

SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY
Number 519 February 2016



THE YEAR IN FUNGI

Nicola Twilley

The New Yorker, Dec. 20, 2015

“If there is a rule in biology, I can think about how it does not apply to fungi,” Anne Pringle, a mycologist at the University of Wisconsin, Madison, said earlier this year. “They challenge our preconceptions of how biology works.” Neither plant nor animal (though closer to the latter in evolutionary terms), fungi are everywhere. They are, for the most part, invisible, single-celled microbes and cobwebs of wispy mycelial thread, lurking beneath the surface of things. Even those species that fruit into the fleshy scallops, caps, and puffballs that we call mushrooms tend to be frustratingly well camouflaged. Scientists often describe fungi as cryptic. Their lifestyles are poorly understood, and their taxonomy is a mess. And yet, without them, biology would not work at all. Fungi are a forest’s sanitation department; in ecosystems across the globe, they break down and recycle organic matter, along the way supplying plants with nutrients, water, and chemical defenses.

In the course of making a podcast episode exploring the history and science of mushrooms earlier this year, I became a confirmed mycophile, visiting mushroom farms, touring the U.S. National Fungus Collection, and voraciously consuming mushroom-related news, washed down with mugs of reishi tea. The elusive and unobtrusive nature of fungi means that we can only speculate as to how the year really went for them. As the composer and fungus fanatic John Cage wrote, “It’s useless to pretend to know mushrooms. They escape your erudition.” With that warning in mind, here are my fungal highlights of 2015.

1. *Geastrum britannicum*

Each monthly issue of *Mycosphere: The Journal of Fungal Biology* contains descriptions of dozens of new species, from *Leptosphaeria italica*, found earlier this year on a dead branch in Italy, to a frilly, ridged parasol named *Marasmius indopurpleostriatus*, which was identified in the tiny Indian



state of Sikkim, in the Himalayas. But the most endearing new fungus of 2015, *Geastrum britannicum*, was actually discovered by Jonathan Revett, an amateur mycophile, fifteen years ago, in the Fens of Norfolk, England. A patch of *G. britannicum*, with its dark brown spheres balanced on fleshy white bodies, looks uncannily like a huddle of little mushroom men, arms by their sides, buried in soil up to their waists. Scientists initially dismissed *G. britannicum* as a variant of another British mushroom, the rayed earthstar, which looks something like a starfish wearing a chef’s toque, but a recent DNA analysis established Revett’s specimen as distinct. “I wouldn’t normally question the experts, but I just knew these were different,” Revett told his local newspaper.

Elsewhere in 2015, scientists found new fungal species on salami and in the nests of leaf-cutter ants. Next year will undoubtedly bring its own fresh harvest. According to Lisa Castlebury, a research mycologist at the National Fungus Collection, of the more than one and a half million species that are estimated to exist, we have named and described only a hundred thousand.

2. *Cordyceps*



Cordyceps subsessilis.

Members of the parasitic genus *Cordyceps* are sometimes referred to as zombie fungi, for their ability to control the behavior of insects and other arthropods. (The best-known zombie, *Ophiocordyceps unilateralis*, which belongs to a closely related genus, forces its ant host to hang on to the underside of a leaf while the fungus consumes its internal tissues, after which its mushrooms sprout from the ant’s empty

husk.) *Cordyceps* also have a long history of use in traditional medicine, particularly in Asia; *C. sinensis*, for example, is known as Himalayan Viagra, and regularly sells for fifty thousand dollars a pound. Western medicine has been slower to embrace the zombie fungi, although the immunosuppressive drug cyclosporine, frequently used after organ transplantation, is derived from *Cordyceps subsessilis*, a devourer of beetles.

In 2009, Cornelia de Moor, a molecular biologist at the University of Nottingham, in England, discovered that cordycepin, a compound that is common to species in the *Cordyceps* genus, can halt the growth of cancerous cells in the lab, using a mechanism that is different from existing cancer treatments. This year, de Moor began trialling cordycepin as an osteoarthritis drug, because of its anti-inflammatory powers. If all goes well, physicians could be prescribing the new drug within the decade. (Which, presumably, is exactly what the fungus wants.)

