# MushRumors

**The Newsletter of the Northwest Mushroomers Association**

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## Early Warmth in Northwest Washington, Ignites a Preview to the 2017 Spring Mushroom Season

Following a winter which featured more measurable snowfalls than Chicago, and record amounts of precipitation in each month since September, February drew to a close with temperatures climbing into the mid-fifties. The mushrooms it seemed, were raring to get started. What promises to be a far better year for the mycorhizal mushrooms than the past three years have been, has already begun.

*Photo by Jack Waytz*

***Pleurotopsis longinqua***

There was a robust fruiting of a rarer relative of the oyster mushroom, *Pleurotopsis longinqua* (pictured here on the left) on the lower trails of Lookout Mountain. After some exhaustive research, neither Buck nor I could find any information on the edibility of this mushroom. Given that there are no dangerous toxins associated with this group, we came to the decision to pioneer it. The small, pink colored caps, which had an odor curiously reminiscent of raw *Boletus edulis,* turned out to be surprisingly flavorful. They had a rich, earthy flavor, which reminded both Buck and me of the flavor of another mushroom found commonly in our area, the sweetbread mushroom, *Clitopilus prunulus.*

Also present on several rotting snags on Lookout Mountain, were significant fruitings of *Xeromphalina campanella,* a fungus found frequently in our area during the fall mushroom season.

More recently, a very nice fruiting of a yet unknown variety of *Galerina* mushroom turned up in wood chips in the parking lot area of the Lookout Mountain trails, and the *Mycenas* typically found throughout the forests of our area in spring are begining to make their presence known as well.

*Photo by Jack Waytz*

***Xeromphalina campanella***

After three years of hot, dry summers, and no real winter weather to speak of, the results of a profound shift in weather patterns should prove to be equally profound throughout the Fifth Kingdom. There will be an abundance of moisture available from the melting of the best snow pack in several years, and a corresponding abundance of available energy in the

### *Inside this issue:*

trees which serve as mycorrizal partners for the fungi. The result ought to be reflected in both diversity and quantity of the mycorrizal mushrooms, many of which have been rare or absent since the phenomenal year for mushrooms of all types in 2013.

Naturally, the success of the fungi will be contingent in part upon weather conditions that establish themselves throughout the summer. But an excellent foundation will be laid following the hard winter, and plenty of all of the elements needed for a great year in 2017 for the mushrooms.

## 100 Years of Research Solves the Mystery of Hair Ice: It's a Fungus!

*By Jack Waytz*

Christian Mätzler, professor emeritus at the Institute of Applied Physics at the University of Bern in Switzerland, and Gisela Preuß, a biologist at the Wiedtal-Gymnasium in Neustadt, Germany, have completed the research began by Alfred Wegener, famous for his continental drift theory, who studied the formation of hair ice in 1918.

The glimmering threads of the fungus *Exidiopsis effuse*, grow predominately at latitudes between 45 and 55 degrees north through countries including Canada, France, Germany, India, Ireland, the Netherlands, Russia, Scotland, Slovenia, Sweden, Switzerland, the United States and Wales.

*Photo by Jack Waytz*

*Photo by Jack Waytz*

**This year provided an uncommon amount of days which favored the formation of hair ice by this fascinating fungus, which forms consistently when the temperature settles within a degree or two of the freezing point and when humidity is high.**

### CONTACT INFORMATION

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The Northwest Mushroomers Association meets 7–9 p.m. on the second Thursdays of Apr, May, June and Sept, Oct, and Nov. Meeting location is the downtown Bellingham Public Library.

We will inform you in advance of any changes in time or venue. Fungal forays and field trips are scheduled for the Saturday after each meeting. To stay apprised of forays, events and more, please join our googlegroups email list by signing up as a member.

