SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY
Number 424 September 2006

PSMS EXHIBIT

Ron Post

I am looking forward to another successful exhibit, our 43rd annual show.

Thanks to artist Pat Murosako for his donation of the image in this year's publicity poster. It is such a creative picture, it spawned the slogan we are using as our exhibit theme: "Mushrooms Big and Small." Feel free to create a table display using that theme and bring it the show for public viewing. Have it there by Saturday morning (Oct. 14) at 10 AM, and we will put it up! For uniformity's sake, a 20-in. by 30-in. display would work best, but nothing will be refused.

Please come to the September meeting and sign up for time slots on the numerous committees that need your help. And you can pick up five or 10 posters to distribute in public places. That is how we advertise, and it is crucial to the show's success.

Thanks also to Agnes Sieger for her elegant poster design! And my sincere thanks to the Seattle Public Library for allowing us to create another mushroom display for the science floor (7th floor) during the month of October.

This year's featured speaker is Paul Kroeger of Vancouver, B.C. Paul will speak Saturday, October 14, about the mushrooms of Haida Gwai, or the Queen Charlotte Islands.

I will speak briefly about the show and answer questions at this month's meeting and in October. **About 50–100 volunteers are needed to bring off the exhibit.** Call me! Or call the chair (listed below) of the committee you wish to help. If you are a chair and no longer able to head the committee listed by your name, call me immediately (my contact number for the exhibit is 206 370-4487).

Reimbursements for reasonable expenditures (excluding gas) will come from either PSMS Treasurer David Manus, President Patrice Benson, or myself, and you need not wait until after the show. Since this is a volunteer effort, we usually require board approval for expenditures of more than $100.

Whether you choose to greet visitors, sell books, identify or display mushrooms, or decorate the facility, thank you, ahead of time, for your effort. Let's hope we have significant rainfall and a bunch of wild Washington mushrooms in good condition. To find a guide on collecting wild mushrooms for the exhibit, go online to our Website (psms.org) or come to the September meeting and pick up a hard copy of the guidelines. It will also be reprinted in the October newsletter in time for your perusal.

Don't forget that every year PSMS members hold a potluck in the hospitality room of the exhibit hall. The kitchen there has an oven, and it's a great chance for you to unwind or chat with other members. Please bring a dish to share.

2006 MUSHROOM EXHIBIT COMMITTEE CHAIRS

Arts & Crafts	Marilyn Droege	206 634-0394
Book Sales	Younghee Lee	206 632-1284
	John Goldman	206 933-0838
Cooking & Tasting	Michael Blackwell	
	Patrice Benson	206 722-0691
	Colleen Compton	206 417-4540
Construction	Don Lennebacker	425 678-8350
Duff/Moss Collection		
Exhibit Chair	Ron Post	206 370-4487
Feel & Smell	Dennis Krabbenhoft	253 752-7202
Hospitality		
Kid's Table		
Membership	Bernice Velategui	206 232-0845
Mushroom Collection	Russ Kurtz	206 784-3382
PSMS Office (latest info)		206 522-6031
Publicity	Emily Routledge	206 355-5221
Ticket Sales	Elizabeth Lisaius	206 433-0193
Tray Arrangement	Marian Maxwell	425 235-8557

Orson Miller, 1930–2006

Dr. Orson K. Miller, Jr., passed away June 9, 2006, from a brain tumor that was diagnosed last fall. A noted mycologist, researcher, teacher, and mentor, Orson always worked to bridge the gap between professional and amateur mycology, and was intimately involved with the North American Mycological Association, the Southern Idaho Mycological Association, and various other local mushroom clubs. He was a past president of the Mycological Society of America and received numerous lifetime teaching and research awards.

His first book, *Mushrooms of North America*, was a notable milestone for mushroom identification in North America. His newest book, *North American Mushrooms: A Field Guide to Edible and Inedible* (with his wife, Hope, as coauthor) was published in May.

At the time of his death, Orson was a professor emeritus of botany at Virginia Tech, and he and Hope had retired to the conifer-aspen forests of McCall, Idaho where he enjoyed fishing, hiking, and collecting mushrooms.

