

AFLATOXIN UPDATE

Sidney Stock, D.C.

Dick Sieger's article in the February *Spore Prints* on one of the most powerful carcinogens known, aflatoxin, raises interesting issues, such as allowable limits of this substance in food and whether aflatoxin-free food is attainable and realistic.

Another issue that I'd like to address is a most exciting concept: whether diet can neutralize carcinogenicity. Such a possibility may seem farfetched at least and preposterous at most to those of us who are attuned/conditioned that early detection is prevention and that chemotherapy and radiation are the only or best options.

T. Colin Campbell, Ph.D., professor emeritus of nutrition, Cornell University, conducted groundbreaking research on aflatoxin and cancer in humans and mice. As a young researcher funded by the National Institutes of Health, Campbell traveled to the Philippines to study the extremely high incidence of liver cancer in children. In the US liver cancer is rare before age 40. In the Philippines, children under 10 and as young as four were being severely affected. He found that Philippine peanut butter contained as much as 300 times the level of aflatoxin allowed in the US.

Campbell began the project with the assumption that the greatest incidence of liver cancer would be found among impoverished Philippine children who received the least protein. He found the opposite. Children of wealthy families with a high-protein diet comparable to the western, US, and European diet suffered a greater incidence of liver cancer than impoverished children who consumed far less protein.

Then Campbell learned of research in India with rats that have a very similar metabolic system to humans. The rats were all fed aflatoxin. Half the rats were fed a 5% protein diet and the other half a 20% protein, again comparable to the western diet. The 5% group developed no tumors or pretumorous lesions! This was true no matter how much aflatoxin was ingested. All of the 20% protein group developed tumors or pretumorous lesions. The research found that casein, the protein that constitutes 80% of milk protein, was the most potent carcinogenic protein.

Campbell then duplicated the Indian research, and his findings were the same. He then fed the 5% protein group a 20% protein diet. All of those rats developed tumors or pretumorous lesions. He then fed the 20% cohort a 5% protein diet. Those rats experienced a sharp decline in cancerous or precancerous foci. When switched back to a 20% protein intake, all of those rats again developed foci. There has never been a chemical/drug or supplement that has both turned on and turned off cancers in these ways.

Another remarkable finding was that the 20% carcinogenic effect was true only for animal-based protein. When similar levels of plant protein from soy beans and wheat were used, there was no carcinogenicity.

Campbell later directed the most comprehensive study of the relationship of diet and chronic disease. Called the China Study, it began over 23 years ago and is ongoing. In his book, *The China Study*, he writes of these aflatoxin studies and of the effect of diet in China on most of the major degenerative diseases, including heart disease, strokes, and diabetes. China is genetically highly homogenous and highly diversified in diet and was a unique opportunity to study such an issue. I highly recommend the book.

Jennifer and Sidney Stock have been members of PSMS for about 3 years and have enjoyed greatly their outings with other members.

RULES ON THE HARVEST OF EDIBLES IN WASHINGTON STATE PARKS

Kelli Burke,

Environmental Specialist, Washington State Parks

Nonmarine edible plants and edible fruiting bodies, including mushrooms, shall be managed by the agency in accordance with WAC 352-28-010. The commercial harvest of edibles is not allowed on park lands. The harvest of edibles for personal consumption, or scientific or educational projects, is subject to the following conditions:

(1) *Personal consumption:* The recreational harvest, possession, or transport of edible plants and edible fruiting bodies including, but not limited to, mushrooms, berries, and nuts, is allowed up to an amount of two gallons per person per day, unless otherwise posted at the park. The harvest amount may be comprised of one or more species. The harvest may occur within the following park classification areas: Recreation, resource recreation, natural, natural forest, heritage, or in parks not yet classified. No harvest of edible plants or edible fruiting bodies, including mushrooms, is allowed within a natural area preserve. This rule is not intended to limit federally reserved tribal rights, including treaty rights.

(2) *Scientific or educational projects:* The harvest of edible plants and/or edible fruiting bodies, including mushrooms, for scientific or educational projects is subject to the prior written approval of the director or designee. The approval shall specify a harvest amount not to exceed the minimum quantity necessary for the purposes of the project. The harvest may occur within all park classification areas.

(3) Harvest techniques that involve raking or other techniques that have the potential to degrade park natural or cultural resources are prohibited.

(4) The director or designee may close, temporarily close, or condition public access to certain park areas for recreational harvesting of edibles upon finding that the activity degrades or threatens to degrade the park's natural or cultural resources, or to protect public health, safety, and welfare. Such closure shall be posted at the entrance to the park area affected and at the park office.

