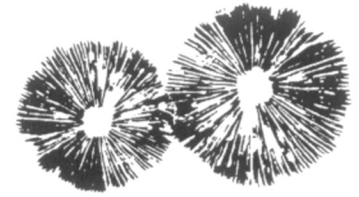


SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY
Number 454 September 2009



46TH ANNUAL WILD MUSHROOM EXHIBIT

Kim Traverse

The Puget Sound Mycological Society will present our 46th Annual Wild Mushroom Show on Saturday, October 17, and Sunday, October 18, at The University of Washington's Center for Urban Horticulture.

As long as the Society has existed, we have been sharing with the public the amazing Kingdom of Fungi. This year will be another opportunity for members to help spread the word about one of the most important natural wonders on this planet. Volunteering for this event benefits PSMS, the larger public, science, and—since it's about the most fun we have all year—every member who helps out.

At the membership meeting, Tuesday, September 8, we will have sign-up sheets for the various committees that make the show happen. Please attend and SIGN UP! This year we will also be having our second Art Show of Everything Fungal. If you are an artist in any media and you portray mushrooms, please visit our website for details and to download the application form.

For more information, please feel free to contact Show Chair Kim Traverse at traverse.kim@gmail.com (206) 380-3222.



TOXIC FUNGAL TRIANGLE

David Bradley

Abridged from Spectroscopynow.com
via *Fungifama*, So. Vancouver Is. Myco. Soc., June 2009

Proton NMR spectroscopy has been used to identify the lethal toxic culprit in a spate of recent food poisoning incidents among Japanese people eating mushrooms including the species *Russula subnigricans*. The compound, cycloprop-2-ene carboxylic acid, is well known to organic chemists as containing a highly strained, and so highly reactive, cyclopropene ring.

Russula subnigricans is a basidiomycete mushroom found in Asia named by Japanese mycologist Tsuguo Hongo in 1955 and shares characteristics of the North American fungus *R. eccentrica*. Ingestion of the mushroom has in recent years led to a spate of mushroom poisonings in Japan and elsewhere. Initial symptoms include nausea and diarrhea, which can start within half an hour of eating the toxic mushrooms. Speech impairment, convulsions, pupil contraction, stiff shoulders, and backache have also presented. However, it is the presence of myoglobin in urine that is the most worrying symptom.

The mushroom apparently causes rhabdomyolysis, the breakdown of muscle fibers, which releases myoglobin into the bloodstream. Myoglobin is a globular protein and has to be filtered out by the kidneys, but it can cause blockages, kidney failure, and fluid build up leading to shock, heart failure, and in extreme cases death.

The potential toxicity of these mushrooms has been known in Japan since 1954, and Japanese researchers have previously isolated and identified several physiologically active agents in *R. subnigricans*. Russuphelin A was identified as a cytotoxic compound in 1992. Cycloprop-2-ene carboxylic acid is fairly well known to synthetic organic chemists but has never before been observed in a biological system. Laboratory tests, however, showed that the compound causes the same severe symptoms as rhabdomyolysis in mushroom poisoning. "This compound is responsible for fatal rhabdomyolysis, a new type of mushroom poisoning that is indicated by an increase in serum creatine phosphokinase activity in mice," the team explains.

The researchers explain that the toxin causes severe rhabdomyolysis, not by direct interaction with muscle cells but probably by acting as a trigger for some other biochemical reaction. They suggest that their discovery will allow biomedical researchers to determine precisely how these and other mushrooms such as *Tricholoma equestre*, which has killed people in France and Poland, cause fatalities and perhaps develop an antidote to the toxin.



Russula subnigricans

DON'T PICK IN THE PARK

Agnes Sieger

Boy is my face red. Several people landed on me for the article on urban edibles in the June newsletter. The most embarrassing part is that they're absolutely right. Most of the incidents I described happened years ago, and as Joy Spurr pointed out, "Times have changed."

Urban scroungers are no longer a small, relatively harmless minority. As a result, many public institutions have established rules against harming or removing any flora, including fungi.

These days, collecting any kind of plant in city parks is not allowed. This is particularly true (and has always been true) for the Washington Park Arboretum, which is an educational facility charged with collecting, maintaining, and protecting plants accrued from all over the world.

In short, you have about as much chance of legally picking in a park as you have of taking the tram out to Green Lake and picking matsutake, as charter member Elsie Burkman remembered doing when she was young.

The point is still valid that edible mushrooms can be found all over town. That doesn't, however, mean that you necessarily have a right to pick them.

Spore Prints

is published monthly, September through June by the

PUGET SOUND MYCOLOGICAL SOCIETY

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CALENDAR

- Sept. 8* Membership Meeting, 7:30 p.m., CUH
- Sept. 14 Board Meeting, 7:30 p.m., CUH
- Sept. 22 *Spore Prints* deadline
- Sept. 24 Start of first session of Beginner I.D. classes,
Douglas Classroom, CUH
- Sept. 26 Field Trip, Soda Springs Campground
- Oct. 10 Field Trip, Bowman Bay, Deception Pass State
Park
- Oct. 17–18 46th annual PSMS Wild Mushroom Exhibit, CUH

*Not Wed., Sept. 9, as shown in the 2009 PSMS mushroom calendar.

