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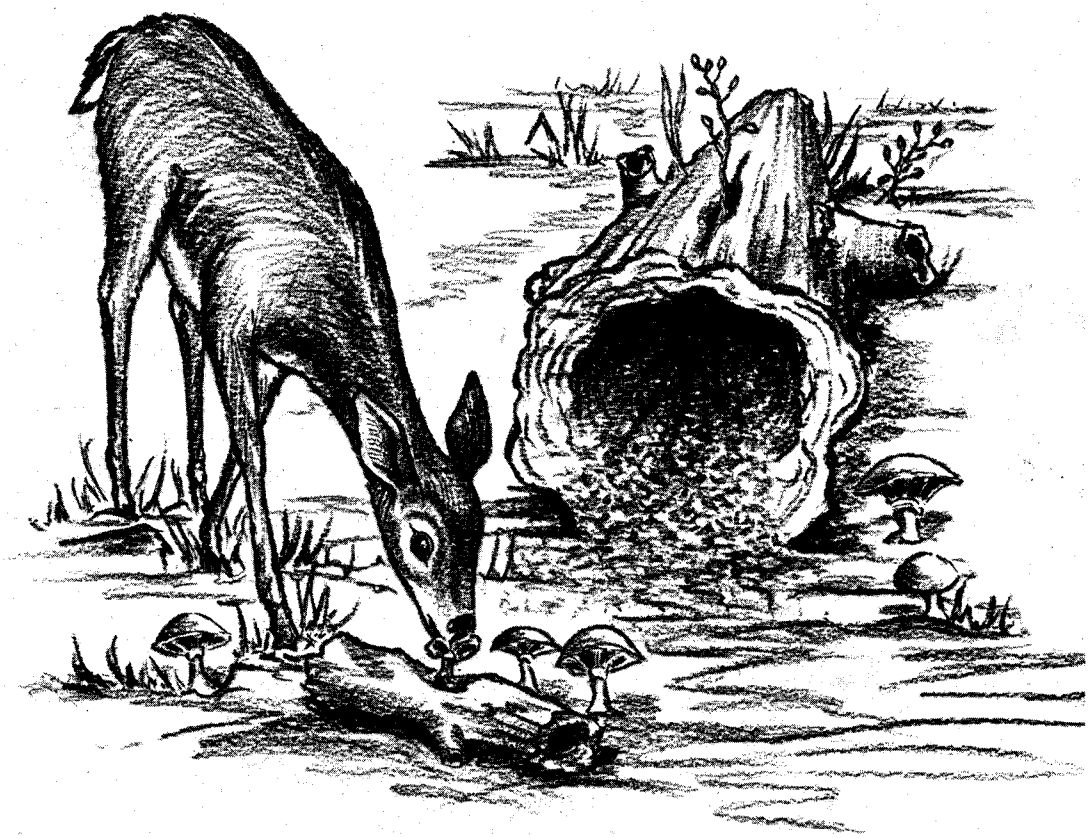
Fleshy Fungi Commonly Eaten By Southern Wildlife



Southern Forest Experiment Station
Forest Service
U. S. Department of Agriculture

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Fleshy Fungi Commonly Eaten By Southern Wildlife

HOWARD A. MILLER
AND
LOWELL K. HALLS

Southern Forest Experiment Station
Forest Service
U. S. Department of Agriculture

1969

CAUTION:

Many species of mushrooms that are deadly to man are apparently harmless to wildlife. Animal use does not indicate edibility for humans.

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Fleshy Fungi Commonly Eaten By Southern Wildlife

Howard A. Miller [1] and Lowell K. Halls [2]

Mushrooms appear to be an important component of the diet for wildlife in the South. They are eaten by deer, small mammals such as squirrels and other rodents, birds, turtles, and numerous species of insects.

In winter, when the food needs of wildlife are usually critical, mushrooms are particularly important, especially to white-tailed deer. During this period the highly nutritious mushrooms help to compensate for nutrient deficiencies in native forage.

At the Atomic Energy Commission's Savannah River Project in South Carolina, David F. Urbston of the USDA Forest Service reported that deer ate mushrooms at all seasons (unpublished data). In an analysis of 100 deer stomachs, he found that 95 percent contained mushrooms or other fungi, varying in volume from a trace to 83 percent. Strode *(21)* lists mushrooms as the most important food for deer on the Ocala National Forest in Florida. He found that 79 percent of deer stomachs examined contained mushrooms; percent by volume was 24. In Missouri, 50 out of 270 deer stomachs contained fungi *(14)*.

While at the Southeastern Forest Experiment Station, Charles Cushwa and colleagues collected stomach samples from deer in the major physiographic provinces of the Southeast. Percent of stomachs containing mushrooms ranged from 10 to 100, depending on province and season; content by volume ranged from 1 to 27 percent (unpublished). Use was generally highest in summer.

Game birds such as grouse, turkeys, and quail feed heavily on mushrooms. Grouse and turkeys, which are strong scratchers, easily uncover mushrooms hidden by pine needles or hardwood leaves. Broken ends and threads of mycelia that have been pulled up indicate the presence of fungi and use by birds. Quail, being weak scratchers, often feed on pieces of mushroom left by rodents.

Among rodents that eat mushrooms are squirrels and white-footed and deer mice. The western gray squirrel feeds heavily on subterranean fungi, such as false truffles. The eastern gray squirrel favors above-ground mushrooms. In Ohio, mushrooms ranked high in the gray squirrel diet *(18)*. In Virginia, fleshy fungi constituted 26 percent of the fall diet and 16 percent of the winter diet of gray squirrels *(5)*.

The fruiting bodies of mushrooms, which are often heavily infested by insects, are also a source of food for birds. Robins and bluejays, for example, frequently tear mushrooms apart in search of larvae.

Four species of mushrooms are preferred far more than others. In order of preference they are peppery lactarius *(Lactarius piperatus)*, little red russula *(Russula roseipes)*, honey mushroom *(Armillaria mellea)*, and granulated bolete *(Suillus granulatus)*.

Purpose of this guide is to aid in identification of mushrooms commonly eaten by wildlife in the southern forests extending from Texas to Virginia. In addition, the aim is to stimulate interest in research on mushrooms as wildlife food and on their ecology and growth.

The fungi described here occur commonly in one or more physiographic provinces of the South. They are known to be eaten by one or more species of wildlife. Their fruiting bodies are large enough (i.e., at least 2 inches in diameter) to provide a substantial segment of the diet for larger birds and mammals. Only mushrooms that meet these requirements according to present knowledge are included here. For those interested in additional information, a list of comprehensive manuals is provided.

[1] Formerly Branch Chief, Wildlife Management, Southern Region, USDA Forest Service. Now consulting forester and biologist, Marietta, Georgia.

[2] Halls is on the staff of the Wildlife Habitat and Silviculture Laboratory, which is maintained at Nacogdoches, Texas, by the Southern Forest Experiment Station in cooperation with Stephen F. Austin State University.

NUTRITIVE VALUE

Fresh fleshy fungi have high moisture contents, usually between 75 and 90 percent. Thus, rather large volumes have to be consumed to provide adequate protein and phosphorus. A protein content of about 30 percent of dry weight has been reported for a typical *Morchella (17)*. Crude protein content averaged 17 percent (dry weight basis) for several specimens of *Hygrophorus, Armillaria, Russula, Clitocybe, Tricholoma, Pholiota,* and *Amanita* collected during late autumn in Georgia; the range was from 12 to 27 percent. Phosphorus averaged 0.40 percent, ranging from 0.20 to 0.58 percent.

In east Texas, specimens of *Hygrophorus* and *Amanita* collected during early winter averaged 23 percent crude protein and 0.55 percent phosphorus. The same samples averaged only 12 percent in crude fiber content, an indication that they are readily digestible by ruminants such as cattle and deer.

Samples of *Morchella, Rhizopogon, Cortinarius, Amanita, Clitocybe,* and *Lactarius* collected in May averaged 30 percent crude protein, 17 percent crude fiber, and 0.68 percent phosphorus.

HABITAT REQUIREMENTS

Fleshy fungi are particularly abundant in the litter on the forest floor. Some fungi are found only in association with conifers and others with hardwoods. Some seem to be dependent upon a single tree species. A few are parasitic on other mushrooms. Certain fungi are especially numerous in soils where organic content is high. A few live mainly on the slash left after logging of hardwoods. Many establish a mycorrhizal association with tree roots.

The mushroom population in the forest changes with the seasons. *Morchella,* or morels, usually appear in the coolness of early spring, *Boletus* in the summer, *Cortinarius* in autumn, *Hygrophorus* in early winter, and *Collybia* during winter *(15)*.

The greatest number of species are usually found where the forest floor is covered with sufficient humus, dead leaves, thick moss, or other debris to hold moisture. Mycelia can live for many years, and mushrooms are often found in about the same spot each year. During a drought, fruiting bodies are seldom seen, and a long rainy spell may be necessary before they appear above ground. Except where rotten logs and woods retain moisture, a single heavy rain or even a number of scattered showers may not be sufficient to induce growth *(12)*.

