

# SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY  
Number 563 June 2020



## NATURAL MOSQUITO FUNGUS “COULD BLOCK SPREAD OF MALARIA”

Fiona Broom

<https://www.scidev.net/>, May 7, 2020

A fungus that lives in malaria-carrying mosquitoes could boost global efforts to control the disease, which kills about half a million people—mostly children under five—every year.

Scientists have discovered a microbe, a fungus they have named *Microsporidia MB*, in *Anopheles arabiensis* mosquitoes around the shores of Lake Victoria in Kenya. The fungus is capable of blocking malaria transmission from mosquitoes to people.

Malaria prevention and control organizations are optimistic the findings could offer a lasting solution to malaria, a disease that infects about 220 million people a year.

The vast majority of malaria cases occur in Africa and India and are caused by the parasite *Plasmodium falciparum* carried by female *Anopheles* mosquitoes.

Focusing on *P. falciparum*, researchers from ICIPE (the International Centre of Insect Physiology and Ecology) and the University of Glasgow reported in a study published May 4 that mosquitoes with the fungus do not carry malaria parasites, either in nature or after experimental infection in the lab.

The fungus *Microsporidia MB* is naturally found at low levels in malaria mosquitoes in Kenya, but the researchers believe there may be ways to increase the number of mosquitoes carrying it, thereby blocking their capacity to transmit malaria. Further research will investigate precisely how *Microsporidia MB* could be used to control malaria in large mosquito populations, but the researchers argue it is scalable and could be delivered to remote areas via plane airdrops of lab-infected mosquitoes or spores.

The microbe is passed from female *Anopheles arabiensis* mosquitoes to their offspring at high rates and does not kill or cause obvious harm to the mosquito host or affect its fitness.

It means using the fungus to tackle malaria would leave mosquito populations intact, in contrast to techniques such as genome editing which could wipe them out.

“Maybe the first step is to look at what’s naturally out there and see if that can work,” lead author Jeremy Herren, from ICIPE and formerly the University of Glasgow, tells *SciDev.Net*.

Herren says his background studying fruit fly and insect symbionts—organisms which live together—led to the study.

“I always thought the concept of symbiosis could be really powerful for controlling diseases,” he said. “I came into vector-borne disease research from that angle.”

The non-profit Malaria Consortium is “excited” about the *Microsporidia MB* discovery, but says that further studies will be required to confirm the findings with larger samples of mosquitoes and in other important mosquito species.

Timothy Wells, chief scientific officer at Medicines for Malaria Venture, says anything that is suggested to have an impact on malaria transmission “is good news.”

“This discovery is extremely interesting, and it will be fascinating to see how the technology can be developed to have impact on clinical malaria,” he says.

Malaria Consortium global technical director James Tibenderana says any potential use of the findings for malaria control will require larger-scale field studies to demonstrate efficacy and cost-effectiveness and to understand operational challenges.

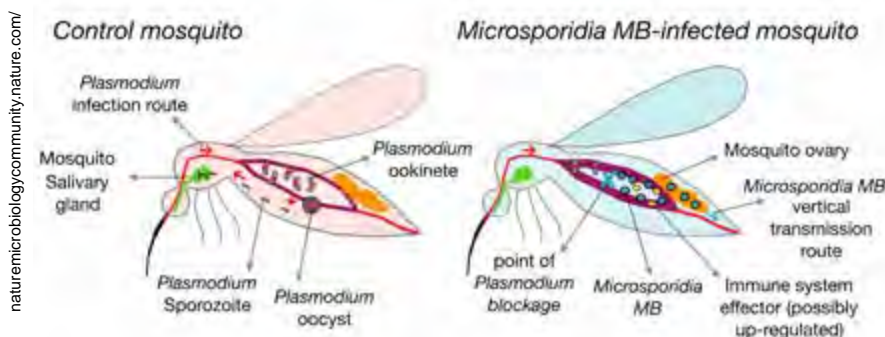
“Acceptance of the approach amongst national governments and communities will have to be assessed,” Tibenderana says.

Herren agreed that demonstrating efficacy and engaging with policymakers is key for public health interventions.

He says community acceptance is crucial before any environmental releases can be considered.

“We’ve done a lot of work with the communities, they’ve actually been a key part of this research,” Herren says.

“They might be the first to benefit if it does work, we need to ensure that they understand what we’re doing and of course it will be up to them if they want this intervention or not.”