3. When It Rains, It’s Spores

Cordyceps may be notorious for their powers of mind control, but, earlier this year, scientists found that fungi can also shape the weather. In a study published in the journal *PLOS One* in November, researchers at Miami University, in Ohio, demonstrated that airborne mushroom spores attract droplets of moisture, seeding clouds and then falling as raindrops. Nicholas Money, the study’s lead author, speculated that this may create a positive feedback loop, in which fungi whose growth is stimulated by rain catapult their spores into the air, only to encour-



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MEMBERSHIP MEETING

Tuesday, February 9, 2016, at 7:30 pm at the Center for Urban Horticulture, 3501 NE 41st Street, Seattle.

Our speaker for February will be Dr. Christopher Hobbs, author of the ground-breaking book *Medicinal Mushrooms* (first edition, 1989). Join us for a lively discussion on all things fungal and healthy! Learn about their current use in modern integrative health care, how to evaluate product quality, and how to make your own remedies in the kitchen, step-by-step! A thorough review of the science and traditional use of the most widely researched medicinal mushrooms (especially turkey tails, shiitake, *Cordyceps*, maitake, and chaga) will be presented based on many years of on-going clinical practice, the historical record, and the current scientific literature. We will cover over 25 species used and studied for medicinal use. The colorful slide show will point out the most important details while acquainting the viewer with the macroscopic characteristics and beauty of these useful fungi.



Dr. Hobbs

Dr. Hobbs is a fourth-generation, internationally renowned herbalist, licensed acupuncturist, herbal clinician, research scientist, consultant to the dietary supplement industry, expert witness, botanist, and a mycologist with over 35 years of experience. The author or co-author of over 20 books, he lectures on herbal medicine worldwide. He has taught at universities and medical schools such as Stanford Medical School, Yale Medical School, Bastyr University, and the National School of Naturopathic Medicine. He has taught classes for the past 6 years at the University of California, Berkeley as a Ph.D. graduate student in evolutionary biology, phylogenetics, plant chemistry, and ethnobotany, and now as a lecturer.

Will persons with last names beginning with the letters L-Z please bring a plate of refreshments to share after the meeting.

CALENDAR

- Feb. 9 Membership Meeting, 7:30 pm. CUH
- Feb. 15 Board Meeting, 7:30 pm, CUH Board Room
- Feb. 16 *Spore Prints* deadline
- Feb. 28 Ballot return cutoff
- Mar. 5 Annual Membership Meeting & Survivors' Banquet, 6:30-9:30 pm, CUH

BOARD NEWS

Luise Asif

PSMS desperately needs a **Field Trip Coordinator** for 2016; contact Kim at president@psms.org if you are interested. Field trip hosts are needed until a coordinator is found; contact Kim. There has been a reshuffling of committee chairs. Milton Tam will head the **Conservation/Ecology Committee** and James Nowak (Animal) will take over the **Cultivation Committee**. In addition to a Field Trip Coordinator, we need chairs for **Mushroom Maynia** and **Club Publicity**. James Nowak and Luise Asif will co-chair the **Ben Woo Foray** cosponsored by the Kitsap Club. Paul Hill and Danny Miller are looking into **electronic ticketing** for PSMS events to minimize standing in line. Erin and Brady Raymond are on schedule to roll out the **PSMS Blog** in March. **Election information** is in this issue, so be sure to vote. New board members will be announced at the Annual Meeting/Survivor's Banquet in March.

PRESIDENT'S MESSAGE

Kim Traverse

It is election time and you will either be receiving ballots in the mail or you will have the opportunity to vote online. *Please* do not think that your vote does not matter. Read the bios and look at the photos of the candidates who are running—these are the people willing to put themselves out there to get what has to be done actually done. Your vote does help elect the next members of the board but it also is a way for you to ratify the hard work that the board does and show your appreciation for the tremendous amount that gets accomplished every year. If *you* were running you would know how important a vote is, so act like you *are* running and cast that vote! We will all sleep better at night.

