

# SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY  
Number 455 October 2009



## HUNTING TRUFFLES WITH FLIES Brian Luther

Most of you have likely heard that pigs were popular as truffle hunting animals, especially during the 19th and 20th centuries. With some training, and if appropriately leashed, they aggressively and reliably seek out and locate hidden truffles by smell. The problem with pigs is that not only are they good at finding truffles, but they are particularly fond of eating them as well. So, yes, they'll happily locate your elusive tuber, but you also must be prepared to rein in the animal before it consumes what *you* wanted to consume. They also hard on the habitat. In 1975 Italy banned the use of pigs as truffle hunters because of the destruction they do when looking for and rooting out truffles (Safina & Sutton, 2003).



That's why dogs have been considered much more agreeable as truffle hunters because they have no interest in eating these subterranean delicacies. They're perfectly happy to get a good word, a loving pat from the owner, and a doggy treat as a reward. Renowden (2005) provides a really cute photo of Dr. Alessandra Zambonelli's dog, appropriately named "Tuberina," sniffing out truffles.

Both pigs and dogs rely on odor as their clue, and they must be trained with mature truffles or truffle oil to be able to know what they're smelling for to begin with. Then you have to practice over and over with a known hidden source of the smell and need to abundantly reward the animal as positive reinforcement when their prey is located. Over time, just about any average pooch, with their well known extraordinary olfactory abilities, could be trained to locate truffles.



However, you don't have to have a trained animal to find truffles. Luard (2006) gives a delightful account of being taken out by a friend in France and being shown how you look for truffles without the aid of an animal assistant. The same reference has a great color photo (p. 151) of people truffle hunting with long handled rakes in a second growth Douglas Fir forest some place in the PNW. The photo may be great, but the practice isn't. It is well known that the use of tools such as rakes for tearing away duff around trees damages the tree roots, immature truffles that still need time to develop, and the environment.

Some people also have good enough senses of smell that they can act as the truffle pig or dog. Hall, Brown & Zambonelli (2007) describe and show a picture of a woman on her hands and knees successfully finding truffles by smell. I did notice that this lady was not kept on a leash, however.

*cont. on page 4*

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## Spore Prints

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## CALENDAR

- Oct. 8 Start of Beginner ID Class First Session,  
Douglas Classroom, CUH
- Oct. 10 Field Trip, Bowman Bay, Deception Pass  
State Park
- Oct. 13 Membership Meeting, 7:30 p.m., CUH  
*Spore Prints* deadline (**early**)
- Oct. 16–18 PSMS 46th Annual Wild Mushroom Exhibit,  
CUH
- Oct. 19 Board Meeting, CUH
- Oct. 24 Field Trip, Twanoh State Park
- Oct. 31–Nov. 1 PSMS/The Mountaineers Joint Field Trip,  
Meany Lodge
- Nov. 7 Nisei Veterans Foray CANCELLED

## BOARD NEWS

**Denise Banaszewski**

John Garfunkel from Global Source Education—a nonprofit that brings educators and community groups together in an effort to educate children about humanity and planet-related issues (like sustainability) using their backyard as a classroom—spoke at the board meeting. We are looking into ways we can support this organization so that kids will be taught about mycology in school, for example by conducting a mushroom class for teachers. The first beginner mushroom ID class is full. Advertising for the Annual Exhibit will be inside some Metro buses this year—watch for it next time you are on the bus! We need more volunteers for the Annual Exhibit; please phone or e-mail Debra Lehrberger at (206) 522-6031 or [volunteer@psms.org](mailto:volunteer@psms.org) if you can help out.

## MEMBERSHIP MEETING

Tuesday, October 13, 2009, at 7:30 p.m. at the Center for Urban Horticulture, 3501 NE 41st Street, Seattle.

Our guest speaker for October is the incomparable Taylor Lockwood with his fabulous mushroom photographs, all choreographed to music. Everyone who has ever seen Taylor's show raves about it. You won't want to miss this entertaining, visual guide to the fifth kingdom.



Taylor Lockwood

If your last name begins with the letters A–K, please bring some goodies to share after the meeting.

## ART BASED ON MICROWORLD

Betty Hageman is a former member and abstract artist who received microscopy training from PSMS. She currently has a show of her art based on fungi and other life found in microhabitats at the Angle Gallery in Seattle's Tashiro Kaplan Building. Gallery hours and other details can be found at <http://www.bettyhageman.com/exhibits.html>.

