

SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY
Number 604 September 2024



2024 WILD MUSHROOM SHOW Derek Hovel

PSMS Annual Fall Wild Mushroom Show

October 19th (12–6 pm) and 20th (10 am–5 pm)

Shoreline Community College
16101 Greenwood Avenue North
Shoreline, WA



The Show: The Wild Mushroom Show chairs are happy to announce the 2024 Wild Mushroom Show! The show is our biggest event of the year, where we share with the general public our knowledge of and enthusiasm for the fungal kingdom. This year’s co-chairs are Derek Hevel, Milton Tam, and Marion Richards. And we have an exciting update: This year we will rent the 300-seat theater for the lectures, so no more limits to the audience size and no more complaints about not getting into the lecture!

We Need Help: We always need YOUR help to make the show happen. Year after year, we put on one of the largest and best shows on the West Coast. Please volunteer to help with one or more tasks, including helping at the touch-and-feel table, cultivation, cooking and tasting, book sales, admissions, hospitality, and loading/unloading. Sign up online starting in mid-September at PSMS.org under “Events.” Publicity posters and post cards will be distributed at our September meeting. And remember: as a volunteer, you get into the show for free, have access to that amazing potluck in the break room, and will be eligible to attend the volunteers-only Memorial Day field trip in 2025.

We Need Mushrooms: We will also need YOUR mushroom specimens for our display tables. As always, the strength of the mushroom season has yet to reveal itself, but we have already seen a few records of folks finding decent amounts of chanterelles, lobsters, and porcini. We don’t know when the rains will arrive, but we’re all crossing our fingers for a well-timed fruiting in order to put on the best show. Come mid-October, we strongly encourage members to forage far and wide to collect specimens wherever they can be found. A month out, experts have suggested collecting display specimens in the foothills of Mount Rainier, the Olympic Peninsula, and the Washington Coast, but it is impossible to predict when and where our mushrooms will flush. This year we will organize collecting trips in the days before the show, so stay tuned for more information if you would like to join. Otherwise we encourage you to self-organize for collecting trips. We’re counting on YOU to make the mushroom display happen!

SURREY ARTIST CREATES INCREDIBLE LIFE-LIKE EMBROIDERED MUSHROOMS

Elizabeth Hunter

<https://www.wokingnewsandmail.co.uk/>, Aug. 19, 2024

[abridged] A Surrey artist creates incredible life-like embroidered mushrooms—which form part of a new fungus-themed exhibition.

Amanda Cobbett photographs the fungi on walks with her dog before painstakingly embroidering life-size replicas of them in intricate detail. Her creations can take more than two weeks to complete, and were born out of a fascination with the importance of mushrooms in the natural environment.

Amanda works from real specimens—by collecting mushrooms from the woods or returning over the span of several days to take multiple reference photographs.

Several of her works are now on display until December, in a limited-time exhibition entitled Fungi Forms at Edinburgh’s Royal Botanic Gardens.

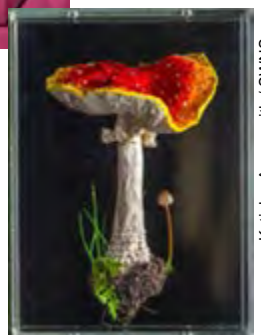
Each mushroom in the exhibit is one that Amanda has seen in her own travels around the Scottish Borders—including her personal favorite, the *Amanita muscaria*, or fly agaric.

Amanda hopes that the exhibit at the Royal Botanic Gardens will encourage art-lovers and plant-lovers alike to appreciate the work—and go out into nature and spot the real thing.



Amanda Cobbett and an item in her mushroom exhibit.

Close-up of *Amanita* cup.



Embroidered *Amanita*.

Spore Prints

is published monthly, September through June by the
PUGET SOUND MYCOLOGICAL SOCIETY
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Another change that has everybody delighted is that we are finally moved into our new office space! A wonderful group of board and PSMS members put in countless hours and enormous amounts of energy into making this move a reality. We are thrilled to be in our new home, a much larger space than the one we used to have but still within CUH and just a few steps from the old one. The next step is finding a new location for our storage shed, closer to the show venue (Shoreline Community College) to simplify setup and tear-down.

And talking about exciting mushroom happenings, Marion Richards updated the board regarding our October Ben Woo Foray, a much beloved event that features guided outings, presentations, workshops, and classes (dyeing, cooking, microscopy, navigation), and an already legendary “Mushroom Happy Hour.” Enrollment is limited to 150 people, so don’t miss this opportunity!

On a different order of business, Treasurer Cindy Brewster and Megan Brewster have been doing some heavy lifting too, and presented to the board a comprehensive analysis of PSMS’s finances for the last 12 months, together with a projection of what our 2025 budget could look like. This analysis will enable PSMS to better set its course for the future and will inform our strategic planning efforts.