Also, it looks like we are close to having an opportunity for members to do some fieldwork and sharpen their identification skills. Daniel Winkler has been working out the details for a fungal survey at Bridle Trails State Park. This location is close enough for anyone with a serious interest to help with. Nothing beats learning mushrooms in their actual native habitat. A totally different experience from filling a sack at Pike Place Market!

STUDY SHOWS MAGIC MUSHROOMS CAN REPAIR BRAIN DAMAGE DUE TO EXTREME TRAUMA

<http://healthperfection.co/>, Jan. 21, 2016

A new study by The University of South Florida has found that low doses of the active ingredient in magic mushrooms repair brain damage caused by extreme trauma, offering renewed hope to millions of sufferers of PTSD (Post-Traumatic Stress Disorder).

The study confirms previous research by Imperial College London that psilocybin, a naturally occurring compound present in “shrooms,” stimulates new brain cell growth and erases frightening memories. Mice conditioned to fear electric shock when hearing a noise associated with the shock “simply lost their fear,” says Dr. Juan Sanchez-Ramos, who co-authored the study. A low dose of psilocybin led them to overcome “fear conditioning” and the freeze response associated with it faster than a group of mice on Ketanserin (a drug that counteracts the receptor that binds psilocybin in the brain) and a control group on saline.

An estimated 5 percent of Americans—more than 13 million people—have PTSD at any given time, according to the PTSD Alliance. The condition, more often associated with combat veterans, is twice as likely to develop in women because they tend to experience interpersonal violence (such as domestic violence, rape, and abuse) more often than men.

Common symptoms, such as hyper-vigilance, memory fragmentation, flashbacks, dissociation, nightmares, and fight or flight responses to “triggers,” are generally thought to be psychological and therefore treatable by learning to change thought processes. But new research suggests that they may in fact be the result of long-term physiological mutations to the brain.

In the South Florida University study, the mice treated with low doses of psilocybin grew healthy new brain cells and their overactive medial prefrontal cortex regions (common in PTSD sufferers) were restored to normal functionality.

Independent studies (<http://www.thedoctorwillseeyounow.com>) have shown that the hippocampus part of the brain is damaged by extreme stress and that this is specific to PTSD and not associated with anxiety or panic disorders.

Sanchez-Ramos acknowledged that there was no way of knowing whether the mice in the experiment experienced altered states of consciousness or hallucinations—commonly experienced with magic mushrooms, but he believed the doses were too low to cause psychoactive effects.

Previous studies have shown that low doses of psilocybin produce no consciousness state altering effects. Administered in the correct amount, psilocybin could therefore be assumed to safely treat PTSD with minimal risk of adverse side effects.

NEW SPECIES PUBLISHED BY BRIAN LUTHER

PSMS ID Chair Brian Luther is the co-author (with Serge Audet of Quebec, who first proposed the genus) of an article just published in *Mycotaxon* (Volume 130, pp. 1191–1202, 2015) describing *Neobatrellus subcaeruleoporus* sp. nov., a new species in the Scutigeraceae.

Year in Fungi, cont. from page 1

age more rain. Millions of tons of fungal spores are released into the atmosphere every year, meaning that mushrooms likely have a significant effect on regional precipitation patterns—and their habitat destruction, Money concluded, could well lead to drought.

4. Yes, We Will Have No Bananas



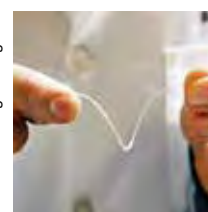
Crop pathologists call *Fusarium oxysporum*, a tiny, asexual soil fungus, the “silent assassin.” It enters plants through their roots and travels through their vascular tissue; by the time it is ready to sporulate, the plant is doomed. The fungus has adapted to human agriculture by differentiating: *F. oxysporum* f. sp. *lycopersici* causes tomato wilt; *F. oxysporum* f. sp. *asparagi* causes asparagus wilt; and *F. oxysporum* f. sp. *cubense* is slowly but surely wiping out the world’s banana supply.