BOARD NOTES, AUGUST

Ron Post

In response to a solicitation by CUH (due to recent budget cuts at the UW) the board voted to contribute \$200 to the director's discretionary fund. Two, four-week sessions of beginner mushroom I.D. classes will be held in the Douglas Classroom at CUH on Thursday evenings from Sept. 24–Oct. 15 and from Oct. 22–Nov. 12. A special field trip is being added to the fall schedule for the benefit of Nisei war veterans. An election committee is being formed to nominate PSMS candidates for 2010–2012. Copies of the new field guide *Mushrooms of the Pacific Northwest* by Steve Trudell and Joe Ammirati are now on hand for sale. The speakers for the fall exhibit will be Langdon Cook and Britt Bunyard. The PSMS roster is online; the password will be changed in September and again in January and noted as usual in *Spore Prints* [see block at top of this page].

MEMBERSHIP MEETING

Tuesday, September 8, 2009, at 7:30 p.m. at the Center for Urban Horticulture, 3501 NE 41st Street, Seattle.

Our guest speaker this month will be Langdon Cook. Langdon lives in Seattle where he writes his popular blog *Fat of the Land* (<http://fat-of-the-land.blogspot.com>), which has been acclaimed as the best local foods blog by *The Weekly*. Complete with recipes and mouth watering pictures, the blog explores the enjoyment of wild food, foraging, and the outdoors. His weekly blog postings are devoted to a local ingredient that he researches, locates, photographs, and cooks with, finding unexpected uses for unexpected foods. He has authored a companion book to his blog, *Fat of the Land: Adventures of a 21st Century Forager*, which is just out this fall. It describes his adventures foraging in and around Puget Sound and the Pacific Northwest. Langdon is a former senior editor at Amazon.com. Since leaving the corporate world he has kept himself busy discovering how to live off the land, writing about wild foods for *Gray's Sporting Journal* and *Outside*, and blogging. He has also been profiled in *Bon Appetit*.



FALL FIELD TRIPS

Brian Luther



An evening or late afternoon potluck meal is planned for all of the fall field trips. Please bring an edible contribution, along with wine or beer, for this culinary social, which is an important part of the field trips. Potluck time varies from 3:00 to 5:00 p.m., but will be listed on the field trip sign-in sheet. The later it gets in the season, the earlier the potluck will be.

PSMS has always had a tradition of greeting members and providing hot coffee and goodies in the morning at field trips. *Please volunteer to be a field trip host.*

I hope you enjoy the selection of field trips we've organized this fall and I look forward to seeing you.

Sept. 26

Soda Springs Campground
Yakima Co., elev. 3200 ft
~125 miles from Seattle

Directions: Take your favorite route to Enumclaw on Hwy. 410. Follow Hwy. 410 east to Mt. Rainier National Park and turn hard left at Cayuse Pass, continuing on Hwy. 410 over Chinook Pass; 19 miles past Chinook Pass turn right onto Bumping Lake Road and go for five miles following the river. Soda Springs will be on your left. A NW Trailhead Pass may be required here.

I have campsite #6 reserved for Saturday and Saturday night; this is the campsite closest to the foot bridge over Bumping River and right next to the shelter. Several people can set up tents at this site, plus there are many other camping spots, most of which will be available since it will be the last weekend that the campground is officially open, but there is a fee. There is additional parking on either side of the shelter and in campsite #6. The shelters are old CCC structures and there's a wonderful large hearth for a big fire in the one we'll be using.

Identifier: Brian Luther

October 10 **Bowman Bay, Deception Pass State Park**
Skagit Co., ~75 miles from Seattle.

Take I-5 north to Hwy. 20. Exit going west on Hwy. 20 toward Anacortes. Proceed until you see signs for Whidbey Island, Oak Harbor, and Deception Pass. Turn left following Hwy. 20 and continue until you get to the sharp left curve by Pass Lake. Turn right just before the curve, then make an immediate left down the hill through the woods to Bowman Bay. If you continue around the curve to the Deception Pass Bridge, you've gone too far. Although Bowman Bay is part of Deception Pass State Park, it is not on Whidbey Island. There are two shelters at Bowman Bay. One has been reserved for PSMS for the day.

I have a current State-authorized educational and scientific collecting permit, required for all WA State Parks, which is valid during the day of our visit. If you wish to collect fungi in the state parks, then you must follow the regulations and guidelines set down, including documenting all collections found with a data slip. I will give an introduction and provide a handout and the data slips in the morning at both Deception Pass and Twanoh State Parks. Collection data slips are not required for specimens found outside of the State Parks.

The shelter is reserved for day use only. We are required to clean up and leave by or just after dark. Please plan to stay and volunteer to help clean up at the end of the day.