Schematic showing the model for *Microsporidia MB*-induced *Plasmodium* protection in *Anopheles* mosquitoes. In control mosquitoes the *Plasmodium* infection cycle is able to progress, whereas in *Microsporidia MB*-infected mosquitoes, the *Plasmodium* is blocked prior to traversing the mosquito midgut.

# Spore Prints

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PUGET SOUND MYCOLOGICAL SOCIETY  
Center for Urban Horticulture, Box 354115  
University of Washington, Seattle, Washington 98195  
(206) 522-6031 <http://www.psms.org>

OFFICERS: Randy Richardson, President<sup>2019–2021</sup>  
*president@psms.org*  
Marion Richards, Vice President<sup>2020–2022</sup>  
Brenda Fong, Treasurer<sup>2020–2022</sup>  
*treasurer@psms.org*  
Luise Asif, Secretary<sup>2019–2021</sup>  
*volunteer@psms.org*

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IM. PAST PRES:

SCI. ADVISOR: Dr. Steve Trudell

EDITOR: Agnes A. Sieger, 271 Harmony Lane,  
Port Angeles, WA 98362  
*sieger@att.net*

## MEMBERSHIP MEETING

Tuesday, June 9, 2020, at 7:30 pm.\*

Our speakers for June are Trent and Kristen Blizzard, who will enlighten us on “PNW Burn Morels.”

Morel mushrooms are famous for thriving in forests the year after a wildfire. Join us on Zoom and learn how to responsibly locate and collect these edible fungi. Locating ideal burn morel terrain starts online with topographic and satellite maps. Other factors that affect your likelihood of hunting success include weather, forest type, elevation, aspect, season, and terrain. We will also be sure to discuss the various *Morchella* species that thrive in the burn as well as proper etiquette and the best Leave-No-Trace practices.



Kristen and Trent  
Blizzard

Trent and Kristen Blizzard are the authors of *Burn Morels - A Modern Forager’s Guide to Finding Mushrooms*. They are not mycologists, but love to utilize science and mapping technology to help locate prime terrain. They enjoy sharing their burn morels secrets because the “secret spots” change every year. Don’t ask them where to find naturals! Based in Glenwood Springs, Colorado, Trent and Kristen forage across the Western U.S. Follow them at [www.modern-forager.com](http://www.modern-forager.com).

**\*Note:** As in April and May, this will be a virtual meeting conducted on Zoom. Members will need to register ahead of time. A link and a password to the meeting will be sent to the email address given in your registration within an hour before the meeting.

## DUES RENEWALS EXTENDED BY ONE YEAR! AND WHAT WE’RE STILL DOING DESPITE DUES

Luise Asif & Anne Tarver

### Dues Renewal Extension

Current PSMS Members will receive membership renewals from Membership Chair Pacita Roberts in mid-June. PSMS is extending the renewal date for dues by a full year—from July 1, 2020, to July 1, 2021—as suggested to the board by PSMS member Cath Carine to help ameliorate the losses caused by COVID-19.

The hard work of PSMS volunteers and the generosity of members combined with good fiscal stewardship by the board members you have elected has given PSMS the financial cushion to be able to do this. Thanks so much to all who have made this possible!

#### *What Do I Need to Do?*

When you receive the email invitation to renew and you accept the dues extension, you don’t need to do anything.

#### *What If I Want to Support PSMS by Paying Dues Anyway?*

If you want, and are able, to pay dues for 2020, we welcome your continued support of PSMS during this time when our income will not cover operating costs. You may do this easily by following the links included in the email sent by the PSMS membership chair or you may send a check (payable to PSMS) to Pacita Roberts, PSMS Membership, 10516 27th Ave NE, Seattle, WA 98125. (Payments made by August 15th will help the board better plan the operational budget for the year.) Thank you so much for your generosity, if you choose to do this!

## CALENDAR

- June 9 Membership meeting, 7:30 pm via Zoom
- June 15 Board meeting, 7:00 pm via Zoom
- Aug. 18 *Spore Prints* deadline
- Sept. 8 Membership meeting

## BOARD NEWS

Luise Asif

We hope everyone is staying healthy and in good spirits. The June membership meeting will again be via Zoom. Marion Richards continues to work extremely hard to provide these very successful events. Milton Tam, Derek Hevel, and Molly Watts are working on options for our Fall Show if crowd restrictions are still in place. A second Ben Woo Scholarship has been granted for 2020. Sweta Agrawal and Marian Maxwell are working on updating the website with links to past Ben Woo Scholarship awards. The board approved a year membership extension for all current members. Details are outlined in a following article. Hallie Magrini and Kim Traverse have resigned from the board to pursue other interests. We thank them for their service and welcome Marcus Sarracino as the new trustee. Kim is still active helping identify mushroom finds at [id@psms.org](mailto:id@psms.org).

