



University of Tennessee, Knoxville

## TRACE: Tennessee Research and Creative Exchange

---

L. R. Hesler's Mushroom Notebooks

University of Tennessee Herbarium

---

November 2013

### Armillaria Notebook 1

L. R. Hesler

Follow this and additional works at: [https://trace.tennessee.edu/utk\\_hesler](https://trace.tennessee.edu/utk_hesler)

---

#### Recommended Citation

Hesler, L. R., "Armillaria Notebook 1" (2013). *L. R. Hesler's Mushroom Notebooks*.  
[https://trace.tennessee.edu/utk\\_hesler/11](https://trace.tennessee.edu/utk_hesler/11)

This *Armillaria* is brought to you for free and open access by the University of Tennessee Herbarium at TRACE: Tennessee Research and Creative Exchange. It has been accepted for inclusion in L. R. Hesler's Mushroom Notebooks by an authorized administrator of TRACE: Tennessee Research and Creative Exchange. For more information, please contact [trace@utk.edu](mailto:trace@utk.edu).

Armillaria

- 3 albitophylla (B. + C.) Murr.
- 6 appendiculata PK.
- 7 australis Murr.
- 5 boryana (Berk. + Mont.) Murr.
- 8 caligata Fr.
- 9 caligata floridana Murr.
- imperialis (Fr.) Singer (Catathelasma)
- 1 mellea (Fr.) Kummer
- 12 ponderosa (PK.) Bacc.
- 4 raphanica Murr.
- 13 robusta (Fr.) Kummer
- 2 squamosidisca Murr.
- ventricosa PK. (Catathelasma)
- 11 viscidipes PK.
- 10 zelleri Stuntz + Smith



## ARMILLARIA

Hotson, H. H. The genus *Armillaria* in Western Washington.

*Mycologia* 32:776-790. 1940

Dennis, R. W. G., et al. The nomenclature of *Armillaria*,

*Hypholoma*, and *Entoloma*. *British Mycol. Soc.*

*Trans.* 37(1):33-37. 1954

Kauffman, C. H. The genus *Armillaria* in the United

States and its relationships. *Michigan Acad. Sci.,*

*Arts, and Letters* 2:53-67. 1922

Mitchel, D. H. and Alexander H. Smith. Notes on Colorado  
Fungi, II. Species of *Armillaria* (Fr.) Kummer  
(Agaricales). *Mycotaxon* 4: 513-533. 1976.

## ARMILLARIA AND CATATHELASMA

### Key to Genera

1. Lamellae decurrent, trama divergent (when fresh);  
spores amyloid..... CATATHELASMA
1. Lamellae adnate to adnexed or sinuate, trama not  
divergent; spores non-amyloid or pseudo-amyloid..  
..... ARMILLARIA

### CATATHELASMA

#### Key to Species of the Southeastern United States

1. Pileus dingy grayish or whitish; spores 7-9 (12)  $\mu$   
long..... 1. ventricosa Pk.
1. Pileus tawny-olive to snuff brown; spores 11-14  $\mu$   
long..... 2. imperialis (Fr.) Singer



# ARMILLARIA

## Key to Species of the Southeastern United States

1. Spores amyloid..... see CATATHELASMA
1. Spores non-amyloid or pseudo-amyloid..... 2
2. Spores pseudo-amyloid (brownish in Melzer's solution)..... 3 } ?
2. Spores non-amyloid (~~yellowish or colorless in Melzer's reagent~~)..... 4 }
3. Carpophores caespitose, usually around deciduous trees or stumps; annulus persistent; spores 7-9.5 x 5-6.5  $\mu$ ..... 1. mellea (Fr.) Kummer
3. Carpophores scattered on hardwood logs; annulus fugaceous; spores 4-5 x 3-3.5  $\mu$ ..... 2. squamosidisca Murr.
4. Spores globose, 16-20  $\mu$  in diameter..... 3. alphitophylla (B. & C.) Murr.
4. Spores subglobose to ellipsoid..... 5
5. Carpophores growing on logs or at base of trees or stumps. 6
5. Carpophores growing on soil..... 8
6. Pileus honey-yellow to brownish; carpophores caespitose; spores 7-9.5  $\mu$  long..... 1. mellea (Fr.) Kummer
6. Pileus of other colors, scattered or gregarious, not caespitose; spores 3.5-5.5  $\mu$  long..... 7
7. Odor (on drying) and taste of radish; pileus glabrous, rosy-isabelline, disk darker..... 4. raphanica Murr.
7. Odor and taste mild or of garlic (rarely of radish); pileus appressed-fibrillose, vinaceous-cinnamon to light ochraceous salmon, more rarely whitish..... 5. Boryana (Berk. & Mont.) Murr.
8. Pileus glabrous, at least in age..... 9
8. Pileus not glabrous (fibrillose, squamulose, scaly)..... 10
9. Spores 8 x 5  $\mu$ ; veil appendiculate..... 6. appendiculata Pk.
9. Spores 4-5 x 2.5-3  $\mu$ ; veil forming a small annulus..... 7. australis Murr.
10. Pileus pallid, central portion usually covered with flat, "deep brownish drab" squamules..... 11
10. Pileus not squamulose..... 12
11. Spores 6.5-9 x 4.5-6.5  $\mu$ ..... 8. caligata Fr.
11. Spores 5-6.5 x 2.5-4.5  $\mu$ ..... 9. caligata var. floridana Murr.
12. Spores 3-3.5  $\mu$  broad; pileus glutinous or viscid, odor farinaceous..... 10. Zelleri Stuntz & Smith
12. Spores broader (4-5.5  $\mu$ )..... 13

*Zelleri + ponderosa becomes squamulose from loosening of cuticle fibrils*



becoming pale brown in age <sup>and</sup> dry<sup>2</sup>,

13. Stipe viscid; odor usually alkaline; spores 6-8 x  
4.4-5.5  $\mu$ ..... 11. viscidipes Pk.  
13. Stipe dry, though the veil subviscid in A. ponderosa..... 14  
14. Pileus white or tinged yellowish, fibrils soon forming  
spot-like scales; odor spicy-aromatic or fruity; spores  
6-7.5 x 4.5-5.5  $\mu$ ..... 12. ponderosa (Pk.) Sacc.  
14. Pileus brownish to reddish-brown; odor mild or rancid-  
farinaceous; spores 5-6 x 4-5  $\mu$ .... 13. robusta (Fr.) Kummer



ARMILLARIA AND CATATHELASMA

Key to Genera

1. Lamellae decurrent, trama divergent (when fresh);  
spores up to 12  $\mu$  long, amyloid..... CATATHELASMA
1. Lamellae adnate to adnexed or sinuate, trama not  
divergent; spores shorter, non-amyloid or pseudo-  
amyloid..... ARMILLARIA