Membership dues are $15 for families and individuals and $10 for students. Please make checks payable to NMA and mail "Attn: Membership" to the address above, or use Paypal online at northwestmushroomers.org/join-or-renew-membership/

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### NEWSLETTER

*MushRumors* is published in the months of March, June, September, November, and January online at northwestmushroomers.org. Club members are encouraged to submit stories, photos, recipes, and artwork. Submissions should be made two weeks prior to the month of publication.

For newsletter content or comments, contact editor Jack Waytz above or mail to:
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## Latest Name Changes Gleaned from Two Recent California Mushroom Guides *By Buck McAdoo*

Due mostly to DNA sequencing we are now seeing an unprecedented amount of name changes in our fungi. The Latin names are changing at such a fast rate that authors Schwarz and Siegel in their guide, *Mushrooms of the Redwood Coast*, included an entire index of common names just prior to the index of Latin names. Indeed, the accent is on stability of nomenclature through DNA. At the present time, it's an uneven roller coaster ride as some genera are receiving a lot more attention than others. But don't be alarmed. Their turns will come. Personally, I am still in favor of Latin names because we need an official botanical language that can be shared by all.

Nonetheless, I thought the time might be right to post a list of all the recent name changes from *California Mushrooms and Mushrooms of the Redwood Coast*. The authors are either professional mycologists or aspiring mycologists with fine connections with the former. They are all in the front lines, where these name changes occur.

| **Formerly** | **Now** |
|---|---|
| Craterellus cornucopioides | Craterellus calicornucopioides – (True C. cornucopioides still exists in Europe. Our West Coast version needed a new name.) |
| Amanita muscaria var. flavivolvata | Amanita muscaria subsp. flavivolvata |
| Cystoderma cinnabarina | Cystodermella cinnabarina |
| Coprinus disseminatus | Coprinellus disseminatus |
| Coprinus domesticus | Coprinellus domesticus |
| Coprinus niveus | Coprinopsis nivea |
| Coprinus atramentarius | Coprinopsis atramentaria |
| Pholiota carbonicola | Crassisporium funariophilum |
| Cortinarius sanguineus | Cortinarius neosanguineus – (Our West Coast version). |
| Psilocybe coprophila | Deconica coprophila |
| Psilocybe inquilina | Deconica inquilina |
| Psilocybe montana | Deconica Montana |
| Entoloma madidum | Entoloma medianox |
| Pluteus cervinus | Pluteus exilis – (P. cervinus turns out to be a valid but rare species that fruits only on wood chip mulch.) |
| Hygrocybe virginea | Cuphophyllus virgineus |
| Hygrocybe pratensis | Cuphophyllus pratensis |
| Clitocybe avellaneialba | Ampulloclitocybe avellaneialba |
| Clitocybe clavipes | Ampulloclitocybe clavipes |
| Mycena speirea | Phloeomana speirea |
| Mycena adonis | Atheniella Adonis |
| Mycena aurantiidisca | Atheniella aurantiidisca |
| Clitocybe flaccida | Paralepista flaccida |
| Boletus coniferarus | Caloboletus conifericola |
| Boletus rubripes | Caloboletus rubripes |
| Boletus mirabilis | Aureoboletus mirabilis |
| Boletus subtomentous | Xerocomus subtomentosus |
| Boletus zelleri | Xerocomellus atropurpureus & X. zelleri – (Xerocomellus zelleri still exists, but is much rarer in our area. The cap margin has a pallid band, which Xerocomellus atropurpureus lacks.) |
| Xerocomus chrysenteron | Xerocomellus diffractus or X. amylosporus or X. salicicola. –( Locally, there are 3 species hiding within the X. chysenteron name, and X. chrysenteron is not here.) |
| Phellinus gilvus | Fuscoporia gilva |
| Lenzites betulina | Trametes betulina |
| Ramaria myceliosa | Phaeoclavulina myceliosa |
| Cavulina cristata | Clavulina coralloides |
| Tyromyces caesius | Postia caesia |
| Tyromyces fragilis | Postia fragilis |
| Clavaria purpurea | Alloclavaria purpurea |

