

# SPORE PRINTS



BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY

Number 409

February 2005

## PRESIDENT'S MESSAGE

Ron Post

I'm always trying to prioritize, to let certain things go at the expense of giving time to what seems more important. But "persistence pays off" is the lesson of this little story.

Last year I went searching for evidence of our society owning a laminar flow hood, which I had been told from more than one source that we did, indeed, own. This little device is very useful in making cultures for fungal inoculation since, because of differences in air pressure, it gives a "clean-air" environment while working under it.

Well, I didn't find any evidence of it, nor did I find the hood. But a prospective board member mentioned to me he thought he saw one in our CUH storage shed while we were moving things to the annual exhibit last year. I searched the shed once but found nothing. Then, in December, while moving exhibit trays that were in need of repair, I saw the device in someone else's storage area of the shed.

Top it off, I was looking through a database of old *Spore Prints* the other day, doing a search for the word "election," and ran across an article with a mention of the purchase of the laminar flow hood (in February 1993). Up to that point all of my searches for "laminar flow hood" and like words had produced no results.

So, our clean-air bench "hood" is now in the hands of a member who will use it, the mystery is cleared up, and the months it took me to find the device have paid off. (I hope it still works!)

Other people were mostly responsible for me finding it: the prospective board member and our former president who put the newsletters into a database.

I've had to search around for a lot of things in life, and waiting and persistence aren't really part of my nature. But the attributes that I usually let lie in the background easily come to the fore when working with other members of PSMS. Let that be my lesson. And perhaps, yours.

Don't forget to vote or to renew your membership soon. And I hope to see you at the banquet March 12.

## CISPUS FORAY

Patrice Benson

Please save the dates of May 13–15 for a Spring Foray at the Cispus Environmental Learning Center near Randal, Washington, on the Cispus River. It will be a two-night foray packed with interesting walks, lectures, and workshops. Microscopy with Judy Rogers and lichenology with Dr. Katherine Glew are only a couple of the fascinating things to look forward to. There will be cooking activities, dyeing with fungi, and nature walks. Also, the mushrooms should be at their prime for the spring fungi in that area, so plan on signing up beginning at the February meeting. Cost for two nights lodging, five meals, and all of the activities will be approximately \$80 per person. There will be more information in the next *Spore Prints*.

## BANCHETTO ITALIANO!!

Marian Maxwell

The theme for our 2005 Annual Survivor's Banquet is Italian!

Our board has voted to alternate potlucks and "going out" or catered events. Last year was catered, so, this year is potluck. We are asking people to contribute Italian dishes in one of these four categories: Appetizers, Main Dishes, Salads, or Desserts (preferably dishes featuring mushrooms...in the first three categories).

Please send **\$7.50 per person** to Marian Maxwell, 14269 145th Place SE, Renton, WA 98059 or you may also pay me at the February meeting. Please do not mail cash. Make checks payable to PSMS. Please include the category of dish that you would like contribute (one of the four above). The amount of \$7.50 includes hall rental, entertainment, door prizes (we have great door prizes!), paper supplies, decorations, coffee and tea, etc. Please reserve your spots early as we have limited seating capacity.

PSMS will supply wine for a glass with dinner (wine for those over 21 only please). We will have a memorial toast to George Rafanelli. There will also be a raffle basket with proceeds benefiting the Ben Woo Scholarship fund.

This banquet will be held at the Center for Urban Horticulture in our normal meeting room. It is also our annual meeting, and replaces the general meeting in March. We will present our newly elected officers as well as the recipient of the Golden Mushroom Award!

Meeting and conversing begin at 6:30 PM. Dinner begins at 7:00 PM.

If you would like to help with decorations, setup, cleanup or raffle ticket sales, please call me at 425-235-8557 or e-mail me at marianmaxwell@hotmail.com.

We will have a great time; you don't want to miss this.

### George Rafanelli

June 30, 1916 – January 3, 2005

A wine connoisseur and friend of Dr. Dan Stuntz, George of was a charter member of PSMS. He served on the PSMS Morel Committee, on the Board, as Vice-President, and as our third President. He was consulted by the Poison Control Center and was a member of the Pacific Northwest Key Council. George was perhaps best known, however, as an intrepid forager, filling carloads of wooden grape crates with mushrooms for the Show—with the help of a little red wine. His motto was, "As long as the red wine flows, you will run into me in the hills" Happy hunting, George!

Memorials are suggested to the Daniel E. Stuntz Foundation, c/o Lynn Phillips, 6518 Woodlawn Ave. N., Seattle, WA 98103.

