SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY
Number 593 June 2023

STATE FUNDS MANDATES PSYCHIATRISTS AT UW TO DESIGN TRIAL TO STUDY MEDICAL USE OF PSILOCYBIN

Jedediah Hoyt

https://keprtv.com/, May 21, 2023

Early this month, Washington Governor Jay Inslee signed Senate Bill 5263, which governs the recreational and medical uses of psilocybin.

Leaders at the University of Washington say the law mandates the University to study the potential for therapeutic value in the psychedelic compounds found in psilocybin mushrooms.

Leaders in the field at the UW School of Medicine say that with a deadline for the ability to start treating people by January 2025, now is the time to set the groundwork for the project.

Psychiatrists and trial leaders say that even though little is known about the effects of psilocybin on mental health, early studies are showing positive results. Leaders say current trials are looking at how psilocybin along with psychotherapy could potentially help those with depression, anxiety, and other hard-to-treat disorders.

Dr. Nathan Sackett, Assistant Professor in Psychiatry & Behavioral Sciences, UW School of Medicine, and overseer of the trial, says, "I should say at the onset, we're at the very early stages of developing this program, so things could change. But as of right now, what we're anticipating is studying people who are veterans or first responders, who meet diagnostic criteria for PTSD, post-traumatic stress disorder, [and] who also meet diagnostic criteria for alcohol use disorder."

Sackett says the trial will include 30–40 first responders and veterans with documented post-traumatic stress and alcohol use disorders. Leaders say these are often linked.

"There's a dizzying number of new indications being explored—a lot of these disorders are very challenging to treat. We have very limited options for our patients and it's very, very frustrating. And these are life-debilitating disorders. And so, I think at this stage, my general attitude is we are desperate for new solutions," said Sackett.

Leaders say the trial will be conducted in a controlled environment. We're told the group will be split into two. Half will receive the treatment in the first round, and half will receive a placebo. Leaders of the trial say those with placebo treatments will later be given the opportunity for a test treatment.

Doctors say before the use of these compounds is available widely, it needs to be better understood in these clinical environments. Trial leaders believe that psilocybin can allow you "to get out of your own head for a bit."

Sackett, says, "My hypothesis is that in using these compounds in a therapeutic setting, you are allowed to step outside of that narrative for a certain time period and question the validity of that story."

SCIENTISTS MAY HAVE FOUND AN ANTIDOTE FOR DEATH CAP MUSHROOMS

Tina Hesman Saey

https://www.sciencenews.org, May 16, 2023

Amanita phalloides.

Death cap mushrooms get their name for a reason: The poisonous fungi can kill if ingested in even small amounts. But researchers may have found an antidote for one of the mushroom's most deadly toxins.

A dye already used in medical procedures can block damage from the mushroom's alpha-amanitin toxin, researchers report May 16 in *Nature Communications*. The work was done with human cells grown in lab dishes and with mice. If the finding holds up in trials with people, the antidote has potential to save lives.

Death cap mushrooms (*Amanita phalloides*) are responsible for the majority of deaths from mushroom poisonings worldwide. Symptoms may appear as soon as six hours after ingestion and include nausea, vomiting, and diarrhea. If a person isn't treated immediately, the toxins can cause liver and kidney damage that can lead to death. There is no antidote currently available, but people can be treated with fluids, activated charcoal, and other therapies.

How alpha-amanitin kills isn't fully understood. A team of researchers in China and Australia used the gene editor CRISPR/Cas9 to determine which human genes the toxin triggers to cause cell damage and death (*SN: 10/7/20*). One of those genes makes a protein called STT3B, which helps attach sugars to proteins. Scientists hadn't known that that process was important for mushroom toxicity.

The team then screened a library of more than 3,000 drugs approved by the U.S. Food and Drug Administration for molecules that could inhibit STT3B's action. The team found that the dye indocyanine green could stop the protein from doing its job and prevent human cells in lab dishes from dying after being treated with alpha-amanitin.

In tests with mice poisoned with alpha-amanitin, the dye reduced liver and kidney damage and increased survival rates if given one to four hours after poisoning. Waiting eight to 12 hours to administer the antidote reduced its effectiveness, the team found, probably because irreversible organ damage had already occurred.

