SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY
Number 435 October 2007

44TH PSMS WILD MUSHROOM SHOW **Ron Post**

To sign up for duties at the 44th Annual Wild Mushroom Show, come to the October meeting or call me at (206) 370–4487.

The publicity posters, designed by trustee Molly Bernstein, have received raves, and our publicity effort is under way. Get those posters that were taken down put back up! Our T-shirts using the poster image will be available at the October meeting and also at the exhibit, so get yours before they sell out! At the show our guest speaker, Taylor Lockwood, will be signing his new book after his talks both days.

Thanks to trustee Brenda Fong for her effort with the media and all our longtime committee chairs. An exhibit floor plan is available, either at the membership meeting or in the PSMS hospitality room during the show. Hospitality will be in Isaacson Hall next door to the club office. Also, the exhibit brochure will have a rough schematic of the grounds.

Please, plan on collecting mushroom specimens on Thursday, October 11, and Friday, October 12, if you can and, of course, Saturday, too. And we will need other things: greenery, lichens, and your helpful presence.

Specimen drop-off for the show will begin at 4 PM on Friday, October 12. Signs will direct you—just follow the mushrooms. Tray arranging and transport begins at 7 AM on Saturday, October 13.

My special thanks to PSMS identifiers and the committee chairs. You will not find their names here but you should get a call by Friday, confirming your time slot. Don't forget the ongoing potluck in the hospitality room during the entire exhibit!

Exhibit Chair: Ron Post
(206) 370–4487

Arts & Crafts
Book Sales
Cooking & Tasting
Construction/Cleanup
Decoration
Duff/Moss Collection
Feel & Smell
Hospitality
Kids' Table (Petting Zoo)
Membership
Mushroom Collection
Poster Distribution
Tray Arrangement

BEGINNING MUSHROOM ID WORKSHOP
Colin Meyer

What:	PSMS Beginning Mushroom ID Course
Where:	Center For Urban Horticulture, Douglas Classroom
When:	Thursday Evenings, 7:00–9:00 PM, 10/18–11/08 (four evenings)
Cost:	$35, cash or check payable to PSMS (bring on first day of class)
Book:	*Mushrooms Demystified*, by David Arora
Bring:	Fresh mushroom specimens
Contact:	education@psms.org (for questions, or to register)

PSMS will offer a beginning mushroom identification class this fall on four consecutive Thursdays, beginning on October 18. Classes will be held at the Center for Urban Horticulture, in the Douglas classroom, from 7:00 to 9:00 PM.

The sessions will be

Oct. 18	Introduction to Mushroom ID
Oct. 25	Identifying Mushrooms with Dichotomous Keys
Nov. 1	Cooking and Collecting
Nov. 8	Mushroom Toxins

The recommended text is *Mushrooms Demystified*, by David Arora. There are several copies available for classroom use from the PSMS library, and the book will be available for sale on the first day of class.

Class cost is $35 for four sessions. For questions or to register, please send e-mail to education@psms.org with your name(s). If you don't have access to e-mail, you may call (206) 354–7789, but e-mail is preferred.

Registration is available for PSMS members only; please print off the membership form from the website (http://psms.org) and send it in if your membership is not current. Please confirm your registration, as classes often fill up.

Please bring specimens of fresh mushrooms to class. Collect the whole fungus, including any root or cup at the base of the stalk. Specimens are best preserved by wrapping in foil or wax paper and putting them in the fridge, where they will last from several days up to a week, depending on the species. You should make a spore print, if you know how. (If you don't, that's OK. We will learn how on the first day of class.) Take a few notes about where the mushroom was collected, and from what sort of habitat (whether on wood or ground, what type of wood, and what type of trees it grows under).

Spore Prints

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PUGET SOUND MYCOLOGICAL SOCIETY

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Annual dues $25; full-time students $15

CALENDAR

Oct. 8	Master Gardener's clinic, 4:00 PM, CUH atrium
Oct. 9	Membership Meeting, 7:30 PM, CUH
Oct. 13–14	Annual Exhibit, CUH
Oct. 15	PSMS Board Meeting, 7:30 PM, CUH Master Gardener's clinic, 4:00 PM, CUH atrium
Oct. 18–21	Breitenbush Mushroom Conference
Oct. 20	Field Trip, Twanoh State Park
Oct. 22	Master Gardener's clinic, 4:00 PM, CUH atrium
Oct. 23	*Spore Prints* deadline
Oct. 27	Field Trip, Deception Pass State Park **(change)**
Oct. 26–28	PSMS-Mountaineers Joint Trip, Meany Lodge
Oct. 28	Master Gardener's clinic, 4:00 PM, CUH atrium
Nov. 5	Master Gardener's clinic, 4:00 PM, CUH atrium