## FALL FIELD TRIPS

**Brian Luther**

Detailed descriptions of the fall field trips and driving directions were given in the September *Spore Prints*, which can be accessed on-line at [www.psms.org](http://www.psms.org).



An evening or late afternoon potluck meal is planned for all the field trips. Please bring an edible contribution to share, along with wine or beer. Potluck time will be listed on the field trip sign-in sheet.

Good hunting!

### Sept. 26

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

From Enumclaw, SE of Seattle, continue east on State Hwy. 410 over Chinook Pass. About 19 miles past the summit, turn right onto Bumping Lake Road (FR 18). About 5 miles farther, turn left into the camp. A NW Trailhead Pass may be required here.

Campsite #6, next to the shelter, is reserved for Saturday and Saturday night. Note that there is a fee. *Identifier*: Brian Luther

### October 10

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

Take I-5 north to Hwy. 20. Go west on Hwy. 20 toward Anacortes. Proceed until you see signs for Whidbey Island, Oak Harbor, and Deception Pass. Turn left following Hwy. 20 and continue until you get to the sharp left curve by Pass Lake. Turn right just before the curve, then make an immediate left down the hill through the woods to Bowman Bay. I have reserved one of the shelters for day use only. Please plan to stay and volunteer to help clean up at the end of the day.

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

*Hosts*: Becky & Steve McIntyre. *Identifier*: Brian Luther

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

From downtown Seattle, (1) take the Bremerton ferry and follow Hwy 3 to Belfair; from there follow Hwy. 106 8 miles west to Twanoh State Park. Or (2) take I-5 to Tacoma, cross the Tacoma Narrows Bridge, go north on Hwy. 16 to Purdy, about 12 miles past the Narrows bridge, then go west on Hwy. 302 about 20 miles to Hwy. 3, then go north on Hwy. 3 about 4 miles to Hwy. 106, and then go west on Hwy. 106 about 11 miles to Twanoh State Park. We will be in Kitchen #2 shelter, the one closest to the large boat-ramp parking lot at the far west end of the park. You can camp in the campground directly across the highway for a fee. Again, this is a day use shelter, and we are required to clean up and vacate the park at dusk. *Host:* Kitty Loceff. *Identifier:* Brian Luther

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

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

**Nov. 7 Nisei Veterans Invitational Mushroom Foray**  
CANCELLED

**SAFETY SUGGESTIONS** **Debie Nederlung**

**First Aid Kit:** Yesterday I was hunting with another member and they accidentally (really, who would do this on purpose) sliced deeply into their thumb. Fortunately we both had a small first aid kit with us and we were able to put a pressure bandage on the wound. When hunting, we are frequently climbing up and down hillsides, stepping over limbs and logs, and often reaching with a sharp instrument in our hands. Anything could happen. This little experience has brought to our attention the importance of a first aid kit, even if it is small.

**Whistles:** A whistle is a piece of safety equipment that all field trip participants should carry on all events. The sound of a whistle will travel much further than that of a human voice, and use of a whistle does not tire your vocal chords the way shouting will. Attach the whistle to yourself (jacket or pack) with a piece of chord so it is readily available. Make sure you pick a whistle that is loud.

PSMS Field Trip Chair Brian Luther adds that the S.A.F.E. whistles website lists the following three signals:

<i>Signal</i>	<i>Meaning</i>
1 blast	“Where are you?”
2 blasts	“Come to me!”
3 blasts	“I need help!”

His understanding is that a single blast is also the response to hearing three blasts sent by someone in distress.

The International Distress signal can be either three whistle blasts in rapid succession repeated every minute, or six blasts one after the other. The response to having heard the six-blast distress signal from someone is to follow up with three rapid whistles.

**FUNGUS-TREATED VIOLIN OUTDOES STRADIVARIUS**

*Science Daily,*  
September 14, 2009

At the 27th “Osnabrücker Baumpflegetagen” (one of Germany’s most important annual conferences on forest husbandry) on September 1, 2009, a “biotech violin” made of wood treated with a fungus dared to go head to head in a blind test against a stradivarius made by the master violin maker of Cremona himself, Antonio Stradivarius, in 1711—and won!

It was a brilliant outcome for Empa scientist Francis Schwarze and the Swiss violin maker Michael Rhonheimer, who created the new violin from Norwegian spruce treated with the fungus *Physiporinus vitrius* and sycamore treated with *Xylaria longipes*.