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CALENDAR

June 3	Field trip (see PSMS website)
June 13	Membership meeting and first Annual Survivors Social Event, 7:30–9:30 pm, CUH
June 19	PSMS board meeting, 7:30–9:00 pm, CUH
Sept. 29	*Spore Prints* deadline

BOARD NEWS

Carolina Kohler

Greetings, PSMS members!

At our meeting on May 15, we welcomed Peg Rutchik as a full board member, replacing Luise Asif, who has had to step down. Luise has been an indefatigable contributor to our organization for decades, and we will dearly miss her. Thank you for all your work, Luise!

After reviewing and approving our treasurer's financial reports for this period, the next order of business was to work on the final details of launching a new format of small pop-up field trips. These will be a "bare bones" version of our normal field trips that will be coordinated at a moment's notice based on how the mushroom season is developing. We are all excited about this and hope to see it come to fruition very soon.

We then continued to work on the details of our upcoming survivor's social event and silent auction, which will take place at the monthly membership meeting on June 13. There will be delicious food and drinks, a silent auction, and the opportunity to meet fellow PSMS members and share our mushroom stories. We hope to see you all there!

MEMBERSHIP MEETING

Scott Maxwell

Our June membership meeting has now become our "Annual Survivors Social Event." It will be held from 7:30 to 9:30 pm on Tuesday, June 13, 2023, at the Center for Urban Horticulture and will be members only. COVID restrictions have been dropped, so masking is optional. This event is a gathering to get to know each other and share our fungal and personal experiences. It will include a fund raiser for our K-12 and Ben Woo scholarship funds. It is also an opportunity to meet and talk with your club board members and committee chairs who can inform you about how to become more active within PSMS. Since it should be warm outside, we will be renting the garden and atrium areas to allow people to spread out and enjoy the beautiful area outside the hall. This event will include light "finger foods" (not a dinner), beer and wine, and non-alcoholic beverages.

Since space is limited, we are requiring pre-registration to attend. Sign-ups will begin on June 1 and you will be receiving a special announcement in your e-mail providing details on registration and an opportunity to donate items for the silent auction fund raiser (if you are signed up to receive PSMS e-mails). The entry fee will be $10 per person. Based on last year's experience, this will be a very enjoyable event. This event is hosted by the PSMS Board. Special thanks to Hospitality Committee Chair Brenda Fong for coordinating the layout and the food and beverages and to Outreach Committee Chair Marian Maxwell for handling the registration and fund raising activities.

Let the "Fun-gal-a" begin!

NEW PSMS SEQUENCING COMMITTEE

Shannon Adams

We're happy to offer a new opportunity to get involved in a groundbreaking project aimed at expanding our database of PNW fungi through DNA sequencing. A new PSMS committee is being formed to spearhead establishment of an efficient pipeline for collecting, documenting, preserving, and sequencing fungi from Washington State.

In partnership with the organizers of Continental Mycoblitz, PSMS is committed to making sequencing accessible to everyone. The only requirement? Well documented collections. With your support, we aim to achieve our target of 500 sequenced collections by the end of the October collecting season of 2023. In addition,

we hope to plan some group collecting forays in late summer, providing a fantastic opportunity for building a community of individuals within PSMS who share an interest in fungal taxonomy. Join us and get ready to explore, discover, and deepen your passion for fungi.

If you are interested in contributing to the initiative, we invite you to contact Shannon Adams, the committee chair, at moonshell@gmail.com for further details regarding our upcoming meeting. Our next gathering will take place at 6 pm on Tuesday, June 20th, at Shannon's home in North Seattle. During this session, we will refine our collecting process, firm up our plans, and get to know each other better.

Thank you for your interest in documenting the world of fungi on our doorstep!

FIELD TRIP REPORT, May 6 — Brian S. Luther

Our first spring outing was well attended, with 134 members signing in, 55 of whom were brand new and on their very first field trip. I brought firewood, and Wren Hudgins did also. We got a campfire going right away and kept it going all day. It sprinkled on us slightly first thing in the morning, but was otherwise a pleasant day. Special thanks to hosts Debbie Johnson and Mandy Andrea, who served us a delicious assortment of breakfast snacks and hot coffee first thing in the morning!

We had 12 field trip guides and guides in training, which covered most of those attending. Thanks to all who volunteered in this important duty.

