SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY
Number 524 **September 2016**

BEN WOO MEMORIAL ALL-SOUND FORAY OCTOBER 21–23, 2016

The Ben Woo Memorial All-Sound Foray is an opportunity for all Western Washington mycological societies to get together, socialize, and forage in a beautiful old growth forest setting hosted by the Puget Sound Mycological Society. It is being held from Friday dinner October 21 through Sunday breakfast October 23 at Black Diamond Camp near Mt. Rainer. The facility is about 30 miles east of Enumclaw just off Route 410 near the Crystal Mountain ski area turnoff. There is abundant mushroom habitat surrounding the camp as well as sites accessible by car just a short drive away.

We will be celebrating the life and work of notable mycologist and PSMS charter member Ben Woo, whose contributions helped us better understand the genus *Russula* and mushrooming in general. We extend an invitation to all Western Washington Mycological societies and other nature groups to join us in this event.

The cost for the retreat is $165.00 per individual (no refunds). Registration and payment must be done online and paid for via PayPal or credit card (no checks). The fee includes two nights' accommodations in a dormitory style setting and five meals. Unfortunately, the facility can't provide vegetarian main course options. Saturday will be a sack lunch to take into the field. Two sheets, a blanket, a bath towel, and a hand towel will be provided. Note this does not include a pillow or extra blankets, so please bring your own pillow and maybe an extra blanket or sleeping bag if desired. Also provided are maps to mushroom foraging locations and any necessary permits. There will be several organized full and half day forays, three outstanding presentations, mushroom tasting, and a mushroom dyeing workshop. There will be an additional charge of $30.00 to participate in the dye workshop.

Check-in begins at 3:00 pm Friday afternoon. Friday evening starts with dinner and then a short presentation by Daniel Winkler followed by fungal-themed movies and popcorn. Saturday there will be many activates including full and half day guided forays and a mushroom dyeing workshop conducted by Erin and Brady Raymond; this includes a foray specifically oriented to the collection of mushrooms to be used in the dye workshop. Reba Tam will be cooking up yummy mushroom recipes for everyone's tasting pleasure Saturday afternoon. Saturday after dinner we will hear presentations from PSMS member Danny Miller and from prominent mycologist Jonathan Frank of Southern Oregon University. Sunday morning the formal event ends with a mushroom ID table walk-through to identify and discuss specimens gathered during the event. You will still have time to spend the rest of the day mushroom hunting on your own.

Please note: Pets are not permitted on Black Diamond Camp property or in any of the Black Diamond Camp buildings. They request that you leave all pets at home. Seeing eye dogs and service dogs on a leash and under immediate control of their owner are allowed; however, please notify James Nowak ahead of time if this is the case.

All attendees must be members of a Western Washington mycological society or nature group. Memberships will be verified.

Please join us in this exceptional event to learn more about Ben Woo and the Russulas that he studied, meet new folks, and gather with old friends. Space is limited to 100 foragers, so avoid future regret and sign up early! To register go to the PSMS home page (www.psms.org) and under the "Events" heading, click on "Event Registration" and follow the prompts.

Hope to see you there!

James Nowak, Foray Chair
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53RD ANNUAL PSMS WILD MUSHROOM SHOW

Milton Tam

Is it already September? Yes it is, and it's time to turn our thoughts to collecting fall mushrooms and our annual fall wild mushroom show.

This year the show will be on October 29 and 30, and once again it will be at the Bellevue College Cafeteria, 3000 Landerholm Circle SE, Bellevue, which last year proved to be a great facility with lots of room for displays, exhibits, and vendors.

Your president, Kim Traverse, and I are again co-chairing the show, which is one of the largest on the West Coast and the largest PSMS event of the year. This is our annual opportunity to share our knowledge of and enthusiasm for the kingdom of fungi with the general public. Every year we try to improve our show. Our goal is to put that "WOW" factor into the show and to dazzle the public with all the colors, shapes, and sizes of fungi we bring in for display.

cont. on page 3

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CALENDAR

Sept. 13	Membership Meeting, 7:30 pm, CUH
Sept. 19	Board Meeting, 7:30 pm, CUH
Sept. 20	*Spore Prints* deadline
Sept. 24	Field Trip (see website)
Oct. 1	Field Trip (see website)
Oct. 8	Field Trip (see website)
Oct. 21–23	Ben Woo All-Sound Foray, Black Diamond Camp near Mt. Rainer
Oct. 29–30	Annual PSMS Fall Wild Mushroom Show, Bellevue College