| | |
|---|---|
| Cordyceps capitata | Tolypocladium capitatum |
| Cordyceps ophioglossoides | Tolypocladium ophioglossoides |
| Cudonia monticola | Pachycudonia monticola |
| Calvatia bovista | Lycoperdon utriforme. |
| Vascellum pratense | Lycoperdon pretense |
| Vascellum curtisii | Lycoperdon curtisii |
| Crucibulum laeve | Crucibulum crucibuliforme |
| Tremella mesenterica | Tremella aurantia |
| Exidia nucleata | Myxarium nucleatum |
| Russula emetica in our area | Russula silvicola or R. cremoricolor |
| Russula rosacea in our area | Russula sanguinea |
| Cystoderma fallax | Cystoderma carcharias var. fallax |
| Lentinus ponderosus | Neolentinus ponderosus |
| Omphalina rosella | Contumyces rosellus |
| Clitocybe mutabilis | Neohygrophorus angelesianus |
| Dacrymyces palmatus | Dacrymyces chrysospermus |
| Gyromitra californica | Pseudorhizina californica |
| Plectania nannfeldtii | Donadinia nigrella |
| Hysterangium darkeri | Trappea darkerii |
| Boletus erythropus in our area | Boletus luridiformis |
| Helvella queletii in our area | Helvella solitaria |
| Collybia bakerensis | Gymnopus bakerensis |
| Mycena griseoviridis | Mycena nivicola |
| Mycena adscendens | Mycenas tenerrima |
| Inocybe geophylla in our area | Inocybe insinuata and perhaps two others |
| Bolbitius aleuriatus | Bolbitius reticulatus |
| Bolbitius vitellinus | Bolbitius titubans |
| Thaxterogaster pinguis | Cortinarius pinguis |
| Conocybe lactea | Conocybe apala |
| Galerina clavata | Galerina semilanceata |
| Galerina heterocystis | Galerina semilanceata |
| Pholiota subangularis | Pachylepyrium carbonicola |
| Cortinarius phoeniceus var. occidentalis | Cortinarius smithii |
| Agaricus albolutescens in our area | Agaricus moronii |
| Agaricus arvensis with pale ochre caps | Agaricus fissuratus |
| Agaricus cupreobrunneus in our area | Agaricus incultorum |
| Lenzites betulina | Trametes betulina |
| Calvatia subcretacea | Lycoperdon subcretacea |
| Tyromyces leucospongia | Postia leucospongia |
| Boletus satanas on west coast | Boletus eastwoodiae |

## Immediate Club Needs and Upcoming Spring Events *A note from Linda Magee*

We need a new VP, Treasurer and Secretary for the board; anyone interested in filling any of these positions should contact Linda Magee at 360nmasecretary.gmail.com or Brennen Brown at 360nmapresident@gmail.com

Upcoming Activities:

April meeting on Thur. April 13, 2017 Bellingham Central Library, 7-9 pm.
Foray at Fairhaven Park on Sat, April 22, 2017, 9:30 am to 1:30 pm.
May meeting on Thur. May 11. 2017 Bellingham Central Library, 7-9 pm
Mushroom Mayhem is May 19-21, 2017 -- check the website for details or contact Linda Magee at 360nmasecretary@gmail.com

## Mushroom of the Month: *Coprinopsis cf. atramentaria* (Bulliard) Redhead, Vilgalys, & Moncalvo *By Buck McAdoo*

*Photo by Buck McAdoo*

What you are looking at is not all that common. With caps at 10-12 cm wide, this is the largest member of the Coprinaceae I have ever seen. Only *Coprinopsis atramentaria* and *Coprinopsis insignis* can reach this size in the literature for north temperate species, and the latter is an east coast species. The 'cf' in the title means 'near' *C. atramentaria*. It's the best we can do for now. The gills had deliquesced to the point where we couldn't observe any tramal features except for spores. Fortunately, if it is *C. atramentaria*, it has a habit of multiple fruitings in the same location over the course of a year, so beginning in April or May, it could strike again. What are called for are fresh specimens that haven't deliquesced.