I counted 60 different species of fungi displayed. As usual, people went to varying locations to hunt, but some went to a local burn and Debbie Johnson, for one, found a beautiful overflowing basket full of choice morels. New members Debra Aker and Pei Pei Sung brought their trained truffle dogs Zoe (a Lagotto Romagnolo) and Santiago (a mixed Jagdterrier), and they came back with an impressive collection of Oregon Black Truffles (*Leucangium carthusianum*), with their distinctive aroma. Besides the truffle, interesting fungi found included the beautiful yellow spring *Amanita aprica* and a single specimen of the diminutive *Arrhenia chlorocyanea* with a gorgeous blue-green color. This last species is actually very common in early spring. However, it is easily overlooked and rarely collected because it's small, low to the ground, inconspicuous, and blends into the exposed and barren mossy habitat it occupies, which most people don't expect mushrooms to be in.

Only a small group stayed for the potluck, but as always it was enjoyable. We all got the site cleaned up and I was the last to leave for home at 5:30 pm, with a long drive back to Leavenworth.

Wren Hudgins

Morning field trip meeting, May 6.

FIELD TRIP REPORT, May 13 — Brian S. Luther

We had very warm weather for this field trip, and it's always a delight to have the use of this facility, thanks to our WRI host Joshua Schaub. We also owe a special thank-you to our PSMS morning hosts Vern and Sunida Hodgson, for providing us with hot coffee and breakfast goodies.

Seventy-two members signed in, and we had six experienced field trip guides as well as three in training, so we had more than enough to take everybody out in groups, who wanted to go. As always, a warm thank-you to all who helped in this regard.

Mushrooms were few and far between, with only 16 species brought in and displayed. The surprise of the day was a most extraordinary complete specimen of *Cantharellus roseocanus* (the Rainbow Chanterelle) that was found this early. This is a fall mushroom. Some fall mushrooms do occasionally fruit in spring, but chanterelles virtually never. I've only seen two other very small, deformed, and depauperate mid-spring chanterelle collections previously. Some very rainy late springs will bring the chanterelles out in early summer, June or July, but I've never seen as perfect specimen as this in early May.

A great potluck was shared by about 12 members who stayed to the end. We were done for the day by around 5:00 pm.

Dave Weber

Group meeting, May 13.

FIELD TRIP REPORT, May 20 — Brian S. Luther

Again we had good weather for this event, though it was breezy in the afternoon and blew a lot of our signs away and mushrooms off the tables. This was the first time we'd been to this location, and we appreciate being welcomed by Karen. Long-time PSMS member BeAnne Hull was, unbeknown to me, a regular contributor to this venue, so it was a surprise to see her there.

PSMS hosts Kitty Loceff and Annie Norton set out an impressive and tasty variety of breakfast snacks and hot coffee. Thank you!

Seventy-eight members signed in and even though the Bolt Creek Fire was officially closed to the public, many searched other locations and found very nice collections of Oyster Mushrooms (*Pleurotus ostreatus*), for the most part in good condition. One member who did go into the burn came back with a broken bottle they'd found upright on the ground with a morel growing through the neck—crazy! Only about 15 species of common spring fungi were collected, but nonetheless everybody seemed to have a good time.

Brian S. Luther

Morel in bottle neck.

Only about 25 stayed for the potluck, which was excellent with a nice variety of foods.

FIELD TRIP REPORT, May 26–29 Brian S. Luther

Approximately 85 members registered for this special volunteer-only trip on Memorial Day weekend, which is the longest official PSMS field trip. Dick and Agnes Sieger were the first to arrive in their camper, then Ben and Natalya Moore. Ben, along with Wren Hudgins, Julia Benson, Carolina Kohler, and Jamie Rumbaugh were especially helpful getting last-minute things set up on Friday, especial the games, which included croquet, ping-pong, badminton, corn toss, and horseshoes, and many members seemed to enjoy them.

Peg and Tom Rutchik were our Saturday and Sunday morning hosts, and they put out a fantastic selection of breakfast snacks, along with unlimited hot coffee. Thank you, Tom and Peg! I always set up a beer garden, and we owe an extra special thank-you to Sara Nelson of Fremont Brewing for contributing a large quantity and wonderful variety of delicious beer for members to enjoy! Thanks also go to several others who volunteered at different times to check in registered members at the gate throughout the days.