Day use is free, but you can camp for a fee at several locations throughout Deception Pass State Park, including Bowman Bay.

Identifier: Brian Luther

Oct. 24 **Twanoh State Park**
Hood Canal, Mason Co., 20 miles SW of Seattle by ferry

We will be in Kitchen #2 shelter, the one closest to the large boat-ramp parking lot at the far west end of the park. Turn right into the boat ramp parking lot and park near the woods on your right. The shelter and a large bath house are close by. You can camp in the campground directly across the highway for a fee. Again, this is a day use shelter, and we are required to clean up and vacate the park at dusk.

Identifier: Brian Luther

Driving Directions. There are two routes to this park—driving around over the Tacoma Narrows Bridge or taking the Seattle-to-Bremerton ferry. Driving around is the fastest and most cost effective. If you don't mind waiting for the ferry, paying a car and driver fee, and enjoy the boat ride, the ferry is for you.

1. Driving around. There is no charge for crossing the old Tacoma Narrows span westbound, but you will have to pay a \$3.75 toll going home over the new span, unless you already have a Washington State DOT Good To Go account. Twanoh State Park is about an hour and a half drive from Seattle, if there's little or no traffic. A word to the wise: leave early on Saturday morning if driving around. Mid-day traffic on Hwy. 16 can be very slow and frustrating.

Take I-5 south to Tacoma, then get into the right-hand turn lane and take Hwy. 16, the Bremerton Freeway. Follow Hwy. 16 for approximately 13.5 miles, over the Tacoma Narrows, to the Purdy exit. Turn right at the exit and drop down to the bottom of the hill to the traffic light. At the light, turn left onto Hwy. 302. Follow 302 for 5.3 miles, then take the right-hand turnoff (just before a light) onto 302 west, also called Elgin Clifton Road NW. Follow 302 west for about 9.5 miles. At the end of the old settlement of Victor, turn right onto the Victor Cutoff Road, which is the

first road after the Coulter Creek Fish Hatchery (the sign says to Belfair). Follow this for 1.3 miles. Turn right onto Hwy. 3 at the stop sign and proceed 1.7 miles down the hill to the light at the bottom. Make a hard left onto Hwy. 106 and continue 8 miles to Twanoh State Park.

2. Taking the Seattle-to-Bremerton ferry. Go to the Coleman Ferry Terminal on Alaskan Way on the Seattle waterfront and take the ferry to Bremerton. It's an hour sailing time. Exit the ferry and proceed to Hwy. 3 going west. Continue on Hwy. 3 through Gorst to Belfair. Continue through Belfair and take the right-hand turn at the light onto Hwy. 106 westbound. Proceed on Hwy. 106 for 8 miles to Twanoh State Park, then follow the directions to the shelter.

There is a third route that avoids both the ferry and the Tacoma Narrows Bridge, but this involves going much farther south through Olympia and then through Shelton and it takes much more time and fuel. Ask me if you're interested.

Oct. 30–Nov. 1 **PSMS / The Mountaineers Joint Field Trip**
(Meany Lodge-Crystal Springs)

This is a joint effort between PSMS and the Mountaineers. For costs, registration, and additional information, visit the Mountaineers' website at <http://www.meanylodge.org> and click on "Mushroom Weekend." You can register online or by phone at the Mountaineer Club Headquarters, (206) 521-6000 or 1-800-573-8484.

Nov. 7 **Nissei Veterans Invitational Mushroom Foray**
Dalles Forest Camp
elev. 2200 ft, 70 miles SE of Seattle

Some time ago we were contacted by a group of retired Japanese-American veterans who wanted the chance to collect Matsutake. Marian Maxwell, Patrice Benson, and John Goldman planned this outing, in their honor. We're calling it the Nissei Veterans Invitational Mushroom Foray. Let's hope for a good fruiting of Matsutake while we're there.



The Dalles campground is in a wonderful area of older growth forest. Only rustic amenities are available (pit toilets and no running water), so please be prepared and plan accordingly by bringing extra water and hand soap. Also, parking might be somewhat limited, requiring you to find a spot that's not as convenient as at most locations. Marian Maxwell is currently negotiating with the US Forest Service to see if we can at least get the gate unlocked and opened for us during that weekend. No promises.

PSMS has been having fall field trips at this site since the late 1960s and it's definitely an "old friend" of ours, but we have not been there in a long time. You can camp overnight, if prepared. I'll bring a large supply of firewood for the hearth in the old CCC shelter. *Identifiers:* Brian Luther, Marian Maxwell, Patrice Benson.

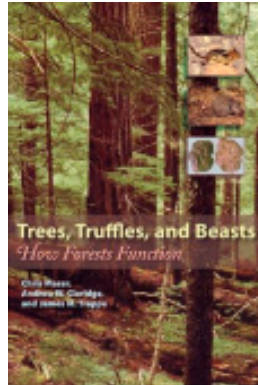
Directions: Take your favorite route to Enumclaw and continue 26 miles east on Hwy. 410 toward Mt. Rainier. The Dalles campground is on the right.