CATATHELASMA

Key to Species of the Southeastern United States

- Pileus dingy grayish or whitish; spores 7-9 (12)  $\mu$  long  
..... 1. ventricosa Pk.
- Pileus tawny-olive to snuff brown; spores 11-14  $\mu$  long.  
..... 2. imperialis (Fr.) Singer

## ARMILLARIA

Key to Species of the Southeastern United States

1. Spores amyloid (see genus: CATATHELASMA)
11. Spores non-amyloid or pseudo-amyloid
  2. Spores pseudo-amyloid (brownish in Melzer's solution)
    3. Carpophores caespitose, about stumps of deciduous trees; annulus persistent; spores 7-9.5 x 5-6.5  $\mu$ ..... 1. mellea (Fr.) Kummer
    3. Carpophores scattered on hardwood logs; annulus, if formed, fugaceous; spores 4-5 x 3-3.5  $\mu$ . 2. squamosidisca Murr.
  2. Spores non-amyloid
    3. Spores globose, 16-20  $\mu$  diameter..... 3. alphitophylla (B. & C.) Murr.
    3. Spores subglobose or ellipsoid
      4. Carpophores growing on wood
        5. Carpophores honey-yellow to brownish, caespitose; spores 7-9.5  $\mu$  long..... 1. mellea (Fr.) Kummer
        5. Carpophores of other colors, scattered to gregarious, not caespitose; spores 3.5-5.5  $\mu$  long
          6. Odor (on drying) and taste of radish; pileus glabrous, rosy-isabelline, disk darker. 4. raphanica Murr.
          6. Odor and taste of garlic; pileus appressed-fibrillose, vinaceous-cinnamon to light ochraceous salmon..... 5. Boryana (Mont.) Murr. <sup>Bork. +</sup>
      4. Carpophores growing on soil
        5. Pileus glabrous, at least in age
          6. Spores 8 x 5  $\mu$ ; veil appendiculate.... 6. appendiculata Pk.
          6. Spores 4.5 x 3  $\mu$ ; veil forming a small, more or less median annulus..... 7. australis Murr.
        5. Pileus not glabrous (fibrillose, squamulose, scaly)



6. Pileus pallid, with numerous soft, flat, "deep brownish drab" squamules
7. Spores 6.5-9 x 4.5-6.5  $\mu$ ..... 8. caligata Fr.
7. Spores 5-6.5 x 2.5-4.5  $\mu$ ..... 9. caligata floridana Murr.
6. Pileus not squamulose
7. Spores 3-3.5  $\mu$  broad; pileus glutinous or viscid, odor farinaceous..... 10. Zelleri Stuntz & Smith
7. Spores broader (4-5.5  $\mu$ )
8. Stipe viscid; odor usually alkaline; spores 6-8 x 4.4-5.5  $\mu$ ..... 11. viscidipes Pk.
8. Stipe dry (veil subviscid in A. ponderosa)
9. Pileus white or tinged yellowish, fibrils soon form spot-like, brownish scales; odor spicy-aromatic or fruity; spores 6-7.5 x 4.5-5  $\mu$ ..... 12. ponderosa (Pk.) Sacc.
9. Pileus brownish to reddish brown; odor mild or rancid-farinaceous; spores 5-6 x 4-5  $\mu$ .. 13. robusta (Fr.) Kummer

THE GENUS ARMILLARIA IN THE UNITED STATES  
AND ITS RELATIONSHIPS

C. H. Kauffman

Papers of the Michigan Academy of Science, Arts and Letters  
1922 (II), pp. 53-67.

Synopsis of the Species of Armillaria of North Temperate Regions

1. Gills decurrent.....( 2)
1. Gills adnate to emarginate or uncinata.....(11)
2. Growing on rotten wood, from old roots,  
stumps, trunks, etc.....( 3)
2. Growing on the ground.....( 6)
3. Stems eccentric or lateral; pileus white or  
whitish.....( 4)
3. Stems usually central.....( 5)
4. Spores 9-10 x 4-4.5 microns.....A. dryina
4. Spores 13-17 x 4-5 microns.....A. corticata
5. Very common; honey-yellow, especially at  
base of stem, becoming darker in age;  
pileus dry; stems caespitose, attached  
to rhizomorphs.....(A. putrida (Scop.) Murr.)..A. mellea Fr.
5. Pileus 5-8 cm. broad, white, with brownish-  
scaly disk, dry; annulus thin, white, mem-  
branous; stem solid, brown-scaly-dotted  
below the ring. (Spores unknown.)...A. rhagadiosa Fr.-Ricken  
(Peck considered A. nardosmia a segregate  
of this. See Farlow Index, p. 257.)
5. Pileus 3-5 cm. broad, brown-gray, viscid;  
especially on mulberry trees. (Spores  
unknown.).....A. mori Paul-Ricken
6. Stem hollow.....( 7)
6. Stem solid.....( 8)
7. Pileus viscid, 5-6 cm., white, brown  
center, striate to middle; under conifers;  
annulus dependent. (Spores unknown.)  
.....A. subconca Schum.-Ricken
7. Pileus dry, 8-13 cm. broad, white at  
first to creamy (rich ochre with reddish  
tint when dried); veil large, white,  
forming a thick, flaring annulus,  
sheathing the stem below; gills very  
broad in front, attenuate at stem, sub-  
distant. (Spores 14-17.5 x 3-5 microns.)  
(Catathelasma evanescens Lovejoy) A. evanescens (Lovejoy) Murr.