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CALENDAR

- May 9 Membership Meeting, 7:30 PM, CUH
- May 13 Field Trip, Crystal Springs Campground
- May 20 Field Trip, 29 Pines Campground
- May 22 Board Meeting, 7:30 PM, Issacson Board Room, CUH (**change**)
- June 2-3 Field Trip, Eagle Creek
- June 10 Field Trip, Swauk Creek Campground

BOARD NEWS

Dennis Oliver

The April meeting marked the arrival of our new president, treasurer, and board members. Carissa Thornock has left the board, and alternate Luis Felix has been elevated to full board membership. John Goldman has volunteered to act as Website content coordinator to improve the site and add needed information. The microscopy class will be on Sunday, April 30, and the spring mushroom class is fully enrolled. We are looking for a "few good people" to be hosting coordinators to find hosts for the field trips and another person to help with book sales (Younghee Lee has volunteered to help). Last but certainly not least, the board unanimously approved a resolution bestowing a lifetime membership to Ron Post for his hard work and effort as our past president.

Note: PSMS Charter member and Golden Mushroom Award recipient Joy Spurr had knee replacement surgery on January 2 and is going through rehabilitation. I'm sure she'd love hearing from people.

MEMBERSHIP MEETING

Tuesday, May 9, 2005, 7:30 PM at the UW Center for Urban Horticulture, 3501 NE 41st Street, Seattle



May is morel month! And to celebrate, our May meeting will feature **Dr. Daniel Stuntz & Morels**.

PSMS President Patrice Benson will wear her other mushroom cap as President of the Daniel E. Stuntz Memorial Foundation. She will talk about Dr. Stuntz—the iconic professor of mycology who was the Society's first scientific advisor and taught at the UW for 40 years—and the Stuntz Foundation's exciting new initiative planned in his name. Afterwards we will munch morels as an appropriate tribute.

Yes, this means a live demo and tastings! Learn how to prepare the bounty of morels you're bound to find this season. Guest chef and cookbook author Julie Hern will share her morel cooking techniques. Julie owned the downtown restaurant "Hoopla" and prior to that cooked at The Herbfarm. She currently focuses on cookbook writing.

Would people with last names beginning with the letters A-G please bring goodies for the social hour?

UPCOMING FIELD TRIPS

Cathy Lennebacker



Morel season is almost here. It's part science, part art, and a whole lot of luck to pick the times and places for field trips. Here's hoping Mother Nature cooperates and sends us lots of delicious mushrooms this spring at the right place and time. As always you need to dress for the weather, bring a lunch, something to share for the potluck, and mushrooming supplies. Don't forget a compass, watch, whistle, and good buddy along with your tread-lightly mushrooming basket so your treasures stay in good shape and drop their lovely little spores everywhere you go. The hosts will place club signs in the immediate area to help you find the meeting place.

May 13

Crystal Springs Campground

(elev. 2400 ft, 60 miles east of Seattle)

Nice picnic tables, pit toilets, and parking area in an area known for morel hunting success. Located near Stampede Pass.

Driving Directions: Drive east over Snoqualmie Pass on I-90. Go 8 miles east of the summit to exit # 62. Turn right at stop sign. Go ¼ mile, turn right and park outside the campground, before crossing the bridge. There is free primitive camping across the road along the river.

May 20

Twenty-Nine Pines Campground

(elev. 2500 ft, 102 miles east of Seattle)

This riverside Forest Service campground has plenty of free camp sites if you want to spend the night. The local woods have plenty of firewood for the taking. *Hosts: Don and Cathy Lennebacker.*

Driving Directions: Take I-90 over Snoqualmie Pass to exit #75. Follow sign to Hwy. 970 east of Cle Elum for 2½ miles. Turn left onto Hwy. 970 and go 4.5 miles. Turn left onto the Teanaway

River Road. Continue approx. 6 miles, bearing right at the fork in the road onto the Teanaway North Fork Road. Continue another 6 miles just past the new fish hatchery on the left. The campground is on the left.

June 2-3

Eagle Creek
(elev. 1800 feet)

Once again Coleman Leuthy has generously invited the club to camp on his beautiful property. There were forest fires the year before last in the area. This is good morel country, so even if the burn sites are less productive the second year, there is a lot of good territory to explore. Tents and RVs alike are welcome. *Host: Emily Routledge.*

Driving Directions: Take your favorite route to Leavenworth, either over Hwy. 2 or I-90/Blewett Pass. In the eastern end of Leavenworth turn north on Chumstick Road, ¼ mile after the Safeway store, at the traffic signal. Go 2 miles (¼ mile after the railway trestle), turn right onto Eagle Creek Road. Follow the road for 4¹/₃ miles until you see an old barn with a dark red roof and several other buildings. Turn right following PSMS signs. Coleman will mark the camping area.