BOOK REVIEW:

***Trees, Truffles, and Beasts: How Forests Function*, by Chris Maser, Andrew W. Claridge, and James M. Trappe, Rutgers University Press, 2008, 280 pp., \$26.95**
Brian Luther

This book covers the unlikely comparison of trees, animals, and truffle-like fungi and their interactions and relationships from two very distinct forested areas of the world: the Pacific Northwest in the Northern Hemisphere and selected areas of southeastern Australia, including Tasmania. The junior author (Jim Trappe) is well known to all of us as the undisputed world authority on truffles and truffle-like fungi, and this in itself should be enough to get you to buy, check out, or borrow a copy to read. Just for your information, Jim gives an acknowledgement to his first mycological mentor, Daniel Stuntz, in the foreword on page xvi, because he was a student at the Univ. of Wash. Having been a student of Dr. Stuntz myself, this comes as no surprise.



The authors have presented the material in nine chapters: (1) The Forest We See, (2) The Unseen Forest, (3) Trees, Truffles and Beasts: Coevolution in Action, (4) Of Animals and Fungi, (5) The Importance of Mycophagy, (6) Landscape Patterns and Fire, (7) Forest Succession and Habitat Dynamics, (8) Of Lifestyles and Shared Habitats, and (9) Lessons from the Trees, the Truffles, and the Beasts. Chapters 3, 4, and 5, are my favorites.

Did you know that North American Elk, Mule Deer, Black Bear, Mountain Goats, and even Pikas and Marmots consume fungi and truffles if they stumble on them and are considered “*opportunistic mycophagists*”? Douglas Squirrels and the Northern Flying Squirrel actively search for and eat truffles and false truffles and because of that are categorized as “*preferential mycophagists*.” All of my observations of our native Douglas Squirrels have been when they’re in trees; I’ve never seen them on the ground, but they obviously must spend some time wandering on the forest floor. The California Red-Backed Vole, on the other hand, almost exclusively eats truffles and truffle-like fungi as its source of nutrition. This animal is therefore categorized as an “*obligate mycophagist*.” How was this determined? Researchers have studied their behavior in detail for a long time, trapped the animals and examined what’s in their stomachs, and examined their “nests” to see what they’ve gathered. They have also studied the feces of these animals, which has shown that they contain the spores of certain fungi.

Rodents and other forest mammals apparently vary in how much nutrition they can obtain from mushrooms or truffle-like fungi, based not only on what part of the fungus they consume but on whether they have a foregut or hindgut digestive system. Hindgut fermenters such as squirrels and voles have an advantage over foregut digesters in being able to more fully digest fungal tissue (see Chapter 5).

Also, quite fascinating is the discovery that mushrooms that are exposed to the sun while drying contain astronomically higher levels of Vitamin D than mushroom specimens dried inside or in the absence of sunlight. Many squirrels collect fungi and hang them up to dry in a storage area, stuck to branches or high in the trees where they get exposed to sunlight and in doing so evidently are making their future meals much more nutritious.

Another amazing fact brought out in this book is that when Fishers—an aggressive and large member of the weasel family known for their incredible ability to catch and kill such agile prey as squirrels and previously thought to be exclusively carnivorous—have been caught and the contents of their stomachs examined, some have been found to be “crammed with chunks” of truffles, as stated by the authors—fascinating! Many other native animals are mentioned, so if you want more details get yourself a copy of this publication and start reading.

All of the above creatures are at least casually familiar to many of us in the PNW, but have you heard of the Quokka, or Gilbert’s Potoroo, or the Spotted-Tail Quoll, the Agile Antechinus, the Swamp Wallaby, or the Tasmanian Bettong, to name just a few? These animals interact in the very same way, only with the Australian trees and fungi.

On page 21 the authors state that Douglas Fir (*Pseudotsuga menziesii*) reaches a maximum height of “about 300 feet” and a maximum diameter of “about 175 inches,” but there are several records of Douglas Firs being taken down that measured considerably taller (close to or over 400 ft) and larger in diameter than what’s mentioned. The largest living Douglas Fir, near Roseburg, OR, is currently 329 ft tall.

The printer made a few errors, for example in paragraph four of Chapter 1, where all the words have been run together in the first sentence, but nothing that detracts from the overall content or experience of the book.

As an addition to the text, the book has 67 figures and 42 color plates. Six of the color plates are of PNW mammals and six of Australian mammals, along with six of North American truffles and six of Australian truffles, all sandwiched between pages 142 and 143. Figure 34 has line drawings of the spores of twelve truffle-like fungi, showing the differences in their ornamentation. This should make you realize that the microscopic world is a whole dimension that most people miss out on. The book has two appendices, covering common and scientific names of the organisms from both regions of the world. It also has an extensive bibliography, organized near the end as “Notes” relative to each chapter, and a glossary and an index.

