

Using Chemical Reagents to Help ID Mushrooms in the Field



By Dawn Wehman - Mushroom Education Day 2025

Who Am I?



- Joined the Club in 2021
- Membership Chairperson since Summer 2023
- Lincoff Foray Chairperson 2024, 2025
- Became a Club Identifier this time last year
- Member of this club as well as MAWDC, WV Mushroom Club, Central PA Mushroom Club and the Ohio Mushroom Society because I love to go to Forays
- Lifelong volunteeraholic
- 2 grown children, husband of 35 years
- B.S. in Elementary Education
- Day job as an Order Entry Specialist for a Commercial Industrial Fan Manufacturer in Zelienople PA



<https://www.inaturalist.org/observations/180766165>

What brought me here today?



FYI - I did not know this was Chicken of the Woods *Laetiporus sulphureus* in 2018
<https://www.inaturalist.org/observations/89341590>

I came to MED in 2022 as a participant & was handed a kit

I had no idea what to do with it but I
kept it with me

Every time I ran into
Chemical Reagents
in books, dichotomous keys, online
descriptions, when hiking in the field
and it was brought up by someone
I TRIED THEM

OMG they worked!

How did we first
start identifying
mushrooms?

Morphological Characteristics

(what does it look like, smell like, taste like, etc.)

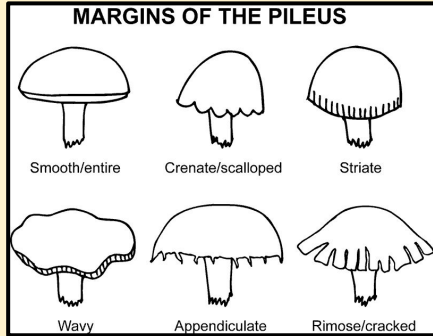


March 2025 Chaga at Walk at Gallitzin State Forest

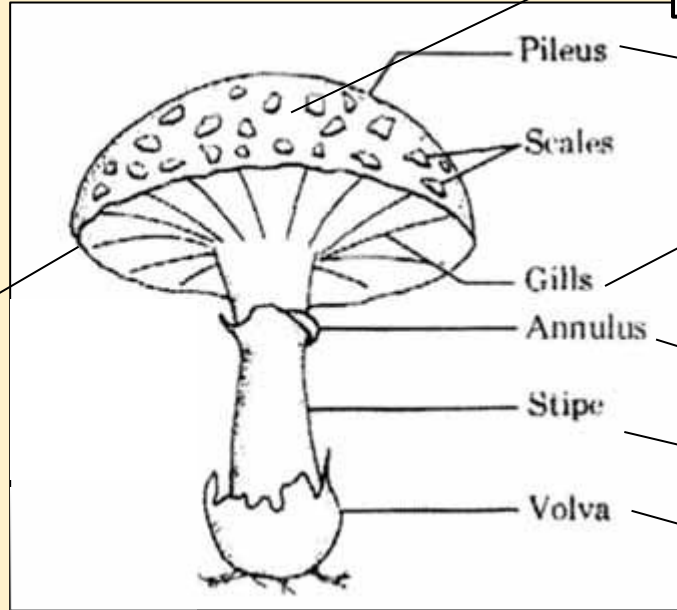
What are Morphological Characteristics

- See
- What happens when it bruises?
- Observe its Environmental Surroundings
- Smell
- Taste
- Feel

What We See



[6]



[5]

Hymenium

The fleshy spore producing layer under the Pileus

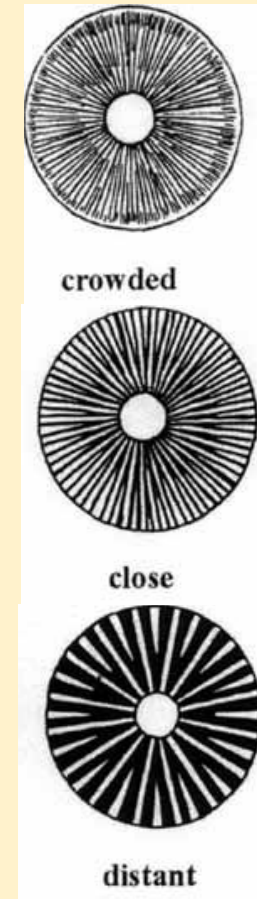
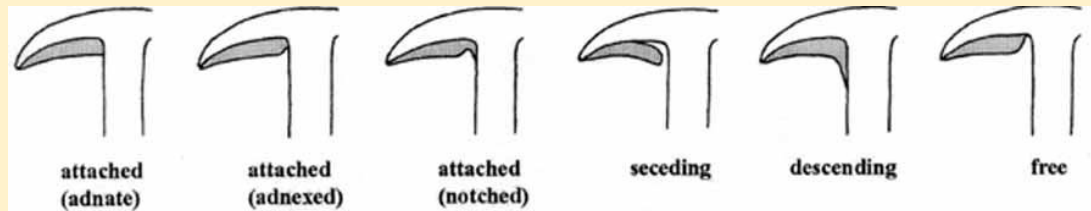
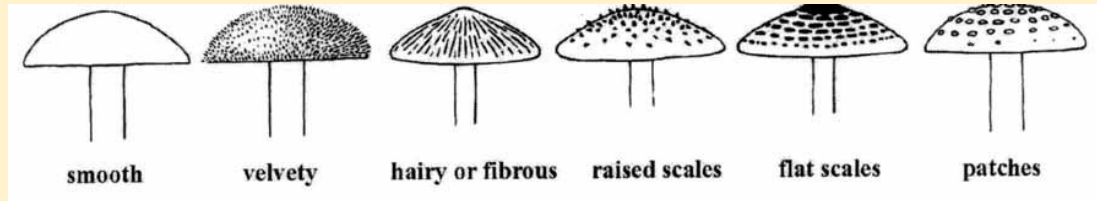
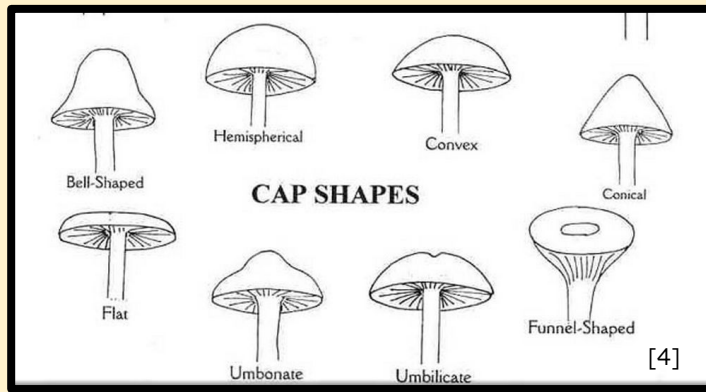
aka Cap or Cuticle

