

SPORE PRINTS

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CANADIAN TRUFFLE FARMER DISCOVERS A NEW NATIVE VARIETY THAT SMELLS LIKE BACON

CBC News

<https://www.cbc.ca>, Oct 22, 2023

When Lucille Groulx started her truffle farm in Wendover, Ont., in 2015, she was using truffles she had imported from France. Only later did she discover an indigenous variety of the rare delicacy was already buried on her land.

The native truffle found on the Domaine du Roi farm is part of the *Tuber rufum* family, a type of truffle that exists almost everywhere in the world but includes local indigenous varieties.

Originally, Groulx had opted for Burgundy truffles and made the trip to France to bring some back. Burgundy truffles were ideal, Groulx said, as they were well adapted to Ontario's climate and would help protect her oak and hazel trees against disease.

But as she was digging to harvest the fungi, she was surprised to come across a delicious intruder.

"I planted Burgundy truffles, then I found another truffle," she said in French. "You know, you plant red potatoes, you find white new potatoes."



Native truffle..

Chantal Dubuc/Radio-Canada

Truffle Has Unique Genetic Makeup

Groulx, a former pharmacy technician, rushed to have the truffle analyzed to ensure it was edible.

A laboratory at the University of Florida confirmed last January the truffle was not only safe to eat, but also had a unique genetic makeup. The truffle's DNA sequence had never been identified before, and its natural chemical compounds give it a unique character—and a smell and taste of its own. According to Groulx, the fungus is distinguished by smoky notes, reminiscent of bacon.

Its interior is made up of hazelnut-colored marbling, while its exterior envelope is pale brown in color, Groulx said.

Maude Lemire-Comeau, president and CEO of Truffles Québec, said the discovery of a truffle native to the area is exciting.

The organization produces truffle trees for all of North America, and Lemire-Comeau sees commercial potential.

Truffle trees are trees that support the growth of truffles, like oak.

Dog Helps Find the Truffles

Lemire-Comeau said truffle spores must already have been present in the Ontario subsoil when she planted the French imports. "The biggest competitors for truffles when you set up a truffle farm are

other types of truffles," Lemire-Comeau said, adding her native truffles are now supplanting the ones from Burgundy.

She's finding many more with the help of her dog, Minoune, whose ability to track down the truffles is "exceptional," according to Groulx.

It takes a lot of patience to spot the powerfully-scented fungi, and Groulx's four-legged companion prefers to hunt mice or eat grass, rather than looking for precious truffles.

"When she starts scratching, you know it's there," she said in French. "As soon as I find it, I put it under her nose so that she can smell what she has found."



Stéphanie Rhéaume/Radio-Canada

Groulx rewards Minoune for each underground treasure she finds.

Truffle hunter Minoune, 7, is an Australian shepherd.

A native of Alfred and Plantagenet, Ont., Groulx studied dairy production at the Alfred College of Agricultural and Food Technology in the 1980s. She then dreamed of taking over the family land.

Now, she's harvesting the native truffle and incorporating it into cream cheese she makes—further evidence she's "caught the truffle bug."

COMMON FUNGUS MIGHT FUEL ALZHEIMER'S ONSET

Homa Warren

<https://neurosciencenews.com/>, Oct. 16, 2023

Previous research has implicated fungi in chronic neurodegenerative conditions such as Alzheimer's disease, but there is limited understanding of how these common microbes could be involved in the development of these conditions.

Working with animal models, researchers at Baylor College of Medicine and collaborating institutions discovered how the fungus *Candida albicans* enters the brain, activates two separate mechanisms in brain cells that promote its clearance, and, important for the understanding of Alzheimer's disease development, generates amyloid beta (Ab)-like peptides, toxic protein fragments from the amyloid precursor protein that are considered to be at the center of the development of Alzheimer's disease. The study appears in the journal *Cell Reports*.

"Our lab has years of experience studying fungi, so we embarked on the study of the connection between *C. albicans* and Alzheimer's disease in animal models," said corresponding author Dr. David Corry, Fulbright Endowed Chair in Pathology and professor

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CALENDAR

- Nov. 4 Field trip (see www.psms.org member's section)
- Nov. 6 Last 2023 PSMS free public mushroom ID clinic
4–7 pm, CUH
- Nov. 14 Membership meeting, 7:30 pm, CUH
- Nov. 20 Board meeting, 7:30 pm, CUH boardroom
- Nov. 28 *Spore Prints* deadline

BOARD NEWS

Carolina Kohler

At its monthly meeting on October 16th, the PSMS board had one last chance to go over the vast amount of volunteer work that went into making our annual wild mushroom show a reality. And once more, it was humbling to see how many people were devoting countless hours, so much work, and such energy to bringing the show to fruition. We hope you all had a chance to enjoy it!