A particular strain of *Fusarium*, Tropical Race One, rendered the original globalized banana variety, the Gros Michel, commercially extinct in the first half of the twentieth century. Fortunately, the banana variety that fills our grocery stores today, the Cavendish, was resistant to Tropical Race One, and it eventually replaced the Gros Michel, although not before widespread banana shortages. Unfortunately, the Cavendish is not resistant to Tropical Race Four. The strain emerged in Taiwan in the late nineteen-sixties and has subsequently destroyed the banana industry in China, Indonesia, and Malaysia, and put a significant dent in the Australian harvest. Once a plantation is infected, there is no way to save the banana trees, and, because the fungus remains in the soil, the land cannot be used to raise bananas again. The only way to combat *F. oxysporum* f. sp. *cubense* is to make sure that it does not spread.

Last month, scientists at Wageningen University, in the Netherlands, published a paper that used genetic analysis to prove that a single clone of Tropical Race Four is responsible for infecting banana plantations on multiple continents. The significance of the Dutch research is that it shows that strict quarantine and biosecurity measures have failed to stop Tropical Race Four’s spread—meaning, as the authors write, that the fungus’s arrival in the banana-growing regions of Central America is a question of “when, not if.” This time, there is no *Fusarium*-resistant replacement waiting in the wings.

5. Bespoke Yeast

Yeasts win fungus of the year every year, at least from the human point of view—wine, bread, and beer ensure that. But 2015 was the year of designer yeast. Yeasts normally consume sugar and excrete carbon dioxide and alcohols, but new gene-editing technologies such as CRISPR have made it much easier and faster to insert strands of functional DNA from other organisms into the yeast genome, transforming its metabolism. The result is a cell-size factory that can pump out anything from flavorings to pharmaceuticals. This year, yeasts capable of producing spider silk, morphine, and palm oil all made their debuts—early signs, perhaps, of a transition from an economy based on agriculture and hydrocarbon chemistry to one run on fungi.



Silk thread made by genetically modified yeast.

CUBAN MUSHROOM STAMPS **Brian S. Luther**

With the recent historic progress initiated by President Obama toward normalizing relations with Cuba, I thought you'd like to see the mycophilatelic items issued by that island nation, so far.

Cuba is about the same size as the state of Virginia and has many different habitats and amazing biodiversity. Its highest peak is Pico Turquino at 6,476 ft. Because of these different habitats, ranging from sub-tropical to mountainous and temperate, many kinds of fungi are found throughout the island.

In the following table, M = mushrooms or fungi as the main illustration; MID = mushrooms or fungi in the design of the illustration, in the background or border; s/s = souvenir sheet; all catalog numbers are from the Scott Postage Stamp Catalogue.

Fungus Illustrated Postal Items from Cuba

<u>Date of Issue</u>	<u>Scott Cat. #</u>	<u>Value</u>	<u>Type</u>	<u>Subject</u>
2/15/1988	3000	1¢	M	<i>Boletus satanas</i>
"	3001	2¢	M	<i>Amanita citrina</i>
"	3002	3¢	M	<i>Tylopilus felleus</i>
"	3003	5¢	M	<i>Paxillus involutus</i>
"	3004	10¢	M	<i>Inocybe patouillardii</i>
"	3005	30¢	M	<i>Amanita muscaria</i>
"	3006	50¢	M	<i>Hypholoma fasciculare</i>
1/10/1989	3094	2¢	M	<i>Pleurotus levis</i>
"	3095	3¢	M	<i>Pleurotus floridanus</i>
"	3096	5¢	M	<i>Amanita caesarea</i>
"	3097	10¢	M	<i>Lentinus cubensis</i>
"	3098	40¢	M	<i>Pleurotus ostreatus</i>
"	3099	50¢	M	<i>Pleurotus ostreatus</i>
6/20/2002	4227	5¢	M	<i>Amanita junquillea</i>
"	4228	15¢	M	<i>Lepiota puellaris</i>
"	4229	45¢	M	<i>Cortinarius cumatilis</i>
"	4230	65¢	M	" <i>Pholliota</i> " <i>adiposa</i>
"	4231	75¢	M	<i>Coprinus comatus</i>
12/15/2005	4551	10¢	M	<i>Clathrus cancellatus</i>
"	4553	30¢	M	<i>Lepiota puellaris</i>
"	4555	75¢	M	<i>Clitocybe infundibuliformis</i>
"	4556 s/s	n/a	MID	<i>Pholiota caperata</i>

The 1988 set consists of seven poisonous or inedible mushrooms, all labeled with scientific names.

