SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY
Number 461 April 2010

RESUPINATE FUNGUS OF THE MONTH: *Peniophorella pubera*

Brian Luther

This month's installment of my ongoing series devoted to common resupinate hymenomycetes of Washington State focuses on *Peniophorella pubera* (previously known as *Hyphoderma puberum*).

An old familiar friend to me, I've been finding this species for many years, most commonly on well decayed Red Alder (*Alnus rubra*) wood, but also on Bigleaf Maple (*Acer macrophyllum*) as well. It's usually in habitats with abundant hardwood forest litter and debris. This species is common, widespread, and found throughout the year in temperate forested areas. Although it has been recorded from conifer debris (Gilbertson, 1974), it is most frequently associated with hardwoods in rich habitats. Depending on how and where it's growing, my experience with this species has shown that the fruiting bodies can be thinner and showing less "fuzziness" as I call it, or thicker and especially fuzzy under 20× magnification.

This fungus causes a white rot and looks like countless other resupinates macroscopically, forming a whitish patch on the underside of decaying woody debris. But it has a really cool microscopic feature I'd like to show you—lamprocystidia.

Brian Luther

Peniophorella pubera

Brian S. Luther coll. # 2010-25-1, Discovery Park, Seattle, King Co., WA, 2/5/2010

Fruiting body: fully resupinate, very thin, about 0.5 mm thick or less, firmly attached to the substrate, mostly whitish but sometimes becoming slightly very pale creamy-yellowish in old age, appearing smooth to the naked eye but very densely short tomentose or hairy under a dissecting microscope owing mostly to the abundant, large lamprocystidia sticking out all over, when fresh very soft and spongy when tissue is removed with forceps under the dissecting microscope. Margin rather abrupt, without rhizomorphs.

Microstructures: *Hyphal system* monomitic, with thin-walled generative hyphae or with some hyphal walls only slightly thickened, 3–8 µm in diameter, clamp connections common. *Spores* 8–10 × 3.5–4.5 µm elliptical to short cylindric or often somewhat bean-shaped in this collection, hyaline, thin-walled, smooth (without ornamentation), inamyloid, with several irregular guttulae or inclusions when mounted in 3% ammonium hydroxide. *Basidia* 29–34 × 5–7 µm, cylindric to narrowly long clavate, thin-walled, four sterigmate, basally clamped but this can be hard to view. *Cystidia* large lamprocystidia, 80–143 × 13–18 µm when mature, very thick-walled, hyaline but appearing dark grayish in mounts, lanceolate, heavily crystal incrusted for approximately the upper 80%, with a noticeable area lacking incrustation at the base, which narrows significantly and abruptly; projecting far beyond the hymenium, very abundant and conspicuous and readily visible on higher powers under the dissecting microscope. When immature and just developing they're lageniform (bottle-shaped) with an enlarged, smooth, rounded apex, which is quite different from their mature shape (see drawing on p. 3). *Cystidioles* or long narrow hyphidia or gloeocystidia 30–45 × 4–5 µm, common in the hymenium, extending beyond the basidia in mature areas of the fruiting body, but projecting noticeably further (up to 100 µm) in immature tubercle-like areas, thin-walled, without incrustation, contributing to the overall "fuzzy" appearance when closely viewed under the dissecting microscope.

This collection is consistent with most all characteristics for the species in the literature, except that some of the spores are slightly more bean-shaped.

The really neat feature of this resupinate fungus is the strikingly large, abundant, thick-walled and crystal incrusted lamprocystidia. (See line drawings). Under 10× or 20× magnification on a dissecting microscope, the cystidia are clearly visible, sticking out all over the place like little needles (along with the hyphidia) and giving the fruiting body a characteristic dense, fuzzy appearance, especially when fresh. These cystidia are even more fascinating and impressive in a mount under 500× or 1000× magnification on a compound microscope.