In the test, the British star violinist Matthew Trusler played five different instruments behind a curtain, so that the audience did not know which was being played. One of the violins Trusler played was his own strad, worth two million dollars. The other four were all made by Rhonheimer—two with fungally treated wood, the other two with untreated wood. A jury of experts, together with the conference participants, judged the tone quality of the violins. Of the more than 180 attendees, 90 persons felt the tone of the fungally treated violin “Opus 58” to be the best. Trusler’s stradivarius reached second place with 39 votes, but amazingly enough 113 members of the audience thought that “Opus 58” was actually the strad! The “Opus 58” was made from wood that had been treated with fungus for the longest time, nine months.



*Which is the strad?*

**Skepticism before the blind test**

Judging the tone quality of a musical instrument in a blind test is, of course, an extremely subjective matter, since it is a question of pleasing the human senses. Empa scientist Schwarze is fully aware of this, and as he says, “There is no unambiguous scientific way of measuring tone quality.” He was therefore, understandably, rather nervous before the test.

Since the beginning of the 19th century violins made by Stradivarius have been compared to instruments made by others in so called blind tests, the most serious of all probably being that organized by the BBC in 1974. In that test the world famous violinists Isaac Stern and Pinchas Zukerman together with the English violin dealer Charles Beare were challenged to identify blind the “Chaconne” stradivarius made in 1725, a “Guarneri del Gesu” of 1739, a “Vuillaume” of 1846 and a modern instrument made by the English master violin maker Roland Prail.

The result was rather sobering—none of the experts was able to correctly identify more than two of the four instruments, and in fact two of the jurors thought that the modern instrument was actually the “Chaconne” stradivarius.

*cont. on page 8*

## Hunting Truffles with Flies, cont. from page 1

Mature truffles have the strongest odors, an evolutionary adaptation thought to have arisen to attract animal and insect foragers at the peak of spore maturation, increasing the chances of successful spore dispersal. True truffles in the genus *Tuber* cannot actively disperse their spores—they have lost the ability to forcibly discharge spores from the mature asci because they have evolved such a specialized subterranean habitat. Thus they rely upon foraging creatures to disseminate the spores by eating and dropping or dispersing pieces of the fruiting body here and there, as well as by passing the spores through their digestive systems, which in fact aids in spore germination. They also rely on natural decomposition of the fruiting body and subsequent release of spores into the soil.

But let's get to the flies now. People do keep some unusual animals, but insects normally don't fall into the category of what humans would consider as pets. They're not real bright, don't have four legs and a tail, live for only a few days or if lucky a season, don't fetch sticks or say "meow," and don't lend themselves for going on a walk with a leash and having people walk by and say, "Oh, isn't that an adorable fly." However, I'm not talking about having flies as pets, but rather about using their presence and behavior as direct indicators of the occurrence of truffles. Dubarry & Bucquet-Grenet (2001) give an excellent brief description of what is apparently becoming a dying art in Europe—namely, hunting truffles by closely watching the behavior of truffle flies. When most of us conjure up the thought of fly watching, it has to do with attempts to locate, capture, swat, and then kill the pesky things when they get into our houses.



Truffle fly,  
*Suilla pallida*

With truffle flies you must first of all familiarize yourself with the several species of flies involved, then it's important to understand how they act in the presence of truffles. Ambient conditions also must be just right for observing them, such as temperature, sky and sun conditions, and the time of day. And, of course, it must be the correct season to find mature truffles. Basically, the flies are attracted to the odor of the truffles because they lay their eggs on or near them in the soil. The eggs then hatch, and the larvae consume the truffle until they pupate and go into their next life cycle. They've obviously been doing this for a long time because the flies have evolved this as an instinctive behavior.

To hunt with flies, you must carefully crouch down and study the soil in a known truffle area, watching for a small, pale reddish colored fly to either move from a specific point on the soil or to fly by and light on a particular spot. Very careful observation is required to pinpoint the exact spot where the fly comes from or lands on the ground, since this, invariably, is where you'll find hidden treasure beneath. As I was reading accounts of how watching flies to locate truffles is done, it struck me that, above all, it requires tremendous patience, and one thing is for sure—no swatting the flies!

But what's attracting the flies to begin with? Pacioni et al. (1991) conducted experiments clearly showing that dimethyl sulfide (DMS) is the primary chemical that acts as an attractant to insects, at least in the European Perigord (Black) Truffle (*Tuber melanosporum*). But many different, complex chemicals and mixtures of chemicals are unique to specific genera of truffles and truffle-like fungi. Case in point,



a closely related European species, *Tuber magnatum* (the Italian White Truffle), apparently does not produce DMS, but instead a completely different chemical that lures insects. According to Talou et al. (1990), DMS also may be the chemical that entices mammals to the European Black Truffle.