# Spore Prints

is published monthly, September through June by the  
**PUGET SOUND MYCOLOGICAL SOCIETY**

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Annual dues \$25; full-time students \$15

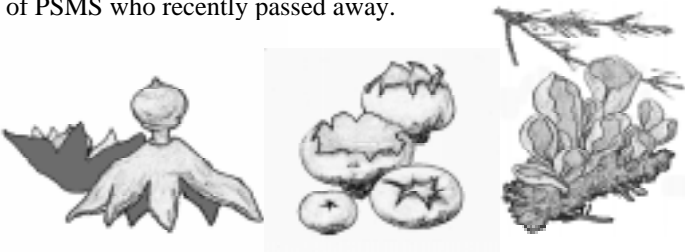
## CALENDAR

- Feb. 8 Membership Meeting, 7:30 PM, CUH  
 Feb. 9–13 NW Flower & Garden Show, Convention Center  
 Feb. 14 Board Meeting, 7:30 PM, CUH  
 Feb. 22 *Spore Prints* deadline  
 Mar. 12 Survivor's Banquet and Annual Meeting  
 May 13–15 Spring Foray, Cispus Environmental Center

## BOARD NEWS

**Dennis Oliver**

Planning has begun under the very able leadership of Marian Maxwell for the annual Survivors Banquet on March 12. Further details can be found in this issue of *Spore Prints*. John Goldman, treasurer, gave the year ending totals and reported that the financial state of the society is good. PSMS had the most successful annual show financially in its history. The society had increased expenses this year due to the membership roster, the increased size of *Spore Prints* (to eight pages), and increased educational spending for grants and classes. Even with these increases, PSMS finished the year in the black. The spring foray has been set for May 13–15 at Cispus, and the annual mushroom show for the weekend of October 22–23. The board is discussing a suitable memorial to George Rafanelli, an old and valued charter member of PSMS who recently passed away.



## MEMBERSHIP MEETING

Tuesday, February 8, 2005, at 7:30 PM at the Center for Urban Horticulture, 3501 NE 41st Street, Seattle

The topic for our February meeting will be “Fungal Chemical Ecology: Fancy Chemistry and Its Role in Nature,” and our speaker will be Brian King, who is currently a graduate student in Plant Science at the University of British Columbia in Vancouver, B.C. He received his BSc in Botany in 2003 from Miami University in Oxford, Ohio. His interests include mycology, ethnobotany, chemistry, and horticulture. His current research deals with entomopathogenic fungi, mostly anamorphic Ascomycetes in the family Clavicipitaceae. Some of you may know these fungi as Cordyceps, the fruiting bodies arise from the insect hosts and are used in eastern medicine to treat many conditions. These fungi will be screened for biocontrol applications and for the biosynthesis of novel chemicals with antibacterial, antifungal, and/or insecticidal activities.

If your name begins with the letters A–L, please bring something to share after the meeting.

## FLOWER & GARDEN SHOW, Emily Routledge

After a one-year absence, the Puget Sound Mycological Society will once again have an educational booth at the upcoming Flower & Garden Show at the Washington State Convention and Trade Center in Seattle. The dates are February 9–13, 2005. Thank you to the many volunteers who have already signed up to staff one or more shifts. We still have a number of slots available to help promote our club—and enjoy the show on a complimentary basis.



Benefits for each 3½ hour volunteer shift include a free full-day admission to the Flower & Garden show (a \$15 value), free shuttle service from the Northgate Transit Center to the Convention Center, and an opportunity to connect with other like-minded groups.

Below is a table indicating the time slots still available. If you are interested in one or more shifts, please e-mail me at [emilyroo@hotmail.com](mailto:emilyroo@hotmail.com) or call me at (206) 355-5221.

Thanks to everyone, in advance, for your participation in this worthy effort.

Day	Date	Time	No of People Needed
Wednesday	Feb. 9	8:45 AM – 12:15 PM	1
Wednesday	Feb. 9	11:45 AM – 3:15 PM	1
Thursday	Feb. 10	11:45 AM – 3:15 PM	1
Thursday	Feb. 10	2:45 PM – 6:15 PM	2
Thursday	Feb. 10	5:45 PM – 9:15 PM	2
Friday	Feb. 11	8:45 AM – 12:15 PM	2
Friday	Feb. 11	11:45 AM – 3:15 PM	1
Friday	Feb. 11	5:45 PM – 9:15 PM	2
Saturday	Feb. 12	8:45 AM – 12:15 PM	2
Saturday	Feb. 12	2:45 PM – 6:15 PM	2
Saturday	Feb. 12	5:45 PM – 9:15 PM	2
Sunday	Feb. 13	8:45 AM – 12:15 PM	2
Sunday	Feb. 13	2:45 PM – 6:15 PM	1

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**Election****Election****Election**

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This year we are voting for a Vice-President, a Secretary, and five Trustees. Please read the following profiles carefully and mark your choice on the enclosed ballot. Return your ballot to "PSMS Election Committee," Center for Urban Horticulture, Box 354115, University of Washington, Seattle, WA 98195. A ballot box will also be available at the February meeting. Each family membership is entitled to two votes, and each individual membership to one vote. Ballots received after February 28 will not be counted.



