

SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY
Number 584 September 2022



2022 PSMS Wild Mushroom Show

October 22 (12–6 pm)

October 23 (10 am–5 pm)

Shoreline Community College
16101 Greenwood Avenue North
Shoreline, WA.



The Wild Mushroom Show chairs are excited to announce information about the fall Wild Mushroom Show! This year's co-chairs are Derek Hevel, Milton Tam, Marion Richards, and Molly Watts.

The show is our opportunity to share with the general public our knowledge of and enthusiasm for the fungal kingdom. Get ready to put that "WOW" factor into the show and amaze the public with all the colors, shapes, and sizes of fungi we bring in for display.

At this time, we plan to welcome all guests, regardless of COVID vaccination or booster status, but we will strongly recommend the use of masks within the show venue. We may have to adjust our plans as show time approaches, but we are keeping close tabs on the situation and will give updates as they come.

Important change: There's one important new change to this year's show that applies to ALL members: free admission to the show for members is no longer being offered, so please come prepared to pay for admission. Your admission fee always goes right back into supporting PSMS members and activities, and we thank you for supporting this change.

We need your help to make it happen! Year after year, we put on one of the largest and best shows on the West Coast. Volunteer for

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 at the September and October membership meetings or online at psms.org under "Members/Events." Publicity posters and post cards will be distributed at our September meeting. And remember: as a volunteer, you'll have access to that amazing potluck in the break room and will be eligible to attend the volunteers-only Memorial Day field trip.

We need your specimens. We also need mushroom specimens for our display tables. As always, the strength of the mushroom season has yet to reveal itself, but we know it's an odd year with heat waves and drought. 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. We encourage you to self-organize for a collecting trip in the day or two before the show.



We're counting on YOU to make the show happen!



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CALENDAR

Sept. 13 Membership meeting
Sept. 19 PSMS Board meeting
Sept. 20 *Spore Prints* deadline
Oct. 1 Field trip (see PSMS website)
Oct. 8 Field trip (see PSMS website)
Oct. 22–23 PSMS annual wild mushroom show

BOARD NEWS

Luise Asif

Insurance and Investment projects mentioned in the last report have been finalized and resolved. Thank you, Joe, and all who worked to make it happen.

Membership Chair Pacita Roberts and Outreach Chair Marian Maxwell are working on developing a curriculum for K–12 schools. A call out for people interested in working on this project is included in this issue of *Spore Prints*.

Since the PSMS Fall mushroom show is the major fund raiser that finances all PSMS activities for the year, the board approved that only people who help with the show will get in free. This year's show dates are October 22 & 23.

The board approved adding a Land Acknowledgement Statement to the website. The board plans to discuss the PSMS Diversity-Equity-Inclusivity survey conducted earlier this year at the September meeting.

Reminder: Starting this month *Spore Prints* will only be available electronically.

On a personal note, I would like to thank all the wonderful people who have worked with me over the years as Volunteer Chair volunteering for PSMS events. I will certainly miss your enthusiasm and kindness. Thank you for the wonderful memories.

— Luise Asif, past Volunteer Chair

MEMBERSHIP MEETING

Scott Maxwell

The membership meeting on September 13, 2022, will be both in-person at the Center for Urban Horticulture and virtual on Zoom.

Please Note: This meeting will begin early to provide our membership with the opportunity to hear about our upcoming PSMS Annual Wild Mushroom Show, to meet the show committee chairs, and learn about what opportunities are available for getting involved! We will be serving coffee, tea, soft drinks, and cookies at 6:30 pm when we start letting people into the event hall. Hand sanitizer will be available and its use is strongly encouraged. Masks are optional.



Andy MacKinnon

Following the meet-and-greet portion of our meeting, owing to popular demand, **Andy MacKinnon** will be once again presenting the popular topic “The Natural and Cultural History of Magic Mushrooms.” This presentation will start at 7:30. Andy has agreed to present via Zoom from Canada. This Zoom session will be

presented at the Center For Urban Horticulture *only*. We will not be sharing the link in September.