BOARD NEWS — Luise Asif

Registration is open for the **Ben Woo Memorial All-Sound Foray, October 21–23.** James "Animal"' Nowak has done an outstanding job getting things organized for a fabulous weekend. The board is continuing to work on recommendations for the **Five Year Plan** with the current focus on field trips and volunteering. **Field Trip Hosts** are needed to make each trip run smoothly. As soon as the fall field trip schedule is posted, consider hosting at least one trip. Planning is under way for the **PSMS Fall Show**, October 29–30. The Board received two requests for **Ben Woo Scholarships**; they are being evaluated by the Scholarship Committee to be voted on at the next Board meeting. Hildegard Hendrickson's memorabilia will be presented at meetings in a **Silent Auction** organized by Shannon Adams. The proceeds will go to the Ben Woo Scholarship Fund. Danny Miller is processing the books to determine which will go into the library and which will be part of the auction. Ann Polin is stepping down as Membership Chair and will be replaced by Alyssa Panning. An enormous Thank You to Ann for her many years of service.

MEMBERSHIP MEETING

Tuesday, Sept. 13, 2016, at 7:30 pm at the Center for Urban Horticulture, 3501 NE 41st Street, Seattle.


Dr. Kem Luther

Our speaker for September is naturalist and writer Kem Luther, who will present a talk and slide show entitled "What does it MEAN?: Mycorrhizas, Mushrooms, and Plants." His presentation overviews the science of mycorrhizal mushrooms and explores how research on mycorrhizas could shift our understanding of Pacific Northwest ecosystems.

Kem grew up in the Nebraska Sandhills, studied at Cornell, the University of Chicago (PhD), and the University of Toronto (MSc), and has taught at Eastern Mennonite University, Sheridan College, York University, and the University of Toronto. For the past two decades he has focused on writing interpretive articles and books. His recent book, *Boundary Layer* (Oregon State University Press, 2016) focuses on regions that lie between large, stable systems—including the strange in-between world of plant/fungal symbionts—and how they develop their own rules that belong to neither of the bounding systems.

PRESIDENT'S MESSAGE — Kim Traverse

I was in Powell's Books in Portland last week and I always check out the mushroom books they carry—several shelves with perhaps ninety different titles. This time there was also someone else browsing, and she already had selected an armload of books. I asked her if she was interested in mushrooms and she said yes, she was just getting interested. Good start, I thought. I recommended a few I thought might work well for her—she lives in Boston and said she already had the Audubon Guide. I encouraged her to join the Boston Mycological Society, the oldest in the nation. She asked how I knew all this stuff and I pointed to my hat and told her I was president of PSMS, not the oldest club but maybe the biggest. Maybe we aren't the biggest. I don't think that matters as much as that we *are* pretty big, and that means that a lot of people are interested in mushrooms and fungi in general. A healthy interest in the world we live in and the good things in it shared by a bunch of people. Pretty nice bumping into someone else like that. Someone just starting out.

PSMS 53rd Annual Wild Mushroom Show, *cont. from page 1*

Mark your calendars now and plan to attend, or better yet, volunteer to help at this year's event. To be successful, our show depends on volunteers. Yes, YOU! We are able to put on a great show year after year only because of your help, so if you can, please give us an hour or a day of your time. We'd appreciate that very much! We promise a great experience and access to the all-day potluck buffet in the volunteer room! Sign-up sheets for various responsibilities and tasks will be provided at our September membership meeting, or you can sign up online at the PSMS.org website under "Events."

For members who are new to PSMS, here's how the show goes. On Friday afternoon, October 28, we will start setting up in the main cafeteria at Bellevue College. Members and friends who have been out collecting wild mushrooms that day begin to come by the show venue to drop off their precious finds. By early evening the main hall is humming with activity, with some volunteers setting up and others sorting mushrooms. On Saturday morning, October 29, we start very early, finish the set-up, select the best examples of fungi, arrange them artfully in trays, label to genus and species, and place them on display. At 12 noon, the exhibit opens to the general public and runs into the evening, when we cover the mushrooms and put them to bed for the night. The next morning, Sunday, the show opens at 10 am and runs until 5 pm, when we rapidly tear down the exhibits, clean up, load our vehicles, and depart.