This is also a very good reminder that PSMS is an organization **fully** run by volunteers, with **no** paid positions. This means that everything—from our annual wild mushroom show to the Monday ID clinics, to the outreach talks, to the field trips, to this *Spore Prints* publication you are reading—is done by volunteers. You can be a

part of this! Search the Member's Page on the PSMS website to find all sorts of volunteering opportunities.

The rest of our board meeting covered the monthly financial reports by Treasurer Brenda Fong; an update on the work to improve our Zoom membership meetings; and the progress of the cleaning and tidying efforts of our spaces at CUH.

The board will also start working on reaching out, both to the public and to the membership, with more in-depth information regarding several of the PSMS pursuits and activities, such as the Mycoblitiz project, the Bridle Trails study, the Citizen Science fungal DNA sequencing project, PSMS-awarded scholarships and donations, etc. A lot goes on behind the scenes at PSMS, and it would be great to make this information better known.

And finally, although the show had been garnering most of our attention until now, we have already started talking about our December social event! We hope to have more details to share after our next board meeting on November 20th.

MEMBERSHIP MEETING

Scott Maxwell

The general membership meeting on November 14, 2023, will again be both in-person at CUH and broadcast via Zoom. People will be let into the meeting at 7:00 pm, and the meeting will begin at 7:30 pm. Zoomers will be let in beginning at about 7:20 pm. The speaker will be Daniel Winkler, who will be sharing what he calls the "Fourteen Fantastic Fungi."



Daniel Winkler

After last year's heart-breaking poor fall mushroom season, this year mushrooms have roared back and pushed out fruiting bodies like crazy. But how do you deal with such a diversity of mushrooms? Daniel describes 14 Pacific Northwest wild fungi—such as chanterelles, hedgehogs, king boletes, morels, bear's head, and cauliflower mushrooms—that are delicious, easy to identify edibles, helping beginners overcome fungiphobia and truly appreciate wild mushrooms. Interestingly, many of these fungi are also collected by mushroom hunters around the world. Daniel includes both fungi and collectors in far flung forests in the talk.

Daniel grew up collecting and eating wild mushrooms in the Alps and is sharing his enthusiasm as a mushroom educator, photographer, and guide. The Puget Sound Mycological Society, which he joined in 1996, was instrumental in exposing Daniel to mycology and inspiring him to bend his career toward mushrooms. Daniel served on the PSMS board and as vice president for many years and just published his book *Fruits of the Forest—Field Guide to Pacific Northwest Edible Mushrooms* (available at mushrooming.com), a product of a life time of mushroom hunting, the last 25 in the PNW. Previously he has also published a series of fold-out field guides as well as MycoCards. As an ecologist and geographer, Daniel focused on High Asia researching Tibet's enormous fungal economy. His ethno-mycological *Cordyceps* research has been featured in *National Geographic*, *The New York Times*, *The Economist*, NPR, BBC World Service etc. In the past decade Daniel started exploring neotropical fungi. With his travel agency MushRoaming, Daniel has been organizing mushroom-focused eco-adventures since 2007; current destinations are Bhutan and Colombia.

FIELD TRIP REPORT, Sept. 30, 2023

Brian S. Luther

Out of 105 members who signed in, 35 were on their first PSMS field trip at this location, and we lucked out by getting a sunny day. Our morning hosts were Donna & Julia Barnett (mother and daughter). They set out a great selection of breakfast snacks, along with plenty of hot coffee and really started our morning off right. Our Hosting Committee co-Chairs, Debbie Johnson & Carolina Kohler, recently purchased some new French Press coffee makers to try out, and they worked well on their debut here. Thank you, Julia and Donna—well done!

Thanks to our Mason Co. Parks host, Bernie Games, who provided us with kindling and firewood for a very appealing morning fire and also brought over several comfortable chairs for us to use and have nice conversations together throughout the day.

There were 16 field trip guides who went out, in 12 groups, so all newcomers and many others got to sign up and be led out. We appreciate their contributions. The guides were Wren Hudgins, Dave & Wuqi Weber, Bill Buck, Sego Jackson, Ashley Laabs & Kai Carpenter, Cindy & Megan Brewster, Melanie Vartanian & Patrick Rice, David Dowd, Andrew Graesser, Sandra Ruffner, Joe Zapososky, and Jan Agosti.



Joe Zapososky

Wren Hudgins & Brian Luther leading the morning meeting.

Pam and I went out with Debbie Johnson and Maria Gerace exploring for good collecting. The first place we went had few fungi, and I only found a single small chanterelle. When we went much farther up logging roads into the forest, then randomly stopped (not knowing where we were going), we were rewarded with big baskets full of choice *Cantharellus formosus*.