We are so grateful for this amazing community of members that keep our club moving forward, growing, and evolving. PSMS is an organization run fully by volunteers, and none of this would be possible without all of you. Thank you!

We look forward to seeing you soon at our meetings, field trips, clinics, classes, and annual fall wild mushroom show!

Until then, happy trails!

MEMBERSHIP MEETING

Joseph Zapotosky

The membership meeting on September 10, 2024, will be a “hybrid” meeting both in-person at the Center for Urban Horticulture and virtual on Zoom. We will start letting people into the CUH meeting hall at about 7:00 pm and into the Zoom meeting at about 7:15. The lecture will begin at approximately 7:30 pm.

Our speaker is Noah Siegel, and his talk is titled “Cascadia—a Fungal Paradise.” The wet mossy forests of the Pacific Northwest host a spectacular diversity of mushrooms, a true fungal paradise! This talk will highlight this diversity, the unique habitats, and their plethora of mushrooms.



Noah Siegel.

He will also be giving us a preview of his latest project co-authored with Christian Schwarz—*Mushrooms of Cascadia, A Comprehensive Guide to Fungi of the Pacific Northwest*—written specifically for our region. Just released and hot off the presses, it is just in time for what we all are hoping will be a memorable season. Noah will have copies available to those in attendance so, plan on coming in person.

Noah is one of North America’s foremost field mycologists. He has spent over three decades seeking, photographing, identifying,

CALENDAR

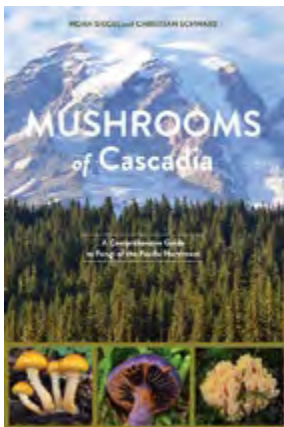
Sept. 10 Membership meeting, 7:30 pm, CUH
Sept. 16 Board meeting, 7:30 pm, CUH boardroom
Sept. 17 *Spore Prints* deadline
Sept. 28 Field trip (see PSMS website)
Oct. 5 Field trip (see PSMS website)
Oct. 19–20 PSMS Annual Wild Mushroom Exhibit
Oct. 25–27 Ben Woo Memorial Foray, Cispus

BOARD NEWS

Carolina Kohler

Greetings from the board, fellow PSMS members!

We hope you are all having a wonderful summer, but the rains are already here and, with that, all that the mushroom season promises. Our field trips and ID clinics will be resuming soon, and our 61st Wild Mushroom Show is already in the making! Show Co-chair Derek Hevel updated the board about some great changes coming this year (among them, a larger space for lectures!), and Pei Pei Sung presented her first proposal for the show poster. If you would like to be a part of the amazing group of volunteers that make our Show happen, reach out to the show committee right now! Spots are already up for grabs. Contact any board member.



and furthering his knowledge about all aspects of macrofungi. He travels and lectures extensively across America, following the mushrooms from coast to coast. Noah was the recipient of the 2022 North American Mycological Association's Award for Contributions to Amateur Mycology. His primary research interest is on the taxonomy and systematics of fungi.

In addition to *Mushrooms of Cascadia*, he has authored, along with Christian Schwarz, *A Field Guide to the Rare Fungi of California's National Forests* and *Mushrooms of the Redwood Coast*, a *Comprehensive Guide to the Fungi of Coastal Northern California*. Along with Steve Trudell and Kate Mohatt, he is currently working on *Mushrooms of Alaska*

THE STUNTZ FOUNDATION, UW HERBARIUM, AND DANIEL E. STUNTZ AND PATRICE G. BENSON ENDOWED MYCOLOGY FUND

Joanne Young, The Stuntz Foundation,
David Giblin, UW Herbarium Collections Manager

Dr. Daniel E. Stuntz, UW Professor of Botany and Mycology, was known for his exceptional teaching and profound kindness. A brilliant scientist first, he was also famous for supplying his students with a daily spread of the best quality pastries, cold cuts, cheeses, and endless pots of coffee. He was generous with PSMS, giving ID classes, talks, and organizing and recruiting members for citizen science studies. Red wine and good food figures in many stories.

When Dr. Stuntz died in 1983, his grad students, friends, and PSMS members wanted to honor him. They raised funds in his memory to assist students and researchers. This became the Daniel E. Stuntz Memorial Foundation.