## Why Continue To Pay My Dues—What PSMS is Doing to Fulfill Our Mission Despite Less Income Due to COVID-19

As most of you know, PSMS is a nonprofit, all-volunteer, member-run organization whose mission is to “foster the understanding and appreciation” of fungi. Although our field trips, membership meetings, and spring show (Mushroom Maynia), have been cancelled, we are still doing many things to fulfill our mission.

By investing in Zoom and putting in a lot of hard work, we had two successful virtual member meetings with guest speakers in April and May; we are working to have more such meetings. Having Zoom has also made it possible for the board to continue to meet to manage our affairs and ensure that our resources are well managed.

PSMS identifiers are available to respond to inquiries at [id@psms.org](mailto:info@psms.org).

Ben Woo Scholarships continue to be disbursed (past recipients include Christian Schwartz, co-author of *Mushrooms of the Redwood Coast*, and Michael Bradshaw, a recent speaker on powdery mildew.)

PSMS is also providing research funding for the DNA sequencing Danny Miller has done in support of the Bridle Trails Study and the Ben Woo Foray collections.

Our new Vice-President, Marion Richards, has picked up the mantle from past Vice-President Daniel Winkler and is continuing the tradition of providing interesting and informative speakers at our meetings.

The *Spore Prints*, made possible by the hard work of Agnes Sieger, continues to go out to our members.

Thanks to Hallie Magrini, former trustee, for pointing out the many things we are still able to do!

All the above activities and more are the result of all the hard work of our many volunteers and the financial contributions of our members. To all who have helped PSMS continue to achieve its mission, thank you for all you have given!

### PRESIDENT'S MESSAGE

Randy Richardson

We realize that times are extra tough for new members, what with the loss of field trips and the guides and ID people that go with them. The board and others are trying to come up with “virtual” aids, whether links to videos or possibly some form of education. In the meantime, I hope these thoughts will be of some help to beginners hunting mushrooms in times of COVID-19 without field trips.



#### *Fruiting Factors*

The main factors that determine mushroom fruiting are moisture (rain!) - elevation - temperature - habitat.

- *Moisture* - Moisture is more than one or two sprinkly days. I've heard that we had an unusually dry March. If it is dry, try checking more sheltered areas with a nearby source of moisture.
- *Elevation* - There was a member long ago who postulated a theory that has stood the test. First, distance from the Cascade Crest is one factor, with the season starting lower down and working toward the mountains. Second, elevation is key, with fruiting generally moving uphill at about 500 ft a week.

- *Temperature* - Nighttime temperatures regulate the fruiting of morels. Ground temperature is what to watch; generally, we look for a sustained 45°F or so. NOAA has the Wenatchee Lake area air temperature at 2000 ft below 40°F this week, so we could still be on the early end.

- *Habitat* - Natural morels like mixed pine and fir forest, but mushrooms don't play by the rules. Morels can be in a place you don't expect them and not in a place that looks exactly like where you just found them.

Slope direction is also important (as are water sources), so warm south slopes are early and chilled north slopes later. Check moist but sunny spots in the beginning of the season.

Many people prefer burns for morels, since some locations fruit abundantly the first spring after a fire. Thankfully there were no big fires last year, but I have found that the second year at a burn site can still be quite good.

#### *Other Thoughts*

One idea to try for “when” is the best guesses that were made for PSMS field trips in the past. For those who are members of PSMS and can access the members page on the website, look at “field trip schedule” or even at long-past editions of *Spore Prints*.

Remember: PSMS hunters are not alone—many eastsiders forage, too, and are closer and more familiar with eastside mushroom spots, so there can be heavy competition.



### BEN WOO FORAY UPDATE: FIELD TRIPS

Luise Asif

The board is monitoring conditions and cautiously moving forward. Initially we will limit the number of participants to 50 to allow for single occupancy. This may mean the cost will go up slightly. A waiting list will be created should restrictions be lifted and we are able to have 100 attendees. If state and CDC regulations recommend no more than 10 people, we will postpone to 2021. Final details will be in the registration email to be sent out to the membership. Meanwhile we have a change in workshops. We will not be able to offer the microscopy workshop since we no longer have an instructor.

