

SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY
Number 499 February 2014



A DEADLY RUSSULA

Ben Hoffman

Cornell Mushroom Blog, Dec. 2013
via *The Spore Print*, LA Myco. Soc., Jan. 2014

An entertaining way to confirm a mushroom is a *Russula* is to throw it at something (a tree, the ground, a friend) and watch for its explosion into little pieces. This is satisfying because it confirms the brittle nature of the mushroom while at the same time reducing the risk that you will attempt to identify it, a process sure to end in tears. Michael Kuo (of mushroomexpert.com) feels that advanced *Russula* identification “is a joke” with species distinctions frequently based on subtle, arbitrary, and highly variable differences. It’s always good to be able to identify mushrooms to avoid eating toxic species, but with *Russulas*, so far, this is quite a challenge. Luckily most *Russula* species aren’t harmful beyond a stomachache; however, one of a few toxic exceptions is the deadly *Russula subnigricans*.

Russula subnigricans is a mushroom first found in Japan in 1955. Since then, it has also been found in China and Taiwan and has sometimes been reported in the Southeastern US. It is one of the blushing *Russulas*; once broken, its tissues slowly bruise red. Two photos of this species are shown here. The first appeared in a book coauthored by the very mycologist (T. Hongo) who first described it). They don’t look very similar to me—the cap colors and gills appear very different. This demonstrates the variability of *Russulas* even within a species, or perhaps differences in opinion between experts due to the difficulty of identification. Scientists aren’t the only ones



Masana Izawa and Nakahiko Mizuno

Russula subnigricans.¹

struggling with *Russula* identification; many people have misidentified this species and eaten it. One study reports that it caused a quarter of the 852 mushroom poisonings in the past 18 years in Southern China. Half the people who ate it died!



Russula subnigricans.²

The horrible thing about *R. subnigricans* is that it causes rhabdomyolysis, or the breakdown of muscle tissue. This is a painful process that can lead to kidney failure. Rhabdomyolysis can also be induced by physical damage to muscle tissue or abuse of drugs like cocaine. In *R. subnigricans*, the toxin that causes rhabdomyolysis is cycloprop-2-ene carboxylic acid—discovered in 2009. Earlier studies found toxins dubbed russuphelins, but it was later questioned whether the researchers had identified their toxic mushroom correctly (darn you *Russulas*!). The reason it has taken so long to identify the real toxin is that it’s unstable, making its isolation and detection difficult; it is also not directly toxic to cells, further

complicating experiments. Although the exact mechanism is not understood, the toxin appears to trigger a cascade of reactions in the body, resulting in widespread breakdown of muscle. If the muscles in your heart or your diaphragm get broken down, you’re in trouble as your heart may stop or you may stop breathing. After muscle tissue is broken down, massive amounts of one of its chemical components (myoglobin) are carried to the kidneys. In high enough doses, this causes kidney failure. In terms of toxicity, 2.5 mg/kg of dried mushroom kills mice. If humans are like mice, then two or three mushrooms can kill a person.

Symptoms usually begin 30 minutes to 2 hours after ingestion and include nausea, vomiting, diarrhea, and abdominal pain. These are common, non-specific symptoms of mushroom poisoning. However, within 6–12 hours victims also have general muscle pain, speech impairment, convulsions, pupil contraction, stiff shoulders, backaches, trouble breathing, and myoglobinuria, which turns their urine red and contributes to kidney failure. Most deaths occur 12 to 24 hours after ingestion.

Treatment for rhabdomyolysis in the case of mushroom poisoning is mainly supportive—there is no specific antidote. The victim is kept hydrated and dialysis may be performed in an attempt to prevent kidney failure. The main factors dictating survival are how much mushroom was consumed and how soon after ingestion treatment begins.

A few other mushrooms are known to cause rhabdomyolysis, including *Tricholoma equestre* (the Man on Horseback). It is globally widespread and was a treasured “edible” mushroom—at least until scientists discovered it caused rhabdomyolysis. A 2001 study examined the 12 cases of delayed rhabdomyolysis in France from 1992–2001. The victims experienced symptoms 24–72 hours after the last meal of *T. equestre*. Of the 12 patients, three died. To confirm *T. equestre* was the culprit, the authors experimented with mushroom extract on mice and determined it was indeed the cause. The specific compound causing rhabdomyolysis was not determined, but this mushroom is no longer invited to dinner. Now it reminds us to be humble, as there are many things we don’t know about this species yet, and furthermore about over 90% of fungi.