Spore Prints

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PUGET SOUND MYCOLOGICAL SOCIETY

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Annual dues $25; full-time students $15

CALENDAR

Sept. 12	Membership Meeting, 7:30 PM, CUH
Sept. 16	Field Trip, Troublesome Creek Campground
Sept. 18	Board Meeting, 7:30 PM, CUH
Sept. 19	*Spore Prints* deadline
Sept. 23	Field Trip, Money Creek Campground
Sept. 30	Field Trip, Tumwater Campground
Oct. 7	Field Trip, La Wis Wis Campground
Oct. 14–15	PSMS Wild Mushroom Exhibit, Sand Point

BOARD NEWS

Dennis Oliver

It might now be 80 degrees, sunny, and dry but soon, soon the skies will darken and rain will fall. Mushroom season will begin again. Your board of trustees gathered to hold the first meeting of the fall season. A good turnout discussed the upcoming mushroom exhibit, coming along nicely chaired by Ron Post. A poster has been designed, committee chairs are being organized, and calls for volunteers are being voiced. Mushroom classes are being planned. The field trips are being scheduled. Patrice Benson, our president, has held meetings during the summer with both CUH and the Burke Museum covering a range of topics: schedules, joint projects, and creation of an endowed mycology position. So PSMS is ready. Now all we need is some rain.

MEMBERSHIP MEETING

Tuesday, September 14, at 7:30 PM at the Center for Urban Horticulture, 3501 NE 41st Street, Seattle

Our featured speaker this month will be our scientific advisor, Dr. Joseph Ammirati. who will talk on fall mushrooms of the Pacific Northwest.

Dr. Ammirati is a mushroom taxonomist, working primarily on *Cortinarius*, but has broad interests in Agaricology. He is respected for his work with *Cortinarius*, toxicology, and forest ecology. His revision of *The New Savory Wild Mushroom* earned him a certificate of achievement from the Society for Technical Communication, and he is co-author of *Poisonous Mushrooms of the Northern United States and Canada*. Dr Ammirati is a constant supporter of mushroom hobbyists, speaking at numerous meetings, banquets, and forays. He was the advisor for our Barlow Pass study, the Oregon chanterelle project, and the Pacific Northwest Key Council. He has been foray mycologist for several North American Mycological Association forays, has been foray mycologist for amateur societies innumerable times, and has spoken at their meetings, classes, forays, and banquets. Now, once again, he will address our society.

Would persons with last names beginning with the letters A–L please bring refreshments for the social hour?

PRESIDENT'S MESSAGE

Patrice Benson

Lots of planning has been going on to make sure that our mission of providing education about mushrooms to our community will be exciting and interesting. The Education Committee met last night to set up mushroom ID classes geared to all for the fall of 2006 and the spring and fall of 2007. All classes will be held in the Douglas Classroom at CUH and will be listed in this newsletter and on our Website, www.PSMS.org.

The poster, planning, and rain-dancing for the 43rd annual PSMS Wild Mushroom Exhibit have been taking place all summer. We need everyone to "think rain" and come to the membership meetings in September and October to sign up to help. Members just need to be willing. There are many easy and fun ways to assist with our main annual fundraiser.

One exciting addition to the Exhibit will be mycopyrography expert Marie Heerkens, who will be demonstrating her art for the whole exhibit.

Please feel free to contact me with suggestions, wishes, and especially compliments for things that you like or wish to see happen in our mushroom world. You can reach me via e-mail from the PSMS Website link to president@psms.org or by phone at 206 819–4842.

FALL FIELD TRIPS — Cathy Lennebacker

All field trips start at 9 AM. Please be prepared for the weather. A potluck is held in the afternoon through October. The potluck time is at the host's discretion. Be safe and bring a watch, compass, walkie talkie/GPS if you have them, and a friend. There will be PSMS signs posted at each site to help you locate the group. Good luck and have fun picking.

September 16 — Troublesome Creek Campground

Troublesome Creek Campground is located approximately 20 miles east of Index, Washington, adjacent to the North Fork of the Skykomish River. There is no shelter, but the site is close. Jack Pass is easily accessible, and the higher elevation will be more moist. Chanterelles are a possiblity if the weather cooperates. If not we've all had a lovely ride in the mountains.

Driving Directions. From Monroe go east on Hwy. 2 toward Stevens Pass. In Index, turn left and follow Forest Service Road 63 along the North Fork of the Skykomish River for 10 miles. The campground is on the right.

September 23 — Money Creek Campground

This is a lovely riverside campground with chanterelle and bolete hunting immediately off Hwy. 2 to the right on the Skykomish River.

Driving Directions. Drive 30 miles east of Monroe on Hwy. 2. The campground is immediately off the highway on the right. Follow the PSMS signs to the camp site. We have reserved a site for Friday and Saturday. There is a $7 overnight parking fee, and forest passes are required.