Fertile, Sporing Surface
Lamellae - Gills
Tubes or Pores
or Teeth

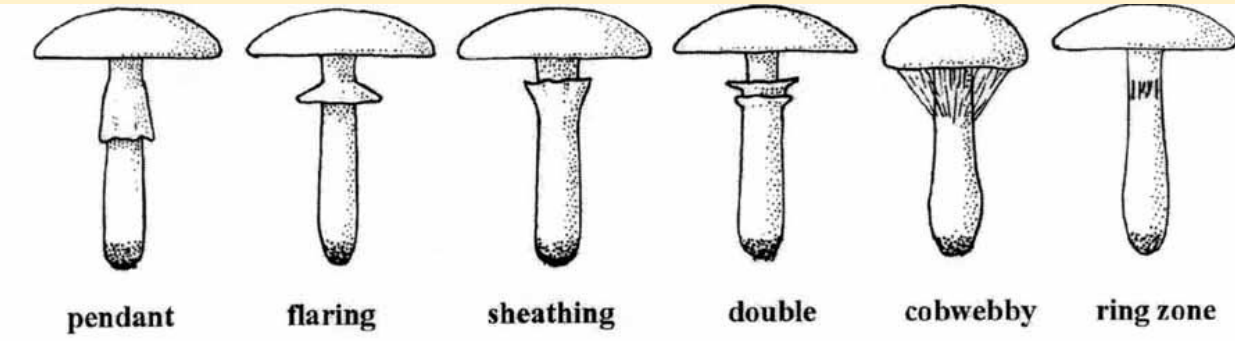
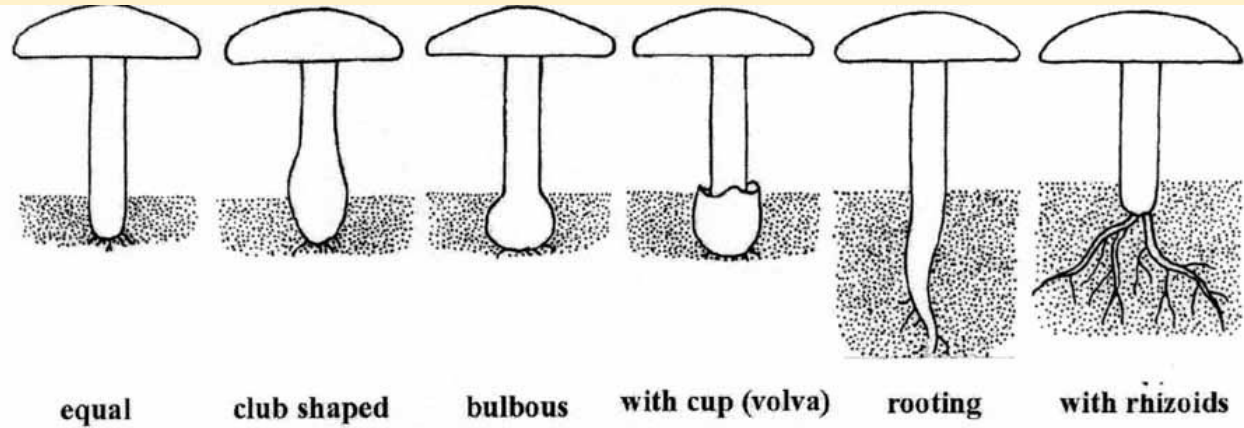
aka Ring

aka Stem

aka Basal Cup



[5]



[5]

Using Chemical Reagents to Help ID Mushrooms in the Field

Terms on this side are arranged in the order of mushroom descriptions used by most field guides. Thus it is easy to check a description or make notes on a collection of your own. These items, plus many others, are arranged in alphabetical order on the reverse side.

GILL (Pileus)	Lamella (Lamellae) RING (Anulus) STALK (Stipe) VOLVA (Circumplex Veil)	Disk (Capitulum) Disc (Mastigophore)
CAMP	 GILLS (Pileus) LAMINAE (Lamellae) RING (Anulus) STALK (Stipe) VOLVA (Circumplex Veil)	 DISK (Capitulum) DISC (Mastigophore)

**E. 2830 Marine Dr.
Post Falls, Idaho 83854**

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Illustrated by Cindy Davis

A. SIZE:

Several nature maps, smallest to largest, are measured for breadth at widest point; also height (only when taller than wide); then range of sizes is given.

B. SHAPE (YOUNG & OLD):

1. Convex (evenly rounded)	2. Void (empty)	3. Conic (cone)	4. Campanulate (bell-shaped)	5. Parabolic (half-globe)	6. Pulvinate (cushion)	7. Cylindrical (bullet)	8. Plane (flat)	9. Conchate (shell-like)
10. Umbonate ("w/bump")	11. Cupulate (eye-tooth)	12. Papillate (w/nipple)	13. Depressed (saucer)	14. Umbilicate (navel-like)	15. Infundibuliform (funnel-shaped)	16. Petaloid (petal)	17. Spatulate (spatula)	18. Gleidiate (w/circle)
19. Flabelliform (fan-shaped)	20. Revolute (rolled back)	21. Exceeding gills (as in <i>Panellus</i>)	22. Straight	23. Decurved	24. Incurved	25. Involute (enveloped)	26. Arched	27. Upraised

C. COLOR:

First should come general color terms, then exact terms from a color book. If possible, for (1) young and old, (2) disc & margin, (3) background if different from fibrils, (4) changes on bruising, (5) wet & dry if hygrophanous.

D. SURFACE FEATURES:

(1) DRYNESS: (a) If dry: Shiny, dull, silky. (b) If not dry: Moist/lustrous/greasy; Viscid/sticky/tacky; Glutinous (slimy).

(2) TEXTURE: (See VEILS below; Wet only.)

41. Smooth (not rough or bumpy)	42. Rugose (wrinkled)	43. Rugose (wrinkled)	44. Pustulose (w/ fine wrinkles)	45. Rivulose (w/ V-like channels)	46. Scrobiculate (w/shallow pits)	47. Warty	48. Water remnants of outer veil
49. Glabrous (bald)	50. Virgate (parallel paler when wet)	51. Hirsutulous (dark when wet)	52. Sericeous (silky)	53. Fibriolate (fillose)	54. Squamulate (scaly)	55. Scales erect or recurved	56. Squamous (scales erect or recurved)
57. Velvety (velvetous short, soft)	58. Pubescent (finely downy fluff)	59. Canescent (whitish downy flakes)	60. Tomentose (matted-downy tufts)	61. Hispid (stiff, med. stiff, strawlike)	62. Hirsute (stiff, shaggy)	63. Villose (long, woolly)	64. Striose (long, coarse)
65. Pruinose (white dust)	66. Granulose (med. fine powder)	67. Gummy (like dandruff)	68. Furfuraceous (furry, branny)	69. Zonate	70. Lacerate (med-cracked)	71. Closoe (w/cracks, crevices)	72. ...