Magic mushrooms have been employed in spiritual practices in Mexico and Central America for millennia. The visionary powers of these mushrooms first became known to the world in 1957, and in the early 1960s they sparked a social and cultural psychedelic revolution soon dominated by LSD. The discovery that magic mushrooms grew commonly and abundantly in the Pacific Northwest and in British Columbia helped make Canada's westernmost province a focal point of social change. Recent advances show promise for carefully monitored treatment of some psychological disorders; see, for example, *Canadian Nurse*, July 2020, “Magic mushrooms and the future of mental health care.”

This presentation will explore the natural history of BC's magic mushrooms and their role in the rapidly changing counterculture of the 1960s, 1970s, 1980s, and up to the present day.

Andy MacKinnon is a forest ecologist who lives in Metchosin, British Columbia. His recent research interests include the ecology of BC's ectomycorrhizal fungal species. He was lead BC scientist for Environment Canada's 2017 ranking of BC provinces threatened and endangered fungal species. Andy has taught rainforest

ecology field courses in Bamfield and Tofino (for the University of Victoria) and Haida Gwaii (for UBC). He has also taught mushroom identification courses in Tofino (for the Rainforest Education Society) and in Victoria. He is co-author of six best-selling books about plants of western North America and co-author of the newly published Royal BC Museum *Handbook Mushrooms of British Columbia*. He is past-president of the South Vancouver Island Mycological Society and an enthusiastic participant, speaker, and field trip leader for various mushroom festivals in southwestern BC each autumn.

Andy has spoken at, and led field trips for, the annual meeting of the Washington Native Plant Society in 2020 and several of its chapters (Central Puget Sound, San Juan Islands) as well as for the Puget Sound Mycological Society.

PRESIDENT'S MESSAGE Randy Richardson

Welcome back after the summer. There are some things to note. This newsletter is now digital only—no more mailed paper copies sent out. We are still dealing with plans being scrambled by the pandemic, so there are fewer field trips this fall than usual, plus there is no Ben Woo Foray for 2022.



The big push now is for a well-oiled Fall Show. This year, only those who volunteer at the show will get free admission; all other members will be charged a half price of \$5, and there will not be ahead-of-time tickets like last year. We hope to have organized collecting, and we are having an early start to the September meeting so that people can learn more about helping out.



DO YOU GET EXCITED TALKING ABOUT FUNGI? ARE YOU READY TO BE A MUSHROOM MISSIONARY? Pacita Roberts & Marian Maxwell

PSMS would like to develop an educational outreach program for K-12 public and tribal schools, with speakers and lectures that could be presented to these schools to encourage future mycophiles. You don't have to be a mushroom ID expert, but some experience and fundamental knowledge of mycology is necessary, and, preferably, you have been a member of PSMS for more than 2 years. This project is in the early stage of development, and in need of enthusiastic participants, folks who can brainstorm and implement. If this is something you think you might be interested in participating in, please contact Pacita Roberts and Marian Maxwell at

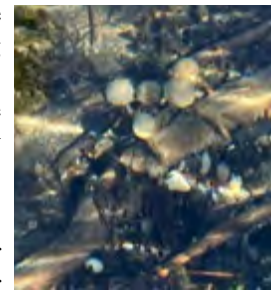
PSMSspeakerproject@psms.org

and provide your name, contact information (email and telephone number), and the year you joined.

RARE UNDERWATER MUSHROOMS IN THE ROGUE RIVER Zack Larsen

<https://kobi5.com/news/>, Aug. 26, 2022

ROGUE RIVER, Ore. - Most people don't think of mushrooms as growing underwater, but underwater mushrooms known as *Psathyrella aquatica* can be found here in the Rogue River valley of Oregon.



This isn't a new discovery. In 2005, Southern Oregon University professor Robert Coffan, with help from other colleagues, found the mushrooms in the upper Rogue River between Prospect and Union Creek.

One of his colleagues, Darlene Southworth, who has studied these mushrooms for over a decade, said they typically grow from June to September every year. According to Southworth, they are extremely small; most are not bigger than a dime.

