

If you learn to collect no other mushroom than *A. mellea*, and if you live in areas as productive as are those of the Upper Peninsula of Michigan, you'll still be able to store your larder with an ample supply to last for a year.

You'll have stiff competition, though, if there is a substantial white tail deer population in your collecting area. Deer are extremely fond of *A. mellea* and also prefer the button stage just before the cap breaks away from the veil.

BE CERTAIN!

It would be simple to collect mushrooms for food safely if, for instance, between the dates of October 1 to 15, the only mushroom to be found on stumps

was *A. mellea*. But this is not the case. A dozen other mushrooms might be growing on one stump at the same time.

Several species might grow in clumps and clusters similar to *A. mellea* including species of *Pholiota*, *Clitocybe*, *Coprinus*, *Psathyrella*, *Cystoderma*, *Naematoloma*, *Collybia*, *Galerina*, etc., some of which are poisonous.

The distinguishing combination of characteristics for *A. mellea* includes the white spore fall, the annulus or ring near the top one-fourth of the stalk, its rather tough, rough general appearance, its manner of clustered growth on stumps and root systems.

One other clue to the presence of the *A. mellea* plant (not necessarily the fruiting mushroom part) is the presence of black string-like strands under the bark of the log or stump. This part of the plant is commonly called "shoestrings." They represent the traveling phase of the spawn. Spawn is the vegetative part of the mushroom plant as compared with the fruiting body which is the mushroom itself. The black "shoestrings" grow out for long distances from the point of origin.

A. MELLEA IS TO EAT IF COOKED

Cooked *A. mellea* is flavorful. The raw fungus tastes repulsively metallic and possibly is toxic. Because the fibrous stalk is tough, the buttons and young caps are preferred for food.

When you become positively certain of the identity, bring home only the edible parts of the mushroom, slicing the buttons off the stump or cutting caps off more mature clusters. Avoid piling the mushrooms too deeply. A wide flat box or basket is the ideal container. Never use a plastic bag, as this encourages rapid rotting. Also never mix collections. Keep each kind of mushroom collected separate from others.

Upon arrival at home, store mushrooms in the refrigerator if it is impossible to process them immediately.

Cut each button and cap in half from the center top of the cap down through the stalk. Insect damage is most apparent on the top center down through the stalk. The buttons with unopened veil may be harboring a centipede or other crawly creature. Wash the mushrooms in several sets of clear, cold

water. You'll notice the water turns brown from the tiny scales on the cap. Agitate the mushrooms gently in the water to remove as much of the "velvet" as possible. The "velvet" seems to give *A. mellea* a slimy consistency when cooked.

If there is evidence of insect damage, the mushrooms may be soaked in salted water for 10 or 15 minutes to encourage the bugs to move out.

European authors suggest that *A. mellea* be parboiled with the first boiling water discarded. Some Upper Peninsula stump jumpers parboil their collections because this reduces the gelatinous consistency of the final product.

Personally, I have not found it necessary to parboil before preparing or preserving *A. mellea*. After the mushrooms have been thoroughly washed, I lift them out of the water, shake off as much excess moisture as possible, place them directly in a heavy kettle over a low heat. Because mushrooms are mostly water, it doesn't take long (about two minutes of boiling) and they are stewing in their own juice.

As soon as they are covered by their liquid they are ready for preservation. To can, I pack them, with juice, directly into jars for processing in the pressure canner for 90 minutes at 10 pounds of pressure. If they are to be frozen, I let them cool in their juice after parboiling, then package, juice and all, for the freezer.

Frozen mushrooms must be reheated to complete cooking for 15 to 20 minutes. I drain the canned or cooked mushrooms, reserving the liquid for gravy stock and use the drained mushrooms in a variety of ways — casseroles, sauteed, etc. *A. mellea* turns quite dark when cooked.

My theory on this method of preparation is this: As in most vegetables, many of the nutrients are soluble so I try not to soak the mushrooms in water any longer than necessary, and I try to conserve and use all the cooking liquid which contains not only much of the nutrient value but also the flavor.