**Patrice Benson** *Vice-President*

I am the current Vice-President, and am happy to continue my job of arranging speakers for our membership (one of the best and most fascinating jobs in the club!). I will do my best to provide interesting things for all of the members to think about and participate on the board as a useful, experienced member.

*Secretary*

**Dennis Oliver**



Appointed to fill the remaining term as PSMS Secretary by the board, I would like to continue to serve PSMS as secretary. I have a degree in Botany from the University of Washington, studying with Dr. Stuntz, and did graduate study with Dr. David Horsford at Central Washington. I am a member of NAMA and the Mycological Society of America.

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**Trustees**

**Steve Haynack**

I joined PSMS in Spring 2003 with my wife, Adriana. Since then we have hosted field trips, worked at the Fall Mushroom show, attended meetings, and taken mushroom identification classes taught by Dr Ammirati. I have learned about mushrooms but much more from the great people who are the club. It would be a great honor to be elected as a trustee.



**Lynn Phillips**

I've been a member of PSMS for about 20 years and have been on the Board for more than half that time in various capacities. After taking a break from my last stint, as treasurer for four years, I'd like to get involved again. I'm particularly interested to see PSMS get more involved in education for our members and outreach to other local mushroom groups.



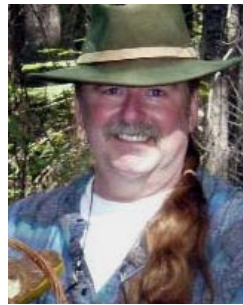
**Molly Bernstein**

Many may know me as the designer of the new website, which I was pleased to help produce. Since joining PSMS in 2003, I have enjoyed the meetings, field trips, classes, and people of PSMS. I would be honored to join the Board, and contribute more to this great society.



**Steve W. Bigelow**

Many of you know me from my work on the Website and the Annual Exhibit as well as from attending available classes. I'm planning on returning to my deep-sea career as a Marine Engineer, but I want to run for the Board as an Alternate to be there if I'm available the Board is short a member. Thanks and happy mushrooming.



**Tony Tschanz**

Growing up in the Swiss Alps and hunting Eierschwemme (Chanterelles) and Steinpilze with my dad got me fearlessly into mushrooms early. I would like to get re-elected for another term and help with the many tasks, since one gets more fun and learning back from the many talented members than one can contribute



**Carissa Thornock**

I graduated with a degree in Microbiology and Chemistry from Boise State University in May 2003 and moved to Puget Sound in June. Since I joined PSMS, I have been on one field trip and returned successfully with morels—which I promptly consumed. Already, I have benefited from my association with PSMS and hope to deepen my involvement and my rewards.



## BOG BLOG 5 - *ENTOLOMA* SP. Noelle Machnicki

As the winter finally settles in and the frost begins to form on the Sphagnum moss of Shadow Lake Bog, the mushrooms that were so abundant less than a month ago are almost entirely gone. With the exception of a few crusty polypores and some frozen Mycenas, the bog team has come back from recent collecting trips with very few mushrooms to work on. The winter mushroom slowdown provides us with much needed time to catch up on organizing collections and data. It also gives us time to reexamine mushrooms that we couldn't identify the first time around. While there are quite a few mushrooms that we haven't been able to name, one infuriating little mushroom gets honorable mention in the unidentified category: *Entoloma* sp., otherwise known among the bog team as "that pink-spored thing."

This innocent-looking *Entoloma* has a convex to conic cap that is occasionally umbonate and ranges in color from golden buff to slightly ochraceous with a darker center. It is hygrophanous, and sometimes translucently striate. The cap is dry and glabrous with thin flesh. The gills are a creamy buff color, with a pinkish cast that deepens with age. The stipe is longitudinally striate and silky in appearance, with a yellowish buff color. It can have a slightly bulbous base and tapers toward the apex.



There are many reasons this mushroom has been nicknamed "*Entoloma confusa*" and "*E. infuriata*" in our database. It is variable in color, size, stature, and growth habit. It has fooled us into collecting it over 30 times and has been found growing on regular moss, Sphagnum moss, hemlock cones, needle duff, and wood. It can be found from October to May and is often the dominant mushroom in the bog. At times (surrounded by *hundreds* of Entolomas) in the bog we have felt mocked by this fungus: "Ha ha, I am *everywhere* and you don't know what I am!"