Since 1983 The Stuntz Foundation together with its supported organization, the Stuntz Mycology Fund, has given over \$648,000 in 158 grants, and 17 special projects including the Mushroom Maynia collaboration with the Burke Museum, lectures by visiting mycologists, and the endowment for the UW herbarium.

Patrice Benson served in nearly every role for PSMS including three terms as president. To list just a few of her other activities, she was a biotech entrepreneur, hematologist, mother of two daughters, and Stuntz Foundation president. Patrice was impossible to say no to and made everything fun and worthwhile.

Dr. Joe Ammirati, UW Professor Emeritus of Biology, succeeded Dr. Stuntz and benefited PSMS in many ways. He gave lectures, ID classes in his lab, and served as our Scientific Advisor. In 2007 Patrice predicted that when Dr. Ammirati retired, there would be no one at the University devoted to fungi.

With that in mind, Patrice led the Stuntz Foundation to establish an endowment at the UW to support a Collections Manager/Research Mycologist in the herbarium at the Burke Museum (also known

as the UW Herbarium). The reality is that faculty curators do not have the time to devote to maintaining and building collections the way that a staff person can. PSMS and the Stuntz Foundation provided initial funding to create the endowment in 2007. The fund now has about \$700,000 and was recently renamed The Daniel E. Stuntz and Patrice G. Benson Endowed Mycology Fund.

The UW herbarium is an internationally renowned collection supporting mycological research worldwide. It was founded in 1879 as part of the Young Naturalists' Society. C. Leo Hitchcock negotiated for the herbarium to be transferred to the Botany Department when he arrived in 1937. In 2003 the Botany and Zoology departments merged as the Biology Department, and the UW herbarium was administratively transferred to the Burke Museum.

The herbarium houses 700,000 specimens, of which approximately 117,000 are fungi (85,000 macrofungi; 32,000 lichenized fungi). The herbarium serves many purposes and audiences: (1) it is the primary specimen repository for documenting the diversity and distribution of Pacific Northwest plants, fungi, and algae; (2) the collections are an invaluable source of plant, fungi, and algae DNA used for discovering new species and exploring evolutionary relationships within these organismal groups; (3) herbarium specimens are loaned to researchers around the world and serve as the primary source of under-graduate and graduate student research at the University of Washington; (4) approximately 450,000 of the herbarium's 700,000 specimens are freely accessible online; (5) the herbarium conducts public outreach that helps build community among those interested in the organismal groups represented in the collections.

In June, members of the Stuntz Foundation board met with the Burke Museum's Executive Director and the newly hired Development Director to make a plan to raise additional funds. With a recently hired Herbarium Curator arriving this fall, the Collections Manager/Research Mycologist position has increased priority.

We will keep you all informed along the way. If this sounds like something you would like to help with, you can find me, Joanne Young, through the Stuntzfund.org website or in the PSMS member's directory.

BEN WOO MEMORIAL FORAY:

Friday, Oct. 25–Sunday, Oct. 27

Marian Maxwell

This year the foray will be held at the Cispus Learning Center in Randle, WA. Surrounded by the magnificent Gifford National Forest, it is the perfect location with great habitat within easy driving distance and mushrooms just outside your door!

Registration

PSMS is pleased to announce that registration for the 2024 Ben Woo Memorial Foray is now open. Invitations to register were sent to active members on the PSMS email list on August 18th. *Note that participation is limited to current PSMS members by pre-registration only. There are no drop-in and no day-only participants.*

Keep in mind that there is also a regular PSMS field trip to a different location on Saturday this same weekend for those who cannot attend this foray.

cont. on page 4

TWO NEW UNITED STATES POSTAGE STAMPS SHOWING FUNGI

Brian S. Luther

On August 10, 2023, the U.S. Postal Service issued a sheet of 20 different First Class Forever Stamps (68 cents) entitled “Life Magnified.” Two of these stamps show fungi.

The first is a dissecting microscope view of mushroom lamellae (gills) of an unidentified mushroom and is labelled “Mushroom Gills.” The other, labelled “Mold Spores,” shows a microscopic view of what appear to be blue-green conidiospores of an *Aspergillus* sp., along with artificially orangish-colored conidiophores, but the fungus is not identified. Some species of *Aspergillus* have smooth conidiospores whereas others have ornamented conidiospores. These spores appear to have very fine ornamentation, but I can’t be sure.

The Scott Catalogue number for the whole sheet pane is 5802, the “Mushroom Gills” stamp is Scott 5802n, and the “Mold Spores” stamp is Scott 5802q. In both, the fungi shown are the main stamp illustration.



Brian S. Luther

Scott 5802, “Life Magnified.”



Brian S. Luther



Brian S. Luther

Scott 5802n, “Mushroom Gills.” Scott 5802q, “Mold Spores.”