I started campfires both in the mornings and evenings, which were enjoyed by all. I got good help from Ben and Julia cutting, gathering, splitting, and stacking the firewood.

We had really good weather but for one dark cloud and a very brief thunder shower on Saturday. Members went out collecting on Saturday to many locations. Nine field trip guides, including Wren, went out to different areas. Two members followed me to the burn up the White River area of Lake Wenatchee. We all did very well, getting about four dozen morels each in prime condition. However, the mosquitoes were terrible. I'd had on a very strong Deet repellent, and they didn't bother me, but the others weren't so lucky. Nonetheless, we had a great time.

Wren Hudgins

Drone photo of some members gathered around the campfire and food tables near the creek during the field trip on May 26–29.

Members who went to non-burn sites found few mushrooms. Conditions were quite dry. Only about 15 species were brought in, and most were somewhat dried up. Besides morels, a couple of prized spring *Boletus rex-veris* were found in good condition, with no bugs.

The only rare specimen collected was a nice caespitose clump of several *Hygrophorus caeruleus*, which are bluish-gray in color and have a peculiar rancid or rotten potato odor. This species is known only from Washington, Oregon, and Idaho. DNA studies indicate it may be closely related to *Clitocybe odora*, which has a strong anise-like odor.

A.A. Sieger

Hygrophorus caeruleus found on the field trip.

On Sunday I lead a small group up to a local fire lookout over rough FS logging roads. It was worth the effort after we hiked to the lookout, with spectacular views all around.

This event rarely gets reported on because it takes place after the normal June *Spore Prints* deadline. But newsletter editor Agnes Sieger moved the deadline up to May 30, allowing this report to be published in time for the June issue.

The Saturday potluck was exceptional. It was pretty much impossible to sample something from all the tasty dishes that were set out.

A.A. Sieger

Saturday potluck.

CAN HALLUCINOGENIC MUSHROOMS AID COLOR VISION? Selina Powell

https://www.aop.org.uk/, Ma 13, 2023

Researchers have described the effect of taking hallucinogenic mushrooms on color vision in a case report published in *Drug Science, Policy and Law*.

The authors shared that recent survey data indicates that some people report long-term improvement in color vision deficiency after using psychedelics such as lysergic acid diethylamide (LSD) and psilocybin mushrooms.

In the reported case, a 35-year-old man with red-green color vision deficiency (CVD) self-administered the Ishihara Test after using 5 gm of dried psilocybin mushrooms.

The man experienced a partial improvement in his CVD lasting for 16 days after taking the mushrooms.

His baseline score on the Ishihara Test before taking the mushrooms was 14 on plates 1–21, indicating a mild red-green CVD.

A day after administering the mushrooms, his score on the Ishihara Test had improved to 18, above the benchmark of 17 required by the Ishihara Test for classification of normal color vision.

The subject's test score remained at 18 around four months after the ingestion of the mushrooms.

The researchers highlighted that a single use of psilocybin may produce partial improvements in CVD extending beyond the period of acute effect.

"Systematic exploration of this possible phenomenon is needed to confirm our findings, gauge their generalizability, and determine the mechanism of action," they emphasized.

HILDEGARD HENDRICKSON
Lost and Gone Forever Ten Years Ago
Brian S. Luther

Hildegard Hendrickson and her husband, Monte, joined PSMS at the 1972 exhibit. Monte passed away in 2001, but they were both very involved in our club in many ways for over 40 years. For 11 years, from September 1974 until June 1985, Hildegard was the editor of our PSMS newsletter, *Spore Prints*, after which our current editor, Agnes Sieger, took over.

Monte was the one who made all of the heavy laminated plastic PSMS name tags that members could order for a nominal fee. In 1985 the *Seattle P-I* published a nice article and photo about Hilda and Monte, showing them holding morels and spring boletes.* Hildegard and Monte received the PSMS Golden Mushroom Award in 1997.

In 2012 there was a big forest fire near Lake Wenatchee, and in June of 2013 Hildegard (or Hilda, as she was called) went collecting for morels on her own in the burn. She never returned.

The alarm was raised when her car was reported by a PSMS member who thought it was suspicious after seeing it unmoved for three days. It was apparently unlocked, and both her purse and cell phone were inside untouched. At the time Hilda was 79 years old and not in the best of health. Unfortunately, and sadly, she failed to follow her own advice which she'd given to countless other members at mushroom talks—namely, ***never*** go out in the woods by yourself.