September 30 — Tumwater Campground
(elev. 2050 ft, 95 miles east of Seattle)

Tumwater campground is located on the north side of Hwy. 2 about 10 miles west of Leavenworth. Camping is available.

Driving Directions. From north of Seattle, drive east over State Highway 2. Tumwater Campground is about 23 miles east of the Stevens Pass summit, on the left. Watch for the sign.

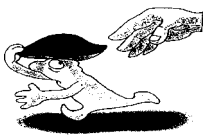
October 7 — La Wis Wis Campground

La Wis Wis campgound is located just outside the southeastern corner of Mt. Rainier National Park in old growth forest with thick moss cover. The forest service campground closes September 30, but there are lovely free primative sites just north along the Ohanapecosh River. There are no bathrooms, so be prepared.

Last year we found tons of Pigs Ears and *Boletus mirabilis* right in the camp area. The Ohanapecosh forest ranger told us where the matsutakes are found outside the park. There should also be lots of white chanterelles and hedgehogs. It's a long way but worth the drive.

Driving Directions. Take I-5 south to exit 68 and turn east on US 12. Drive 65 miles to Packwood. Continue 7 miles east on US 12, then drive ½ mile west on forest service road 1272. The main campground will be closed, so follow the PSMS signs north from there to a free spot between the campground and Mt. Rainier National Park.

Alternate Route. Go east on Hwy. 410 over Cayuse Pass, past the southeast entrance to Mt. Rainier National Park toward Packwood. The La Wis Wis campground entrance is on the west side of the road 7 miles past the Ohanapecosh campground.



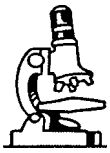
Follow the PSMS signs from both directions.

BEGINNING MUSHROOM I.D. CLASS — Colin Meyer

Beginning mushroom identification classes will be offered this fall on three consecutive Sunday evenings, September 24 through October 8. Classes will be held in the Douglas Classroom at the Center for Urban Horticulture, from 7:00 until 9:00 PM in the evening.

The classes will focus on learning the anatomy of mushrooms and how to use dichotomous keys for identification. The recommended text is *Mushrooms Demystified* by David Arora. The book will be available for sale on the first day of class, and there will be a few copies available for borrowing from the PSMS library.

The cost for the classes is $25. Registration is available to PSMS members only. The class always fills up, so please do not come if you do not have a confirmed registration. For more information or to register, please telephone (206) 722–6687 or (preferably) e-mail Colin Meyer at education@psms.org.



ASTRAEUS SPECIES WANTED FOR BIO-MEDICAL RESEARCH — Jim Trappe

An opened specimen of Astraeus pteridis

Once again the fungi show their importance to mankind! Extracts of *Astraeus pteridis* have shown exceptionally strong suppression of certain human pathogenic bacteria in collaborative research by Drs. Samir Ross of the University of Mississippi and Jim Trappe of Oregon State University. Substantial quantities of specimens are needed to follow up the exciting results of their preliminary studies. Ross and Trappe solicit dried specimens of both *A. pteridis* and *A. hygrometricus.* Send them to Jim Trappe, Forestry Sciences Laboratory, 3200 Jefferson Way, Corvallis, Oregon 97331.

Astraeus spp. resemble earth stars in the genus *Geastrum*, but their spore sacs are sessile, sitting flush on the cracked, inner peridium. The peridium opens as star-like rays to expose the spore sac in wet weather (see the figure), but the rays close around the spore sac in dry weather. *A. hygrometricus* is about 2–4 cm broad and rounded when the rays are closed, the "star" is 4–6 cm broad and sometimes up to 9 cm when the rays are open. *A. pteridis* can be even larger.

Suppliers of specimens will be gratefully acknowledged in any publications that result from this research.

MEXICO MUSHROOMS KILL 10 FROM SAME FAMILY

AP, August 4, 2006

TUXTLA GUTIERREZ, Mexico - Several cases of mushroom poisoning were reported in Chiapas, Mexico's southernmost state, in July. The poisonings occurred in the area around the colonial city of San Cristobal Las Casas, 460 miles (740 km) southeast of Mexico City.

A 7-year-old boy and his father died August 4, bringing to 10 the number of people killed by toxic fungi. At least 10 victims remained hospitalized for mushroom poisoning, some with severe liver damage.

The 10 fatalities, all from the same Indian family in the community of Tenejapa, had eaten a soup made with wild mushrooms gathered deep in the mountains of Chiapas. An 11th family member, a 69-year-old man, did not eat the soup and was not affected. Medical officials said the type of toxin contained in the mushrooms that the family ingested had immediate and severe effects on the liver, making it difficult for doctors to help them.