Some of our Pacific Northwest truffles and false truffles have strange and interesting odors when mature, both pleasant and unpleasant. Different people seem to have different reactions to the same smell and give different descriptions or comparisons with known scents. As an example refer to my article on the Oregon Black Truffle (*Spore Prints*, May, 2009). Also, the odor of an immature fruiting body may change somewhat at maturity.

I have not heard of anyone using observable insect behavior to locate any of the native truffles or false truffles we have here in the Pacific Northwest, but who knows what might be discovered?

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## BHUTAN'S BUDDHA MUSHROOM AND OTHER FUNGI Daniel Winkler

The tight curves wound their way up the narrow valley along a mountain river. The gushing water was brown from the heavy monsoon rains. I was already a day late for the conference on Traditional Asian Medicines and eager to make the late morning session on medicinal plants and their increasing scarcity in Asia. We passed by a farmer selling apples and peppers along the roadside. He also sold small plastic bags full of a yellow product that reminded me of chanterelles. Could that be? A few kilometers up the narrow road I spotted another improvised stand, and passing by more slowly I clearly saw mushrooms. In a hurry or not, I had to call a stop and rushed out of the car before it stood still.



Two farming ladies were selling bags of smallish, bright-yellow chanterelles, aromatic whitish brown matsutake, and big purple corals. Quickly, I took pictures, bought some chanterelles and a coral, and got back in the car.

I was invited to Thimphu, Bhutan, to present my research on the caterpillar fungus (*Cordyceps sinensis*) in Tibet at the quadrennial conference on Traditional Asian Medicines. At first I was hesitant to participate, since the invitation came only with a small grant, just a fraction of the travel costs. However, once I realized the conference was taking place during mushroom season, I knew I had to go.

I had wanted to go to Bhutan for 20 years, but somehow it had never worked out before. Partially this is explained by Bhutan's policy to minimize the impact of tourism by letting in only a very limited number of guided groups while maximizing the financial benefits by offering high-end tourism. However, through the years I had been in contact with Dr. Phuntsho Namgyel, a Bhutanese researcher who used to work on the caterpillar fungus and matsutake, Bhutan's most precious fungal resources, as a source of rural income. So I had my hopes up to be able to explore Bhutan's fungal economy instead of joining exclusive tours ignoring the forest full of mushrooms.

It wasn't so easy to get back in contact with Phuntsho. As it turned out he had switched fields and was now a director in the Election Commission of Bhutan, a new office, since the King, Jigme Khesar Namgyel Wangchuck, had ordered Bhutan to become a democracy. This move was not so popular with many people, but the fourth king pointed out that democracy is the future and one bad king could ruin a country.

Bhutan is located in the Eastern Himalayas, sandwiched between India and Chinese-administrated Tibet AR. It is nearly the size of Switzerland and has fewer than a million inhabitants (Switzerland has 7.8 million); the whole valley with the capital, Thimphu, might have around 100,000 now. The strong pull of the urban area worries planners. The administration is working hard on improving living conditions in the countryside to slow down emigration.

In this context, rural mushroom income is regarded as an important factor for rural development, and Bhutan has been dedicating resources to this cause for many years now. For example, the annual *Cordyceps sinensis* harvest is being sold via a government organized auction system to maximize local income in remote regions, which otherwise have an extremely hard time generating a cash income that would allow participation in a modern economy. Also, Bhutan has the most advance field trials researching *Cordyceps sinensis* ecology, although Bhutan's annual production is below a ton and thus less than 1% of the annual production of the Tibetan Plateau and the Himalayas. And the interest in *Cordyceps* is great. Most people I talked with were familiar with "yartsa guenboob," as it is commonly known in Bhutan. I was even interviewed by *Bhutan Today*, a daily newspaper, and invited to present my *Cordyceps* research from Tibet at the ministry of agriculture [see [http://www.moa.gov.bt/moa/news/news\\_detail.php?id=845](http://www.moa.gov.bt/moa/news/news_detail.php?id=845) for a web version.



*Daniel Winkler (left) speaking on "Fungi as a sustainable source of income—The case of yartsa goenbub and sangay shamu in Tibet."*

Still during the conference, Phuntsho took me to the National Mushroom Center, just a short walk from the venue, to meet his friend Dawa Penjor, the NMC director, whom I presented with booklets on PNW chanterelles, morels, and matsutake. We connected quickly through our shared fascination with mushrooms. I told Dawa that I would love to go out in the field with them.