More than 125 different species of fungi were brought in, covering two picnic tables. Chanterelles were the only choice edibles found, along with a few Angel Wings (*Pleurocybella porrigens*). Quite a few Woodland Russulas (*Russula xerampelina*) were also found, as well as some miscellaneous boletes that were not especially desirable for eating.

The prettiest mushroom found was *Marasmius plicatulus* with its beautiful warm chestnut-colored cap and stem. Other interesting species included *Truncocolumella citrina*, a hypogeous false truffle, the polypores *Climacocystis borealis*, and *Fomitopsis officinalis* (Agaricon/Quinine Conk) with multiple vertical growth layers.

A single specimen of the rare Western form of *Amanita farinosa* was also brought in, which I hadn't seen in many years. The Western Dust Cap, as it's called, is larger and somewhat different from the Eastern form, which is the true *A. farinosa*. Our Western form is awaiting



Brian S. Luther

Amanita farinosa.

a new name. Most people would not even recognize it as being in that genus. At first glance it looks more like a small gray *Russula*, lacking an enlarged stem bulb, an annulus or pronounced universal veil tissue on the cap, as is commonly seen in that genus. It does have a granular coating on the cap, and its microscopic features put it unmistakably in that genus.

An excellent potluck at 3:30 pm was a very satisfying end to a fun day out in the woods collecting.

FIELD TRIP REPORT, October 7, 2023

Brian S. Luther

We had great weather for the day on our second fall outing, which was at a location we'd never been to before. One hundred and sixty one members signed in, making it one of the largest field trips we've seen in a long time. Of those, 36 were on their very first PSMS field trip. As soon as I arrived, I got a fire going in the shelter fireplace, and even though it ended up being a warm, sunny day, the fire was quite welcoming as it was cool first thing in the morning.

Our host was Mark Boyle, ably assisted by Debbie Johnson, Mandy Andrea, and Hans Drabicki. What a wonderful spread of tasty breakfast snacks they set out, along with abundant hot coffee. This is the reason that PSMS field trips always start out right in the morning, so a special thank-you to our hosts!

Seventeen field trip guides (a record number) were organized by Wren Hudgins and Dave Weber, allowing everyone to go with a group if they wanted to. Thanks to all who contributed to this part of our field trips.

Even though I counted 150 species covering two tables, good edible fungi were few and far between. Only a few chanterelles (*Cantharellus formosus*) and three nice *Boletus fibrillosus* (a relative of *B. edulis*) were collected, as well as small collections of *Hericium abietis* (Bear's Head) and Angel Wings



Wren Hudgins



Brian S. Luther

Cauliflower mushroom.

(*Pleurocybella porrigens*); however, two lovely specimens of *Sparassis radicata* (Cauliflower Mushroom) came in, to the delight of the members who found them. I did table tours throughout the day as members returned.

Several specimens of the Dyer's Polypore or Conk (*Phaeolus schweinitzii*) were found in different stages of development, showing the transition of colors as the species matures. Interesting finds included *Mycena oregonensis* and the polypore *Postia perdelicata*. The most beautiful mushrooms were *Leucoagaricus (Lepiota) roseilivida*, a very petite species with a gorgeous lilac-purple cap, and *Atheniella (Mycena) aurantiidisca* with brilliant yellow-orange caps.

The potluck at 3:00 pm was quite a spread and well attended, ending a delightful day with friends in the woods. A number of members pitched in to clear the specimen tables and get the shelter cleaned up so it was in the same good condition as when we arrived.

On this, our third PSMS fall field trip, we had 30 members sign in. Most were either camping in tents or with RVs on Friday and Saturday, but some came just for the day. It drizzled only infrequently and was mostly just cloudy and with moderate temperatures, making for an excellent weekend out.

Our PSMS hosts were Vern Hodgson & Sunida Bintasan, who made sure we were fueled up on breakfast goodies and hot coffee before heading out into the woods. This was a rather remote, non-electric site, so we also greatly appreciated Dave & Wuqi Weber bringing their generator and extension cords, allowing the hosts to boil water for the French Press coffee makers, etc. Thank you Vern, Sunida, Dave & Wuqi! I always throw in a chain saw and it came in handy getting more firewood for the campfire that was kept going all weekend. Julia Benson, Ben Moore & I worked together cutting a couple of loads of wood for the fire—thanks Ben & Julia.

Dave Weber organized three groups of field trip guides: he & Wuqi, Julia Benson, and Patrick Rice. Because of the very manageable number of participants, all of whom arrived early, everybody was able to go out with an organized group if they wanted to.