She's looked at many rivers in Oregon and other states for years, but there has yet to be another discovery of this fungus. "It seems unlikely that this is the only place," Southworth said. "But at this point, this particular stretch of the Rogue River is the only in the known universe where these fungi occur."

Southworth said there are currently around 24 mushrooms in the river this year. It's unknown if the mushrooms are poisonous or not. But either way, they're so small, it would be difficult to cook or eat them.

**Dennis Krabbenhoft
Aug. 1935–Sept. 2021**

We are sad to report the passing of long-term PSMS member and consummate volunteer Dennis Krabbenhoft in September of 2021. Dennis joined PSMS in January 1970. He became interested in hunting mushrooms after meeting Charlie Volz, who introduced him to the wood blewit which he said that he found to be delicious! In 1979 he served as an Alternate to the PSMS Board of Trustees but was elected to two separate terms and served as a Board Member from 1979–1983. In the late 1990s, he spent many years volunteering at the Feel and Smell table at the annual Wild Mushroom show. In addition, from 1982 through 2015 he always arrived Friday evening to help set up for tray arrangement and the pre-sorting to genus, which was a huge help to me. We have missed seeing him at PSMS functions as his health did not permit him to attend since 2015. We offer our condolences regarding his passing to his wife, Nancy Hogan.

— Marian Maxwell

FIRST REPORT OF A RARE *AMANITA* FROM WASHINGTON STATE

Brian S. Luther

At our last spring PSMS field trip on June 4, an *Amanita* was brought in that appeared to be *Amanita nivalis* or something very similar like *A. populiphila*. I sent photos to Britt Bunyard, co-author of *Amanitas of North America*, and one of his comments was that it was not *A. nivalis* or *A. populiphila* and “much more likely to be an undescribed spp.”

In over 50 years, I’ve never seen this fungus before or anything like it. I don’t know who found it or the exact location and habitat it was collected in. It was dropped off on the ID table, so I was unable to get any of these pertinent details. If the PSMS member who collected it happens to read this article, see my photos, and remember having found it, I’d be pleased to hear from you.

Here’s a brief description, along with some photos I took before drying the collection. One of the photos is a photomicrograph showing the basidiospores.

Description of Collection

Amanita swaukensis Luther nom. prov. - BSL coll. #2022-64-1

Basidiocarp: 12 cm tall; pileus 6.5 cm in diameter, approximately 2 cm thick, white, irregularly circular in outline with slight undulations having a few small, thin whitish patches of universal veil tissue and with distinctive marginal striations going for 1–1.5 cm; lamellae white, appearing mostly free, with some lamellulae; stipe 10 × 1.5–2 cm, white, with no partial veil, slightly enlarging at the pileus and the base mostly uniform in diameter or very slightly enlarged also for the lower 3.5 cm, just above the pronounced white volva. Odor indistinct or slightly fungoid.



Amanita sp. showing volva at stem base.

Brian S. Luther



Amanita sp. showing close up of upper cap surface .



Amanita sp. showing close up of stem and lamellae.

Brian S. Luther

Basidiospores 13.5–16 (17) × 8–10 (11) μm, ellipsoid, smooth, thin walled, hyaline and with a distinctive apiculus.

Amanita sp. spores @1,000× in 3% NH₄OH + Phloxine.



Brian S. Luther

Comments

Bunyard & Justice (2020) note that the spores are “typically subglobose, occasionally broadly ellipsoid” in *A. nivalis*. None of the basidiospores I observed in this collection were subglobose. The basidiospores are also somewhat larger than those of *A. nivalis*, but the fungus itself is identical in size and appearance to that species.

According to Bunyard & Justice (2020) *Amanita nivalis* is an Arctic-alpine species, known from Europe and NE North America and also reported from Colorado, but with no mention of any collections having been found in the Pacific Northwest. As a result, I’m hoping to find additional specimens in the future.

Reference

Bunyard, Britt & Jay Justice. 2020. *Amanitas of North America*. The Fungi Press, 336 pp.