Certain conditions of temperature and humidity must be present even when soil moisture is ample. Commercial mushrooms grows best between 50° and 60°F., but in the wild there is a wider tolerance *(15)*. If showers occur frequently during warm weather, a large number of species can be found fruiting simultaneously in a small area *(20)*.

Since mushrooms lack chlorophyll and get their food from organic matter, direct sunlight is not necessary for growth. The mycelium is capable of fruiting even under dense shade, given the proper temperature and moisture. This characteristic will become increasingly important in management of game habitat under dense pine stands grown on short rotations.

Any forest management practice that results in disturbance to the soil or an accumulation of derbis and organic material will usually affect the mushroom population. Species of mushrooms that live on slash and downed trees should increase for several years following logging. Later, as the debris breaks down, additions to the duff provide a medium on which a large number of mushrooms of other species live.

Burning, an important management technique, often causes certain fungi to fruit for a few years, after which they are not seen until the next burn. On six burned plots of loblolly and shortleaf pines *(Pinus taeda, P. echinata),* the senior author observed that fire apparently induced heavy fruiting of *Suillus granulatus, Russula delica, R. variata, Armillaria ventricosa,* and *Hygrophorus tennesseensis*. On the other hand, where fire destroys a substantial proportion of the litter, the number and kinds of fleshy fungi will probably decline.

In southern forests where upland hardwoods have been converted to pines, certain mushrooms that were scarce or absent among the hardwoods become abundant. Species such as *Amanita verna, A. chlorinosma,* and *Lactarius piperatus* tolerate the high density of young stands and the lack of hardwood litter and debris.

Agaricaceae

Members of the family Agaricaceae are parasol-shaped fungi bearing gills under the cap. They are sometimes known as the true mushrooms. The agarics may be grouped according to the color of their spore masses. Wildlife apparently prefer those in the white, pink, purple-brown, and yellow-brown groups. No use of species with black spores has been observed, probably because as the fungi mature the caps and gills liquify through a process of autodigestion.

Species described here are arranged alphabetically by genera within spore-color groups.

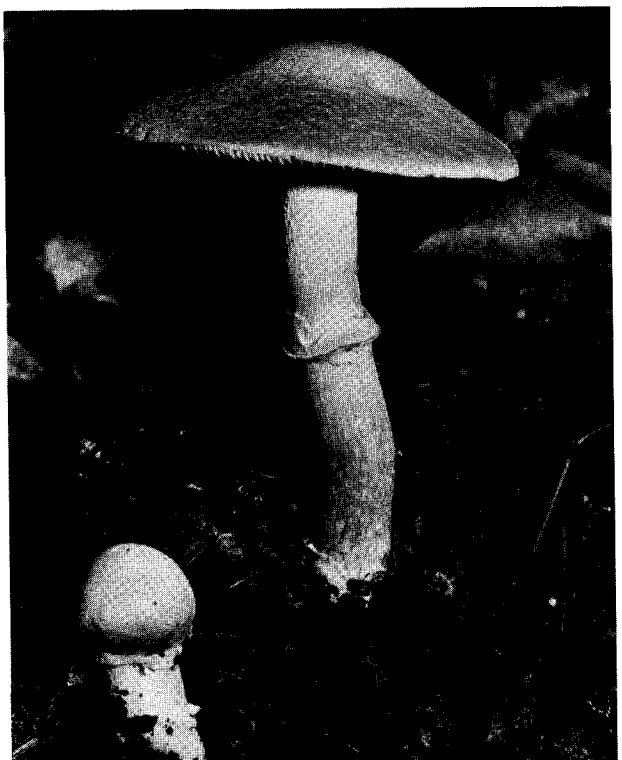
Amanita

Amanitas are eaten by deer, squirrel, turkey, grouse, and other birds and mammals. Most of them are deadly to humans, however.

These beautiful mushrooms range in color from pure white to brilliant red and orange. The spores are white and the gills are free or only slightly attached to the stem. The outer veil, when broken, becomes the volva or cup at the base of the stem. The inner veil, when broken, becomes the ring on the stem.

Species described here are common in southern pine-hardwood forests.

Browning amanita



Browning Amanita

Amanita brunnescens

CAP 1½ to 4 inches wide; conical, becoming flat convex with small umbo; tan to gray-brown, smoky; nauseous odor

GILLS white; close; medium broad

STEM 2 to 5 inches long; tapering upward and often splitting up and down

RING on upper portion of stem

VOLVA a shallow cup, if at all

Occurs from June through August.

Caesar's Mushroom

Amanita caesarea

CAP 2 to 5 inches wide; conical, becoming convex to flat; red to orange; scales rarely found on mature specimens

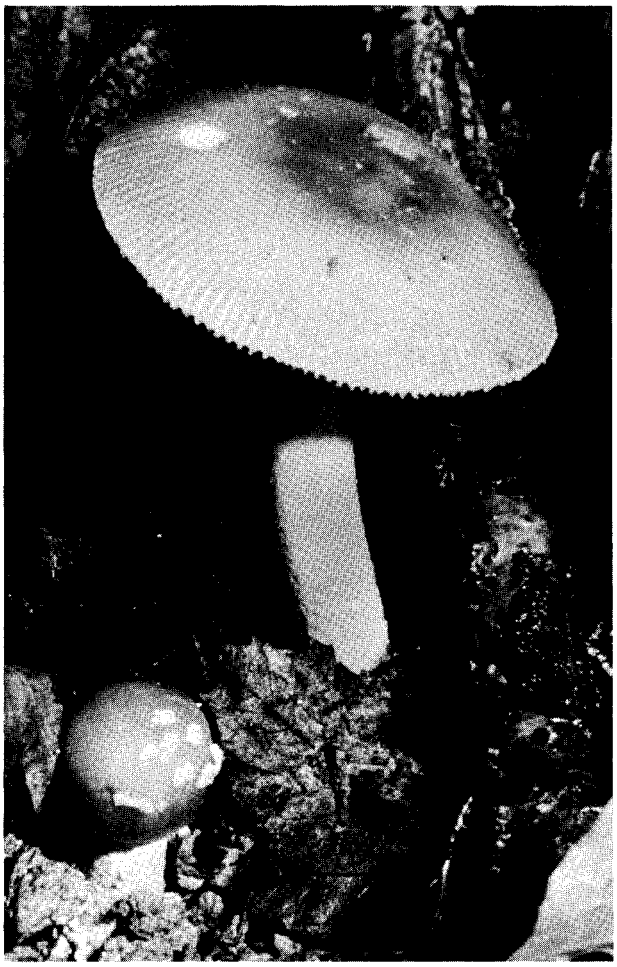
GILLS white or slightly yellow; close and medium broad

STEM 4 to 7 inches long; yellowish

RING yellowish

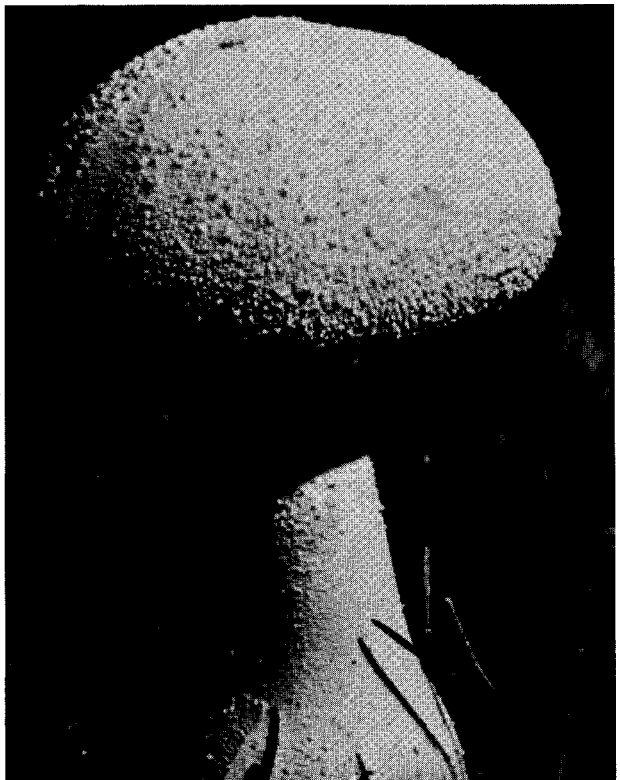
VOLVA deep, well-formed white cup

This colorful mushroom is found from July through August.



Caesar's mushroom—mature and immature

Chlorine amanita



Chlorine amanita—sectioned

Chlorine Amanita

Amanita chlorinosma

CAP 3 to 10 inches wide; conical; whitish or pale cream; has odor of strong lime or old ham

GILLS white to creamy; close

STEM 4 to 10 inches long; bulbous at ground

RING fragile, soon disappears

VOLVA mealy powder on base of stem

Warty scales on the central portion become soft and powdery and often fall from the cap and stem; fruiting bodies occur from July to November.

Tawny Amanita

Amanita fulva

CAP 1 to 4 inches wide; conical; tawny to gray or pale orange to buff, with conspicuously striate margin

GILLS white, close and narrow

STEM 3 to 5 inches long; whitish above and dull yellow below

RING not evident

VOLVA white; deeply cup-like

Occurs solitarily and scattered, June to August.