What are cystidia? Cystidia are microscopic sterile cells or structures which, if present, are often seen in the hymenium or spore bearing layer in fungi, which are normally very different in form from the basidia or basidioles, and which are quite obvious. There are many different kinds and shapes, from thin-walled leptocystidia to very thick-walled cystidia, such as metuloids or lamprocystidia with crystal incrustations. If a fungus has cystidia (occasionally

cont. on page 3

Correction:

In the Coral Root article by Brian Luther in the March *Spore Prints*, the second sentence in the second-to-the-last paragraph should read

> *If you were to take away the fungi, then the trees and shrubs would barely grow, and we would get but a fraction of the mushrooms we now get because only those that were* ***non-*** *mycorrhizal (saprophytic only) would fruit.*

Endomycorrhizal fungi would also die, and they don't produce mushrooms. Thank you, Brian, for catching my mistake.

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CALENDAR

Apr. 11	Beginner's Microscopy Class
Apr. 13	Membership Meeting, 7:30 pm, CUH
Apr. 15	Intermediate ID Class
Apr. 17	Field Trip (see insert)
Apr. 19	Board Meeting, 7:30 pm, CUH
Apr. 20	*Spore Prints* Deadline
Apr. 22	Intermediate ID Class
Apr. 24	Field Trip (see insert)
Apr. 26	Master Gardener's ID clinic, CUH courtyard
Apr. 29	Intermediate ID Class
May 2	Mushroom Maynia!, Burke Museum, UW campus
May 3	Master Gardener's ID clinic, CUH courtyard
May 6	Intermediate ID Class
May 8	Field Trip (see insert)

FEBRUARY BOARD NEWS

The vice president will have the discretion to pay speakers honorariums ranging from $100–300. Intermediate classes will start April 15 with a maximum of 40 students. A basic microscopy class will be offered on April 11 in Dr. Ammirati's lab. His lab will also be used for four sessions of ID training classes. Joanne Young will chair Mushroom Maynia! Spring field trips are set; the field trip information will continue to be on an insert in the mailed *Spore Prints* and posted on the password-protected portion on our website. Ostrom's will be hosting a field trip on April 24 in Lacy. Monday mushroom ID at CUH will start April 26. A felting workshop will be held March 28. The Survivor's Banquet will be held at CUH on March 13. Milton Tam has inventoried the cultivation supplies and equipment donated to the club.

MEMBERSHIP MEETING

Tuesday, April 13, 2010, at 7:30 pm, in the Center for Urban Horticulture, 3501 NE 41st Street, Seattle

The speaker this month is former PSMS member, friend, and colleague Judy Roger. She will speak on "The role of microscopy in mushroom identification."

Judy is an expert microscopist and a multitalented mycologist who started studying fungi under Dr. Daniel Stuntz during, as she puts it, "the last ice age." She has continued her studies of mushrooms over the years, with workshops with "Dr. Joe" and others. She has made mushrooms a major focus in her life. As such, she was a lead investigator on the Oregon Cantharellus Study Project from 1986–1996. She is a member of the Oregon Mycological Society, the North America Truffling Society, the North American Mycological Association (where she is Executive Secretary), and a charter member of the Pacific Northwest Key Council.

SPRING NATIVE PLANT SALE

The Washington Native Plant Society (WNPS), Central Puget Sound Chapter, will host their annual spring sale of native plants on Saturday, May 8, 2010, from 10 a.m. to 4 p.m., at the Bellevue Botanical Garden, 12001 Main Street, Bellevue, WA 98005.

This plant sale features a large selection of native trees, shrubs, perennials, and ground covers that are ideal for gardens in western Washington. There will be botanical and gardening books and native plant experts to dispense gardening advice.

For more information, please contact the Washington Native Plant Society at (206) 527–3210 or visit their website at www.wnps.org.