The 1989 set of six stamps all show edible fungi. They're all labeled with the scientific names, but each also says "setas comestibles" (edible mushrooms). Note that Scott 3098 and 3099 show two different color forms of *Pleurotus ostreatus*.

The 2002 set of five stamps has a mixture of edible and poisonous fungi. The genus on Scott 4230 is misspelled and should read *Pholiota*. Not shown is Scott 4231a, a sheet of this set with a seal (i.e., nonstamp Cinderella).

All the stamps in the 2005 set are titled "Hongos y Polimitas" (mushrooms and snails), an unusual combination. The complete set is Scott 4551–4556, with half (3) of the stamps showing snails only. Scott 4551 is misidentified and should read *Clathrus archeri*. *Clathrus cancellatus* is a synonym of *C. ruber*, which has a globular netted shape, like a Wiffle ball only with irregular or elongate (rather than round) openings, very different from the species shown on the stamp. The s/s has the snail stamp Scott 4556 on it, but most of it shows *Pholiota caperata* (= *Cortinarius caperatus* = *Rozites caperata*, the Gypsy Mushroom); however, that mushroom is not on a stamp. Thus, if you collected only the six stamps in this set, without the s/s, you would miss out on much of the mycological interest, as four species of fungi are illustrated in the complete set, though only three species are actually shown on the stamps.

Several surrounding Caribbean countries, including many in the Lesser Antilles, have issued beautiful mushroom postage.



Cuba 1988 set.



Cuba 1989 set.



Cuba 2002 set.

Cuba 2005 set, without the souvenir sheet.



Brian S. Luther

“This research is all pointing towards the concept that there might be a few super species of mycorrhizal fungi out there.”

Further studies examining phosphorus limitations in strongly weathered soils are also supporting the concept that there may be a subset of super mycorrhizal fungi with the ability to thrive where other fungi struggle.

However, further research is needed to isolate and identify these super fungi in the laboratory or glasshouses, according to Dr. Teste.

“What we need to do is to see if we can use them for management or other purposes such as restoration.”

Dr. Teste says plants in nutrient rich or fertilized soils do not always need these fungi.

“Plants are doing many different things to cope and survive. Western Australia soils are incredibly interesting and valuable, and can teach us what is happening as soils age and get incredibly impoverished,” he says.

“Plants have figured out how to survive in this type of environment but we are just discovering these tricky strategies now.”

NEW BRUNSWICK R&D STARTUP COMPANY MAKES BLOOD-CLOTTING BIOPOLYMER FROM FUNGUS

James Risdon

<http://nbdaily.com/chitosan/>, Jan. 19, 2016

A Fredericton-based company that makes a biopolymer called chitosan from fungus grown in vats and then sells it to the pharmaceutical and medical device industries is seeing sales ramp up only months after getting \$500,000 in venture capital through the New Brunswick Innovation Foundation [NBIF].

“Over the next couple of years, we will go from four to nine or 10 employees, including sales staff,” Mycodev Group CEO Brennan Sisk told the *NB Daily Star*. “The world market for chitosan is estimated to be \$21 billion in 2015 with medical wound care attributing \$3 billion to that total amount.”

In the bloodstream, chitosan acts as a clotting agent, making it highly sought to help wounds heal. Brennan says the \$100 million medical wound-care industry is the company’s primary target market.

“Chitosan is an extremely effective coagulant that, when combined with other agents, can almost immediately stop bleeding and promote healing in humans,” says NBIF CEO Calvin Milbury. “Although chitosan is already on the market, its traditional production method leaves impurities that can prevent its use in pharmaceutical products.”