Dozens of references including recipes for preparing wild mushrooms for the table are available in most public libraries and book stores.

Oyster Mushroom

SOON AFTER THE MOREL SEASON IS OVER in the spring, mushroom collectors in the Lake Superior country begin looking for the oyster mushroom that grows on popple (aspen). The Latin name for the so-called "popple mushroom," "popple jack" or "oyster mushroom" is *Pleurotus ostreatus*.

Several members of the *Pleurotus* family are good to eat, some fruiting most heavily in the spring, others in the fall. It is rather easy to learn to collect *Pleurotus* for food. The mushrooms are shell-, fan- or funnel-shaped with little or no stalk; the texture is fleshy (not hard, tough or leathery); and they grow on wood, usually in overlapping shelves. The most important character is the spore color. The ones regarded as safe to eat are those with a white or lilac-tinged spore fall.

It is important for you to remember that there are no known poisonous Pleurotus species among those that have white or lilac-tinged spores.

To make sure that the mushroom is a *Pleurotus* and not an undesirable *Lentinus* or *Lentinellus*, examine the edge of the gills. They are even and unbroken in *Pleurotus* species. The gill edges on *Lentinus* and *Lentinellus* are serrated and jagged like a saw.

WHAT TO LOOK FOR

Pleurotus ostreatus, or is it *sapidus*?

It really doesn't matter to the food collector if it is *P. ostreatus* (with white spores) or *P. sapidus* (with lilac-tinged spores) since both species are edible. They look alike. Both are white or pale tan, fleshy (not leathery or woody) shelves that grow in layers or clumps on wood.

The cap of *P. ostreatus* is usually fan- or shell-shaped. If one had a clam, broke the shell apart at the hinge and attached the shell to a log at the point of the hinge, it would resemble the oyster mushroom. The name "oyster" is attributed to the shell shape of the mushroom in most literature, though there is also some reference to the "oyster-like" flavor.



Pleurotus ostreatus - edible

The June-fruiting, white form is common on aspen.



Pleurotus ostreatus (*sapadius*) - edible

Tan- or gray-tinged forms fruit most commonly in fall.

The shapes of the cap vary with the attachment to the log. If growing on the side of a log or tree trunk, the shape is that of shells growing in overlapping layers. However, if *P. ostreatus* grows out of the top of a stump, the mushroom may be almost funnel-shaped. Most often a dent or depression develops in the cap near the point of attachment to the wood host.

The size of the cap varies from 2 to 6 inches broad (sometimes larger).

The top of the cap is most often white but may be tinged with pale gray or brown. Old caps usually develop a yellow coloration. The thin margin of the



Pleurotus ostreatus - edible

One downed tree top can provide bushels of edible "oyster" mushrooms.

cap is inrolled at first. It expands as the cap grows, often becoming lobed or wavy.

The smooth cap surface feels moist. The flesh is firm to pliant, thick near point of attachment, white or dull white in color.

P. ostreatus has a rather mild, pleasant odor when small but a most disagreeable, sulphury smell (and flavor) in tough old specimens.

There are gills underneath the cap that extend from the margin to the base at point of attachment. The gills are white and fairly well separated. The edges of the gills are smooth and even. Upon close inspection you'll notice some evidence of branching where the gill turns into a narrow vein along the base portion.

P. ostreatus may have little or no stalk if it grows on the sides of logs or branches. If it grows underneath a log or on top of a log or stump, a short, thick, solid stalk ordinarily develops that is off center. Very often the base of the stubby stalk is covered with short white hairs.

The color of a mass of spores, collected on white paper in a spore print (details on page 4) will be white or faintly cream-colored for *P. ostreatus* or more likely lilac-tinged for *P. sapidus*.

The presence of numerous long, shiny, black, swivel-tailed beetles is confirmation of your find. They'll float out when mushroom is submerged in water. They ordinarily live in the popple wood upon

which the mushroom grows, using the mushroom as a highway system in their search for insect larvae. However, it is best to check thoroughly for beetle infestation in the mushroom itself.