JANUARY BOARD NEWS

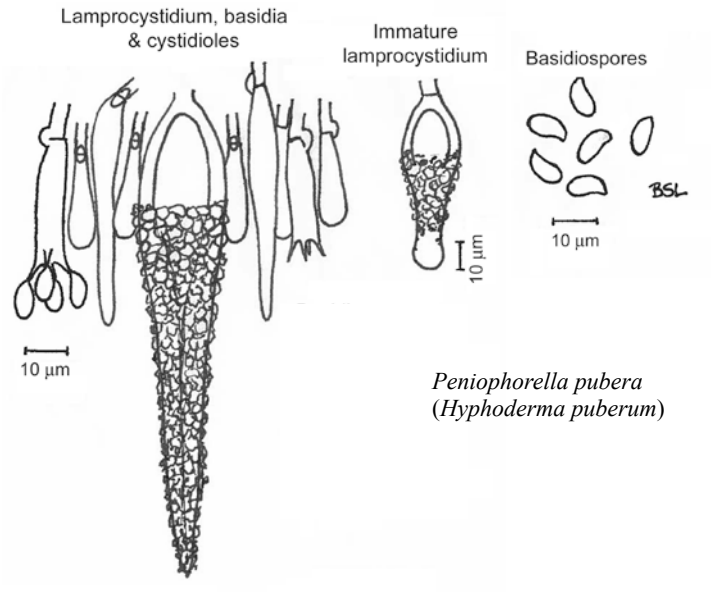
Ballots are at the printer and will be included with the February *Spore Prints* mailing. Patrice Benson will contact the Burke to confirm the date (Sunday, May 2) for the 2010 Mushroom Maynia! and ask Joanne Young about chairing the event again this year. Work is continuing on a web-based database for the roster. The 2009 members not renewing have been taken off the membership. The roster will be next updated in June. Three updates are planned per year. The theme of this year's Survivor's Banquet will be *The "Joy" of Mushrooming*, intended as a tribute to the late Joy Spurr. Beginners' classes are under way. An intermediate ID session will start on April 15 and run three additional weeks. An advanced identifiers' course will be held in Joe Ammiratti's lab during August and September, meeting twice weekly. Molly Bernstein will set up a PayPal system on the website. Cost is 30 cents and 5 percent of each transaction, making it costly for smaller items such as $5 payment for the banquet. It is envisioned that memberships can eventually be renewed on-line with PayPal. Patrice proposed organizing a felting workshop; a mushroom dyeing workshop was also discussed. It was decided to purchase a new projector rather than rehabilitate the old unit and to buy a new label maker for the show. The Society has been bequeathed some cultivation equipment and supplies, including a laminar flow hood. Discussions on reviving a cultivation group will start after an inventory of the equipment available.

Peniophorella pubera, *cont. from page 1*

more than one kind), then the type and form is always consistent for a particular species and is an important diagnostic characteristic, as in the case of this month's fungus. On gilled mushrooms, cystidia can be found on the pileus, or cap (pileocystidia), on the stipe, or stem (caulocystidia), on the face of the lamellae, or gills (pleurocystidia), and on the gill edge (cheilocystidia), and all of these may be different in appearance. In most cases, with the resupinate fungi there is only one surface that produces cystidia, if they're present.

Some of the important sources I commonly use for the identification of resupinate fungi are listed in the bibliography. For the descriptions of terms unfamiliar to you, consult the glossaries in these sources or any dictionary of fungi; you can also go on-line using your favorite search engine for definitions of any unknown terminology.

Hyphoderma puberum is the scientific name used for this species in most modern references. However, Larsson (2007) did DNA research on the species in the genus *Hyphoderma* and found it to be polyphyletic (meaning, not a genus of uniform origin or relationships)—in other words, heterogeneous. A phylogram (a chart showing the species grouped by closeness in relationship) based on this analysis clearly put most of the species into distinct groups representative of genera. Some species remained in *Hyphoderma*, but others belong in different genera. As a result, he reinstated the older genus *Peniophorella* Karsten for some of the species formerly in *Hyphoderma* and officially transferred several, including this species, into that genus. Because of this work, our resupinate fungus of the month must now be called *Peniophorella pubera.* DNA studies are changing many of the older familiar genera and demonstrating true relationships that were not previously known or understood prior to the advent and application of this technology.



Peniophorella pubera
(*Hyphoderma puberum*)

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PLEASE REGISTER *NOW* FOR SPRING CLASSES

Patrice Benson

We especially need a list of attendees for the beginner's microscopy class in order to plan for the right amount of equipment.

Space is limited, but spots are still available in all of our classes. For instructions on how to register for PSMS classes and workshops, visit http://www.psms.org/classes.htm. For information about membership in PSMS, visit www.psms.org join.html.

Beginner's microscopy class (members only)

This class will be geared to those who have no knowledge of how to use a microscope and will teach how the microscopic world of fungi is used for identification of mushrooms. Dr. Joseph Ammirati will give an overview of how to use the great UW microscopes, and Judy Roger will teach you details of how to use these instruments and the chemicals needed to help ID mushrooms microscopically. This workshop will be held on Sunday, April 11, at Dr. Ammirati's lab on the UW campus. Details will be sent to registrants; parking is free on campus on Sundays.