Posters, yard signs, and postcards will be distributed at the September meeting. We are also planning a members-only reception with wine and cheese on Saturday after the show closes for the evening, so please plan to stay if you can. And yes, if you are wondering, we will have wild mushroom soup again at the show!

EASY MONEY

Wren Hudgins

No, not for you, but for PSMS, your favorite nonprofit organization. This is not a new program, and I have used it for a few years. What is new for me is discovering that PSMS is an eligible organization.

Amazon has a foundation called Amazon Smile Foundation. Once you set up an account at www.smile.amazon.com, you can select your preferred nonprofit organization to receive donations. Then, instead of shopping at amazon.com, you shop at smile.amazon.com. The products are all the same and the prices are all the same. The only difference is that eligible purchases will result in a 0.5% donation to your designated nonprofit. Website language uses the word "charity," but the more accurate term would be "nonprofit organization." PSMS is listed as eligible, so you can select it and it remains your donation recipient until you change it. Which purchases are eligible? Almost all. Non-eligible purchases are recurring and renewing items (perhaps like magazine subscriptions or monthly server memory storage charges) and returned items.

The amount of the donation is calculated as 0.5% of the purchase price of eligible purchases minus rebates, shipping and handling, taxes, gift wrap fees, and service charges. If you are already signed up as a smile.amazon.com member but have designated a different donation recipient and want to switch to benefiting PSMS, it's easy. Go to smile.amazon.com, select "your account," then "change your charity," then "PSMS."

If you are an Amazon Prime member, you have all the prime benefits on smile.amazon. Frankly, I don't see why everyone doesn't do this. Using this program doesn't take any money out of your pocket. It just means that Amazon is willing to take 0.5% out of its pocket and donate it to the nonprofit of your choice. So my suggestion is that all PSMS members who shop at Amazon do this. If you have other organizations you would rather donate to, that's fine. If not, let's help our club. There are a lot of folks out there who need the money more than Amazon does.

FALL ID CLINICS BEGIN ON SEPTEMBER 26

Brian S. Luther

The Hildegard Hendrickson ID Clinics start this fall on Monday, September 26. They will be held every Monday from 4:00 to 7:00 pm at the Center for Urban Horticulture (CUH) in the Miller Library atrium area. We'll run them until sometime in early November. These are free to members and the public, who are invited to bring in fungus collections for identification. CUH is located at 3501 NE 41st St., south of University Village on the east campus of the UW. Please remember to bring in the entire fungus. If you just cut the stem, you may be leaving behind important features we need for ID.

A SPECIAL NOTE OF THANKS

Brian S. Luther

The June issue of this newsletter ends the spring season and has a May deadline, so the last few PSMS spring field trips (in late May and June) rarely get reported on, because it's "old news" by September. So, I'm writing this to make a special point of thanking some members for their contributions last spring. First off, **Sara Nelson** provided us with a keg of her own delicious Fremont Brewing Co. Summer Ale at the Eagle Creek field trip, even though she had a family obligation at the last minute that prevented her from attending. Thank you, Sara; your beer was a huge hit with everybody during the entire weekend and you would have loved seeing all the enthusiastic members getting their cups filled. I also want to convey a special thank-you to **Debbie Johnson** and **Mandy Andrea** for hosting at Eagle Creek. Debbie and Mandy stepped forward to volunteer when we had no other hosts lined up for this field trip, and they did a great job!

WATCH OUT WHEN PICKING THOSE "PUFFBALLS"

Brian S. Luther


Brian S. Luther

During this last summer at our normally dry property in Eastern Washington, we got some highly unusual rain storms. A week or two afterward, I started finding a few select species of fungi, including some small puffballs. One very gray overcast early morning in July, I saw what appeared to be some more small puffballs of the type I had been finding earlier. I reached for one—and was greeted by a female Black Widow spider.