June 10

Swauk Creek Campground
(elev. 2500 feet, 110 miles east of Seattle)

We will meet in the picnic shelter. This is a Forest Service campground managed by 1000 Trails. Camping is available.

Driving Directions: Take I-90 over Snoqualmie Pass to exit #85. Follow Hwy. 10 east of Cle Elum for 2½ miles. Turn left onto Hwy 970. Bear left (north) onto Hwy. 97 after 7 miles and continue for 16 miles. The campground is on the right.

June 17

La Wis Wis ?

Stay tuned to the PSMS Website or check the phone announcements at the CUH office. This trip depends entirely on the weather. Some springs are hot and dry, in which case this would be too late in the season.

Driving Directions. Take I-5 south to exit 68 and turn east on US 12. Drive 65 miles to Packwood. Continue 7 miles east on US 12, then drive ½ mile west on forest service road 1272.

Alternate Route. Go east on 410 over Cayuse Pass, past the south-east entrance to Mt. Rainier toward Packwood. The campground entrance is on the west side of the road 7 miles past the Ohanapocosh campground. Follow the signs to the picnic shelter.



FIELD TRIP HOSTS NEEDED!

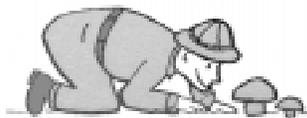
Hosts are needed for Crystal Springs, Swauk Creek, and maybe La Wis Wis if the weather hasn't gotten too hot and encouraged the mushroom critters. No experience is needed. The club's host box has everything you need but the goodies the host picks up the day of the trip. Save your receipts as the club treasurer will reimburse you. Contact Cathy Lennebacker at (425) 742-3163 or Patrice Benson at (206) 722-0691.

FLAMING GEYSER STATE PARK

Brian Luther

The weatherman predicted that April 8 would be a wet day, and when we got to Flaming Geyser State Park along an isolated section of the Green River between Black Diamond and Enumclaw, that's just exactly what we got. I had my rain gear and rubber boots on almost the entire day.

Ross and Val Othus hosted, setting up in one of the open-sided shelters fairly close to the river. They greeted and offered coffee and delicious muffins to what seemed to be a lot of new members. Forty-four people signed in, and at 10:00 AM I handed out my "A Guide to Mushroom Collecting in Washington State Parks" and maps of Flaming Geyser. After giving all members the time to read this info, I spoke to the group about collecting methods and the data collection required by my Washington State scientific collecting permit. After that I talked briefly about the questionable edibility of the larger *Verpa* species (*Ptychoverpa bohemica*). The Assistant Park Manager, John Heublein, came over, and we had a nice long talk; he seemed to be delighted that we were there.



Relatively few fungi were brought in, only 22 species. People collected in conifer, mixed woods, and hardwood forested areas—all common in the park. There was a noticeable dearth of verpas as well as many other fungi usually found much more abundantly at this time of year. *Pleurotus ostreatus* was the only excellent edible species found by several people (including myself) during the day, but it was not abundant. Nothing rare was found, but an unusual early spring fruiting of *Laetiporus conifericola* (Western Chicken of the Woods) was brought in by one person.

Between the shelter and the river was a large, round, sunken concrete fire pit. Someone took a closer look at it, and there were a dozen or so true morels (*Morchella elata*) fruiting all around and near the immediate outside of the concrete rim. I explained to everybody that the combination of the heat from the campfire and the wood ash (high in calcium carbonate) being spilled and leaching in on the outside of the edge of the fire pit stimulated the morel mycelium to fruit. A few were mature and in their prime, with many smaller ones coming along nicely all around. John Heublein was amazed and said he hadn't seen any true morels out here since he had left Michigan a few years ago, and he was fascinated by the cause of their fruiting by the fire pit.

My daughter Arnica (16) spent her time doing water color painting and she ended up with lovely pictures of a *Verpa*, a pair of Canada Geese that wandered by, and a tree. Potluck at about 4:30 PM was just Ross and Val Othus and Arnica and I. We shared a large four-bean salad Arnica had made and a delicious chicken salad on bagels that Val had made. Just as we were finishing our brief potluck, a whole bunch of kayakers came down the swiftly moving river and beached right by the shelter in front of us, some flipping over in the water on their approach. They all had smiles on their faces. It was a little windy, and both Ross and Arnica were shivering, so we quickly got the shelter cleaned up, packed our stuff, and left for home by 5:00 PM.