8. Annulus narrow, membranous, rather thin; stem dry, solid, with slight fibrillose shreds; pileus 7-10 cm., sordid-alutaceous, pallescens, glabrous; gills very attenuate at both ends, long-decurrent, crowded. (Spores unknown.).....A. Laschii Fr.
8. Annulus thick, terminating the well-developed sheathing veil, at least in vigorous plants.....( 9)
9. Pileus fuscous-brown, 8-15 cm. broad, with darker appressed scales toward margin; gills narrow, crowded; annulus ample, persistent; stem scaly below annulus. Under conifers. (Spores 12-14 x 5-6 microns Murr. Sacc.) (Spores 11-13 x 5-6 Peck).....(A. nobilis Murr.) A. imperialis Fr.
9. Pileus and stem white or whitish.....(10)
10. Spores 10-12 x 5-6 microns; pileus and stem not viscid, white or nearly so.....(Lentinus ventricosa Pk.) A. ventricosa Pk.
10. Spores 14-16 (17) x 5-6 (7) microns; pileus and stem subviscid from the outer thin pellicle of the universal veil, "pinkish-buff" to "cinnamon-buff" (Ridg.).....A. macrospora Pk.
11. Growing caespitose or subcaespitose on stumps or logs, trunks, branches, or cut timber; mostly on long stems.....(12)
11. Growing on the ground, or among mosses, humus or debris.....(14)
12. Pileus granulose, rugose-wrinkled, ochraceous to fulvus; stem floccose-peronate, with flaring annulus; spores 4-5 x 3 microns.....(Lepiota granosa (Morg.) A. granosa (Morg.) comb. nov.
12. Pileus not granulose.....(13)
13. Pileus white, viscid; on dead beech and birch trunks or branches; spores subglobose, 14-18 microns (Ricken: 15-18 microns) (Stevenson: 14-17 microns) A. mucida Fr.
13. Pileus tawny to chestnut brown; on or around conifer wood; gills free; pileus subviscid; stems fuscous-scaly below annulus; odor heavy, of rancid meal. Spores globose 5-6 u ..... A. megalopus Bres.
14. Pileus not granulose-warty ..... (18)
14. Pileus granulose or granulose-warty; plants Lepiota-like ..... (15)
15. Gills adnate; stems rather long and slender ..... (16)
15. Gills adnexed; stems short ..... (17)

16. Spores 6-7 x 3.5 microns (Lange);  
cystidia none; pileus usually umbonate,  
reddish-ochraceous.....  
.....(Lepiota amianthina) A. amianthina (Fr.) comb. nov.
16. Spores 5-5.5 x 2.5-3 microns (Kauffman);  
cystidia present but scattered; pileus  
rusty-red.....  
.....(Lepiota adnatifolia) A. adnatifolia (Pk.) comb. nov.
17. Pileus varying "ochraceous buff" to "cin-  
namon-rufous" (Ridg.).....  
.....(Lepiota granulosa) A. granulosa (Fr.) comb. nov.
17. Pileus varying "ferruginous" to "English-  
red" (Ridg.).....  
.....(Lepiota granulosa cinnabarina) A. Cinnabarina (Fr.) comb. nov.
18. Pileus white, creamy white to buff,  
sometimes sordid ochraceous or rust-  
colored in age, not with markedly  
uniformly yellow shades or red shades.....(19)
18. Pileus either at first with yellow or  
rufous colors, or soon becoming so.....(24)
19. Pileus 3-5 cm. broad, dry.....(20)
19. Pileus usually much larger.....(21)
20. Odor strongly of fresh meal; stem solid;  
all parts white; spores 7-8 x 4-5 microns,  
elliptical (Ricken); in grassy places  
under willows, etc.....A. constricta Fr.
20. Odor none; stem equal, stuffed-hollow;  
pileus, etc., at first snow-white, then  
yellowish on disk when old; under Larix;  
spores elliptical, 4-5 x 2.5 microns  
(Bres.).....A. Ambrosii Bres.
21. Veil (probably outer layer) subviscid,  
at least on stem; stout plants.....(22)
21. Veil, etc., dry, gills rather broad;  
stout plants.....(23)
22. Spores ellipsoid, 5-6 x 3-3.5 (4)  
microns (Kauffman), odor penetrating,  
subalkaline; gills narrowed behind,  
at first slightly subdecurrent-  
acuminate.....A. viscidipes Pk.
22. Spores globose or subglobose, about  
4 microns (Peck); gills narrow, sub-  
emarginate; veil prominent, sheathing;  
odor and taste mild.....  
.....(A. magnivelaris Pk.) A. ponderosa (Pk.) Sacc.
23. Spores ellipsoid, 7.5 x 5 microns  
(Peck); stem bulbous, tapering upwards;  
described from Alabama.....A. appendiculata Pk.
23. Spores globose or subglobose, 5-6 x  
4.5-5 microns (Kauffman); stem taper-  
ing downwards or subequal; from Oregon  
and Washington.....A. arenicola Murr.
24. Reddish or brown shades predominating.....(25)
24. Yellow predominating.....(28)



25. Like Lepiota amianthina in habit, etc., but color incarnate-vinose; annulus cortiniform; stem fistulose.....A. haematites B. & Br.
25. Not with these characters.....(26)
26. Plants firm, compact; stems stout, short-pointed at base.....(27)
26. Plants of rather soft texture; pileus and stem tile-red or cinnabar-incarnate; odor farinaceous; spores 4-5 x 3 microns (Ricken).....A. focalis Fr.
27. Pileus rufescent, soon rimulose-diffracted; gills relatively broad, becoming rufous-spotted, adnate; odor subfarinaceous; spores 4-5 x 2.5-3 microns (Kauffman).....A. robusta Fr.
27. Pileus brownish, spotted with thin, appressed rufous-brown to blackish-brown scales; gills medium broad, white, sinuate-adnate; odor slight or fruity; spores 6-7.5 x 5 microns (Kauffman) (?A. nardosmia (Ell.) Sacc.) A. caligata Fr.
28. Spores globose, 4-5 microns (Ricken); stem solid; pileus dry, straw-yellow, tinged greenish in age; gills deeply emarginate.....A. luteovirens Fr.
28. Spores ellipsoid, 6-9 x 4-5 microns (Atkinson), 4-5 (6) x 3-3.5 microns (Kauffman); stem stuffed-hollow; pileus viscid, "apricot-yellow" (Ridg.), tinged tawny in age; gills adnate, rounded behind.....A. albolanaripes Atk.

ARMILLARIA ALPHITOPHYLLA (B. & C.) Murrill

N. A. Flora 10:39. 1914

Oudemansiella Canarii (Jungl.) Hoehnel (see Mycol. 37: 436.)  
(from N.A.F. 10:39)

"Pileus toughish, drying easily, convex to plane or depressed, very variable, solitary, 3-15 cm. broad; surface varying from subglabrous to fibrillose or squamose, and from white or whitish to avellaneous or rarely to isabelline, the disk dark-avellaneous, fuliginous, or at times rosy-isabelline; margin thin, entire, even, or at times striate or plicate; context thin, white; lamellae pure-white, ventricose, rounded-adnate with a decurrent tooth, somewhat mucilaginous and sticking together in a peculiar way when young; spores globose, smooth, hyaline, 16-20  $\mu$ ; cystidia abundant, protruding, ventricose, tapering at both ends, 100-200 x 25-40  $\mu$ ; stipe cylindric and equal above, somewhat enlarged below, white to pale-avellaneous, glabrous, furfuraceous, or somewhat roughened with erect scales, solid, fleshy with a tough rind, 4-6 cm. long, 4-8 mm. thick; veil small, soon appendiculate, not forming a distinct annulus."