They weren't puffballs at all, but rather Black Widow egg cases! The spider was moving rapidly upside down in her typical very untidy, but extensive web a few inches above the ground, and I was clearly able to see the bright red hour-glass mark on her jet black abdomen. This spider is very common in Chelan Co., living in old abandoned vole or Pocket Gopher holes directly in the ground. The egg cases are actually elevated above the ground by an inch or less, tangled in the spider's web, but from above it appears they're on the ground. They're about 15 mm long, globose to mostly slightly ovoid (egg shaped), and whitish to ivory or pale tan in color, and thus mimic small puffballs at first glance. Inside they're filled with many perfectly round little spider eggs.

Inspecting large areas of our fields, I found the Black Widow egg cases to be very common and quite extensive. Fortunately, these highly venomous arachnids are normally very shy and nocturnal, and thus not usually seen or encountered. However, I sometimes find them out in their webs on very cloudy days or at dusk. Often when they see me approaching they'll scurry back into their hole. Where we're located they're restricted to old rodent holes, never getting into buildings—thankfully. Puffballs, indeed!


Brian S. Luther

GROWING MUSHROOMS IN YOUR CHICKEN COOP

Jennifer Wilson

http://www.livingthecountrylife.com/, Aug. 11, 2016

You probably like your chickens as much as you dislike their mess. But what if you had a chicken run that literally *ate the mess*?

Tradd Cotter, founder of a mushroom farm and research lab in South Carolina called Mushroom Mountain, did an experiment to accomplish just that, mixing the wood chips of his chicken run with mushroom spawn.

While most chicken runs benefit from a little mulch, Cotter added to his a mushroom called King Stropharia or Wine Cap (*Stropharia rugosoannulata*) that literally eats chicken manure, combating both harmful bacteria and odor. Added bonus: Wine Cap mushrooms make an edible secondary crop.

He says the method is cheap and easy to replicate, even if you're a fungi amateur.


King Stropharia

1. In the chicken run, layer 6–8 inches of hardwood wood chips. Mix in King Stropharia spawn as you go. Lay down poultry wire on top.

2. On top of this filter, add 3-4 inches of wood chips mixed again with King Stropharia spawn. Worms attracted to the spawn come to the surface for it, inspiring the chickens to scratch and work the chips. Their manure hits the wood-chip surface, then moves down through the protected filter, where the fungus consumes it in order to thrive.

3. Water the run daily for the first week, then weekly to keep the fertilizer liquid, washing it down to that bottom layer where the King Stropharia is waiting, basically killing harmful coliforms and "eating them for dinner, preventing bacteria and odor from leaving the site, capturing and preventing run-off," says Cotter.

4. On the outside of his coop, Cotter adds an additional foot or two of wood chips like a halo. If the coop is located near a downhill slope, he'd even suggest making a trench to capture some of the water to slow it down. Fill the halo and trench with hardwood chips and spawn. "The bigger the filter, the better," he says. The mycelium mat grows quickly in these conditions, spreading outward from the coop, sending up its fruit (the mushrooms) where there's shade and moisture, avoiding the sun, up to several feet away. Cotter even directs his mushroom crop by planting coop fencing with gourds to create shade.

5. He harvests the mushrooms at the edges of the coop throughout summer and fall. Both the stem and cap are edible, hinting at flavors of wine and asparagus. He cooks them with risotto, or grills with marinade.

Rather than the usual muck-out of the coop, Cotter waters the top layer of the wood chips weekly. He replaces the entire filter yearly, and harvests a nice layer of soil that's developed from the nutrient breakdown.

The system is inexpensive—some arborists even give away hardwood chips. A bag of King Stropharia runs about $25 to inoculate 1 cubic yard of chips.

SCIENCE WILL GROW YOUR NEXT "LEATHER" PURSE OUT OF MUSHROOMS AND ZIPPERS

Emily Arata

http://elitedaily.com/, Aug. 12, 2016

I have a confession to make: Meat makes me feel kind of queasy. As a longtime vegetarian, it's been years since a single bit of rare steak passed my lips.

But, while trading in chicken for tofu never caused me any distress, the issue I continue to struggle with is where to draw the line. Do I stop buying eggs? Do I quit my soft leather purse cold turkey?

A brand called MycoWorks believes it's solved that last question, at least. The brand combines the knowledge of researchers with the know-how of designers, creating a biodegradable, carbon-negative leather substitute that will make even the most granola-happy vegan pleased: A faux leather made from mushrooms.