E. CAP MARGIN:

73. Entire Even, Regular	74. Apiculate (w/lines or spines)	75. Striate (radial lines)	76. Sulcate (furrows)	77. Plicate (folded)	78. Eroded	79. Split	80. Lacerate	81. Hairly	82. Girdling	83. Creeping
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F. CONTEXT (FLESH):

- Color: moist or dry; under color (if different)
- Thickness: at disc and at margin
- Tissue: soft, spongy, firm, compact, rigid, brittle, corky, etc.
- Latin color, changing after exposure; taste, abundance

G. ODDER:

Note: Fruity; Lemony; Alsemy; Litoric; Farinaceous (like fresh meal); Pungent; Nauseous; Nitrous; Earthy; Spermatiz; Rhythmic (like rhytm); Green corn; Almost Extract (almost dried); Astringent; Agreeable; Astringent; Nitrous; Earthy; Spermatiz; TASTE: (immediate or later). Mild; Bitter; Acid; Coughy; Astringent; Agreeable; Astringent; Nitrous; Earthy; Spermatiz;

H. HABIT:

1. Solitary	2. Scattered (1-2 ft. apart)	3. Gregarious (growing in a group)	4. Fasciated (clustered not joined)	5. Connate (fused at base)	6. Imbricated (one overlapping another)	7. In troops or rings
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I. SPACING:

1. Young Subdistant	2. Mature
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J. E. COLOR:

1. Young Subdistant	2. Mature
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K. ATTACHMENT OF GILLS:

101 Free	102 Remote/close	103 horiz./ascending	104 distant (almost free)	105 Sinuate (notched)	106 Emarginate (hooked)	107 decurrent long/short	108 ascending (breaking away)	109 free	110 imbricate (tooth)
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L. BREADTH:

Narrow	Broad	Ventricle	Average	Thick	Tapering
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M. THICKNESS:

Serrate	Serrulate	Fringed	Marginate (diff. color)	Create (scallop)	Acute	Obtuse (blunt)	Crisped (crinkled)
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N. MISCELLANEOUS:

Waxy (feeling like soft wax)	Arid (dry)	Deliquescent (dissolving into liquid)	Velvined (with ridges)	Interveneous (with "veins")	Unequal (w/short gills)	Forking	Anastomosing (joining crossways)
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O. LOCATION OF SYSTEM:

Central	Eccentric (off-center)	Lateral (attached at margin)	sessile (missing)
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P. SIZE:

Length: base to junction x diameter, at top, also at widest point below if difference is great.

Q. SHAPES:

OF	Terete (round)	Compressed	Clavate (club)	Radicating (w/"root")	Flexuous	Fusiform	Tapering	bulbous	Rounded (angle)	Marginate
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R. BULBS:

157	158	159	160	161	162	163	164	165	166
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S. VOLVAs:

167	168	169	170	171	172	173	174	175
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T. COLOR & CHANGES:

Same as cap, PLUS differences between base & apex, interior & exterior, bruises, etc.

U. SURFACE:

Same as cap, PLUS differences between base & apex, interior & exterior, bruises, etc.

V. BANDS:

Perinate Fibrils Longitudinally Ribbed Scarious (punctate dots) (dark sticky dots) (glare-dotted dots)

W. INTERIOR:

Solid; Hollow; Tubular; Cavemous; Stuffed with pith (describe)

IV. PARTIAL (INNER) VEIL & REMAINS

A. COLOR:

B. TEXTURE:

Membranous (skin-like); Cortinate (cobwebby); Fibrillose (thready); Gelatinous (slimy)—See RINGS below.

C. PATE:

Disappearing (Leaving fragments); Cap Ring Annular; Rim Annular; Rim Disappearing; Rim Persistent.

D. RING (ANNULUS):

Describe appearance, size, position (superior, median, inferior), persistence.

E. DISAPPEARING REMAINS:

Describe appearance, size, position (superior, median, inferior), persistence.

V. UNIVERSAL (OUTER) VEIL & REMAINS

A. DESCRIPTION:

(1) Texture: (2) Method of retaining; (3) Fate: disappearing? remains where?

B. VOLVA:

(1) Absent or present; (2) Size; (3) Shape, see above; (4) Color; (5) Texture

VI. MYCELIUM, RHIZOMORPHS, ETC.

Describe color and texture, etc.

VII. HABIT,

HABITAT,

PLANT ASSOC. & LOCATION

1. Solitary	2. Scattered (1-2 ft. apart)	3. Gregarious (growing in a group)	4. Fasciated (clustered not joined)	5. Connate (fused at base)	6. Imbricated (one overlapping another)	7. In troops or rings	8. Terrestrial (on soil)—bare, barren, disturbed	9. Lignicolous (on wood)—what kind of tree?	10. Humicolous (on humus, turf—confir., oyster?)	11. In grassy area—low, moss, pasture, etc.	12. Miscellaneous—lawns, cemeteries, what?	13. With what kinds of tree or other plants?	14. Where? What mountains, creek, etc.? What county?
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What We Observe in its Environmental Surroundings

Is it growing on

- Wood?
- Dung?
- Dirt?
- Leaves?
- Another Mushroom?
- An insect?

If so can we tell what? Everything counts!

What We Smell

Just a few:

- Like fish or shrimp
- Like almonds
- Like apricots
- Like bleach
- Like cucumbers
- Like sperm
- Like anise
- Foul - dung or a corpse
- Etc.

This is HARD!

“Like a Mushroom!” is NOT a smell characteristic



What We Taste

Chew and spit test is typically very safe

- If your mushroom has a mealy or bleach like odor, do not waste your time (or your taste buds) testing its taste. It will undoubtedly taste more or less like it smells—and assessing the odor is already enough for identification purposes.
- If you have tasted *Lactarius piperatus*, *Tylopilus felleus*, or another excruciatingly acrid or bitter mushroom, be prepared to regret the experience. [11]

Just a few:

- Spicy
- Non-Distinctive
- Hot
- Chemically
- Mildly sweet

This too is HARD!

What We Feel

- Dry
- Slimy
- Powdery
- etc.

Age

How old is the specimen?

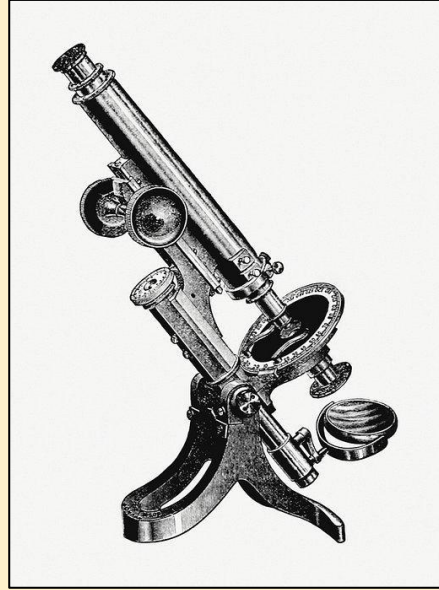
- Fresh
- Dried
- Decaying

This will be key when you get to using reagents.

Microscopy

“**Pier Andrea Saccardo** (1845-1920) was an Italian botanist and mycologist. His multi-volume *Sylloge Fungorum* was one of the first attempts to produce a comprehensive list of identified fungi, using their **spore-bearing structures** for classification.[1]”

This was only 150 years ago!