Tawny amanita

Fly Mushroom

Amanita muscaria

CAP 4 to 6 inches wide; egg-shaped when young; convex to flat and often slightly concave when mature; surface pale yellow to orange, sometimes reddish, often with white or pale yellow scales in concentric rings

GILLS white, turning yellow; close and broad

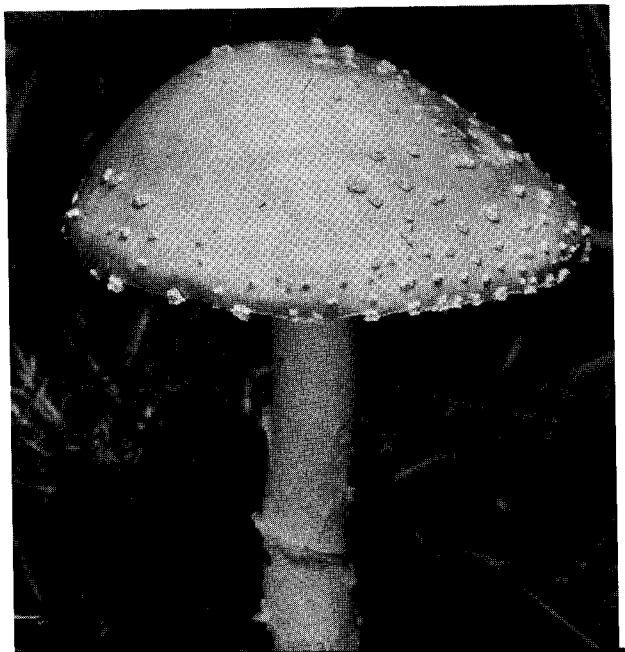
STEM 4 to 6 inches long; enlarged at base and tapering upward; yellowish white

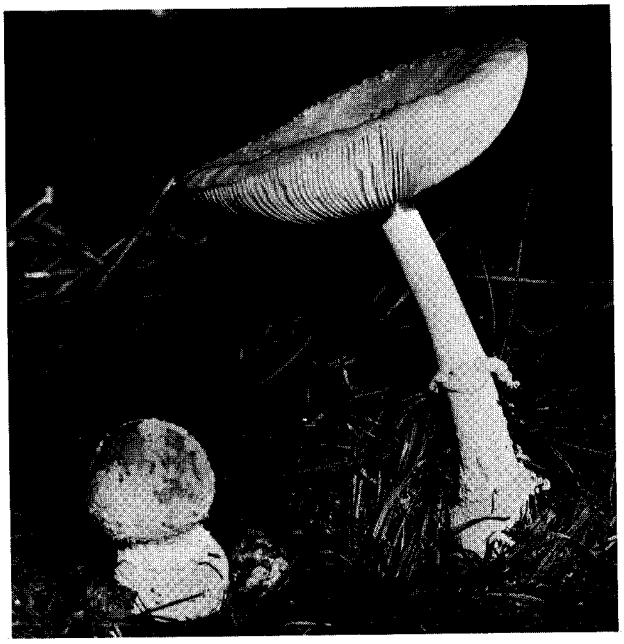
RING fragile, often hanging from stem or cap edge

VOLVA scales or broken ridges encircling lower stem and bulb

Found from June to October.

Fly amanita





Fly amanita

Solitary Amanita

Amanita solitaria

CAP 3 to 5 inches wide; first conical, later flat; surface white or nearly so with brownish warts

GILLS white to yellowish; close

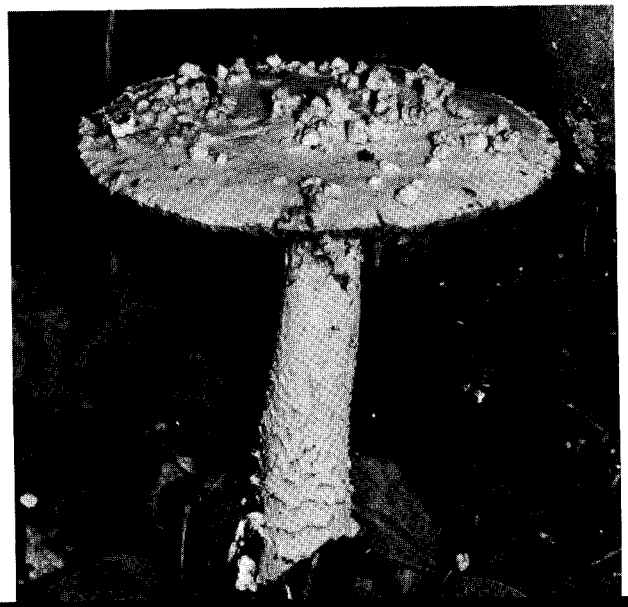
STEM 4 to 8 inches long; scaly and bulbous at ground line

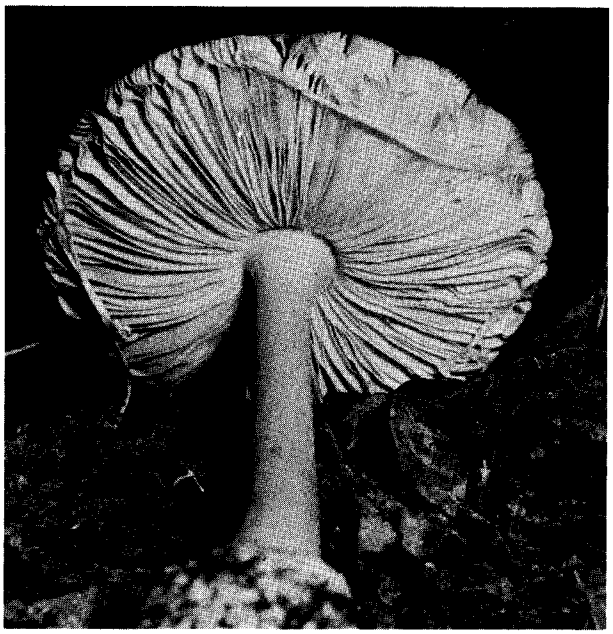
RING white; at first attached to stem; remnants of veil often persist on gills

VOLVA scales on base; no well-formed cup

Occurs singly, June through August.

Solitary amanita





Solitary amanita—veil remnants

Destroying Angel

Amanita verna

CAP 2 to 5 inches wide; convex to flat; white

GILLS faintly serrate in older specimens

STEM 4 to 7 inches long; white; bulbous at base

RING white, often hanging from upper portion of stem

VOLVA cup-like, often in soil

Usually grows solitarily or in small groups, June to August; deadly to humans.

Destroying angel

Armillaria

Species in this genus have white spores, and the gills are attached to the stalk. A ring occurs on the stem, but it is often inconspicuous and short-lived. In contrast to amanitas, armillarias have no volva. The stem is continuous with the cap and does not separate readily. Armillarias differ from lepiotas, the other white-spored mushroom with a ring, by their attached gills; in lepiotas the gills are free. Armillarias occur in pine and pine-mixed hardwoods in the mountains, Piedmont, and upper Coastal Plain.

Booted Armillaria

Armillaria caligata

CAP 2 to 6 inches wide; flat or funnel-shaped at maturity; reddish-brown scales tinged with purple

GILLS white to grayish, turning brown with age

STEM 2 to 3 inches long; brownish and scaly below, white and smooth above

RING flaring and conspicuous

The lower portion and light upper part resemble a boot; common in autumn; often associated with huckleberry thickets.

Booted armillaria—variant

Honey Mushroom

Armillaria mellea

CAP 2 to 5 inches wide; convex to flat when mature; honey-colored or brown, usually scaly; surface of young plants sticky

GILLS decurrent; pale yellow to white, frequently brownish when mature

STEM 4 to 10 inches long; tapering downward and scaly to pointed "root"

RING at first stands out like collar, later collapses and may disappear

This common mushroom grows abundantly in large clusters about stumps of deciduous trees; it often produces black strands of fungal filament, under the bark, that resembles shoestrings; found mainly in September and October.

Honey mushroom—squirrels and turkeys feed heavily on this species.

Swollen-Stalked Armillaria

Armillaria ventricosa

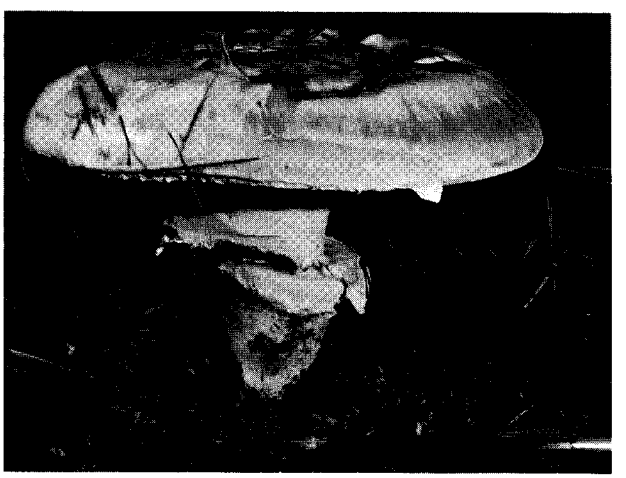
CAP 4 to 12 inches wide; depressed in center when young, flat or funnel-shaped when mature; shining and smooth; whitish or silver-gray

GILLS decurrent; narrow and white

STEM 2 to 6 inches long; stout; tapering rapidly to point

RING flaring and prominent

This species is important to deer in late fall and winter.