These deadly mushrooms serve as a reminder to respect mushrooms and correctly identify them before eating them. Mushrooms can do some pretty crazy, complicated stuff and make some weird molecules we don’t understand. Even familiar mushrooms like *T. equestre* that we thought were safe sometimes turn out not to be. Although we now know the toxic component of *R. subnigricans*, we are still only beginning to understand its effects. With this in mind, if you find a *Russula*, you might as well throw it at a tree and enjoy the show.

1. Rokuya Imazeki, Yoshio Otani, and Tsuguo Hongo. 1988. *Fungi of Japan (Nihon no Kinoko)*. Yama-Kei Publishers, Japan.

2. Chen Zuohong, Zhang Ping, Zhang Zhiguang. 2013. Investigation and analysis of 102 mushroom poisoning cases in Southern China from 1994 to 2012. *Fungal Diversity*, Springer-Verlag. ISSN (Online) 1878-9129.

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MEMBERSHIP MEETING

Tuesday, February 11, 2014, at 7:30 pm at the Center for Urban Horticulture, 3501 NE 41st Street, Seattle.

This month, **Dr. Denis Benjamin** will speak to us on "The Art and Science of Mycophagy." Collecting and eating "wild" mushrooms is part of contemporary foraging and culinary chic. However lore and urban legends still surround the edibility, nutritional value, and best ways to preserve and cook mushrooms. Denis will demystify the issues of mushroom edibility and cookery and will clarify and describe ways to enjoy the bounty of field and forest.



Dr. Denis Benjamin

For those who don't know Denis, he is a retired physician, long-time PSMS member, and self-professed curmudgeon. As a second career, he is now in demand as a speaker on the fungus foray circuit and to mushroom clubs. He grew up in South Africa and, as a young physician, found himself in the Pacific Northwest in 1970. He soon became interested in mycology and joined PSMS. He practiced pediatric pathology at children's hospitals in Seattle and Fort Worth, Texas, and after retirement returned to Cle Elum to continue his passion for mushrooms, the outdoors, and natural history. He was a consultant to the regional poison control center, a former member of the PSMS Board of Trustees, and a past Chairman of the Toxicology Committee of NAMA. In addition to his nearly 100 professional publications, he also contributes to the lay literature and mushroom publications such as *Fungi*. He authored the landmark book *Mushrooms: Poisons and Panaceas* on the health effects of mushrooms, and authored a personal collection of anecdotes, lessons learned, and foraging essays in *Musings of a Mushroom Hunter: a Natural History of Foraging*.

Will all persons with last names beginning with the letters L to Z please bring a snack or treat to share.

CALENDAR

- Feb. 11 Membership Meeting, 7:30 pm, CUH
- Feb. 18 Board Meeting, 7:30 pm, CUH Board Room
- Feb. 18 *Spore Prints* deadline
- Mar. 23 Annual Membership Meeting & Survivors' Banquet, Kaspars Seafood Bar & Grill, 5:30 pm

BOARD NEWS

Marian Maxwell

The budget for the upcoming NAMA Foray in October is done and has been submitted to NAMA for approval. The Board voted to have the Survivors' Banquet at Kaspars Special Events & Catering on Sunday, March 23, at 5:30 pm. Monday night public mushroom ID clinics at the Center for Urban Horticulture will start April 21 and will be from 4-7 pm. The slate for the PSMS elections was reviewed. Nine people are running for five board positions. We will also elect a Vice-President and Treasurer. Voting will be done online on our website, with the exception of those who do not have computers and will require mailed ballots. Dispersal of a \$2000 Ben Woo Scholarship to Christian Schwarz was approved for an herbarium sequencing project. Most of the funding will be provided by the Fungus Federal of Santa Cruz. They will provide a receipt for the donation, will be keeping funds for the project separate, and will provide updates on the financial expenditures.