Wild mushrooms flourish during the rainy season in the forests and jungles of Chiapas, and are a common dietary staple for many Indian families. Relatives of the victims said the family had picked and eaten mushrooms from the same spot, and with the same appearance, last year, without suffering any ill effects.

Officials speculated that recent genetic mutations may have made some mushrooms, consumed for years in Indian communities, newly poisonous. Authorities have been inspecting open-air food markets, collecting all mushrooms sold there to prevent further deaths.

BE VERY CAREFUL WITH YOUR AGARIX

Tony Wright

Mycelium, Myco. Soc. of Toronto, April–June 2006

Agarix has been a very popular dietary supplement in Japan, reputed to have many health benefits. It is formulated from the mushroom *Agaricus blazei*, a member of the same genus as our ubiquitous store-bought button mushroom. A Web search will yield all sorts of information on its advertised medicinal properties, including tumor fighting.

But why should we be careful? Well…here goes! The Japanese health authorities decided to test three different brands of Agarix products available in their market place. Rats were their guinea pigs to evaluate the health risk, if any, to humans. On February 13, 2006, they issued a report and caused one brand to be withdrawn from the market, but not the other two.

Why one and not all? It seems that the three brands used different processes in the preparation of their products, and procured their mushrooms from different growing areas. The brand whose products were withdrawn reportedly used mushrooms grown in China. There are several other countries where the mushroom is commercially grown, including Japan, where it is known as Himematsutake and Kawariharatake. Brazil was the original supplier, and interestingly the correct name for the mushroom now being used in this industry may, in fact, be *A. brasiliensis* and not *A. blazei*.

If the basic ingredient was a problem (*A. blazei* or *brasiliensis*) in the minds of the Japanese authorities, all these products would presumably have been withdrawn from the market, not just one brand. We might therefore surmise that the health problem lies in the growing, processing, transporting, or packaging conditions for the one particular brand. Soil conditions, pollution contamination, or use of pesticides somewhere in the chain might have been responsible.

But there is more news: The other suppliers of Agarix in Japan have subsequently withdrawn all their Agarix products from the shelves. Why? Maybe the problem is not just with one supplier's processes.

I checked with two local health food stores in Toronto to see if they carry products with *A. blazei* listed as an ingredient. They do, and the label on one product mentioned the name of Paul Stamets, noted mycologist, author and grower of medicinal mushrooms. This led me to the website of his medicinal mushroom enterprise, Fungi Perfecti, and the page http:// www.fungi.com/mycomeds/agaritine.html, where he discusses this mushroom and its agaritine (a toxic carcinogen) content, and displays a comparative scientific component analysis for four sources of the mushroom extract. Fungi Perfect does produce an extract of this mushroom, but NOT by using the fruit bodies of the mushroom; they only use freeze-dried powdered mycelium or ethanol/water extracts of live mycelium. That web page includes a comment by Paul Stamets "…I do not ingest products made from the fruit bodies of *Agaricus*, especially *A. brasiliensis…*".

If you manage your ingestments. this is all food for thought.

A USEFUL FUNGUS

The New York Times

June 20, 2006

The modern house is held together by glue. That is, many construction products—like plywood and fiberboard used as sheathing—are laced with phenolic resin adhesives. These are heat-set polymers that are so impregnable that they will outlast the wood sheets or chips they hold together.

White rot fungi on wood, doing their thing

The staying power of phenolic resins also means they accumulate in landfills in large amounts. If the glues could be broken down, recycling of plywood might be possible. But methods devised so far require heat and costly solvents.

Adam C. Gusse and colleagues at the University of Wisconsin-Lacrosse wondered about an alternative approach. Fungi that cause wood to rot, they noted, work by breaking down lignin, the compound that holds plant tissues together. The molecular structure of lignin and phenolic resins is similar. Could a fungus be used to degrade the glues?

Their answer, to be published in the journal *Environmental Science and Technology*, is yes. They showed that a species of white-rot fungus (*Phanerochaete chrysosporium*) cultured in a Petri dish with chips of phenolic resin, turned pink—the color of the resin before it is thermally cured. Further experiments showed the fungus was taking up carbon from the glue.

The researchers say this is the first demonstration of biodegradation of phenolic resins.

NEW METHOD SHOWS MUSHROOMS A TOP SOURCE FOR ONE ANTIOXIDANT

The Sporeprint, L.A. Myco. Soc., October 2005

University Park, PA - Using a new, more sensitive testing approach they developed for fungi, Penn State food scientists have found that mushrooms are a better natural source of the antioxidant ergothioneine than either of the two dietary sources previously believed to be best.

