

SPORE PRINTS

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MAN INJECTS “MAGIC” MUSHROOMS INTO BLOOD, RESULTING IN ORGAN FAILURE

Hannah Sparks

<https://nypost.com/>, Jan. 13, 2021

A man took to medical experimentation on himself when he decided to mainline “magic” mushrooms in order to kick his opioid use.

However, when the fungi started, well, mushrooming in his bloodstream, he almost kicked the bucket.

The 30-year-old, who was known to have bipolar disorder type 1, was brought into a Nebraska emergency room recently, with reports of vomiting blood, diarrhea, nausea, jaundiced appearance, confusion, and fatigue.

Upon arrival, the man spoke incoherently, doctors said in a medical journal report of the incident. Tests revealed his liver had been injured by infiltrating fungi and his kidneys were not fully functioning. In other words, he was going into organ failure.

Doctors later learned that the man had ceased taking medication for his mental illness, which prompted episodes of mania and depression.

During one such occasion, he launched a personal investigation into psilocybin-based therapies, including those speculated as potential treatment for addiction from opioids, as well as anxiety and depression. Touted as the “safest” of all recreational drugs, ‘shrooms may have seemed like a cure-all to the patient in question, whose case study now appears in the *Journal of the Academy of Consultation-Liaison Psychiatry*.

His nearly fatal flaw, however, was the decision to inject a “tea” made of psilocybin mushrooms, rather than consume them as is customary.

Tests later revealed that actual fungus had cropped up in his blood supply, and the man spent three weeks in the hospital recovering from the ill-conceived stunt, on a ventilator and attached to a machine that could filter his blood of toxins.

After 22 days in the hospital, the man recovered and was released to his family with orders of two courses of antibiotics and one ongoing anti-fungal treatment, the case report said.



A REAL-LIFE TALE OF SURVIVAL FOR B.C. DOG WHO APPEARED IN A FILM ABOUT A PLANE CRASH

Dan Ferguson

<https://www.aldergrovestar.com/>, Jan. 13, 2021

A B.C. dog who was featured in a film about survival had a real-life brush with death in a Langley, B.C., park.

Raleigh, a seven-year-old yellow lab who appeared in “The Mountain Between Us” starring Kate Winslet and Idris Elba, has recovered after barely surviving an encounter with a poisonous mushroom in McLeod Athletic park in November.



He was rushed to the Animal Emergency Clinic of the Fraser Valley (AECFV) in Langley after developing severe symptoms that included weakness, salivating, and abdominal pain.

Pieces of the poisonous mushrooms he consumed were identified when he vomited them up.



AECFV owner Dr. Nadine Koreman described it as “probably the most severe confirmed mushroom toxicity [case] that I’ve seen.”

Raleigh, the yellow lab who appeared in “The Mountain Between Us” has recovered after he was treated for mushroom poisoning in Langley, B.C.

Severe vomiting and diarrhea led to liver failure, and over several days, Raleigh underwent what was described in a Facebook posting by the clinic as “extensive” treatment, including numerous lab tests and medications, multiple ultrasounds, and a plasma transfusion.

“Ultimately Koreman aspirated his gallbladder, which is not commonly performed in veterinary medicine, which she feels helped considerably with his recovery.”

Koreman said the clinic sees around five serious cases a year of mushroom poisoning involving dogs, usually when the weather gets damp and more mushrooms appear.

Dog owners should keep a watchful eye on what their dog tries to eat while out on walks, and if their pet develops severe symptoms, they need to get to a vet quickly, Koreman advised.

“There’s a lot of mushrooms that don’t cause problems, [but] there’s a lot that do,” Koreman observed.

Humans need to be careful, too. Many mushrooms that are poisonous to dogs are also poisonous to people.

Spore Prints

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ANNUAL MEMBERSHIP MEETING Marion Richards

The annual membership meeting will be held Tuesday, February 9, 2021, at 7:30 pm via Zoom. Everyone is welcome to attend! The link will be available on the PSMS homepage at www.psms.org.