*Fungi emerging
Ephemeral things
Making us wonder*

PINK SNOW MOLD

Brian S. Luther

Pink Snow Mold is a plant pathogen that grows mostly on living blades of grass and turf directly under snow where the temperature is tempered by the snow cover. It's also common in extended wet falls under leaves that have fallen. It attacks most grasses, including food grain crops, and has been known to cause extensive damage to winter wheat crops in the Palouse region of Washington State (Sprague, 1950). With snow melt in late winter or early spring, this fungus suddenly becomes visible as pale creamy or pinkish masses, hence the common name. Because it's the first fungus to show itself as the snow melts in February on the compacted grass in the open fields by my home on Eagle Creek (Chelan Co., WA), I thought I'd discuss it at this time.

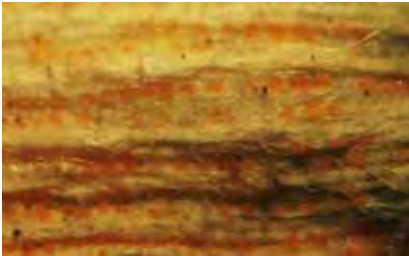
The asexual or anamorphic (hypha/conidiospore forming) stage of this mold is called *Microdochium nivale*. This anamorphic form (formerly called the "imperfect" stage) was previously placed in the genus *Fusarium* and other genera as well. The macroconidia (asexual spores) of the anamorphic stage form in tiny, brightly colored sporodochia. These conidia are 15-24 x 2.5-3 µm, fusiform-falcate (tapered to both ends and sickle shaped), hyaline, unornamented, and can have none to three septa. (Gilman, 1957, says they can have up to seven septa.) The septa can be faint and are best seen using a cell-wall stain such as Congo Red.

Photomicrograph of macroconidia of *Microdochium nivale*, 1000×, 3% ammonium hydroxide and Phloxine.



Brian S. Luther

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Bright orange sporodochia (conidia bearing structures) of Pink Snow Mold on grass blade - 40× dissecting microscope.

The sexual or teleomorphic (perithecia/ascospore forming) stage that forms later is called *Monographella nivalis*. One of the older names for this teleomorphic stage is *Calonectria graminicola* (Dickson, 1947; Sprague, 1950). My photos all show the anamorphic stage.

The matted patches produced by this mold can be a few square inches to several square feet or even square yards in extent and are usually a distinctive creamy pinkish color. Even though common and widespread, this mold is often overlooked and people don't realize that it causes a grass disease. When it does get noticed, usually because of obvious unattractive patches on turf, it becomes a cause for concern. This is especially the case on manicured lawns and golf greens where the distinctive areas of whitish or pinkish growth are unsightly on an otherwise unblemished green background.

Brian S. Luther



Several square feet of Pink Snow Mold in field.

A major factor in its development and spread on turf grass appears to be the late summer use of nitrogen fertilizers (Dickson, 1947). Although growing primarily on living grass, it also grows on blades of dead grass from the previous year. It's common here in the Pacific Northwest but is more of a problem in the Mid-West and East, where the winters are colder and longer and the snow pack lingers. According to Dickson (1947) this fungus is particularly a problem in areas where the snowfall is heavy and the soil temperatures are mild.

Brian S. Luther



Close up of Pink Snow Mold showing both parasitized and unparasitized grass blades from the previous year.

There's a wealth of information online concerning this fungus, especially as it relates to maintaining healthy lawns and turf. A lot of the information presented on Pink Snow Mold deals with measures to prevent it and effective fungicides to combat it. It's an unwelcome infestation, and what home owners really care about the most is controlling its spread for appearance.

Sprague (1950) actually has a lot to say about Pink Snow Mold in Washington State, because he was a plant pathologist with the Agricultural Experiment Station at what used to be The State College of Washington and his office was based in Wenatchee.

From my experience the fungus is commonly on both *Secale cereale* (cultivated Rye) and our native *Bromus inermis* in the fields at Eagle Creek.

Good descriptions of this species are given by Dickson (1947), Sprague (1950), and Gilman (1957). Spore illustrations are provided by Toussoun & Nelson (1976) under the genus *Fusarium*.