I counted approximately 90 species of fungi displayed and did table tours discussing them a couple times on Saturday. Concerning edibles, most all members found White Chanterelles (*Cantharellus subalbidus*), with some getting bags full. Western Matsutake (*Tricholoma murrillianum*) were also found (I personally found seven choice buttons). Few other good edible species came in except some Woodland Russulas (*R. xerampelina*), most of which were over-mature, and a collection of *Pleurotus pulmonarius*, our only species of Oyster Mushroom growing on conifer wood.

Interesting fungi included three different species of *Clavariadelphus* (*C. truncatus*, *C. sachalinensis*, and *C. mucronatus*) and the gorgeous apricot-orange colored *Pyrrhulomyces astragalinus* (formerly *Pholiota astragalina*).



Brian S. Luther

The rarest fungus was *Neolecta irregularis*, a bright yellow club-shaped Ascomycete which is normally found only at much higher elevations. The two strongest smelling species were *Rhodocollybia oregonensis* with a distinct bitter almond odor and the beautiful blue-green *Clitocybe odora* var. *pacifica* with an unmistakable aroma of anise.

Clavariadelphus mucronatus.

After coming back from collecting in the afternoon, the whole group sat around enjoying the big campfire and the camaraderie for a few hours. Eighteen stayed for the potluck at 4:00 pm Saturday, which had a good selection of tasty dishes so nobody left hungry. The culinary highlight, however, in my opinion, was the smoked Ling Cod and salmon that Ben and Natalya Moore had caught themselves and prepared—a real treat for all!



Having reminded the members remaining how it was important to make sure the group camp was immaculate upon leaving on Sunday, Pam and I left a couple hours after the potluck. It was a delightful day in the woods with PSMS friends.

Wouldn't it be great to have a field trip day that was warm (74°F), partly sunny, and with tons of mushrooms? Well, that's what we had on this Saturday with 84 members signing in.

Our morning hosts were Paolo Assandri & Masaki Jo, who provided us with a delightful selection of snacks and coffee. Special thanks, Masaki & Paolo!

Seven field trip guides took out groups interested in going. Some who went out did very well, finding the following good edibles: White Chanterelles (*Cantharellus subalbidus*), Matsutake (*Tricholoma murrillianum*), some *Hericium abietis* (Bear's Head), and one King Bolete (*Boletus edulis*). Approximately 200 different species were displayed on eight tables—a huge selection!

Interesting species included a few rare *Cortinarius iodes* with a beautiful bright purple cap mottled with white and the large and meaty yellow-greenish polypore *Albatrellus (Scutiger) ellisii* with a heavily scaly cap. One of the most beautiful was a brilliant red-orange *Hygrophorus speciosus*. This last mushroom was one of several others found that are mycorrhizal only with Larch, including *Suillus ampliporus* (formerly *S. cavipes*), *S. grevillei*, and *S. ochraceoroseus*.

The most remarkable find was the largest gilled mushroom that I've ever seen here in over 50 years of collecting—a gargantuan specimen of *Leucopaxillus giganteus* with a cap measuring 26 inches in diameter—wow! It was so large that the member who found it could not bring the entire mushroom in without the stem breaking off.



Brian S. Luther

Leucopaxillus giganteus cap 25 inches in diameter.

All in all, an excellent day, which ended with a fine potluck. We want to thank Tucker Jonas, our facility host at this location, for being so accommodating.



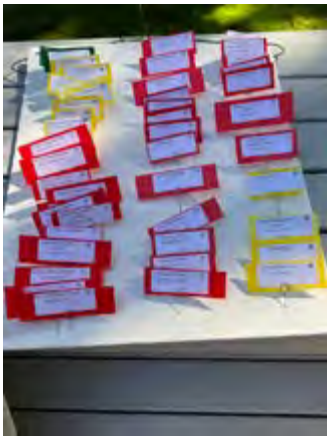
Brian S. Luther

Eight tables covered with mushrooms, Oct. 21, 2023.

UPDATING LABELS FOR THE 2023 SHOW (and beyond) Danny Miller & Wren Hudgins

Many of you know that PSMS Education Chair Danny Miller, with primary funding and assistance from a research grant set up by a donation from PSMS member Yi-Min Wang, has for a couple of years now been pursuing DNA analysis of Pacific Northwest mushrooms. Increasingly we are learning from research projects

like this all over the continent that many of the specimen names we have been using for a long time are not correct. Some of the mushrooms we thought we knew need a new species name and others new genus and species names.* While this list of new names has been building up, we have been getting feedback from attendees at the annual mushroom show for at least the past two years saying that they would like common names added to the labels. So for our 2023 show, we decided to tackle both issues at once and create entirely new ID labels for 929 species that include the latest scientific name, the most popular common name, and also an edibility icon for color blind attendees who could not see a difference between our green label backing (edible) and our red label (toxic). We average 272 specimens per show but have seen a total of 929 different ones over the last 23 years.