A nice park, but the lack of mushrooms in general was a surprise.



THE MOREL STORY Kitsap Peninsula Myco. Soc.

May is morel month! A good time to dust off this local article, last published in Spore Prints in 1998. Unfortunately, I don't have an author.

Description

True morels have hollow caps and hollow stems. The stems are usually white but may be slightly yellowish. The stems connect to the bottom edge of the cap on all except *M. semilibera*, where the stem extends partly up into the cap. The caps have irregular indentations, which are characteristic of morels. *Gyromitra* mushrooms, sometimes called false morels, have caps with folds and wrinkles that differentiate them from the true morel.



Distribution

Morels are one of the most widely distributed mushrooms, flourishing in temperate regions around the world across Europe, Asia, and North America. In the U.S. they can be found from coast to coast and from the Canadian border south, petering out about halfway between Washington, D.C., and the Gulf of Mexico, although they are occasionally found as far south as Louisiana.

Season

In most of the United States, May is considered morel month, although the season advances from south to north, with April being the peak season in Maryland. In the Pacific Northwest, the season usually peaks in the last 2 weeks of May on the east side of the Cascades, although morels may begin showing up as early as the end of February in the lowlands. The season may shift a week or two depending on the temperature. It also varies with altitude and on different sides of a mountain.

Location

One location that most of us forget to remember is our own backyard. Since morels appear in the lowlands first, this gives us an early start. Morels can grow in your lawn, in the wood mulch under the rhododendrons, along hedges, and in old fruit orchards. The quantities may not equal what we hope to find in the Cascades, but it is a good pre-season location. The best picking areas are on the east side of the Cascade Mountains. Locations of forest fires can yield unbelievably large quantities the following spring. Morels seem to become adaptive to certain areas. They may be found by elm trees in one state and by oaks in another.

Here, morels may be found anywhere. They may grow near trees in conifer forests, in open flat grassland, in bare dirt areas, or out of needle duff. If the season is dry, it may pay to look in gullies and other areas of water runoff and under logs or little tree seedlings whose shade may have saved moisture for the mushroom. Yet, the most dense fruiting of morels that I have ever seen was in a large clear-cut area where the stumps were pulled and the weather was hot. This all leads me to believe that *morels grow anywhere they feel like growing*.

The Hunt

Morels tend to blend into the surrounding area. It is always hard to find the first mushroom each year. The eye has to get accustomed to separating the morel from its background. You have to learn to

walk a few steps, then stop to look, and you may be surprised to see morels that seem to magically appear and grow before your eyes. Once you find a morel, stop and look around. Start walking around it a small circle, increasing the radius out to maybe 75 ft. Sometimes that will lead you right into a river of morels. Morels need moisture and warmth to grow, so early in the season look on south-facing slopes; later in the season, look on north-facing slopes.

Edibility

All fresh and prime morels are considered edible and very good, but a warning does exist. Never eat these mushrooms raw. Also, a few people have an allergy to this mushroom even after cooking, so eat only a little the first time and wait at least a day before eating more.

Preservation

The most convenient way to preserve morels is to cut each in half and dry. They can be threaded on a string to air dry and later stored in a sealed fruit jar. Dried morels are reduced to about one tenth of their fresh weight and will store for long periods of time if completely dry. In damp weather, this may require the use of an electric food dryer that can keep the temperature at 100–125°F and has a small fan to circulate air. Some people add a bay leaf to each sealed jar. Morels can also be sautéed just long enough to stop enzyme action and then placed in sealed freezer bags before freezing. Larger quantities can be processed more quickly by par-boiling whole morels to stop the enzyme action and sealing them in bags or jars for freezing. These mushrooms can then be stuffed and baked later. Whole mushrooms will not keep over long periods without deterioration and should be used within a year.

THE HUNT

Amo Amaranthus

The North American Truffle, NATS, May–June 2005

Every year in May my friends and I arrange our weekends (and our “regular” employment!) to dress in old clothes and boots, carry mesh bags and fancy European knives, and wander aimlessly in variable cold, wind, rain, sun, and bush. The simple objective is to spot an unpredictable and virtually invisible spongy growth that appears to suddenly appear in the wink of an eye. To make matters more difficult to understand, these spongy growths occur from the beauty bark in our neighborhoods to the alpine meadows of the Pacific Crest Trail. We get lost, trespass, and risk hypothermia, poison oak, and other various brambles. Why?

The air is fresh and clean. The meadow and forest alive. The birds active. The wildflowers blooming. The soils are warming and waking from the winter slumber. The view of the lake is spectacular. But that is just part of the story.