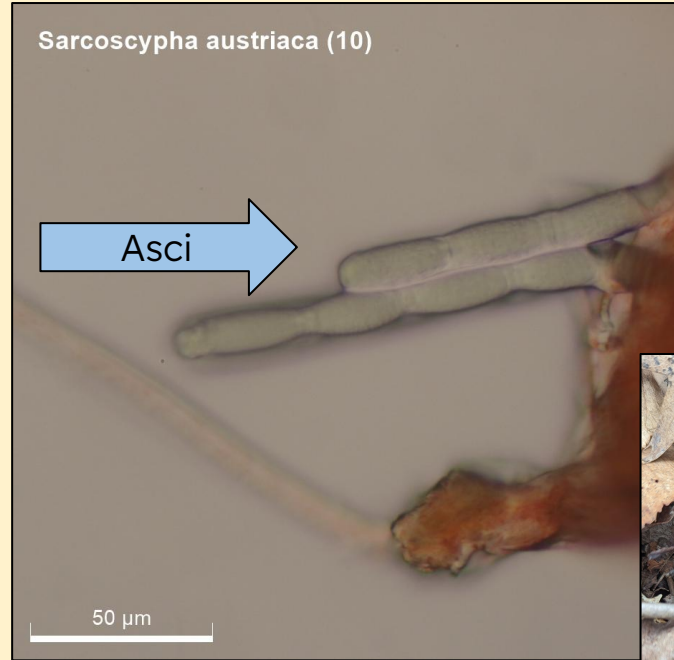
Spore-Bearing Structures can only be seen via a microscope

Ascomycetes vs Basidiomycetes

Briefly:

Macro fungi can be divided into two broad groups, called ascomycetes and basidiomycetes, depending on how their sexual spores are formed.

“In **ascomycetes** the spores are produced within microscopic structures called asci. The asci vary in shape from cylindrical to spherical. Commonly, each ascus holds 1 to hundreds of spores, with the most common being 8.”
[2]



Sarcoscypha austriaca (Scarlet Elfcup)

<https://www.inaturalist.org/observations/202902123>



“In **basidiomycetes** the spores develop on projections that grow out of structures called basidia. Commonly, each basidium has four projections and four spores - but some species may have just one projection others up to eight. The projections from the basidia are called sterigmata.” [2]



Galerina marginata (Funeral Bell)

<https://www.inaturalist.org/observations/264726355>



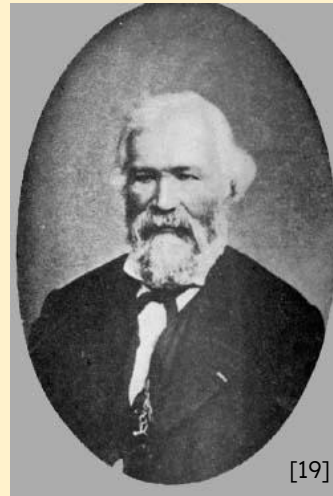
Chemical Reagents

(likely mid 1800's)

“According to (Lawrence) Leonard, the earliest reference to the usage of iodine to identify fungi was by Currey in 1858 on the ascomycete *Amylocarpus encephaloides* and by the Tulasne brothers in 1861 with lichens ...”[12]



[18]



[19]

Charles and Edmond Tulasne

DNA

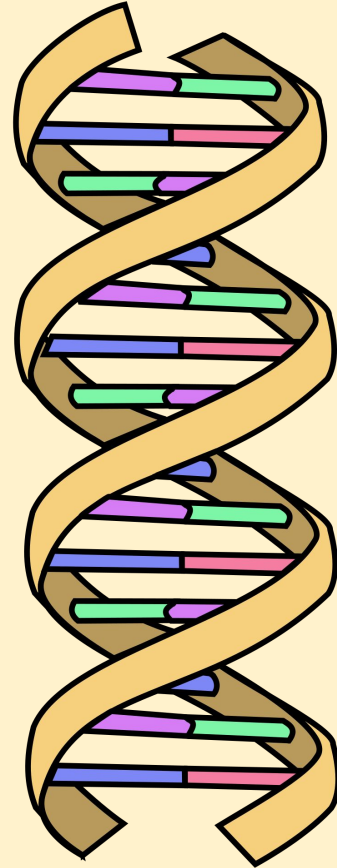
Sanger Sequencing - developed by Frederick Sanger & his colleagues in 1977. It's expensive and the machine takes lots of maintenance.

PCR, a polymerase chain reaction, invented in 1983 by American biochemist Kary Mullis at Cetus Corporation. Mullis and biochemist Michael Smith, who had developed other essential ways of manipulating DNA. [9]

PCR targets a certain gene, doubles it, copies it billions of times. It's cheaper and easier, but doesn't work on every type of mushroom. This is typically what the club sends out to Stephen Russell at [Mycota](#) during the [Continental MycoBlitz](#) each year.

Fun fact:

The whole genome of the mushroom is approximately 40 million base pairs long.



Why go through with all of these previous slides if we have DNA?

We amplify a small region of DNA for barcoding analysis (if PCR is used)

Some mushrooms are NOT easy to sample

Samples fail

Regarding [Fungarium](#) samples, the sample may be too old or preserved with something that degraded the DNA

DNA is only one part of the “story”

For the everyday person, it can take up to a year to get your results back

Science is evolving - who knows what we'll use next!

Important notes at this stage

“Many mycophiles keep a few simple chemicals close at hand that, when applied to collected mushrooms, can elicit a color change and assist identification.” [12]

- Field guides don't always agree
- Field guides get out of date
- Lots of individual people observe the same exact thing in different ways
- Guides don't always approach identification in the same way
- Dichotomous keys differ from one another due to authors. Another author can approach the key differently from one version of a book to another based on things they picked up from listening to their audience and new things they have learned themselves

Chemical reagents are only a small part of this deciphering process,
but can be key in differentiating between similar looking species
that might otherwise require microscopy or DNA work

A reaction alone will not make an ID (but they certainly help)

What are Chemical Reagents?



Chemicals that are used to initiate, carry out, speed up or monitor a reaction but are not themselves used up.

Chemical Reactants vs Reagents?

Term	Reactant	Reagent
Definition	Chemicals that are consumed in a reaction in order to form products	Chemicals that are used to initiate, carry out, speed up or monitor a reaction but are not themselves used up.
Example	$2\text{H}_2 + \text{O}_2 = 2\text{H}_2\text{O}$	Initiators Solvents Catalysts Indicators

[3]

Safety First!

Most of the chemicals are safe if used as described.

Obviously you should not drink the liquids or put them in your eyes or eat anything that you have put the chemical onto.

If you get them in your eyes accidentally, it is heavily advised to seek prompt medical attention.

Gloves aren't a bad idea, but not necessary because the chemicals have been diluted. If you get them on your skin, just rinse it off with water as promptly as permitted.

We also recommend protecting the surface where you work and wearing old clothes.

Take care to inspect the bottles in your kits for damage. The club may have some reserves or you can purchase bottles on Amazon.