Dawa was so kind as to organize an overnight excursion to Ganekha, the village where the "first" matsutake was found. Actually, this mushroom was known before, but in 1988 a Japanese visitor realized that Bhutan's "Po shamu" (penis mushroom), as it was nicknamed back then for its sometimes suggestive shape, was identical with the famous Japanese matsutake. Already the next year, commercial harvest had started, and ever since then it has been collected in several areas in Bhutan that have warm-temperate oak-pine forests. Most of the matsutake are exported fresh by plane to Japan. All it needed was a new name; everyone now knows it as "sangay shamu," the Buddha Mushroom.

In Ganekha we met the village headmen and the chairman of the local mushroom cooperative, who coordinates the matsutake harvest. We talked about matsutake in Bhutan, Tibet, and the Pacific Northwest. Our visit was timed so that we could attend the matsutake market the next afternoon. Several buyers come to the village three days a week, and all the local collectors bring their matsutake, which are sorted into two categories. Class A are specimens whose caps have not fully opened and whose partial veil is still more or less intact. Collectors can sell this class for US \$5 per pound. Class B are open-capped mushrooms and fetch \$2. Most mushrooms sold are class A. Collectors make \$650–850 per season, which constitutes over 40% of their income. A decade ago matsutake generated over 80%, but the money from the trade has been used to invest in agriculture to buy cows, diversify crops, and introduce power tillers. Thus, the fungal income enabled farmers to increase overall income. This strategy was also strongly supported by Bhutan's king, who, when visiting Ganekha, pointed out that complete dependence on matsutake is not a smart strategy for sound rural development and suggested diversification.

Dawa and Phuntsho had arranged with Aum Kuchum, the lady who had found the first matsutake, to stay the night in her house and join in on an early morning matsutake hunt. She lived in Zamto village, about half an hour's drive on a very rough road up the valley. On the way we encountered a collectors' camp on a small meadow surrounded by dense oak forests. Thirty-five men from a lower village for whom the walk up into the woods was too far for a daily hunt had camped out in group tents. Their daily work was done, and they were playing *Khuru*, throwing heavy metal darts over a distance of 20 yards. We were invited to join in, and it took quite awhile until I managed to figure out how to give the weighty dart the right spin to fly straight.

We continued on, only to find the road blocked by a landslide. In May, totally untypical, a typhoon had struck Bhutan and caused much destruction. So we had to hike the last bit. The narrow valley opened up between forested slopes. The southern slope was dotted with tall, beautiful wooden farmhouses with ornate windows surrounded by already harvested fields.

Once in the house, which we entered by way of a small bridge over a dry moat, we were served milk, tea, and cookies. This was soon followed by a sumptuous dinner.

First we received a big bowl of "red rice," a rice with a natural pinkish grain. I was shown how to use the cooked rice to clean

*cont. on page 6*

## Bhutan Mushrooms, cont. from page 5

my hands by first rubbing it and then kneading it in my hands. The color change convinced me that my hands should be clean enough to eat my food with. On top of my rice I received a ladle each of “ema datsi” and “shamu datsi.” Datsi is a cheese sauce, somewhat close to our idea of a cream sauce, and a Bhutanese favorite. Ema are green chilies. In Bhutan hot peppers are a vegetable, not a spice. Incredible amounts of hot green and red chilies are eaten every day. Not surprisingly, the shamu datsi—mushrooms in cheese sauce—were also enriched with lots of chilies. The mushroom served was the Himalayan Gypsy (*Rozites emodensis*), which looks just like its close relative the Gypsy (*Rozites caperata*) but can be distinguished by the pinkish-purple hue of its gills and the wrinkled cap. It was difficult to discern its taste beyond pleasantly fungal owing to the overwhelming presence of the green peppers. Rounds of arak, a clear alcohol derived from grain, often rice, were also served, but arak turned out to be the wrong kind of drink to fight the spiciness of the food. We went to bed early, since we were scheduled to rise at 5 a.m. to hunt for matsutake.