Habitat and Distribution. - On hardwood logs, Florida, June.

My No. 18451, from Murrill, shows spores globose, 14-18  $\mu$  diam., non-amyloid, smooth.



ARMILLARIA APPENDICULATA Peck

Torrey Bot. Club Bul. 24:140. 1897

(from N.A.F. 10:36)

"Pileus broadly convex, 5-10 cm. broad; surface glabrous, whitish, often tinged with ferruginous or brownish-ferruginous on the disk; context white or whitish; lamellae close, rounded behind, whitish; spores sub-ellipsoid,  $8 \times 5 \mu$ ; stipe equal above or slightly tapering upward, solid, bulbous, whitish, 4-9 cm. long, 1-2 cm. thick; veil membranous or webby, white, commonly adhering in fragments to the margin of the pileus."

Habitat and Distribution. - On soil, Alabama

ARMILLARIA AUSTRALIS Murrill

Florida Acad. Sci. Jour. 8:175. 1945

"Pileus semiglobose to broadly convex, scattered, 1.5-2.5 cm. broad; surface dry, white or ocher with minute floccose fibrils, becoming subglabrous, margin even, entire; context 1 mm. thick, white, unchanging, odorless, mild; lamellae adnate with a small decurrent tooth, inserted, medium distant, 2-3 mm. broad, entire, white; spores subellipsoid, smooth, hyaline, about  $4.5 \times 3 \mu$ ; cystidia none; stipe equal, white or cream, glabrous at the apex, squamulose below, about  $2 \times 0.15-0.2$  cm.; annulus 1 cm. from apex, small white.

Habitat and Distribution. - On soil, lawn, Florida, July.

Notes on Type

My No. 18452, part of type, shows spores ovoid-ellipsoid,  $4-5 \times 2.5-3 \mu$ , smooth, non-amyloid. Murrill says many of the hymenophores turn buff on drying.



ARMILLARIA BORYANA (Berk. & Mont.) Murr.

Torrey Bot. Club Bul. 66:31. 1939

Agaricus (Collybia) Boryanus Berk. & Mont. Ann. Sci. Nat.  
III, 11:235. 1849

Gymnopus alliaceus Murr., Mycologia 35:425. 1943

Gymnopus Boryanus (Mont.) Murr., N. A. Flora 9:370. 1916

Collybia alliacea Murr., Mycologia 35:433. 1943

Pileus 2-6 (8) cm. broad, convex, finally depressed, sub-hygrophanous, not viscid, "vinaceous cinnamon" to "light ochraceous salmon," at times paler or whitish, tough, pliant, appressed-fibrillose, margin incurved, even when dry, short-striate when wet, appendiculate. Flesh white, thick on disk, thin on margin; odor mild or of onions, taste mild, then of garlic or radishes. Lamellae free or narrowly attached, seceding, white, finally pinkish, sub-arcuate, rather narrow, crowded or close, edges fimbriate. Stipe 2-4 cm. x 3-7 (10) mm., usually flattened and enlarged at apex, white then tinged "vinaceous cinnamon," at first fibrillose above, fibrillose-squamulose or scaly and often darker below, at times glabrescent, tough, solid. Veil ample, fibrillose-membranous, white, appendiculate to pileus margin, no annulus.

Spores 3.5-5.5 x 1.7-3  $\mu$ , ellipsoid-subfusoid, at times slightly allantoid, white in mass, non-amyloid. Pleurocystidia none; cheilocystidia fusiform, clavate, 18-28 x 4-5  $\mu$ .

Habitat and Distribution. - On oak and gum logs, Florida, July-August.



21432 - *Armillaria Boryana* (Mont.) Murr.



= Armillaria Boryana (Berk. (Mont.) Murr.  
(see Mycologia 36:122. 1944.)  
Collybia alliaceus Murrill

Murrill's description (Mycologia 35:425-426. 1943):

"Pileus subcircular, convex, gregarious, 6-8 cm. broad; surface opaque, smooth, glabrous, pallid or rosy-isabelline, margin even, often lobed; context thin, whitish, with a strong odor of onions and a distinct taste of radishes; lamellae adnate, seceding, arcuate, narrow, crowded, entire, pallid to rosy-isabelline; spores broadly ellipsoid, smooth, hyaline, uniguttulate, 5-6 x 4  $\mu$ ; cystidia none; stipe eccentric, curved, tough to almost woody, tomentose, enlarged and striate above, white or rosy-isabelline, solid, scaly below, 2-3 x 0.3-1 cm.

"Type collected by W. A. Murrill on the side of a rotten oak log in a low hammock at Magnesia Springs, Fla., August 15, 1938 (F 17940). The odor develops as the hymenophore begins to dry. The eccentric stipe may be due to its position on the log."

= Collybia alliacea Murr. *Mycologia* 35:425-426. 1943.

~~Berk.~~  
Armillaria Boryana (Mont). Murrill

Collybia Boryana Sacc. Syll. Fung. 5:240. 1887.

Murrill's description (N.A.F. 9:370. 1916):