The researchers found that white button mushrooms, the most commonly consumed kind in the U.S., have about 12 times more of the antioxidant than wheat germ and 4 times more than chicken liver, the previous top-rated ergothioneine sources based on available data.

Until the Penn State researchers developed their testing approach, known as an assay, there was no method employing the most sensitive modern instrumentation and analytical techniques to quantify the amount of ergothioneine in fungi. The researchers say that their assay can be used for other plants, too, not just mushrooms.

Joy Dubost, doctoral candidate in food science who conducted the study, says, "Numerous studies have shown that consuming fruits and vegetables which are high in antioxidants may reduce the risk of developing chronic diseases. Ergothioneine, a unique metabolite produced by fungi, has been shown to have strong antioxidant properties and to provide cellular protection within the human body."

Dubost detailed the new assay and the amounts of ergothioneine in the most common and exotic in mushrooms typically available in U.S. food stores in a paper presented at the 230th meeting of the American Chemical Society in Washington, D. C. Her paper was titled "Identification and Quantification of Ergothioneine in Cultivated Mushrooms by Liquid Chromatography-Mass Spectroscopy."

The Penn State researchers found that among the most commonly consumed mushrooms, portabellas and criminis have the most ergothioneine, followed closely by the white button mushrooms. A standard 3-oz USDA serving of these mushrooms [all *Agaricus brunnescens*], about the amount you'd put on a cheese steak or mushroom-topped burger, supplies up to 5 mg.

The exotic mushrooms have even more ergothioneine. The same standard serving size of shiitake (*Lentinula edodes*), oyster mushrooms (*Pleurotus ostreatus)*, king oyster mushrooms (*Pleurotus eryngii*), or maitake (*Grifola frondosa*) can contain up to 13 mg in a 3-oz serving, or about 40 times as much as wheat germ.

Dubost notes that the levels of ergothioneine do not decrease when the mushrooms are cooked.

In developing their new assay, the researchers adapted an assay used to quantify the amount of ergothioneine in bovine ocular tissue. They used high performance liquid chromatography (UPLC), a UV-VIS detector, and mass spectroscopy, instruments normally used in analytical chemistry.

There are mushrooms that are commonplace,
And some that are incredible.
But the mushrooms that attract me most
Are the species labeled "edible."
—Don Goetz

FUNGI TO THE RESCUE? **Dean Abel**

The Mycophile, North Amer. Myco. Assoc., May/June 2006

The American honey bee faces a new threat, a tiny mite named *Varroa destructor*. An inadvertent stowaway on bees smuggled into the United States sometime before 1987, the mites, which feed on the blood of immature bees as they develop in their brood cells, can wipe out a honeybee colony.

Treatment for bee mites has ranged from peppermint oil to heated "mite zappers" to chemical pesticides. The chemicals work for a time, but the mites soon develop resistance to them. Steve Sheppard, entomology professor at Washington State University, has investigated control methods that take advantage of the fact that queen bees measure the size of comb cells with their antennae to decide whether to lay a male or female egg. Since the mites preferentially reproduce on male brood, beekeepers can add special combs to each hive that will produce only drone bees. Once these cells are full, the combs are removed and put into a freezer to kill the mites. However, his method is economical only for small beekeepers, as it is too labor intensive for commercial operations.

New developments in the control of bee mites utilize the fungi *Metarhizium anisopliae* or *Hirsutella thompsonii*, which are lethal to the bee mites and harmless to the honeybees (although *Metarhizium* does kill termites, locusts, and grasshoppers). These fungi are Deuteromycetes like *Aspergillus* and *Penicillium.* They are often called "imperfect fungi" because they have no known sexual stage. They produce spores neither within asci nor upon basidia but reproduce solely through conidia (asexual spores) by budding in one manner or another.

Plastic strips coated with dry fungal spores are placed in the honeybee hives. The bees chew up the strips and spread the spores throughout the colony. The fungal spores attach to and germinate on the surface of the mites. The fungus forms a swelling that produces a peg that penetrates the cuticle of the host; thus the mites are not required to ingest the spores. Growth of the fungus is usually confined to the haemolymph (blood) of the host prior to death. When the host dies, the fungus takes over the cadaver and envelops it with a mat of green conidia. In field trials most of the mites were dead within three to five days.