Chitosan is traditionally made by extracting it from shrimp and lobster shells. Owing to some unfavorable characteristics, widespread use in humans has not developed, and it is restricted to veterinary applications. Mycodev’s patented process produces chitosan by extracting it from a selected species of fungus which will allow companies to develop products which are safer for human use.

Fetching thousands of dollars per kilogram, chitosan can also be used in applications such as drug delivery, cancer treatment, surgical hemostats, and more.



Brian S. Luther

Cuba 2005, Scott 4556 souvenir sheet with Gypsy Mushrooms in the illustration.

FUNGI AID PLANTS IN SCAVENGING NUTRIENTS FROM ANCIENT SOILS

Jo Fulwood

<http://www.sciencewa.net.au/>

via *MushRumors*, Ore. Myco. Soc., Jan.–Feb. 2016

A super-fungi subset, discovered by scientists in two million year old soils along Western Australia’s coastal plains, may be the key to plant survival in nutrient deficient soils.

Scientists now know the survival of plants in even the most impoverished soils is often based on the coexistence between mycorrhizal fungi and the roots of a plant.

A study at a biodiversity hot spot at Jurien Bay, which boasts some of the oldest sandy soils on the planet, is showing that the fungi exchange the nutrients they get from the soil for carbon that they get from the plant.

The often-microscopic organisms do this by moving through the soils, attaching themselves to plant roots and assisting the plants in scavenging for soil nutrients.

The most interesting finding of the study was that this biodiversity hotspot may host some super-fungi, University of Western Australia root ecologist Francois Teste says.

“These fungi assist plants in tough environments, and while we have known this for some time, what was interesting in this study was that as nutrients became extremely scarce in the older soils, we saw the first indication that the fungi were also struggling, and they started to show signs of stress,” he says.

“Like the plants trying to survive, these important fungi also had to change their behavior to survive, and a small portion of the fungi seemed to be able to cope with the impoverished conditions showing little signs of struggle.

INTRODUCING THE PSMS “SOUP BRIGADE”

Jennifer Karami

At the annual PSMS Fall Mushroom Show, wafts of Thai coconut, miso, and corn chowder draw hungry attendees to the soup table. For the past two years, members of the colloquially nicknamed “Soup Brigade” have been serving batches of homemade soup to PSMS members and guests. The newly formed operation consists of three women with a flair for the culinary arts and about a dozen volunteers.

“First of all, don’t call us a brigade,” Mycophagy Committee Chair Jo Ann Henderson says. “We’re the Mycophagy Committee. Mycophagists are people who [eat and] cook mushrooms.”

For years, cooking demonstrations were a part of the Fall Show, organized by Dennis and Jamie Notman, but there was no way for PSMS to send guests home with a substantial meal. That’s when Jo Ann Henderson, along with Joyce Budisana and Sweta Agrawal, stepped up to form the Mycophagy Committee. Alyssa Panning joined the committee the following year.

In the beginning, the committee faced a daunting challenge: getting approved by the Health Department. Henderson describes the process as involving a lot of paperwork and “crossing T’s and dotting I’s,” both of which she enjoys doing. The first soup sale was scheduled for the 2014 show at Magnuson Park.

“When the inspector came, we were cooking outside in the rain and the elements,” Henderson says. “We passed the inspection, and the soup sale was officially on.”

That day, the soup sold out in less than three hours. Since then, keeping up with demand has been a challenge for the mycophagists.

“We underestimated the time required to clean mushrooms,” Budisana says. “It took five hours to finish cleaning and chopping about 40 pounds of fresh mushrooms. We came back . . . just barely in time for opening day.”

Besides having to jump through bureaucratic hoops and keep up with demand, the committee has to come up with creative, mushroom-oriented soup recipes. PSMS has a cookbook, but many of the recipes show their age. Loaded with butter and MSG, they’re not the healthy type of cooking people have come to expect. Henderson looks for recipes where she can reasonably substitute several types of mushrooms to replace meat, seafood, and poultry.

“I substituted the lobster mushroom into a Thai coconut and seafood recipe,” Henderson says.