Since we’re talking about trees, truffles, and critters, I thought you might be interested in knowing that Dr. Stuntz liked telling the story of how he found his first truffle: He was collecting in the woods and suddenly was hit from above by a falling truffle. Looking up, he could see the squirrel which had carelessly dropped its meal. I never did find out what the species he was accidentally bombarded with.

Trees, Truffles, and Beasts is well written, easy to read and follow, and contains very interesting information, with many personal experiences and comments interjected here and there by the respective authors. As a graduate teaching assistant in the late 1970s at the University of Tennessee, I would have appreciated having this book to assign selected chapters to students, because it gives an excellent overview of the importance and interactions of plants, animals, and mycorrhizal fungi, with an emphasis on subterranean fungi such as truffles and false truffles, and although it focuses on two very disjunct regions of the world, what’s happening is applicable to forest ecosystems pretty much everywhere. The book is chock full of captivating observations and data, and once I started reading it, I had trouble putting it down.



NEW PHAEOLLYBIA BOOK OUT



Released in June, 2009, *Phaeocollybia of Pacific Northwest North America* by Lorelei L. Norvell & Ronald L. Exeter (USDI BLM/OR/ WA/GI-08/100-1792, Salem, Oregon, 228 pp.) offers a key to 25 described *Phaeocollybia* species from the Pacific Northwestern United States (California, Idaho, Washington, Oregon) and Canada (British Columbia). All species are treated in depth (a minimum of six pages per species); there are keys, a glossary, a complete bibliography, and notes on distribution, biology, and taxonomy, plus a guide on how to collect and examine this fascinating genera. Full color micrographs—highlighting all characters that differentiate one species from another look-alike—accompany the detailed technical descriptions.

A specialty publication, it has—alas—been priced by the government accordingly at \$71 (500 color photos in 228 pages are not cheap). However, if you have ever been stumped by one of these long-rooted slime balls or are simply scientifically intrigued, you may be interested in this monograph of the 25 PNW representatives that hide in our northwest rainforests.

For additional information or to order by phone using Visa or MasterCard, call (503) 375-5646. To order by mail, send a \$71 (USD) check or money order to

Salem Bureau of Land Management
c/o *Phaeocollybia* publication,
1717 Fabry Road SE, Salem, OR 97306 USA.

BOOK REVIEW:

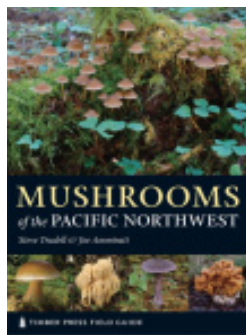
***Mushrooms of the Pacific Northwest*,
by Steve Trudell and Joe Ammirati,
Timber Press, 2009, \$27.95**

Ron Post

This new field guide to the diverse fungi of our region is a book that wraps itself comfortably around several decades of experience and teaching by two mycologists, both of whom have looked at mushrooms from every angle, inside and out.

It is a book that many of us will be wrapping our hands around for decades to come. The text sometimes harkens back to the memories of other local mycologists some of us have known and loved, such as Ben Woo, Kit Scates-Barnhart, and Daniel Stuntz. Among the book's finer points: true-color photos on almost every page amounting to more than 450 regional species, a key and illustrated introduction for each color-coded section, a wealth of description about the "just plain interesting" mushrooms, based partly on habitat and fruiting season as well as taxonomic characteristics of the species, and clear writing that makes no bones about the authors' approach to collecting fungi.

Practical guidance is given to help the beginner tell apart many of our look-alikes, from the hardy *Cantharellus* and its two false mates, *Hygrophoropsis* and *Chroogomphus*, to the fragile and beautiful pseudo-duo *Marasmiellus* and *Hemimycena*. An abun-



dance of useful microscopic characters is also presented for most of the species.

And the authors' long experience helping amateurs and pot hunters is carefully brought to bear in defining familiar groups of mushrooms, as in this portion of text about *Suillus* (p. 220): "We define *Suillus* in a broad sense here, including species that often are classified in *Boletinus* or *Fuscoboletinus*. Most suilluses are edible, but few of them make many top-ten lists."

How fortunate to have such a deeply thoughtful guidebook, co-written by Joe Ammirati, our esteemed advisor, a taxonomist, and by Steve Trudell, a well-known photographer and ecologist. The 24-page section entitled "Preliminaries" is full of necessary information as well as a conservationist's ethic and some well-written cautions; undoubtedly it will be reprinted as a separate tract by and for many mushroom hunters.

Certainly there will be quibbles on a few minor things: for some, the size of the photos may engender wishes about even more pages and a larger-format edition; here or there a species you or I have found commonly may rate only a mention; common polypores are well-described but their total number might be larger.

In the field or at home, however, this text is now the high-water mark for Northwest field guides to fungi. No small feat, writing for an audience that spans the local population, from uneducated migrant pickers and pot hunters to armchair botanists and academically advanced students of biology!