Swollen-stalked armillaria

Lepiota

Most *Lepiota* species have white spores though some have cream-colored or green spores. All have a ring on the stem, which separates readily from the cap. The gills are free. Lepiotas resemble amanitas except that they do not have a cup. They grow on the ground, on debris, or on rotten wood. Wildlife do not feed heavily on them, probably because they occur along with large and succulent species of *Lactarius,* which may be more attractive. Three species, however, are locally common enough to be considered valuable for wildlife.

Green-Gilled Mushroom

Lepiota molybdites

CAP 3 to 8 inches wide; buff with pale brownish scales

GILLS becoming dull green with maturity; spores green in mass

STEM 3 to 8 inches long; tapering toward bulbous base

RING whitish; becomes movable

Found mainly in grasslands, July to early fall.

Green-gilled mushroom—immature group

Smooth Lepiota

Lepiota naucina

CAP 2 to 4 inches wide; oval when young, later convex to almost flat; surface smooth or faintly cracked; white with central portion frequently smoky

GILLS close and white when young, later turning pinkish and finally pale brown; edge serrate; spores white

STEM 2 to 5 inches long; tapering upward from bulbous base; white and hollow when mature

RING prominent, sticking out from stem

Grows on the ground in grasslands and open hardwood types, June to October.

Smooth lepiota

Parasol Mushroom

Lepiota procera

CAP 2 to 6 inches wide; reddish brown with conspicuous concentric brownish scales

GILLS close; white, then pinkish or brownish; spores white

STEM 6 to 9 inches long with brownish scales and bulbous base

RING movable

A grassland species, July to early fall.

Russula

The species number in the hundreds. Many are yet to be described. They are widely distributed and occur in all major cover types. Judging from the use by wildlife, they are quite palatable.

Russula species have no ring or cup. The stem and cap are continuous. Cap colors range from dingy white through all the colors of the rainbow. The spore mass is basically white or pale cream, but in several species it is bright yellow. The gills are brittle and easily break into small pieces.

This genus resembles *Lactarius* in many ways. General shape and growth habits are similar. During wet weather both may exude droplets of liquid from their gills and the edges

of their caps. Russulas will not, however, exude a milky substance from the flesh of the cap, when broken.

Typical russula

Scarlet Russula

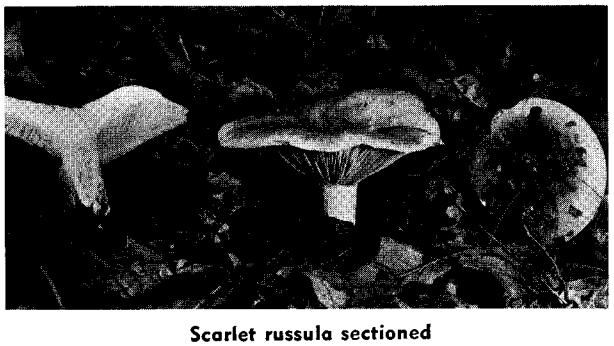
Russula borealis

CAP 3 to 7 inches wide; spherical when young, later flat or depressed in the center; dry and not sticky, easily peeled from surface; white flesh tinged red beneath cuticle; scarlet or blood-red in center, fading toward edge

GILLS short, decurrent; spore mass yellow

STEM 3 to 5 inches long; uniform in diameter; often white, spotted or tinged with red

Occurs usually in groups of two to four, August to October.



Scarlet russula sectioned

Encrusted Russula

Russula crustosa

CAP 2 to 5 inches wide; depressed in center; margin recurved when young, later upraised and striate; surface sticky and greenish, appearing crusted and scaly

GILLS white, later buff; spores whitish

STEM 2 to 4 inches long; white; thick at tip and tapering toward base

Found in summer.

Zoned-Stem Russula

Russula delica

CAP 5 to 10 inches wide; at first with central depression; margin upraised later so cap has broad funnel shape; smooth but sometimes faintly hairy; surface dull white with rusty brown patches, yellowish stains, and concentric rings

GILLS short decurrent; white; short and long gills alternating; spore mass creamy white with faint pinkish cast

STEM ½ to 1½ inches long; cylindrical; usually with blue-green ring at top

Fruits from August through December.

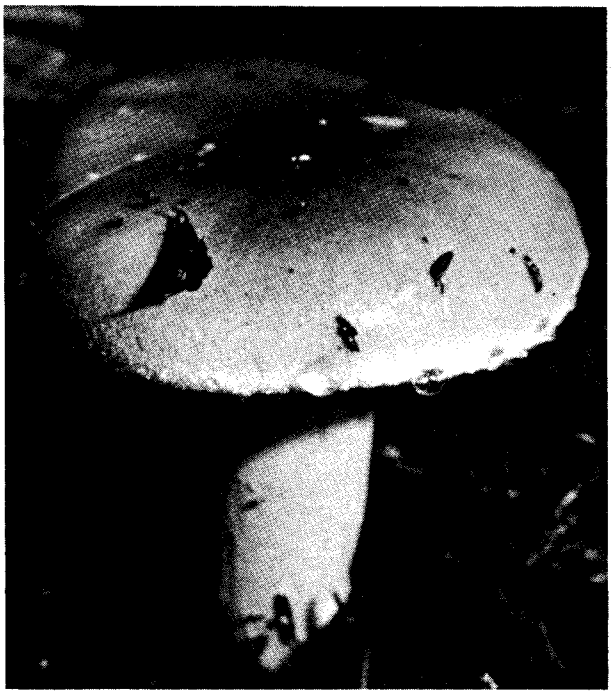
Zoned-stem russula—sectioned

Fetid Russula

Russula foetens

CAP 2 to 5 inches wide; sticky; at first spherical, later flat or nearly so with tan to pale brown, coarsely striate margin

GILLS pale yellow; short decurrent or attached; usually exudes drops of



Fetid russula

liquid from edges when fresh; spores white

STEM 2 to 4 inches long; white or pale brown where bruised; quickly hollowed out by insect larvae; putrid odor when mature

Occurs from July through September.

Little Red Russula

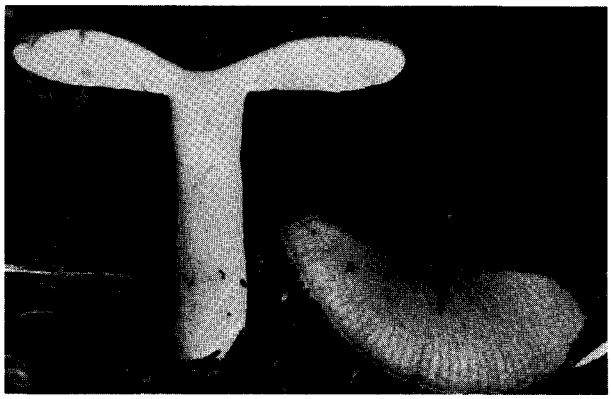
Russula roseipes

CAP 1½ to 3 inches wide; convex; flat or slightly depressed in center; sticky when young; margin prominently striate; cuticle easily peels off; surface bright red and may be slightly yellow in center

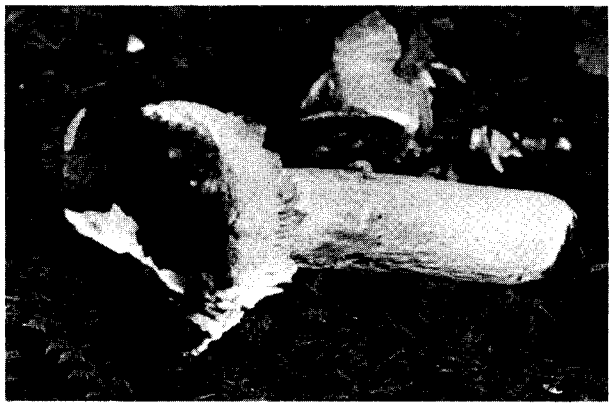
GILLS free or slightly attached; white when young, turning yellow with maturity; spores yellow

STEM 1 to 2 inches long; cylindrical or slightly tapered upward; white or pale red; spongy

Usually found scattered under conifers but sometimes occurs in pine-hardwood types, August to October.



Little red russula—sectioned



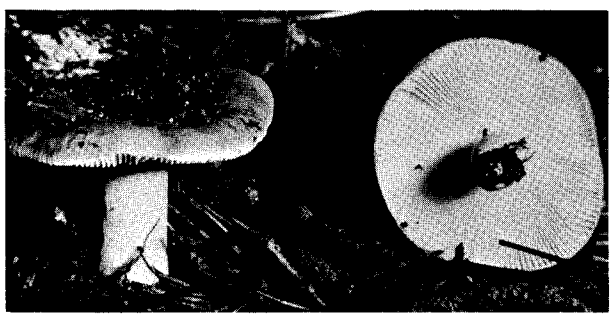
Wildlife apparently prefer little red russula more than most species.