BOARD NEWS

Dennis Oliver

The August board meeting was packed with items. PSMS in conjunction with the Master Gardeners will offer Mushroom Mondays where the public can bring mushrooms for identification and information. It should be great fun. Please contact Cynthia Nuzzi (cynthianuzzi@hotmail.com) if interested in volunteering to help out at the table. The field trip schedule has been finalized. Colin Meyers will be organizing mushroom classes this fall (see article on page 1 for details). Preparations for the annual mushroom show are progressing: art contest, tee shirt design and the poster preparation. Taylor Lockwood and Kathy Casey will be our speakers. Plus the board even had time to think about the survivor banquet, and Jamie Notman has agreed to head the banquet committee.

MEMBERSHIP MEETING

Tuesday, October 9, 2007, at 7:30 PM at the Center for Urban Horticulture, 3501 NE 41st Street, Seattle.

Our guest speakers this month are Tuula Niskanen and Kare Liimatainen. Their presentation is titled "An Introduction to the Wonderful World of *Cortinarius*." Tuula and Kare are both Ph.D. candidates at the University of Helsinki in Finland and are currently studying the taxonomy of *Cortinarius* and *Ramaria* using molecular, microscopic, and morphological methods.

Tuula Niskanen (left) and Kare Liimatainen (right)

The *Cortinarii* are of interest because of all the Agaricales (gilled mushrooms) found in boreal forests, *Cortinarius* is the genus that is the richest in numbers of species, with 2,000 alone in Europe, accounting for up to 60% of fall mushrooms in some locations. However, this genus is also one of the more poorly known. For example, although 200 *Cortinarius* species to date have been catalogued in Finland, the actual number of species in Finland is estimated to be three times higher. Their research project is funded by the Finnish government and is called the Deficiently Known and Endangered Forest Species Research Programme, abbreviated as PUTTE in Finnish.

Before the membership meeting, at 7 PM, Hildegard Hendrickson will present a thirty minute program for new members. She will offer tips on hunting and identifying mushrooms and answer your questions.

Would people with the last names beginning with the letters L–Z please bring a plate of refreshments for the social hour.

BREITENBUSH MUSHROOM CONFERENCE

Patrice Benson

The 23rd annual mushroom gathering at Breitenbush Hot Springs Resort is October 18–21, 2007, near Detroit, Oregon, in an Old Growth forest. This year's theme of "Mushrooms: Poisons, Passions and Psycho Activity" will feature Dr. Michael Beug, Professor Emeritus of Evergreen State College and expert on the chemical and taxonomic aspects of both poisonous and psychoactive fungi. Paul Kroeger will lecture about psychoactive mushrooms. Judy Roger, Hildegard Hendrickson, and Patrice Benson will provide further lectures on mushroom passions and mushroom hunting of the area. Chef Michael Blackwell will lead a gustatory journey through the local edible mushrooms in a tasting workshop. Since the mushrooms and weather seem to be cooperating, we are sure to have a fantastic time in this prime mushroom hunting area of the Oregon Cascades. The hot springs will provide added relief to the weary legs and arms aching from carrying lots of mushrooms to study and consume. Space is filling and limited, so call Breitenbush to register.

For reservations, call (503) 854–3320 or e-mail your request to office@breitenbush.com. For additional information, phone Patrice Benson at (206) 819–4842 or e-mail Patrice.benson@comcast.net.

MUSHROOM OF THE MONTH, *Aleuria aurantia* (Fr.) Fuckel

Buck McAdoo

MushRumors, Northwest Mushroomers Association, August-September 2003

The cosmopolitan Orange Peel Fungus looks just like its popular epithet—an orange peel on the side of the road. How many times have you reached for one, hoping for a little extra vitamin C, only to be bummed by this fragile, colorful discomycete? Nonetheless, it does brighten up the gravel at the end of your driveway, and if you take it a step further, the salad below your fork.

Aleuria aurantia*, the Orange Peel fungus. Great taste, or just less filling? You be the judge*.

Aleuria aurantia can be found from Spain to Japan, Scandinavia to the Pacific Northwest and fruits solitary, gregarious, or cespitose on disturbed ground. It is a saprophyte, probably feeding on nutrients brought up by a back hoe or a plow. The fruiting bodies range in size from 2–10 cm wide and are broadly cup shaped at first becoming saucer shaped to nearly flat in age with irregular margins. The interior hymenial surface is bright orange and smooth. The exterior surface is paler orange and slightly scurfy. The flesh is thin and fragile. It is found from July through October on the sides of logging roads, embankments, loose gravel, and newly graded terrain.