Four-week intermediate ID sessions (members only)

Any one who has been around mushrooms for a few years, has possibly taken the beginning class, and is comfortable with using keys (even if you are not too comfortable but are willing to learn more) should consider attending the 4-week intermediate ID sessions which begin April 15 (taxes all done...). Instructors will be Daniel Winkler, Danny Miller, and Patrice Benson. There will be knowledgeable members in attendance to assist with keying.

Mushroom needle-felting workshop

Artist/designer Molly Bernstein will conduct a workshop on how to create mushrooms using needle felting. The workshop is open to all interested adults and children over 10 years of age.

FUNGI ECOLOGY: Why a Column About Fungal Ecology?

Kit Marx

Why a column about fungi ecology? The initial reason is a selfish one. I am a self-taught naturalist, who very much enjoys explaining how Nature works. Although my interests and classes cover many aspects of Pacific Northwest geology and ecosystems, my favorite general topic is the ecology of old-growth forests. And within that context, the processes most fascinating to me are those involving fungi. (As an aside, I have a collection of well over 200 mushroom figurines.)

It seems to me that PSMS meetings, field trips, courses, and the annual Wild Mushroom Show mostly emphasize finding and identifying mushrooms. Even *Spore Prints* has but a scattering of fungi ecology articles (a good example being Brian Luther's "Coral Root" in the March issue). I perceive PSMS as more of a mushroom society than a mycological society. I hope we can put more interest in the ecology aspect of mycology.

So, here we are: a monthly column on this intriguing topic. Some columns will be mycelium-broad, as this one below; others will be as finely focused as a spore. I am very much open to ideas about subject matter for the column and your constructive criticism. Please contact me at kit@kit-the-naturalist.com. Keep in mind that the information in this column is intended for *Spore Prints'* general readership. Now, let's get started—with some basics.

Mushrooms are but the reproductive organs of much more extensive organisms. Within the soil surrounding a clump of mushrooms are many miles of interconnected, undetected hyphae forming a mycelium that may thread through multiple acres. Who could even guess at the number of miles of hyphae supporting those relatively few spore producers. Hyphae collectively interconnect entire ecosystems into what could be considered superorganisms.

Biologists compartmentalize Earth's organisms into broad categories, usually called kingdoms. The kingdoms receiving most of our attention are plants, fungi, and animals. Note: fungi are not plants. They are, in fact, evolutionarily more closely related to animals than plants. Here are two examples indicating that. Fungi cell walls contain chitin, the same stuff found in insect exoskeletons; plant cell walls consist of cellulose and lignin. Plants (producers/autotrophs) make their own food from raw materials; fungi and animals (consumers/heterotrophs) must obtain food from other organisms.

The ecological roles of fungi can be variously categorized. The following examples are overlapping—and not inclusive. Many fungi species perform multiple roles.

- Decomposers: Turn organic detritus into raw materials.
- Mycorrhizae: Form mutual (+/+) symbiotic relationships with plants.
- Parasites: Obtain their nourishment from other living organisms (+/-).
- Pathogens: Cause diseases (+/-).
- Predators/Carnivores: Capture animals and obtain nourishment (+/-) from them.
- Saprobes: Obtain their nourishment from dead organic matter.

I find that "translating" scientific words makes them easier to understand and easier to remember how to use properly. From above, some examples are (G = Greek, L = Latin):

- hypha (-ae, -al): hypha (G: a web)
- mycorrhiza (-ae, -al): myco (G: a mushroom) + rhizo (G: a root)
- parasite (-tic): para (G: together) + sit (G: food)
- predator: predat (L: hunter) / carnivore: carni (L: meat) + vor (L: to devour)

In May, I'll go more into fungi's general ecological roles.

TRICHOTHECIUM ROSEUM: A Beautiful Mold on *Alnus rubra*

Brian Luther

You don't normally think of moldy things as being "beautiful," but this one was, for sure. In my constant wandering and collecting in woods, I recently ran across a large dead standing Red Alder with bark covered with a gorgeous, bright pink fungus. It was quite striking (see photo). I assumed it was a resupinate Basidiomycete, because there are a couple of similar looking species I've been finding for years. I photographed it, collected a sample, and continued my walk through the woods.