A list of the U.S. stamps with fungi that I’ve documented in *Spore Prints* over the years is posted on the PSMS website homepage (www.psms.org) under “Education.” I have not yet added these fungi to the list. Nor have I added Luther (2018). I’ll be updating the website articles sometime soon to show all of these stamps with additional details.

Reference

Luther, Brian S. 2018. US stamp showing a bioluminescent mushroom coming in 2018. *Spore Prints* 539 (Feb. 2018), p. 6. Online and in color at www.psms.org

Ben Woo Foray, cont. from page 3

Cost and Description

Total package is \$245 per person. This includes Friday and Saturday night accommodations, five meals, engaging presentations, a DIY oyster mushroom cultivation kit, access to workshops, and guided forays. Please note that workshops are an extra cost and fill up very fast. This year’s presenters on Friday evening and early Saturday evening will be Langdon Cook, Marian Maxwell, and Danny Miller. Expert mushroom identifiers will label specimens and answer your questions. Saturday after the evening presentation, we will be hosting the “Mushroom Happy Hour”—a great opportunity to socialize with other mushroom enthusiasts and enjoy snacks and beverages. In all, it will be a wonderful weekend filled with friends, good wholesome fun and adventure.

Accommodation options include dormitory, tent/car camping, RVs, and off campus. Same price for any choice. Dietary options are regular, vegetarian, or vegan. For more information or to register, please refer to our website www.psms.org and click on “Event registration” under the “Events” heading.

MOLD BURGER: COMING RIGHT UP Laura Tran

<https://www.the-scientist.com/>, Aug. 15, 2024

Fungi are the versatile thread connecting bread, cheese, alcohol, and soy sauce, infusing each with distinct flavors. While fungi are deeply interconnected with food production, Vayu Hill-Maini, a chef turned bioengineer at the University of California, Berkeley, was inspired to innovate fungal alternatives to improve food sustainability.

Recently, Hill-Maini and his team modified genes of *Aspergillus oryzae* to create a visually appealing meat-like patty. Their creation, reported in *Nature Communications*, showcased the possibilities of bringing gene-edited fungi to the table.

“We thought about the potential of fungi and how it can be unlocked by tinkering with what was already there [in the genome],” said Hill-Maini.

Hill-Maini used *A. oryzae*, commonly known as koji mold, for his experiment. Using clustered regulatory interspaced palindromic repeats (CRISPR), the team overexpressed two genes: one that produced ergothioneine, an antioxidant found in fungi and one that coded for heme, a molecule that gives meat its color and distinct flavor.



Marilyn Sargent, Berkeley Lab

Petri dishes showing original mold (left) and the CRISPR-edited mold (right).

Three days later, the once white fungi grew red and were ready to harvest. After removing excess water and grinding the fungi into a patty, the researchers threw it on the grill. The result was a sizzling meat-like patty with a tantalizing smell. Their proof-of-concept experiment demonstrated ways

to boost nutritional value and sensory appeal of the fungal patty in food preparation.

“It’s a novel idea using whole filamentous fungi cells as the main food ingredient instead of isolating a fungal product,” said Yong-Su Jin, a food microbiologist and bioengineer at the University of Illinois at Urbana-Champaign, who was not involved in the study. However, Jin lamented the lack of a taste test of the creation.



Vayu Hill-Miami

Hot mold burger.

Next, the researchers want to explore the genes that control the mold’s texture. “This work can inspire us to think about what food can be and what is possible,” said Hill-Maini. “It is just the starting point to pushing the boundaries in food sustainability.”

“ARE YOU AWARE YOU DON’T HAVE PANTS ON?” NEIGHBORHOOD RESIDENTS WITNESS NAKED MAN WALKING DOG **Hannah Tiede**
<https://www.kens5.com/>, Aug. 13, 2024

SAN ANTONIO - Northside residents were exposed to a scandalous sight on Tuesday. A naked man was seen walking his dog through the Castle Hills Forest neighborhood near Military Highway and Wurzbach Parkway, according to the San Antonio Police Department.

“I’m working from home today,” Harley Walters said. “Normally, I’m at the office, but I was working from home. I looked out my window and saw a gentleman walking down the street with no clothes on. He was just taking a stroll, a calm and easy stroll, and his dog was walking alongside him.”

Walters, who has lived in the neighborhood for 25 years, couldn’t believe his eyes. “I thought, ‘How dare he walk his dog without a leash!’ ” laughed Walters.

Joking aside, the homeowner says he feared the man was suffering from a stroke or mental health breakdown. “It was just true concern of, ‘Was he okay?’” said Walters. “That was really my thought, because nothing like this has ever happened here before.”

Neighbors shared pictures and videos with KENS 5. According to Walters, a group of worried onlookers decided to approach the man.