Our speaker for February is Tradd Cotter of Mushroom Mountain, and his talk is entitled “Opportunities with Fungi that Make a Difference.”



Tradd Cotter

Mushrooms are fascinating. Problem solvers. Opportunistic. Orchestrating complex and dynamic physical and chemical behaviors that can make a difference in our present and future. Tradd Cotter discusses how he started Mushroom Mountain and how the business has evolved to stay on the fringe of ideas that can help solve hunger, disease, and beyond. Inspiring to mycologists, gardeners, students and environmentalists, this lecture showcases a promising and optimistic movement toward planetary healing using fungi, encouraging viewers to join a community of creative and goal-oriented citizens who want to change the world. The future of civilization depends on every one of us making a difference. It doesn’t take a million years to evolve. It will happen overnight.

Tradd Cotter is a microbiologist, professional mycologist, and organic gardener, who has been tissue culturing, collecting native fungi, and cultivating both commercially and experimentally for more than twenty-two years. In 1996 he founded Mushroom Mountain, which he owns and operates with Olga Katic, to explore applications for mushrooms in various industries. His primary interest is in low-tech and no-tech cultivation strategies so that anyone can grow mushrooms on just about anything, anywhere in the world.

CALENDAR

Feb. 9 Annual membership meeting, 7:30 pm, via Zoom
Feb. 15 Board meeting, 7:30 pm, via Zoom
Feb. 16 *Spore Prints* deadline

BOARD NEWS

Luise Asif

It’s election time! Please be sure to vote. Candidates and instructions are shown on pages 4 & 5. There are exciting new faces as well as old friends. Winners will be announced at the annual membership meeting, March 9. A huge thank-you to Marian Maxwell and Anne Tarver for their hard work in implementing suggestions for the bylaw update. Back to 2021, the dates for the fall show and Ben Woo Foray are already set in the hope that the fall will bring back some normalcy. Meanwhile more virtual events are being considered for the first part of the year. Derek Hevel has taken the lead on creating a survey on diversity, inclusion, and equity in our PSMS community. Deb Johnson, Sweta Agrawal, Molly Watts, and Pacita Roberts joined Derek in formalizing concerns into the survey, which has been already sent out. Please check your email and respond if you have not yet done so. Membership Chair Pacita Roberts and Outreach Chair Marian Maxwell have established a new communication mechanism using the current PSMS platform. Information and instructions are detailed on page 3. Pacita and Marian are available to answer any questions.

Irwin Kleinman 1929–2021



This announcement is in remembrance of Irwin Kleinman, a long-term member of PSMS. Irwin, passed away on January 6 at the age of 92, one month short of his 93rd birthday. In his personal life, he was a military professional, serving in various parts of the world including Europe where he met his wife, Millie, who died several years ago. They both joined PSMS in 1985 and were very active members for many years. They hosted field trips and volunteered for many PSMS activities such as the survivors’ banquet and the annual show. At the annual show, Irwin especially liked to host the “Touch and Feel” table, interacting with the children and adults who felt a little intimidated asking their questions at the official identifiers table. Irwin had a slightly rough exterior, but had a very warm heart. Irwin and Millie were presented the Golden Mushroom Award in 2011 for their years of outstanding service. Irwin will be missed. However, it is our hope that he has rejoined Millie and they are picking mushrooms in heaven.

— Scott Maxwell

Our communication system has changed after Yahoo groups was shut down. We currently have two avenues of communication available to PSMS members.

The first way is the PSMS broadcast system. This system is *only* from PSMS to each member who opted into the list. This list is strictly for PSMS business—event & class notifications, emergency field trip changes, elections, bylaws changes, etc. This is a one-way notification system, although you can reply to the person who posted the notification. There is no member-to-member exchange on this system. To join this list:

1. Log in to your Membership profile at www.psms.org.
2. Scroll down to “My Membership Information.”
3. Select “Change Contact/Profile Information” under Member Information on the right.
4. Check the box after “Member Email List?”