Variable Russula

Russula variata

CAP 2 to 4 inches wide; pinkish to deep wine and lavender; convex to flat, often with depression in center

GILLS white; finely branched toward outside



Variable russula

STEM 2 to 4 inches long, white, moderately stout

Found in pine types in the Coastal Plain and among hardwoods in the mountains; fruits from May to September and is responsive to fire.

Green Russula

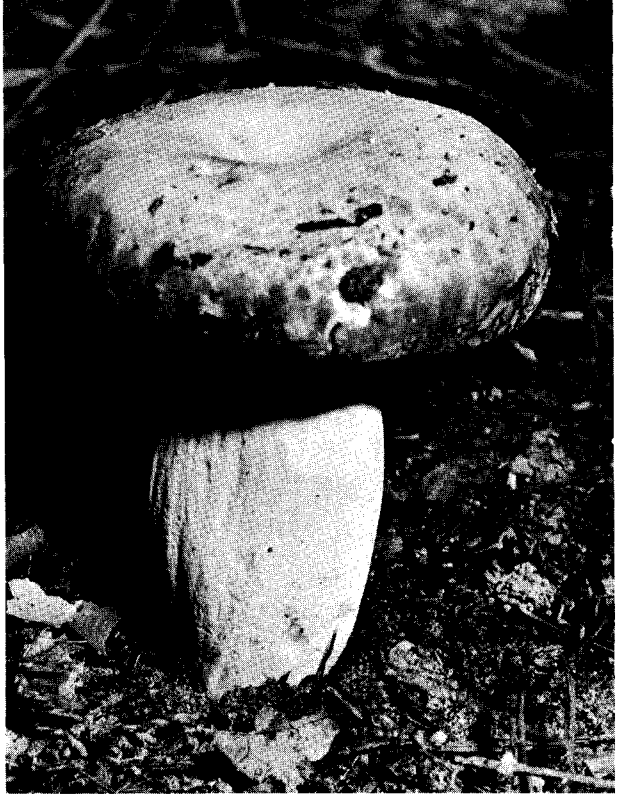
Russula virescens

CAP 2 to 6 inches wide; flat to slightly depressed in center; green to grayish-green or olive; at maturity solid color breaks, showing white flesh beneath

GILLS white, free; spores white

STEM 1 to 3 inches long; thick and often tapered near base or on both ends

Grows singly from June through October.



Green russula

Lactarius

Members of this genus are among the largest and showiest mushrooms in the woods. They are highly attractive to insects, rodents, and deer. An untouched, mature specimen is rarely found.

Species range from about 4 inches in diameter to as large as a dinner plate. They have white spores and attached or decurrent gills. Cap and stem are continuous. The cap is more often depressed to funnel-shaped. The single most distinguishing character is the presence of white or colored juice when the cap is broken. In wet weather, droplets often ooze from the gills. Droplets are not visibly exuded from old dry specimens; a low-power lens may be required to distinguish their presence.

The genus is well distributed in the mountains, the Piedmont, and Coastal Plains, as well as on flood plains of the major rivers. It is mostly terrestial, sometimes on much decayed wood. *Lactarius* species often occur in large numbers in the open woods of higher ground.

Blue Lactarius

Lactarius indigo

CAP 2 to 6 inches wide; convex with central depression when young, becoming broad, funnel-shaped at maturity; concentric bands

GILLS blue, at times pale green; decurrent and occasionally forked

Blue lactarius

STEM 1 to 3 inches long; stout; blue

Grows solitarily, August and September; blue juice exuding from cap and gills.

Peppery Lactarius

Lactarius piperatus

CAP 4 to 12 inches wide; margin incurved at first, center later depressed to funnel-shaped; surface white, dry, smooth

Peppery lactarius

GILLS white, decurrent, crowded, and forked

STEM 1 to 3 inches long; white and stout, often tapering downward; may be finely pubescent

Grows in hardwood stands and occasionally in pines, August and September; normally in groups of four to eight but sometimes found singly; juice white.

Orange-Brown Lactarius

Lactarius volemus

CAP 2 to 4 inches wide; flat to convex when young, later funnel-shaped; golden brown; smooth but sometimes with small pinpoint-sized spots

GILLS decurrent; pale cream or brownish; occasionally forked

STEM 2 to 4 inches long; colored like cap or paler; usually solid and cylindrical.

Scattered throughout Southeast, June through August; juice is white.

Orange-brown lactarius

Cantharellus

Cantharellus species have vase-like, funnel-shaped caps and long decurrent, forked gills that, in most cases, are so thick that they resemble folds rather than gills. The ring and cup are absent and the stem and cap are continuous.

Chanterelle

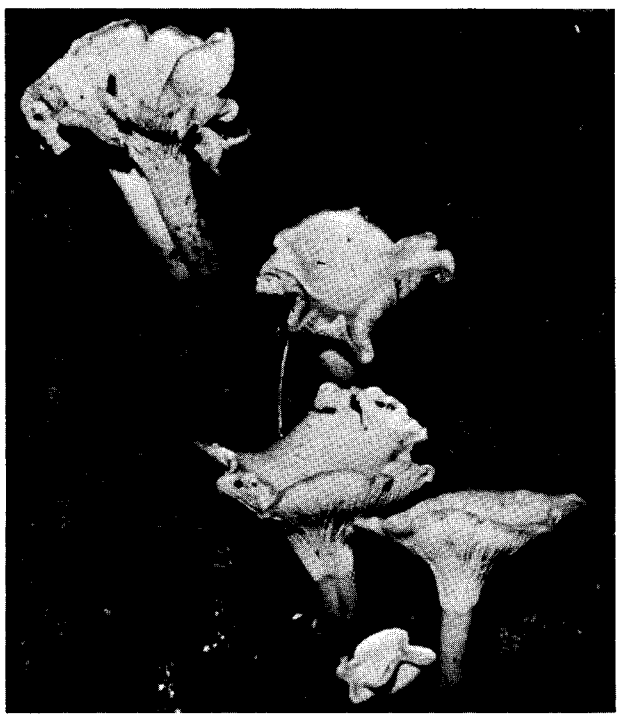
Cantharellus cibarius

CAP 3 to 8 inches wide; first convex then flat, later shallow and funnel-shaped; margin curved down, wavy; yellowish to buff and orange

GILLS yellow; thick and forking; spores pinkish-yellow or cream

STEM 1 to 3 inches long; thick at top and tapering downward, same color as gills, or lighter

Grows scattered or in groups on the ground, June through August; similar to *Craterellus cantherellus* but has true gills instead of folds.



The chanterelle

Shaggy Chanterelle

Cantharellus floccosus

CAP 2 to 4 inches wide; almost cylindrical with flat top at first, later deeply funnel-shaped; yellow to pale orange and scaly

GILLS ridge-like or folded; forking and pale yellow; spores yellowish-cinnamon

STEM 1 to 2 inches long; not distinct from cap; pale yellow and often covered with white mycelium at base

Fruits from May through September.

Shaggy chanterelle

Hygrophorus

Gills, the principal means of identification, are soft, waxy, and widely spaced; they are not brittle. Gills are sharp at the edges but thicken toward the cap; they are triangular in cross-section. Spores are white. The stem is hollow at maturity and is sometimes twisted and split lengthwise. *Hygrophorus* species are not large mushrooms. The stem and cap are not continuous but do not separate easily from one another.

Scarlet Hygrophorus

Hygrophorus coccineus

CAP 1 to 2 inches wide; conical at first, becoming upturned and wavy; scarlet-red, fading somewhat with age

GILLS orange-red or yellow-orange; alternately long and short; spores white

STEM 1 to 3 inches long; same color as cap but with white base

Grows on the ground in open, grassy woods, July to November.

Scarlet hygrophorus

Russula Hygrophorus

Hygrophorus russula

CAP 2 to 5 inches wide; convex when young, becoming broad and shallow, funnel-shaped; surface pale red to coral pink; sticky when moist, often spotted with very small scales; margin raised and wavy

GILLS white and later spotted with red; attached to stem or short decurrent; spores white

STEM 1 to 3 inches long, tapering downward and covered with downy mycelium

Russula hygrophorus

Grows solitarily on ground, October through December; closely resembles *Russula roseipes*, which has yellow spores.

Tennessee Hygrophorus

Hygrophorus tennesseensis

CAP 2 to 5 inches wide; convex to slightly flat; tawny or clay colored; surface sticky

GILLS white

STEM 2 to 4 inches long; dingy white, tapering downward or occasionally crooked

Found in wet years, September through December.

Tennessee hygrophorus

Clitocybe

Clitocybe have attached or decurrent gills and a tough stem that does not separate readily from the cap. To differentiate between cap and stem flesh it may be necessary to use a hand lens or let the specimen dry. Spores, though generally white, are yellow in some species. The genus is probably best known for the jack-o-lantern mushroom, which glows in the dark. Individuals are not large, but since they occur in groups the total mass is large enough to attract wildlife. They usually occur on decaying wood.

Cartilagenous Clitocybe

Clitocybe cartilaginea

CAP 2 to 4 inches wide; convex; tan to brown in center, becoming pale at edge; surface slick when moist; cap margin on young plants turned in; skin tough, often wrinkled and can be peeled from flesh

GILLS short; decurrent or attached; pale yellow to white

STEM 2 to 8 inches long; rather tough and stringy; slick when moist; several stems often arise from common base

Occurs in mixed hardwoods, October and November; scattered or in dense clumps that resemble fairy rings.