LOST MUSHROOM HUNTER (PLUS STASH) RESCUED UNHARMED

KRDR News, Aug. 15, 2022

CUSTER COUNTY, Colo. - Late last Friday night, Custer County Search and Rescue (CCSAR) was called to assist with locating a lost mushroom hunter near Saint Charles Peak in the Wet Mountains.

Using his last known GPS point, rescuers narrowed down a search area and were able to find the man around 2 a.m. Saturday morning. CCSAR said the man was cold, tired, and out of water, but he was uninjured.

After some hydration, food, and a new warm layer, the man was able to hike with rescuers. CCSAR said he came out with a great stash of mushrooms as well.

WOMAN WHO WENT MISSING WHILE PICKING MUSHROOMS FOUND DECEASED: RCMP

<https://northeastnow.com/>, Aug. 15, 2022

RCMP have confirmed a woman who went missing while foraging for mushrooms has been found deceased.

On Sunday, searchers found Lois Chartrand in a forested area about one kilometer from where she was last seen. Her family has been notified.

Chartrand was last seen on Aug. 4 while picking mushrooms on the northeast side of the 30-km mark of the Hanson Lake Highway.

Police said they had contacted Chartrand through radio but later lost contact.

Saskatchewan RCMP said they’re thankful to all the agencies and people involved in the search efforts including the Alberta RCMP, Saskatoon Police Service, the Saskatchewan Public Safety Agency, Search and Rescue Saskatchewan Association of Volunteers (SARSAV) Civilian Air Search and Rescue Association (CASARA), and Heli Recon.

They’re also grateful to the volunteer searchers as well as community members and Lois’s loved ones, who—despite the stressful circumstances—ensured all searchers were fed and supported.

MUSHROOMS VS. EGGS ON A POSTAGE STAMP

Brian S. Luther

I wouldn't think anyone would have trouble distinguishing eggs from mushrooms, right?

Well, some mycophilatelic (mushroom stamp) catalogs, including those of McKenzie (1997) and Gimeno (1999–2000), list an East German postage stamp as having mushrooms in the illustration. The stamp is Scott Postage Stamp Catalogue 1299, issued by the DDR in 1971, and it shows a print of an engraving by the German renaissance artist Albrecht Dürer titled *Three Peasants in Conversation* (c. 1497). The peasant on the right is holding a basket which the McKenzie and Gimeno catalogs claim contains mushrooms, but after doing some research, I disagree.



The objects in the basket are much too uniform in size, shape, and color to be mushrooms. You might think that medieval chicken eggs would all be speckled or brown, but that was not the case at all. Many paintings from hundreds of years ago clearly show white eggs. It is also possible that some of the eggs in the basket are duck eggs, which are larger than hen's eggs, but we'll never know.

How about the possibility that these were freshly cut or picked cultivated *Agaricus bisporus* or wild mushrooms? First off, cultivated button mushrooms were not available at that time, with the process only having first been established in France around 1650, about 150 or so years after Dürer's engraving was made. And, if these were wild picked mushrooms, again they are uncharacteristically perfectly uniform overall in color and form—not likely.

The clincher would be seeing a side view, a stem or a mushroom cap turned upside down showing gills, but none are visible. It would be very unlikely not to see any if they were, in fact, mushrooms.

Finally, I found that the art historian Strauss (1980) says these are eggs, without any reference to mushrooms. Dürer also made other engravings which show a basket of eggs in the scene, so this was a recurring design theme by him.

Years ago I collected this stamp assuming these catalogs were correct, but now I know better.

This original Dürer engraving is held at the Clark Art Museum in Williamstown, MA.

References

- Gimeno, Jordi. 1999–2000. *Setas, Mushrooms, Champignons, Pilze, Funghi. Domfil Thematic Stamp Catalogue*, 2nd ed. Amos Press, Inc., Sidney, OH. In Spanish and English. 258 pp.
- McKenzie, Eric H.C. 1997. *Collect Fungi on Stamps*, 2nd Ed. Stanley Gibbons Thematic Catalogue. Stanley Gibbons Ltd., 86 pp.
- Strauss, Walter L., ed. 1980. *The Illustrated Bartsch 10 (Commentary): Sixteenth Century German Artists*, Albrecht Dürer. New York: Abaris Books, 328 pp.