Well, kind of. The leather-like material is actually grown from mycelium, [the mass of fungal filaments from which mushrooms


Mycoworks

fruit.] Shiitake leather, I'd call it (that's definitely not the precise term, it's just catchy). Have you ever accidentally bitten into the stem of a shiitake mushroom? You might as well be gnawing on the arm of your parents' leather couch.

By growing mycelia in a lab, the team hopes to create a far more sustainable version of leather for furniture, purses, and coats—one that won't slowly destroy our environment.

According to *Popular Science*, one incredibly sci-fi aspect of the process is that scientists can actually grow mycelia around other things. They'll add zippers, for example, while the filaments are still growing. Unlike the labor-intensive process of raising a cow, butchering it, tanning the hide, and painstakingly crafting a Coach bag, MycoWorks' solution is relatively simple (not to mention painless, for everybody involved).

Once the mycelium is ready, the team can stamp it with patterns to give it unique texture that mimics the skin of animals like crocodiles and snakes. Nobody wants to feel like they're just carrying an oversize mushroom around town.


Mycoworks

Ready to buy? While 'shroom leather isn't on the market yet, *Popular Science* reports the brand was seeking investors as recently as July. MycoWorks sees mycelium as the future, from the bricks we use to build houses, to the coats we wear.

RUSSIAN TOURISTS PICKLE MUSHROOMS IN LUXURY HOTEL BATHROOM

http://sputniknews.com/, Aug. 12, 2016

A couple of Russian tourists impressed the staff of a five-star hotel in Switzerland by pickling mushrooms in a bathtub of their room, Russian online media Lenta.ru reported.

The two Russian tourists, both around 50 years old, checked into a hotel in the Alps and went for a walk in the woods on a mushroom hunt. Since there were no other mushroom pickers around, the couple collected everything that was within reach.

The tourists went to the woods several times that day. They collected so many mushrooms that it was impossible to eat them at once. The travelers then decided to pickle them in their hotel bathtub to keep them for a later date.

Since returning home, the couple has reportedly decided that they are planning a return visit to the same Swiss hotel.

MUSHROOM POWER BLOCKS BITTERNESS IN FOOD

Megan Molteni

http://www.wired.com/, Aug. 19, 2016

"I actually hate the taste of mushrooms," says Josh Hahn, as he flicks on the lights in the clean room. Which is funny, because Hahn's livelihood depends on fungi. Here, inside the lab at the biotechnology startup MycoTechnology, a few dozen Erlenmeyer flasks slowly gyrate on shake tables. They're filled with a liquid the color and consistency of cloudy bone broth, a slurry of growth media and, yep, mushrooms. Or, to be more precise, mycelia: the thread-like strands that make up fungal colonies and produce mushrooms but that humans rarely see because they're below ground.


MycoTechnology

Dr. Brooks Kelly examining a flask full of liquid mushroom growth.

In its Aurora, Colorado, production facility, MycoTechnology is fermenting mycelia, later blast-drying them into an odorless, tasteless powder called ClearTaste—what marketing manager Hahn would call "the world's first organic universal bitter blocker." Not a black coffee drinker? You could be with just a tiny sprinkle of the stuff. It works on the molecular level, bonding to taste receptors on your tongue and blocking signals to your brain that translate to perceiving bitterness. Such a substance could have big implications for the health of the United States' sugar-addicted society. But like all food additives, it has its mysteries—and no one is sure exactly what your body does with it once it's inside.

ClearTaste isn't the only bitter blocker on the market, but it's the only one that claims to be universal. There's a good reason no one has done that yet—bitterness is a notoriously elusive taste to commandeer. Your tongue is littered with 25 kinds of bitter receptors (called T2Rs) that are triggered by thousands of different molecules. An aversion to bitterness is a kind of gustatory flare gun: Some of those thousands of compounds are toxic, so the tongue needs a wide range of receptors to detect them.

With so many redundancies, it's a tricky system to override. The world's largest flavor companies have been throwing money at the problem for more than a decade, and have little to show for it. There are currently 13 known bitter blockers, all synthetic chemicals discovered using multi-million dollar high-throughput assays. Most can only bind to one or two receptors. The best top out around 10. Keeping bitter flavors out of America's food supply has required adding these chemical blockers in multiples—and when that fails, masking them with a boatload of sugar.