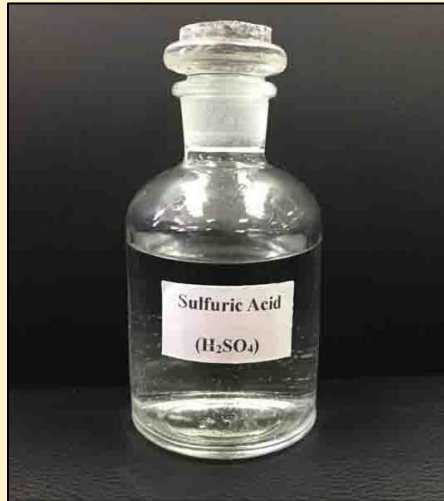
Safety Data Sheets have been provided in your kits.



What we could possibly use

The Club put together a kit in the past that included some items that are not included in today's kit:

Sulfo-Vanillin
Sulfuric acid 1N
Hydrochloric acid
Lugol's Iodine



What are the most popular, useful and safe

Ammonia (NH_3)
Ferrous sulphate (FeSO_4) 10%
Potassium hydroxide (KOH) 10%



Why we don't use some of the chemicals we first mentioned?

Depending on the concentration of the hydrochloric acid you are working with, significant injury can occur as it comes into contact with skin, eyes, ingestion or inhalation of acidic vapors.

Exposure to sulfuric acid can occur as skin/bodily contact, ingestion, or inhalation of vapors. Each type of exposure can pose serious hazards to your health and should be managed immediately and appropriately by a medical professional to minimize damage and health risks.

Lugol's Iodine 5% - is really worth the long read but is **about \$30 for a 1 oz. bottle**. The 2% is available on Amazon.com but is more suitable for medical uses.

Melzer's reagent - we'll talk about in a slide or two



Some additional test include:

The Meixner test (also known as the Wieland test)

This test uses concentrated **hydrochloric acid** and **newspaper** to test for the deadly amatoxins found in some species of Amanita, Lepiota, and Galerina. **The test yields false positives for some compounds, such as psilocin.** [10]

Let's see if this embedded video works

<https://www.facebook.com/watch/?v=720245335123987>

Ehrlich's reagent

A very common Ehrlich test is used to identify psychoactive compounds such as tryptamines, lysergamides (LSD), and psilocybin (the active substance in psychedelic mushrooms). This test will also give a positive reaction to opium because of the tryptophan. "Psilocybes are very difficult to discern from other little brown mushroom look alike, including Deconicas, Stropharias, Conocybes, Panaeolus, Galerinas and others." [12] This reagent is expensive - \$20 for up to 100 tests. [14]

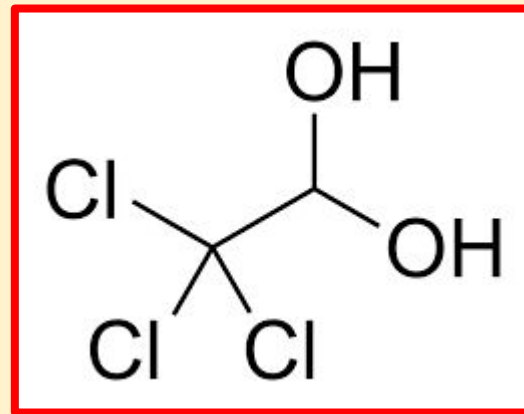
“Far and away, Melzer’s reagent and KOH are the most important and most used.” [12]

Melzer’s reagent used by mycologists is an aqueous solution of chloral hydrate, potassium iodide, and iodine. Due to the legal status of chloral hydrate, Melzer’s reagent is difficult to obtain in the United States, [13] but you can order Melzer’s and other reagents from <https://www.myko-service.de/>

The chloral hydrate in Melzer’s reagent clears the cell contents so that the color reaction is more obvious [12] which is what makes it superior to all of the other iodine based reagents.

Melzer’s reagent ... is normally performed on white spored mushrooms. If the spores are not light colored, a change will not be readily apparent. It is easiest to see the color change under a microscope, but it is possible to see it with the naked eye with a good spore print. [10]

The color change described above is either **amyloid** (means “starch like”) where the spore walls turn blue/black, or **dextrinoid** where they turn red brown. If no change happens, the correct term is **inamyloid**.



Getting Started

It is important to test for chemical reactions on *fresh* mushrooms, preferably within an hour of picking them ... try to test mushrooms as soon as possible when you get home, remembering that the longer you wait, the less reliable your results may be. [11]



Good habits in the field

- Protect your specimens as you travel (fishing tackle box, mesh bag, NOT your pocket, lol)
- Get pictures for iNaturalist, in situ w substrate or environment, top, gills, vulva, stipe and any distinguishing features.

Once you get in the door:

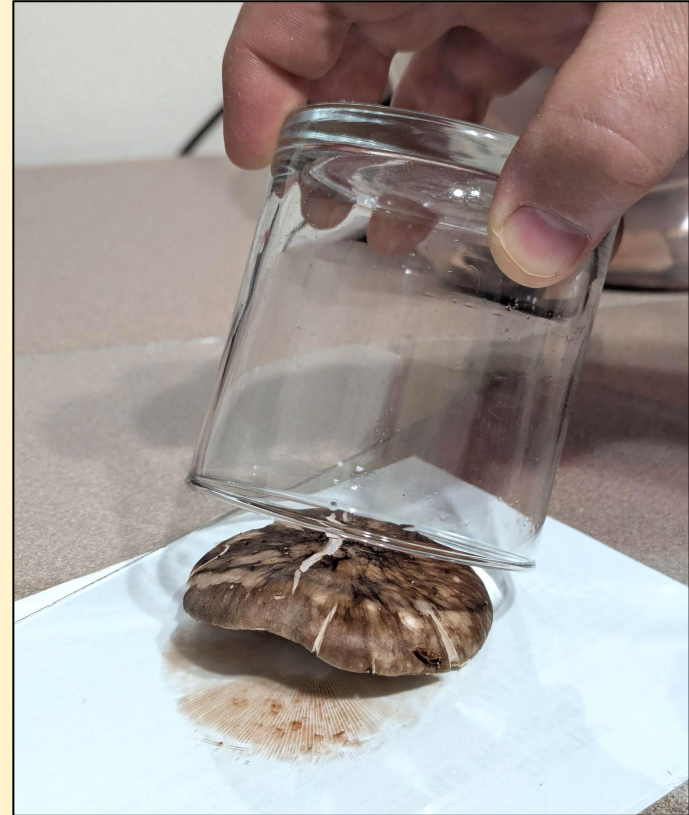
- Clean glass ready w cups ready to do a spore print (typically takes an hour to several hours)
- Have your field guides nearby
- What color are the spores - really helps when looking at dichotomous keys
- Look hard at your specimen for those distinguishing features and **WRITE IT DOWN** (notes field in iNaturalist)

Advanced users (those w/ a microscope):

- Have your slides and chemicals ready and don't over harvest (just a little experience talking here!)

NOTE:

There are separate chemical concentrations that are used for under the microscope (KOH, iodine based solutions like Melzer's, Lubol's, Hoyer's medium, ammonium hydroxide and several other that are key that we won't discuss today) - The concentrations are NOT what is in your field kit today.



My home set up



Ammonia (NH_3)



Standard household cleaning ammonia, undiluted

Don't get the orange citrus scented

Do not inhale.