Leesa and I have spent countless hours looking through keys and microscopes trying to find a name for this *Entoloma*. Potential names have included: *E. cuneatum*, *E. cetratum*, *E. pallescens*, and *Nolanea holoconiota*. For each name, we have been unable to match up key features on our fungus. Sometimes the spores (which are angular and 5–7 sided, very cool!) aren't the right size or the hyphae or basidia are too wide. Sometimes we look for hours for features (like clamp connections) that should be there but aren't. Nothing fits!

Since we are unable to make any progress on this ubiquitous bog mushroom, Dr. Ammirati has asked Dr. Machiel Noordeloos, a mycologist from the Netherlands, to look at our collections. So we have prepared our notes, photographs, and collections for a trip to Europe! Stay tuned for updates in future Bog Blogs on this mysterious pink-spored mushroom.

## POISON DIGS ITS OWN GRAVE *The Sporeprint* L.A. Mycological Society, January 2005

*Botrytis cinerea* (gray mold) causes rot in fruit and vegetables and is therefore a major problem for growers in horticulture and viticulture. Unfortunately, it is scarcely affected by natural or synthetic compounds used to protect against it, because it uses minute protein pumps (so-called ABC transporters) to pump these compounds right back out again.

When the fungus initially comes into contact with toxic substances, they enter it unhindered. About 15 minutes later, an emergency

mechanism starts up, and the fungus secretes the toxic substances so that their concentration in the fungus falls below the lethal dose.

Dutch researcher Henk-jan Schoonbeek studied the genes involved in the secretion of toxic substances by ABC transporters. He discovered that upon entering the fungus, the toxic substances stimulate the fungal DNA to produce certain proteins, which then immediately pump these substances out of the fungus.

The researcher established that this mechanism in *B. cinerea* is comparable to multiple drug resistance in humans. Multiple drug resistance is when cells that have been treated with one type of medicine, become resistant to a completely unrelated group of medicines.

One of these ABC transporters is the protein BcatrB. This protein is involved in defending the fungus against many different toxic elements. For example, it is active against resveratrol, a defense compound produced by grapevines. Therefore the fungus can easily break through the defense lines of grape plants. Although antibiotic-producing bacteria are used to protect plants successfully against other pathogens, the phenazine antibiotics they contain cannot stop *B. cinerea* because they activate the production of the BcatrB protein and are immediately pumped back out again. This new information is helpful in developing new strategies to control gray mold diseases.

The research was funded by the Netherlands Organization for Scientific Research.

## BARNEY THE DOG SNIFFS OUT COURTHOUSE MOLD *The Washington Post* for September 7, 2004 via *The Boston Mycological Club Bulletin*, December 2004

Dogs may have uses other than for hunting truffles. For 12 years, employees of the Howard County Circuit Court clerk's office in Maryland had complained of headaches, respiratory problems, and a general sense of the blahs. They'd feel fine on the weekends, they said, but come back to find that the place smelled like a locker room or rotten potatoes.

So in early August, fed up with years of breathing bad air, they threatened a sickout. Enter Barney. Not the giant purple dinosaur. The 2-year-old mold-sniffing dog.

Margaret D. Rappaport, clerk of the Circuit Court, had long suspected mold as the culprit in their windowless ground-floor office at the tiny Ellicott City courthouse. Several times over the past 12 years, she has brought in county officials to try to fix the problem. Mold remains visible in several locations, including two courtrooms.

She was mulling over the options when a colleague steered her to Barney's owners, David Marcelli and his wife, Rondra, of Westminster. A few days later, Barney, a mixed breed of indistinguishable ancestry who appears to be part Labrador retriever, was on the case in the clerk's office. Barney, David Marcelli said, has been trained to detect 18 types of mold as well as a bacterium commonly found in rotting wood.

It didn't take long. He sat several times while ambling on a leash through the clerk's office—a sure sign he was finding mold, Marcelli said. "If that was a bomb dog, I'd be getting the hell out of here," one sheriff's deputy said as he watched Barney sniff the rugs and bookcases and hit the deck repeatedly.

At one point, while in the document room, Barney moved low and rolled over several times on the carpet. "There was so much mold, he didn't know which way to go," Rappaport said.

## PRIZE TRUFFLE GOES BAD

**Cahal Milmo**

*New Zealand Herald*, via *The Sporeprint*,  
L.A. Myco. Soc., January 2005

18 December 2004 - When London restaurant manager Enzo Cassini clubbed together some of his regular customers to spend £28,000 (over \$50,000) on the world's second largest Italian white truffle, he could be forgiven for assuming he had a winner. The



arrival of the 850-gram fungus at Zafferano, his Michelin-starred Italian restaurant in Knightsbridge, drew salivating admirers from Paris and Madrid. Gourmet glitterati vied for a taste, described by Mr. Cassini as “earthy, sexy, and an aphrodisiac”—at a cost of £600 per micro-sliced sprinkling.

Imagine the horror when the head chef, Andy Needham, took the mushroom from its refrigerated safe and found it had gone bad.