If you elect to opt out of the PSMS broadcast notices, you will not receive emergency field trip cancellations or notices for upcoming classes and events.

The second way is through our listserv in the Members’ area of our webpage. This is a member-to-member communication listserv. You may join as many of the topics as you would like on this list. To join this list, follow the steps 1–4 above. Scroll to “Member Area Features,” and under “Communication,” select “Message Boards”. You will only need to log in the first time to subscribe to the list or later to subscribe to another topic. Once you are subscribed to the list and the topics of your choice, you only need to reply to the email in your inbox. New topics must be approved by admins.

We also maintain these pages for our members and the public:

PSMS blog: <https://psmsblog.com/>

PSMS Facebook page:

<https://www.facebook.com/PSMS.mushrooms>

MODERN TOMATOES CAN’T GET SAME SOIL MICROBE BOOST AS ANCIENT ANCESTORS

Brian Wallheime

<https://www.purdue.edu/>, Jan. 13, 2021

WEST LAFAYETTE, Ind. - Tomato plants are especially vulnerable to foliar diseases that can kill them or impact yield. These problems require a number of pesticides in conventional crops and make organic production especially difficult.

A team of scientists led by Purdue University has evidence that tomatoes may be more sensitive to these types of diseases because they’ve lost the protection offered by certain soil microbes. The researchers found that wild relatives and wild-type tomatoes that associate more strongly with a positive soil fungus grew larger, resisted disease onset, and fought disease much better than modern plants.

“These fungi colonize wild-type tomato plants and boost their immune systems,” said Lori Hoagland, an associate professor of horticulture. “Over time, we’ve bred tomatoes for yield and flavor,

but it seems they have inadvertently lost their ability to benefit from these soil microbes.”

Hoagland and Purdue post-doctoral researcher Amit K. Jaiswal inoculated 25 diverse tomato genotypes—a range of wild types to older and more modern domesticated varieties—with *Trichoderma harzianum*, a beneficial soil fungus often used to prevent malicious fungal and bacterial diseases.

In some of the wild-type tomatoes, the researchers saw up to 526 percent more root growth in plants treated with the beneficial fungus compared with those that weren’t treated, and as much as 90 percent more plant height. Some modern varieties had as much as 50 percent more root growth, but others showed no increase. Height in modern varieties increased about 10–20 percent, far less than in the wild types.

The researchers then introduced the plants to two disease-causing pathogens—*Botrytis cinerea*, a necrotrophic fungus that causes gray mold disease, and *Phytophthora infestans*, a blight-causing mold that was responsible for the Irish potato famine in the 1840s.

The wild types showed increased resistance by up to 56 percent and 94 percent, respectively, for *Botrytis cinerea* and *Phytophthora infestans*. However, the *Trichoderma* actually increased the disease levels in some genotypes, generally in modern plants.

“We saw significant response to the beneficial fungi in the wild-type plants, with increased growth and disease resistance,” Jaiswal said. “As we moved across the spectrum toward the domesticated varieties, we saw less benefit.”

The research was conducted through the Tomato Organic Management and Improvement Project (TOMI), led by Hoagland, with a goal of improving organic tomato production and disease resistance. Funded by the U.S. Department of Agriculture’s National Institute of Food and Agriculture, the TOMI team includes researchers from Purdue, the Organic Seed Alliance, North Carolina State University, the University of Wisconsin-Madison, North Carolina A&T State University, and Oregon State University.

Hoagland said her team wants to identify wild-type tomato genes responsible for soil microbe interactions and reintroduce them to current varieties. The hope is to keep the traits growers have selected for over thousands of years while recapturing those that make the plants stronger and higher yielding.

“Plants and soil microbes can co-exist and benefit each other in so many ways, but we’ve seen that the plants we’ve bred for certain traits have broken that relationship. In some cases, we could see that adding what should have been beneficial microbes actually made some domesticated tomato plants more susceptible to disease,” Hoagland said. “Our goal is to find and restore those genes that can give these plants the natural defense and growth mechanisms that they had so long ago.”