NISEI VETERANS INVITATIONAL MUSHROOM FORAY

Marian Maxwell



On November 7, 2009, PSMS is proud to host the Nisei Veterans Committee and Foundation for a joint mushroom foray. This hunt will be open to both members of PSMS and members of the Nisei Veterans Foundation. The Nisei Veterans Foundation honors those

US veterans who served during WW II as well as the families who were interned during that war.

Japanese-American culture has long-standing traditions of entire families hunting mushrooms together, as have many European-American cultures. Mushroom hunting in families serves to bind the family generations together in a common purpose and celebration.

We will welcome our guests at 9:30 a.m. with coffee, tea, and donuts. There will be a potluck at 4:00-5:00 p.m. after the hunt for those wishing to participate.

For further information and for people who wish to help with this foray in honoring our Nisei veterans and their families, please call Marian Maxwell at (425) 235-8557.



PRESIDENT'S MESSAGE

Patrice Benson

Dyeing Workshop. The steam is rising from my caldron of simmering bolete pores as I prepare the dye bath for the 3-D felted mushrooms we will be making from mushroom-dyed wool at a workshop this fall. Please stay tuned for further details.

In the meantime, you are probably wondering about the bolete pores. I found them today attached to 25 pounds+ of *Boletus edulis*. Hee Hee Hee. The mushrooms are finally arriving in my favorite spots and in yours, too, I do believe. If you do not have favorite spots yet, then you must attend the beginners classes and the field trips to learn how to locate likely places to find mushrooms.

Beginner I.D. Classes. The beginner's mushroom identification classes are open to all members on a first come, first served basis. The classes are a series of four on consecutive Thursday evenings from 7 to 9 p.m. The two series being offered this fall run from 9/24–10/15 and from 10/22–11/12. The classes will be held at the Douglas classroom at the Center for Urban Horticulture. The text will be David Arora's *Mushrooms Demystified*. The cost of the classes is \$35 for members and \$70 for nonmembers, which includes a membership. You can register by e-mailing education@psms.org. If you do not have e-mail, call (425) 678-8350 to register. Check the PSMS website for the latest info about classes.

Members Roster. We will be creating a secured online members roster which will be located in the password-protected members section of our website. It will be updated monthly and available only to those members with current membership. The password for our member's page will be changed quarterly beginning in September. The current password is located *on the printed copy only* of each issue of *Spore Prints* in the publisher's block on page 2. We will post this roster as soon as possible. It can be downloaded and printed for your ease of use. If you do not have access to a computer and wish to receive a printed copy, please send a self-addressed stamped envelope to

PSMS
PO Box 354115
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Visiting Mycologists. I would like to take the opportunity to welcome visiting mycologists Kare Liimatainen and Tuula Niskanen, who will be arriving on September 22 from Finland and will be working on *Cortinarius*. They will be a wonderful resource for our club during their 5 month stay in Seattle. Tom Volk will be visiting in November and will be our speaker on November 10. Please do not miss them and their wealth of knowledge!

Wild Mushroom Exhibit. Please volunteer for our annual wild mushroom exhibit, which will be held on October 17–18, 2009, at CUH. Sign up at the membership meeting on September 8 or e-mail Kim Traverse at traverse.kim@gmail.com. You need know nothing about mushrooms to volunteer, but if you do know something we will put it to use! It is fun and friendly and you could get to know some mushroom hunting buddies.

Happy Hunting!

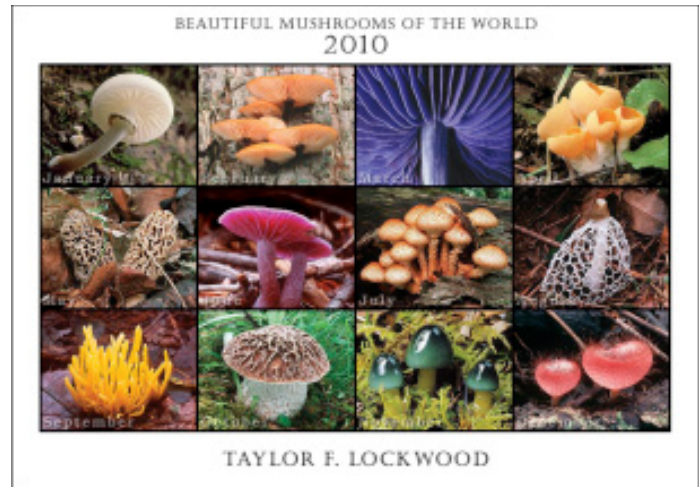
MUSHROOM MISSIONARIES

Brian Luther gave an hour-long color slide lecture on mushrooms at the Paradise Lodge on Mt. Rainier on Saturday, August 1, as part of the park's annual lecture series.