Microscopically, the spores are rather unusual. They measure 18–24 × 9–11 µm and are at first elliptical and smooth walled, usually with two oil drops. As they mature, they become coarsely sculptured with strange thorn-like projections at both ends. The asci, which house the spores, are cylindrical and measure 175–250 × 12–15 µm. The paraphyses are abruptly enlarged at the apices into subglobose knobs filled with orange granules.

It is hard to confuse the Orange Peel Fungus with any other cup fungus. *Aleuria rhenana, Aleuria rutilans, Aleuria splendens,* and *Sowerbyella imperialis* all have stems. *Caloscypha fulgens* has an exterior surface that turns blue-green when touched. And all the orange species of *Scutellinia* are much smaller in stature and have hairs on their cup margins.

After reading in *The New Savory Wild Mushroom* that the flavor was pleasant tasting, I was mildly surprised not to find any recipe for *Aleuria aurantia* in any of my mushroom cookbooks. I find it to have a nice nutty flavor and the consistency of the better kind of potato chip

Bibliography

David Arora, *Mushrooms Demystified*, 1986.

Breitenbach & Kranzlin, *Fungi of Switzerland*, Vol. 1, 1984.

Vera Evenson, *Mushrooms of Colorado*, 1997.

McKenny, Stuntz, & Ammirati, *The New Savory Wild Mushroom*, 1987.

Roger Phillips, *Wild Food*, 1983.

Fred Seaver, *North American Cup Fungi*, Operculates, 1928.

UPCOMING FIELD TRIPS

October 20 **Twanoh State Park**
(Hood Canal)

There is no overnight camping here at this park on Hood Canal. Meet at the day-use picnic shelter. Washington collects $5 per car parking fee. The identifier will be Brian Luther.

Driving Directions: Take the Bremerton Ferry (a half hour ride) from downtown Seattle, take Hwy. 3 southwest to Belfair, and proceed west 8 miles on Hwy. 106 to the park.

October 27 **Deception Pass State Park**
(elev. near sea level, 80 miles north of Seattle)
(Note change in date.)

A $5 parking fee is collected at the entrance unless you are camping, in which case your camping receipt includes parking. The potluck will be held at approximately 1 PM. Brian Luther will identify.

Driving Directions: Going north from Seattle on I-5, take exit #226 and go west on route 536 (becomes 20). Turn south, away from Anacortes and toward Whidby Island. Cross the bridge at Deception Pass. The park entrance is on the right, one mile past the Deception Pass bridge. Follow the PSMS signs to the Cranberry Lake shelter. *(***Note new date.)**

October 26–28 **PSMS / The Mountaineers Joint Field Trip**
(Meany Lodge-Crystal Springs)

This is a joint effort between PSMS and The Mountaineers. This event is organized by Coleman Leuthy, one of our local mushroom experts, and it is an experience you should definitely consider having. This year there are two choices.

Option One - Friday, Saturday, Sunday
(Limit 30, register as "full week-end," Cost $100.)

This option begins 7 PM Friday at Meany Hall and continues through Sunday afternoon. Participants will receive a field guide and a seminar by Larry Baxter, who will cover examples of mushrooms you may find the next day. There also be mushroom hors d'oeuvres, and the evening will conclude with a dessert buffet. Friday guests will find items available to pack a sack lunch for the next day. Also, they will be served breakfast early Saturday morning.

Option Two - Saturday, Sunday
(Limit 40, register as "Sat-10/28," Cost $65. Bring a sack lunch.)

This option begins 9:30 AM Saturday at the Crystal Springs Campground, where guides will lead the group out on forays. Groups will retire to the Meany Lodge at 3 PM, where mushroom hors d 'oeuvres and mulled wine will be served. Sorting, discussing, and identifying mushrooms will be followed by a sumptuous dinner and dessert. There will be an evening presentation. Sunday, breakfast will feature local mushrooms, followed by a cooking seminar. Lunch will be served before heading back to town.

Driving Directions: Drive east on I-90 over Snoqualmie Pass. Continue east for 8 miles. Take Stampede Pass exit 62. Turn right at the stop sign. After ¼ mile, before the bridge, turn right to the Crystal Springs campground.

If you are arriving Friday, continue to the end of the asphalt, and straight up. Cross the John Wayne Trail and go about ⅛ mile, taking the next left turn (look carefully—it is narrow and drops off Stampede Pass Road). Continue on the main road going under the power line, cross the creek, and turn right up the hill. At the top take the 180º uphill right turn through the gate and parallel the railroad tracks to the private crossing, (Caution, the trains come very fast and quietly downhill). Cross and continue a short distance. Go left uphill on the driveway to Meany Lodge.