The largest search and rescue parties ever assembled in Chelan Co., including aircraft, searchers on horseback, and searchers on foot with blood hounds, were unable to find even a trace of her. If she had taken her cell phone with her, then the authorities could have pinged it and tracked where she was, but she didn't. Over the decades we've had PSMS members get lost in the woods temporarily, but Hilda was the only one to go out and never come back. Her disappearance was first reported to the membership in *Spore Prints 494*, Sept. 2013, with a nice photo by Joanne Young.

I was officiating our last spring field trip in 2013 over Blewett Pass on the day she disappeared. Hildegard would often stop in briefly at this location just before potluck time to check in, say "hi" to everybody, and often show off what she'd found collecting during the day. When it got to be potluck time, I and others wondered why we hadn't seen Hildegard. We figured she'd found a really good patch of morels or spring boletes some place and just didn't make it to the field trip.

Hilda was born in what was Yugoslavia at the time, very close to Austria, where she ended up living. She considered herself Austrian and was fluent in German. She emigrated to the U.S., got a PhD in business from the University of Washington, and became a Professor of Finance at Seattle University, where she retired in 1996. She and Monte had two sons, Joe and Andy.

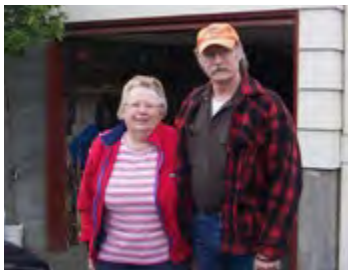
I have very fond memories of Hilda. She and I, and sometimes also my daughter, would go out scouting for a day together in late winter for possible early field trip sites and we lived only about a mile apart in North Seattle.

After she disappeared, I presented a PowerPoint lecture about her, to PSMS. Attached are some selected photos of Hilda, and for those who knew her they'll bring back many memories, and for those who never knew her it'll give you a chance to see who she was. She has been dearly missed by all who knew her.

There's a very poignant message here, which I hope has not escaped anyone reading this who's thinking about going out mushroom hunting—namely, be prepared.**

Photo taken April, 1974, at King Co. Tolt River Campground (*now MacDonald Park*) *in Carnation. L to R: Bill Pollard - Beverly Bourgeois - Pauline Pollard - Frank Rentz - Evelyne Rentz - Howard Melsen - Joe Hendrickson - Monte Hendrickson - Hildegard Hendrickson - Andy Hendrickson - Ed Cantelon - Ella Cantelon - Togie.*

Arnica Luther



Hildegard and Brian ready to go early field trip scouting.

Brian S. Luther

Hildegard and her treasures, Eagle Creek field trip, May 30, 2010.

Seattle Post-Intelligencer

Hildegard and Monte Hendrickson. Expert mushroomers from North Seattle display morels they collected during one foray. Exactly where they search for morels is their secret.

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*The article was titled "To find the morel, just sort of sneak up on it" by author/reporter John Hessburg. It appeared on the front page of the Saturday, May 25, 1985, *Seattle Post-Intelligencer* and continued onto page 8.

Make sure you have the **ten essentials (Google this if the term is unfamiliar), wear the appropriate clothing and boots, be prepared for unexpected inclement weather, charge your cell phone ahead and keep it on you, take a compass or GPS device, noting where you went into the woods so you can get back out, and it doesn't hurt to have two-way radios for quick communication with others, and *very importantly*: tell others where you're going and **never** go out into the woods by yourself.

THE 400 MILLION-YEAR-OLD FOSSIL CACHE UNCOVERS EARLY LIFE

Aaron Rottenberg

https://list23.com/, May 20, 2023

Cutting-edge technology has revealed new insights about a world-renowned fossil treasure trove, which might provide important evidence about early life on Earth.

Scientists investigating a 400 million-year-old fossil cache discovered in a remote northeastern region of Scotland demonstrate a higher degree of molecular preservation than previously assumed.

Scientists have been able to detect the various organisms living inside the exquisitely preserved treasure trove from Aberdeenshire via fresh inspection.

The Rosetta Stone assisted Egyptologists in translating hieroglyphics, and the group expects these chemical codes to assist them in deciphering more about the life forms that other more ambiguous fossils represent.