According to DNA studies by Duong et al. (2006), this fungus belongs in the order Xylariales, in the Division/Phylum Ascomycota (formerly Ascomycetes).

You might be interested in reading about another pink mold from the Pacific Northwest that I discussed in an earlier article (Luther, 2010).

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MUSHROOM STAMPS FROM FINLAND

Brian S. Luther

If Finnish stamps say Suomi on them, they're from Finland. If they say Åland, then they're from the province of Finland with that name. In addition to known fungus-illustrated stamps from this Nordic country, I'm delighted to be bringing to your attention two stamp issues showing fungi that I've recently discovered while studying Finnish stamps.

All catalog numbers are from the Scott Postage Stamp Catalogues. M = mushrooms or fungi as the main illustration; MID = mushrooms or fungi in the design of the illustration, background, or border but not the primary illustration. FDC = first day cover. This is an envelope with the stamps on it that has been canceled on the first day of issue; usually the envelope has a colorful or interesting illustration (cachet) of the same theme.

Finland

Cat. No.	Date	Value	Type	Species
B200	9/24/74	0.35 + 0.05	M	<i>Gyromitra esculenta</i>
B201	"	0.50 + 0.10	"	<i>Cantharellus cibarius</i>
B202	"	0.60 + 0.15	"	<i>Boletus edulis</i>
B215	9/13/78	0.50 + 0.10	"	<i>Lactarius deterrimus</i>
B216	"	0.80 + 0.15	"	<i>Macrolepiota procera</i>
B217	"	1.00 + 0.20	"	<i>Rozites caperata</i>
B221	4/19/80	0.60 + 0.10	"	<i>Lactarius torminosus</i>
B222	"	0.90 + 0.15	"	<i>Leccinum versipelle</i>
B223	"	1.10 + 0.20	"	<i>Russula paludosa</i>



Scott B200–B202.



Scott B215–B217.



Scott B221–B223.

These three sets are of official Finnish postage, but are called *semi-postals* in the Scott Postage Stamp Catalogues because

they're not just regular postage but were specifically issued to help support a particular cause, in this case the Finnish Red Cross. The FDCs for these stamps have either a round-cornered square, a circle, or a fish cancel mark.

Cat. No.	Date	Value	Type	Species
634 (663)	1979–1982	1.60	MID	<i>Pholiota sp.</i> (possibly)



Scott 634 (663).

This stamp commemorates Multiharju Forest in Seitsemien National Park. Under magnification I count 19 or 20 mushrooms high up on a conifer tree trunk. They appear to be a species in the genus *Pholiota*, but this can't be determined with certainty. The 2011 Scott Postage Stamp Catalogue lists this stamp as No. 634, but the exact date of issue is not specified; in fact, the year is also unclear, which is highly unusual. Gerlinger (1991) lists this stamp as Scott No. 663 and gives the date of issue as February 8, 1982. Weber

(1983–1994) lists the same issue date. McKenzie (1997) gives the issue year as 1981 (but no date). Gimeno (2000–1) also lists it as Scott 663 issued February 8, 1982. However, the 2011 Scott Catalogue does not even register a number 663 from Finland (it goes from 662 to 664), so this matter remains unsettled.

Cat. No.	Date	Value	Type	Species
896	10/5/92	2.10	MID	<i>Leccinum</i> or <i>Boletus sp.</i>



Scott 896.

I found fungi on this stamp and on the following stamp (1315a) although neither are mentioned in any mycophilatelic catalogs. Scott 896 depicts children's art—a painting—but also has four boletes on the ground near a Birch tree, presumably mycorrhizal with it. The stamp also has 1917 printed

directly above 1993 in small numerals, indicating something took place between these dates, but the significance of this is not noted on the stamp or explained in the Scott Catalogue.

Cat. No.	Date	Value	Type	Subject
1315a	5/9/2008	1 LK KL	M	Melting mushrooms



Scott 1315a.

This stamp shows psychedelic art (according to the Scott Catalogue) and has two stylized melting mushrooms along with teardrops. It's one of five stamps I discovered in an air balloon celebration booklet.