For additional information see the Meany website, www.meanylodge.com, or call Coleman Leuthy at (206) 322–2554. You can register online or by phone at The Mountaineer Club Headquarters, (206) 284–8484 or 1–800–573–8484.

DUTCH MAY JOIN TREND AND BAN MAGIC MUSHROOMS

Drug War Chronicle, Aug. 10, 2007

Since the turn of the century, psychedelic (or magic) mushrooms have been declared illegal by authorities in Britain, Denmark, Ireland, and Japan. Now, amidst a media blitz over a handful of incidents involving people high on " 'shrooms," the conservative Dutch government is considering doing the same.

While the United Nations 1971 Convention on Psychotropic Substances banned psilocybin, the main psychoactive ingredient in magic mushrooms, the mushrooms themselves, especially when fresh, have inhabited a murkier legal status. In the United States, magic mushrooms are illegal under federal law, but not the spores from which they can be generated.

In Holland, where marijuana is retailed at state-sanctioned coffee houses, magic mushrooms are also available at so-called smart shops. Under Dutch practice, the smart shops can sell the mushrooms as long as they are fresh. They also sell various "smart drugs" and herbs, as well as other exotic psychedelics, such as *Salvia divinorum* or San Pedro cactus.

But ever since Gaelle Caroff, a photogenic French teenager, died after jumping from a building under the influence of magic mushrooms in March, sectors of the Dutch press and conservative politicians and Caroff's parents have agitated for their sale and use to be banned. Although Caroff had suffered previous psychiatric problems, her parents blamed the mushrooms.

Dutch newspapers repeatedly published photos of the 17-year-old Caroff and they began highlighting other incidents involving people high on mushrooms, usually young tourists: a Brit, 22, who ran amok in a hotel, breaking a window and cutting his hand; an Icelander, 19, who, thinking he was being chased, leapt from a hotel balcony, breaking both legs; a Dane, 29, who drove crazily through an occupied campground.

Amsterdam health services reported in January that emergency services were summoned to deal with bad mushroom trips 148 times over a three-year period from 2004 to 2006, or about once a week. Of the 148 incidents, 134 involved foreigners. Other Dutch government numbers suggest that tourists are gobbling up most of the mushrooms sold in smart shops.

In response to the rising clamor in the press, Health Minister Ab Klink ordered the national health institute to reassess the risks of magic mushrooms. Klink has said that, depending on what the institute concludes, he will recommend either that magic mushrooms sales be banned outright or limited to those over 18.

Either proposed move appears to have broad support in parliament. A majority of center and rightist parties has demanded the fungi be banned. That would be in line with the broad contours of a Dutch government that is increasingly conservative on issues ranging from Muslim immigrants to misbehavior in Amsterdam's notorious Red Light District to a mostly frustrated inclination to try to reverse the country's liberal marijuana policy.

Peter Dejong

Commercial magic mushrooms grown in the Netherlands. A Dutch fling of the past?

PARASITIZED *ARMILLARIA MELLEA* WANTED

One of the grad students at Duke is studying a mushroom parasite, *Entoloma abortivum*, which is parasitic on *Armillaria mellea*. She would like any specimens from anywhere of this parasitized form and can receive it at the address below.

Bernadette O'Reilly
Duke University
Box 90338
Durham, NC 27708
Bdo2@duke.edu

John Plischke III

Normal (left) and parasitized (right) Armillaria mellea

WINE, MUSHROOMS CAN BE TRICKY PAIRING

Andrew Dornenburg & Karen Page

Washington Post, via *Mushrumors,*
Oreg. Myco. Soc., July/Aug. 2007

We've come to think of mushrooms as the red meat of the vegetable kingdom (even though we know they're fungi) because—almost invariably—the sometimes-earthy, sometimes-meaty flavor of mushrooms says "red wine" to us. In fact, it's hard for us to think of mushrooms without immediately having pinot noir come to mind. The two are a match made in heaven.

Of course, mushrooms don't have a singular flavor profile, as they range from the mildest of button mushrooms to porcini that pack a punch. Each suggests a different wine pairing, from lighter-bodied and more delicate for the former to fuller-bodied and more powerful for the latter.

Scott Calvert, a fine-wine consultant to restaurants and private collectors (www.tastevinwines.com), shared some of his mushroom pairing secrets with us. "Earthy mushrooms pair best with earthy wines," Calvert advises, in explaining why he pairs black trumpets, chanterelles, and shiitakes with earthy reds such as Burgundy, nebbiolo, and pinot noir.