Pam Anderson came in from the cold. She found it out near Kendall in a ditch in a field. This is not the normal habitat for this taxon, but it could have been on buried wood. Evan Sanford drove it all the way to Bellingham on Thanksgiving Day. You have to be pretty stoked to walk away from your turkey, and I hadn't seen him this excited in years. If you look at the normal picture of *Coprinopsis atramentaria* below, you can see why.

I chose The Tippler's Bane as a rallying point because of the size of the carpophores and an on-line photo of this species showing the deeply furrowed caps and umbilicate discs before autodigestion had started. The only difference was the lack of a hole in the center of the pileus. This photo can be seen at Myco DB – Base de données mycologique. The photo is in the lower right corner. When I saw this I knew we had a great candidate for 'mushroom of the month'.

When you encounter specimens this bizarre in appearance, you wonder if you have stumbled upon a new species. Evan did some research on this and discovered that the hole in the cap disc and the deeply furrowed stipes (2 cm thick at the apex, tapering towards base) were not even mentioned in literature. In this particular time period new species crop up every week. They are simply ghost species hiding within species we already know, but with different DNA sequencing profiles. It would be refreshing to see a 'real one' for a change.

In the Middle Ages *Coprinopsis atramentaria* was heavily maligned. It was considered poisonous. The moment it appeared above ground it was kicked and destroyed by the English citizenry. Shelley even wrote a rhyme about it:

'Their mass rotted off them flake by flake,
'Till the thick stalk stuck like a murderer's stake,
Where rags of loose flesh yet tremble on high,
Infecting the winds that wander by'

By the late nineteenth century, *C. atramentaria* had gained a new reputation for unnatural strength. Worthington G. Smith reported that it lifted a large mass of asphalt paving in Hampton Road in 1889. Then in 1899 it repeated the feat in Dunstable. The fact that it often fruits in great clumps must have made this possible.

Normal caps of *Coprinopsis atramentaria* run from 3-8 cm wide and are ovoid at first before expanding to conical-convex with lobed margins. They are smooth at first becoming radially ribbed in age. Cap discs are bald or have tiny adpressed squamules. The gills are almost free and are whitish at first, then dark brown to purple brown, finally black as they start to deliquesce. Stems are 1- 1/12 cm thick at apex and 7-17 ½ cm long. They are white, smooth, except for a ring-like velar mark just above the base. The apex is often minutely pruinose at first. Odor and taste are mild. The spore deposit varies from dark brown to purple-brown to black-brown. It is usually found around rotting stumps or buried wood, but has also been found in organically enriched soils, mounds of burnt coffee, cultivated gardens, and compost heaps. It is never found on dung. They also produce a brown butt

and root rot of aspen and are suspected of being an aspen parasite.

The bulk of the above description was furnished by Orton & Watling in British Fungus Flora 2. From Duane Sept we learn that the bell shaped caps can be slightly depressed in age. From David Biek we discover that the veil does not always leave the vestige of a ring on the stem. From Kuo & Methven we note that cap margins are tattered and curled up in age. In The Fungal Pharmacy Robert Rogers shows us a photo of an umbilicate cap disc on page 106. From Geoffrey Kibby we learn that stems elongate as caps expand, often becoming spindle shaped, narrowing at base and apex. From Fred Van de Bogart we can look for small brown appressed squamules just above the stem base. Nina Lane Faubion chips in with 'the inside of the stem is obscurely banded, by which it may be recognized with certainty.' From McIlvaine we discover that gill edges are white floccose at first. According to Louis C.C. Kreiger, caps start off with a grayish bloom that is easily rubbed off. From Carleton Rea we learn the gills are very crowded, free, and ventricose. From D.H. Mitchel & A.H. Smith we find out that caps are often split at the disc in age as the context becomes very fragile, thin, watery, and pallid. From Desjardin, Stevens, and Wood we learn there is no partial veil, only a universal veil that leaves a fugacious ring above the stem base. Ammirati embroiders this statement by adding 'a true universal veil is lacking.' And finally, Soothill & Fairhurst show a photo of *C. atramentaria* that has the same brown cap color as Pam & Evan's specimens.