Following are the field trip options as promised last month. Participants must pre-register Friday evening, no extra charge. Please sign up for only one trip.

#### *Chanterelle Field Trip*

Saturday October 10

8:00 am to 12:00 pm

Field Trip leaders: Daniel Winkler and Scott Maxwell

Join us on a morning foray in search of the Pacific Northwest icon, the golden chanterelle. We will car caravan to the site just a short drive from camp. The foray leaves just after breakfast, so get up early and get ready for fun. We will be back in camp for lunch, and you will be free to attend afternoon workshops or perhaps do more mushroom hunting. Mushroom gathering is limited to 1 gallon/day unless you stop at the Enumclaw Ranger Station and pick up a free 5 gallon/season permit.

*cont. on page 7*

## SOME GOOD NEWS AND HOPE DURING THE ... WELL, YOU KNOW

Gwynne Dyer

<https://www.sentinelsource.com>, May 9, 2020

You don't feel like reading about the plague today? Good. I don't feel like writing about it again either. So here's some reasons to hope, none of which are even remotely related to the coronavirus.

### Combating Malaria

First, they have found not one but three new ways to combat malaria, just as the problem of growing resistance to existing drugs and insecticides was getting out of hand.

In Burkina Faso, collaboration last year between the local Institut de Recherche en Sciences de la Santé and the University of Maryland showed the effectiveness of modifying a fungus that normally infests mosquitoes. The fungus was genetically engineered to produce lethal spider toxin, and 99 percent of the mosquito population in the trial area died within 45 days.

Scientists at the Kenya Medical Research Institute have found that an existing drug, Ivermectin, which is used against parasitical diseases like river blindness and elephantiasis, is also effective against malaria. It kills both the *Plasmodium falciparum* parasite in your blood and the mosquito whose bite put it there. (But you'll still get bitten first—try hanging chicken feathers on the porch.)

And best of all, a cure that doesn't kill the mosquitoes, which are an important source of food for many bird species. The International Centre of Insect Physiology and Ecology in Nairobi has discovered that around 5 percent of the mosquito population on the shores of Lake Victoria in Kenya carries a microbe [fungus] called *Microsporidia MB* that completely blocks the *Plasmodium* parasite.

The microbe lives in the mosquitoes' gut and genitals without doing them any harm, and mothers pass it on to most of their offspring. So if you could spread that microbe to the rest of the mosquito population ....

*Microsporidia* form spores that could be released en masse to infect mosquitoes, or male mosquitoes could be infected in the lab and released into the wild to infect the females when they have sex. It's early days, but this could actually solve the malaria problem for good.

### Blocking Bacterial Resistance To Antibiotics

Second piece of happy news: Researchers at the University of Groningen in the Netherlands are having some success in blocking the growth of bacterial resistance to antibiotics. This is the most urgent medical issue of our time, because if the antibiotics don't work, then the old infections that they have long suppressed will come back and make even the simplest operation life-threatening.

Bacteria share and spread their resistance by swapping genes, and to do that they secrete a protein called CSP. The Groningen team worked through more than 1,300 existing drugs, and found 46 candidates that disrupt the ability of the bacteria to produce CSP. It's a first step, but a very promising one.

### Recycling Plastic

And now for something completely different. Environmentalists hate plastics because half of the megatons produced each year ends up in landfills or the oceans. However, plastic is a strong, lightweight material that is very useful in many different roles.

The trick is to recycle it all properly, so it doesn't end up damaging the environment.

Enter a French start-up company called Carbios, which began by screening 100,000 microorganisms for promising candidates that could decompose plastics quickly and cheaply into chemical building blocks that can be recycled into new plastics. They found what they were seeking in a leaf compost heap: a bacterium that produces an enzyme that will do that job.

It took a little work to mutate the enzyme so that it enthusiastically consumes the PET plastic from which plastic bottles are made. Carbios predicts that it will be operating at an industrial scale by 2024—and in March German researchers found a different bacterium that will eat up polyurethane.

### Flour from Bacteria

Now for the big one. There is a company called Solar Foods in Helsinki that is growing bacteria (just add hydrogen) to make an organic soup from which you can make flour. Tweak the bacterial formula a bit and you can create the right proteins and fats for lab-grown meat, fish, milk, and eggs.

There are many other companies just a bit behind Solar Foods (which will open its first commercial factory next year). The prospect glimmering on the horizon is that we might be able to feed the world from a relatively small amount of land, and give the rest back to nature.