Likewise, meaty mushrooms—such as cremini, morels, porcini and portobellos—pair best with meaty wines, among which Calvert counts pinot noir (which "can go either way" as earthy or meaty), sangiovese, and syrah/shiraz.

The mushrooms themselves are only the starting point: What you do to and with them matters, too.

With more ambitious dishes, such as "Portobello Mushrooms Pretending to Be a Filet Mignon," other dominant elements of the dish come into play. Calvert recalls, "I found it was best with a sangiovese that was brightly acidic to match the tomato, with a bit of a gamey scent to play with the meatiness of the portobello, plus nice, sweet fruit to bring out the sweetness of the caramelized shallot. With simpler fare, such as a mushroom pizza, we tend to think regionally—the first rule of food and wine pairing. While such food

goes well with wines as varied as red Burgundy and Chateauneuf- du-Pape, we like to opt for an Italian red, such as a sangiovese.

Bon Appetit!

Now for those exceptions: even Calvert likes a pinot gris (which he says can have "a smoky, bacon quality") with meatier mushrooms. When we encounter milder mushrooms in butter or cream sauces, a full-bodied white can be the way to go. For special occasions, a 100 percent chardonnay-based champagne works beautifully.

A MUSHROOM LIKE A SOMBRERO

Süddeutsche Zeitung, via sueddeutsche.de, July 12, 2007

Local media reports that natives of the Mexican rainforest have found a mushroom that weighs 20 kg and is as wide as an umbrella, with a diameter of 70 cm.

According to experts the mushroom, which was discovered on the Mexican-Guatemalan border in the federal state of Chiapas, belongs to the genus *Macrocybe titans* Pegler.

Two smaller examples of this species have been found in Chiapas before. Whether the mushroom is edible is not known. It was brought to the biological institute in Tapachula for further study.

Giant mushroom, Macrocybe titans *Pegler*

HUNDREDS OF SWISS MUSHROOM SPECIES FACE EXTINCTION

***Swiss info*, Sept. 5, 2007**

There are approximately 5,000 species of mushrooms in Switzerland that are visible to the human eye. Around 3,000 of these species are well documented. Unfortunately, though, nearly a third of these might vanish altogether.

The Federal Environment Office has published the first-ever red list detailing the 937 known species facing possible extinction in the country. According to researchers at the Federal Institute for Forest, Snow and Landscape Research, who put together the red list for the Environment Office, most of the threatened mushrooms belong to species that are highly dependent on their surroundings.

Habitat loss is the main threat for some mushroom species say the list's authors. Changes in agricultural practices, the growth of built-up areas, and air pollution can lead to the destruction of some types of fungi, particularly in marsh or pasture zones.

Forest mushrooms are less endangered, thanks to more sustainable forestry practices implemented a century ago. But the researchers say there is not enough dead wood lying around on the ground to guarantee fungi development and that atmospheric contaminants are also having an effect.

The situation of Swiss mushroom species is not yet desperate. Switzerland's fungi are in a similar state to those of Sweden, but fare better than those of the Netherlands where two thirds of documented species are threatened.

Good news for mushroom lovers is that picking edible fungi is not being blamed for the disappearance of species. According to Beatrice Senn-Irlet of the Federal Institute for Forest, Snow and Landscape Research, there are around 200 edible species, none of which appear on the endangered list.

The only danger for mushroom survival seems to be if too many people walk in a zone where fungi are found, compacting the earth where they grow. The Environment Office is recommending that restrictions on mushroom picking be maintained and that zones where species are threatened be protected.

As mushrooming season begins, police sent out a strong reminder about picking restrictions. Three Italians were caught with 23 kilograms of penny bun mushrooms (*Boletes edulis*) in eastern canton Graubünden last week, well above the legal limit of two kilograms per person.

The many Swiss mushroom pickers are also being warned to take care with what they collect. If they are unsure what they have in their basket, the association of national mushroom controllers is urging them to have their bounty checked to avoid cases of poisoning.

There are around 150 species of poisonous mushrooms in Switzerland.

PRESIDENT'S MESSAGE

Patrice Benson

One of my greatest joys seems to be mushroom activities, teaching about mushrooms and exploring the forests with friends hunting for mushrooms. Some may think this wacky, but fortunately, I hang out with those of you who have the same interests. We have lots of great energy right now, with our PSMS board generating lots of ideas, changes, and support. Here are a few of the upcoming activities for you to enjoy and to join in as a volunteer.