WHEN AND WHERE TO LOOK

In northern Michigan, in the country adjacent to the shores of Lake Superior, *P. ostreatus* can be harvested in abundance during the month of June. You must first learn to recognize an aspen tree since this is a favorite host. An aspen or popple tree has soft, brittle wood and is easily damaged by wind, ice and snow. The year following damage to a tree, *P. ostreatus* is likely to appear along the part of the damaged tree that is still standing or on the remains of a downed or cut aspen. Because the fruiting body is white, they are easy to spot, even from a moving car.

Aspen groves are numerous in northern Michigan, sprouting up after hardwood trees have been harvested.

P. sapidus is a fall-fruiting oyster mushroom to be found most often on downed maple logs or branches. The spore fall is lilac-tinged. It is similar in appearance to *P. ostreatus*.

P. ulmarius is another white-spored *Pleurotus*. It is usually larger than *P. ostreatus* and *P. sapidus* and usually has a rather well-developed stalk. The cap is most apt to be tannish-white and it grows in profuse abundance on elm or maple tops left in the woods after logging. It is less tender than *P. ostreatus* or *P. sapidus*.

There is a small (1 to 3 inch) broad, edible *Pleurotus* with white spore fall that grows on old, mossy,



Pleurotus porrigens - edible

"Angel wings" is the popular name of this small, fragile, white *Pleurotus* that grows on old mossy conifer logs in the fall.

conifer logs, especially hemlock, in late fall, *P. porrigens*. It is a beautiful, pure white. The frequently lobed cap and white color has earned for it the popular name "angel wings."

If you are hunting mushrooms during the late fall in Superiorland and, should you find the logging remains of yellow birch trees, and if weather conditions are suitable for fruiting, you'll certainly find *A. mellea* growing on the stump and along the root system. There is also likely to be a *Pleurotus*-like shelf growing on the yellow birch stump that has a dingy, bronzy, green color on top of the cap and orange to creamy-white gills under the cap. Upon closer scrutiny you're apt to find even more of this mushroom, *P. serotinus*, on the tops, branches or logs of yellow birch that remain than on the stump itself. This kidney-shaped *Pleurotus* with an inrolled margin has a white spore fall and is regarded as another of the edible oyster mushrooms. However, some forms have a bitter taste when cooked, making them undesirable.

A similar variant that grows on elm has a bluish-tinge to the cap color.

In searching for soft, shelf-shaped mushrooms growing on logs, you may find a clump of hairy, apricot-colored mushrooms similar in size and shape to *Pleurotus* species. The gills are fine and leave a pink to apricot-colored spore fall. Once you smell this mushroom, *Phyllotopsis nidulans*, you'll have no desire to eat it because of its strong disagreeable odor. Don't.

BE SURE!

The important things to remember when collecting *Pleurotus* species for food are:

1. They grow on trees or wood.
2. They are most often shell- or fan-shaped.
3. The stalk is stubby and short if present at all.
4. The gill edge is smooth and even, not wavy or serrated.
5. The texture is pliant or fleshy. There are no hard, woody or leathery species in the *Pleurotus* group.
6. Most important — the color of the spore fall must be white or lilac-tinged.

There are no known poisonous *Pleurotus* among the white or lilac-spored species.

"OYSTERS" ARE TO EAT

Pleurotus species can be prepared by almost any method. Use only young specimens. Older caps, particularly of *P. ostreatus*, which show some yellow coloration, are strong-flavored and most disagreeable. They taste like rotten popple smells. Canning or freezing (after cooking) are the two preferred methods of preservation.

The texture of cooked *Pleurotus* is another reason for calling it the "oyster mushroom."

The Polypores

YOU'LL NOT HAVE TO spend much time looking for mushrooms on wood before you realize that about half of them are tough, hard conks or brackets, some of which look as though they've persisted for years. You'll notice also that there are a lot of small, thin, leathery, fan-shaped mushrooms growing in masses which make old logs or stumps look as though they were covered with turkey or partridge feathers.

When you study these hard or leathery mushrooms, you'll find that they do not have gills under the cap. The under surface appears smooth, so much so that some of the conks serve as a base on which to draw pictures or write messages.