MycoTechnology

Mycotech bio reactor

A Spoonful of Mycelium

Which is why ClearTaste has gotten so much attention from the food industry. It promises to reduce the sugar content of all your favorite foods by 50 to 90 percent. With sugar on the White House's

shit list and consumers clamoring for healthier options, food companies are eager for a simple solution.


MycoTechnology

ClearTaste's "universal" bitter blocker.

ClearTaste is already in some US foods, thanks to a partnership with alternative sweetener producer GLG Life Tech Corp. And with GLG's recent inking of a deal with food giant Archers Daniel Midland (makers of ubiquitous ingredients like oils, starches, flours, and cocoa powder), it's slated to show up more and more. "We're currently in talks with every major food company in the world," says Hahn.

But don't expect to see it on food labels any time soon. You need such a small amount that it likely won't be showing up on any ingredient lists. And because MycoTechnology sells directly to flavoring companies that have NDAs with their partners, not even the makers of ClearTaste will know who has it.

This raises flags with groups like the Center for Food Safety, which are concerned the product will be used to market to children sensitive to bitter tastes. "Just because something comes from yeast or a mushroom doesn't make it automatically safe," says the Center's senior policy analyst Jaydee Hanson. "It should still go through the whole testing process that any food additive would." ClearTaste is FDA-approved under Generally Regarded As Safe status because mycelia have been in supplements for decades.

Even though they didn't have to jump over food additive regulatory hurdles, MycoTechnology's scientists have been trying to understand how ClearTaste interacts with the mouth (they submitted their first peer-reviewed paper in July). But they haven't looked at what happens after you swallow—which is where it starts to really get interesting.

Down the Chain

Those bitter receptors, the T2Rs, don't just show up on your tongue. They're also in your gut, your lungs, and your brain. Scientists aren't sure why we have T2Rs in these other tissues, and they're just starting to figure out how they work. In the lungs, for example, they're involved with the relaxing and constricting of the airways and show promise for the treatment of asthma. In the gut, bitter compounds bind to T2Rs and stimulate the release of peptides that tell our stomach walls how hard to contract, our intestinal cells how well to absorb nutrients, and our brains how full we feel.

In 2015, researchers from Belgium saw substantial changes in mice when bitter substances were put directly into their stomachs. Obese mice lost a significant amount of weight over the course of a month, while normal mice ate less and their stomachs emptied more slowly. When scientists repeated the experiment in humans, subjects who got the bitter treatment felt satiated earlier and absorbed fewer calories. In each experiment, it was the T2Rs that mediated the observed changes. Scientists have hypothesized that blocking the receptors' ability to send signals could have direct effects on gut function.

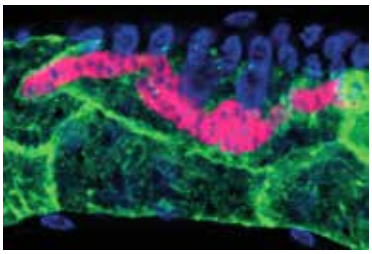
Others say there's not enough data to predict what would happen down there. "It's very complex and difficult to say what the effect of an antagonist will be," says Prashen Chelikani, director of the Manitoba Chemosensory Biology Research Group. "But we do know that blocking won't have the same effect in different tissues. And if the efficacy of the blocker is high it will shut down multiple pathways."

Mounting evidence indicates that bitterness is more than just a bad taste to be blocked. It's an essential component of digestion and metabolism, without which who knows how many dark chocolate bars or pints of West-Coast hopped IPAs you might put down. And sure, with ClearTaste, they'd be low in sugar, which is a good thing. But it's also important to consider what happens after we take that perfect, bitter-free bite. Because sometimes when you play tricks on your senses, you learn later the joke was on you all along.

PARASITIC FUNGI TRANSFORM A WHOLE ORGAN INTO ONE GIANT CELL

JV Chamary

http://www.forbes.com/, Aug. 22, 2016



Nematocida *fungi infecting the gut of a* Caenorhabditis elegans *worm.*

Scientists have shown that some parasitic fungi can fuse a host's cells together while hiding in the gut, turning the entire organ into one big cell.