A downcast Mr. Cassini said afterwards, “The problem was that after we received the truffle, it was displayed for four or five days because so many people wanted to come and see it. Then, Andy had to go away for a few days. When he came back, we found our poor little truffle had gone past its best. It was very sad.”

Mr. Cassini placed an order for an extra kilogram of the fungus to present to his clients. He said: “We had some of our celebrities in last night and served them with the new truffles. They just laughed when they heard the news. We are very sorry.”

Zafferano staff planned to return the truffle from whence it came by burying it in Mr. Needham's garden in Fulham, West London. However, when the truffle experts of Florence heard about the its unhappy fate, they asked for its return. In exchange, they offered Mr Cassini a selection of much smaller white truffles weighing the same as his original trophy mushroom.

After a farewell poem, the truffle is being solemnly re-interred in the grounds of an historic castle built by the Medici, former rulers of Florence, not far from where it was originally found.

“It died a very happy truffle,” Mr. Cassini said, “back in the ground, unsliced....Hopefully next year it will have spawned some little truffles.”

*That was no trifle of a truffle. May it rest in Pisa.*

—Kevin Trim

## FIRST TRUFFLE MUSEUM

**Shasta Darlington**

*The Sporeprint*, L.A. Myco Soc., Dec. 2004

ROME (Reuters), 11 Nov. 2004 - Italy's warty white truffles, once aphrodisiacs for the ancient Romans and now the most expensive fungi in the world, are finally getting their own museum.

The tiny Tuscan village of San Giovanni d'Asso, one of the main producers of the “white diamonds of Italy,” will throw open its doors on Italy's first truffle museum on Saturday.

“It's going to be more than a museum. It's going to be an assault on the senses,” says Enzo Francini, head of finances for the medieval town of 950 people.

A pharmacist, a botanist, and a chef were called in to help the museum in a 13th century castle where exhi



bitions, videos and interactive programs will explain the history of the prized fungus and recreate the modern-day hunt for it.

But creators are most proud of the “odorama” exhibition which will allow visitors to drink in the heady aromas of dozens of different kinds of truffles.

“There's a reason they're considered aphrodisiacs,” Francini said. “They're not exactly Viagra, but our chemical tests showed that smell has a tranquilizing effect which puts people in the mood for love.”

## FRENCH POLICE DIG DEEP TO OUT-SMART TRUFFLE THIEVES

**Susan Bell**

*The Scotsman*, via *The Sporeprint*, L.A. Myco Soc.,  
January 2005

30 December 2004 - Police in France are turning to satellite tracking technology in a bid to outsmart increasingly sophisticated thieves who are devastating the country's truffle-growing region.

Using hi-tech equipment, including infra-red goggles, the criminals are able to detect and dig up the legendary culinary delicacy even at night. Their lucrative hoard can fetch up to £516 (734 Euro) per kilogram on the wholesale market.

“Truffle theft is a recurrent problem, but for the past few years, it has become systematic,” said Jean Louis Gailleur of the truffle farmers' union in Riez, Provence. “The other morning, a colleague went to his truffle farm and discovered 250 freshly dug holes and just as many missing truffles,” he added.

“Nights when there's a full moon are particularly dangerous,” said Armand Fabre, who heads a local association of trufficulteurs, as the producers are known in France.

Still recovering from last year's blistering heatwave that scorched the country's main truffle-producing regions of Perigord and Lot, the trufficulteurs say they have lost an estimated £8,000 worth of the precious tubers to thieves since the beginning of October. The farmers are particularly angry because many of the stolen truffles were not yet ready for harvesting.

The highly organized gangs, accompanied by dogs which have been specially trained to sniff out and dig up the valuable fungus, drive up to the vast oak groves of Provence from the Mediterranean cities of Nice and Marseilles. They are often armed, and police say the use of infra-red goggles enables them to maneuver easily under cover of darkness.

The gangs leave their dogs in the oak groves and then drive back a couple of hours later to pick them up—along with the prized loot the animals have unearthed. The truffle gangs smuggle their precious haul across the border to Italy, or flog the rare and expensive tubers on the black market to unscrupulous French restaurateurs.

In previous years, police have stepped up night patrols during the truffle season from mid-November until February in an attempt to catch the thieves. But now, they are also considering inserting microchips into a batch of truffles while they are still in the ground to allow them

(cont. on page 6)



*Mycologists raking for truffles in Herford, Fungal Spores, T.C. Ingold, reproduced from an illustration in Graphic, 1873*

to track thieves by satellite using the Global Positioning System. There is one drawback, however—police must move fast before the device is either discovered or ruined when the delicacy is grated or shaved into paper-thin slices ready to be tossed into the saucepan.