Upon close inspection, you'll discover tiny holes or pores in the smooth-appearing surface under the cap. In these tiny pores is the tissue on which the minute spores develop. And because of the great number of these tiny holes on the spore-bearing surface beneath the cap, this large group is called *Polypores* (meaning many holes or pores).

Among the *Polypores* there are very few (about three in northern Michigan) that are considered edible. Most are too tough, hard, woody or bitter to be eaten. The three species that are considered edible are:

1. *Polyporus sulphureus*, sometimes called *Laetiporus sulphureus*.
2. *Polyporus umbellatus*, sometimes called *Poly-pilus umbellatus*.
3. *Polyporus frondosus*, sometimes called *Poly-pilus frondosus*.

You'll notice when you study mushroom books that different authors may call the same mushroom different names.

P. frondosus and *P. umbellatus* are found only on very rare occasions in Superiorland. But should you find, at the base of a stump or tree, a huge clump of mushrooms growing out of a central base that resembles a large overgrown cauliflower with mushroom caps on the ends of the branches; and, if the caps are some shade of gray or tan, chances are that your find will be *P. frondosus*, a fall-fruiting mushroom, or *P. umbellatus* which fruits in mid-summer. You'd be much more apt to find these mushrooms in southern Michigan where there are more oak trees. Only the tender tips and caps are used for food.

Polyporus sulphureus

P. sulphureus is most commonly referred to as the "sulphur shelf" because of its color. Occasionally it is called the "chicken" mushroom because of its flavor and texture when cooked.

P. sulphureus is the only one of the three edible *Polypores* that fruits in quantity along Michigan's northern boundary. On one occasion I saw 21 groups of shelves, each bunch large enough to fill a half-bushel basket, growing along a mossy hemlock log—a sight to remember!

WHEN AND WHERE TO LOOK

June is the month of heaviest fruiting in northern Michigan, and you're most apt to find *P. sulphureus* on hemlock stumps or logs and damaged oak trees.

WHAT TO LOOK FOR

P. sulphureus is a large mushroom. The flat, fan-shaped caps are attached directly to a log or tree in masses of compact, overlapping layers. The caps often grow to be a foot or more wide.

It's the color of this mushroom that gets your attention. The top of the caps, when young and fresh, are banded with bright tangerine, sulphur-yellow and cream tones. The brilliant tones fade as the mushroom ages. The underside of the cap is a persistent, intense sulphur-yellow; hence, the popular name, sulphur shelf.



Polyporus sulphureus - edible

Clusters of "sulphur shelf" mushrooms are emerging from a damaged oak tree.



Polyporus sulphureus - edible

The tender marginal, growing edge of young specimens such as this are choice for eating.

When this mushroom emerges on a log, usually from a cream-colored layer of tissue on the bark, the margin of the cap is thick, fleshy and cream- to sulphur-colored. As the cap expands and takes on its brilliant hues, the margin becomes thinner and usually lobed and wavy.

The texture of *P. sulphureus* is fleshy but firm when young. When it matures, it becomes punky and tougher.

The spore color is white, visible when a spore print is made.

The only part of *P. sulphureus* that is considered edible is the margin or growing edge of the cap at very early stages of development. The texture and flavor when cooked resembles that of chicken.

Once you've watched *P. sulphureus* grow from the time it first appears through to maturity, you'll have no trouble recognizing it another time at any stage of development. It takes only a few young fruiting bodies to provide a quantity of food.

More Than The Big Three

IF IT'S FOOD YOU'RE AFTER, you'll not have to learn to identify any other than the "big three" described— *Armillaria mellea*, *Pleurotus* with white or lilac spore fall and *Polyporus sulphureus*. When weather is favorable for fruiting in northern Michigan, these three types of wood inhabiting mushrooms will provide you with more than enough to eat fresh, plus all you'll need to preserve for use till the next season.

There are other edible species which grow on wood in Superiorland which are less abundant or not quite so highly prized for food. Reference is made herein so you can study the mushroom in more technical literature after you master the big three.