Our education chair and website master is Colin Meyer. He has been coordinating and teaching our basic and intermediate mushroom identification classes for a few years now. Many of you are learning the basics of mushroom identification because of his efforts and the efforts of his many teaching volunteers. The space for these classes is made available through the diligence of PSMS Vice President Milton Tam in scheduling space with CUH, not always an easy task because of the popularity of the site with many groups. Beginner classes start October 18, after the mushroom exhibit to give newcomers (and others) a chance to learn the basics in time for our remaining fall field trips! You can sign up by e-mailing Colin at **education@psms.org**. Phone him as a last resort or if you do not have computer access. (For details, see the article on ID classes on page 1.)

Monday mushroom ID with the master gardeners in the atrium at CUH began September 17. This will be a public service which will both help those needing their mushrooms identified and provide the identifiers with more practice! There will also be a chance for those wishing more practice to work with a more experienced identifier. This activity coincides with the current master gardener plant ID and plant pathogen/problem ID clinics already in place. Contact board member Cynthia Nuzzi to volunteer for this weekly event from 4–7 PM.

With autumn come thoughts of the holidays at year's end, and for some of us, thoughts of holiday and year end donations. Consider a

cont. on page 6

President's Message, *cont. from page 5*

gift to the Daniel E. Stuntz Memorial Endowment Fund (DESMF) at the UW (see http://www.stuntzfoundation.org).

We hope that this fund will eventually enable great mycology support for faculty at the UW. This will directly benefit our efforts to train amateur mycologists and provide the public with safe and interesting mushroom interactions. To raise awareness of our new endowment fund and to bring some mushroom fun and interaction to the public, DESMF and PSMS will host "Mushroom MAYnia" at the Burke Museum on May 4, 2008. Consider volunteering for this event. I recently attended "Bug Blast" at the Burke, and it was!

Not least on my list of mushroom things to do is our Annual Wild Mushroom Exhibit. Chair Ron Post has been working hard for months organizing this event. This takes lots of effort on the part of the many chairs involved in making this our coolest event of the year. It is also our main fund-raising effort and helps keep our membership fees affordable to almost everyone. Please read more about the exhibit and volunteer by calling one of the chairs or Ron. Lots of info can be found on our website under "exhibit." Posters can be picked up by calling me at (206) 722–0691.

The field trips this fall promise to be great owing to the timing of rains this summer. Our mushrooms will put on a good show this year! So join in on any or all of the above activities and volunteer.!

MAMMOTH MADRONA THREATENED BY FUNGI INFECTION

Diane Urbani de la Paz

Peninsula Daily News, August 27, 2007

A team of volunteer tree experts examine the roots of the state's tallest, and possibly oldest, madrona. The tree, at Eighth and Cherry streets in Port Angeles, received an antifungal treatment that should save its life.

The mammoth madrona—the state's largest—is sick, but it still has plenty of power to bring people together.

"Ted's tree," as the roughly 400-year-old madrona is known, rises 85 feet over Eighth Street in Port Angeles, just east of Cherry Street. It's named after the late Ted Serr, who drove past it daily for 20 years. His widow, Virginia, bought the small lot at 231 W. Eighth St. in 1999 and had the "Ted's Tree Park" sign erected last September.

But the madrona's roots have become infested with at least two kinds of deadly fungi, identified as *Phytophthora cactorum* and an *Armillaria mellea*.

Diane Urbani de la Paz

Experts consult on how to save Washington State's biggest madrona

Tree specialists from around the Pacific Northwest heard about Ted's tree, and they were determined to save it. Olaf Ribeiro—a Bainbridge Island resident, who is a Portuguese-Indian named after the king of Denmark—is the leader of the pack of arborists and other scientists who came here to practice root medicine.

At his home laboratory, Ribeiro studies fungi and develops treatments for ailing trees around the world. In many cases, he uses an "air spade," a kind of weed whacker that clears soil without hurting a tree's roots. With him on Friday was Martyn Jack, a Federal Way-based landscape consultant with considerable air-spading experience. The tool is also used to find land mines in Southeast Asia, Jack said.

Ribeiro's tree therapy involved air-spading the soil beneath the madrona to expose the roots, injecting organic microbes that attack the fungi, and excavating the decayed roots.

Providing the fungi-fighting micro-organisms was Nick Penovich of Port Orchard. He runs a turf-cultivation business, The Lawn Jockey, but like Jack and Ribeiro, has a passion for big, old trees.

The men have seen microbial infusion save many diseased plants, from oaks to tomatoes. But Port Angeles' giant presented them with a thorny challenge. "We had to take a drastic approach to save it," Ribeiro said.

When Jack, Ribeiro, and their colleagues air-spaded the madrona's roots on Friday morning, they found much more damage than they had expected. The roots have been "sopping wet," Ribeiro said. The crew discovered a water pipe under the tree but couldn't find the source of the excessive water—so the fungi flourished and killed much of the root system.