The Rhynie chert is a hard rock from the Early Devonian period that dates back to about 407 million years ago, and has a significant role to play in scientists' understanding of life on earth.

Researchers used data analysis and machine learning to analyze fossils from National Museums Scotland, Aberdeen, and Oxford. They believe this might reveal new insights about less well-preserved samples.

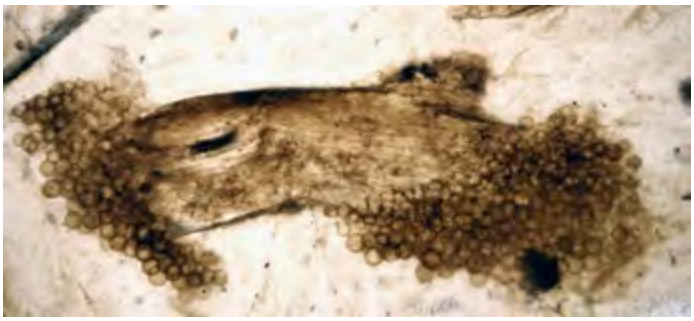
Researchers demonstrated that molecular information was preserved within the cells, tissues, and organisms in the rock by an innovative FTIR spectroscopy technique.

The team was able to detect molecular fingerprints that reliably distinguish between fungi, bacteria, and other organisms because they already knew which organisms the majority of fossils represented.

These fingerprints were then used to identify several of the Rhynie's more mysterious members, including two examples of an obscure tubular "nematophyte."

These strange organisms found in Devonian—and later Silurian—sediments have both algal and fungal characteristics, and were previously difficult to classify in either category due to their high prevalence.

"We have demonstrated how a quick, non-invasive technique can be used to differentiate between different lifeforms, and this opens a new window on early life on Earth."



Loron et al.

Photograph a small piece of Rhynie fossil plant w with fossil fungi colonizing its ends.

The team developed a machine learning algorithm that was capable of recognizing the different organisms, giving the potential for separating other fossil-bearing rocks.

The Royal Society, Wallonia–Brussels International, and the Mexico National Council of Science and Technology funded the research.

Dr. Corentin Loron, a Royal Society Newton International Fellow from the University of Edinburgh's School of Physics and Astronomy, believes the research shows how bridging paleontology with physics and chemistry can reveal new insights about early life.

"Our research underscores Scotland's remarkable natural heritage in a unique scientific way, and it provides us with a way to investigate life in trickier, more mysterious remains," said Loron.

Nick Fraser, the Keeper of Natural Sciences at National Museums Scotland, believes that the value of museum collections in aiding our understanding of the world should never be underestimated.

"Our new study provides a new avenue of looking ever deeper into the fossil record," says the author.

Reference

C. C. Loron, E. Rodriguez Dzul, A. V. Gromov, N. C. Fraser, and S. McMahon, 12 March 2023, *Nature Communications*. DOI: 10.1038/s41467-023-37047-1

EXAMINING PUPPETEER FUNGUS' TARGETED TAKEOVER

Harvard University

https://phys.org/news/, May 19, 2023

In a new study published in *eLife*, lead author Carolyn Elya, postdoctoral researcher in the Department of Organismic and Evolutionary Biology at Harvard, reveals the molecular and cellular underpinnings behind the parasitic fungus *Entomophthora muscae*'s (*E. muscae*), ability to manipulate the behavior of fruit flies.

Elya first described the manipulated behavior, called summiting, in a study published in *eLife* in 2018. Elya, who was studying microbes carried by fruit flies while a graduate student at University of California (UC) Berkeley, set out rotting fruit to capture wild fruit flies.

When she later checked to see is she had captured any, she found instead zombie flies, with a banding pattern on their abdomen, that had died striking an interesting pose. Through extraction and sequencing of DNA Elya confirmed the suspected cause, *E. muscae*.

Carolyn Elya

Fruit fly with its wings up and evidence of a fungal outgrowth.

Summiting occurs at sunset when the infected flies climb to an elevated location and extend their proboscises to the surface. A sticky droplet that emerges from the proboscis adheres the fly to the surface right before the wings raise up and away from the body and the flies die.

"The climbing is very important as it positions the fly in an advantageous location for the fungus to spread to the most possible hosts," says Elya. "The fungus jumps to the new host by forming very specialized and temporary structures that burst through the

fly's skin and shoot spores into the environment that are only good for a handful of hours. It's a fleeting process, so an advantageous position is everything to survival."