*Tuber melanosporum*, the famous diamant noir, or black diamond, has long enjoyed a reputation as an aphrodisiac and is prized by gourmets for giving an added sense of mystery and depth of flavor to omelets, salads, terrines, foie gras, risottos, and oysters. In gourmet shops in Paris, New York, and Tokyo, prices for the delicacy can soar. Black truffles were yesterday priced at £1,168 (1,650 Euros) per kilogram at the top Paris grocer Fauchon.

Under French law, stealing truffles is an offence punishable by up to three years in prison.

## MATSUTAKE ALCHEMIST SPINS MUSHROOM SPAWN INTO GOLD

*The Asahi Shimbun*  
via *The Sporeprint*, L.A. Myco. Soc., December 2004

24 December 2004, Kawanishi, Yamagata Prefecture - For gourmets in this country, the matsutake is the king of mushrooms. Like France's exalted truffle, the delicate flavor of this rare delight adds a cachet to the elite dining experience—but at a staggering price. Just a few pieces of domestically grown matsutake can fetch up to 10,000 yen. The aromatic delicacy costs so much because matsutake are devilishly hard to cultivate and must be searched for in the wild on mountainsides around the archipelago.

Recently, a researcher who has been chasing the matsutake rainbow for several decades announced he has found a way to cultivate these "golden eggs" using artificial methods.



Shuichi Aono, 69, of Yonezawa, says he and a researcher at Yamagata University have together developed a way to grow transplanted matsutake spawns that were cultivated in a laboratory. Many previous attempts to transplant matsutake spawns—the mycelia of fungi used to grow mushrooms—to the roots of Japanese red pine trees, where matsutake grow best, have not succeeded commercially.

In the early 1990s, Aono decided to add fertilizer to the soil around the roots of red pines to see if the trees would thrive and be more likely to adopt the spawns. Not much happened.

A few years later, Aono hit on a way to produce more viable spawns. First, he brought soil from the mountain to the lab and sterilized it. Then he added the spawns, adjusting the soil temperature and water supply. After much trial and error, he produced artificially cultured spawns, which he transplanted to soil around the red pine roots on the same mountain in 1997.

After three years of lonely work, Aono's red pine produced just three matsutake mushrooms. Two years later, up popped 45 of the golden delicacies.

In fact, this year his spawns produced numerous matsutake despite the poor harvest nationwide. Sniffing a lucrative idea, Aono has filed for a patent on his method.

Rival researchers attempting to cultivate matsutake haven't had much success.

Aono had some help from Takao Nakai, 71, the director of Tokyo's Japanese Matsutake Laboratory.

## SEX GENES OF INFECTIOUS FUNGUS CLOSELY RESEMBLE THOSE OF HUMAN Y CHROMOSOME

*The Sporeprint*, L.A. Myco. Soc., Dec. 2004

Fungi and animals, including humans, have a lot in common when it comes to the arrangement of genes that determine their sex, according to new work by geneticists of the Howard Hughes Medical Institute at the Duke University Medical Center.

Regions of the genome that determine the sexual identity of the infectious fungus *Cryptococcus neoformans* bear striking similarities to those on the human Y chromosome—the sex chromosome associated with male characteristics—the team found. The researchers reported their findings in the December 2004 issue of the *Public Library of Science Biology*.

The result suggests that, despite their differences, similar evolutionary processes shaped the chromosomal sex-determining regions in both groups, said investigator Joseph Heitman, M.D., director of Duke's Center for Microbial Pathogenesis. The fungus might therefore serve as a useful model for the study of sex chromosome evolution and the genetic changes that can lead to infertility, he said.

"The revolution in genome sciences has rapidly accelerated our ability to elucidate the process by which sex chromosomes evolved," Heitman said. "While mechanisms of sex determination are extremely diverse, our study highlights remarkable similarities among them in widely divergent groups."

The findings might also provide new insight into the process whereby the infectious fungus spurs disease, because evidence suggests a close tie between the genes involved in sexual identity and virulence, Heitman added. The work was supported by the National Institute of Allergy and Infectious Diseases.

Sexual identity is governed by sex chromosomes in plants and animals. In humans and other mammals, males have one X and one Y chromosome while females have a pair of X's.

In fungi, sexual identity is determined by so-called "mating type loci," genes located in a contiguous region of the genome but which typically do not span an entire chromosome. *C. neoformans* exists in two mating types determined by a single genetic locus. Earlier work found that this sex-determining region is unusually large in *C. neoformans* compared to other fungi, containing a series of more than 20 genes.

The researchers reconstructed the sequential evolutionary events that fashioned the sex-determining region of the *C. neoformans* genome by comparing it to that region in the related pathogenic fungal species, *Cryptococcus grubii* and *Cryptococcus gattii*.