Finland—Åland Islands

The Åland Islands are a semi-autonomous province of Finland comprising over 6,000 separate islands located between Sweden and Finland. Earlier in history this was Swedish territory and most of the residents speak Swedish, but the land was awarded to Finland in 1921.

Cat. No.	Date	Value	Type	Species
194	1/2/2003	€0.10	M	<i>Cantharellus cibarius</i>
197	"	0.50	"	<i>Boletus edulis</i>
200	"	2.50	"	<i>Chlorophyllum procera</i>



Scott 194, 197, 200.

These three stamps are not labeled with scientific names, so I've provided them. FDCs were issued for this set, with the cachet showing a full mushroom basket on the left and having either a Chanterelle or a Boletus cancel. Postcards (maxi-cards) were also issued showing photographs of the same species, with the stamps having a Boletus first day cancel as well.



FDC for Scott set 194, 197, 200.

Please refer to Luther (2012, 2013) for other stamps showing mushrooms that I've recently discovered.

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PRESIDENT'S MESSAGE

Marian Maxwell

We are excited to be having our PSMS election this month and to be voting online for the first time! You will need to review the members' biographies in this issue of the *Spore Prints*. Please follow the directions for voting at the top of the biographies. We had a great response this year and have 9 PSMS members running for Board of Trustee positions, one person for Vice-President, and one person for Treasurer. A BIG thank-you to our Nominating Committee—Milton Tam, Jon Hall, Luise Asif, and Brenda Fong—for a job well done!

Debra Lehrberger has stepped down from the Board of Trustees and Brady Raymond has stepped forward to fill her position for the remaining 3 months. Thank you for your many years of service on the board and as field trip host coordinator as well as volunteer coordinator for the show, Debra! You did an amazing job!

Planning for the NAMA Foray of 2014 is going well. This foray will be from October 7 or 9 through October 12. Since the traditional PSMS show would be on the heels of this foray and would be a considerable amount of work for the same people who are working on that, the board has voted to do something different in our 50th Anniversary year. Instead of our traditional show, where PSMS members volunteering for the show work hard and many don't get much of a chance to participate in the fun aspects of the show, we will be having a more fluid social event for PSMS members only. The idea is to celebrate our membership by allowing members to attend scheduled lectures and socialize. We have not decided on the final details of this event but will be working on it in the coming months. I am personally excited about doing something different this year that would encourage members to meet others in our group and be able to participate together in a one day event on the weekend of October 25–26. I believe this will help us all to get to know one another better as we move forward after our 50th anniversary year. We will then return to hosting our regular PSMS show in 2015.

Last year the Daniel Stuntz Foundation, PSMS, and the Burke Museum mutually agreed that the 2013 Mushroom Maynia would be our last. We may partner together in the future to host a guest speaker.

As always, if you have any questions or concerns please feel free to contact me at president@psms.org.

OUR CULINARY DEBT TO THE FUNGI

Maggie Iadanza

Ore. Myco. Soc. *MushRumors*
via Boston Myco. Club *Bulletin*, Dec. 2013

• *Edible Fruiting Bodies* - Wild or cultivated, we love 'em just as they are (well-cooked, naturally) or in a variety of yummy dishes.

• *Breads* - We are all familiar with breads leavened with yeast (*Saccharomyces cerevisiae*) that consumes simple sugars and excretes carbon dioxide and alcohol to develop the gluten, giving bread its texture and flavor.

• *Cheeses* - Think of the blue cheeses: Camembert, Roquefort, Gorgonzola (*Penicillium roqueforti* and *Penicillium glaucum*). Don't forget Brie with its rind of off-white mold (*Penicillium candidum*, *Penicillium camemberti*, or *Brevibacterium linens*).