Brian Luther

Trichothecium roseum

Back in my lab later in the day, one quick look under the microscope convinced me I was dead wrong. It was an "imperfect" fungus, that is, a fungus that has only an asexual stage. I was not familiar with the particular species, so I sent a piece to Dr. Bryce Kendrick, a well known authority on these fungi who lives on Vancouver Island, BC, and is a member of PSMS. He gladly provided a definitive ID on this species, and it turned out he'd published on this mold previously (Kendrick & Cole. 1969). Barron (1972) also has lots of information about this species. He discusses this fungus in detail and provides excellent photomicrographs of the large conidia in Fig. 210 (p. 310).

Dr. Kendrick also informed me that—although mycologists used to lump all fungi that had only an asexual stage in the "fungi imperfecti" group, or Hyphomycetes, and refer to them as "imperfect fungi"—the more correct nomenclature is *anamorphic fungi*. Many anamorphic fungi, however, also have a sexual stage, called the teleomorph. Article 59 of the *International Code of Botanical Nomenclatur*e allows giving separate scientific names to different life-cycle forms of the same organism. Hence, the "imperfect" (anamorph) stage has a different name from the "perfect," or sexual (teleomorph) stage. *Hypomyces* is a good case in point.

Let's use as our example the anamorph fungus *Sepedonium chrysospermum* which appears first as a white mold parasitizing various boletes and then becomes yellow from maturing aleuriospores. We've all seen this thing many times on decomposing boletes in fall and wished we could have beaten the mold to the quarry (it's often on *Boletus mirabilis*, a choice edible). But, when the sexual, or teleomorph, stage forms later in its life cycle, it has a different set of characteristics and is then called *Hypomyces chrysospermum*. The majority of molds discovered to have a teleomorph stage are Ascomycetes (Ascomycota).

According to Bryce (personal communication) *Trichothecium roseum* is often a parasite on other fungi, but it is also known from the literature to be saprophytic on woody or other organic debris.

An important reference on these fungi is *Genera of Hyphomycetes* (Carmichael et al., 1980). PSMS has a copy in the library. This book has a good illustration of the didymospores of this species still attached to the conidiophore (plate 67 E, p. 271). Two detailed studies relating to the conidiophore and conidial development in this species are Ingold (1956) and Kendrick & Cole (1969).

Following is a brief description of my collection of *Trichothecium roseum*:

Fruiting body: Anamorph producing small, low isolated mounds which can remain somewhat separate, or more often growing together forming various sized, continuous, and extensive resupinate patches on bark, up to 3 mm above the substrate, bright pink when fresh and remaining so on drying.

Microstructures: *Basal mycelium* 3–7 µm wide, hyaline, thin-walled, septate, smooth, either parasitic, saprophytic or both. *Conidiophores* long and thin, hyaline, smooth, unbranched and septate, arising from the basal mycelium. Conidiophores with intact conidia difficult to find in mounts, because they've all fallen off, but naked conidiophores and conidia are abundant in all mounts. *Conidia didymospores* 17–33 × 9–16.5 µm, irregularly ellipsoidal to pyriforme, quite variable in form, hyaline, thick-walled, smooth, often constricted at the septa between cells, pink in mass, but appearing hyaline in microscopic mounts of 3% ammonium hydroxide or 3% KOH; basal cell often (but not always) slightly longer and narrower than the apical cell, narrowed to where formed and attached on the conidiophore; apical cell rounded above (see drawing).

Trichothecium roseum, *showing variability in conidia (diymospores)*

Culture work was not done, but it is my understanding that this species grows readily on standard culture media.

According to Barnett & Hunter (1972) the conidia form "by growth of the apical region of the conidiophore, resulting in a gradual change from cell of conidiophore to conidium with no change in length of conidiophore." Because of how they are formed, these conidia are classified as meristem arthrospores. The above reference also provides a series of four line drawings showing the progressive development of the conidia for this species (p. 105, under *Trichothecium*, figs. A–D).

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MUSHROOM IDENTIFICATION AT CUH

Hildegard Hendrickson

PSMS will resume mushroom identification at CUH on Mondays from 4–7 pm starting, Monday, April 26, 2010 (or earlier, depending on the weather) and continuing until the end of the spring mushroom season. You may call Hildegard Hendrickson (206) 523–2892 to find out if mushroom identification will be held.