At this point it might be helpful to describe how deliquescence works. The Coprinaceae differ from other genera by having parallel gills instead of wedge shaped ones. This means the gills are so plastered together that spores have nowhere to go. To solve this dilemma the cap margins expand in age and start curling up at the margins. This allows spores to be released at the bottoms of each gill. Meanwhile the basidia are maturing in sequence from the gill edge upwards. Spores are also released just prior to autodigestion. Dispersal is further aided by the presence by extremely large pleurocystidia (200 x 20-30 microns) that help keep adjacent gills apart. As the spores disperse, the gills turn into ink, trapping many more spores in the liquid. Autodigestion also helps by removing parts of the gills that have already shed their spores, thus providing space for the next wave of basidia to release theirs. The black color comes from an oxidizing enzyme that digests the cells of cap and gills. Even the basidia are helped along in separation from each other by the presence of brachybasidioles, bloated cells that appear between them.

*Photo by Buck McAdoo*

Microscopically, the spores are broadly ovate, thick-walled, usually guttulate, and have centrally truncate germ pores. Van de Bogart measured them at 8-10 x 4.4-6.5 microns. Pam & Evan's specimens had considerably larger spores at 9.5-12 x 6.7-7.6 microns. The basidia are broadly clavate with narrowed bases and measure 22-40 x 7-10 microns. D.H. Mitchel & A.H. Smith found them to be of two distinct lengths, either at 26 or 32 microns. According to Ramsbottom the two different lengths permit the development of a greater number of basidia in a given area. More basidia, more spores. The giant pleurocystidia are subcylindric, thin-walled, and collapse readily. The fact that we couldn't see these in the Kendall specimens attests to the power of deliquescence over microscopic features. The cheilocystidia are cylindric to clavate, narrowly fusiform or elongate-ovoid. They measure 24-80 x 10-30 microns. The pileipellis is a cutis of inflated cells intermingled with narrower hyphae. The gill trama is of loosely arranged semi-inflated cells and the subhymenium is cellular. Greenish refractive oleiferus hyphae sometimes appear in cap and gill trama. According to Breitenbach & Kranzlin 'velar hyphae on the stem are brownish encrusted, some with clamps.' There are no pileocystidia nor caulocystidia. A squash mount of the cap disc of one of the Kendall specimens revealed thin, interwoven, encrusted hyphae with thick-walled sphaerocysts here and there among them. These globose spheres measured 20-30 x 20-27 microns and were filled with granular contents. And as for reagents, Mitchel & Smith reported no reaction from KOH and a pale gray result from FeSo4.

Look-alikes of *Coprinopsis atramentaria* are as follows:

*Coprinopsis acuminata* – This taxon has a smaller stature with umbonate discs that become flattened in age. It has thinner spores at 4-5.2 microns wide.

*Coprinus alopecia* – Differs by its verrucose spores and habit of fruiting on oak trunks.

*Coprinopsis depressiceps* – Differs by its laterally flattened spores, ring-like veil at mid-stipe, and deeply rooting stems. Caps have depressed discs but only reach 4 ½ cm wide. The basidia come in three distinct sizes. Found around willow.

*Coprinus fuscescens* - A smaller, thinner species with gray-brown caps and reddish discs. Spores are 7-9 microns wide. Cap discs are rimosely squamulose. A dubious species according to Orton & Watling.

*Photo by Jack Waytz*

*Coprinus fuscescens var. rimoso-squamosus* – Has caps that become cracked into angular patches in age.