TAYLOR LOCKWOOD MUSHROOM CALENDAR

The latest Taylor Lockwood mushroom calendar is now available. To view the cover, go to http://www.kingdomoffungi.com/c_pages/clndr_cover.php. To view a sample month, go to http://www.kingdomoffungi.com/c_pages/clndr.05-2010.pdf.php. For more information, contact

Taylor F. Lockwood
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PARASITE CAUSES ZOMBIE ANTS TO DIE IN AN IDEAL SPOT

The American Naturalist

via <http://www.innovations-report.de>,
August 14, 2009

A study in the September issue of *The American Naturalist* describes new details about a fungal parasite that coerces ants into dying in just the right spot—one that is ideal for the fungus to grow and reproduce. The study, led David P. Hughes of Harvard University, shows just how precisely the fungus manipulates the behavior of its hapless hosts.

When a carpenter ant is infected by a fungus known as *Ophiocordyceps unilateralis*, the victim remains alive for a short time. The fungus, however, is firmly in the driver's seat.

It compels the ant to climb from its nest high in the forest canopy down into small plants and saplings in the understory vegetation. The ant then climbs out onto the underside of a low-hanging leaf where it clamps down with its mandibles just before it dies. There it remains, stuck fast for weeks.

After the ant dies, the fungus continues to grow inside the body. After a few days, a stroma—the fungus's fruiting body—sprouts from the back of the ant's head. After a week or two, the stroma starts raining down spores to the forest floor below. Each spore has the potential to infect another unfortunate passerby.

Scientists have known for over one hundred years about this parasite's ghastly ability to turn unsuspecting ants into zombies. But Hughes and his colleagues chronicle the amazingly precise control the fungus has over its victim.

At a field site in a Thai forest, Hughes's team found that the infected carpenter ants are almost invariably found clamped onto the undersides of leaves that are 25 centimeters (about 10 inches)

from the ground below. What's more, most of the dead ants were found on leaves sprouting from the northwest side of the plant. Interestingly, the researchers found that temperature, humidity, and sunlight in these spots are apparently optimal for the fungus to grow and reproduce. When the researchers placed leaves with infected ants at higher locations, or on the forest floor, the parasite failed to develop properly.

"The fungus accurately manipulates the infected ants into dying where the parasite prefers to be, by making the ants travel a long way during the last hours of their lives," Hughes said.

But getting the ant to die in the right spot is only half the battle, as the researchers found when they dissected a few victims.

"The fungus has evolved a suite of novel strategies to retain possession of its precious resource," said Hughes.

As the fungus spreads within a dead ant's body, it converts the ant's innards into sugars which are used to help the fungus grow. But it leaves the muscles controlling the mandibles intact to make sure the ant keeps its death grip on the leaf. The fungus also preserves the ant's outer shell, growing into cracks and crevices to reinforce weak spots. In doing this, the fungus fashions a protective coating that keeps microbes and other fungi out. At that point, it can safely get down to the business of claiming new victims.

Carpenter ants apparently have few defenses against the fungus. The most important way they avoid infection seems to be staying as far away from victims as possible. That may be part of the reason why these ants make their nests in the forest canopy, high above fungal breeding zones. Carpenter ants also seem to avoid blazing their foraging trails under infected areas. This too might be an adaptive strategy to avoid infection, but more study is needed to confirm it, Hughes says.

The mechanisms and cues the fungus uses to control an ant's behavior remain unknown. "That is another research area we are actively pursuing right now," Hughes says. Whatever the mechanisms, this much is clear: *O. unilateralis* has evolved highly specialized abilities to get unsuspecting ants to do its bidding.

Sandra B. Andersen et al., "The Life of a Dead Ant: The Expression of an Adaptive Extended Phenotype." The American Naturalist, September 2009.

SCIENTISTS FORCE FUNGUS TO HAVE SEX TO CREATE BIOFUEL

Ethiopian Review

<http://www.ethiopianreview.com/articles/23425>

August 13, 2009

Austrian scientists are putting the "fun" in "fungus" by forcing organisms which are usually asexual to have sex instead.

The hope is that the fungus would then be easier to breed, which would allow researchers to create organisms that are more efficient at degrading cellulose for the purpose of making biofuel.

Scientists have long known that the soil fungus *Trichoderma reesei*, originally discovered in the Solomon Islands during World War II eating away at the canvas and garments of the U.S. Army, was particularly good at converting cellulose—a major component of plant biomass—into glucose. But until now it has been difficult for researchers to improve the fungus because it was believed to be asexual.

Because sexual organisms exchange and mix their genetic material when they breed, their traits can be more easily manipulated

artificially. Under the assumption that *Trichoderma reesei* was asexual, scientists looking to improve the fungus were instead limited to techniques like dosing the fungus with radiation or chemicals in order to alter its genetic profile. But that process only created random or unpredictable mutations.

But for the first time since its discovery 50 years ago, scientists can now make the fungus have sex.

Past studies have shown that *Trichoderma reesei* is genetically identical to another species of fungus, *Hypocrea jecorina*, which it so happens is capable of sexual reproduction. The primary difference between the two organisms was that *Hypocrea jecorina* seemed capable of assuming both the male and female roles, whereas *Trichoderma reesei* seemed capable of assuming only the male role.