Cartilagenous clitocybe

Cartilagenous clitocybe—sectioned

Jack-O-Lantern Mushroom

Clitocybe illudens

CAP 2 to 8 inches wide; convex at first with margin turned down or inrolled, becoming flat or shallow funnel-shaped at maturity; bright yellow or orange-yellow with dull silky sheen when dry; margin sometimes lobed or wavy

GILLS luminescent; spores pale yellow

STEM 4 to 6 inches long; bases often fused; buff-colored; fibrous and usually curved

Usually grows in dense clumps on and around old stumps, logs, and decaying roots; generally found among mature oaks, May to October; luminescent.

Jack-o-lantern

Parilis

Clitocybe parilis

CAP 2 to 4 inches wide; convex when young, becoming shallow funnel-shaped with maturity; surface grayish tinged with brown, margin curved down or flat; flesh white and thicker near stem

GILLS gray to pale yellow; long decurrent

STEM 1½ to 2 inches long; tapering downward; white or pale gray; base often covered with white mycelium

Grows on the ground near streams and low sites in the mountains, September and October.

Parilis

Mycelium on base of parilis stem

Collybia

Collybias of known value to wildlife grow in groups or clusters on and around hardwood stumps. They are numerous on the Ocala National Forest in Florida and are also found in the upper Coastal Plain and mountains.

Collybia sp.

CAP 1 to 3 inches wide; not continuous with stem and difficult to separate; often enrolled in young plants

GILLS vary from almost free to attached; spores white

STEM tough; thick and fleshy

Collybia

Laccaria

Species of *Laccaria* closely resemble those of both *Hygrophorus* and *Clitocybe*. The waxy gills are well separated and thickened at the base but are pink, which is not a characteristic of *Hygrophorus*. The gills are not attached to the stem, nor decurrent as in *Clitocybe*. In short, *Laccaria* looks like *Hygrophorus* with pink gills. *Laccaria* spores are white.

Waxy Laccaria

Laccaria laccata

CAP ¾ to 2 inches wide; brown to cinnamon, paler when dry or frozen; surface scurfy

GILLS pink; broad; waxy, and free from stem

STEM 1 to 3½ inches long; usually same color as cap; often skin of stem will separate near upper end and resemble a ring, which is fake

Most common of the genus in the Southeast; found mostly in pine types, December and January; withstands freezing well.

Waxy laccaria—note false ring on stem

Waxy laccaria

Purple Laccaria

Laccaria ochropurpurea

CAP 2 to 5 inches wide; grayish when dry, purplish-brown when wet

GILLS bright purple

STEM 1½ to 6 inches long; usually same color as cap, except lighter

Fruits during autumn in mountains.

Tricholoma

Tricholomas have white spores and gills notched at the stem. The stem does not separate readily from the cap. The dividing line between the cap flesh and the stem is often difficult to distinguish. The four species described here are the ones most commonly eaten by wildlife.

Yellow-Brown Tricholoma

Tricholoma flavobrunneum

CAP 2 to 4 inches wide; at first rounded with an umbo, later flat; reddish-tan, sticky when moist; margin incurved for some time, later wavy

GILLS whitish and red-spotted

STEM 2 to 4 inches long; white with red stains

Fruits from August through December.

Yellow-brown tricholoma

Yellowish-Tawny Tricholoma

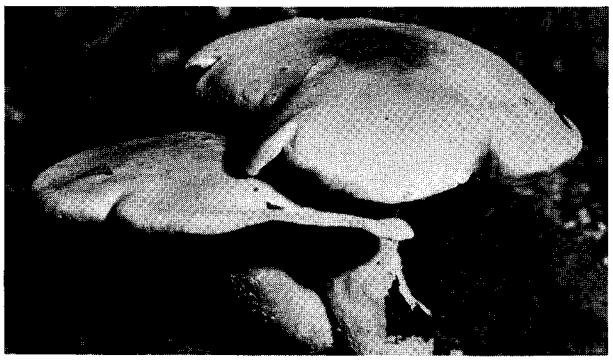
Tricholoma flavovirens

CAP 2 to 5 inches wide; convex at first, later becoming shallow funnel-shaped; wavy margin; tawny color; slightly scaly with a hint of green

GILLS yellow

STEM 1 to 4 inches long; white or tinged with pale yellow

Fruits in October and November.



Yellowish-tawny tricholoma

Lavender Tricholoma

Tricholoma personatum

CAP 2 to 6 inches wide; at first convex, becoming flat; surface at first covered with fuzz; pale watery gray, later turning to pale lavender and becoming naked; flesh pale lavender to gray

Lavender tricholoma

Lavender tricholoma—sectioned

GILLS notched or almost free; same color as cap

STEM 2 to 3 inches long; thick, with enlarged base; color same as cap

Grows in small groups or singly among decaying leaves or brush, September through October.

White-Shining Tricholoma

Tricholoma resplendens

CAP 2 to 4 inches wide; white and sticky

GILLS white with maturity, faintly flesh-tinted

STEM 2 to 6 inches long; white; slightly bulbous at base or with fleshy crook

Occurs in hardwood stands, October and November; usually covered by leaves; squirrels often dig up and eat the enlarged, crooked base, apparently preferring it to the stem or cap.

White-shining tricholoma

Agaricus

The Agaricus species generally have purple-brown spores and a ring. The cap and stem are easily separated. Gills are free. The stalk tapers slightly above the bulbous base. Only three species are common enough to be considered as valuable to wildlife.

Meadow mushroom

Meadow Mushroom

Agaricus campestris

CAP 2 to 4 inches wide; flat with small umbo; surface silky white, tinged with buff or brown, may be delicately scaly

GILLS free; at first bright pink, turning to dark purple-brown with maturity; spores purple-brown

STEM 2 to 4 inches long; white; does not have bulbous base

RING white; thin; fragile with persistent remnants often hanging from edge of cap

Meadow mushroom

Often cultivated; wild species fruits in grassland, meadows, and open hardwood types in May.

Flat-Capped Mushroom

Agaricus placomyces

CAP 2 to 4 inches wide; oval at first, later convex to flat, sometimes with small umbo; white but covered with soft brown scales often concentrically arranged from center of cap; pinkish tint in older caps; flesh white

GILLS at first white, free, later turning pinkish and finally dark brown; spores smoky-brown in mass

STEM 3 to 6 inches long; bulbous base

RING prominent; white and persistent

Fruits in deciduous woods and grassy areas, June through October.

Flat-capped mushroom

Sylvan Mushroom

Agaricus sylvicola

CAP 2 to 4 inches wide; at first long and conical, later convex to flat; silky white with yellow tinge, no scales; turning yellowish with age or injury

GILLS free; crowded; white at first, then dark brown at maturity; spores purple-brown

STEM 3 to 5 inches long; hollow; usually white with bulb at base; flesh turns yellow with injury

RING loosely attached; drooping and may be halfway down stem

Scattered at low elevations in deciduous woods, July and August.

Sylvan mushroom

Cortinarius

Cortinarius has yellow-brown spores; cap and stem are continuous. A distinct cobweb-like inner veil appears on young mushrooms. Remnants of the veil frequently persist on the gills to maturity. Gills may be notched, attached, or short decurrent. *Cortinarius* is most abundant in late summer and fall. Over 100 species of the genus have been described and many are yet to receive attention.

Distant-gilled cortinarius—sectioned

Distant-Gilled Cortinarius

Cortinarius distans

CAP 2 to 4 inches wide; brown and silky when dry, bell-shaped and later convex or flat with an umbo; margin recurved and often split; flesh pale brown to yellow

GILLS may be short notched to short decurrent; often widely spaced

STEM 2 to 4 inches long; brownish with white band of veil often apparent

Fruits from May through December; rodents feed heavily on this species.

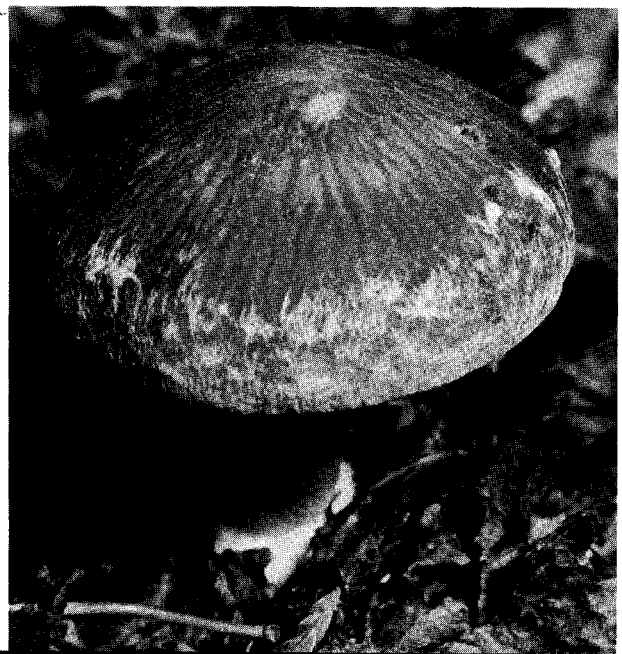
Flourishing Cortinarius

Cortinarius evernius

CAP 2 to 5 inches wide; bell-shaped when young, becoming convex to conspicuously elevated on central portion; brown and radially streaked at maturity; radish-like odor

GILLS brown and notched

Flourishing cortinarius



STEM 4 to 6 inches long; gray-wine color
White veil frequently leaves white patches on stem.