We are here for one thing, and one thing only—the hunt. It resonates in the soul. A fleeting echo from our Pleistocene past when survival meant finding food. It’s about wandering, patience, looking for indicators, keen eyesight, and, most important, getting lucky. I’m talking about finding the morel mushroom.

To celebrate this bizarre ritual there is wine, food, and hunting advice (which never seems to work). We share our secrets of the hunt: How to walk, how far to look ahead, which plants are indicators, the best elevation, aspect, and amount of canopy. Every day is filled with success and failure, often just a stone’s throw from each other.

There is so much weirdness around the morel. Why do morels suddenly appear full grown? Do they change color to blend into their specific environment? Why do they fruit in one spot and not in what appears to be the exact same habitat? How come when you find one there are suddenly handfuls? And, after a day picking in the woods, why can you close your eyes and see morels as clear as a photograph in your sleep?

They are special, fleeting and delicious. Great in eggs, cooked with bacon, fresh trout, stuffed with crab, sausage, cheese (oh the stuffers!), sautéed over toast, steak. You name it, they are meaty, nutty, and the worthy object of all this attention.

I'm writing this to share with friends some morel recipes I've read or never put to paper and to celebrate what has become a ritual of great enjoyment. I remember as a small boy going hunting mushrooms with my grandfather and his friends. Italians, dressed in vests, ties and fedora hats. Smoking cigars and talking (all at the same time). But, when the car stopped, for *the hunt*, suddenly there was silence. They went into the woods as quickly as cats. Curiously alone to their favorite mushroom spots in secrecy. Then a honk of the pickup and their return. Surrounding their pickups with bags of fungal treasure, strange shapes of gills and sponge. Filling the air with stories and glasses filled with homemade wine. It seems so odd at the time, and so familiar today.

Let's get 'shroomin!

CARNATION FIELD TRIP Hildegard Hendrickson

On Saturday, April 1, twenty-nine persons signed the field trip register (and a few did not). For the second year in a row, it rained most of the day. Thank you to Tony Tschanz for hosting. He kept us in coffee and goodies. Brian Luther gave a talk about the mushrooms we might find and how they should be collected. He also mentioned that all spring mushrooms need to be cooked and that everybody needs to use caution with the Verpas. Hildegard Hendrickson spoke about equipment—compass or GPS (if you can afford it), basket or bucket (no plastic bags), knife, brush, wax paper, and foil—as well as clothing (sturdy, waterproof boots, raingear, and a hat (keep an extra set of clothes in the trunk), and insect repellent later in the season. We split into two groups, and Brian led one group along the Snoqualmie River while Hildegard and her group forayed along the Tolt River. The *Ptychoverpa bohemica* barely showed their caps, but all new mushroomers could see what we had expected to find. The list of mushrooms brought in this year also was short.



Fomitopsis pinicola
Ganoderma applanatum
Gloeophyllum sepiarium
Mycena sp.
Nolanea sericea
Polyporus elegans
Polyporus varius
Ptychoverpa bohemica

Sarcoscypha coccinea
 (Scarlet Cup)
Stereum sp.
Trametes versicolor
 (Turkey Tail)
Trametes sp.
Tubaria sp.
Xylaria sp.

LICHENS SURVIVE IN SPACE

European Space Agency, 8 November 2005
 via *The Sporeprint*, L.A. Myco. Soc., Dec. 2005

One of the main focuses in the search for living organisms on other planets and the possibilities for transfer of life between planets currently centers on bacteria, because of the organism's simplicity and the possibility of it surviving an interplanetary journey exposed to the harsh space environment.

This focus may develop to encompass more advanced organisms following the results of an ESA experiment on the recent Foton-M2 mission, where it was discovered that lichens are very adept at surviving in open space.

Lichens are not actually single organisms but an association of millions of algal cells, which cooperate in the process of photosynthesis and are held in a fungal mesh. The algal cells and the fungus have a symbiotic relationship, with the algal cells providing the fungus with food and the fungus providing the alga with a suitable living environment for growth.

Lichens are well known extremophiles, being able to survive the harshest environments on Earth. The most striking element of the finding is the complexity of this organism: it is multicellular, it is macroscopic and it is a eukaryote, meaning that on the evolutionary scale it is a much more modern organism than bacteria. In fact lichens can be considered as very simple ecosystems.