Lori Hoagland & Amit Jaiswal

Wild tomato plants treated with *Trichoderma harzianum* (right of each frame) grew taller and amassed significantly more root growth than non-treated plants. Modern hybrids (left) didn’t.

ART CREATED IN A PETRI DISH IN INDIA HAS JUST WON AN INTERNATIONAL AWARD

Harikrishnan Nair

<https://www.hindustantimes.com/>, Jan. 22, 2021

Talk about art in unexpected places. Balaram Khamari's canvas is the Petri dish. He arranges microorganisms in such a way that they will form artistic patterns as they grow. The medium he uses is agar—a jelly-like substance made from seaweed—which is why he and other creators like him are called agar artists.

Khamari, 26, is a doctoral fellow in medical microbiology at the Sri Sathya Sai deemed university in Anantapur, Andhra Pradesh. He's been "painting" with microbes for just over a year and already, in December, one of his art works—"Microbial Peacock"—won second prize at the American Society for Microbiology's (ASM) annual agar art contest.

At first glance, "Microbial Peacock" may seem unremarkable. Give tracing paper and a pencil, almost anyone could draw a bird like it. Except this drawing is alive—the lines and dots that form the intricacies of the work are made up of three kinds of bacteria. "All are highly pathogenic," Khamari says, rather cheerily. "So it must be done in a controlled protective environment like a lab."



Khamari's
"Microbial Peacock."

Khamari says this medium allows him to combine his love for art and his fascination with science. Ever since he first heard about agar art from a colleague, he's been tinkering with the Petri dishes and microbes. He makes his own agar, by heating and cooling agar-agar powder, much as one might do with jelly. "The agar provides nutrients to get the microorganisms to multiply," Khamari says.

The selection of the microbes depends on how the artist wants it to grow and if the work needs any color. While there are several bacteria that give off color naturally as they grow, others can be genetically engineered to produce colors; still others can be fluorescent. Some artists also use fungi and yeast to add depth to their pieces.

While this may sound like fun, Khamari says the result is always uncertain, because the agar artist is essentially painting with a substance invisible to the human eye—and one that is growing and changing all the time.

Election

Elections are held electronically online. Voting opened on January 31 and will end on March 7 at midnight. An email with the link will be sent out on January 31. This year we will be voting for President, Secretary, and five Trustees for the years 2021–2023. Please read the following candidate profiles carefully.

How to Vote Electronically: Go to the PSMS website at www.psms.org and click on "Members' Page" under the heading "Membership."

You will need to log in with your username and password. If you have forgotten your password, please fill out the section "Forgot your password?" at the bottom of the page and click on "Reset your password." If you cannot remember your username, contact Pacita Roberts at membership@psms.org or Marian Maxwell at outreach@psms.org.

Election

Scroll to the bottom of the member's area page to "Member's Area Features." Under the heading "Engagement" click on the link "Elections." This will open the ballot for the 2021 PSMS election. You may now make your selections. *Be sure to click on "submit" on the bottom of the ballot when finished.* Please note: Some biographies in *Spore Prints* have been abbreviated owing to space considerations. Online bios are as originally submitted. It will be helpful to have your *Spore Prints* issue with the candidates' photos and bios available to view when voting. You may only vote once. There are two votes per family membership; each person has to log in separately and use their individual user ID to vote. If you have any questions or confusion about voting, please contact Marian Maxwell at outreach@psms.org.

Election results will be announced at the annual membership meeting on March 9.

Election

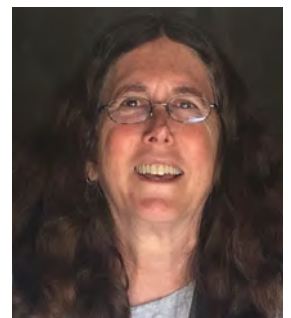


Randy Richardson *President*

I am honored to spend another term as PSMS president. I had initially wished we could return to single 2-year stints, as had been the case for the first 40 years of the club, but would not want to hand off the role in the midst of the pandemic, with so many of our functions cancelled and no in-person contacts. With your help, I will continue to try to find ways to improve the club, both during our time of virtual functioning as well as when we are free and open again.