Label work party, October 1, 2023.

Within our club membership, we have a group of field trip guides who know a little more than average and work harder than average to improve their skills. We recruited 9 of them for a work party at the residence of Wren Hudgins on October 1, 2023. In 4.5 hours, we managed to completely update the accuracy of our

*In the late 1700s two mushrooms were called the same genus and species if they looked alike to the naked eye. This lasted about 100 years until we got the microscope and could see detail at a finer level. Then a wholesale reclassification occurred with many specimens getting new and different genus and/or species names. This arrangement lasted about another 100 years until we got DNA analysis. So we are going through another wholesale reclassification right now. The good news is that this is probably the final word. We (the professional mycological community) have decided that DNA analysis is the definitive analysis. But humility is a good thing. Those early users of the microscope probably thought they had the last word too.

identification labels, all 1773 of them, not including preparation work on the front end and cleanup on the back end.

This is no small accomplishment. Every club in the country is faced with the specter of refreshing labels at some point. Most show attendees are beginners and won't know the difference, but for those of us who do know the difference, we are proud to offer what may be the most updated specimen ID labeling (for PNW mushrooms) that may exist in the USA. Perhaps some other clubs have gone through a similar process in the last few months relative to their region, but it's probably safe to say that no other club has a more updated set of ID labels than we do (as of 10/1/23).

INTESTINAL FUNGI MAY WORSEN LUNG INFLAMMATION IN SEVERE COVID-19 CASES

Mary Van Beusekom

<https://www.cidrap.umn.edu/>, Oct. 24, 2023

In severely ill COVID-19 patients, some kinds of fungi can thrive in the intestines, exacerbating the virus's characteristic inflammation and leading to an outsized immune response against the fungi for up to 1 year after infection, suggests a study published yesterday in *Nature Immunology*.

Weill Cornell Medicine and New York Presbyterian researchers analyzed blood samples from patients with severe COVID-19, finding immunoglobulin G (IgG) antibodies against fungi commonly found in the gut and an increase in neutrophil immune cells in the lungs.

They then used mouse models to confirm that fungi in the gut, especially strains of *Candida albicans* yeast, provoked the production of more neutrophils in the blood and lungs. The mice also had signs of inflammation when infected with SARS-CoV-2.

Patient blood samples showed signs of persistent immune-system changes believed to be related to long COVID. At 1 year postinfection, the blood still contained antifungal antibodies and stem cells that give rise to neutrophils were primed to attack fungi.

The immune protein interleukin-6, induced by fungi, seemed to increase levels of both neutrophils in the lungs and fungal antibodies. The use of IL-6 blockers or antifungal drugs in patients or mice, however, reduced levels of neutrophils and fungal antibodies. Patients treated with the anti-inflammatory drug tocilizumab saw sustained reductions in IgG antibodies against both *C. albicans* and neutrophil progenitors.

"Severe and long COVID-19 were not thought to involve fungal blooms in the intestines that, in addition to the virus, can impact patient's immunity," senior author Iliyan Iliev, PhD, of Weill Cornell Medicine, said in a college news release.

The authors said the findings don't change the guidelines for treating severe or long COVID, but they may someday lead to tailored treatment, such as the use of antifungal antibodies to identify patients eligible for a therapy targeting the fungi or the immunologic changes they trigger. The antifungal antibodies may also be a marker of increased risk of long COVID or other infectious inflammatory conditions.

Fungus vs Alzheimer's Onset, cont. from page 1

of pathology and immunology and medicine at Baylor. He also is a member of Baylor's Dan L. Duncan Comprehensive Cancer Center.

"In 2019, we reported that *C. albicans* does get into the brain where it produces changes that are very similar to what is seen in Alzheimer's disease. The current study extends that work to understand the molecular mechanisms."

"Our first question was, how does *C. albicans* enter the brain? We found that *C. albicans* produces enzymes called secreted aspartic proteases (Saps) that breakdown the blood-brain barrier, giving the fungus access to the brain where it causes damage," said first author Dr. Yifan Wu, postdoctoral scientist in pediatrics working in the Corry lab.

Next, the researchers asked, how is the fungus effectively cleared from the brain? Corry and his colleagues had previously shown that a *C. albicans* brain infection is fully resolved in otherwise healthy mice after 10 days. In this study, they reported that this occurred thanks to two mechanisms triggered by the fungus in brain cells called microglia.