Occurs on ground in low, moist woods and along streambanks, August and September.

Scaly Cortinarius

Cortinarius squamulosus

CAP 2 to 5 inches wide; convex; reddish-brown to dark brown; scaly

GILLS notched, dark grayish-purple; veil often persistent to maturity

STEM 2 to 4 inches long, expanded and bulbous at base; ring (remnant of veil) frequently noted on stem

Scaly cortinarius

Pluteus

Pluteus has free gills and pink spores. The stem has neither ring nor volva.

The large fawn-colored pluteus, commonly found in old sawdust piles and decaying wood, fruits in early spring when food is scarce. It grows singly or in clumps of three to eight specimens.

Fawn-Colored Pluteus

Pluteus cervinus

CAP 1½ to 5 inches wide; usually brown to smoky-gray, at times whitish; sticky when wet

GILLS white, then flesh-pink

STEM 3 to 6 inches long; dingy-white; bases often fused

Fawn-colored pluteus

Clitopilus

Spores are pinkish to rosy. The stem is fleshy and at times eccentric. Gills are decurrent. There is no ring or volva.

Plum clitopilus grows near stumps in mountain hardwood types during October and November. It is often associated with an aborted form that appears globular and is intermingled with normal specimens. Both are eaten by animals.

Plum clitopilus (left) with aborted form

Plum Clitopilus

Clitopilus prunulus

CAP 2 to 6 inches wide; at first convex, but later almost flat with wavy decurved margin; surface gray to white, not sticky; flesh white

GILLS long decurrent; white; becoming pink with maturity; pink spore mass often observed on layered caps

STEM 3 to 8 inches long; thick at top, tapering upward; often slightly woolly at base

Evidence that deer are fond of this species

Boletaceae

Members of the Boletaceae are large and common enough to furnish a substantial amount of food to deer as well as to squirrels and other rodents.

Boletes differ from other parasol-shaped mushrooms in that tubes have replaced gills as reproductive surfaces. From the outside the tubes resemble pores; thus the boletes are often referred to as pore mushrooms. Coker and Beers (1943) list 68 species and six varieties in North Carolina; there are probably many more yet to be described. They occur on many sites, but those that grow in the soil appear most attractive to wildlife.

Three important points help to determine genus and species of boletes: ease with which the cap and tubes can be separated, character of the cap and stem surface, and changes in flesh and tube coloring resulting from injury.

Most species of boletes are brilliantly colored. Certain species are noted for their mycorrhizal relationship with several tree species —principally conifers.

Boletes described here are usually found in pine and hardwood forests from the Coastal Plain to the mountains.

Boletellus betula

CAP 2 to 4 inches wide; convex, often pitted and sticky; yellow with red center when young, becoming orange with maturity

TUBES yellow at first, later becoming dark olive-brown

STEM 4 to 8 inches long; slender, often twisted; prominent reticulations yellow; reddish-tinted flesh evident between yellow ridges

(SYN.: *Boletus betula)*

Fruits mainly from July through September.

Typical boletellus betula

Painted Bolete

Boletinus pictus

CAP 2 to 6 inches wide; flat, convex, and slightly sticky; dark red; scaly at first; scales later gently raised at

Painted bolete

edges; yellow upper skin presents mosaic appearance with red scales; flesh creamy yellow, turning reddish when cut

TUBES light brown; cap flesh and tubes do not separate easily

STEM 2 to 3 inches long; same color as cap; may be slightly bulbous at base

Fruits mostly from July through September.

Typical boletus

Two-Colored Bolete

Boletus rubelus

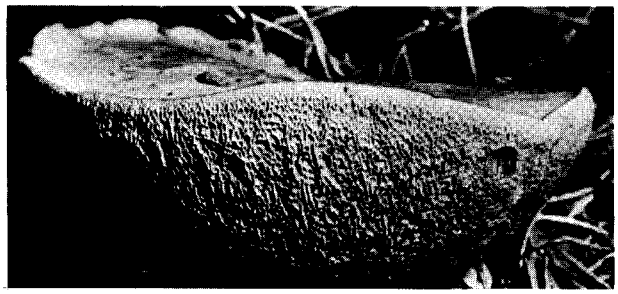
CAP 2 to 6 inches wide; convex; dark rosy red, becoming yellowish and mottled with age; thick flesh whitish at first, later yellow, turning golden with exposure

Two-colored bolete

TUBES depressed around stem; yellow, finally olive or brownish, turning blue very slowly when injured

STEM 3 to 4 inches long; yellow band at top, red below

Fruits in moist sites, August and September.



Gyroporus cyanescens

Gyroporus cyanescens

CAP 3 to 5 inches wide; flat, pitted, and frequently with brownish splotches; flesh pallid but rapidly turning indigo when injured

TUBES brownish-yellow, rapidly turning indigo when injured

STEM 2 to 4 inches long; stout, smooth, and hollow, but loosely filled with fibrous material

(SYN.: *Boletus cyanescens)*

Occurs mainly in young timber stands, July and August.

Pulverboletus retipes

CAP 3 to 7 inches wide; convex; dry; dull yellow to golden; often covered with yellow powder, stains hands if handled; firm flesh light yellow, turning golden when cut

TUBES yellow, turning golden when injured; varying length gives pitted appearance

STEM 3 to 6 inches long; slender and often gently curving; same color as tubes and also powdery; surface strongly reticulated

(SYN.: *Boletus retipes)*

Usually fruits from July through September.

Pulverboletus retipes

Cone-Like Bolete

Strobilomyces floccopus

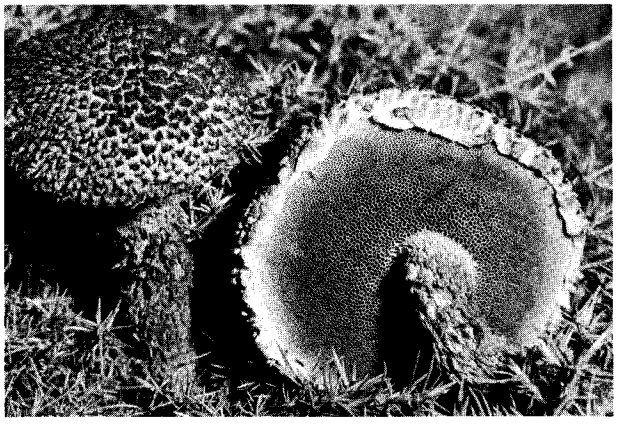
CAP 3 to 7 inches wide; convex, dry and covered with large brownish-black warts and scales; intervening flesh grayish white; remnants of veil frequently found on cap margin; flesh white but rapidly turning nearly black when cut

TUBES grayish white when young, becoming nearly black with age

STEM 4 to 6 inches long; cylindrical; covered with scales same as cap

(SYN.: *Strobilomyces strobilaceus)*

Usually found in pairs, August to October.



Cone-like bolete

Granulated Bolete

Suillus granulatus

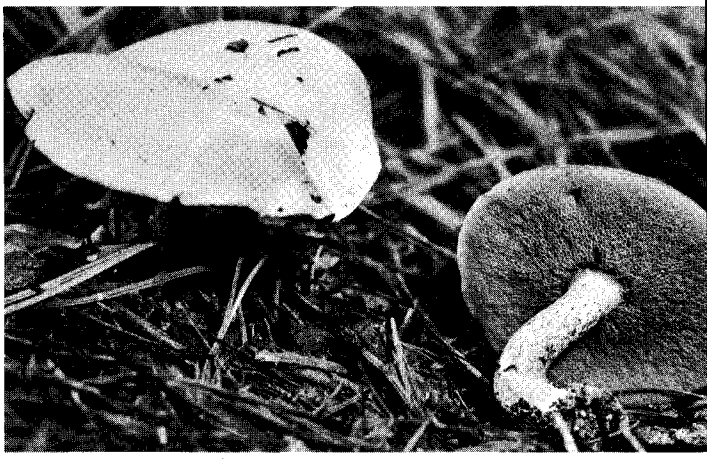
CAP 2 to 3 inches wide; flat, convex; slimy and sticky when moist; pinkish-gray to reddish-brown to yellowish or reddish; may have minute scales under slimy surface when wet

TUBES whitish or pale yellow at first, becoming dingy ochre-colored with glandular dots

STEM 1 to 2 inches long; often crooked at lower end; slightly sticky spots darker in color than rest of stalk

(SYN.: *Boletus granulatus)*

Commonly found in pine types, May through November; particularly important to deer on the Ocala National Forest and other sand pine areas in Florida; responsive to fire.