Naematoloma sublateritium

N. sublateritium is usually edible and grows prolifically on old stumps, particularly on those trees or stumps that have been uprooted with a goodly amount of soil attached to the roots. Occasionally this mushroom has a bitter taste which makes it undesirable for food. The popular name is "brick cap" or "stump mushroom."

N. sublateritium grows to be about the same size as *A. mellea*. Caps are 1 to 3 inches in diameter. The stalks are smaller, both in diameter and length. The manner of growth is similar, as they grow in clusters or clumps attached to wood.

The cap is shaped like an inverted cereal bowl—rather deep. It is smooth on top and moist-feeling. The color is the most apparent mark of identification, being of a yellow-red brick color similar to that



Naematoloma sublateritium - edible

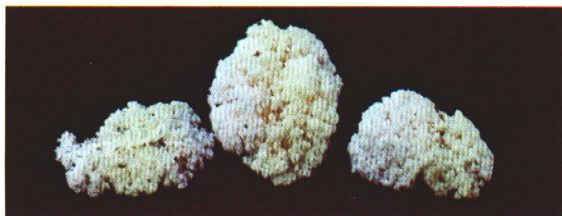
The "brick cap" that fruits profusely on wood in the fall has not gained the popular acceptance of other "stump" mushrooms.

of a clay flower pot. The color is a deeper, darker shade in the center of the cap, fading to a lighter tan or buff near the margin, which is inrolled in young specimens.

A fragile veil tissue is apparent on the young buttons. It breaks away, leaving a few fibers adhering to margin of the cap with very little evidence of a ring on the stalk.

When you inspect the gills underneath the cap, you'll find them quite close together and attached squarely to the stalk. The color of the gills varies from cream in the button stage, changing to a dingy olive green, and finally to a deep, smoky, purplish-brown at maturity. A mass of spores collected in a spore print will be smoky, purple-brown.

The stalk is 2 to 4 inches long, $\frac{1}{4}$ to $\frac{1}{2}$ inch wide and equal in width. It is smooth, dingy white near the top, darkening to a rusty or dingy brown at the base.



Hericium - edible

The several species of *Hericium*, with their mass of icicle-like teeth, are at their best when young, tender and white.

N. sublateritium fruits in abundance in the fall and occasionally very early in the spring. To date it has not been popular as a food item in northern Michigan.

Lycoperdon pyriforme

When searching on old dead wood, particularly on old hardwood logs or stumps, you're certain to find dense masses of small puffballs fruiting profusely in suitable weather during the late summer and fall.

L. pyriforme is usually shaped like a miniature pear standing on the stem end. It grows 2 to 3 inches high with the broad upper part 1 to 2 inches wide. The external color of this smooth - to granular - surfaced puffball varies from a very pale tan, when growing in shady places, to a deeper tan or pale brown when exposed to sunlight. Age also affects color. The white rootlets (strands of fungus tissue called rhizormorphs) in the host wood are readily apparent.

These white-fleshed puffballs are edible if used in young stages when the flesh is pure white and of uniform marshmallow-like consistency. As *L. pyriforme* ages, the flesh becomes soft and yellowish, then dingy green. It is then no longer edible.

Hericium (See page 24)

Should you find a white mass about the size and shape of a small head of cauliflower growing on the side of a log or trunk of a wounded tree, it will most likely be a member of the *Hericium* group of mushrooms.

Some species of *Hericium* are compact (try to visualize a white head of broccoli). Most of them are composed of branches like overgrown cauliflower. Whether compact or more loosely branched, they are covered with a multitude of tiny, white, icicle-like spines or teeth, all of which point to the ground.

Hericium species are pure white at first, turning yellowish or brown as they dry out and disintegrate.

They are edible when young, white and firm-fleshed. The hardest job is to free the mushroom of insects if you plan to eat it. A soaking in salted water helps.

This mushroom does not fruit in great abundance, so is seldom used for food in the Lake Superior region.

Entoloma abortivum

There is another white mushroom that fruits as a glob or lump of white tissue at the base or along the roots of a stump. Stump jumpers of northern Michigan refer to them as "hunter's hearts."