While at UC Berkeley, Elya developed a laboratory model she refers to as the *Entomophthora muscae-Drosophila melanogaster* "zombie fly" system using the wild fungal isolate she found in her backyard. With this system, Elya could continuously infect fruit flies (a laboratory staple) as well as culture the fungus independently of the fly host in media thought to mimic the internal environment of the fly.

Summiting has appeared several times in scientific literature, but studies had only been observations of dead house flies. No one had ever observed how flies behave in their last hours of life. Elya set out to fill this knowledge gap of what happens when flies summit by developing a high-throughput behavioral assay to automatically track hundreds of infected flies. While using this platform to monitor the behavior of flies becoming zombies, she encountered a surprise.

Carolyn Elya

Zombie flies strike their final pose adhered to a wooden dowel.

"We found that summiting is not about climbing," said Elya, "it's actually this burst of locomotor activity that starts about two and a half hours before the flies die."

With this discovery, Elya and co-authors paired her system to create on-demand zombie flies with the lab's powerful fruit fly genetic toolkit. With these and the author's new behavior assay they could identify genes and neurons required for flies to summit.

"Overall, we found the flies hormonal axes was mediating summiting behavior. When we silenced these neurons the flies were really bad at summiting," Elya says. These neurons send projections to a neurohemal organ that produces juvenile hormone, a hormone conserved in insects. "We think the fungus is actually driving the activity of these neurons in order to drive the release of this hormone, which is causing the flies to have this burst of locomotor activity."

Elya and co-authors were then able to collect a behavioral dataset consisting of hundreds of infected flies, which they then used to train a computer to identify flies as they are summiting. This classifier tool enabled the team to discover that fungal cells invade the fly's brains in an organized way, occupying specific regions of the brain during summiting.

Interestingly, the team also discovered that the flies blood/brain barrier is compromised when exposed to the fungus. Normally the neurons are protected from the blood that's circulating through the fly's body. The breakdown of the blood/brain barrier has important consequences for what the neurons are being exposed to, potentially allowing things that are circulating in the blood to interact with neurons in the brain, thus providing a route for modulating neural activity.

"We think this could be important for the way that the fungus is driving behavioral changes," Elya said, "and we actually found that you can pull blood from flies that are doing the summiting behavior, put it into naive flies and drive some of this increased locomotion. So we've shown that there's at least the partial ability to recapitulate this summiting behavior just by transferring fly blood."

Elya says that these experiments show some blood-borne factors can drive summiting behavior, though it's not yet clear what the identity of these factors are or who produces them (the fungus or the fly).

Elya hopes to next develop transgenics to help modulate things from the fungus side in addition to perturbations that can already be made in the flies. "There are still a lot of open questions here," she says, "what the fungus is doing is still a mystery."

The Miracle of Becoming

It's a small ecstasy when,
strolling through the field,
I see the mottled tip
of the blonde morel
pushing up through bent grass.
And another. And another.
They were not here yesterday,
but now I kneel on the earth
with my blade sharp and true
and slice through the strange
and rubbery stems
and hold the handful of treasure
to my nose and breathe in
the earthy, woodsy scent.

So curious to think how they go
from not being here to being here.
Like when I realize I love someone,
but can't say precisely when love began.
A life is made of such moments—
this wonder that rises
at the miracle of becoming,
this sweet gift of passing through.

—Rosemerry Wahtola Trommer
(by permission)

MUSHROOM DESSERTS

Slurrp Desk

https://www.slurrp.com/, May 23, 2023

The concept of incorporating mushrooms into desserts has gained popularity as chefs and bakers seek to push the boundaries of flavor and create unexpected culinary experiences. It is a testament to the versatility of mushrooms and the creative spirit of chefs who are constantly exploring new ingredients and combinations.

Mushroom desserts encompass a variety of culinary techniques to incorporate these fungi into sweet creations. One common method is to infuse mushroom flavor into creams, custards, or syrups by steeping them with dried or fresh mushrooms. This process allows the flavors to meld and creates a subtle mushroom essence. Another technique involves incorporating finely chopped or powdered mushrooms directly into the dessert batter or dough, adding texture and flavor.

https://thealnaturalvegan.com/

Ice cream recipe loaded with 7 different mushrooms and heirloom cacao.