The experiment was called "Lichens" and was one of the exobiology experiments that was located in the ESA Biopan facility. This exposure facility was located on the outer shell of the Foton return module and, once at the correct orbital altitude, opened to expose the samples inside to open space, i.e., to vacuum, wide fluctuations of temperature, the complete spectrum of solar UV light, and bombardment with cosmic radiation. During the Foton-M2 mission, which was launched into low-Earth orbit on 31 May 2005, the lichens, which came from two different species (*Rhizocarpon geographicum* and *Xanthoria elegans*) were exposed for a total 14.6 days before being returned to Earth. At the conclusion of the mission the lid of Biopan was closed to protect the lichens from the conditions of reentry. The Biopan was thereafter transported back to ESA's research facility, ESTEC, in Noordwijk, the Netherlands to be opened.

(cont. on page 6)



Rhizocarpon geographicum



Xanthoria elegans

Lichens Survive in Space (cont. from page 5)

The results of the experiment were presented by one of the experiment team members, Dr. Rosa de la Torre from the Spanish Aerospace Research Establishment (INTA) in Madrid, at a post-flight review in October at ESTEC. Initial conclusions of the experiment, which is under the scientific leadership of Prof. Leopoldo Sancho from the Complutense University of Madrid, indicate that lichens have the capacity to resist full exposure to the harsh conditions of space, especially high levels of UV radiation. Analysis post flight showed a full rate of survival and an unchanged ability for photosynthesis. This experiment opens up many possibilities for future research into the possibility of transfer of life between planets. Follow-up experiments could focus on questions such as to what extent lichens, if transported by a meteorite, can survive the reentry conditions into Earth's atmosphere, i.e., what degree of shielding would be needed for lichen samples to survive? The outcome of this Biopan experiment also suggests that lichens might survive at the surface of Mars. Follow-up experiments on ground and in space are bound to provide further answers to these intriguing astrobiological questions.

MUSHROOM OF THE MONTH

Dick Sieger

Spring comes, and with it comes sunshine and the "Sunshine *Amanita*," *A. aprica*.

Amanita aprica is the bright yellow beacon that grows in openings of older forests and along forest roads. It is frequently seen during morel season in the Pacific Northwest but was published as a new species only last year by Rod Tulloss and Jan Lindgren. Before publication, Jan called it MYF—My Yellow Friend.

Amanita aprica has the size and robust stature of *Amanita muscaria*. The breadth of its cap is 2–6 inches and the length of the stalk is a little less than that. Its cap is bright yellow, orange yellow, or occasionally orange and is covered with flattened whitish warts. The edge of its cap has scarcely noticeable radial grooves. The white to creamy stalk bears a fragile ring that hangs like a skirt and may collapse. The lower part of the stalk bears torn universal veil remnants—a band of tissue with an unrolled free edge and sometimes, below that, narrower rings of tissue. Like other *Amanitas*, *A. aprica* is geotropic (i.e., tries to keep its cap parallel to the ground). If a reclining mushroom in your basket starts to sit up after an hour or two, suspect that you have an *Amanita*.

Amanita aprica is similar to two Northwest species: the yellow variety of *Amanita muscaria* and the *Amanita gemmata* group. Both are found in the late summer and fall and may have noticeably grooved cap margins. *Amanita muscaria* has erect pointed warts. All three species are poisonous.



Jan Lindgren

CULTIVATING A MYSTIQUE

Jane Black

The New York Times, March 1, 2006

In the foothills of the Pyrenees, two dozen women dressed in green lab coats stand at an industrial sorting machine inside a vast warehouse filling gray plastic bins with thousands of dollars worth of black truffles, *Tuber melanosporum*.



Tony Centicola

The warehouse is part of the Arotz truffle plantation, the world's largest. On more than 1,500 acres of land, with 150,000 truffle-producing trees, the company harvests several tons of truffles a year, according to the managing director, José Barbarin. Though he won't disclose its exact production, he estimates that it can make up 15–25% of the global supply of truffles, depending on world weather conditions.

During peak season, which spans January to March, thousands of truffles arrive each day at the warehouse here in Navaleno. Every truffle is cleaned, weighed, labeled, and vacuum-packed. Shipments to restaurants and food processors take place within 24 hours to ensure freshness.

It doesn't exactly fit most people's romantic image of how truffles are gathered: the bereted Frenchman trundling through the woods with his trusty dog. Indeed, it's hard to find New York restaurateurs or importers who say their truffles are cultivated, not wild. The reality, however, is becoming increasingly difficult to deny. The truffle in your aromatic risotto may well be farmed.

"Some restaurants and traders want to keep the myth alive because truffles have such a mystique," said Heidi Stanvick, owner of Vervacious, a company that sells cultivated black truffles from Europe to New England restaurants and online. After all, would the allure be the same if people knew that truffles were grown on a farm just like potatoes?