“It’s got a tomato base to it. It’s very resonant with garlic, lemon-grass, red chiles, and ginger. The rest of it is texture: you get kind of a chewy-crunchy from the bamboo shoots and a meaty texture from the mushrooms. It really captures the richness of Southeast Asian flavor.”

Panning’s contribution to the show was a vegan Matsutake-miso soup.

“The Matsutake mushrooms give it a distinctive flavor,” Panning says, “It’s pungent, yet sweet and spicy. I put quite a bit of kelp in the soup.”

Next year, the committee is considering expanding to serve not only soup but mushroom-based food of all kinds.

“It’s like an orchestra,” Henderson says. “That’s what we’re doing: orchestrating flavors. You can’t have an orchestra unless every component is playing in harmony. It takes all of us to pull this off.”

THAI WILD MUSHROOM COCONUT CURRY

Adapted from Curry Tomato Soup, *A Taste of Thai* website

1 TBs olive oil	½ lb wild mushrooms, sliced
½ C minced onion	10-oz can bamboo shoots
½ TBs red curry paste	2 TBs brown sugar
1 28-oz. can peeled plum tomatoes	2 TBs fresh lime juice
1 13.5-oz. can coconut milk	2 TBs fresh basil leaves

In a medium saucepan heat oil and sweat onion and wild mushrooms. When most of moisture has evaporated add red curry paste. Cook over a medium heat until onions are soft and curry is dissolved. Blend or process tomatoes until smooth and add to pan with onions and mushrooms. Add coconut milk. Bring to a boil and turn heat down to a simmer. Add sugar, lime juice, and basil. Cook stirring occasionally until flavors are blended, about 10 minutes. Serve with or without rice.

Note: Seafood or chicken can substitute for some or all of the mushrooms.



Election

As in the last two elections, we will **vote online electronically**. This year we will be voting for a Vice-President, a Treasurer, and five Trustees. Please read the following candidate profiles carefully. To vote electronically go to the PSMS website at www.psms.org and click on “membership page” under the heading “Membership.” You will need to log in with your user name and password. If you have forgotten your password, please fill out the section “Forgot your password?” at the bottom of the page and click on “Reset your password.” If you cannot remember your user name, contact Ann at membership@psms.org or Marian at outreach@psms.org. When you successfully log in to the members’ page you will see an icon named “Elections” at the bottom of the page under “My Membership Information.” Click on the

Election

icon and follow the instructions to vote. It will be helpful to have your *Spore Prints* issue with the candidates and bios available to view when voting.

You may only vote once. There are two votes per family membership, but you will each have to use your individual user IDs to vote. Memberships who do not have computers or who have not provided an email address will receive their ballots by mail. These mailed ballots need to be returned in person at the February meeting or mailed to Marian Maxwell at 14269 145th Pl SE, Renton, WA 98059 by February 28. Votes received after that date will not be counted. Election results will be announced at the Annual Meeting/Survivor’s Banquet on Saturday, March 5, 2016.

Election

Daniel Winkler *Vice-President*



Daniel grew up mushroom hunting in Bavaria. A PSMS member since 1996, he is actively involved in the education program. He works on environmental issues of the Tibetan Plateau and also runs MushRoaming LLC, a travel agency specializing in myco-tourism for fungophiles. He is the author of field guides on edible mushrooms in the PNW and California. Daniel travels widely and meets a lot of interesting people whom he hopes to invite to speak at PSMS.

Treasurer **John Goldman**



I would like to continue being the treasurer. I feel a deep responsibility to caring for the business side of our wonderful organization so that we can continue fulfilling our mission to “foster the appreciation of mycology as a hobby and a science and assist related institutions.” I will continue to advocate utilizing more of our funds for grants to support mycology.

Donna Naruo

Trustee

The past two years that I have served as Trustee have been enlightening and rewarding. I’ve enjoyed participating in Mushroom Maynia, our annual fall show, and field trips. The enthusiasm, varied interests, and generosity of our membership make it a pleasure to be part of and I would be honored to serve one more term on your board.