This is a curious mushroom. The white globs look like they are trying to grow into something but can't quite make it. They vary in shape. Some resemble tulip bulbs, others have a wilted trumpet-shape like an over-the-hill pumpkin blossom. Most of the globs have no distinctive shape. Their white color is most apparent, but streaks of pink may be evident when the mass is cut in half. This is the aborted form of *E. abortivum*.

Occasionally you will find a perfect fruiting body of *Armillaria mellea* growing from the white globular masses along the roots or base of a stump.

About a week after the white globs appear, a perfectly shaped, clean-looking, pale gray mushroom with pink gills appears on the same stump. This is the normal fruiting body of *E. abortivum*. The cap is silky gray, 2 to 4 inches wide, with an inrolled margin at first. The stalk is 1 to 3 inches long and $\frac{1}{4}$ to $\frac{1}{2}$ inch thick. The gills are close together, narrow and run down the stalk. They change from a pale gray to pink as they mature. The spore fall is pink. The normal stage of this mushroom is considered edible but, because there are some species of *Entoloma* that are poisonous, you'd better hold off until you become expert at identification.



Courtesy A. H. Smith

Entoloma abortivum (aborted form) - edible

The white globs of the aborted form of *E. abortivum* are sometimes called "hunter's hearts." They grow at the base and along exposed roots of stumps.



Courtesy A. H. Smith

Entoloma abortivum (normal, spore-bearing form)-edible

This is one of the few edible species of *Entoloma*. Since some *Entoloma* species are poisonous, you must be very sure of identification. It is safest to limit your table fare to the white, globular, aborted form of this species.

The aborted stage is more often used as food, though it doesn't look very tempting. According to recent literature, the aborted white, basically oval-shaped globs are a combination of two mushrooms. They contain the vegetative growth of both *Entoloma abortivum* and *Armillaria mellea*. It is believed that *A. mellea* is a parasite on *Entoloma*. You're apt to find the mature caps of both species on the same stump at the same time also.

Flammulina velutipes

This small mushroom is rarely harvested in quantities for preservation. It is worthy of note because, in climates a little warmer than those in Superiorland, it can be found fruiting in almost every month of the year. It will fruit even in mild winter weather; therefore, its popular names "winter mushroom" or the "survival mushroom." Its "velvet stem" name refers to the deep brown or black velvet-like hairs which cover most of the stalk.

The spores are white in mass.

This is a small mushroom with yellow-brown or reddish brown, sticky caps, 1 to 2 inches broad. The gills are yellow-tinged, attached to a narrow, tough, velvet-covered stalk, 1 to 3 inches long.

It grows in clusters (occasionally singly) on elm logs or tree trunks. Peel off the slimy skin of the cap if you intend to cook this mushroom.



Courtesy A. H. Smith

Flammulina velutipes - edible

In areas with mild winters, this mushroom fruits throughout the winter on elm trees; hence, its popular name, the "survival" mushroom.

Watch Out For The Bad Ones

FOLKLORE ABOUT THE EDIBILITY of wild mushrooms becomes ridiculous because it is so contradictory. Some believe that "any mushroom that grows on a hardwood stump is edible." Others swear to the contrary, "If it grows on hardwood it is poisonous." "If bugs or other insects eat it, it's safe." How do we know if the insect lived or died? "Eat only those that the squirrels, mice or deer eat." I've not been smart enough to catch too many of them in the act of eating mushrooms, nor have they confided their gustatory secrets with me.

Through hundreds of years, mushrooms have earned their reputation as edible or non-edible by human experimentation. The only way to know if

one is regarded as edible or otherwise is to positively identify the mushroom, then look up its reputation in credible literature.

Some mushrooms that grow on wood are definitely poisonous.

Clitocybe illudens

In some recent literature this mushroom is referred to as *Omphalotus olearius* or *Monadelphus illudens*.

Clitocybe illudens is regarded as a poisonous mushroom. Known as the Jack-O-Lantern mushroom it is a large mushroom (caps 2 to 5 inches broad, stalk 3 to 8 inches long) that is bright orange-yellow. The crowded, narrow gills run far down the stalk. The spore fall is creamy white. This mushroom grows in dense clusters at the base of a stump (it prefers oak stumps) or from buried wood during late summer and early fall.