We would then have to figure out what to do with the half of mankind that currently makes its living from farming, but we can assume that this would be a change that takes decades to work its way through the very large and extremely complex global society we live in today.

What all this tells us is that there are many clever people working on all the problems that threaten our future, and that for some of them at least, solutions will arrive in time. It is still heroically optimistic to believe that all of them will, or even enough of them. There is hope, but there is also great danger.

### Novice Mushroomer

*In fields and in woods, in fall and in spring,  
A mushroomer's guide I used to just bring,  
To help me best know, right on the spot,  
Whether this one, or that, was edible, or not.*

*On each it took me quite some time,  
To key in on color, size, shape, or the slime,  
But absolute certainty had never resulted,  
Only when experts were later consulted.*

*So my basket contained only those few that I took,  
After cautiously studying some pages in a book,  
While my comrades ran round and quickly collected,  
Baskets of goodies that I must have neglected.*

*I thus would advise you, if you are able,  
To take new finds home, and, laid out on the table,  
With guides and spore prints, allaying all fears,  
Learn a few new species for following years.*

—Boris Subbotin, *The Sporeprint*  
LA Myco Soc., N



## SCIENTISTS DISCOVER NEW SPECIES OF FUNGUS WHILE SCROLLING THEIR FEED, NAME IT AFTER TWITTER

<https://www.hindustantimes.com/>, May 16, 2020

People often use social media platforms to keep themselves entertained, but in a bizarre incident, scientists have discovered a new species of parasitic fungus on the micro-blogging platform Twitter.

According to the study, published in the journal *MycKeys*, the researchers spotted an image of a millipede while scrolling through the site and noticed a few tiny red dots near the creature's head, something that has never been seen on the American millipedes.

The newly discovered parasitic fungus has now been given its official Latin name, *Troglomyces twitteri*.

"I could see something looking like fungi on the surface of the millipede. Until then, these fungi had never been found on American millipedes. So, I went to my colleague and showed him the image. That's when we ran down to the museum's collections and began digging," said Ana Sofia Reboleira from the University of Copenhagen in Denmark.

The research team discovered several specimens of the same fungus on a few of the American millipedes in the Natural History Museum's enormous collection—fungi that had never before been documented.

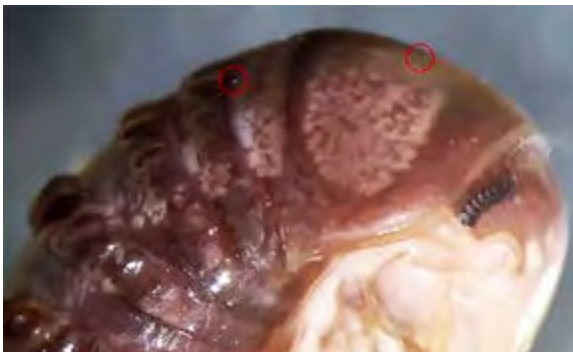
This confirmed the existence of a previously unknown species of Laboulbeniales—an order of tiny, bizarre, and largely unknown fungal parasites that attack insects and millipedes.

The researchers point out that discovery is an example of how sharing information on social media can result in completely unexpected results.

"As far as we know, this is the first time that a new species has been discovered on Twitter. It highlights the importance of these platforms for sharing research—and thereby being able to achieve new results," Reboleira said.

"I hope that it will motivate professional and amateur researchers to share more data via social media. This is something that has been increasingly obvious during the coronavirus crisis, a time when so many are prevented from getting into the field or laboratories," she added.

Reboleira believes that social media is generally playing a larger and larger role in research and stresses that the result was possible because of her access to one of the world's largest biological collections.



*Troglomyces twitteri*



"Alice in Wonderland" mask by Port Orchard artist Sallie Nau from porcelain clay, lichen, and wool.

## WHILE MANY HUNT, ONE EASTERN IOWA MAN FARMS HIS OWN MOREL MUSHROOMS

Aaron Scheinblum

<https://www.kcrg.com/>, May 8, 2020

VINTON, Iowa (KCRG) - Many morel mushroom hunters have already been hitting the trails—but one farmer is taking matters into his own hands.



A farmer in Vinton says he has crafted a science that has led him to grow hundreds of pounds of morels this season—and he expects next year to get into the thousands of pounds.

There are a lot of steps that go into being a good morel mushroom hunter: knowing what trees to look for, where to find those trees, and the best time to hunt.

But there are not many that have taken a path like Josh Osborn.