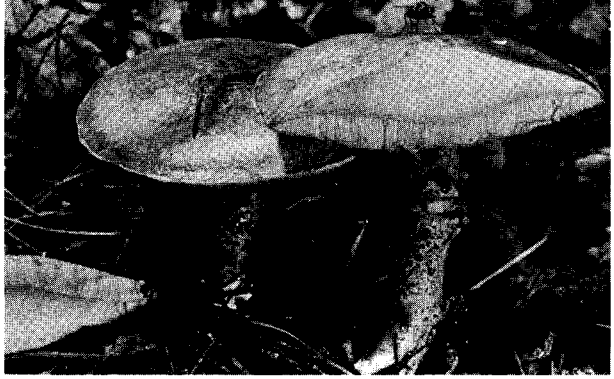
Granulated bolete

Slippery Jack

Suillus luteus

CAP 3 to 5 inches wide; convex; shiny and brownish to reddish-yellow, may be mottled and streaked with darker hues; flesh pale yellow or cream-colored, does not change color when injured

TUBE mouths dotted with sticky particles; spores yellowish-brown or olive-colored



Slippery Jack

STEM 2 to 4 inches long with conspicuous persistent ring; spotted with slimy mucus and droplets of clear liquid

(SYN.: *Boletus luteus)*

Found mainly in pine woods, August through October.

Other Fleshy Fungi

The other fleshy fungi that are commonly eaten by wildlife belong mainly to four families: Lycoperdaceae, Clavariaceae, Hymenogastraceae, and Helvellaceae.

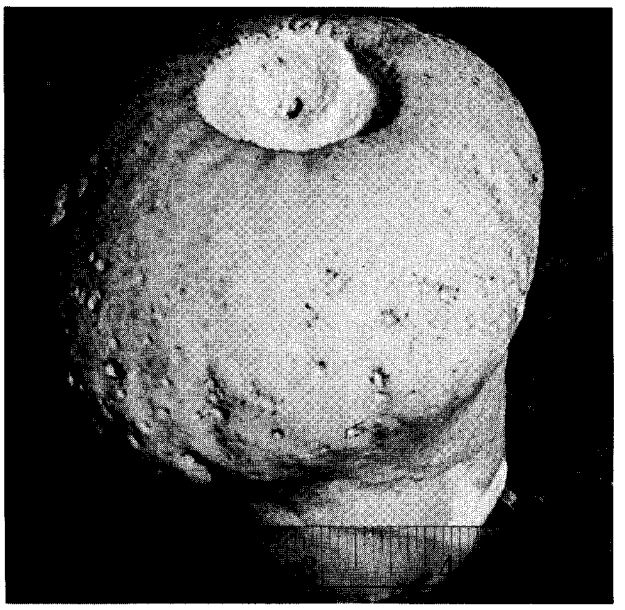
Calvatia

This genus belongs to the family Lycoperdaceae, a group of fungi known as puffballs, smokeballs, and devil's snuffboxes. These fungi have spores enclosed until maturity in chambers surrounded by a continuous skin. They spend most of their lifetime underground, getting food from decaying vegetable matter. When about ready to scatter their spores, they emerge from the ground.

The balls have a fleshy interior; cheesy and white at first, they turn yellowish or pinkish, gradually darkening until part or all of the interior becomes filled with dust-like spores.

In *Calvatia,* the wall of the upper part of the fruit body breaks up and disappears at maturity, thus exposing the spore mass. The stalk-like base, with a structure suggesting a honeycomb, may remain in place long after the spores have been blown away.

The giant puffball has a thick tapering base composed of spongy mycelium, distinct from the spore-bearing part above. It occurs in all provinces from August to November.



Immature giant puffball

Mature giant puffball

Giant Puffball

Calvatia gigantea

FRUITING BODY 6 inches in diameter or larger; smooth exterior; white at first, becoming tan to brown at maturity

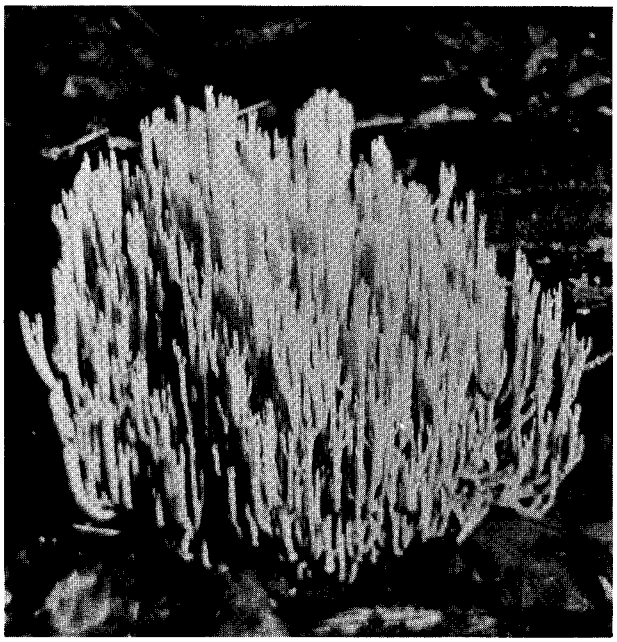
Clavaria

This genus belongs to the family Clavariaceae, the club fungi. It includes a large number of species, many of which are identifiable only by microscopic details. Those eaten by wildlife are fleshy, erect, and repeatedly branched. They are commonly referred to as "coral fungi," because of their resemblance to structures built by this marine animal.

Deer, in particular, graze on the succulent fleshy tops of the coral fungi. Groups of the fungi ranging from 4 to 8 inches in diameter occur in pine and hardwood types. Often these groups number in the hundreds. Clavarias occur from the mountains to the Coastal Plains and fruit during July and August. They do not appear to do well in the fall months.

Clavaria sp.

FRUITING BODY 4 to 8 inches in diameter, usually branched, erect



Typical clavaria

Rhizopogon

Rhizopogon belongs to the family Hymenogastraceae. The fruiting bodies, commonly known as false truffles, form just beneath the surface of the ground. While in the underground stage they are eaten by squirrels and other rodents. They appear to have no attraction once they emerge from the ground.

False truffles generally occur in grassy areas or under pine straw at the edges of pine stands in fall and winter. Careful searching where rodents have been digging may reveal an underground portion that is often from 6 to 12 inches below the surface.

False Truffle

Rhizopogon sp.

FRUITING BODY 1½ to 3 inches in diameter; flat spherical; brownish-black with tough, hard cover over purplish interior

Rhizopogon

Morchella

This genus belongs to the family Helvellaceae, a group that has a fruiting body consisting of a stalk and an enlarged cap that is pitted. Some species fruit in recent burns, others in cultivated soil.

In *Morchella,* the morels, the surface of the bell-shaped cap has prominent irregular ridges that resemble the surface of a sponge. The stem is fluted and hollow, often containing holes where insects have emerged; it is lighter in color than the head. The head, or cap, likewise is hollow; darker in color, it is composed of folded, narrow, long, sac-like cells in which the spores are contained. The spores are "squirted" out at maturity.

There are several species of morels in the South. The common morel has the widest distribution and is probably best known. It fruits in March and early April.

Morels grow in deep soils along streams under hardwoods—usually oaks—and in old apple orchards from the Coastal Plain to the mountains. They are readily taken by most mammals.

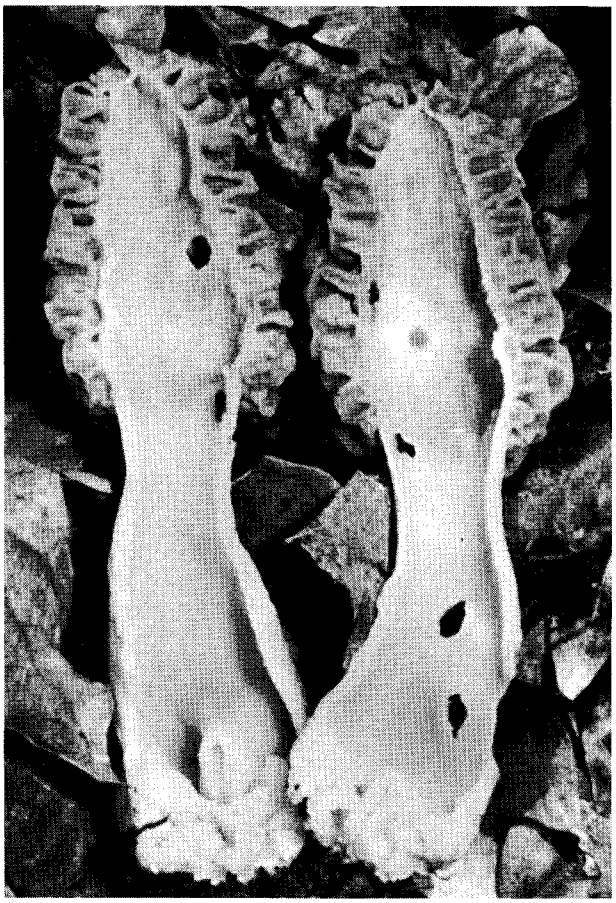
Common morel

Common Morel

Morchella esculenta

CAP elongated or nearly globose; has deep pits and ridges about 1½ to 3 inches long and about 1 to 2 inches in diameter; gray-brown to yellowish-brown

STALK 1½ to 2 inches long; whitish or yellowish



Common morel sectioned

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