Secretary **Susan Fenton**

I have been a member of PSMS since 2017. I am an avid birder and have been obsessed with mushroom identification since joining. I have taken several classes and volunteered at the mushroom fairs, and the Bridle Trails survey. I attend meetings and field trips and have gone to two Ben Woo weekends. I am looking for more ways to give back to the club.



Trustees

Valerie Costa

As the Executive Director of 350 Seattle, I work to advance just and equitable action on climate change. When I'm not working, I'm often in the woods, connecting with what I yearn to protect. The variety and beauty of mushrooms captivate me. I've been a member of PSMS for four years and would be honored to serve on the Board.



Wren Hudgins

A have been member since 1974, with a major focus on field trips, identification, and education. I reorganized the field trip guides and formalized the safety rules. I have participated in the annual show and the Monday ID clinics, and the online identification group continues to be my focus during COVID restrictions. What I bring are calmness and thoughtfulness.



Joe Zapotosky

Joining PSMS in 2002, I have enjoyed participating in the various activities of this wonderful club. I have assisted in set up for the annual show, attended ID clinics, taken many of the mushroom classes, and on occasion helped out as a field trip guide. In short, I believe I have benefited greatly from this organization and would like, in some small way, to repay some of this debt.



Molly Swesey Watts

A PSMS member for 9 years, I've taken classes the club offers. In 2020 I served as co-chair of the PSMS fall show, and I am now the PSMS representative for NAMA. I enjoy foraging and cooking wild mushrooms with my husband and two puppies. I've learned so much from PSMS and would like to continue to serve as a Trustee for a second term.



Esther Kelli G. Marks

My fierce concentration on being able to identify the things around me led me to join a naturalist program, birding group, and mycological club. Fungi became a serious focus, and in 2018 I became trustee of the Snohomish Mycological Society and last year was Vice President. I would like to serve the members of PSMS also, plus help build stronger bridges between Puget Sound clubs.



Scott Maxwell

A PSMS member for many years, I have provided support for many of the PSMS functions, including annual shows, dinners, retreats, field trips, and forays. I just retired as a test engineer from the Boeing Laboratories and would like to continue in an active role helping PSMS inform and educate others about the role of fungi in our environment...as well as promoting fun activities within the club.



Bruce Robertson

I have been a member of PSMS since 2017 and have enjoyed being part of this amazing community. After looking up in the trees for birds over the past few decades, I now find myself searching the ground wherever I go. I look forward to joining the board to hopefully contribute and learn and have some fun along the way.



*While hunting morels with Alexander Smith in the woods near Ann Arbor, I mentioned having found quantities of *Lactarius deliciosus* in the woods in northern Vermont. He said, "Were the stipes viscid?" I said, "Yes, they were." He said, "It's not 'deliciosus'; it's 'thyinos'." He went on to say that people go through their entire lives thinking that things are that when they are actually this, and that these mistakes are necessarily made with the very things with which they are the most familiar.*

—John Cage

WANTED: ELLIS'S BLUE MUSHROOM

Nina Burghardt

NJMAnews, New Jersey Myco. Assoc., Jan.-Feb. 2021

Last July, two young women in Manhattan were looking on the internet for a weekend activity. They found a free mushroom foray in New Jersey in a place called Wells Mills. It seemed like a lot of fun, so they got in a car and headed for the Pine Barrens. Unknown to them, July in the Pine Barrens is usually hotter than Hades and full of ticks and chiggers. Luckily for them, the temperature was comfortable with a breeze; better still, no one encountered any biting or sucking insects.

After everyone got back from collecting, these women produced a beautiful, perfectly collected, steel-blue mushroom with pinkish-white gills. They took pictures and left, never realizing that the mushroom they had just collected was last found and named 137 years ago.