"[We've] been interested and hunted them all our lives since we were kids, so I was wondering why nobody was growing them," Osborn said.

He has turned the annual hunt into a year-round effort.

"I've got notebooks of stuff researching the morels," Osborn said. "Because that's basically why I started it ... I've always been a morel mushroom lover, and when I was a kid it was just morels. That's all I wanted."

Both indoors and outdoors, Osborn became a mushroom farmer, now working under the label "Blues Best Mushrooms," originating from his middle name: Blue.'

His prized crop, morel mushrooms, would likely take others years to collect.

Osborn said it started with a morel more than ten years ago, inspired by his brother.

"The first one I grew was in the basement of my house in town," Osborn said, who admitted he thought it was easier than he expected. He learned in the years after, he got lucky his first time around.

But like all farms using the right mixture, things grew.

"Once I got a decent handle on how to get them to grow, I've been trying to expand it ever since," Osborn said.

Osborn monitors their growth, harvests when the mushrooms are ready for harvest, and works with area grocery stores to sell them—taking the hunt out of morel season and turning it into a science.

"I've already started stuff for next year," Osborn said. "As soon as I see mushrooms popping, I start a culture for the following spring."

Making him less of a farmer and more of a morel magician.

## ENDANGERED BATS ARE EVOLVING TO FIGHT OFF AN EXOTIC FUNGAL DISEASE

Elizabeth Claire Alberts

<https://news.mongabay.com/>, May 14, 2020

A mysterious disease is wiping out one of the world's smallest bats, the aptly named "little brown bat," which has an extensive range across the United States and Canada. But these tiny mammals, which are classified as an endangered species by the IUCN and Canada's Species at Risk Act, are turning out to be more tenacious than previously thought. New research shows that little brown bats (*Myotis lucifugus*) could be fighting off the disease through genetic resistance.



Justin Boyles / Flickr

A little brown bat that was banded for scientific research.



A little brown bat with white-nose syndrome

The disease, white-nose syndrome, comes from a fungus called *Pseudogymnoascus destructans*, often abbreviated to *Pd*. This pathogen is believed to have originated in Asia or Europe, although researchers haven't been able to pinpoint a specific source. It was first detected in Albany, New York,

in 2006, and since then, it's spread across North America—from southern Texas to the western seaboard of Newfoundland—killing millions of bats in the process. Some experts refer to white-nose syndrome as one of the deadliest wildlife diseases in modern times.

*Pd* grows in cool, moist places, such as caves, which are exactly the environments in which little brown bats and other bat species like to hibernate.

"When bats hibernate, their body temperature drops so low that they're basically the same temperature as the cave surface," Giorgia Auteri, Ph.D. candidate at the University of Michigan, told Mongabay. "So the fungus grows on them . . . it's growing on their noses and on their wings, and it's possibly inhibiting their breathing a little bit since it's going over their face. They wake up to clean it off when they're supposed to be in a sustained deep hibernation, and every time they do wake up, it takes up a pretty big portion of their winter energy budget. From all of these arousals, they run out of fat reserves too early before the winter ends."

The syndrome gets its name from the visible white fuzz that often develops on a bat's nose and wings. However, the fungus isn't always detectable on an infected bat, and researchers sometimes need a microscope to identify *Pd* on a bat's skin.

This debilitating disease doesn't just affect little brown bats. In North America alone, 12 additional bat species, including the gray bat (*Myotis grisescens*), Indiana bat (*Myotis sodalis*) and northern long-eared bat (*Myotis septentrionalis*), have been infected with white-nose syndrome, according to an informational site produced by the U.S. Fish and Wildlife Service. *Pd* has also been detected in a further eight species, although these bats haven't shown any

symptoms of white-nose syndrome. Numerous bat species in Europe and Asia are also being decimated by the fungus.

In a recent paper in *Scientific Reports*, Auteri and her co-author, L. Lacey Knowles, draw from previous studies to note the little brown bat population has declined by more than 90 percent due to white-nose syndrome.

Gregory Turner, a biologist at the Pennsylvania Game Commission, says he has also seen a sharp decline in bat species since the onset of the disease.

"My state saw an overall 98 percent decline for all 6 species we have here that hibernate, with 2 that exceeded 99 percent" Turner told Mongabay in an email. "Those were the two most abundant and ubiquitous species at that time."