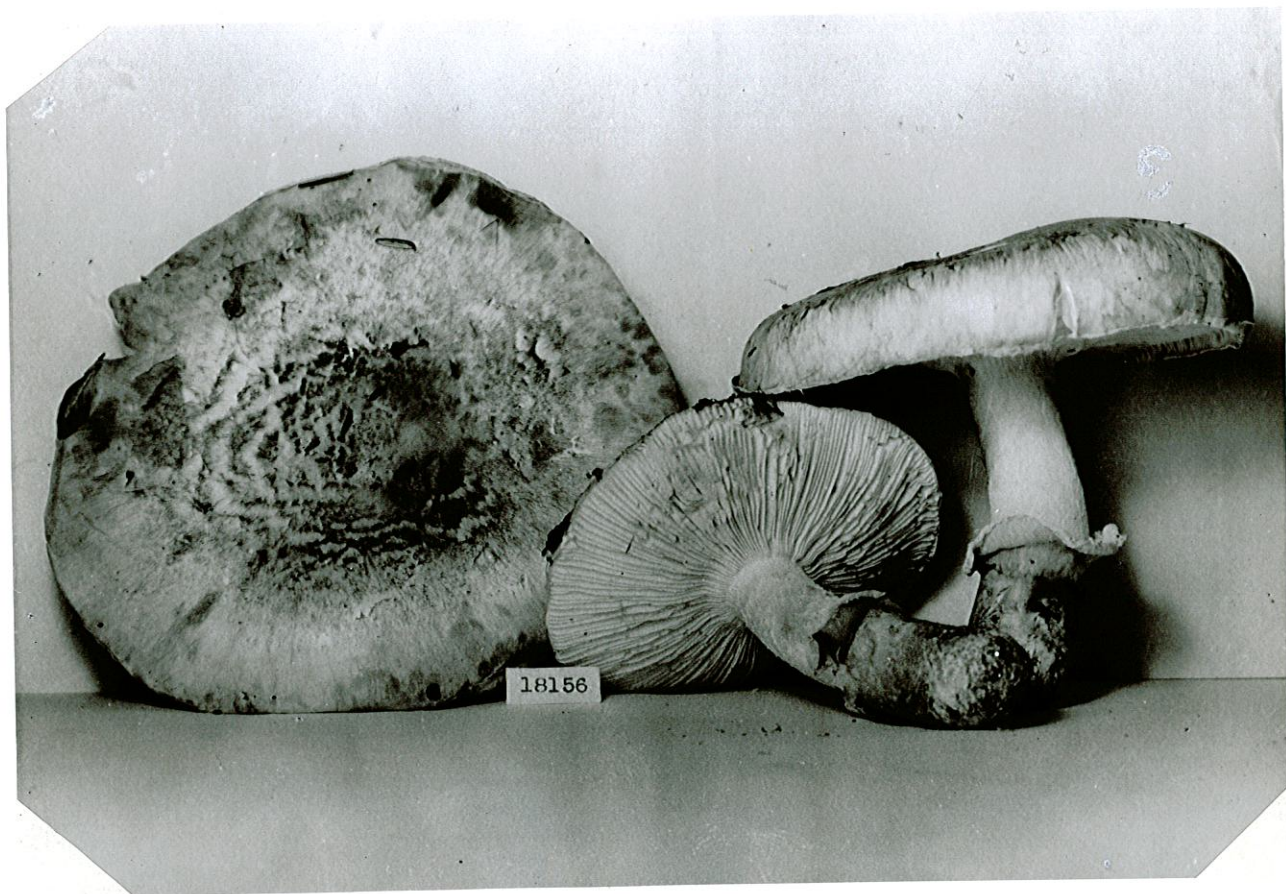
"Pileus rather thin and tough, convex to plane, becoming depressed at the center, gregarious, 5-8 cm. broad; surface pure-white, glabrous, smooth, margin concolorous, undulate, inflexed when young; context thin, white, edible; lamellae very narrow, crowded, white, sinuate to nearly free, separating from the stipe with age; spores ellipsoid, smooth, hyaline, 4-6 x 3-4 u; stipe equal or enlarged at the apex, cartilaginous, solid, isabelline to testaceous, blackish at the base, rough with scales pointing upward, 3 cm. long, 3-4 mm. thick."

Murrill's comments (Bul. Torrey Bot. Club 66:31. 1939):

"This tropical American species is frequent about Gainesville on oak logs and stumps, often appearing in quantity, but the presence of a veil was not noticed until Mr. Erdman West brought in a collection he made at Magnesia Springs, Fla., July 3, 1938 (F 17344). In young hymenophores about 1.5 cm. broad, the tough, white, membranous veil had just ruptured from the stipe, exposing the young gills in a polygonal area. Older hymenophores showed broad fragments of the veil attached to the margin, while in still older stages hardly a trace of the veil was left. At no time was an annulus present, the stipe being simply squamose where a ring might have been."



14350 - *Armillaria caligata* Fr. ~~Vincenti~~ <sup>Vincenti</sup>



18156 - *Armillaria caligata* Fr.

ARMILLARIA CALIGATA Viviani

Funghi Ital., p. 40. 1834

Armillaria nardosmia (Ellis) Sacc., Syll. Fung. 5:86. 1887

Tricholoma caligatum (Viv.) Ricken

Illustration:

Plate

Coker, Elisha Mitchell Sci. Soc. Jour. 64, pl. 52, 1948

Pileus 6-14 cm., convex, expanding, margin finally upturned, central portion with "deep brownish drab", appressed scales, dry, even. Flesh thick, white or tinged grayish, firm; odor mild (or fruiting or raphanous in same), taste unpleasant, bitterish. Lamellae adnate-sinuate, with a decurrent tooth, medium broad, white to grayish-white, brownish in age, <sup>at times with tinges of green on edges</sup> crowded, edges even. Veil ample, fibrillose-membranous, leaving a flaring annulus which is median to superior, finally collapsing. Stipe 4-7 (10) cm. x 12-30 mm., equal or slightly enlarged below, brownish below, white above, stuffed, dry.

Spores ellipsoidal, variable in size, mostly about 7 x 4.5 u (6.4-9 x 4-6.4 u), smooth, white in mass, non-amyloid. Basidia 32-36 (48) x 7.5-8.5 u. Gill trama undulate-parallel, hyphae 12-27 u broad.

Habitat and Distribution. - On soil, in deciduous woods, Tennessee, North Carolina, Virginia, Kentucky, and Florida, September-October (December in Florida).



Armillaria caligata floridana Murrill

Murrill's description (Jour. Fla. Acad. Sci. 8:176. 1945):

"Pileus convex to depressed, 7-8 cm. broad; surface with bay or chestnut scales; context white, unchanging, odorless, mild; lamellae adnexed or adnate, rounded behind, 5 mm. broad, close, entire, white, unchanged and rigid when dry; spores ovoid or ellipsoid, smooth, hyaline, about  $5 \times 3 \mu$ ; stipe subequal to obese, 5-7 x 1-3 cm., sheathed at first by the veil; annulus more or less ample, median, flaring, bay, often collapsing.

"Type collected by W. A. Murrill under laurel oaks in Gainesville, Fla., Jan. 21, 1944 (F 15948). Compared with specimens collected under oak in Michigan by A. H. Smith, who finds the spores as Kauffman described them,  $6-7.5 \times 5 \mu$ . Breszadola gives  $5-6 \times 5 \mu$  for the spores of his forma gracilis, collected under conifers. Kauffman perhaps confused A. caligata and A. nardosmia Ell., which latter species is frequent in Florida and is readily distinguished by its spores and fragile gills, which are dirty-brownish in herbarium specimens while those of A. caligata are rigid and white."

My No. 18454, from Murrill, has spores ellipsoid,  $5-5.5(6.5) \times 2.5-3.2(4.5)\mu$ , smooth, non-amyloid.