*Coprinopsis insignis* – The other large member of the Coprinaceae with caps up to 15 cm wide. It differs by its verrucose spores, pallid gray caps with brownish discs and a more distinct veil on the cap. An east coast species that prefers maple stumps. Bill Russell warns us that it is poisonous to some.

*Coprinus quadrifidus* – Has a much smaller stature and large flattened cap scales. It further differs by its white rhizomorphs at the stem base.

*Coprinopsis romagnesiana* – Differs by its appressed rusty-brown squamules at disc and small blackish scales on lower stem.

*Coprinus sobolifer* – Another large species that has spores 15 x 7 microns. Found on maple roots, it traditionally differed by its pallid, almost whitish caps. According to Index Fungorum, now a synonym of Coprinopsis atramentaria.

As for edibility there are no dearth of opinions in how to prepare or eat *C. atramentaria*:

Charles Horton Peck – "It deliquesces rapidly and is therefore more available as catsup than for food."

David Arora – "I ate Inky Cap and salami sandwiches as a teenager."

Ansell Stubbs – Inkies can be quick frozen after gathering. They can be used as a dressing for meats. Once cooked they will keep for several days in the fridge.

Bill Russell – You can safely eat this mushroom if it is fresh and has not spoiled from bacterial contamination.

Worthington G. Smith – *Coprinus atramentarius* is used to make an inferior ketchup, but preferred by some to Shaggy Mane.

Leon Schemenauer – Inky caps can be kept fresh for eight days if totally submerged in water.

Mordecai Cooke – This is another fungus, closely related to the Shaggy Mane and resembling it in many particulars, which is equally edible and nearly equal in its flavor.

Jiri Kubicka & Mirko Svrcek – It can also be toxic when mixed with coffee.

Ben Guild – Stems are tough and cartilaginous and should be discarded in the field.

Robert Rogers - This species contains 21% protein and 5.7% fat. It also contains tryptamine, tryptophan, and high levels of ergosterols. In China it is eaten to improve digestion and reduce phlegm.

Dickinson & Lucas – It can be eaten raw in salads.

A.H. Smith – It should be cooked immediately. Will not keep overnight in the fridge.

Calvin Kauffman – Tastes best when the caps are not expanded.

William Sturgis Thomas – An excellent edible species.

Forsberg & Lindberg – Research has shown that coprine can cause testicular damage to rats.

Clyde Christensen – Eminently edible. They are of good flavor and very delicate texture. They mature in a few hours to a day, so must be eaten immediately.

W.B. McDougall – It is more highly flavored than the Shaggy Mane and considered an excellent species for stewing.

After this endorsement, it would not do not to have a recipe included here. Ansell Stubbs supplies us with one.

He calls it: **Beef Fillets with Inky Caps**.

| Ingredients | Preparation |
|---|---|
| ½ cup sliced inky caps | Sautée onion slices in oil until browned. |
| 1 lb. beef cut into strips | Remove onions from pan. |
| 3 cups sliced onions | Reheat with 2 tblsp. oil and fry beef strips until brown. |
| 2 tblsp. peanut oil | Add the mushrooms, shredded ginger, soy sauce, and onions. |
| 2 tblsp. shredded ginger | Heat thoroughly and thicken with cornstarch, mushroom liquid, |
| 4 tblsp. soy sauce | and enough water to make one cup. |
| 2 tblsp. cornstarch | |