ADDITIONAL ON-LINE MEMBER BENEFITS

Ann Polin

Some of you may not be aware that your PSMS membership includes the following on-line benefits:

1. Access to the "Members Only" page on the PSMS website.
   - Go to www.psms.org.
   - On the top of the website page, highlight the word "Membership" and then click on the sub-link "Members Page."
   - Enter the User Name and Password. The User Name and Password can always be found on the top of the second page of the printed and mailed version of the *Spore Prints* newsletter. The User Name and Password will change annually, usually around February or March of each year, after the membership database is updated. Be sure to check your February/March *Spore Prints* newsletter (second page) for the new User Name and Password if you are having trouble logging in to the Members Page. If you continue to have problems, contact membership@psms.org.
2. Access to the PSMS-Members Yahoo Forum/Discussion Group.

   This will allow you to receive late breaking news and discussion items relating to PSMS topics (including field trips), and view members' comments and photos, arrange car pools for forays, etc. Since this is a private Yahoo group (not visible to the public at large), you must wait until you receive an "Invitation" to subscribe from the Membership Chair. You will receive this invitation via e-mail after you join PSMS. Please follow the instructions in the "Invite" in order to subscribe to this PSMS Members-Only Discussion Forum. If you do not receive an invite, or have a problem subscribing to the Group after receiving an "Invite," contact membership@psms.org.

HOW LOW CAN THEY GO? Oregon Truffle Thieves Stoop to Steal Valuable Delicacies

Lynne Terry

The Oregonian, Mar. 12, 2010

A new breed of thief has sprouted in southern Oregon in recent years, pursuing a culinary delicacy long revered in Europe. They're truffle thieves. They sneak onto private forestland at night with rakes and scratch up the ground, digging for the musty mushrooms that sell for up to $200 a pound. They're breaking trespassing laws, undermining Oregon's truffle industry, and ravaging reforestation efforts of some private landowners.

"They're illicit commercial types," said Rod Nichols, spokesman for the Oregon Department of Forestry. "They go in and ravage the areas around the trees without any regard for the trees or the soil and haul off as many as they can and sell them wholesale."

One of the victims is Roy Marshall, a 79-year-old who owns 160 acres in the Siuslaw River watershed near Walton, about halfway between Florence and Eugene.


Charles K. Lefevre

Thieves are stealing Oregon truffles like these because of their value. But in doing so, they're harming not only the rightful owners but the environment.

cont. on page 6

Oregon Truffle Thefts, *cont. from page 5*

"The first year I thought it was coyotes," Marshall said. "The second year they came back and started digging in October. When I got there, they had dug the whole area up."

Last winter, he saw a man and a woman fleeing in a Toyota pickup. This past December, he actually caught two men in the act. The two gave him phony names and fled in a Chevrolet. Marshall wrote down their license plate number, but the Lane County Sheriff's Office has not been able to track them down.

Truffle thieves have since been back, tearing up a 15-acre parcel near Whittaker Creek off Oregon 126. They did a lot of damage to his 20-year-old Douglas firs, cutting into the roots by digging down 18 inches over large areas. They're ruining the reforestation of the plot, Marshall said. "It will cause root rot and stump rot," he said. "The trees will end up dying. I had to spend days raking the dirt back over the roots."

Truffles are the fruit of mycorrhizal fungi that grow underground in forests from northern California throughout the Pacific Northwest. On the West Coast, they only grow next to the roots of relatively young Douglas fir trees, according to fungi specialist Charles Lefevre. Four varieties grow in Oregon, he said: brown, black, winter white, and spring white.

Lefevre, who owns New World Truffieres, Inc., which grows tree seedlings, said Marshall is not the only victim. "I've heard of a number of other cases," he said. "We've had irate landowners contact us from time to time, asking for help."

He said the thieves are hurting the Oregon truffle industry. In digging up large areas, they're snagging many unripe truffles that don't have much odor. Only ripe truffles have the strong scent that makes them a gourmet treat.

"The fact that they're being raked up means they're almost worthless," Lefevre said. "That's why the price of Oregon truffles is so low."