cont. on page 6

Culinary Debt to Fungi, cont. from page 5

- *Sauces* - Both soy sauce and miso require the use of *Aspergillus oryzae* which ferments to produce the final product.
- *Tempeh* - Tempeh usually begins with whole soybeans, which are soaked, dehulled, and cooked. A fermentation starter containing spores of the fungus *Rhizopus oligosporus* is mixed in, and the beans are allowed to ferment. In good tempeh, the beans are knitted together by a mat of white mycelium.
- *Quorn* - Quorn is a brand of mycoprotein extracted from the fungus *Fusarium ueneni*. Glucose is added as a food for the fungus, as are vitamins and minerals to improve the food value of the meat substitute.
- *Corn Smut* - A delicacy in Mexico, where it is known as huitlacoche, corn infected by *Ustilago maydis* has kernels with large, distorted tumors similar to mushrooms.
- *Chocolate* - *Candida krusei*, *Geotrichum*, and *Acaulospora scrobiculaia* are three fungi needed for making chocolate. Cacao beans must be fermented (partially decayed), to remove the bitter taste and break down the beans. Tom Volk has a detailed explanation of how fungi are necessary for both the growth of the cacao tree and the manufacture of chocolate.
- *Beverages* - Last but not least, fungi are used to ferment beverages, e.g., *Aspergillus niger* is used to ferment sugars into citric acid, which is used in many soft drinks. In both beer or wine, yeasts such as *Saccharomyces cerevisiae* are grown in a source of sugars (the grain or grapes) in the absence of oxygen; the lack of oxygen forces yeasts to switch to fermentation and they convert the sugars to ethanol.

OREGON MUSHROOM PICKER OK AFTER SPENDING NIGHT IN WOODS

The Register-Guard, Jan. 22, 2014

DORENA - A Dorena woman who didn't return home as expected on Monday after a mushroom picking trip finally found her way out of the woods on Tuesday evening, Lane County sheriff's officials said.

Relatives of Marion Mae Foley, 52, reported her missing on Tuesday morning. Foley had been picking mushrooms with her son in the Wicks Road area of Dorena on Monday when she decided to return home and became disoriented and lost in the woods, sheriff's officials said.

Family members didn't realize that she hadn't reached home until Tuesday. A search and rescue team spent Tuesday afternoon looking for Foley, but learned at 6:30 pm that she had walked out of the woods nearly 12 miles from where she was believed to have been, officials said.

Foley was tired and thirsty after spending the night in the forest, but was otherwise in good condition, officials said.

Sheriff's officials advise people who go on outings in the woods to prepare themselves for the elements and carry a survival pack.

*You'll have lots of fun at board meetings
With the feudin' and fussin' and fumin'.
You may not learn much
About fungus and such,
But, boy, what you'll learn about humans.*

—Ralph Nolan

Election

Election

Election

This year we will be **voting electronically online** 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." 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 president@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 icon and follow the instructions to vote. 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.

Members who do not have computers or have not provided email addresses will receive their ballots by mail. Please return your ballots to Milton Tam, 7501-21st Avenue NE, Seattle, WA 98115 by March 16. Votes received after that date will not be counted.

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



As the current PSMS Treasurer I really enjoy the position. I'm dedicated to keeping our finances in order, keeping our expenses low and our income healthy so that we can fulfill our mission to promote mycology to the membership and the public. We have grown greatly in the past few years, which brings more responsibility and accountability. I appreciate your ongoing confidence and would like to be re-elected.

Larry Lee

PSMS was a remarkable discovery for our family. We have made wonderful friends, plan our spring and fall around field trips, and scan the ground more often than the sky. I have participated in the Bioblitz and voucher program, taken ID classes, and worked the Children's booth and Security for the Show. I will be a strong advocate for field trips.



Danny Miller

A member of PSMS since 2007, Danny has served on the board in the past and hopes to continue. As club Librarian, he uploaded all of PSMS's collections into a reservation-and-check-out system on our website. He is Education Chair and serves on the ID Committee. He is also a co-author of the free PNW mushroom identification program MatchMaker.



Shannon Adams

Shannon has been fascinated by NW fungi since moving here from South Africa (via Australia). She enjoys foraging for mushrooms to eat, paint, draw, use for dye, and identify. Shannon has two school-age boys and is interested in facilitating club outreach to schools. She has just bought her first microscope!



Jeff Stallman

I am a four-year member and life-long outdoor lover who has happily volunteered to help at PSMS activities such as the Meany Weekend and the annual show. I have enjoyed learning more about fungi and getting to know members. I look forward to helping on the board so others enjoy PSMS.