"The same Saps that the fungus uses to break the blood-brain barrier also break down the amyloid precursor protein into Ab-like peptides," Wu said. "These peptides activate microglial brain cells via a cell surface receptor called Toll-like receptor 4, which keeps the fungi load low in the brain, but does not clear the infection."

Candida albicans also produces a protein called candidalysin that also binds to microglia via a different receptor, CD11b. "Candidalysin-mediated activation of microglia is essential for clearance of *Candida* in the brain," Wu said. "If we take away this pathway, fungi are no longer effectively cleared in the brain."

"This work potentially contributes an important new piece of the puzzle regarding the development of Alzheimer's disease," Corry said.

"The current explanation for this condition is that it is mostly the result of the accumulation of toxic Ab-like peptides in the brain that leads to neurodegeneration. The dominant thinking is

that these peptides are produced endogenously, our own brain proteases break down the amyloid precursor proteins generating the toxic Ab peptides."

Here, the researchers show that the Ab-like peptides also can be generated from a different source—*C. albicans*. This common fungus, which has been detected in the brains of people with Alzheimer's disease and other chronic neurodegenerative disorders, has its own set of proteases that can generate the same Ab-like peptides the brain can generate endogenously.

"We propose that the brain Ab-peptide aggregates that characterize multiple *Candida*-associated neurodegenerative conditions including Alzheimer's disease, Parkinson's disease, and others, may be generated both intrinsically by the brain and by *C. albicans*," Corry said.

"These findings in animal models support conducting further studies to evaluate the role of *C. albicans* in the development of Alzheimer's disease in people, which can potentially lead to innovative therapeutic strategies."

Summary

Researchers explored the link between the fungus *Candida albicans* and Alzheimer's disease. They found that *C. albicans* produces enzymes breaking down the blood-brain barrier, allowing it to access the brain and produce toxic amyloid beta-like peptides, typically associated with Alzheimer's. These peptides activate microglial brain cells to keep fungal load low but don't clear the infection. The study suggests that the amyloid beta aggregates in Alzheimer's could be generated both by the brain and by *C. albicans*.

Source: Baylor College of Medicine

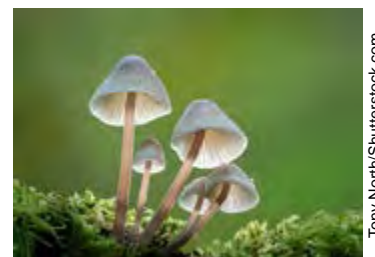
AN EVOLUTIONARY LEAP: MYCENA FUNGI CAN NOW INVADE LIVING PLANTS

Holly Large

<https://www.iflscience.com/a>, Oct. 24, 2023

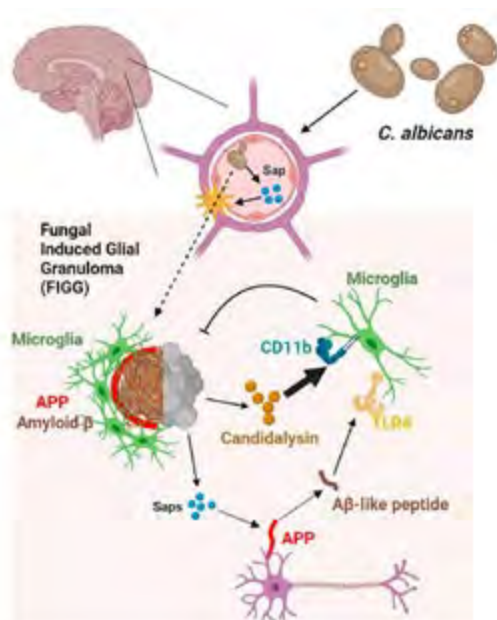
There's something strange happening in the world of fungi—rather than solely dining upon the dead, bonnet mushrooms have now been found to invade living plants.

Bonnet mushrooms, also known by their genus name *Mycena*, have long been thought to be saprotrophic organisms, living exclusively off nonliving organic matter, like dead trees. However, when a team of Danish mycologists were investigating local *Mycena*, they discovered that the fungi were in the middle of a significant change.



Mycena galericulata, aka the common bonnet mushroom, is widespread across the Northern Hemisphere.

"Using DNA studies, we found that *Mycena* fungi are consistently found in the roots of living plant hosts. This suggests that bonnets are in the process of an evolutionary development, from uniquely being decomposers of nonliving plant material to being invaders of living plants, under favorable conditions," explained Christoffer Bugge Harder, lead author of a study detailing the findings, in a statement.



Y. Wu and D. Corry/Cell Reports, 2023.

Graphical abstract of the findings of this work.

By analyzing the carbon isotopes found in *Mycena*, they also found that the genus has evolved to lie between the traditionally strict bounds of the fungal kingdom's three ecological niches because its members can utilize both living and dead matter—Bugge Harder dubbed them “opportunists.”