Can cause skin irritation

Can cause serious issues if gets in the eyes

Ferrous Sulfate (FeSO₄)



FeSO₄: a blue-green powder, is mixed with water before application to the surface of a mushroom. The liquid will turn orange within several days as ferrous sulfate begins oxidizing to liquid rust. The bottles provided in our kit are premixed for you and in plastic squeezable liquid “eye” dropper bottles with a tamper resistant cap.

If the contents crystallize, this is normal

Your bottles are marked with an expiration date of approximately 18 months from when they were mixed.

Green vitriol test (the common name for ferrous sulfate) on boletes and russulas [8]

Potassium Hydroxide (KOH)



KOH: The bottles provided in our kit are premixed for you and in plastic squeezable liquid eyedropper bottles with a tamper resistant cap.

KOH slowly eats glass.

At full concentration KOH causes severe chemical burns. Gloves are recommended but not necessary due to the eyedropper tip & dilution.

Rinse off the skin, surfaces and clothing with soapy water.

Which families of mushrooms have regular reactions

- Russulas
- Polypores
- Amanitas
- Boletes
- Gilled Mushrooms (Cortinarius, Lactarius & Agaricus)



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Search!



Revised 5/6/2005 *Lycium aschersonianum*

Michael Kuo

Added 5/1/2005 *Malospora ulmivora*

Michael Kuo

Revised 5/6/2005 *Malospora ulmivora*

Michael Kuo

Added 4/25/2005 *Cremolobus melleocephalus*

Robert O'Brien

This site is the creation of Michael Kuo. With some exceptions, the site is based on my collections of North American mushrooms, made over the past 30 years, and the more than 1300 species pages here illustrate and describe these collections, along with collections that have been sent to me by others for study.

MushroomExpert.Com contains no information about the edibility or toxicity of mushrooms. I think mushrooms are much more interesting, engaging, and important than figuring out what happens to humans who digest them—so you will need to consult other resources if eating mushrooms (or avoiding poisonous ones) is your goal.

Identifying mushrooms is often much more difficult than identifying birds, for example, or trees. There are tens of thousands of species, many of which have not even been named! Comparing mushrooms to pictures is rarely successful. Instead, carefully studying the mushrooms (see the links to the right to get started) and using identification "keys," which ask questions to narrow down possibilities, is a more successful strategy.

[Mushroom Identification Keys](#)

Please Donate!

I am incredibly grateful for the support of my readers. So many have donated over the years, in amounts ranging from a few dollars to hundreds, and many readers donate regularly. Thank you for your generosity!

Donations can be made through PayPal or Venmo, using the buttons to the right—or feel free to [email me](#) to ask about other ways to donate.

midwestnaturalist.com

Be sure to visit [midwestnaturalist.com](#), a companion site for non-mushroom natural wonders in the Midwest!

Archived Websites

These inactive websites are now archived at MushroomExpert.Com as a public service.

Fungi Growing on Wood

Gary Emberger's [Fungi on Wood](#)

INDIANA MUSHROOMS

Ron Kerner's [Indiana Mushrooms](#)

Herbarium

My herbarium contains more than 4000 mushroom collections from North America (and a few from elsewhere). The herbarium database contains records for all collections. If you would like to contribute to the herbarium, please don't hesitate to [email me](#).

Identifying trees can be crucial for mushroom identification. For reference, I have made brief pages for the trees I am familiar with.

Trees

Abortsponus

Agaricus

A. biennis

A. abruptus/bulbus

A. amicus

A. andrewii

A. argenteus

A. asperatus

A. auricular

A. bellinianae

A. bernardi

A. bisporus

A. bisporus

A. erodii - see **A. floccosus**

A. bernardiformis - see **A. bernardi**

A. brunneus - see **A. bernardi**

A. capillatus = **A. subcapillatus**

A. chrysenterus - see **A. floccosus**

A. eximius = **A. crocodylus**

A. floccosus - see **A. floccosus**

A. kuesterianus = **A. crocodylus**

A. macrosporus = **A. crocodylus**

A. praedecoloratus - see **A. turgidus**

A. subfloccosus - see **A. macrosporus**

A. vernalis = **A. subcapillatus**

All text and images © 2025 [mushroomexpert.com](#)

I use this site almost daily during mushroom season and Michael Kuo is my first go to for microscope chemicals as well as chemical reagents to try

BECAUSE THIS SITE IS RIGHT AT MY FINGERTIPS

and doesn't have the inherent limitations of a textbook

Russulas



Russula grata aka *laurocerasi*
(almond or maraschino cherries scented russula)

Photo by Barbora Batokova

<https://www.inaturalist.org/observations/242995546>

Used with permission ©, no edits were made to the original image.

KOH on cap surface pinkish to orangish.

FeSO₄ on stem surface negative to
pinkish or orangish [20]



Photo by Robert Bosiljevac

<https://www.inaturalist.org/observations/228684382>

Used with permission ©, no edits were made to the original image.

FeSO₄

For Russulas, place a drop on the stem surface. [11] Three results are expected with the iron salts tests: no change indicates a negative reaction; a color change to olive, green or blackish green; or a color change to reddish-pink. [10]

KOH


“Red, yellow, green, purple or black color reactions can be expected. Some *Russula* and *Lactarius* species may give a strong olive green color.” [12]



Russula aeruginea
(Green brittlegill)

Photo by Fluff Berger

<https://www.inaturalist.org/observations/93658633>

Used with permission , no edits were made to the original image.

Mushroom Expert has been my favorite “go to” for what chemical to start with as well as Microscopic Features.

Russulas are particularly difficult to identify, but according to Michael Kuo, “KOH on the cap surface turns orange. Iron salts the on flesh and stem surface slowly turn pink.” [22]

Russula xerampelina
(Shellfish-scented Russula)

Photo by Fluff Berger

<https://www.inaturalist.org/observations/56659632>

Used with permission © no edits were made to the original image.

“Stem surface and flesh turn
green to gray-green or olive with
iron salts.” [23]



If you have a particular interest in Russulas, check out these additional links:

[Field Mycology Volume 5\(3\), July 2004 on the Use of Guaiac in the Identification of Russula by Mario Tortelli](#)

[Sorting Out Russula by Tavis Lynch recorded Spring 2025 by the North American Mycological Association](#)

Polypores



Photos by Jared White,
KOH provided by
Barbora Batokova

<https://www.inaturalist.org/observations/176894629>

Used with permission @, no edits were made to the original image.

Ammonia or KOH on the cap of
Hapalopilus rutilans aka nidulans
will result in a vibrant purple (or vibrant
red in other parts of the world) [15]

Little Latin Lesson:

As of April 2021, both MycoBank and Species Fungorum treat H. nidulans as a synonym of H. rutilans. This species of polypore is commonly known as the "purple dye polypore", "cinnamon bracket", or the "tender nesting polypore". Rutilans is Latin for "orange-red", whereas nidulans means "nesting".[17]

KOH can be applied to the to the flesh and the cap surface of polypore mushrooms. Black reactions among polypores are crucial separators on dichotomous keys. [11]

Picipes badius
(Bay Polypore)

<https://www.inaturalist.org/observations/62851797>

aka *Polyporus badius*,
aka *Polyporus picipes*,
aka *Royoporus badius*



KOH negative (inamyloid reaction) on
cap surface, or grayish on darker,
redder caps; negative on flesh

Cerioporus varius
(Elegant Polypore)

<https://www.inaturalist.org/observations/121173276>

aka *Polyporus varius*,
aka *Polyporus elegans*,
aka *Polyporus leptopezomus*



KOH brownish orange on flesh and cap
surface.