At dawn, following Dema, the daughter of Aum Kuchum, we quickly traversed some pastures covered with aromatic wild hemp on the way uphill to the matsutake forest. The altitude of nearly 10,000 ft slowed me down. In the morning light, the forest of stout evergreen oaks (*Quercus semecarpifolia*) and Bhutan pines (*Pinus wallichiana*) decorated with long strands of *Usnea* lichen interspersed with tall Rhododendrons and *Pieris* shrubs seemed like it was out of a fairy tale. The silver gray *Usnea longissima* is also known in Bhutan as Dakini hair. Dakinis are female beings which usually reside in a different sphere but once in a while manifest in the human dimension to help humans along the path to wisdom.

It did not take any divine intervention to find the first mushrooms. Bright yellow chanterelles and a variety of Russulas dotted the ground. Matsutake were much more elusive, the daily collection by locals having cleaned out the forest successfully. Or maybe they were all hidden? A small Class A budding matsutake was found, but since it was still below the minimum size of 3 inches required by collection regulations we hid it under some moss so it could grow some more.



*Tricholoma matsutake*,  
the Buddha Mushroom

Soon I lost sight of Dema, Dawa, and two of his people, since taking mushroom photos and identifying species to a new member of the Mushroom Center slowed me down. We found many familiar mushrooms such as chanterelles (*Cantharellus cibarius*), russulas (*R. emetica*, *R. cyanoxantha*, and *R. delica*), amanitas (*A. citrina* and *A. franchetii*), milk caps (*Lactarius scrobiculatus* and *L. rufus*), and a whole range of *Tricholoma* such as *T. sejunctum*, *T. sulphureum*, and *T. focale*. Also we came across a big purple *Ramaria* called “Bjichu kangru,” the bird foot; nobody knows the exact scientific name, but everybody eats it. Also abundant was the Himalayan Gypsy (*Rozites emodensis*). We picked the young ones, but left behind many more old ones, which lose much of their pink-purple complexion. But, of course, there were plenty of mushrooms I had never seen in my life or just couldn’t place.

Returning to the farmhouse, we started an ID session with European and Japanese books, as there are no Himalayan mushroom

books. Dawa is very troubled by using European names, but has no real alternatives owing to the lack of comprehensive taxonomic research in the region. I told him many mushrooms in North America were also named for European species and received their own names a century or decades later. Dawa was aware of the case of our Pacific chanterelle, *C. formosus*, which was known for a long time as *C. cibarius*, although it is very distinctive.

Talking about chanterelles, while collecting with Sabrintara and Dorji, both members of the NMC, below Cheri Gompa up the valley from Thimphu, we found “regular” chanterelles (*Cantharellus cibarius*), white chanterelles (*Cantharellus sp.*), and a blue-gray chanterelle (*Craterellus cornucopioides*); the last, known as the Horn of Plenty, is an excellent edible but is not often eaten in Bhutan because of its dark color. (Interestingly, close by in Tango I found the winter chanterelle *Craterellus tubaeformis*, but was told by a fungophile monk that this mushroom was not edible.)

Also on this very moist shady slope under deciduous oaks, I found my first *Amanita rubrovolvata*, a beautiful, tiny, light-red, spotted fly agaric with a red volva. Another tiny, but stunning, mushroom was a viscous *Suillus* with a dimpled dark brown cap. Big old oaks served as habitat for *Ganoderma* and hand-sized *Oudemansiella*, which grew below leaning trunks, probably preferring the rain protection for fruiting.

With us looking for mushrooms in the woods were a bunch of young Nepali women (Bhutan has a big Nepali population), who were picking any good-sized mushrooms, often asking us if they could eat them. We told them we didn’t know what they were picking, and it is not smart to eat any mushroom you cannot recognize for sure. They did not care for that bit of information and went their way with a wild assortment, at least with no deadly mushrooms as far as we knew. Also, several people told me that there are many people who are convinced that any toxicity in a mushroom can be neutralized by cooking them with the seed from a native Prickly ash, “tingke” (*Zanthoxylum sp.*), known in China as Sichuan pepper.

The consumption of mushrooms not really known to the collectors is a big problem in Bhutan. Every year many people get sick or even die from eating poisonous mushrooms. One of the Mushroom Center’s main objectives is to educate the public. Dawa and the NMC have published two posters of the main edible and poisonous mushrooms. They have also produced table calendars and brochures about poisonous mushrooms and mushroom poisonings—with symptomatic diagnoses—which have been distributed widely in Bhutan. In addition, the NMC is working on a compilation of Bhutan’s mycota, but there is no end in sight. (In Europe some mycologist suggest calling the fungal flora “funga,” which seems a good choice, staying with Latin in the context of flora, fauna, and funga, not to mention the catchy alliteration.)