The parasites—a group known as microsporidia—invade the intestinal tract of many animals. They can cause diarrhea in humans and, in immune-compromised patients, even death. The fungi are common pathogens: in some populations, half of all individuals carry at least one of the 14 species that infect people.

Microsporidia are single-celled organisms. As in humans, their DNA is contained within the distinct nucleus of a cell, making them "eukaryotes." Bacteria and other microbes without a nucleus—"prokaryotes"—are known to multiply by sticking host cells together, but this is a new discovery in eukaryotes.

"Viruses and bacteria have been shown to fuse host cells together to facilitate the spread of an infection," said Emily Troemel of the University of California, San Diego, the biologist who led the study. "But this is the first time we've seen this mode of infection by a eukaryotic pathogen."

Troemel compared cell fusion to war. "It's like microsporidia have figured out that, like soldiers fighting in an urban warfare, it's easier and safer to go from house to house by entering adjacent houses through a common wall, rather than by going through the front door of each house."

Troemel's team observed microsporidia infections in *Caenorhabditis elegans*, a 1 mm-long nematode worm with a transparent body that consists of less than 1,000 cells. Whereas the human intestine is made up of millions of cells, the worm's tiny gut has only 20. This allowed the UC San Diego biologists to see how a parasite performs the destructive remodeling of its host's "houses."

The fact that parasitic fungi stay hidden within an organ has implications for treatment, as medicines should target the inside of cells. According to Troemel, existing drugs haven't been effective against the parasites. "It's been an unappreciated medical issue because of how difficult it's been to detect microsporidia."

"I confess, that nothing frightens me more than the appearance of mushrooms on the table, especially in a small provincial town."
—Alexandre Dumas, early 19th century

1.5 KILOGRAM BLACK TRUFFLE DISCOVERED NEAR MELBOURNE, AUSTRALIA

Alisha Buaya

http://www.dailymail.co.uk, Aug. 22, 2016

AFP / Getty

A truffle farmer has dug up what could be Australia's biggest truffle, weighing more than 1.5 kilograms.

Stuart Dunbar, owner of the Yarra Valley Truffles farm in Victoria, and his Lagotto Romagnolo dog Lani found the earthy fungus under a tree root last Thursday.

Dunbar told *Daily Mail Australia* that he spotted it under a tree before the season, marked it, and checked its growth regularly. "It took 45 minutes to carefully get it out from under a large tree root," he said.

Weighing in at a hefty 1511.10 grams, the giant black winter truffle could fetch him $3,000. In previous seasons, he has harvested truffles in the 100–200 gram range, which he sells at $2 per gram.

He said he has had a particularly good season this year, finding truffles ranging from 600–800 grams.

Dunbar, who said he was in the Australian Truffle Growers Association, said his truffle smashed the record of 1,172 grams held by a New South Wales grown fungus, which was harvested last year. It's also beaten a 1,277 gram truffle found in Bordeaux, France, in 2012.

He said that harvesting truffles can be a delicate process, adding that he has broken a few of the prized fungi this season.

Dunbar said he will not be cutting up the fungus to sell in smaller chunks.

He also added that he will not sell the fungus, noting that some chefs could not handle its size or we not deserving of his prized possession. "It will be of more value as a marketing piece for the orchard for next year," he said.

yarravalleytruffles

Giant black truffle in ground.

Stuart Dunbar / AFP

Stuart Dunbar with giant truffle and his truffle dog Lani.

IT TAKES THREE TO LICHEN!

Nadia P Morales-Lizcano

Mycelium, Myco. Soc. Toronto, July–Sept. 2016

Lichens were thought to be organisms formed by a symbiosis between a single fungus (mycobiont), usually an ascomycete, and a photosynthesizing partner (photobiont; algae, cyanobacteria, or both). However, new research published in *Science Magazine* (Spribille et al., *Science 10*, 1126, 2016), has shown that many lichens have a third symbiotic partner: a yeast belonging to the phylum Basidiomycota.

It all started with related lichens: *Bryoria fremontii* and *B. tortuosa*. The first one has a dark brown thallus (lichen body), while the second species is yellow. The yellow color is caused by the production of a toxic substance called vulpinic acid. The surprising thing about these two lichens is that they were found to be genetically identical! There were no DNA sequence differences between the mycobiont (*Bryoria*) or the photobiont (*Trebouxia simplex*) between the two lichen "species."