CHANGES TO FIELD TRIP GUIDING POLICY FOR FALL 2022

Wren Hudgins

In our ongoing attempts to ensure that beginning mushroomers have access to a field trip guide, we tried out for our Spring 2022 trips, a system of online registration, not for the field trips themselves, but for the chance to go with a guide. The main point here is that beginning mushroomers are not familiar with what promising habitat looks like and without that knowledge, they are more likely to experience frustration than success. The online registration system may have looked to many members as if it was working well, but there were problems behind the scenes. Without going into detail, I'll say that the online registration solved some problems but created others.

For Fall 2022 field trips we will revert to a system we have used before. There will be paper sign-up sheets available at field trips for beginning mushroomers to sign up to hunt in a guided group on a first come, first served basis. We trained more guides in 2022 so that translates directly to more chances to hunt with a guide. If we can give every absolute beginner a chance to hunt with a guide and we still have spaces remaining in our groups, then we can offer those spaces to others, but that can be determined only on the morning of the field trip. If we know something about a particular guide's plans for the day, we can put that information on the sign-up sheet. For example, one guide may plan a family-oriented hunt, may or may not welcome dogs, may plan a longer-than-average day, or plan a longer-than-average drive to a remote hunting location

The requirements to sign up to hunt with a guide remain the same as they have been:

- You must be a club member.
- You must have never been guided on a PSMS hunt. (You may have attended a field trip, but not have been guided there.)
- You must have a whistle (and we no longer give them out).
- You must arrive before 9 am so you hear the safety talk.

When you sign up to hunt with a guide, your guide will ask you the above questions. We can verify whistle possession but must rely on the honor system for answers to the other questions. While most members are honest, a few selfishly sneak into guided groups and that has the unfortunate effect of leaving true beginners behind, likely headed for a frustrating day. For those not going with a guided group, we will encourage and try to facilitate the formation of small groups and give you some ideas on where to go.

The importance of habitat recognition is illustrated by the 2 percent rule,* which states that you find mushrooms in 2 percent of perfect habitat and 0 percent of the wrong habitat. So learning habitat may seem like the priority for guided groups, and it is important, but in reality, safety is our biggest priority. Mushroomers get lost in the woods every season, from a few uncomfortable and scary hours to a life-threatening overnight, or worse. Club guides have never lost anyone in the woods, although we thought we did when a few members of a guided group chose to leave the guided group and not tell their guide. Please don't do that. It scares us and wastes our time. Let's work together on this.

*I made this up, but I think it's more or less accurate.

LOUISIANA MAN ARRESTED DRIVING 50 mph OVER THE SPEED LIMIT POSSESSED 150 gm OF MAGIC MUSHROOMS

Michael Scheidt

<https://www.cbs42.com/>, Aug 17, 2022

PAINCOURTVILLE, La. – Joshua Alexander Skal, 32, of Baton Rouge, is currently behind bars in the Assumption Parish jail after a recent traffic stop on LA Route 70 East by an I.C.E. deputy on Wednesday, August 17.

During the stop, the deputy noted “factors consistent with illegal drug activity,” according to the Assumption Parish Sheriff’s Office.

A subsequent search uncovered 149.4 grams of psilocybin (the active ingredient in magic mushrooms) and assorted drug paraphernalia

Skal was then taken into custody and transported to the Assumption Parish Detention Center. The 32-year-old is charged with

- Possession with Intent to Distribute Psilocybin (magic mushrooms)
- Possession of Drug Paraphernalia
- Speeding 103/55 mph Zone
- Illegal Window Tint
- Vehicle License Required
- No License Plate
- Careless Operation of a Motor Vehicle.

OSTROM’S SUED AFTER FIRING FEMALE WORKERS

Emily Goodell

https://www.yaktrinews.com, Aug. 17, 2022

SUNNYSIDE, Wash. - Workers are speaking out against a Sunnyside mushroom farm they claim fired the bulk of its majority-female workforce, leaving behind more than one single mom frantically searching for ways to pay the bills.