In a report published in *Science* in 2010, Turner and his colleagues predicted that the little brown bat would experience a "rapid regional extinction," despite being one of the most widespread bat species in North America. While no bat species have yet gone extinct from white-nose syndrome, Turner says the danger is still imminent.

"While mortality has ameliorated since its arrival, remaining population levels are very small for some of these species, and so any additional stresses or threats could be catastrophic until some recovery occurs," Turner said.

If species like the little brown bat disappear from North America, local ecosystems could be thrown out of balance. Bats act as pollinators and seed dispersers, and also help with pest control, according to Auteri.

"Little brown bats are insectivores, so they exclusively eat insects," Auteri said. "And since they are a smaller species, their diet is a lot of smaller flying insects like flies and mosquitoes."

In their new paper, Auteri and Knowles offer a glimmer of hope: little brown bats were found to have significant differences in at least three genes, and certain individuals appeared to have the ability to fight off the disease due to these gene variations. Bats that survived white-nose syndrome due to genetic resistance should pass on their genes to their offspring, Auteri said, which can theoretically strengthen the population.

The team got their data by going into mines and natural caves in Michigan and collecting tissue samples from deceased bats.

"We went and looked for bats that we could identify as adult little brown bats, so we knew that they had survived at least one winter while hibernating in this area where the disease was all over the place," Auteri said.

In the summer, they also collected DNA from living bats by catching them in thin nets, extracting small tissue samples from their back wings, and then letting them go.

While previous studies have suggested that bats could be surviving white-nose syndrome through genetics, this is the first study that uses genetics to find a direct correlation between genes and survival, Auteri said.

"[W]e're finding the hint that there could be these genetic changes that are occurring that might provide some type of survival in the future," Knowles, a professor at the University of Michigan, said in a statement. "So as these variants increase, there's some hope that these bats are not all going to die from the disease itself."

“Eventually the population might be able to survive on their own without a lot of human intervention, and that helps inform the tempo and pace of conservation decisions,” Auteri said. “There are a lot of people and nonprofits ... working to protect the species and put up bat boxes, and there’s even people working on developing vaccines for the disease to be administered to wild bats. So this research that there are genetically resistant individuals helps to inform those efforts.”

According to Turner, bats are also changing their behavior, perhaps in response to white-nose syndrome, which may improve their chances of survival.

“These colder temperatures likely help the bats save energy by lengthening the amount of time they stay in torpor (reducing the number of times each winter they exit torpor and spend energy on warming their body), and thus not running out of stored energy reserves as quickly,” Turner said. “So, with some changes on their end, and a few management techniques we are working on currently that I hope have promise, I do have hope that these species will persist.”

**Citations:**

Auteri, G. G., Knowles, L. L. (2020). Decimated little brown bats show potential for adaptive change. *Scientific Reports*, 10. doi:10.1038/s41598-020-59797-4

Frick, W. F., Pollock, J. F., Hicks, A. C., Langwig, K. E., Reynolds, D. S., Turner, G. G., Butchkoski, C. M., and Kunz, T. H. (2010). An emerging disease causes regional population collapse of a common North American bat species. *Science*, 329(5992), 679–682. doi:10.1126/science.1188594.

**Ben Woo Foray, cont. from page 3**

*Educational Field Trip*

Saturday October 10

8:00 to 11:00 am

Field Trip leader: Steve Trudell

Have you ever wondered, what mushroom is this? Then join us for a couple of hours exploring the forests surrounding the campus. Expand your understanding of fungi on this educational adventure. Steve Trudell, Ph.D. mycologist, will share his wealth of information as he shows us the details, differences, and characteristics unique to the species encountered. Participants will be back in time to attend the cultivation and afternoon workshops.

*Collection Field Trip*

Saturday October 10

8:00 to 10:00 am

Field Trip leaders: Marian Maxwell and Alana McGee

Marian and Alana will lead this morning foray, the emphasis will be on species collection for the identification table. The site is a beautiful second growth forest with abundant mushrooms and amazing diversity. Several new species were discovered there on previous forays. We will car caravan to the spot, a short drive from camp. Identification slips and wax paper bags will be provided.

The invitation to register will be mailed out to the membership around the beginning of June. For information please contact [Secretary@psms.org](mailto:Secretary@psms.org) or [outreach@psms.org](mailto:outreach@psms.org).

We will keep you updated in our September *Spore Prints* with any changes. Meanwhile have a safe and healthy summer.