Yet another arborist working alongside Ribeiro is James Causton of Port Angeles. Over many years, he's watched the madrona grow larger—until overly moist soil and fungi endangered its life. "When you get to anaerobic conditions," in which the roots can't breathe in oxygen, "you have a lit fuse," Causton said.

Yet Ribeiro believes the madrona can survive, just as other ill trees have. He's helped resurrect 1000-year-old chestnuts in Britain, old orchards in California, a three-century-old oak in Alabama, and numerous apple trees in eastern Washington.

For Port Angeles' massive madrona, another 200 years of life "is no problem," Ribeiro said. "Time will tell . . . to get it to a thousand years would be great."

On Friday, Penovich sprayed some 240 gallons of organic microbial therapy into the roots and onto the tree's crown.

Jack air-spaded the soil and "got it nice and fluffy," Ribeiro said, "so the roots are in a happy environment."

Finally, to keep the soil from compacting around the roots—which would shut out air—his crew laid down porous lava rock.

Expenses from Friday's work totaled $900—a tiny figure compared with what it would cost if Ribeiro and the others got their usual fees. Ribeiro charges $150 an hour, plus $75 for each test he conducts. His recent treatment of an ailing Douglas fir in Seattle cost $1800.

Sequim arborist Chris Austin came to Port Angeles Friday to work alongside the giants of his profession. "I'm just here to help . . . and learn from Dr. Ribeiro. It's a privilege to be able to preserve these large trees. They're an important part of the city's infrastructure."

"There's a desperate need for the public to understand the root-zone requirements," Austin added. When homes and subdivisions are built, contractors should mark tree protection zones so their heavy equipment doesn't damage soil and roots, he said.

At the end of the day, Ribeiro declared this the most difficult project he'd ever worked on. "There were so many decaying roots, and the soil was so wet," he said. The volunteer crew, however, buoyed him.

"I have great faith that this tree is going to look great in two to three years," Ribeiro said. He's seen microbial treatment hasten many others' recovery.

"There's a lot of good karma coming from these people," the tree doctor added, looking around at his fellow volunteers. "There's a lot of positive energy here."

A KIRO-TV reporter from Seattle came to produce a feature, and marveled at the number of hours donated by the crew.

"Come here and stand under the tree, and you'll understand," Ribeiro told him.

APPEARANCE AND DISAPPEARANCE OF GENES TRACKED OVER 300 MILLION YEARS

John Timmer

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It's been thought for a while that gene duplications play a key role in fostering evolutionary novelty. With an extra copy of a gene, the original can keep performing its normal function, while the new copy can change in a way that allows novel or specialized activities. Some examples of this behavior have been identified over the years, but there were lingering questions about whether those examples represented the typical behavior. The completion of genome sequences from a variety of related species has now allowed these questions to be explored in a systematic manner.

A paper that will appear today in *Nature* takes advantage of 17 different genome sequences in a group of related fungi (the Ascomycota) to compile a natural history of all the genes present, including duplication events, gene losses, and a single whole-genome duplication event. The reconstruction spans 300 million years' worth of evolution, and precisely identifies when new genes appeared relative to speciation events.

Most of the genes essential for basic organismal function are ancestral, appearing throughout these fungi; for example, in baker's yeast, 96 percent of essential genes are ancestral. Many novel groups of genes have appeared within this time scale, most of them related to significant lifestyle adaptations, such as sporulation and sexual reproduction. Gene loss also occurred, often associated with adaptation to a pathenogic lifestyle.

A number of results provide us with a much greater perspective on how changes in gene copy numbers fit into the big evolutionary picture. When it comes to the basic biology of the cell, it looks like additional gene copy numbers may be unhelpful or actually harmful, as they don't last long in the genome: there were far fewer changes in gene dose for genes involved in growth and metabolism. In contrast, genes involved in stress response, development, and sensing environmental changes were frequently duplicated.

The analysis also looked at how the extra copies of genes picked up new functions by comparing the activities of the new and old copies using a number of assays: physical interactions between the gene product and other proteins, genetic interactions with other genes, and common regulation by the same transcription factor(s). The authors suggest that changes in physical interactions indicate different function has come about via biochemical changes in the protein itself. In contrast, changes in regulation indicate that new regulatory information has evolved to allow the two copies to perform different functions.

In the end, the data suggest that regulatory differences seem to be key. The authors conclude, "Our analysis shows that paralogues [duplicated genes] diversify most frequently at the level of regulation, less frequently through changes in their cellular component, biological process or molecular interactions, and rarely in biochemical function." In the ongoing argument about the importance of regulatory changes in evolution, this paper clearly sides with those who argue that these differences are key.