Dawa emphasized that NMC would love to be able to send some of its staff abroad for training to improve their taxonomic skills and pointed out that taxonomic experts interested in coming to work in Bhutan—which not only has a forestation rate of over 70% but also boasts an incredible biodiversity, from tropic Himalayan foothills to high alpine areas peaking out at 24,000 ft—may have the opportunity to help NMC in mushroom taxonomy. If there is any mycology department interested in cooperating with Bhutan and able to offer an opportunity for training, I would be glad to help in making a connection.

Another main task of NMC is disseminating the know-how of mushroom cultivation in the country. When I was visiting, NMC was growing Shiitake, *Pleurotus*, and *Ganoderma*.

But let's get back into the soaked oak forest on a 60° slope. The extreme steepness slowed us down and the mossy "ground" in the form of the slope was right in our faces. As I was photographing a big white *Ramaria* (the main challenge was not sliding down), I noticed a minute, filigreed fruiting body with a yellow base and the rest all covered in white spores, like a small tree covered in powder snow. Eureka! I had found a *Cordyceps*. We looked all around and found four more minute similar fungi. Well, it turned out we had found three different species, all technically not *Cordyceps*, but anamorphs of *Cordyceps*, one of them most probably *Isaria tenuipes*. This I was told by Dr. Nigel Hywel-Jones, a Welsh mycologist who started out as an entomologist but slowly was caught in the fungal web and has been researching *Cordyceps* fungi in SE Asia for two decades. His recent research focus is in Bhutan.

Although it is absolutely fascinating discussing *Cordyceps* and other entomophagous fungi with Nigel, he himself is not much of a mycophagist. However, that wasn't much of an issue in a country where the only Italian restaurant serves you an excellent pizza con funghi cooked with fresh *Sisi shamu*, the oak mushroom, which we know as chanterelles.

PS: I will be posting photos from Bhutan on my webpages: [www.MushRoaming.com](http://www.MushRoaming.com).

Bhutan flag



## A RASH SUGGESTION

Marshall Deutsch

*Boston Mycological Club Bulletin via  
MushRumors, Oregon Myco. Soc., July/August 2009*

This article by Marshall Deutsch appeared a number of years ago in the *Boston Mycological Club Newsletter*. The medicinal uses for mushrooms are typically investigated in long-term studies. If you are unlucky enough to get poison ivy or poison oak and lucky enough to find boletes that turn blue when bruised (e.g., *B. zelleri*) at the same time, here is something you can try. Thank you to Dick Bishop for sending this article to us.



Poison ivy

One of the perils in hunting mushrooms is the possibility of developing a rash from poison ivy. Collectors of wildflowers have been known to treat this rash with the juice of the jewelweed. We mushroom hunters have available our own remedy for this condition.

The active principle of poison ivy, which is called urushiol, is also found in poison oak, poison sumac, and the Japanese lacquer tree. In fact, it gets its name from "urushi," the Japanese word for lacquer. An enzyme called laccase, or diphenol oxidase, extracted from the familiar shelf mushroom named *Polyporus versicolor* alias *Coriolus versicolor* or "turkey tails" has been used to harden the lacquer, which it does by oxidizing the urushiol to another compound (a quinone), which spontaneously polymerizes. This process renders the urushiol innocuous.

This is only part of what I learned when, a few years ago, attacks of "Rhus dermatitis" (poison-ivy rashes) sent my wife to a physician and me to the medical library. The most interesting thing I found in the library was a reference to U.S. Patent 4,259,318 which described an invention of Nanda V. Duhé and Donald L. Hendrix, then of the University of Texas. Dr. Hendrix is now in Phoenix, Arizona; I couldn't trace his co-inven-



Poison oak

tor. Their invention was a cream to be applied to the skin for the relief of poison ivy, and its active ingredient was laccase.

The next morning, as I was driving to work, I passed a large flush of the bay bolete, *Boletus badius*. I stopped to pick a number of them, with only gastronomy in mind, but as I continued on to work,



Poison sumac

I was struck by a brilliant idea. A poison ivy lesion on my wrist was itching badly, so I tore a piece of the cap off one of the mushrooms and rubbed it on the lesion. It was rather messy, but in a few minutes, the itching stopped, and it never returned.