Numbers in the notoriously secretive business are difficult to track, but Michel Courvoisier, president of the French Federation of Truffle Growers, said 80 to 90% of French truffles are now cultivated. And throughout Europe—from Croatia to Sweden—small growers are buying and planting seedlings whose roots are treated with truffle spores. Wealthier farmers use high-tech growing and processing methods as Arotz does. Others go the old-fashioned route, feeding their inoculated trees with a powder of ground truffles. Daniel Bertolin, president of the truffle association in Teruel, Spain, makes his feed in the kitchen blender with truffles past their peak.

About 100 truffle farms have been started in New Zealand over the last decade, and the trend is catching on in the United States, where as many as 30,000 truffle trees are planted annually, according to Charles Lefevre, an Oregon mycologist. The company Mr. Lefevre runs, New World Truffieres, began selling trees inoculated with truffles four years ago to farmers and, increasingly, to notable vineyards like Turley Wine Cellars. On the last weekend in January, more than 400 people attended tastings, cooking demonstrations and truffle cultivation workshops with European experts at the first Oregon Truffle Festival in Eugene, where the company is based.

The rise of truffle farming is a matter of supply and demand. Several years of drought combined with a century-long reduction in

woodlands in areas of Europe where truffles grow naturally have sharply reduced wild production. The French federation, one of the only consistent record keepers, estimates that annual production in France was 675 tons in the late 19th century. Today, it rarely exceeds 35 tons a year, wild and cultivated. This, just as increased affluence and the spread of formerly epicurean tastes into the mainstream have swelled demand. Modern transportation has also made it possible to deliver truffles around the world. (It has also made it possible for a rampant trade in Chinese truffles, *Tuber indicum*, which look like black truffles, or *Tuber melanosporum*, but lack their signature aroma and flavor, and sell for a fraction of the price.)

“There’s no better time to get into the business,” said Gareth Renowden, a grower who is president of the New Zealand Truffle Association. (to be continued next month)

PRESIDENT’S MESSAGE

Patrice Benson

I would like to thank the officers and board members who recently completed their terms and are taking a well deserved rest. Treasurer John Goldman and President Ron Post will now hopefully have time to collect mushrooms and attend to other things which have been neglected during their terms of office. Thanks to Lynn Elwell, Dan Winkler, Carissa Thornock, Brett Vielbig, Daniel Winkler for their board service, which has now been completed, and to Karin Mendell for her role as Past President for these last 2 years. Welcome to David Manus as our new Treasurer and to new board members Younghee Lee, Jamie Notman, Doug Ward, and Luis Felix, as well as to re-elected board members Colleen Compton and Marilyn Droege. The new energy is flowing and hopefully will spill over to the membership, for the following reasons.

First, we need a second person to step up and volunteer for the job of Book Sales Coordinator. This is a very important position, as book sales are one of the main sources of funds for club operations. Younghee Lee has volunteered to help, but we need another person to share the book selling/ordering job, as it is much more fun and flexible if two people combine forces to share the task.

The other task that needs a regular volunteer is that of host coordinator for the field trips. This volunteer will work with Don and Cathy Lennebacker to obtain hosts for the field trips which they coordinate. Brian Luther coordinates the identifiers, but we need hosts and someone to schedule them. To volunteer for either of these tasks, call Patrice at 206-819-4842. Please!

We also need some library volunteers to help with a bit of organizing and cataloguing which remains; any amount of time is acceptable. To volunteer call Ron Post at 206-527-2996. Thanks to Marilyn Droege for offering to help with the Library.

Colin Meyer has been working with Ron Post and Dennis Oliver with help from Dr. Ammirati on the educational aspects of PSMS. Thanks to Colin and crew, a beginner class is under way, and a special microscopy class took place on April 30. Other education opportunities will be posted in *Spore Prints* or on our Website.

Speaking of the PSMS Website, the webmaster is Colin Meyer, the design and content are maintained by Molly Bernstein, and our new content coordinator is John Goldman. Please contact John (rose.gold@comcast.net) to submit additions to or relay changes

in the content of the Website. The Website is a fluid thing and needs attention and feeding, and I welcome you all to participate with the content through John Goldman.

Please come to our May membership meeting to find out about some PSMS history and what function the Stuntz Foundation plays in the scheme of mushroom education in the great Pacific Northwest. In true Stuntzian mode, at the May meeting we will feature more tasting and a cooking demonstration as well as an information and history recap. Please join me in having fun as well as working together to put a mushroom in every pot and at least one mushroom per member into the herbarium. Don’t know what an herbarium is? Come to the May meeting and find out!

WERE THE DINOSAURS DONE IN BY FUNGI?