“The other gentleman that stopped him on the street as well said, ‘Hey, are you aware that you don’t have pants on?’” said Walters. “He said, ‘Yeah,’ like it was no big deal and just kept on going.”

Kathy Miller is thankful to have been spared the view. “If I had [seen him], I think I would have thought something about it,” Miller laugh ed. “I don’t think I would have thought, ‘Oh, that’s usual.’”



Harley Walters

Naked dog walker.

“250 yards away, we’ve got our pool,” added Walters. “There were actually kids swimming in the pool this morning. There’s also a bus stop right there where the kids would have been coming home as well.”

Police say they were called to George Road for “Lewd Conduct.” Officers quickly uncovered the cause of the

unsightly offense. Authorities say the man was high on mushrooms, and officers gave him a courtesy ride home. The man was not charged with a crime, police say. Walters just hopes he learned a lesson so their peaceful neighborhood can put the incident in their rearview mirror.

THE FUNGUS AMONG US AND CAPITOL HILL SUMMER GARDENS IS POWDERY MILDEW

Brendan McGarry

<https://www.capitolhillseattle.com/>, Aug. 18, 2024

I got a little overzealous when planting kale this year. In an effort to overcome the slugs that boomed this wet spring, I went hard and overseeded. But then we got busy and didn’t inhale kale quite so much as I thought we would. Kale leaves kept filling in until our entire raised bed was covered. And with this dense, moisture trapping layer came powdery mildew—lots of it.

Powdery mildew is a common summer affliction in this part of the world. Caused by a number of species of fungi in the Order Erysiphales, you can’t simply look at powdery mildew and know the species it is associated with. Even if you didn’t know the name of the pathogen, however, you’ve definitely seen it.

The term powdery mildew is just a catch-all term for a number of species that infect plants worldwide, but it’s an apt description. It looks a lot like someone threw sifted flour all over a plant’s leaves. What actually creates that layer of white are the mycelia of the fungus spreading across the leaves and stems of the infected plant.

The fungus uses specialized hyphae that pierce the plant surface to extract nutrients from within the live tissue. Many fungal species lead complex lives that intertwine with plants and link them to important resources or that contribute to nutrient cycling. But Erysiphales fungi are purely pathogenic, feeding on plants when conditions allow. The warm days combined with the high humidity in my kale made the perfect place for powdery mildew to take hold.

Erysiphales are cosmopolitan and at least 1,000 species of them can be found eating at plants all across the globe. Though not all of them create powdery mildew, they are all parasites.

In what seems unworldly, several species of powdery mildew fungi are missing a high number of the genes that generate the enzymes used in DNA repair. In most organisms this loss would be debilitating because it allows for high rates of mutation. Re-

www.vegetables.cornell.edu/



Powdery mildew on kale.

searchers presume this allows them to flow with conditions and challenges rapidly, zigging and zagging in the evolutionary arms race that is always happening between plants and pathogens. It sounds like a risky move, but it clearly works. In agriculture, powdery mildew often hits cucurbits (melons, pumpkins, squash, and cucumbers) hard.

If you are merely an observer and not a gardener, take a walk around the Hill. You’ll start to notice powdery mildew colonizing specific plants in specific locations. Maples are particularly susceptible. I recently noticed a trio of “Crimson King” Norway Maples on Olive that were covered and looked particularly dreary on the smoky afternoon I saw them. Our native Bigleaf Maples

cont. on page 6

Powdery Mildew, cont. from page 5

are also impacted by the pathogen, though the worst cases in my yard right now are on trees that haven't had the best life and have it worst on the lower branches that don't get much airflow around them. For better or worse, it's been a decent year for Erysiphales fungi in Seattle.

Powdery mildew isn't the end of the world. The trees that get it generally survive just fine, and if you grow fruit and vegetables like me, a little care and effort will handle the worst of it.



Reddit / davenport

Now it's time to go cry about all the kale I should've been eating.

Powdery mildew on Big Leaf Maple.

SOME PSYCHEDELIC MUSHROOM CHOCOLATES ARE LIGHT ON THE PSYCHEDELICS

Tobias Carroll

<https://www.insidehook.com/>, Aug. 11, 2024

In recent years, psychedelics have expanded their purview, with something that had once been a countercultural accessory expanding into the field of mental health. That's gone hand in hand with a global movement to legalize psychedelics—something which has made the experience of seeing psychedelic-tinged food and drink more widespread than it was a decade ago.

Just how psychedelic are the psychedelic snacks you may see available for purchase, though? According to a new *Los Angeles Times* investigation, the answer is “not much” in plenty of cases. Keri Blakinger and Connor Sheets researched the contents of various magic-mushroom-infused chocolates and found plenty of mushrooms, but far less magic.