Perhaps a new strain of honeybee will evolve that carries the spores of the useful fungi with it much as some ants and termites carry their symbiont fungus along to establish it in new colonies. We hope that the honeybees will survive and that we will continue to enjoy Marti's honey next year.

An adult female Varroa *mite feeds on a developing bee*

MIGHTY MITES AND NIFTY MUSHROOMS

Else Vellinga

Mycena News, Myco. Soc. of San Francisco, February, 2006

Those plants with seeds that stick to our cat's fur have really come up with a nice way to get their offspring to new places. It works well for all fur-bearing mammals and those naked ones who wear clothes. Some mushrooms have come up with the same brilliant idea: make spores that stick to hairs, and let an animal disperse them.

Consider *Tomentella sublilacina*. This fungus forms fuzzy gray-purple crusts on the underside of pine branches lying on the forest floor. It is extremely common in the coastal Bishop pine forests of Point Reyes and Salt Point, where it is one of the dominant ectomycorrhizal species. After the 1995 Mount Vision fire it immediately colonized the newly germinated Bishop pine seedlings. However, it is not restricted to coastal California. It can be found on a wide range of host trees, and has been recorded all through North America and in Eurasia from the Atlantic Ocean to Kamchatka and from the Caucasus to the northern Ural.

There is not much breeze close to the forest floor, so relying on wind to disperse its spores wouldn't get *Tomentella* far. How then is it possible for such a species to be so widely distributed?

Tomentella *spores*

The answer depends on the little creeping, crawling, racing animals of which forests and their soils are full. To prepare for their ride the spores of this and all other *Tomentella* spp. have developed irregular shapes with knobs and spines. For protection on the way, they are thick walled and pigmented.

Oribatid mite with Tomentella *spores in gut*

These spores adhere particularly well to the hairs of Oribatid mites (a group of mites especially species-rich in woody settings). The mites walk over the *Tomentella* and, acting like little lawn mowers, eat spores and hyphae as they go. Inside and out they become covered in spores. The mites being small do not get far; they certainly do not disperse the spores from one continent to another. However, they get eaten, and other critters like millipedes, centipedes, salamanders, and beetles acquire the spores at second hand. The nice touch is that the *Tomentella* spores are pretty good at surviving the passage through two digestive systems and a reasonable percentage remains viable. An experiment with millipede frass on young pine seedlings resulted in ectomycorrhization of the growing roots, though it developed slowly. This showed that these spores are good at surviving hostile environments, like stomachs and soils on fire.

That mites are good at transporting propagules has been shown in lichens as well. Lichens, of course, demand more because they consist of two organisms, a fungus and an alga (or a blue-green alga, or both). Mites that graze on the yellow wall lichen *Xanthoria parietina* digest bits of the fungus and of the alga, both of which are still able to germinate after passage through the mite's intestinal tract. This, of course, is of great advantage to the lichen, as the two constituents of the organism are close when they are ready to commence a new life together.

Other studies have focused on the oribatid mites themselves and what they do. They are everywhere in the soil. So many species, with so many individuals, exist in one habitat that there must be some kind of differentiation in food, microhabitat, or life cycle. In one German forest 120 species were encountered, with densities up to 400,000 individuals per square meter! Some mites are litter feeders, but others specialize on fungi. Do these species indiscriminately eat any kind of fungus or do they have preferences? To figure this out, several different mites were presented with a choice of fungi served up as little disks of mycelium (the vegetative part of tile mushroom which is underground and not visible to the naked eye). Only a few species of mites were used in this experiment, but they had strikingly different tastes; *Boletus badius* was eaten more than the other species offered, but one species of mite preferred the ericoid mycorrhizal species *Hymenoscyphus ericaa* while *Agrocybe* species, *Paxillus involutus*, and *Amanita muscaria* were shunned completely by another of the mite species. However, problems with equalizing mite motivation and appetite for the fungal feasts cloud these results.

In the case of *Tomentella*, the fungivores serve the fungus by dispersing its spores. But in general, fungi not unreasonably put up defenses against being eaten. Fruit bodies (the mushrooms) are ephemeral. The long-lived part of a fungus which must be preserved consists of its underground hyphae, which can be covered in calcium oxalate crystals, the way walls are covered in barbed wire and broken glass. In the fruit bodies themselves, crystals on cystidia may just be a remnant or by-product of this or a similar hyphal defense mechanism. Thick cell walls, though desirable for resisting digestion, can decrease palatability as can acrid or bitter substances within cells.