Carolyn Y. Johnson, *The Boston Globe*, via *Fungifama*
So. Vancouver Island Myco. Soc., April 2006

After a meteor slammed into the Earth 65 million years ago, “the great dying” began, decimating life in the oceans and killing off the dinosaurs—with mysteriously little effect on mammals. Conjecture over what did in the reptiles has long fascinated everyone from school children to paleontologists, but a new theory suggests that a less earth-shaking possibility could have played a role.

“The forests went out. The fungi proliferated, and the Earth became a giant compost pile. An enormous number of spores were released,” said Dr. Arturo Casadevall, an infectious disease researcher who proposed last month that air thick with fungal spores after the meteor hit could have overwhelmed animals’ immune systems, causing sickness and death. If he’s right, the large numbers of warm-blooded mammals and birds that survived the mass extinction might have had a natural advantage—body temperatures too hot for fungal infections to take hold.

“It’s just a beautifully creative suggestion,” said Nicholas Money, a mold expert, from Miami University of Ohio and author of *Carpet Monsters and Killer Spores: A Natural History of Toxic Mold*.

Casadevall, of Albert Einstein College of New York, laid out his suggestion in this month’s issue of *Fungal Genetics and Biology* when considering a much larger question: “I ask you, why are we so hot?” He has long been troubled by the lives of warm-blooded animals, who must live a virtual food-finding mission because they burn so many calories each day just heating their bodies. Cold-blooded animals, on the other hand, need eat only once every few days. Where, he wondered, is the advantage in a life of constant scurrying, foraging, and saving up food for the winter?

That question coincided with another puzzling trend: Fungal infections rarely give mammals more than a mildly irritating case of athlete’s foot or a yeast infection but are often deadly to plants, fish, and insects. At a crucial time in natural history, the world’s 1.5 million species of molds, yeasts, rusts, and mushrooms also might have been a vehicle for natural selection. In the aftermath of the meteor that carved out the Chicxulub crater on the Yucatan Peninsula, the Earth probably was a cool, shady place. Researchers last year discovered fossil evidence of a post-collision “fungal spike,” and in a world dense with potentially pathogenic fungi, warm-blooded animals might have had a unique advantage.

In such a situation, “every warm-blooded generation has a little advantage, and when the dust settles and the sun comes out again...

(cont. on page 8)

Dinosaurs (cont. from page 7)

the warm-blooded find themselves in a world with a lot more space,” Casadevall said. Other evidence shows that the mass die-off didn’t occur immediately after the collision, but about 300,000 years afterward—raising the possibility that an intermediary factor, like fungi, could have played a part.

The trouble with the theory, experts said, is that no one is sure whether the dinosaurs were warm or cold blooded. Smaller cold-blooded animals like turtles, lizards, snakes, and frogs were able to weather the mass extinction, indicating that size, not body temperature, may have been a deciding factor. And, while there is wide agreement that a massive meteor struck the Earth 65 million years ago, other theories suggest that increased volcanic activity could have played a role in the extinction.

Stephen McLoughlin, a geologist from Queensland University of Technology in Australia who discovered evidence of the long-ago fungal explosion, said the spores that his group studied, which were preserved in a layer of coal in New Zealand, probably did not harm animals. He stated in an e-mail that he finds Casadevall’s idea “intriguing” but “while this may have been the case, it is virtually impossible to test.”

Nonetheless, the main idea behind Casadevall’s research—that deadly fungi could have helped establish the age of the mammals—is timely. Fungal infections are now emerging as an important force in nature again. Fungal diseases also may be contributing to the worldwide decline of the coral reefs and appear to play a poorly understood role in the steady decline of amphibians. A study last year reported that a third of all amphibian species worldwide are facing extinction—and while climate change, pollution, and habitat loss are all thought to play a role, many of the extinct and endangered frog species have been infected with the chytrid fungus *Batrachochytrium dendrobatidis*, which may interfere with their delicate, breathable skin, produce a toxin, or something else.

“Like everything in life, it wasn’t just one thing” that killed the dinosaurs, Casadevall said. In the case of the amphibians, “you can imagine [the culprit] could be a weakening of their immunity caused by a fungus.”

STUFFED MORELS

Sometimes the simplest recipes are the most delicious, as proven by this recipe adapted from PSMS’s *Of Told Mushroom Recipes*.

½ lb morels
½ lb ground beef (not lean)
salt & pepper

Split the morels down one side from top to bottom. Stuff with the meat. Season with salt and pepper. Bake uncovered in a 400°F oven for about 20 minutes depending on the size of the mushrooms. Some juice should remain. Pour it over the mushrooms.



**Who is this man and why is he important to PSMS?
Find out at the May meeting.**

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