The gills of this mushroom glow in the dark but this is little comfort to the collector unless he is picking mushrooms by the light of the moon.

The careless collector might confuse *C. illudens* with *Armillaria mellea*. The clustered manner of growth on a stump or from buried wood is similar. Both *A. mellea* and *C. illudens* have a white- and yellow-spored form. The bright orange color of *C. illudens* and the honey-yellow color of the smooth-capped, larger variety of *A. mellea* is somewhat similar. The common form of *A. mellea* is usually tan with fine, hairy scales on the cap. The cap of *C. illudens* is smooth but streaked with flat-lying fibrils. The gills of *C. illudens* are yellow and decurrent; of *A. mellea* white to rusty tan, squarely attached or decurrent only by a short fine line (tooth). The annulus (ring) on the stalk of *A. mellea* is an important character since *C. illudens* has no ring on the stalk; in fact, no veil at all as is evident when "buttons" are compared.

If you are collecting in Superiorland you should be comparatively safe from poisoning by *C. illudens*. It prefers oak stumps and warmer climate. Not once in 25 years of collecting have I found it in the Upper Peninsula of Michigan.

Galerina autumnalis

A safe general rule for the amateur is to avoid those with brown spores.

G. autumnalis is dangerously poisonous. It's a small, densely-clustered, brown to tan (depending on whether it's dry or wet) mushroom, growing abundantly on rotted logs in late summer and fall and often in the spring. Most mushrooms in a cluster of *Galerina* will have a narrow band-like ring near the upper third of the stalk. The color of the stalk is lighter at the base, getting darker toward the upper part. THE SPORE FALL IS BROWN.



Courtesy A. H. Smith

Galerina autumnalis - poisonous

This innocent looking, small, brown-spored mushroom is definitely poisonous. It has been confused with edible "stump" mushrooms.

Pholiota group

The *Pholiota* group is another of the wood-inhabiting mushrooms that has brown spores.

Some of this group are regarded as edible by some authors, and some are said to cause distress—so it is best for the amateur to leave the whole group alone. Some species of *Pholiota* could be confused with *A. mellea* by the coloration, clustered manner of growth and size. *Pholiota* species are rougher and tougher looking and feeling. The brown spore fall is indication for you to wait till you become an expert before experimenting with them for food.

Crepidotus

Crepidotus is a group that might confuse folks who collect "oyster mushrooms." It grows on wood in fan or shell shapes, and most have a white surface color on the cap. They are most often much smaller than the *Pleurotus* species we collect for food. THE SPORE FALL OF *CREPIDOTUS* IS BROWN.

"JUNK" BUT BEAUTIFUL

There are hundreds of mushrooms that grow on wood. Beginning students should stick to the big three edibles; *A. mellea*, *P. ostreatus* and *P. sulphureus* until they become proficient at identification. They should also become familiar with those that cause serious poisoning — *C. illudens* and *G. autumnalis*.

Most of the mushrooms can be classed as "junk" species if you're a food collector. They're too small, too tough or often of too poor flavor to be considered for food.

"Junk" they may be but they are incredibly beautiful. Claim a stump or log for your very own. Then watch the fascinating progression of plants that inhabit it in the transformation of wood to humus. Stumps are beautiful!

Should The Uninitiated Collect Wild Mushrooms For Food?

1. Not unless you are willing to study until you learn the positive identification of the mushroom you seek and become selective in your collecting.

2. Not unless you assume the responsibility of 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 trespass, private property, no littering and posted land signs.

4. And certainly not unless you have the same respect for every living plant, bird or animal that shares the mushroom hunting area, as 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.) Promptly clean, refrigerate, cook or preserve your collections upon returning home. Unless you intend to use 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.

Mushrooms Grow on Stumps is the second in a series of booklets designed to help the beginner appreciate wild mushrooms as a safe source of food. This booklet deals with species that grow on wood.

May Is Morel Month in Michigan, Extension Bulletin E-614, is the first in the series.

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