The sex-determining genome region appears to have acquired genes in four main steps—beginning with the acquisition of genes into two separate sex-determining regions that later fused, the team reported. Furthermore, they found that the fungal sex-determining genes exist in clusters of functionally related genes. For example, genes involved in mate recognition occur in tandem, as do those that govern spore production.

Other researchers have found that the human Y chromosome—and the functionally related gene clusters it contains—has a similar history, characterized by the "sequential capture of genes" on four separate occasions, Heitman said.

The fungal mating-type locus later underwent processes that suppress recombination, they found. Recombination is the process whereby each member of a pair of chromosomes exchange segments of DNA. The procedure allows for new gene combinations to form and for the repair of damaged DNA.

The human Y chromosome is also barred from recombination along most of its length, a necessary requirement to prevent genes that encode male traits from infiltrating the female X chromosome, Heitman noted.

The researchers suggest that, despite the lack of recombination, some fungal mating-type gene repair might occur through the exchange of gene segments within chromosomes. Certain sex-determination genes occur in palindromic orientations—head-to-head or tail-to-tail repeats of particular sequences—which would make such intra-chromosomal repair possible, a pattern also found on the Human Y chromosome, according to Heitman.

“These similarities suggest that further study of *C. neoformans* might help elucidate the genetic changes that can lead to infertility in fungi and humans, as well as the repair mechanisms that prevent its more common occurrence,” Heitman said.

## WEB PROJECT VOLUNTEERS WANTED

**Steve Bigelow, Web Editor**

Any PSMS members who have Web creation skills or Web content and would like to contribute to the enhancement and development of our new Website are invited to contact me, Steve Bigelow, at [webeditor@psms.org](mailto:webeditor@psms.org) or Molly Bernstein, our Head Web Designer, at [webdesign@psms.org](mailto:webdesign@psms.org). Colin Meyer, our Web Master ([webmaster@psms.org](mailto:webmaster@psms.org)), also wears several hats in our Website team and is responsible for many of the technical issues involved in keeping the Website up and running. He also co-chairs our educational committee with Patrice Benson (Past President and current Vice-President), [vicepresident@psms.org](mailto:vicepresident@psms.org).

We have many projects that we are looking forward to developing for our Website, such as:

1. A recipe page (which has a tentative starting page on our current site)
2. A Mystery Mushroom quiz game (similar to the quiz in the Matchmaker program)
3. A cultivation section, which I hope to develop over time to show the various techniques and aspects of cultivation
4. Reports, with photos, of the various mushroom hunts and PSMS events.
5. An Education section under guidance from our Science Adviser Dr. Joseph F. Ammirati and education chairpersons to present varying educational content.

All projects will be filtered through our Web Editor and will be modified as necessary by our Head Web Designer to fit into the format of our Website. Your participation is encouraged. Your contributions would be greatly appreciated and would be acknowledged on the Website. Thanks.

## MUSHROOM OF THE MONTH

**Dick Sieger**

*Flammulina velutipes* (Curtis; Fries) Singer is a winter mushroom that makes its own antifreeze to keep it viable in cold weather. Even when frozen, it may resume spore production after thawing. Its tufts are found on rotting stumps and refrigerated shelves in the produce section.

*F. velutipes* has been cultivated in China for more than a thousand years. Eighteen percent of the mushroom is protein. It produces FVP and *flammulin*, polysaccharides that may help ward

off cancer. It is grown in cool, dark rooms and is sold immature so it remains pallid. The packaged mushrooms, labeled “Enoki-(taki),” have small caps and long slender translucent stalks that arise from a mushroom wad the size of the neck of the flask in which they were grown. Cooks break the tufts apart and use the raw mushrooms to decorate salads, soups, and stir-fries. When grown in Japan they have a slight yeasty flavor. Domestic ones are almost tasteless.

The appearance of wild *F. velutipes*, often found in the Pacific Northwest, is entirely different. The lower part of its usually flattened stalk is dark brown and fuzzy. The sticky cap has a ruddy yellow brown color that fades toward the margin. The gills are pale, the color of the cap margin, and may be broadly attached to the stalk or scarcely reach it. Individual mushrooms are 1 to 4 inches tall with caps 1/2 to 2 inches broad. The odor and taste are mild and pleasant.



When cooking wild *F. velutipes*, it's best to discard the stalks and peel away the sticky layer on the caps. Beware of your identification. Poisonous mushrooms, particularly the deadly *Galerina autumnalis* and *Conocybe* species, are similar in appearance to *F. velutipes* and may be intermingled with it. Both produce brown spore prints and may have rings on the stalk. *F. velutipes* produces a white spore print and never has a ring. Compare each mushroom with the description in the *Match-Maker* program or a good field guide such as *The New Savory Wild Mushroom*.