A newly-filed civil rights lawsuit claims Ostrom Mushroom Farms has systemically fired 85 percent of the women working for them and mostly replacing them with mostly male H-2A workers, who have fewer rights protecting them in the workplace than U.S. residents.

“Ostrom even made a Facebook post in the middle of its firing spree seeking quote ‘only males’ to apply to work at the farm,” Washington State Attorney General Bob Ferguson said Wednesday at a press conference about the lawsuit.

KAPP-KVEW reached out to Ostrom Mushroom Farms regarding the lawsuit, but did not receive a response.

In the lawsuit, Ferguson has accused the company of engaging in “calculated” discrimination against women and U.S. residents, purportedly violating state law with both their hiring and firing practices.

Samira Rosas was one of three current and former employees who shared stories about their treatment by the company at the press conference. She said she believes the company doesn’t want female employees because they often have family obligations.

“We are equal workers and it’s not fair to think of us as women that have children, that have appointments, that have to leave the work place for our children,” Rosas said. “We have a lot to contribute.”

Rosas continues to work at Ostrom Mushroom Farms despite the alleged discrimination and her own negative experiences, including reportedly facing retaliation after sharing her concerns with management alongside a group of her coworkers this summer.

“I’ve suffered blows; one of the managers hit me with a metal cart,” Rosas said. “I believe that the retaliation was due to the fact that we manifested against injustice.”

The lawsuit claims managers issued a warning to one worker they falsely accused of bringing a weapon to work and another to a worker because he couldn’t keep “dirt from falling off the broken piece of machinery he was operating.”

Another current employee, Jose Martinez, said despite good-faith efforts from their small group of employees to bring their concerns to the managers’ attention, retaliation is all they’ve received.

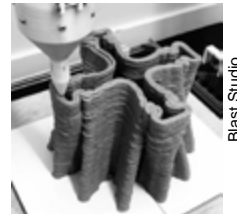
“This is the beginning; the fight goes on,” Martinez said. “What we want is to have a union.”

3D-PRINTED MYCELIUM STRUCTURAL COLUMNS

Valeria Montjoy

<https://www.archdaily.com/>, Aug. 23, 2022

Fungi, the most abundant group of soil microorganisms, play several significant roles in ecosystems, from being an important food source to providing nutrients to plants. Recognizing these advantages, Blast Studio has developed a way of 3D printing a two-meter-high structural column—known as the Tree Column—out of waste and mycelium, fungi’s root system. The production process begins with collecting discarded paper coffee cups and boiling their shredded pieces in water to produce a sterilized pulp. Mixed with the mycelium, this creates a biomass paste that is later 3D-printed to form 10 separate modules, which are then stacked one on top of the other and fused together with more mycelium.



Tree column manufacture.

The Tree Column’s ridged, undulating shape is algorithmically designed to retain moisture and protect from airflow, recreating an ideal climate for mushroom growth. But the design also has a structural purpose—thanks to the material’s elasticity, the column is lightweight and good in compression and flexion. Once it is solidified, it achieves a structural capacity similar to medium-density fiberboard, meaning the mycelium can ultimately substitute for concrete in small buildings. Therefore, the technology is able to create, without formwork, complex shapes that optimize performance

while replacing traditional structural materials. Blast Studio currently aims to scale up the technology to print a pavilion and hopes to construct buildings in the future, which would potentially allow cities to grow architecture from waste while providing food for their inhabitants.



Stacking a Tree Column.

SCIENTISTS EXPERIMENT ON HOW PLANTS ENGINEERED TO EMIT LIGHT

Paw Mozter

<https://www.natureworldnews.com/>, Aug. 22, 2022

Wouldn't it be nice to have your personal backyard fairyland, a garden where the flowers and foliage shine at night? If so, there is help available. Scientists have been working on creating plants with auto-luminescence—the ability to shine in the dark—for some time.

History of Creating Plants with Bioluminescence

Gene transfer

Scientists initially experimented with the straightforward approach of taking out the genes that cause the illumination in fireflies and injecting them into plants.