We sent the mushroom to Dr. Tim Baroni, one of the country's foremost experts in the genus *Entoloma*. At first, he thought it might be an undescribed species similar to *Entoloma bloxamii*, but when the cap was examined, it had erect inflated septate cells on the surface. This identified the mushroom as *Calliderma indigofera* [aka *Entoloma indigoferum* (Ellis)]. Dr. Baroni has extracted DNA from our mushroom and will post the sequence on GenBank.



Ellis's blue mushroom,
Calliderma indigofera.

No one has documented finding this mushroom since J. B. Ellis first collected it in the white cedar bogs near his home town of Newfield, NJ, in 1876. (Editor's note: I can remember Bob Peabody repeatedly suggesting that NJMA organize some summer forays to look for the mushrooms that J.B. Ellis had collected. That was back in 1976!)

Rutgers' Chrysler Herbarium has a perfectly dried specimen of Ellis's find. How did he do it? How did he (or his wife) dry his mushroom so it stayed in perfect condition after so many years? There were no cars, no driers. How did he collect in the heat of the summer on horseback without the mushrooms rotting or getting crushed? Did he pack them in moss? Where in Newfield did he collect? Today are no cedar bogs close to town, but there are some to the northeast—maybe this is where he collected. Why has no one found this mushroom in the intervening years? Is it that the mushroom is extremely rare or that no one in their right mind goes looking for mushrooms in the middle of summer in the Pine Barrens?

It would be fun to find more specimens. To this end, I have made some posters which I will distribute around the Pine Barrens to involve everyone in the search for this rare mushroom.

**WANTED
BLUE MUSHROOM**



CAP 2" HEIGHT 4"

LAST SEEN - WELLS MILLS 2013
PREVIOUSLY - PINE BARRENS 1876
TAKE PHOTO ONLY
NOTE LOCATION
CONTACT: njmyco@njmyco.org
New Jersey Mycological Association

FIRST DOGS TRAINED TO SNIFF OUT KAURI DIEBACK FUNGI

Jean Bell

<https://www.rnz.co.nz/>, Jan. 14, 2021

New Zealand's first kauri tree dieback sniffer dogs are ready to get to work in the fight against the spread of kauri dieback in the Auckland region.

The super smart sniffer dogs—five-year-old Jagdterrier Mawhai and four-year-old English Springer Spaniel Pip—are trained to follow their noses and identify the fungi behind kauri dieback, *Phytophthora agathadica*.



Jagdterrier Mawhai &
English Springer Spaniel Pip

Since the dogs started training in February 2020, they had spent about 10 hours a week at a facility in West Auckland.

They were being phased into operation and will eventually detect the disease on goods, footwear, and equipment.

Dog handler Kerryn Johnson said Mawhai and Pip—who have noses 40 times more sensitive than humans—were trained to flag when the pathogen is present through an odor recognition test.

This test involved the dog identifying a sample of kauri dieback material amongst a number of samples of other materials that the dog might come across while working, including kauri bark, soil, gloves, and other types of fungi.

When the dog found the kauri dieback sample, they were trained to sit down and were then given a treat.

Auckland Council is spending \$100 million over 10 years to combat kauri dieback—the dogs cost \$49,000 [~\$35,000 USD] to train.

Phil Goff says the dogs will be a valuable addition as they can instantly detect the fungus.

Kauri dieback is currently identified by testing a soil sample, and it can take six weeks to get results.

"If we've got a boat or ferry going over to Waiheke Island for example, we can have [the dogs] on the wharf. They'll be sniffing goods and people, and we'll be able to tell instantly if there is a problem."

Goff said the aim is to stop the spread of the incurable disease around the region, particularly to the Hūnua Ranges and islands in the Hauraki Gulf which were currently clear of the disease.

"Because there is no cure to kauri dieback, we've got to look at preventative measures."

Auckland Council kauri dieback team manager Lisa Tolich said the team was always looking for new ways to fight the disease.