The *Times* investigation gathered together samples of 33 different products purchased in San Diego and Los Angeles. Under analysis, these turned out to be a bit less psychedelic than prospective buyers likely hoped. As Blakinger and Sheets wrote, after analyzing the samples, lab results revealed that “40 percent contained no psilocybin.” In lieu of psilocybin, some of the chocolates contained synthetic hallucinogens instead; one... featured bath salts.

Earlier this summer, the FDA opened an investigation of one brand of psychedelic chocolates: Diamond Shroomz. The agency issued a recall and posted a warning about the symptoms that some people who tried the candies experienced, including “seizures, central nervous system depression (loss of consciousness, confusion, sleepiness), agitation, abnormal heart rates, hyper/hypotension, nausea, and vomiting.”

[Ed. Note: In June all Diamond Shroomz-brand microdosing products were recalled by the FDA.]

Psychedelic chocolates are like nearly anything else you might consume: you're going to want to make sure that what you're putting into your body is what it purports to be. Psychedelic mushrooms and bath salts are not the same thing; if a product says that it contains the former but actually contains the latter, that's a risky proposition for everyone involved.

MEET THE MICROSCOPIC THIEVES FIGHTING INFECTIONS WITH STOLEN GENES

Marine Biological Laboratory

<https://scitechdaily.com/>, Aug. 17, 2024

Bdelloid rotifers, a type of small freshwater animal, harness stolen bacterial genes to create antibiotics, offering insights into developing safer antimicrobial drugs and addressing growing antibiotic resistance.

A team of researchers from the University of Oxford, the University of Stirling, and the Marine Biological Laboratory (MBL), Woods Hole discovered that a group of tiny, freshwater animals protect themselves from infections using antibiotic recipes “stolen” from bacteria.

These microscopic creatures are called bdelloid rotifers, which means “crawling wheel-animals.” Although they are smaller than a hair's breadth, they have a head, mouth, gut, muscles, and nerves like other animals.

Genetic Defense Mechanisms

The study, recently published in *Nature Communications*, reveals that when these rotifers are exposed to fungal infection, they activate hundreds of genes that they acquired from bacteria and other microbes. Some of these genes produce resistance weapons, such as antibiotics and other antimicrobial agents, in the rotifers.

“When we translated the DNA code to see what the stolen genes were doing, we had a surprise,” said lead study author Chris Wilson of the University of Oxford. “The main genes were instructions for chemicals that we didn't think animals could make—they looked like recipes for antibiotics.”

Prior research found that rotifers have been picking up DNA from their surroundings for millions of years, but the new study is the first to discover them using these genes against diseases. No other animals are known to “steal” genes from microbes on such a large scale.

“These complex genes—some of which aren't found in any other animals—were acquired from bacteria but have undergone evolution in rotifers,” said study co-author David Mark Welch, senior scientist and director of the Josephine Bay Paul Center at the Marine Biological Laboratory. “This raises the potential that rotifers are producing novel antimicrobials that may be less toxic to animals, including humans, than those we develop from bacteria and fungi.”

Unveiling Unique Antibiotic Production

Antibiotics are essential to modern healthcare, but most of them were not invented by scientists. Instead, they are produced naturally by fungi and bacteria in the wild, and humans can make artificial versions to use as medicine.

The new study suggests that rotifers might be doing something similar.

“These strange little animals have copied the DNA that tells microbes how to make antibiotics,” explains Wilson. “We watched them using one of these genes against a disease caused by a fungus, and the animals that survived the infection were producing 10 times more of the chemical recipe than the ones that died, indicating that it helps to suppress the disease.”

cont. on page 7

Implications for New Antibiotics

The scientists think that rotifers could give important clues in the hunt for drugs to treat human infections caused by bacteria or fungi.

Antibiotics are becoming less effective because the disease-causing microbes have evolved to become resistant and no longer respond to treatment. The World Health Organization recently sounded the alarm, warning in a June report of the “pressing need” to develop new antibiotics to counter the threat of resistance.

“The recipes the rotifers are using look different from known genes in microbes,” said study author Reuben Nowell of the University of Stirling. “They’re just as long and complicated, but parts of the DNA code have changed. We think the recipe has been altered by a process of evolution to make new and different chemicals in the rotifers. That’s exciting because it might suggest ideas for future medicines.”

The genes the rotifers acquired from bacteria encode an unusual class of enzymes that assemble amino acids into small molecules called non-ribosomal peptides.

“The next phase of this research should involve identification of multiple non-ribosomally synthesized peptides produced by bdelloid rotifers, and establishment of the conditions upon which the synthesis of these compounds can be induced,” said study co-author Irina Arkhipova, senior scientist at the Marine Biological Laboratory.