Bioluminescent fungi

Another approach involved the use of bioluminescent fungi. Bioluminescent fungi can continuously generate green light for days because they have the only genetically encodable bioluminescent system among eukaryotes. The water-soluble and cell-permeable nature of fungal luciferin, as well as the fact that its light-emitting reaction is not ATP-dependent, makes the fungal bioluminescent system appealing for a variety of biological imaging applications.

Fungal luciferin is created when four enzymes react with caffeine acid. Now, plants contain caffeine acid, and researchers at the Institute of Bioorganic Chemistry, Russian Academy of Sciences, in Moscow, created fungal luciferin through biosynthesis.

The Russian researchers used genetically modified plants designed to transfer a certain amount of caffeic acid to the fungi, and the fungi were then left to complete the task.

Phosphors

In more recent years, scientists at MIT in the United States have created plants that emit light all through the night by infusing them with nanoparticles called phosphors that absorb light or UV radiation during the day and emit it at night. They used a phosphor called strontium aluminate, coated it in silica for protection, and then inserted it into the pores or stromata on the surface of leaves.

According to the scientists, this approach could conceivably introduce luminous plants that offer both real lighting and a delightful glow.

Fungal Bioluminescence

Four different lineages of luminous mushrooms exhibit cross-reactions, which suggests that they all share a similar bioluminescent mechanism, as per *ACS Publication*.

Yampolsky lab has performed a number of good tests that have uncovered the essential elements of fungal bioluminescence (BL), from luciferin to emitted light. The precise underlying mechanism or mechanisms, however, are still unknown.

They elucidated the bioluminescent process's molecular and electronic state by calculating multireference and (time-dependent) density functional theory.

The formation of a-pyrone endoperoxide high-energy intermediate results from the cycloaddition of O₂ to luciferin, which starts the fungal BL.

Instead of a single-electron transfer, as in firefly BL, a charge transfer accompanied by a spin inversion process explains how this oxygenation occurs.

The thermolysis produces oxyluciferin via a zwitterion intermediate in the first singlet excited state. A chemical variation of oxyluciferin in the S1-state has the capacity to emit light.

To fully comprehend the chemical mechanisms in fungal BL and chemiluminescence involving a-pyrone endoperoxide, one must grasp the current theoretical computation in considerable depth.

HOW CORN SMUT (*USTILAGO MAYDIS*) RENDERS ITS HOST PLANT DEFENSELESS

<https://www.sciencedaily.com/>, Aug. 10, 2022

Ustilago maydis attacks and reproduces in the aerial parts of the corn plant. Huge tumor-like tissue growths often form at the infection sites. These galls can reach the size of a child's head. The growths are triggered by molecules released by the fungus, called effectors. They manipulate the plant's metabolism and suppress its immune system. They also promote cell growth and division in corn. To do this, they interfere with a plant's signaling pathway regulated by the plant hormone auxin.



Corn smut.

“The fungus uses this auxin signaling pathway for its own purposes,” explains Prof. Armin Djamei, who heads the Plant Pathology Department at the INRES Institute of the University of Bonn. “This is because the huge growth of the tissue devours energy and resources that are then lacking for defense against *Ustilago maydis*. In addition, the fungus finds an ideal supply of nutrients in the growths and can multiply well there.” The formation of the characteristic galls is thus definitely in the interest of the pathogen.

“We therefore wanted to find out how the fungus promotes these proliferation processes,” says Djamei. “To do this, we searched for genetic material in the fungus that enables it to control the auxin signaling pathway of its host plant and thus its cell growth.” The complex search began seven years ago at the Gregor Mendel Institute in Vienna. Later, the crop researcher continued the work at the Leibniz Institute in Gatersleben and later at the University of Bonn.

Pathogen Reprograms its Host

With success: Together with his collaborators, he was able to identify five genes that the fungus uses to manipulate the host plant's auxin signaling pathway. These five genes, called Tip1 to Tip5, form what is known as a cluster: If one imagines the entire genome of *Ustilago maydis* as a thick encyclopedia, these five lie, as it were, on successive pages.