But the road to heaven is seldom straight. *Coprinopsis atramentaria* is not called 'The Alcohol Inky' or 'TheTippler's Bane' for nothing. It is one mushroom you don't want to consume with alcohol. The result is coprine poisoning, a type of poisoning actually named for this species. Coprine is an amino acid derivative, a compound considered to be 1-aminocyclopropanol. It interferes with the ability of the liver to metabolize alcohol. Enzymes which normally convert alcohol to acetaldehyde, which then is converted to vinegar and then to carbon dioxide and water before being expelled from the body, are interrupted. The process is stopped at the acetaldehyde stage. It is the acetaldehyde which causes the violent vasomotor reactions that produce the symptoms.These symptoms can start from ten minutes to half an hour after ingesting the mushrooms and drinking alcohol. According to Emil Guba, " The face becomes red, then violet; the coloring spreads to the neck and body. The tip of the nose and the ear lobes become pale. There is a sensation of heat, palpitations of the heart, and the pulse races to 150 beats per minute. There can be a sudden drop in blood pressure along with severe vomiting, diarrhea, and shock. Reactions vary depending on the person and the amount of alcohol consumed. Others have reported light headedness, a metallic taste in the mouth, nausea, a tingling in arms and legs, severe headache, sweating, anxiety, and cardiovascular collapse. Occasionally the victim actually faints. The good news is that these symptoms usually fade away after two or three hours on their own."

In severe cases the symptoms can progress to trachycardia, hypotension, dyspnea, cardiac arrhythmias, or esophageal rupture. Curative steps are then required. These generally would include activated charcoal if there was no vomiting, propanolol for trachycardia and heavy palpitations, and isotonic fluids for hypotension prior to vasopressor therapy. If cardiac problems occur, Moreno, Manjon, & Zugaza suggest administering vitamin C and an intervenose dosage of iron. If low blood pressure persists, Turner & Szczawinski suggest dopamine. It is important to maintain fluid and electrolyte balance.

Moira Savonius can tell us about it. She wrote "this unattractive bell-shaped fungus does not dissolve in the same way as Lawyer's Wig (*Coprinus comatus*). It will cause sickness and frightening purple blotches on the face and arms if served with wine, beer, or spirits because it contains antibuse."

It actually doesn't contain antabuse (the medicine taken to curb alcohol abuse) but the symptoms are similar enough to prompt Andrus Voitk to note "The reaction from eating *C. atramentaria* along with alcohol led to the development of antabuse, the treatment for alcoholics."

Several sources report a recurrence of the symptoms if alcohol is again taken up to five days after the *Coprinopsis* was eaten. It seems like there should be spans of time both before and after the mushroom was eaten before alcohol can be tried. Cattle are also affected by the syndrome. Dr. Heinz Clemençon reported from Switzerland about a farmer who mixed *C. atramentaria* into the evening fodder. By nightfall, four of his cows seemed inflated. He proceeded to give them an anti-gas remedy. One of the cows only got worse. This bovine was then given a half-liter of kirsch, a cherry liquor. It went berserk with accelerated pulse, high fever, and agitated respiration. A veterinarian was summoned. He gave the cow a calming injection that did nothing at all. The cow was eventually sacrificed (their term).

Other mushrooms that can produce similar symptoms when mixed with alcohol are *Coprinopsis insignis*, *Coprinopsis variegata*, *Ampulloclitocybe clavipes*, *Coprinus quadrifidus*, *Coprinus erethistes*, *Laetiporus sulphureus, Pholiota squarrosa*, several black morels, *Suillellus luridus*, *Tricholoma auratum*, *Tricholoma equestre*, and *Verpa bohemica.* No specifics were given over which morels.

According to Emil Guba raw specimens of *Coprinopsis atramentaria* mixed with alcohol do not provoke the same symptoms. One day my brother and I decided to test this theory in Vermont. We fried up some chopped

onions, minced several large caps of the Alcohol Inky and mixed them with sour cream to make a chip dip. Then we popped some beers. About twenty minutes later we were both running for the toilets. Luckily there were two of those. We experienced explosive diarrhea on and off for about 45 minutes, but suffered no other evil symptoms. We came to the conclusion that if we were in need of cleansing our stomachs, the Alcohol Inky was a better choice than an enema.

We can all thank Evan and Pam for finding the fungus that brought this little known story to light. It turns out this mushroom has other attributes as well. In Sweden it is applied to sores caused by burns. In China it is applied externally to furuncles, sores and dermatitis. It is found all over the world except in Greenland and New Guinea.