With living plants, there may even be a mutualistic relationship, the mycologist explained. “We see that [some] *Mycena* appear to exchange nitrogen, an indispensable nutrient for plants, with carbon from plants,” although he went on to say this exchange was yet to be finely tuned.

In what feels like an increasingly common sentence to read, the researchers think that this change in *Mycena* may be at least partly the result of human activity. Plantations with a single species population of young, healthy plants seem to play a role because, compared to older forests, more specialized fungi haven't yet established themselves. This creates “optimal conditions” for *Mycena* to adapt, according to Bugge Harder, and they appear to have seized this opportunity.

If you're wondering whether this could turn into a *The Last of Us* situation, you'll be pleased to know that you needn't worry. There's been some speculation that, because of climate change, fungi could adapt their temperature tolerance to the point where they could survive in the human body, but it's unlikely to involve *Mycena*.

“It isn't inconceivable that groups of fungi relevant to the ecological niche of humans could develop. But, there are lots of fungi in tropical regions which have already adapted to high temperatures. When they're not in our bodies anyway, it is due to our effective immune system,” explained Bugge Harder.

“So, I don't see any reason to fear fungi—or at least not worry about *Mycena*.”

Epitaph on a tombstone in North Scotland

*Come bide a wee,
And sit with me
Upon my tombstone long.
The key die lee,
Though it may be
I did but read it wrong.*

THE ENDANGERED WYOMING TOAD IS MAKING A RECOVERY WITH THE HELP OF PRIVATE LANDOWNERS

Suraj Singareddy

<https://www.wyomingpublicmedia.org>, Oct. 20, 2023

Fred Lindzey and his wife, Stephanie, call 140 acres of farmland just west of Laramie home. Their property is full of meadows, temporary ponds, and even a small stream. Their main crop is hay, but that is not the only thing they are helping to grow. Enter the rare Wyoming toad, *Anaxyrus baxteri*.

According to Fred, it's not easy to spot the Wyoming toad while walking around their property.

“So, you've got to ask yourself, ‘Can I find something about the size of a 50 cent piece or silver dollar scrunched down to the ground and colored like the ground?’ The answer is it's not easy.”

However, it is easier to find the toad here than almost anywhere else. That is because the Lindzeys are part of a small group of landowners who are helping the endangered species make a comeback.

Rachel Arrick, who works for the U.S. Fish and Wildlife Service (USFW), is the coordinator of the Wyoming Toad Recovery Team, which is the main group spearheading the recovery efforts. The team includes members from USFW, the Wyoming Game and Fish Department, the University of Wyoming, the Laramie Rivers Conservation District, and more.

The animal is native to the Laramie River Basin, and just 50 years ago it was not endangered at all. The toads were important to the local ecosystem, both as prey and as predators.

“They also helped eat a lot of bugs,” said Arrick. “So I always tell folks, like, if there were big, healthy populations of the Wyoming toad in Laramie, there'd probably be fewer mosquitoes around.”

However, by the 1980s, the population had begun to decline. The amphibians lost land to human development, and pesticides had harmful effects. The biggest threat, though, was a fungus called *Batrachochytrium dendrobatidis* (Bd). It is an infectious disease that can be lethal to many amphibians, including the Wyoming toad.

“There's actually 90 species that have just gone completely extinct due to Bd spread and introduction,” said Arrick.

The fungal disease flourishes in cool wet environments, which are the type of environment that toads love. By 1985, the disease had run so rampant that scientists believed the Wyoming toad was lost forever. Then, at Mortenson Lake, a small, surviving population was discovered.

“There were about 10 or so toads left at this time that were brought into captivity, and those were the founders of our current population,” said Arrick.

A Wyoming toad wearing a radio telemetry belt, which the recovery team uses to track the animals.



Rachel Arrick / U.S. Fish and Wildlife Service

Conservationists bred a new generation of toads in zoos, labs, and hatcheries across Wyoming and beyond. But that would have all meant nothing without somewhere to release the toads back into the wild.

That is where the Lindzeys come into the picture. They are involved through something known as a Safe Harbor agreement.

“They basically say, ‘Okay, we kind of like your land, and we think in this case, it may be suitable for the Wyoming toad,’” said Fred Lindzey.

“When they lay their eggs, they kind of hang them on a piece of grass or rush or something and string them out,” said Fred. “And we've had tadpoles in here before and toads calling during the breeding season.”

According to the Wyoming Toad Recovery Plan, as long as toads continue to breed in the wild, they could be delisted as an endangered species as soon as 2030.