Genes are construction manuals—the fungus needs them to produce respective proteins. “The proteins encoded by the five Tip genes can bind to a protein in the corn plant known to experts as Topless,” explains Dr. Janos Bindics. A former employee of the Gregor Mendel Institute, he and his colleague Dr. Mamoon Khan performed many of the study's key experiments.

Topless is a central switch that suppresses very different signaling pathways in the plant. The fungal effectors produced by the five

cont. on page 8

BEAUTIFUL BOOK SCULPTURES ADORNED IN FUNGI

Jonny Diamond

<https://lithub.com/>, Aug, 23, 2022

Australian artist Stéphanie Kilgast is trying to make a point about the millions upon millions of books that end up in landfills each year. A sculptor who works primarily in discarded materials, Kilgast's latest series focuses on old books, reimagining them as sources of organic vitality playing host to delicately rendered mushrooms, coral, flowers, and butterflies. A few of his mushroom creations are shown below.



Some mushroom creations by Australian artist Stéphanie Kilgast, three books and a tin can.

CALIFORNIA'S "MUSHROOM DOME" IS THE MOST POPULAR IN AIRBNB HISTORY

Aaron Spray

<https://www.thetravel.com/>, Aug. 1, 2022

Airbnb is a massive accommodation listing website. In 2019, it celebrated half a billion guest arrivals. With countless listings, it also has plenty of unusual accommodations. Airbnb boasts over 14,000 tiny houses, over 4,000 castles, and over 2,400 tree houses. The most visited room is a 600-year-old castle in Ireland—but the most visited listing on Airbnb is the "Mushroom Dome" near the village of Aptos, California.

It may seem strange that the most popular listing is not a high-end glitzy hotel but a 100 sq. ft. geodesic dome that has a tiny bedroom, two beds, a kitchen, and a wooden patio.

The Dome was originally built as temporary housing for a friend, but later it was opened to short-term tenants. The first to come were refugees looking for an escape from the stress of Silicon Valley, but now it attracts people from the world over.

The dome is in a Redwood grove, and there is hardly any sound there apart from crickets. Guests can enjoy 10 acres of private land without fences, relax on the deck, or take a hike out into the woods.

As of the time of writing (August 2022), they are no longer allowed by Santa Cruz County to rent the Mushroom Dome Cabin. Instead,

they rent the land, and guests can still have unlimited access to the Mushroom Dome.

The bathroom features a Travertine shower and a self-contained Swedish composting toilet. Be sure to follow the instructions on how to use the toilet to avoid any unpleasant odors. If you would like to book a stay, then plan ahead. Generally, people need to make a reservation request around five months in advance. The cost is \$159.00 per night. The couch bed and a dog are each \$15.00 extra.



California mushroom dome cabin at night.

Corn Smut, cont. from page 7

Tip genes override this repression—and do so very specifically for signaling pathways that benefit the fungus, such as the auxin-driven growth signaling pathway. In contrast, other signaling pathways controlled by Topless are not affected. "Figuratively speaking, the fungus acts with surgical precision," stresses Djamei. "It accomplishes exactly what it needs to accomplish to best infect the corn plant."

Insights for Basic Research

There are a number of pathogens that interfere with the auxin signaling pathway of the hosts they infect. Exactly how is often not fully understood. It may be that Topless plays an important role in this process in other crops as well. After all, the protein originated several hundreds of millions of years ago and its central role has hardly changed since then. It therefore exists not only in corn, but in a similar form in all other land plants. For example, the researchers were able to show that the Tip effectors of *Ustilago maydis* also interfere with the auxin signaling pathway of other plant species.

The findings could therefore help to better understand the infection processes in important plant diseases. The results are particularly interesting for basic research: "Through them, it will be possible for the first time to influence specific effects of the auxin signaling pathway in a very targeted manner and thus to elucidate the effect of these important plant hormones even more precisely," hopes Armin Djamei, who is a member of the Transdisciplinary Research Area "Sustainable Futures" and the PhenoRob Cluster of Excellence at the University of Bonn.

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