So far we have taken a fungal perspective. Our examples have indicated the influence these little animals have on fungi, on fungal composition and their functioning in nature. But the opposite is also true—the composition of the soil fauna is determined by the presence of fungi. So far, only a few of the intricate mutual relationships between mushrooms and soil-dwelling creatures have been unraveled, but it is clear that we have only got a glimpse into terra firma, the black box on which we all stand.

For further reading and some nice pictures check out the following papers:

Lilleskov, E. A. & T. D. Brims, 2005. Spore dispersal of a resupinate ectomycorrhizal fungus, *Tomentella sublilacina*, via soil food webs. *Mycologia*, *97*, 762–769.

Meier, F.A., S. Scherrer & R. Honegger, 2002. Faecal pellets of lichenivorous mites contain viable cells of the lichen-forming ascomycete *Xanthoria parietina* and its green algal photobiont, *Trebouxia arboricola*. *Biol. J. linn. Soc*., *76*, 259–268.

Schneider, K., C. Renker & M. Maraun, 2005. Oribatid mite (Acari, Oribatida) feeding on ectomycorrhizal fungi. *Mycorrhiza*, *16*, 67–72.

BLIND FUNGUS

The Sporeprint, L.A. Myco. Soc., April 2006

The gene whose mutation renders a fungus "blind" to light has been discovered by Duke University Medical Center researchers. They said their finding—which solves a genetic mystery four decades old—could give basic insights into how organisms sense and respond to environmental signals. These signals include not just light, but also gravity, touch, and chemicals.

The researchers identified the mutations in a particular strain of a filamentous fungus called *Phycomyces*, which scientists use to

study sensory perception. The strain has an unidentified mutation, called madA, which causes defects in phototropism, the growth of the fungus toward light.

The discovery of the specific mutated gene underlying the madA defect could signal a turning point in the field of sensory research, providing an avenue for other researchers to join in the pursuit of the remaining nine genes in the mad family, said the investigators.

The results of the Duke research appeared this week in the online edition of the *Proceedings of the National Academy of Sciences*, to be published in print in the March 21 issue of the journal. The work was supported by the National Institutes of Health.

"These organisms can sense all kinds of environmental stimuli—light, gravity, objects," said Joseph Heitman, M.D., Ph.D., senior author of the study. "Their spore-containing branches respond by growing in a different direction or at a different speed in reaction to such stimuli."

Phycomyces mutants with defective phototropism were isolated in the laboratory of Nobel Laureate Max A. Delbrück, with the aim of identifying the components of the sensory pathway. Biologists named the phototropic mutants mad mutants in honor of Delbrück. Of the ten mad mutants identified, three (madA, madB, and madC) have defective phototropism but react normally to gravity and other environmental signals.

"In 1953 Delbrück quit his research for which he won the Nobel Prize and worked the rest of his life on discovering the photoreceptors, or light-sensing proteins, in the fungus *Phycomyces*," said Duke's Alex Idnurm, Ph.D., first author of the study. "He never succeeded, though was still at it up until he died in 1981. In our paper, we identified one of the *Phycomyces* photoreceptors and show Delbrück's 'blind' strains contain mutations in this gene."

Using genetic sequence information from the genes for photoreceptors of other fungi, the researchers identified two candidate light-sensing genes of similar sequence in *Phycomyces*. To determine whether either of these genes was required for light-sensing, the researchers determined the sequences of genes from *Phycomyces* strains that contain madA, madB, and madC mutations. They found mutations in one of the candidate genes in three separate madA mutant strains of *Phycomyces*. Further experiments showed that the mutant fungi did have a light-sensing defect that is directly attributable to the madA mutation.

Later this year the sequence of the *Phycomyces* genome will be completed. The researchers envisage that the complete sequence will facilitate the cloning of the other mad genes, further elucidate how the fungus responds to light, and eventually enable the discovery of the molecular basis by which other environmental signals are perceived. Emaxhealth.com. 13 March 2006

EAGLE CREEK FIELD TRIP

Agnes Sieger

Some 50 congenial people and five dogs congregated at Coleman Leuthy's cabin on Eagle Creek near Leavenworth on June 2–3. A few enthusiasts dropped in on Friday, with most showing up Saturday. The mix included eager newcomers, blasé old-timers, and all ages in between. It was good to see so many young people out, and especially good to see Pamela Luther, wife of Identification Chair Brian Luther, back again after major surgery last spring.

Coleman was his usual gracious host, mowing the meadow to provide parking spots, furnishing electricity for the people in campers, and providing real restrooms, complete with plumbing and electricity, in the barn for all.