With kauri forest lands extending from Northland to the Waikato, she said sniffer dogs were a cost effective way to manage inter-regional travel.

"We have ferries that will travel across from the Coromandel to some of our Auckland-based ports. Those pathways are just as important as our sailings from downtown Auckland to Waiheke Island."

Anyone out enjoying walking tracks near kauri forest are urged to always follow the tracks, stay off closed areas and clean their footwear.

TWO TOUGH FUNGI DISCOVERED IN DENMARK: DEVOUR FLIES FROM WITHIN

Phys.org
via *The Spore Print*, L.A. Myco. Soc., Jan. 2021

Researchers from the University of Copenhagen's Department of Plant and Environmental Sciences and the Natural History Museum of Denmark have found and described two new fungal species. Both fungi were discovered in the Capital Region of Denmark—with *Strongwellsea tigrinae* being found in Jægerspris and *Strongwellsea acerosa* on Amager.

The fungi infect two Danish fly species, *Coenosia tigrina* and *Coenosia testacea*. As they do, they create a large hole in the abdomen of their infected hosts. The flies buzz about for days as fungal spores are released into the air from this hole and drift upon new victims. If, for example, a fly comes by to mate, it risks becoming infected. The fungi are nourished from within the rear segments of flies' bodies right up until the end. After a few days, the fly lies on its back and spasms in its final hours of life.

"This is an exciting and bizarre aspect of biodiversity that we have discovered in Denmark," says Professor Jørgen Eilenberg of the Department of Plant and Environmental Sciences. He adds: "In and of itself, this mapping of new and unknown biodiversity is valuable. But at the same time, this is basic new knowledge that can serve as a basis for experimental studies of infection pathways and the bioactive substances involved."

The fungal parasites probably only infect a small percentage of these two fly species, which, ironically, live by preying on other flies. These fungi survive the stresses of winter with the help of their thick-walled, orange or yellow resting spores. The researchers believe that these resting spores germinate in spring and infect flies as they become active.

"It is fascinating how the life cycles of these fungi are so well adapted to the lives of the flies they target," says Eilenberg.

The ability of these fungi to keep flies healthy enough to buzz around for days while being eaten from within has raised speculation among the researchers that the fungi may be producing substances which "dope" their hosts. Research into other types of fungi that infect cicadas suggests that amphetamine-like substances may be at play. "We suspect therefore that these fungi may produce amphetamine-like substances which keep a fly's energy level high up until the end. At the same time, we have a theory that the fungi also produce substances which keep microorganisms away from the fly's fungal wound. We would definitely like to continue our research, as doing so has the potential to discover and later make use of these substances, perhaps in medicine," says Eilenberg.



The fly species *Coenosia tigrina* with two large holes in the abdomen. The holes (arrows) are a result of infection with the fungus *Strongwellsea tigrinae*. The infective spores are discharged through these holes.

A PSYCHOTROPIC FUNGUS IS EATING AWAY CICADAS' GENITALIA AND BOOSTING THEIR SEX DRIVE

Michele Debczak
<https://www.mentalfloss.com/>, July 2, 2019

A droning sound that fills your backyard at volumes exceeding 100 decibels is a sign that the cicadas have emerged for the summer. The noisy bugs have one of the most fascinating life cycles of any insect species—spending up to 17 years of their lives underground as nymphs before finally crawling to the surface, molting their exoskeleton on the first elevated surface they can find, and mating as mature adults for a few weeks before expiring. As *The New York Times* reports, a recent phenomenon observed by scientists is making this process even stranger. Many cicadas have fallen victim to a psychotropic fungus that invades their bodies and compels them to keep mating even after their genitals have been replaced with fungal spores.



Cicada infected with Massospora cicadina.

A study recently published in the journal *Fungal Ecology* explores how exactly the fungus is able to prey upon its hosts. *Massospora* is a genus of fungi that live in the soil where young cicadas spend the first part of their lives. A cicada that digs through dirt containing *Massospora* emerges contaminated with fungal spores. The spores proliferate as the insect matures, eventually eating through its abdomen and destroying its reproductive system.