The most expensive Oregon black truffles sell for up to $200 a pound. That compares with $800 a pound for French truffles, he said. Lefevre said the main market is high-end restaurants.

The French, who have long savored truffles, traditionally used female pigs to sniff them down because truffles smell like male pig hormones. But pigs will also eat them, which is why Europeans have switched to truffle-sniffing dogs.

"They find the exact spot, said Daniel Luoma, a fungi expert at Oregon State University. "The person just has to pull the truffle out of the ground without all that random raking for nothing."

There is one problem with using dogs in Oregon. The state only has four truffle-sniffing dogs that he knows of. But that may change. The North American Truffling Society, which is based in Corvallis, will offer a dog training seminar in the near future.

While dogs would not tear up the forest, Marshall does not want trespassers on his property at all.

"If it isn't stopped," he said, "down the road there will be a problem on everybody's property for years to come with the price of those things."

In the summer of 2001, the citizens of Kerala in India were doused in red rain. This was initially believed to be the work of demonic forces; however, scientists later revealed it was the work of red fungus spores.

The porker and the truffle hound,
Both find and dig them from the ground,
The dog for treats,
The pig for eats,
At several hundred bucks per pound.

—Boris Subbotin, via *The Sporeprint*,
L.A. Myco. Soc., Dec. 2001

"EXTINCT" AUSTRALIAN FROG REAPPEARS 30 YEARS AFTER LAST SIGHTING

John Platt

Scientific American, Mar. 4, 2010


D. Hunter

Yellow-spotted bell frog

The yellow-spotted bell frog (*Litoria castanea*), last observed in the 1970s, has long been thought to be extinct in the wild. Scientists believed it was probably a victim of the deadly chytrid fungus *Batrachochytrium dendrobatidis*, which has devastated amphibian populations around the world.

But last year, Luke Pearce, a fisheries conservation officer in the Australian state of New South Wales (NSW), thought he saw a yellow-spotted bell frog in an isolated stream where he was looking for another endangered species. He returned a year later with herpetologist David Hunter of the NSW Department of Environment, Climate Change and Water. Together, they found a population of around 100 adult frogs.

They also found tadpoles, six of which were collected and raised to maturity. The six frogs have now been placed in a captive breeding program at Taronga Zoo in the Sydney suburb of Mosman.

"This was definitely the most exciting moment of my career and I will be surprised if I repeat it," Hunter told the AFP news service.

So why did this one isolated population survive when all other yellow-spotted bell frogs have disappeared? Hunter thinks the population could have some sort of resistance to the chytrid fungus, although he says it is too early to speculate if that is true, or why.

Interestingly, despite the amount of time since the frog had been seen in the wild, the Australian government never gave up on it. A formal recovery plan for the species has been in place since 2001.

The location where the pair discovered the frogs has not been disclosed to protect the remaining habitat.

Here's to Gus!

The editor would like to designate April 1 Caveat Gustator Day. Gus's ability as an observer is remarkable. He is, for instance, the only one to have reported an occurrence of Amanita melanospora *in the Pacific Northwest. He is perhaps best known, however, for his opus,* A Field Guide to Antarctic Mushrooms*, which includes in its bibliography, "Technical Literature" and "Pseudotechnical Literature." The latter list—a long one—includes writing by amateurs as well as some prominent professionals. Once when he was logging the daily growth of a crustose lichen, he was asked about the patience required to study such a slowly developing organism. Gus replied that many studies have been done on cats, which are not much more energetic.*

FUNGI CAN CHANGE QUICKLY, PASS ALONG INFECTIOUS ABILITY

Science Centric, Mar. 28 2010

Fungi have significant potential for "horizontal" gene transfer, a new study has shown, similar to the mechanisms that allow bacteria to evolve so quickly, become resistant to antibiotics, and cause other serious problems.

This discovery, to be published Thursday in the journal *Nature*, suggests that fungi have the capacity to rapidly change the make-up of their genomes and become infectious to plants and possibly animals, including humans.

They are not nearly as confined to the more gradual processes of conventional evolution as had been believed, scientists say. And this raises issues not only for crop agriculture but also human health, because fungi are much closer on the "evolutionary tree" to humans than bacteria, and consequently fungal diseases are much more difficult to treat.