One problem with developing new drugs is that many antibiotic chemicals made by bacteria and fungi are poisonous or have side effects in animals. Only a few can be turned into treatments that clear harmful microbes from the human body. If rotifers are already making similar chemicals in their own cells, they could lead the way to drugs that are safer to use in other animals, including people.

Understanding Rotifer Gene Acquisition

A big question is why rotifers are the only animals that borrow these useful genes from microbes at such high rates.

“We think it might be linked with another strange fact about these rotifers,” said Tim Barraclough, a study co-author from the University of Oxford. “Unlike other animals, we never see male rotifers. Rotifer mothers lay eggs that hatch into genetic copies of themselves, without needing sex or fertilization.”

According to one theory, animals that copy themselves like this can become so similar that it starts to be unhealthy. “If one catches a disease, so will the rest,” explained Barraclough. Because bdelloid rotifers don’t have sex, which allows the parental genes to recombine in beneficial ways, the rotifer mother’s genome is directly transferred to her offspring without introducing any new variation.

“If rotifers don’t find a way to change their genes, they could go extinct. This might help explain why these rotifers have borrowed so many genes from other places, especially anything that helps them cope with infections,” said Barraclough.

Nowell thinks there is much more to learn from rotifers and their stolen DNA “The rotifers were using hundreds of genes that aren’t seen in other animals. The antibiotic recipes are exciting, and some other genes even look like they’ve been taken from plants. The findings are part of a growing story about how and why genes get moved between different kinds of life,” he said.

FDA APPROVES ALGAE- AND FUNGI-BASED BLEEDING CONTROL GEL

<https://www.policemag.com/>, Aug. 16, 2024

A new bleeding control tool called Traumagel, which earned the Food and Drug Administration’s medical device clearance on Wednesday, could change how first responders address severe bleeding.

Traumagel, which will launch later this year, is a 30-ml syringe of an algae- and fungi-based hemostatic gel that’s the color and texture of hummus. It can be applied directly into a wound, helping stanch bleeding within seconds. The FDA cleared its use for moderate to severe bleeding, Fast Company reports.

Joe Landolina, founder of Brooklyn-based Cresilon, which makes Traumagel, says that in addition to stopping bleeding quickly, the product’s “flowable” properties can improve the safety of treating something like a gunshot wound.



Cresilon

Traumagel, a new hemostatic agent just approved by the FDA.

PA FARM SELLING NATION’S FIRST BIO-DEGRADABLE CASKETS FROM MUSHROOMS

Marshall Keely (WPMT)

<https://www.fox43.com/>, Aug. 7, 2024

FRANKLIN COUNTY, PA - For more than a year, Max Justice has been on a mission to bury the way we’re buried. Deciding to abandon metal caskets, he feels the funeral industry has mushroom to grow, literally.

“We’re taking those natural resources out of the ground to put a dead body into it and back in the ground. It absolutely doesn’t make any sense,” said Max Justice, CEO of Setas Eternal Living.

His company is now the first in the nation to sell biodegradable coffins made from fungi.

It starts with mushroom mycelium growing in a bag of hemp. It’s moved to a mold and formed in the shape of a coffin as it continues to grow and solidify over a few days. The coffins are moved to a chamber with purified air and then to an oven.

They cook for 20 hours at 155 degrees and become petrified.

Setas finishes one human coffin and two pet coffins per week.

Justice said embalming isn’t necessary. “The water within the individual will help to bring that mycelium back to life which will in turn biodegrade the body in under three years,” Justice said.

The coffins are grown to be big enough to fit a person about six feet tall, but in the future, they’ll be grown for any size and at a price that will make you sit up straight.

“Right now, our coffins are \$2,495,” he said. “Getting a coffin at a funeral home, those can easily start around \$5,000 and quickly go to \$20,000.”

Justice said he’s seen proof the caskets work. “A year ago, unfortunately, one of my chickens passed away so we buried one of my chickens in our small coffins,” Justice said. “After a year of being interred in the ground, we exhumed the chicken and all we found were two thigh bones and a couple of vertebrae.”

SCIENTISTS UNCOVER GENETIC KEY TO STOPPING BANANA-KILLING FUNGUS

University of Massachusetts Amherst

<https://www.technologynetworks.com/>, Aug. 16, 2024

The bananas in your supermarket and that you eat for breakfast are facing functional extinction due to the disease Fusarium Wilt of Banana caused by a fungal pathogen called *Fusarium oxysporum* f.sp. *cubense* (*Foc*) tropical race 4 (TR4). However, thanks to recent research from an international team of scientists led by the University of Massachusetts Amherst, we now know that *Foc* TR4 did not evolve from the strain that wiped out commercial banana crops in the 1950s and that the virulence of this new strain seems to be caused by some accessory genes that are associated the production of nitric oxide. The research, published in *Nature Microbiology*, opens the door to treatments and strategies that can slow, if not control, the as-of-yet unchecked spread of *Foc* TR4.