OFF-DUTY PILOT MAY HAVE BEEN ON PSYCHEDELIC MUSHROOMS WHEN HE TRIED TO SHUT OFF PLANE ENGINES various sources

Oct. 24, 2023

The flight started normally on Sunday, October 20, 2023, with two pilots and an off-duty colleague in the cockpit talking about the weather as they took off from Seattle for San Francisco a few minutes ahead of schedule.

But the Horizon Air flight ended about as strangely as it could—an emergency landing in Portland, Oregon, the off-duty pilot handcuffed and strapped to a seat in the back of the plane after allegedly trying to shut off fuel to the engine.

He was arrested when the plane landed at Portland International Airport and later booked into nearby Multnomah County Detention Center, where he remains jailed.

According to a probable cause statement filed in Multnomah County Circuit Court, Emerson told Port of Portland police following his arrest that he had been struggling with depression, that a friend had recently died, and that he had taken psychedelic mushrooms about 48 hours before he attempted to cut the engines. He also said he had not slept in more than 40 hours. An FBI special agent investigating the matter said in an affidavit that Emerson, told police “it was his first time taking mushrooms.”

On Tuesday, Federal and local authorities separately filed charges against Emerson, 44, who pleaded not guilty to 83 counts of attempted murder and other charges he faces in Oregon state court. He is expected to be arraigned later this week on a single federal charge of interfering with flight crew members and attendants.

Emerson, a California resident with ties to Seattle, was an experienced pilot. He had been a commercial airline pilot since 2001 and had flown with Alaska since 2016.

FRANCE SUFFERS 600 POISONINGS FROM WILD MUSHROOMS SINCE JULY

Emily Rickerby

<https://www.connexionfrance.com/>, Oct. 18, 2023

[Mushroom] Poisonings are increasing, said Chloé Greillet from France’s national health agency Anses. “In 2022, there was a spike in poisonings in October, the same month as in the previous five years,” she warned in her July report.

The trend that has continued this year, with more than 600 cases reported to poison control centers since July 1, 2023. Whether you are a connoisseur or an occasional picker, the health consequences from a mistake can be serious.

These poisonings often result either from mistaking a poisonous species for an edible one or from eating edible mushrooms in poor condition, poorly preserved, or undercooked.

The confusion of edible and poisonous species could also be caused by a mushroom recognition smart phone app identifying them incorrectly. Anses recommended “not consuming mushrooms identified by a mushroom recognition application on a smart phone due to the high risk of error.”



Attention!
Champignons toxiques!

SHOUT OUT TO OUR MEMBERS FOR THEIR DONATIONS AND VOLUNTEER SUPPORT

Brenda Fong

The season is starting out strong with lots of new and renewing members. Many of these members have generously added a donation when renewing or joining. Since the beginning of July, the start of our new season, we’ve received more than \$750 in donations! The board and membership thank you for your support in furthering our mission to “foster the understanding and appreciation of Mycology as a hobby and a science, and to assist related institutions in these purposes.”

We would also like to thank the Hilcorp Donor Advised Fund of The Alaska Community Foundation for two generous grants this year. These contributions along with that of others help support PSMS programs, meetings, classes, field trips, scholarships, the newsletter, and community outreach.

And of course, as an all-volunteer, nonprofit organization, we thank all of the volunteers who keep us going and help in so many ways at the annual show, field trips, teaching, ID clinics, outreach, meetings, and surveys. Behind the scenes we have the board and committee chairs both past and present, running various operations like a small business with a growing membership of over 1,800 members. Very special thanks to Agnes Sieger, the exceptional, long-time editor of *Spore Prints*, who keep us informed of fungi news from around the world.

THANK YOU ALL!!!



MUSHROOM ASTROLOGY

Bob Lehman, LAMS



Scorpio (Oct. 23–Nov. 21): You love the mysteriousness of mushrooms. You plot your mushroom hunting strategy in advance, taking into account the motives and likely strategies of competing mushroom hunters. While others on a foray engage in small talk, you sneak away from the group to fill your basket from your secret spot. Aires may cover more ground, but you know how to get more out of the ground you cover. You don’t mind Leo’s boasting about his chanterelles because you know he’ll be proud to give you some. You are willing to endure difficult conditions in order to find the mushrooms you want. You are fascinated by poisonous mushrooms.

Sagittarius (Nov. 22–Dec. 21): You love the sport and adventure of mushroom hunting—any concrete benefits being of secondary importance. You think in terms of expeditions, and you wax eloquent about the noble quest for earthly treasure. You love forays, and you love to share your exuberance and your mushroom theories with fellow mushroomers.

You like taxonomy, but tend to gloss over the details of identification in order to focus on the bigger picture of evolutionary relationship. Before eating anything, you would do well to check your identifications with a Gemini or a Virgo.