James Nowak

James moved to the PNW as a young child. Graduating from the UW in 1980 with a B.S.M.E., he worked as an assistant nuclear test engineer for the US Navy before settling on glass art as a career. He was introduced to mushroom hunting early owing to his Polish parents' obsession with fungi. He continues to study mycology, leads forays, and conducts cultivation classes and seminars.



James Ardena

During the past year with PSMS, I have met so many wonderful and amazing people. In the coming year I look forward to hosting a field trip, developing confidence to lead newer members in search of their first chanterelles, cultivating more mushrooms, and supporting a great community. Please help me in this endeavor, Thank You!



Michael Hilliard

I joined PSMS in 2011. As a creative director/commercial photographer for 25+ years I'd like to put my communication and outreach skills to use for our organization while expanding my mycological experience and enjoying time with like-minded people. I would love an opportunity to serve on the board.



Donna Naruo

My interest in wild mushrooms was sparked in childhood when a package of Matsutake arrived from my Seattle cousins. In the 3 years I have been a member, I have learned a great deal. PSMS has much to offer mushroomers from beginners to veterans, and I would like to contribute to the process.



Nick Herschberger

I am a graduate student at the School of Environmental and Forest Sciences, University of Washington. My research focuses on fungal symbiosis in plants. When I joined the PSMS just over a year ago, by chance, by luck, or by fate, I filled a vacant spot on the board. It has truly been a privilege to work as a steward for this club and I hope to continue to be allowed to lend my insights.



FUNGI PLAY A CRUCIAL ROLE IN POLICING BIODIVERSITY IN RAINFORESTS

phys.org, Feb. 22, 2014

Research led by Oxford University has found that fungi regulate diversity in rainforests by making dominant species victims of their own success. Fungi spread quickly between closely packed plants of the same species, preventing them from dominating and enabling a wider range of species to flourish.

“In the plant world, close relatives make bad neighbors,” said Dr. Owen Lewis of Oxford University’s Department of Zoology, who led the study. “Seedlings growing near plants of the same species are more likely to die and we now know why. It has long been suspected that something in the soil is responsible, and we’ve now shown that fungi play a crucial role. It’s astonishing to see microscopic fungi having such a profound effect on entire rainforests.

“Fungi prevent any single species from dominating rainforests as they spread more easily between plants and seedlings of the same species. If lots of plants from one species grow in the same place, fungi quickly cut their population down to size, leveling the playing field to give rarer species a fighting chance. Plots sprayed with fungicide soon become dominated by a few species at the expense of many others, leading to a marked drop in diversity.”

The study, published in *Nature*, looked at seedling plots across 36 sampling stations in the Chiquibul Forest Reserve, Belize. It was carried out by scientists at Oxford University and Sheffield University and funded by the Natural Environment Research Council.

Researchers sprayed plots with water, insecticide, or fungicide every week for 17 months. They found that the fungicide Amistar® reduced the effective number of species by 16%. While the insecticide did change the composition of surviving species, it did not have an overall impact on diversity.

“We expected that removal of both fungi and insects would have an effect on the tree species,” said Professor Rob Freckleton of Sheffield University, who co-led the study. “However what was unexpected was that removal of the fungi affected diversity, but eliminating insects didn’t. Ours is the first study to unpick the effects of the different natural enemies.”

CREW USES MUSHROOMS TO CLEAN UP POLLUTED OREGON CREEK

Anthony Rimel

Corvallis Gazette-Times, Jan. 22, 2014

An environmental group is attempting to clean the waters in Corvallis’ Sequoia Creek, and potentially the Willamette River beyond it, using an unusual tool—mushrooms. The process used by volunteers with the Ocean Blue Project, an ecological restoration nonprofit, is to put mushroom spawn and a mixture of coffee grounds and straw in burlap bags that the mushrooms can grow in and then place the bags so that water entering storm drains will filter through them. The technique is attempting to take advantage of the natural ability of mycelium—the underground part of fungi—to break down toxins like oil and pesticides and metabolize harmful bacteria like *E. coli*.

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