Foc TR4 infected Cavendish banana.

“The kind of banana we eat today is not the same as the one your grandparents ate. Those old ones, the Gros Michel bananas, are functionally extinct, victims of the first *Fusarium* outbreak in the 1950s,” says Li-Jun Ma, professor of biochemistry and molecular biology at UMass Amherst and the paper’s senior author.

Today, the most popular type of commercially available banana is the Cavendish variety, which was bred as a disease-resistant response to the Gros Michel extinction. For about 40 years, the Cavendish banana thrived across the globe in the vast monocultured plantations that supply the majority of the world’s commercial banana crop.

But by the 1990s, the good times for the Cavendish banana had begun to come to a close. “There was another outbreak of banana wilt,” says lead author Yong Zhang, who completed his doctorate in UMass Amherst’s Organismic and Evolutionary Biology program under Ma’s direction. “It spread like wildfire from South-East Asia to Africa and Central America.”

“We have spent the last 10 years studying this new outbreak of banana wilt,” says Ma, who is an expert in *Fusarium oxysporum*, which is not a single species but a “species complex” with hundreds of different varieties that specialize in affecting different plant hosts. These varieties are determined by the acquisition of strain-specific accessory genes in addition to a shared core genome. “We now know that the Cavendish banana-destroying pathogen TR4 did not evolve from the race that decimated the Gros Michel bananas. TR4’s genome contains some accessory genes that are linked to the production of nitric oxide, which seems to be the key factor in TR4’s virulence.”

To arrive at this conclusion, Yong, Ma and their co-authors from China and South Africa as well as universities in the U.S., sequenced and compared 36 different *Foc* strains collected from all over the world, including those strains that attack Gros Michel bananas. Then, with the help of UMass Amherst’s Institute for Applied Life Sciences, the team discovered that *Foc* TR4, responsible for the current outbreak of banana wilt, uses some accessory genes for both production and detoxification of fungal nitric oxide to invade the host.

While the team doesn’t yet know exactly how, they were able to determine that the virulence of *Foc* TR4 was greatly reduced when two genes that control nitric oxide production were eliminated.

“Identifying these accessory genetic sequences opens up many strategic avenues to mitigate, or even control, the spread of *Foc* TR4,” says Yong.

RIEDDIT CONTROVERSY OVER DANGEROUS AI MUSHROOM I.D. BOOK

Brenda Kanana

<https://www.msn.com/>, Aug. 19, 2024

David Schwartz, Ripple’s Chief Technology Officer, recently posted a viral Reddit post on his social media account which tells the story of a family who was admitted to the hospital after consuming poisonous mushrooms,[that] they identified using an AI-generated book.

According to the Reddit post, the family used a mushroom identification book they bought from a popular store. The post stated that the book provided images and text created by AI to identify the mushrooms, but all of them were poisonous. The family consumed the mushrooms with the help of the book written by the AI, and all of them were admitted to the hospital, which is a big question mark on the AI content.

The post also stated that not only there are AI pictures in the book but also Chatbot replies in the text of the book suggesting that no human had a hand in it. Even though the retailer has apparently provided a refund for the book, the issue has made people question whether there could be more low-quality books written by AI for sale.

In his social media post, Schwartz compared this event to a well-known lawsuit that occurred at the beginning of the 1990s. The Ripple executive cited *Winter vs. G.P. Putnam’s Sons*, a 1991 Court of Appeals case. The case points to two young adults who decided to purchase a book they named *The Encyclopedia of Mushrooms* to act as a reference. Although the two mushroom hunters almost lost their lives because of the wrong information provided by the book, the court ruled in favor of the publisher.

MUSHROOM HUNTER FINDS SKELETAL REMAINS NEAR WINTER PARK Darren Whitehead

<https://www.9news.com/>, Aug. 19, 2024

WINTER PARK, Colo. - A man out hunting for mushrooms made a gruesome discovery Saturday in Grand County the Colorado Bureau of Investigation (CBI) said: He found a human skull just off of Highway 40 near Mary Jane Road.

CBI investigators, Fraser-Winter Park Police, and officers from the U.S. Forest Service, along with the Grand County Coroner’s Office, responded to the scene. The remains appear to have been in that location for quite some time, maybe even for years, CBI said. No identification or clothing was found at the scene.

The bones will be sent to a forensic anthropologist, who will work to determine the sex, race, general age, and how long the person has been dead.