And of course we can't forget the ink. Back in the early days of mycology, Emile Boudier had a special method. The carpophores were put in a large vessel and allowed to deliquesce. After some time ¾ of the liquid was decanted off and gum arabic was added to make a strong ink. Boudier wrote his manuscript with this ink. Pierre Bulliard also experimented. He discovered that Coprinus ink boiled with a little water and cloves prevented mold. He used the ink for wash drawings. And according to Patrick Harding in the 17th and 18th centuries phenol was added to boiled Coprinus ink to help in preservation. It was suggested that fungal ink be used for legal documents. Later, the absence of spores cold indicate a forgery.

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***Attention Northwest Mushroomers! After 14 years as the editor of MushRumors, I have decided that it is time to hand over the reigns of editor to an enthusiastic and qualified individual with a desire to be the jounalist that represents our fine organization. The process would begin with me mentoring you as an assistant, allowing you to familiarize yourself with the necessary institutional knowledge to produce this newsletter. If interested, contact me, Jack Waytz, via email at: gandalf5926@comcast.net***

## Satellite Images Uncover Underground Forest Fungi *By Carol Rasmussen, NASA's Earth Science News Team*

A NASA-led team of scientists has developed the first-ever method for detecting the presence of different types of underground forest fungi from space, information that may help researchers predict how climate change will alter forest habitats. Hidden beneath every forest is a network of fungi living in mutually beneficial relationships with the trees. Called mycorrhizal fungi, these organisms spread underground for miles, scavenging for nutrients that they trade with trees for sugars the trees make during photosynthesis. "Nearly all tree species associate with only one of two types of mycorrhizal fungi," explained coauthor Richard Phillips of Indiana University, Bloomington. Because the two types of fungi are expected to respond differently to a changing climate, knowing where each type predominates may help scientists predict where forests will thrive in the future and where they will falter.

*Credit: Malene Thyssen/CC BY-SA 3.0.*

**Exact types of fungi in a forest location can now be identified in satellite images.**

Creating maps of forests and their fungi has traditionally relied on various methods of counting individual tree species, an approach that cannot be done at large scales. In a new study published in the journal *Global Change Biology,* a team led by Joshua Fisher of NASA's Jet Propulsion Laboratory, Pasadena, California, and UCLA, found a way to detect this hidden network using satellite images.

Every tree species has its own spectral signature — it absorbs or reflects light in a specific pattern across all the wavelengths in the spectrum of light. Using satellite images of forest canopies, Fisher's group probed whether they could identify any patterns in the spectral signatures of tree species associated with one type of fungus that did not appear in species associated with the other type.

Fisher explained, "Individual tree species have unique spectral fingerprints, but we thought the underlying fungi could be controlling them as groups." The team studied images of four U.S. forest research lots that are part of the Smithsonian Institution's Forest Global Earth Observatory. In these forests, which include 130,000 trees across 77 species, the tree species associated with each type of fungus had already been mapped from the ground. The researchers analyzed images of the forest canopies taken by the NASA/U.S. Geological Survey Landsat-5 satellite from 2008 to 2011 in many different ways, searching for similarities that lined up with areas of fungus dominance. They found what they were looking for when they examined various milestones throughout the growing season, such as when the trees leafed out in spring and when they reached peak greenness. There were significant differences in the timing of these milestones between regions dominated by the two types of fungi.

**Mycorrhizal fungi (white/yellow) trading nutrients for carbon with tree roots (brown). Credit: Indiana University**

Having identified the timing sequences related to each type of fungus, the researchers developed and tested a statistical model to predict the areas of fungus domination in any particular Landsat image from canopy changes alone. They found they could predict the fungus association correctly in 77 percent of the images. They went on to produce landscape-wide maps of fungi associations, uncovering intriguing patterns in forests that will be studied in greater depth in the future.

Source: NASA: Global Climate Change, http://climate.nasa.gov/news/2424/. Reprinted from the newsletter of the Oregon Mycological Society, also called MushRumors, Vol. 55, No. 3 May/June 2016