Amanita Family

KOH on the cap of
Amanita bisporigera
(Eastern Destroying Angel)
will result in a bright yellow



BTW, almost all white Amanitas
will give you a yellow reaction




KOH on the cap of
Section *Vaginatae*
Negative to bright yellow [25]



Amanita fulva (Tawny Grisette)

Photo by Dana Driscoll

<https://www.inaturalist.org/observations/245157112>

Used with permission , no edits were made to the original image.

KOH negative (inamaloxyd) on the cap [26]

Amanita jacksonii
(Jackson's Slender Caesar)

<https://www.inaturalist.org/observations/173135310>

KOH on cap surface causes
“erasing” of red pigment,
causing it to turn yellow [27]



Boletes

Ammonia is primarily used in the identification of boletes. Place a drop of ammonia on a fresh bolete's cap, stem, sliced flesh, and pore surface. Note any color changes that take place. Some species, like *Xerocomus illudens*, will demonstrate a quick flash of one color (for example, blue-green), then settle into another, more permanent color change (for example, grayish). Other species, like *Boletus separans*, may demonstrate a single color change. [11]



Xerocomus illudens

Photo by Robert Bosiljevac

<https://www.inaturalist.org/observations/127908802>

Used with permission ©, no edits were made to the original image.



Boletus separans
(Lilac Bolete)

<https://www.inaturalist.org/observations/180751169>

FeSO₄

- For boletes, place a drop of Iron Sulfate on the cap, stem, sliced flesh, and pore surface [11]
- Three results are expected with the iron salts tests: no change indicates a negative reaction; a color change to olive, green or blackish green; or a color change to reddish-pink. [10]

KOH

- For boletes, place a drop on the cap, stem, sliced flesh, and pore surface.
- Various colors are produced with boletes [11]

Rusty Bolete (*Xerocomus ferrugineus*) vs. Suede Bolete (*Xerocomus subtomentosus*)

These two macroscopically similar species can easily be distinguished by adding a drop of ammonia to their cap surfaces. *X. ferrugineus* “displays a vivid blue or blue green reaction that turns reddish brown, whereas the cap surface of” *X. subtomentosus* “immediately stains reddish brown” [16]



Photo by John Plischke III

<https://www.inaturalist.org/observations/106378360>

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Photo by Dirk Cappel

<https://www.inaturalist.org/observations/124185101>

Used with permission ©, no edits were made to the original image.

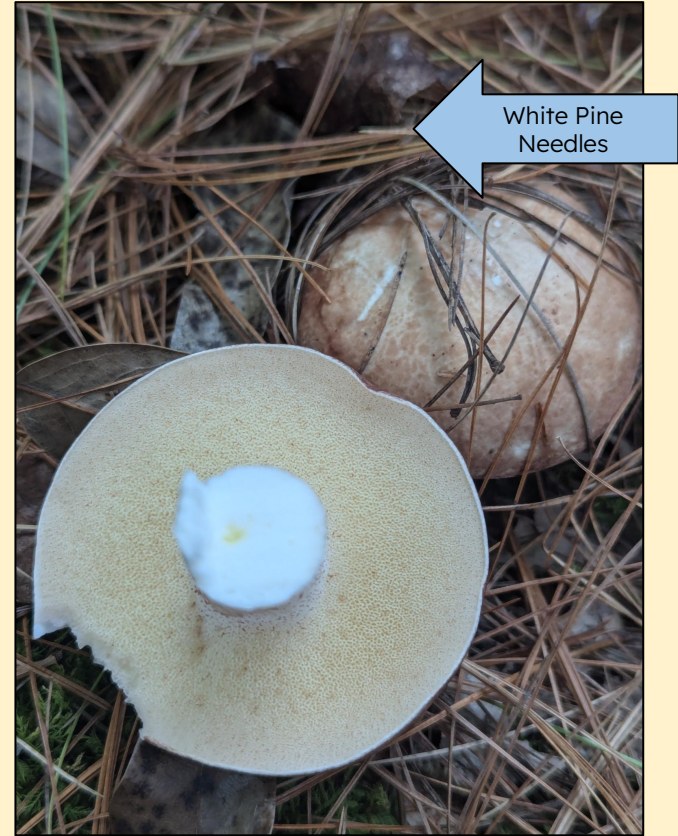
Suillus weaverae (Butterball)

Because we want to “play” with these chemicals and this mushroom flushes in quantity, *Suillus weaverae* is an excellent mushroom to try FeSO_4 on.

Be sure to safely dispose of your “test” mushroom and don’t consume it.

Bucket List:

The cap surface turns bluish gray to olive with Ferrous Sulfate [16]



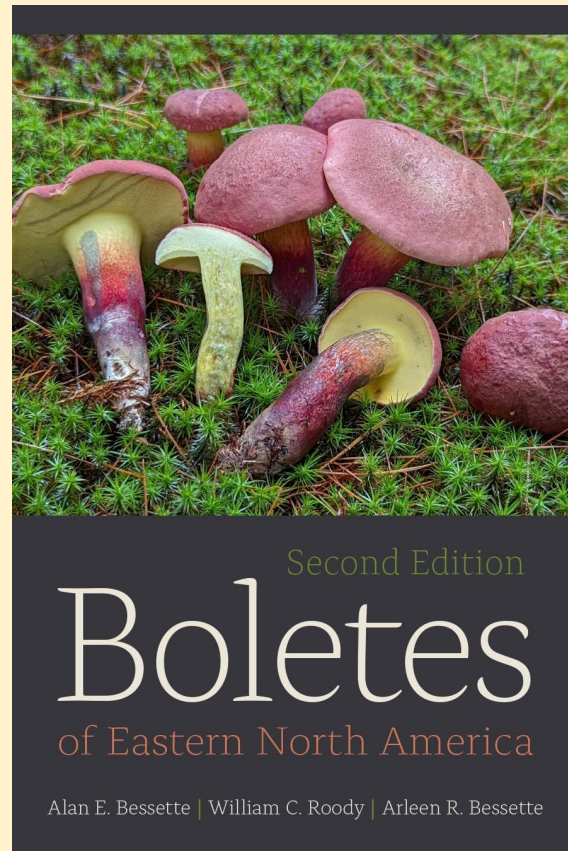
<https://www.inaturalist.org/observations/246988365>

Boletes of Eastern North America, 2nd Edition

Appendix A has a long passage that details temperature of the reagent, temperature of the mushroom, reagent quantity and application (they recommend using a cotton tipped swab) and reaction times that I won't just site here. If you are interested in Bolete identification this book is fantastic and from some of the best experts in the field.

A final statement that the authors made as part of this appendix worth mentioning is the inconsistencies in the literature and variable results. [16]

This book references chemical reagents on many many mushrooms!