Trustee

James Nowak

James moved to the PNW as a young child and worked as an assistant nuclear test engineer for the US Navy before settling on glass art as a career. Introduced to mushroom hunting early by his Polish parents, he continues to study mycology, lead forays, and conduct classes. He has enjoyed serving on the board and would like to continue to serve for a second term.



Paul Hill

Trustee

I have been in PSMS for about 10 years. I enjoy the field trips and have helped at many annual exhibits, including organizing the new photography exhibit in 2015. I have also led several photography walks in Seattle parks. In 2015 I went from being an alternate board member to a full-fledged member. It has been a great experience, and I’d like to continue.



Trustee

Shannon Adams

Shannon joined PSMS in 2001—carrying her 2 month old on a foray. She has been excited to see the club grow in membership and popularity. Her interest in joining the board is to develop our ability to serve the growing club community, develop more intermediate identifiers, and help members have meaningful involvement in PSMS.



Ann Tarver

Trustee

I joined PSMS in 2014 and have loved how welcoming, helpful, and informative our members are. I have non-profit board experience, including for an organization very similar in spirit to ours. The strengths I would bring are an enjoyment of working with others, excellent communication and problem solving skills, and a sense of humor.



Trustee

Sweta Agrawal

Since joining PSMS in 2013, I have met wonderful people and learned so much. I have tried to return the favor by acting as a field trip guide, volunteering at the show, and serving on the Mycophagy Committee. I would be honored to serve on the board. I am a postdoctoral researcher at UW and am especially fascinated by insect–mushroom interactions!



Alyssa Panning

Trustee

It has been a pleasure hosting and attending field trips, and I’ve made some wonderful friends. Serving on the Mycophagy Committee and making Matsutake miso soup for the annual show was a highlight of the year. I want to bring more young people to PSMS and show everyone how fun the world of fungi can be! Thank you for your support.



POWDERY MILDEW ATTACKS ARTIFICIAL GRAIN THANKS TO AN EVOLUTIONARY TRICK

Univ. of Zürich, Jan. 12, 2016

Triticale is an artificial grain stemming from a cross between wheat and rye. Cultivated in many places as a feed grain since the 1960s, triticale had proved very resistant to attack by powdery mildew [*Blumeria graminis*], which can reduce a wheat crop by up to 45%. But triticale fields were infected for the first time in 2001, and mildew is now being reported in many triticale growing regions in Europe.

Researchers from the University of Zürich have now examined how the mildew managed to spread to triticale. To do this, they collected samples from infected grain fields all over Europe and examined the genetic information of different forms of mildew. The genetic material (genome) of the pathogens that attack triticale, rye, and wheat were then compared using bioinformatics. The comparisons showed that the new triticale fungus is a hybrid of the variants specialized in wheat and rye: 12.5% of the genome is identical to DNA sequences from the form specialized in rye, while 87.5% stems from the form specialized in wheat.

This means that a hybrid from two mildew variants specialized in two different host plants can infect the cross between those two host plants. The study thus shows the manner in which mildew adapts to new host plants in a co-evolutionary way and can break down their resistance. The study also reveals that this recent evolutionary event was not a one-off occurrence. Around

10,000 years ago, mildew overcame the resistance of bread wheat, which was relatively new at the time, in the same way. “These results are of major significance for treating and preventing plant diseases. The more we know about the evolutionary mechanisms of mildew, the better we can keep new cultivated plants resistant to the pathogens,” explains Thomas Wicker from the Institute of Plant Biology at the University of Zürich.

KUDOS TO RON POST

Agnes Sieger
Spore Prints editor

I wish to extend a hearty thanks to past PSMS President Ron Post, our backup *Spore Prints* editor, who was responsible for doing the December and January issues. Without him, there would be no newsletter when we are gone.



Ron Post and friend.

All this despite several disadvantages—he must find the time to do the newsletter despite working two jobs; he has to deal with InDesign, my complicated layout program with which he gets practice only once or twice a year; his old computer does not support PhotoShop, so he has to go to the local library to tweak the *Spore Prints* photos or change them from color for the Web issue to black and white for the printed issue.

That’s what I call true dedication. Kudus to you, Ron!

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