Limacella

Armillaria floridana Murrill

Ree H.V. Smith  
re: Limacella

Murrill's description (Mycologia 35:422. 1943):

"Pileus convex to plane and finally depressed, not umbonate, 4.5 cm. broad; surface somewhat viscid, uneven, glabrous, uniformly umbrinouse-isabelline or slightly darker on the disk, margin even, undulate; context white, unchanging, odor faint and pleasant; lamellae deeply emarginate, just touching the stipe, broad, ventricose, rather close, inserted, entire, fragile, white, isabelline when dry; spores subglobose, smooth, hyaline, uniguttulate, about 4  $\mu$ ; stipe subfusiform, not bulbous, white, smooth, dry and glabrous above the annulus, viscid and floccose-squamulose below, about 3 x 0.7-0.9 cm.; annulus median, small, white, persistent.

"Type collected by W. A. Murrill in humus under an oak at Gainesville, Fla., July 7, 1938 (F 17467). Only two hymenophores were found, growing a few inches apart. They suggested nothing with which I am acquainted, either in Armillaria or Lepiota. No cystidia of any kind were seen and the spores are not amyloid. Dr. Singer would probably refer the species to Limacella."

*Limacella glioderma* (Fr.) Earle  
~~*Armillaria graveolens* Murrill~~

Murrill's description (Mycologia 35:422-423. 1943):

"Pileus convex to plane, scattered, 4-6 cm. broad; surface distinctly viscid, glabrous, uneven, isabelline, somewhat darker on the disk; margin projecting, decidedly appendiculate; context soft, white, unchanging, taste very farinaceous, odor strong, earthy-farinaceous; lamellae adnexed, narrow, crowded, inserted, soft, entire, milk-white, unchanging; spores globose, smooth, hyaline, granular, about 6.5  $\mu$ ; stipe fleshy, solid, equal or slightly tapering upward, not at all viscid, not separating, smooth, white and glabrous above, scurfy near the base with rosy-isabelline remains of the veil, 4-6 x 0.5-1 cm.; veil mostly breaking up, leaving a double ring-trace near the base of the stipe.

"Type collected by W. A. Murrill in moist, sandy soil under a camphor tree in Gainesville, Fla., July 27, 1941 (F 21435). The objectionable odor was distinct in the open air and became almost unbearable in a closed room, suggesting a shock of rotting wheat. No cystidia were observed and the spores are not amyloid. According to Dr. Singer's classification the species would probably go into Limacella."



ARMILLARIA MELLEA (Fr.) Kummer

Der Führer in die Pilzkunde, p. 134. 1871

Armillaria putrida Murr., N. A. Flora 10:39. 1914

Pileus 3-10 cm. broad, dry, hemispheric then convex, expanding plane or convex, often wavy, at times with yellow floccose scales, or with tufts of blackish hairs all over, "verona brown" to "mikado brown," "sayal brown," to "cinnamon buff," at maturity, rarely whitish, margin concolor or "honey yellow," at first incurved, striate. Flesh medium thick on disk, thin on margin, white; odor and taste strong, fungoid, at times bitterish-astringent. Lamellae adnate, soon adnate-decurrent or decurrent by a line, white, finally pinkish buff or pale cream colored to dingy or watery white, usually stained brownish in age, close, medium broad or broad, many short, edges eroded-crenulate. Stipe 6-11 cm. x 5-17 mm., fibrillose to floccose, scales often yellow, white or pallid above, dark-dingy to honey-yellow or olive-brown downward, base usually "honey yellow," dry, spongy, equal or enlarged downward, stuffed, becoming hollow. Annulus superior, white, cottony to membranous, rather persistent.

Spores 6-9.5 x 4-5 (6)  $\mu$ , ellipsoidal, smooth, in mass white (in No. 21085 "reed yellow" at times pale cream tinted), non-amyloid or some pseudo-amyloid (tinged amber in Melzer's). Pleurocystidia none; cheilocystidia clustered, clavate, 27-42 x 7-10  $\mu$ .

Habitat and Distribution. - Caespitose, at base of trunks and stumps of deciduous trees, mostly oak, Tennessee, North Carolina, Louisiana, and Florida, June-December.

*over*

Faiger, R.

The *Amillariella mellea* group.

*Stydia* 19: 176-178, 1956.

Pileus 3-5.5 cm. broad, disc brown, margin whitish, elsewhere "colonial buff," radiately streaked and appearing appressed-fibrillose, margin striate. Context white, thin; odor fungoid, taste acidulous.

Lamellae adnate-decurrent, white then tinted flesh, close, medium broad.

Stipe 6-8 cm. x 5-7 mm., smoky-greenish with a coating of yellowish-white fibrils, connate at base (14 in cluster), equal, stuffed to hollow. Annulus superior, yellowish.

Observations. - The yellow pileus and thin flesh distinguish this form.



16615 - *Armillaria mellea* (Fr.) Kummer

18288 - *Armillaria mellea* (Fr.) Kummer.



14370 - *Armillaria mellea* (Fr.) Kummer





24952 - *Armillaria mellea* (Fr.) Kummer



29966 - *Armillaria mellea*

ARMILLARIA PONDEROSA (Pk.) Sacc.

Syll. Fung. 5:58. 1887

Armillaria magnivelaris (Pk.) Murr., N. A. Flora 10:37. 1914

Armillaria arenicola Murr., Mycologia 4:212. 1912

Pileus 7-14 (25) cm. broad, convex, expanding, dry, "light buff," becoming tawny in age or when dry, cuticle elements loosening to form flat, "buckthorn brown" fibrillose scales, margin involute, even. Flesh white, thick, compact, firm; odor somewhat spicy-aromatic, fruity, taste mild. Lamellae narrowly adnate then sinuate to emarginate-decurrent, close to crowded, relatively narrow, white at first, becoming buff, at times staining vinaceous-brown when bruised, several short, few forking, edges even, wavy. Stipe 6-12 cm. x 15-40 mm., equal or ventricose or clavate, or tapering downward, brownish-stained below with brown, scale-like patches, whitish to purplish-brown above, solid. Veil white, forming a viscid, membranous, superior, persistent, brownish annulus.

Spores (5) 6-7.5 x 4-5  $\mu$ , subglobose to ellipsoidal, non-amyloid to yellowish (in Melzer's reagent), white in mass. Pleurocystidia and cheilocystidia none.

Habitat and Distribution. - On wet soil, under hemlock, Tennessee and North Carolina, November.





18325 - *Armillaria ponderosa* (Pk.) Sacc.

Armillaria raphanica Murrill

Murrill's description (Mycologia 35:423. 1943):

"Pileus convex to expanded, slightly depressed at times, gregarious to subcespitose, 5-7 cm. broad; surface smooth, glabrous, rosy-isabelline, a little darker at the center, margin incurved, even, entire, appendiculate; context very thin, white, unchanging, not fragile, odorless when fresh, with the taste of radishes; lamellae adnate, seceding, very narrow and very close, entire, some inserted and a few forked, white or pallid; spores oblong-ellipsoid, obliquely apiculate, smooth, hyaline, about  $5 \times 2 \mu$ ; stipe tapering downward, solid, cartilaginous to subligneous, fibrillose-squamulose, white throughout or brownish below, 3-5 x 0.4-0.6 cm.; veil evanescent, leaving no annulus.