The genetic mechanisms fungi use to do this are different than those often used by bacteria, but the end result can be fairly similar. The evolution of virulence in fungal strains that was once believed to be slow has now been shown to occur quickly, and may force a renewed perspective on how fungi can behave, change, and transfer infectious abilities.

"Prior to this we've believed that fungi were generally confined to vertical gene transfer or conventional inheritance, a slower type of genetic change based on the interplay of DNA mutation, recombination, and the effects of selection," said Michael Freitag, an assistant professor of biochemistry and biophysics at Oregon State University.

"But in this study we found fungi able to transfer an infectious capability to a different strain in a single generation," he said. "We've probably underestimated this phenomenon, and it indicates that fungal strains may become pathogenic faster than we used to think possible."

Researchers from the Centre for Genome Research and Biocomputing at OSU collaborated on this study with a large international group of scientists, including principal investigators from The Broad Institute in Massachusetts, the University of Amsterdam, and the USDA Agricultural Research Service at the University of Minnesota.

Bacteria use "horizontal" genetic transfer through chromosomes and DNA plasmids to change quickly, which is one reason that antibiotic resistance can often develop. This capability was believed to be possible, but rare, in fungi. In the new study, based on a genome-wide analysis of three *Fusarium* species, it was shown experimentally that complete chromosomes were being transferred between different fungal strains, along with the ability to cause infection. Various *Fusarium* fungi can infect both plants and humans.

In humans, fungal infections are less common than those caused by bacteria, but can be stubborn and difficult to treat—in part, because fungi are far more closely related to animals, including humans, than are bacteria. That limits the types of medical treatments that can be used against them. Fungal infections are also a serious problem in people with compromised immune systems, including AIDS patients, and can be fatal.

According to Freitag, this new understanding of fungal genetics and evolution is great news.

For one thing, it may help researchers to better understand the types of fungal strains that are most apt to develop resistance to fungicides and help crop scientists develop approaches to minimise that problem.

On a more basic level, this study provides evidence that the "tree of life," with one trunk and many branches, is outdated. It should be replaced by a "network of life" in which many horizontal connections occur between different species.

PRESIDENT'S MESSAGE

Marian Maxwell

Hello, Fellow Mycophiles!

Thank you for the opportunity to serve the Puget Sound Mycological Society as your president. These are big shoes to fill, in that our past presidents have done a fantastic job for our Society in their leadership of this organization. Thank you to Patrice Benson, our immediate past President, and to outgoing Board Members Cathy and Don Lennebacker, Brenda Fong, Jennifer Slack, and Jena Zatochill for all your hard work on our behalf. I look forward to serving with our terrific Board and Show Chairman.

This is a wonderful organization, built on many hours of volunteer work by so many people. I would like to take time to thank those who have given time to our group both recently and in past years, you are appreciated! We have shared friendship with those who have passed on and we are thankful for their time in helping to build our Society. We miss them.

As we go forward, we should keep their ideals for our group in our hearts. I encourage you (this is for me, too!) to push your "comfort zone" a bit more—welcome and speak with newer members, reach out to other mushroom groups, volunteer in areas where you can develop and learn, consider taking older members to the field trips to foray, consider shorter forays for younger members (someone suggested this recently), to think outside the box. Be that which you wish to see in our group.

We have a tremendous opportunity to reach out to our youth, perhaps more than any time in our Society's history, given the current emphasis on ecological and environmental studies in the schools. Together we can touch many people in our community, and help them understand the role of fungi in our ecosystem, which in turn helps us all.

I love this group, its diverse makeup, and the coming together to discover and learn about fungi. As with most other people in our group, this hobby is woven very tightly into my own and my family's life—calculating the seasons and the weather, the camaraderie and forged bonds, the "hunt" itself, the study, the culinary aspects, and in general the excitement that comes with each one of these activities, and sharing that excitement with like-minded people.

To the newer members and guests, I guess this is a warning as well. Once bitten by this hobby, it is quite possible that you may never go back to where you were before an interest in fungi entered your life, and your views (and priorities) about the world around you may change. If you already can't walk in the forest without looking for mushrooms 100 percent of the time, it is too late for you. Just knuckle under, admit it, and know that you are one of us.

Welcome.

photos by John Goldman

PSMS Survivor's Banquet, March 13, 2010

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