## MUSHROOM SPINACH SOUP WITH CROUTONS

*Hope's Mushroom Cookbook*, Hope Miller

- 2 TBs butter or margarine
- 1½ cups mushrooms, thinly sliced
- 1 large onion, chopped
- 4 cups beef broth
- 1 TBs dry sherry
- ½ package (3½-oz size) Enoki mushrooms
- 1/8 tsp freshly ground nutmeg

Pepper to taste  
4 cups fresh spinach leaves, packed tightly, cut into thin strips  
Garlic Croutons (see below)

Melt butter in 4- to 5-quart sauce pan on medium heat. Add mushrooms and onion and cook until all but approximately ½ cup liquid remains (approximately 8 to 10 minutes). Add broth, sherry, Enoki, nutmeg, and pepper. Bring to a boil; reduce heat and simmer, covered, about 15 minutes. Serve immediately or cover and chill up to 3 days. To serve, reheat; stir spinach into soup, ladle into bowls, and top with a garlic crouton.

### Garlic Croutons

Combine 2 tablespoons olive oil with 1 minced clove of garlic. Cut 1 (8 oz) baguette into ½-inch slices. Place slices in a 10 × 15-inch baking pan; brush tops with garlic oil. Bake in a 300°F oven for 25 to 30 minutes until crisp and golden brown. Serve either hot or at room temperature. Yield: 24 to 26 rounds.



## **GOLDEN NUGGET SQUASH WITH TRUFFLE OIL, PARMESAN, MASHED POTATOES, AND GRILLED SHIITAKE**

**Michael Blackwell**

6 soft-balled sized golden nugget squash  
with rub of vegetable oil  
4 cups stemmed Shiitake mushrooms  
2 cups quartered Yukon gold potatoes  
¼ cup heavy cream  
1 Tbs butter  
2 Tbs Truffle oil  
½ cup fresh grated Parmesan  
1 tsp kosher salt  
½ tsp fresh cracked black pepper  
2 Tbs olive oil  
2 tsp fresh thyme  
1 Tbs fresh chopped parsley  
2 Tbs fresh shredded basil

Lightly rub squash with vegetable oil and cut the bottom points of each squash off so they sit upright. Place on a cookie sheet lined with the kosher salt. Bake at 350°F for 35–40 minutes. Cool. Cut 1 inch off tops of the squash. Remove the seeds. Season the inside with salt and pepper. Set squash and lids aside

Toss Shiitake with olive oil and ½ tsp salt and ¼ tsp pepper. Grill mushroom on each side for 2 to 3 minutes. Cool slightly, then cut into thin strips. Toss with 2 Tbs truffle oil, 2 tsp Parmesan, thyme, and parsley. Set aside.

Boil, mash, and drain potatoes. Heat cream, butter, and remaining half of Truffle oil. Add to potatoes with 4 Tbs Parmesan and ½ tsp salt and ¼ tsp pepper and shredded sweet basil. Mash ingredients together.

Fill the squashes with potatoes. Place Shiitake on top, pressing them in firmly. Sprinkle with remaining Parmesan. Warm squash in a 350°F oven for 15–20 minutes until the centers are hot and the Parmesan cheese becomes almost golden brown. Serve with lid leaning on filled squash or discard lids.

Makes 6 portions.

## **PSMS E-MAIL LIST/DISCUSSION GROUP**

**John Goldman**

The PSMS e-mail discussion group maintained by Yahoo Groups is an easy way to keep in contact with other members, to circulate information about PSMS events, and to post general mushroom information. By signing up, you can send a message using only one address (psms-members@yahoogroups.com) and have it reach everyone in PSMS who also has registered.

There are two ways to sign up: The simplest way is to e-mail psms-members-subscribe@yahoogroups.com and you will be added to the list to get e-mail. If you want to get e-mail and have access to the Web-based features of YahooGroups, go to <http://groups.yahoo.com/group/psms-members> and follow the link that says “Join this Group” (you will need to sign up for a free Yahoo Groups membership if you do not have one already). By joining this way, you can access the e-mail from any computer (not just the e-mail inbox of your computer), search messages, and have access to the photo section and the “file” section where other documents are stored.

## **THE MEMBERSHIP SURVEY ON EDUCATION**

**Ron Post**

I am still compiling the responses to the educational-needs survey that appeared in the newsletter. We received a fairly good response. I will soon forward a summary and copies of all responses to our education chair. At our earliest convenience the board will meet to discuss what implications this survey has for our educational program, and I will then outline my vision for an annual program. Your responses have been valuable, and I want to invite anyone interested to continue giving your opinions about what’s needed to our trustees. Meanwhile, thanks to Education Chair Colin Meyer and the time given by many of our teachers and identifiers, we continue to have a fine education program. If your thoughts on our educational efforts have to do with cyber-activity, you may contact board member Steve Bigelow, our Web editor, with your suggestions.

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