What I had done was more of a random experiment than the testing of a scientific hypothesis; about all that *P. versicolor* and *B. badius* appear to have in common are pores with spores. Using hindsight, however, I can supply a rationale for what I did. The patent refers to previous researchers who observed that tyrosinase, the enzyme responsible for the darkening of cut potatoes and apples, also detoxifies urushiol. *Boletus badius* darkens upon being bruised, but it darkens to a blue color, as do many boletes, instead of the brown-black color of cut potatoes. Presumably it contains an enzyme which is responsible both for the formation of the blue color and the relief of Rhus dermatitis. Also, presumably it contains more, or a more active form, of the enzyme than is found in potatoes or apples.

My guess is that mushrooms that discolor on bruising will in general relieve poison-ivy rashes if rubbed on the rashes. A few subsequent experiences with unidentified boletes have done nothing to make me modify this guess.

## WHEAT DUMPING CAUSED BY MISPRINT

*CBC News, September 18, 2009*

Agricultural officials on Prince Edward Island are trying to determine how many tons of wheat were dumped in the mistaken belief it was not fit for human consumption.

For more than 20 years, the Canadian Food Inspection Agency has set the acceptable level of the toxin caused by *Fusarium* blight at two parts per million. This year, however, a letter from Dover Mills to P.E.I. Grain Elevators said the acceptable level was one part per million.

"It is simply a miscommunication," said Wes Sheridan, the acting agriculture minister.

Mary Van DenBroek-Grant, who owns Cardigan Feed Services, said although she was relieved to hear the standards had not changed, the situation was highly stressful for farmers. "There will be a real blame game happening here as there rightly should be," she said. "Somebody has to be held accountable for these kinds of losses. And it shouldn't be the grower in the end again."

Sheridan said agriculture officials will begin next week to try to determine how much good wheat has been dumped. Sheridan did not discuss the possibility of compensation for farmers.

Farmers who have dumped their wheat will be partially covered by crop insurance, providing them with about half of what the crop would be worth in the marketplace.

*Some of the thousands of tons  
of wheat dumped on Prince  
Edward Island.*



### Biotech wood, a revolution in the art of violin making

Fungal infections are generally thought to damage wood, but results published by Francis Schwarze last year suggested that some types of soft rot fungi reduced the density of the wood, making it lighter and improving its tonal quality without impairing its firmness. Fungi may thus help artificially replicate the unusually low density of wood that is thought to have occurred in Stradivarius' time. The "Little Ice Age" that occurred from 1645 to 1715 brought about long winters and cool summers in Central Europe, causing trees to grow slowly and uniformly and creating wood with great tonal qualities

Horst Heger of the Osnabruck City Conservatory is convinced that the success of the "fungus violin" represents a revolution in the field of classical music. "In the future even talented young musicians will be able to afford a violin with the same tonal quality as an impossibly expensive Stradivarius," he believes.

Schwarze said the new instruments would probably run about \$25,000.



*Some who hunt the autumn's fragile hedgehogs  
prefer them to the more popular and easily found  
chanterelle,  
and some connoisseurs would only eat a Russula  
in secret,  
praying that their best friends will never, ever  
ever, ever ever, ever tell.*

### CRISPY PORCINI PANGRATTATO

*MushRumors*, Ore. Myco. Soc., May/June 2009

½ ounce dried porcini (*Boletus edulis*)  
4 ounces artisan bread, preferably stale, cut into chunks  
Salt  
Black pepper  
2 tablespoons olive oil  
2 cloves garlic, crushed  
4-in. sprig fresh rosemary



Process the mushrooms, bread, and garlic with a pinch of salt and pepper in a food processor until the mixture looks like bread crumbs. Heat olive oil in a large frying pan. Add the sprig of rosemary and cook for a minute, then fry the bread crumbs in the oil until golden and crisp. Keep shaking the pan—don't let the bread crumbs stick to the bottom. Discard the rosemary. Cool the bread crumbs and store in the refrigerator.

It isn't often that you discover a new and truly different way to include mushrooms in dishes. "Crispy Porcini Pangrattato" is part of a recipe for "Pappardelle with Slow-Braised Leeks" from the Food Network. The pasta recipe sounds tasty but it is the crispy topping that offers a novel use for dried porcini. Brainstorm ways to use these crumbs, for example, as a topping for a casserole or to garnish vegetables.

Adapted from a recipe in *Jamie at Home*, by Jamie Oliver and available on the Food Network at [http://www.foodnetwork.com/food/recipes/recipe/0,1977,FOOD\\_9936\\_122644,00.html](http://www.foodnetwork.com/food/recipes/recipe/0,1977,FOOD_9936_122644,00.html).

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