**YOU CAN NOW SEE SOMERSET HOUSE'S MUSHROOMS EXHIBITION FROM HOME**

**Orla Brennan**

<https://www.anothermag.com/art-photography/>, May 18, 2020



Seana Gavin / Somerset

*Somerset-Seana Gavin, "Mindful Mushroom."*

Since lockdown began, museums, galleries, and other cultural institutions have been finding new ways to connect with their audiences—from launching interactive initiatives to transporting exhibitions into the digital realm. Somerset House is the latest to join the movement, today unveiling a digital tour of its brilliant exhibition, “Mushrooms: The Art, Design and Future of Fungi” Curated by AnOthermag.com contributor Francesca Gavin, “Mushrooms” looks at fungi in visual culture—their connection to fantasy worlds, psychedelia, and spirituality—as well as exploring their place in a sustainable future.

“Mushrooms kept appearing in contemporary art and I wanted to know why,” Francesca Gavin told Daisy Hoppen when the exhibition first opened. “I am fascinated by how such a variety of artists and designers are drawn to a single topic of inspiration. The results are so varied and touch on everything from poetry to economics to ideas around communication, climate, and the psychedelic experience.”



Somerset

*Beatrix Potter, Hygrophorus puniceus.*

The exhibition’s eclectic offering reflects this far-reaching fungi obsession Gavin speaks of, from beautiful 1902 illustrations by Beatrix Potter to a solar-powered “mushroom suitcase” by conceptual artist Carsten Höller, plus hypnotic mushroom collages by Seana Gavin.

Among her personal highlights, Gavin told *AnOther* in January, are Jason Evans’ film about mushroom pickers in the Pacific northwest and Perks and Mini’s handmade graphic rug—as well as Cy Twombly’s print series loaned from the Tate collection. Elsewhere, the exhibition showcases a decomposable mushroom burial suit, designed to reduce the damaging environmental impact of the funeral industry, by Jae Rhim Lee; experimental fungi-based shoes by designer Kristel Peters; a surreal film from Egyptian artist Adham Faramawy entitled *My fingers distended as honey dripped from your lips ...* and a large-scale mushroom-based floral installation from the London Flower School, featuring mushrooms grown at Somerset House—all of which are now available to browse [online](#).



Somerset

*Mushroom shoe.*



Somerset

*Mushroom light shades.*



# BUMPER CROP LEADS TO SPATE OF AUSTRALIAN MUSHROOM POISONINGS

various sources, May 2020

MELBOURNE - Several people have been hospitalized after eating poisonous mushrooms, sparking a warning for Victorians to not consume fungi growing in parks and gardens.

The Department of Health Victoria issued the warning May 13, after eight Victorians, including a child, had been taken to the hospital in the past two weeks with severe poisoning after eating wild mushrooms. Five people were admitted to intensive care and one person died, but Victoria's Deputy Chief Health Officer Dr. Angie Bone could not confirm if the death was directly related to the mushroom poisoning.

Heavy rainfall across the state in the past month has led to ideal growing conditions for toxic fungi, with an increase in sproutings spotted in Melbourne parks and gardens. Toxic Death Cap (*Amanita phalloides*) and Yellow Stainer mushrooms (*Agaricus xanthodermus*) are sprouting in large numbers across Melbourne, leading to an unprecedented number of people getting sick after eating them.

*Amanita phalloides* is responsible for 90 percent of mushroom poisoning deaths worldwide. Symptoms can occur up to 24 hours or more after ingestion and include



*Amanita phalloides*.

stomach pains, vomiting, and diarrhea. Death can ensue owing to liver or kidney failure



*Agaricus xanthodermus* induces serious stomach cramps, nausea, vomiting, sweating, and diarrhea. Curiously, it appears that some people can eat it without ill effects

Daylesford ecologist Alison Pouliot said she had never seen a busier foraging season. "We're having such a bumper season with so many fungi popping up this autumn." She speculates that "Because of the current pandemic situation, people have got a little more time to be wandering around, so I think there is an increase in foraging. Certainly we've seen an increase in calls to the poisons information center, so that perhaps also suggests more people are picking fungi."

Rohan Elliott, manager of the Victorian Poisons Information Centre, said there has been a 50 percent increase in calls about mushrooms this year, including double the number of callers with symptoms.

Tom May, Senior mycologist at the Royal Botanical Gardens, agreed. "There's been a very big increase in the number of calls going to the poisons information centers across southern Australia this year, because of the sheer amount of mushrooms out there."

**This will be your last *Spore Prints* until September.  
Have a safe summer!**

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Puget Sound Mycological Society  
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