But the goal of the fungus isn't to kill its host immediately. Even when two thirds of a cicada's body is made up of *Massospora*, it continues to fly around, committed to its purpose at the end of its life—reproducing—seemingly more than ever. And when it tries to mate, the white clump of spores where its genitals should be can potentially infect a new victim.

The researchers could see how *Massospora* spread from cicada to cicada, but why the cicadas were driven to keep mating in such poor condition was more of a mystery. Their paper points to psychotropic substances found in the fungus—including the same compound that makes magic mushrooms a Schedule 1 drug.

The spore plugs of infected cicadas contain psilocybin, the hallucinogen in magic mushrooms, and cathinone, an amphetamine found in the East African khat plant. When the researchers sequenced the genomes of *Massospora*, they found that the fungus didn't contain either the genes used by magic mushrooms or khat to produce their mind-altering substance. This could mean that the cathinone and psilocybin found in the spore plugs are the products of a chemical reaction between the fungus and something in its cicada host, possibly the bacteria in the insect's gut. The two compounds also appeared independently in different types of cicadas—annual cicadas were effected by psilocybin and periodical cicadas, which include 17-year and 13-year cicadas, contained cathinone.

In people, psilocybin has been shown to combat symptoms of depression and anxiety, while cathinone can improve focus in people with ADHD. It's possible that some version of these effects is amping up the infected cicada's sex drive. It's easy to see how this benefits *Massospora*: The more cicadas its host tries to copulate with, the more insects are exposed to its spores. Why cicadas would have evolved to synthesize the narcotics in the first place is less clear.

Nancy Smith Weber
March 12, 1943 – December 19, 2020

We regret to report that Ascomycete expert Nancy Smith Weber died on December 19, 2020 at Evergreen Hospice in Corvallis, Oregon. The daughter of eminent mycologist Alexander Smith and his wife, Helen, she traveled extensively throughout western North America in conjunction with her father's mushroom research and never lost interest in mycology, earning a Ph.D. in Botany in 1965.



While living in Oregon, she participated in mushroom hunting forays and making scientific presentations throughout western North America. She was the author of *A Morel Hunter's Companion: A Guide to the True and False Morels of Michigan* and coauthor of *A Morel Hunter's Companion, a Guide to True and False Morels; The Mushroom Hunter's Field Guide; A Field Guide to Southern Mushrooms, and How to Know the Gilled Mushrooms*.

On April 18, 1970, she married James (Jim) A. Weber in Ann Arbor, and in 1988 moved to Corvallis, Oregon, when he accepted a position with the EPA laboratory. She joined the Oregon State Department of Forest Service in 1990 and worked as an Assistant Professor, Senior Research until 2000. She held a courtesy faculty position in the department from 2000 to 2004 and was an Affiliate Facility member beginning in 2004.

Nancy is survived by brother-in-law Michael Leo Weber and sister-in-law Frances Spivy Weber of Sacramento, CA, sister-in-law Karen Marie Weber of Santa Fe, NM, and cousins Margaret (Smith) and Scott Arighi, Anne (Smith) Dowling, Dorothy (Smith) Martin and their families. Nancy enjoyed sharing her enthusiasm for botany and especially mycology.

Nancy was awarded the North American Mycological Association Award for Contribution to Amateur Mycology in 2007 for "more than 30 years of duty in the trenches of amateur mycology." She was a member of the American Institute of Biological Sciences, Botanical Society of America, North American Truffling Society, Northwest Scientific Association, Oregon Mycological Society, Phi Beta Kappa, Society of Sigma Xi, American Women in Science, Native Plant Society of Oregon, Michigan Botanical Club, PEO chapters in Ann Arbor and Corvallis, and life member of the North American Mycological Association and Mycological Society of America. Nancy was also an honorary member of the Michigan Mushrooms Hunter's Club and the West Michigan Mycological Society. —*Ann Arbor News*, Jan. 2, 2021

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