FUNGUS OUTBREAK LINKED TO COSMETIC SURGERY IN MEXICO

Luke Andrews

https://www.dailymail.co.uk/, May 17, 2023

A woman has died and four others have been hospitalized after receiving liposuction and other cosmetic surgeries in Mexico. The individuals, aged in their 30s and 50s, were diagnosed with fungal meningitis—swelling of the membrane surrounding the brain and spinal cord caused by a fungal infection.

They had all traveled from Texas to clinics in Matamoros, on the Mexican border, and developed the potentially fatal condition—that can cause seizures and a coma—three days to six weeks later.

The operations took place between February and April, and health officials in the U.S. have raised the alarm over the cases, urging Americans to cancel medical procedures in Matamoros.

It is unclear what type of fungus the patients were infected with,

The Centers for Disease Control and Prevention (CDC) and Texas Department of Health issued the warning over the cases on Tuesday.

They said each patient had received an epidural, when an anesthetic is injected into the area around the spinal cord to numb pain.

It was not clear at this stage whether the cases were linked or where the patients had become infected. Officials are monitoring for more cases.

Raising the alarm, the CDC urged anyone with a treatment booked in Matamoros that involved an epidural injection to cancel the procedure.

The agency added that those who got treatment there since January should watch for warning signs of meningitis.

Those with concerns were told to speak to their doctor.

Dr. Jennifer Shuford, from the Texas Department of Health, said: "It is very important that people who have recently had medical procedures in Mexico monitor themselves for symptoms of meningitis.

There is a booming medical tourism industry south of the U.S. border, where procedures can be offered at a fraction of the cost of those in the U,S. About a million Americans cross the border to get medical procedures every year, figures suggest.

Meningitis can be caused by an infection in these areas by fungi, including *Blastomyces*, which has triggered an outbreak in Michigan, and *Candida albicans*, the fungus behind thrush.

"Meningitis, especially when caused by bacteria or fungus, can be a life-threatening illness unless treated promptly."

Patients cannot spread the infection to others but may experience symptoms including fever, severe headaches, stiff neck, and sensitivity to light. Patients can progress into suffering seizures, fall into a coma, and later die from the infection.

Treatment involves administering courses of antifungal medications, typically into the vein via an IV drip. They may be taking the drugs for six months to a year.

MUSHROOM ASTROLOGY

Bob Lehman, LAMS

Gemini (May 21 – June 20): You enjoy the mental challenge of figuring out when and where mushrooms are going to fruit—making calculations about rainfall, temperature, humidity, season, mycelial activity, and fruiting patterns. Having made your calculations you may get distracted by some other interest and never actually do any mushroom hunting, but you can check your calculations later by asking what other people found. You are good at mushroom identification, which is like a game to you, and you like taxonomy—especially all the name changes that drive other people crazy.

Leo (Jul. 23–Aug. 22): You love to go on club forays, make spectacular mushrooms finds, and show them off to everyone else. If other admire your basket full of chanterelles, you day has been a success—even though you may not care much for eating chanterelles yourself. You are delighted to give your mushrooms to anyone who will show appreciation. Even on forays when few mushrooms are to be found, you keep people's spirits high.

We are sad to report the loss of two well-loved PSMS members.

Lifetime member and 2017 Golden Mushroom recipient **Cathy Lennebacker** passed away after a battle with cancer on May 4, 2023. A PSMS member since Jan of 1999, Cathy was an avid volunteer with her husband, Don Lennebacker, serving for many years as a host for field trips, serving on the Board of Trustees, working on the annual PSMS fall mushroom show, on Mushroom Maynia, and on the combined Mountaineer/PSMS event at Meany Lodge. She was creative, knitting, sewing, and dyeing natural fibers with mushrooms and lichens. We offer our condolences to her husband, Don, their family, and other friends.

Longtime member **John Hall** passed away from cancer on April 22, 2023. Since January of 2008 when he and Sue Lynette joined PSMS, they always stepped forward to help with various PSMS activities, field trip hosting, and helping with PSMS events. Jon was also on the PSMS Board of Trustees for two years. Jon was an artist and a musician. We will miss his gentle countenance and offer Sue and his family and other friends our sympathies.

This will be the last newsletter until September.
Have a great summer!