There are a lot of other notable details in the results, but I'll end this report by backing out and looking at the big picture. The computational tools the authors developed for this analysis are general, rather than specific to the fungal genomes. They should work just as well with any collection of organisms (say, all the vertebrate genomes), and the analysis can be redone as new genomes are completed. So, we can look forward to these tools providing us with further insights in the future.

FUNGI MAKE BIODIESEL EFFICIENTLY AT ROOM TEMPERATURE

Aaron Rowe

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Scientists at the Indian Institute of Chemical Technology have found a much better way to make biodiesel. Their new method could lower the cost and increase the energy efficiency of fuel production.

Instead of mixing the ingredients and heating them for hours, the chemical engineers pass sunflower oil and methanol through a bed of pellets made from fungal spores. An enzyme produced by the fungus does the work—making biodiesel with impressive efficiency.

Last Monday, Ravichandra Potumarthi showed off his work during a poster session at the International Conference on Bioengineering and Nanotechnology. After returning to his lab in Hyderabad, he was able to send out some pictures of his experimental reactor and the fungal pellets.

Typically, biodiesel is made by mixing methanol with lye and vegetable oil and then heating the brew for several hours. This bonds the methanol to the oils to produce energetic molecules called esters. Unfortunately, heating the mixture is a huge waste of energy, and a major selling point of alternative fuels is efficiency. An enzyme called lipase can link oil to methanol without any extra heating, but the pure protein is expensive.

Potumarthi has a simple solution. Why bother purifying the lipase? It would be easier to just find an organism that produces plenty of the enzyme and squish it into pellets. In this case, the fungus *Metarhizium anisopliae* does the trick.

Recently, several huge research centers have sprung up to develop better ways to make biofuels. Considering that a handful of chemical engineers can accomplish so much on what appears to be a shoestring budget, the future of alternative fuels looks pretty good— but maybe a bit slimy.

Biofuel reactor *Biofuel pellets*

MUSHROOM-CRUSTED LAMB LOIN WITH RED WINE GLAZE

Whole Foods Market

Mushrooms bring an earthy flavor to the tender meat, which is balanced by a bold red wine sauce. The lamb pairs splendidly with steamed haricots verts (French green beans) and brown rice. Serves 4.

2 racks of lamb (8 ribs each)
2 cups white or cremini mushrooms, about 6 oz
½ teaspoon salt
¼ teaspoon black pepper
3 tablespoons Dijon mustard
1 tablespoon canola oil
¾ cup red wine
¾ cup beef or chicken broth
1 teaspoon sugar (optional)
1 tablespoon chopped fresh thyme

Debone and remove the fat and silverskin from the rack of lamb. If you are not familiar with how to do this, ask the meat department butcher. Set the resulting lamb loins aside.

Place the mushrooms in a food processor and process until finely chopped. If you do not have a food processor, chop the mushrooms until they are very fine. Remove any resulting liquid from the mushrooms by placing them in a paper towel and squeezing. Transfer the chopped mushrooms to a large plate.

Sprinkle the lamb loins with the salt and pepper, then rub the Dijon mustard on the outside of the loins, not including the ends. Press the mustard-rubbed side of the loins into the chopped mushrooms on the plate, making sure the mushrooms adhere well to the lamb.

Heat the canola oil in a sauté pan.

Using tongs, place the lamb loins in the pan and sear on all sides containing the mushroom mixture. This should take about 3 minutes per side. Once they are seared, either reduce the heat to medium and continue to cook, covered, on the stove or transfer the uncovered pan to a 350ºF oven and continue to cook until the lamb is medium rare (125ºF internal temperature), or longer if desired. Remove the loins from the pan and let them sit for a few minutes prior to slicing so that the meat redistributes its natural juices.

In the meantime, add the wine, stock, and sugar to the pan and simmer on medium-high heat until it reduces so that it is thick enough to coat the back of a spoon. (The sauce should reduce by approximately half of its volume.)

Slice each loin into eight slices on a bias. Drizzle some sauce on the bottom of each plate and shingle four slices of lamb on top. Top with the fresh chopped thyme.

The Wild Mushroom

The Fern,
With its green fingers
of lace
and lilac
With its heavy lavender tresses
Are held above you-
The ugly duckling cousin
Who hides among
Fallen leaves
Or peeks out humbly
From beneath the
Tree trunks's shadow.
Yet not scorned by all
Is the wild mushroom...
Who has been
Chosen by fairies
Who dance in moonlit circles,
And the riddle-weaving
Caterpillar of Wonderland
As his throne.

—Carissa Bielamowicz

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