Based on these results, a team of researchers, led by Toby Spribille from the University of Montana, hypothesized that the differences in the amount of vulpinic acid between both species could be explained by differences in gene expression (the amounts and kinds of genes in use). They not only found no differences in the genes used in each species, but found that they were turned on to similar levels. What they did find were a number of genetic sequences belonging to an unknown organism present in much greater levels in *B. tortuosa*. Most of these sequences resemble genes known from the phylum Basidiomycota. What this means is that the previously unknown Basidiomycotan organism was present in both lichen species, but was more abundant in *B. tortuosa*, the species with high amounts of vulpinic acid. Fluorescent microscopy revealed that there are indeed basidiomycete yeasts embedded in the cortex of the lichens!

Now the question was whether this Basidiomycete was specific to the two above-mentioned species or was also present in other lichens. In order to answer this question, the researchers found a genetic signature of the newly found species and screened lichens in neighboring *Bryoria* forests in Montana for this signature. What they found was that each lichen species was associated with a genetically distinct strain of Basidiomycota, even when the lichen grew intermixed with *Bryoria*. Interestingly, the team of scientists found similar results in 52 lichen genera from six continents, suggesting that these Basidiomycotan fungi are globally associated with some lichens, and the authors suggest that this group may complete their life cycle entirely within the lichens.

Genetic analyses of the unknown fungi revealed that these new lichen-associates are closely related to the yeast *Cystobasidium* (class Cystobasidiomycetes, subphylum Pucciniomycotina). Two previously known lichen associates in the Cystobasidiomycetes are in the genus *Cyphobasidium*, and the genetic signature used to find the new lichen symbionts supports them also falling within *Cyphobasidium*. The genetic diversity within this group is consistent with it being quite ancient, and the authors suggest that it may have become a lichen associate at the same time as the ascomycete host.

Altogether, the results of this research put a new complexity layer on lichens and classic textbook examples of symbiosis, and remind us that nature is full of little surprises right in front of our eyes.

WWII GERMAN POSTAL CANCEL WITH MUSHROOMS

Brian S. Luther

I recently purchased two 1930s German covers (envelopes) that show a very scarce postal cancel illustrated with mushrooms from Nazi Germany. One is postmarked from 1937 and the other from 1938. They were issued from the German District of Ahrweiler, which is located south of Bonn with the Rhine River as its eastern border. Ahrweiler is a very scenic area with iconic views of the Rhine and many old castles. It is especially well known for its vineyards and wineries, which have been in production for hundreds of years, and for its annual wine festival. The area was under Roman control during the first and second centuries A.D.

The cancel is a complete circle. The inside top shows the word "AHRWEILER"; below that is a row of five mushrooms which are intended to represent cultivated mushrooms. The mushrooms go from small to big and then back again, left to right. Centered on the bottom of the circle is a bunch of grapes with a leaf and tendrils, which is clearly in reference to the importance of grape growing and wine making in the region. The numbers "24.2.38 - 12" (right) and "14.10.37 - 20" (left) beneath the mushrooms at the center of the circles signify the date (24 Feb.1938 and 14 Oct. 1937) and the post office where the envelope was cancelled. The inscription in the bottom left of the circle reads "Ahrburgunder," which is a red wine unique to the region. The bottom right says "Champignon," which means button mushroom, or cultivated mushroom, in German and is also French for mushroom. The horizontal letters "Kostbarkeiten des Ahrtals" means treasures or delicacies of the Ahr Valley. Thus this cancel is essentially advertising the main agricultural crops and industries in Ahrweiler: growing mushrooms, growing grapes, and producing wine. For mycophiles, these are always a very good combination, of course.

Brian S. Luther

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Acknowledgment

Special thanks to family member Olaf Weckner for helping me correctly translate the German Fraktur printing in the cancel.

BAMFIELD FUNGUS FESTIVAL

Bamfield, B.C., on Vancouver Island will hold their first annual Fungus Festival on September 15–18, 2016. There is no cost to attend, but donations would be greatly appreciated. For information, email Orla Osborne at bamfieldfungusfestival@gmail.com or visit their Facebook page, Bamfield Fungus Festival 2016, and Facebook group Bamfield Fungus Community.

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