Most of the crowd undoubtedly harbored dreams of duplicating the mushroom bonanza found on this field trip last spring. Alas, it was not to be. Despite off and on clouds and a few sprinkles of rain on Friday, the ground was still dusty and dry. Consequently almost everybody came up short in the mushroom department, and the specimens on the display table were few and desiccated.

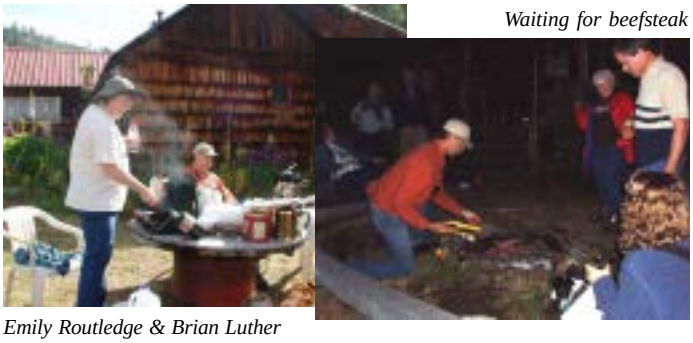
The only people (that I heard of anyway) who loaded up with morels were the Birkebaks, who dropped in briefly Saturday to check out the display table and then headed off for their secret spot where they loaded up last year.

Despite the paucity of mushrooms, everyone appeared to have a good time. Several cars spent the day caravanning up the ridge to a fire lookout, where, as expected, they found few mushrooms but enjoyed a spectacular view. A few people, like my husband, bagged the mushrooms entirely and found fulfillment sticking around Coleman's place, drinking wine and talking.

After 2½ months, I'm afraid all I remember clearly about the weekend are vignettes: Hostess Emily Rutledge cooking bacon and eggs over the Coleman stove Saturday morning. Brian Luther crouched over the fire pit in front of Coleman's cabin in the gathering darkness barbequing beefsteaks on wood coals. All the dogs, and their owners, sitting around the fire pit smelling the aroma of sizzling beef. Colorful tents in primary colors sprinkling the lawn and down by the creek.

The last image is Coleman bent over a flower bed, muttering to himself the Latin name of every weed as he yanked it up.

Waiting for beefsteak



Emily Routledge & Brian Luther

UPCOMING EVENTS

Priest Lake Foray, September 22–24, 2006, Spokane Mushroom Club. For information email lmforeman@juno.com or visit www.SpokaneMushroomClub.org.

Breitenbush Mushroom Conference, October 8–10, 2006. For information visit http://www.breitenbush.com/events/oct8-11.html.

Annual Fall Foray, South Vancouver Island Mycological Society, October 13–15, 2006, Lake Cowichan Education Centre. For information, e-mail j.greenwell@shawlink.ca

Mushroom Show, Snohomish County Mycological Society, Sunday, October 15, 2006, Floral Hall in Forest Park, Everett, WA

Mushroom Show, Vancouver, B.C., Mycological Society, October 22. 2006

Mushroom Show, South Vancouver Island Mycological Society, October 29, 2006, Swan Lake Nature Centre

FRESH FETTUCCINI WITH CHANTERELLES AND FRESH TOMATOES

Nell's Restaurant
6904 Green Lake Way N., Seattle, WA 98115

1 pound fresh pasta
1 pound chanterelles, cleaned and cut into 1 in. pieces
1 Tbs finely chopped shallot
2 Roma tomatoes, seeded and peeled
1 cup chicken stock
1 Tbs olive oil
2 Tbs butter
1 tsp fresh rosemary
1/2 cup grated Reggiano Parmesan cheese
Salt and pepper

1. Heat olive oil in large sauté pan over high heat. When almost smoking add chanterelles. Sauté for 4–5 minutes tossing regularly to lightly brown. Add shallots and cook 1 minute more. Add chicken stock and reduce by half. Add salt and pepper to taste.
2. Cook pasta in large pot of boiling water for approximately 4 minutes. Drain.
3. Bring mushrooms back to boil, add tomatoes and rosemary, cook 1 minute, and then add butter to thicken sauce. Check seasoning. Combine in a bowl with noodles and then serve with grated Parmesan.

Serve with a good Chianti—1995, 1996, 1997 and 1998 are all good vintages for Italian red wines. The 1995 Castello della Paneretta, Chianti Classico Riserva is a classically flavored Chianti, medium bodied with good fruit, some oak, and an earthy complexity. This wine complements perfectly the woodsy flavors of the chanterelles in the pasta.

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