So scientists got a novel idea: Why not breed the male-oriented *Trichoderma* with a female-oriented *Hypocrea*? The result was a successful mating—the *Trichoderma* lured into having sex could now be artificially selected for their advantageous genetic traits.

The findings could have large-scale ramifications. Researchers want to employ the organisms to make use of the otherwise useless cellulose in sawdust, weeds, and other plant scrap to make biofuel. Thus, the primary benefit of fungus sex could be to turn brush into biofuel. But the newly sexualized fungus can also help farmers. Since *Trichoderma* includes species that help plants by killing harmful fungi, they can be put to use protecting crops we use for food.

CONTROLLING KUDZU WITH NATURALLY OCCURRING FUNGUS

Science Daily, July 20, 2009

Kudzu, "The Vine that Ate the South," could meet its match in a naturally occurring fungus that Agricultural Research Service (ARS) scientists have formulated as a biologically based herbicide. By one estimate, kudzu spreads at the rate of 150,000 acres annually, easily outpacing the use of herbicide spraying and mowing, as well increasing the costs of these controls by \$6 million annually.

But in Stoneville, Miss., ARS plant pathologist Doug Boyette and colleagues are testing a fungus named *Myrothecium verrucaria*, which infects kudzu with an astonishing speed of its own. In fact, the fungus works so quickly that kudzu plants sprayed with it in the morning start showing signs of damage by mid-afternoon, according to Boyette, with the ARS Southern Weed Science Research Unit in Stoneville.

He first began working with *M. verrucaria* in 1998, when a Louisiana Tech University scientist furnished him with isolates from diseased sicklepod specimens. In greenhouse experiments, spray formulations killed 100 percent of kudzu seedlings and 90 to 100 percent of older plants in outdoor trials. *Myrothecium* also worked its anti-kudzu magic under a wide range of conditions, including the absence of dew.

Additionally, host-range tests in 2005 showed that *Myrothecium* caused little or no injury to many of the woody plants known to occur in kudzu-infested habitats, including oak, cedar, pine, hickory, pecan, sassafras, and blackberry.

A few companies expressed interest, but only if the fungus' production of toxins called trichothecenes could be reduced or stopped. Boyette's group examined several approaches, settling

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Kudzu, *cont. from page 7*

on a method of growing *Myrothecium* in a fermenter on a liquid diet instead of a solid one. Not only did this stop trichothecene production or reduce it to acceptable levels, the method also extended the fungus' shelf life and potency under field conditions.

Besides kudzu, *Myrothecium* also showed potential as a pre-emergence bioherbicide, controlling purslane and spurge in transplanted tomatoes.



Did you know?

Mushroom hunters have long called the chanterelle (or girolle in French) the "queen of the forest" because of the mushroom's earthy, but mild flavor.
—Carol Mighton Haddix

CHANTERELLE POTSTICKERS **Mary J. Taylor**

Too early in the season for fresh mushrooms? I've found the following recipe works equally well with fresh or canned mushrooms. The potstickers easily freeze for a month or so and can be brought to the table in various ways. Experiment with cooking. For example, try baking or steaming or frying and dropping into clear soups. Experiment with dipping sauces, although I always think that the traditional seasoned soy sauce blend works well.



- 6 slices bacon (or ¼ lb chopped ham and 2 TBs butter)
- 1 lb fresh chanterelles, chopped OR 1 pint canned chanterelles, drained (reserving liquid) and chopped
- 1 onion, chopped
- 1 clove garlic, minced
- ¼ cup sherry
- 2 TBs flour
- 1 package gzoza wrappers

1. Fry bacon in large skillet until crisp over medium heat. Drain, reserving the drippings. Crumble the bacon and set aside.
2. If using fresh mushrooms, add them to drippings along with onions and garlic. Cook until all juices have evaporated. Stir in sherry and flour and cook, stirring, until thick. Remove from heat and cool.
3. If using canned mushrooms, add onions and garlic and drained juices from the mushrooms to the drippings. Cook until all juices have evaporated. Stir in mushrooms, sherry, and flour and cook, stirring, until thick. Remove from heat and cool.
4. Place about 2 tsp of the filling in the center of each wrapper. Fold dough in half to form a half moon shape. Pinch closed along curved edge. Set on plastic wrap, seam side up, and keep lightly covered while preparing remaining potstickers.
5. To cook in the Oriental fashion: Set a large frying pan over medium high heat and brush with oil. Add potstickers and fry until golden brown on the bottom, about 5–10 minutes. Add ¼ cup beef broth to the pan, cover with lid and steam 10 minutes. Serve with dipping sauce.
6. Traditional dipping sauce: For each serving, blend ¼ cup each soy sauce and beef broth, 1 TBs vinegar, and ¼ tsp hot liquid pepper seasoning.

Note new user name and password.