"Type collected by E. West and W. A. Murrill on a hardwood log in Sanchez Hammock, near Gainesville, Fla., July 23, 1938 (F 17949). Suggesting A. Boryana (Berk. & Mont.) Murrill but differing in closer, narrower gills, etc. In the drying oven the odor of radishes becomes very pronounced. According to the latest classification species of the old genus Armillaria are scattered among several genera. This one, with its non-amyloid, cylindric, smooth spores and no cystidia would be placed by some in the genus Lentinus."

My No. 16075, from Murrill, part of type, shows spores  $4.5 - 5 \times 1.8 - 3.2 \mu$ , elongate-ellipsoid, smooth, non-amyloid.

ARMILLARIA ROBUSTA (Fr.) Kummer

Der Führer in die Pilzk., p. 135. 1871

Pileus 5-11 cm. broad, convex, "clay color" to "sage brown," appressed-fibrillose (under lens), shining (dry), not viscid, <sup>margin</sup>appendiculate, even. Flesh firm, white, thick on disk, thin on margin; odor and taste mildly or rancid farinaceous. Lamellae emarginate-uncinate, white, becoming slightly smoky-gray, rather broad, ventricose, close, edges eroded. Stipe 4-7 cm. x 15-30 mm., firm or hard, dry, with brownish appressed squamules below annulus, white squamulose above annulus, base attenuated, solid. Annulus evanescent, leaving remnants on stipe.

Spores broadly ellipsoid to subglobose, 5-6.5 x 3.5-4.5  $\mu$ , white in mass, smooth, non-amyloid. Cystidia none.

Habitat and Distribution. - On soil, in pine woods, Tennessee and Kentucky, November.



ARMILLARIA SQUAMOSIDISCA Murrill

Mycologia 36:122. 1944

(from Torrey Bot. Club Bul. 67:151. 1940)

"Pileus convex, cespitose, 3-5 cm. broad; surface white, the disk decorated with ferruginous scales; margin even, entire to undulate; context subfleshy, thin, white, odorless, sweet and nutty; lamellae adnate, narrow, crowded, inserted, entire, white, unchanging; spores copious, ellipsoid, smooth, hyaline, 4-5 x 3-3.5  $\mu$ ; stipe equal, squamulose, white, unchanging, about 3-4 x 0.3 cm.

"Type collected by West, Arnold and Murrill on a much-decayed hardwood log in dry oak-pine woods at Grove Park, Fla., July 15, 1938 (F 18262). Suggesting Collybia maculata in miniature in coloration but cespitose and scaly."

Discussion. - Murrill described this species as Marasmius squamosidiscus sp. nov. (citation above). Later, he changed the identification and name to Armillaria squamosidisca Murr. comb. nov. (see Mycologia 36:122. 1944.)

My No. 18455, from Murrill, has spores 3.5-4.5 x 2.2-3  $\mu$ , ellipsoid, smooth, pseudo-amyloid. Cheilocystidia clavate, rarely bottle-shaped, 28-37 x 6.5-8  $\mu$ .

ARMILLARIA VENTRICOSA Fr.

Torrey Bot. Club Bul. 34:104. 1907

Illustrations:

Plates (photographs herewith)

Hepler, Tenn. Acad. Sci. Jour. 18, figs. 1-2. 1943

//

Pileus ~~2~~-35 cm. broad, convex at first, expanded plane or finally deeply concave by upturned margin, "drab-gray," "light drab," or dingy whitish, shining when dry, viscid to gelatinous or lubricous, with a thick, tough, gelatinous, separable pellicle, appearing glabrous but, under lens, with appressed fibrils somewhat disposed into appressed scales, margin even, thin, incurved, appendiculate. Flesh white, firm, thick (2 cm. or more) on disk, abruptly thin on margin; odor and taste strongly farinaceous. Lamellae decurrent, close to crowded, narrow (5-7 mm. broad), linear, white, becoming "light buff" to "pale pinkish buff," dingy brownish in age, prominently forked, edges even or denticulate. Stipe 6-15 cm. x 2.5-5.5 cm., central, usually ventricose, with a long tapering, more or less pointed root, white, shining and glabrous above, concolor to pileus and felted-fibrillose below, not viscid, solid. Annulus membranous, double, the outer "avellaneous" to "clay color" sheathing base of stipe and concrete with cuticle, the inner white, breaking to leave an ample, superior, persistent, flaring collar, appendiculate on margin of pileus, finally collapsing to leave a double ring on stipe.

Spores ellipsoid, ends blunt or pointed, 7-9 (12) x 3.8-4.5 (6)  $\mu$ , smooth, white, amyloid. Pleurocystidia none; cheilocystidia numerous, variable: clavate, cylindrical, *often with undulating sides*, 26-48 x 4-6  $\mu$ . Trama of lamellae composed of *(divergent)* undulating-parallel hyphae. *Singer gives Basidia 50-68 x 7.5-8  $\mu$  (Mich. Acad 32:120, 1946), + found no cystidia of any kind.*

Habitat and Distribution. - On soil, in pine woods, Alabama and Tennessee, October-December.

Observations. - From our studies of fresh material, certain characters stand in contrast to the published records. (1) All our specimens exhibited a farinaceous odor and taste - a character not reported by others. (2) If collections are examined when dry, the surface of the pileus is not viscid, but when wet the cuticle is decidedly gelatinous or viscid-lubricous. Since Kauffman (1923), in his key, gives the impression that the pileus is not viscid, it is assumed that he may have worked entirely with dry specimens. (3) We find the gill-trama composed of undulating-parallel hyphae. Kauffman (1923), in discussing gill-structure of species of *Armillaria*, draws the tentative conclusion that in forms bearing decurrent gills the hyphae of the gill-trama are diverging. (4) The amyloid character of the spores was first observed by Dr. A. H. Smith (unpublished).

On Sept 30, 1966, I observed ~~an~~ <sup>two</sup> arcs of a fairy-ring, in a pine woods Cades Cove. The ring was 60 ft. diam., with some 80 basidiocarps, the largest about 35 cm. broad.



12939 - *Armillaria ventricosa* PK.

19546 - *Armillaria ventricosa* PK.



19546 - *Armillaria ventricosa* (PK).



12939 - *Armillaria ventricosa* PK.