Gilled Mushrooms



Potentially *Pholiota granulosa*

<https://www.inaturalist.org/observations/278048195>

If you look at this observation online, you will note all of the other details provided to debate if this could be *granulosa*. This was a small very young specimen and has also been retained for eventual DNA testing.



Galerina marginata

<https://www.inaturalist.org/observations/279347352>

- KOH can be placed a drop at a time on on the cap surface
- Yellow is sometimes found in species of *Agaricus*
- Magenta or Olive is sometimes found in *Lactarius*
- Deep Red or Black reactions can help sort out many gilled mushrooms [11]

Cortinarius distans

KOH on cap surface
slowly turns dark reddish
brown. [28]



<https://www.inaturalist.org/observations/228547795>

Documenting what you've observed



If you try chemical reagents but your key doesn't provide test results, check MushroomExpert.com

How to document reagent reactions or non-reactions within iNaturalist



Be ready. Get a picture!

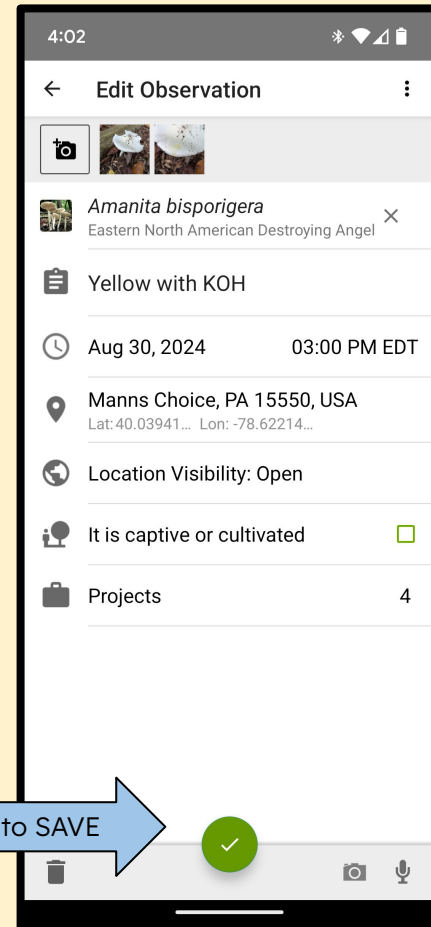
Eastern North American Destroying Angel (*Amanita bisporigera*)
<https://www.inaturalist.org/observations/238865221/>

iNaturalist mobile for Android or iPhone

Make a comment in the “notes” field

EASY Peasy!

Don't forget to SAVE



iNaturalist for desktop

(highly recommended for advanced users!)

Make a comment in the
“notes” field

Don't forget to SAVE

Explore Your Observations Community Identify More

Back to observation

Editing Observation 238865221

What did you see?
Amanita bisporigera

Was it captive / cultivated?

When did you see it?
2024-08-30 15:00:01
Eastern Time (U.S. and Canada)
e.g. 2019-10-29 13:12:21

Notes
Yellow with KOH

Where were you?
Manns Choice, PA 15550, USA
Lat: 40.0394166667 Lon: -78.6221444444
Acc (m): Src: gps

Map

Media
Photos Sounds
Source: your hard drive

Selected photos
View Sync View Sync
Choose Files No file chosen
Sync obs. w/ photo metadata? clear

Re-order photos


Tags Comma-separated, please

More Fields
Add a Field Start typing field na Create a New Field View All Fields

Save Observation Cancel Delete


How to document reagent reactions or non-reactions on common foray or walk ID slips

1cm

FIELD DATA SLIP	
 FUNGAL DIVERSITY SURVEY # _____ <small>Temporary # for associating photo & specimen at home</small>	iNat# or MO# <small>Permanent # (for sequencing & vouchering)</small>
	Species
Date _____ State _____ County _____ Foray ID _____	Photo Checklist — top — underside — habitat — photo of specimen with field slip for # and scale — nearby trees/plants photograph leaf(s) on ground — stem (stipe) — base — stain/bruising — ooze/milk record any color change
	Additional Descriptions Landowner permission <input type="checkbox"/> Y <input type="checkbox"/> N spore color _____ habit (circle) _____ single, few, many substrate (circle) _____ On wood: conifer, hardwood; living, dead; On soil: Leaf litter, Moss, Needle duff, Grass, Dung, Other - _____ odor _____ other _____

Make a comment in the “notes” field or “additional descriptions field” or on the back of the slip noting there is a something someone might miss!

1cm

FIELD DATA SLIP	
 FUNGAL DIVERSITY SURVEY # _____ <small>Temporary # for associating photo & specimen at home</small>	iNat# or MO# <small>Permanent # (for sequencing & vouchering)</small>
	Species
Date _____ State _____ County _____ Foray ID _____	Photo Checklist — top — underside — habitat — photo of specimen with field slip for # and scale — nearby trees/plants photograph leaf(s) on ground — stem (stipe) — base — stain/bruising — ooze/milk record any color change
	Additional Descriptions Landowner permission <input type="checkbox"/> Y <input type="checkbox"/> N spore color _____ habit (circle) _____ single, few, many substrate (circle) _____ On wood: conifer, hardwood; living, dead; On soil: Leaf litter, Moss, Needle duff, Grass, Dung, Other - _____ odor _____ other _____

Comments: Amanita, 8/20/24, b. sporigera, Beech Trees, (Additional comments on other side)

Location: Manns Chapel PA

What's in your kit?



Where's the QR Code take me to?



The QR Code will take you to our website where you will find the flyer and safety data sheets that are also in your kits, just in case you lose them and/or need them in an emergency.

Questions?



Contact me at
dawnwehman@gmail.com or
membership@wpamushroomclub.org

Thank You



The Western Pennsylvania Mushroom Club
is a 501(c)(3) non-profit organization.

References

- [1] https://en.wikipedia.org/wiki/Pier_Andrea_Saccardo
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- [12] Simple Chemistry for better Mushroom ID by Britt A. Bunyard *Fungi Magazine* Vol. 12. No. 2 Summer 2019
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- [15] There are “No Known Poisonous Polypores” ... Think Again by Jan Thornhill *Fungi Magazine* Vol. 9 Summer 2016
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- [18] https://en.wikipedia.org/wiki/Charles_Tulasne
- [19] https://en.wikipedia.org/wiki/Edmond_Tulasne
- [20] https://www.mushroomexpert.com/russula_laurocerasi.html
- [21] https://www.mushroomexpert.com/polyporus_badius.html
- [22] https://www.mushroomexpert.com/russula_aeruginea.html
- [23] https://www.mushroomexpert.com/russula_xerampelina.html
- [24] https://www.mushroomexpert.com/polyporus_varius.html
- [25] https://www.mushroomexpert.com/amanita_vaginata.html
- [26] https://www.mushroomexpert.com/amanita_fulva.html
- [27] https://www.mushroomexpert.com/amanita_jacksonii.html
- [28] https://www.mushroomexpert.com/cortinarius_distans.html

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A huge



**goes out to all of my
“Mushroom Mentors”**