13084 - *Armillaria ventricosa* PK.

ARMILLARIA VISCIDIPIES Pk.

New York State Museum Ann. Rept. 44:128. 1892

*Remispheric then*  
Pileus 8-14 cm. broad, convex, margin incurved and with an evident band (remains of veil), whitish tinged "clay color" to "warm buff," darker on disk, appearing appressed-fibrillose or scaly, shining, *viscid, with glutinous brownish scales.* ~~dry (scarcely sub-viscid even when thoroughly wet).~~ Flesh white, firm, thick; odor mild or strong on drying, taste mild. Lamellae adnate or adnexed to emarginate, "light buff," "ivory yellow," to "cream buff," crowded, medium broad, narrowed at either end, edges even. Stipe 6-15 cm. x ~~2.2-4~~ <sup>2-4</sup> cm., viscid, appressed-scaly below the annulus, scales reddish-brown, white and minutely fibrillose scaly or furfuraceous above annulus, tapering at base or equal, *base scaly*, solid. Annulus viscid, white, heavy-cottony, then membranous, slightly flaring, finally collapsing, apical, evanescent.

Spores short-ellipsoidal, 6-8 x 4.4-5.5  $\mu$ , smooth, non-amyloid.

Habitat and Distribution. - On soil, under hemlock-rhododendron, Tennessee and Kentucky, October-November.

Discussion. - An alkaline odor is reported for this species. Smith suggests that the odor may develop only as the sporophores become older, or ours may be an odorless form. In my No. 19453, which are young sporophores, the odor when fresh was peculiar, and strong on drying.



19453 - *Armillaria ponderosa* (Pk.) Sacc.  
*viscidipes* Pk.



ARMILLARIA ZELLERI Stuntz & Smith

Smith, Mushrooms in Their Natural Habitat, p. 351. 1949

Illustration:

Plate

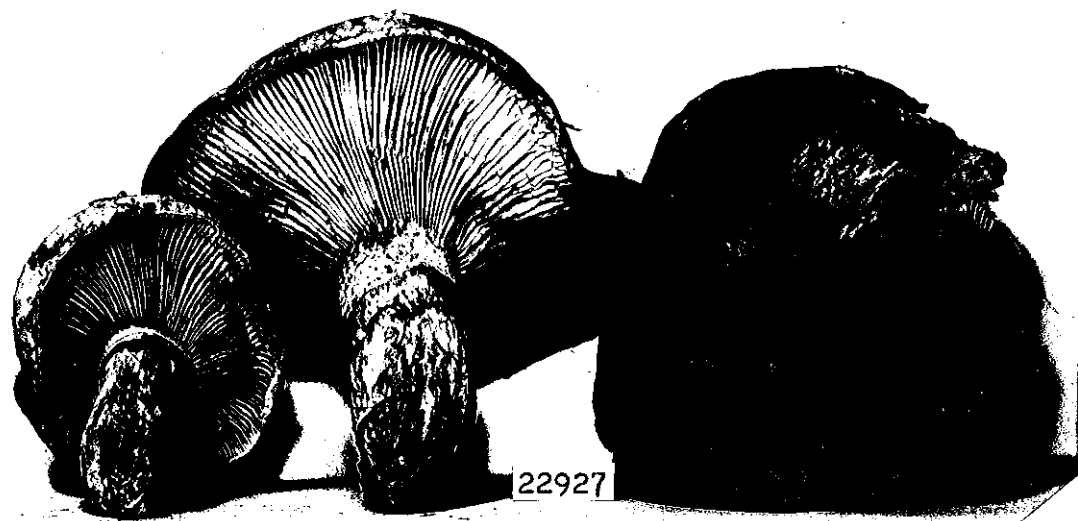
Smith, Mushrooms, Reel 15, No. 105. 1949

Pileus (3) 5-11 cm. broad, convex, expanding plane or nearly so, viscid when wet (more so when young), "honey yellow" to "isabella color" to "tawny olive" or "yellow ocher," appressed-fibrillose, becoming scaly from agglutinated fibrils, margin at first strongly incurved and densely to felty white-fibrillose (from veil-remnants), even. Flesh firm, thick on disk, thin on margin, white; odor and taste slightly farinaceous when fresh. Lamellae adnate to adnate-subdecurrent, finally emarginate, white at first, becoming dingy or ashy, and often spotted brown, close or crowded, medium broad, many short, few forked at base, edges even or eroded. Stipe 2-5 (9) cm. x 10-15 (25) mm., dry, fibrillose, often <sup>white</sup> squamulose at apex, at times compressed, base curved and tapering rather abruptly, apex white, elsewhere brownish, with 1-3 median or basal rusty brown zones and scales, solid. Veil apical, membranous, at first forming a flaring annulus, which is white above, orange to brownish below, soon collapsing.



Spores 3.8-5.5 x 3-3.5 u, ellipsoid to subglobose,  
smooth, white in mass, non-amyloid. Basidia 24-32 x 5-6.5 u.  
Pleurocystidia and cheilocystidia none. Gill trama  
subparallel.

Habitat and Distribution. - On soil, in pine woods,  
usually forming a fairy-ring 6 to 8 feet in diameter,  
<sup>Alabama,</sup>  
Tennessee and Georgia, November-December.  
^



22927 - *Armillaria zelleri* Stuntz + Smith

21591 - *Armillaria Zelleri* Stuntz & Smith  
(Georgia)



22230 - *Armillaria Zelleri* Stuntz + Smith





19542 - *Armillaria Zelleri* Stuntz & Smith



18869 - *Armillaria Zelleri* Stuntz & Smith

22414

ARMILLARIA

On soil, in mixed woods, near Mt. LeConte, Sevier County,  
Tennessee, September 11, 1956

Pileus 7-9 cm, convex, viscid, "clay color,"  
glabrous except for large, conspicuous, white patches  
(veil remnants), margin even. Context white, thick on  
disc, thin on margin; odor and taste mild.

Lamellae adnexed, close, broad, "pinkish buff,"  
edges even.

Stipe 6-7 cm long, 11-13 mm thick, equal above  
the subemarginate bulb, bulb 30 mm in diameter, solid  
with a white pith.

Spores 6-8.5 x 4-4.5(5)  $\mu$ , ellipsoid, smooth,  
colorless in KOH (spore-deposit failed). Basidia 47-54 x  
5-6  $\mu$ , 4-spored. Pleurocystidia and cheilocystidia none.  
Gill trama of subparallel hyphae, 6-15  $\mu$  broad. Pileus  
cuticle an ixocutis; hypodermium obscure, hyphoid.  
Stipe cuticle of repent dry hyphae. Clamp connections  
none.