SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY
Number 408 January 2005

PRESIDENT'S MESSAGE

Ron Post

Happy New Year to all of you, and happy mushrooming in the coming season. My first duties of the year are all pleasant ones. First, a personal note of thanks to all of you who offered me mushrooms for my table or help with club duties this past year. You all have made my first year as president a memorable one.

And thank you for responding to the education survey that appeared in your December newsletter. I will have more details later, but I can note that several of you asked for field trips to be held on Sunday. We do hold some field trips in the spring and fall that last from Saturday until Sunday, but I've asked that at least one trip each season this year be held only on Sunday. I'll keep you posted about that.

It's time to renew your membership. Please do this as soon as possible.

Board and officer elections are coming up. We are taking nominations from the floor at this month's membership meeting, and we'll publish a list of candidates and a statement from each one in the February *Spore Prints* along with a mail-in ballot. Or you can bring your ballot, filled in with your choices, to the February meeting. The end of February is the deadline for receiving ballots (a postmark by that date is fine.) Winning candidates will be announced in March at the Survivor's Banquet.

Five trustees will be elected. The following trustees' terms end in March: Alissa Allen, David Hunt, Pacita Roberts, Tony Tschanz and Steve Bigelow. Also, we need candidates for vice-president. I'm sad to note that Patrice Benson, our current vice-president, is ineligible this time around, as are board members Pacita Roberts and David Hunt. Dennis Oliver, appointed as PSMS secretary a few months ago after a resignation, is eligible to run for that position.

The vice-president has responsibility for programs. If you have questions about what the trustees do, please call me at (206) 527-2996 or another board member.

And please sign up to help staff our booth at the February Flower and Garden Show! Call Emily Routledge at (206) 355-5221 for information about helping out.

Our Survivor's Banquet (and annual business meeting) is scheduled for Saturday, March 12, at the Center for Urban Horticulture, so there will be not be a regular Tuesday night meeting in March.

Call me at (206) 527-2996 or e-mail me at *ronp46@hotmail.com* to say you'll be at the banquet. Please give an idea of what type of dish you will bring. Since it's potluck this year, we may ask for a small donation at the door.

Congratulations to the following people for attending Dr. Ammirati's identifier classes throughout the fall: Steve Bigelow, Alissa Allen, Christie Robertson, Colin Meyer, Katherine Kehl, Stephanie Medlock, Kendrick Shaw, and others I know I'm forgetting. Thank you to lab assistants Joshua Birkebak and Dennis Oliver, and especially to Dr. Ammirati for his time and effort with all our members. And thank you to those who took our beginner's class in the fall. We expect to offer another beginner's microscopy class in mid-spring. Stay tuned.

I encourage all of you to attend our field trips this spring and to carpool or otherwise go collecting together. You'll learn more about the mushrooms by sharing information and have a better time. How to find a carpool? One way is to subscribe to the Yahoo members' forum on the Web and simply post or reply to a message. You can e-mail *Webmaster@psms.org* for instructions. Another way is to e-mail your name and phone number to me at least six weeks before the field trip. I'll create a list and ask our newsletter editors to publish it in a special "Carpool Wanted" box in that month's edition.

At this month's meeting, come early (6:30 to 7:15 PM) to explore how to use the Matchmaker CD. And next month at the same time is new-member orientation! See you there!

SOME PIX FROM THE DECEMBER COOKIE BASH

DUES ARE DUE!

It's time to renew memberships in PSMS. *Unless you obtained or renewed your membership at or after the Annual Exhibit in October,* it officially ends December 31, 2004.

To renew your membership, send your dues now to

Bernice Velategui, PSMS Membership Chair
2929 76th Ave. SE, #504
Mercer Island, WA 98040

Annual dues are $25 for single or family memberships or $15 for full-time students,.

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PUGET SOUND MYCOLOGICAL SOCIETY

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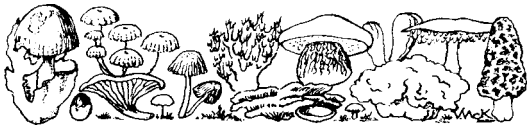
Annual dues $25; full-time students $15

CALENDAR

Jan. 11	Membership Meeting, 7:30 PM, CUH
Jan. 17	Board Meeting, 7:30 PM, CUH
Jan. 18	*Spore Prints* deadline
Feb. 8	Membership Meeting, 7:30 PM, CUH



BOG BLOG IV

Colin Meyer

The bog team has been collecting and identifying mushrooms at Shadow Lake Bog for a little more than a year now. Here is a quick update. As of late November, we have made more than 490 collections. We have identified more than 145 species from 66 genera. Twenty one of these genera have a least two species. The bog contains at least 31 species of *Mycena*, 15 of *Cortinarius*, and eight of *Galerina*.

The winter isn't a slow mushroom time for boggers. We continue to collect many mushrooms. Some of the mushrooms out there are ones that we have seen before, such as *Laccaria bicolor* and *Russula crassotunicata*, both very prolific in the bog. Other mushrooms, like *Rhodocybe* species, that fruited copiously last year are completely missing this year. And there are new ones that weren't there last year, like *Amanita porphyria*. It seems like every gray *Mycena* that we collect is a new species for our list. This might be because they weren't there, or it may be that we overlooked them last year.

As we continue on our second year of this survey, we hope to develop a thorough list of the species of fungi in the bog.

MEMBERSHIP MEETING

Tuesday, January 11, 2005, at 7:30 PM at the Center for Urban Horticulture, 3501 41st Street, Seattle

January's meeting will feature Dr. Katherine Glew, who will talk on "Lichens: An Overlooked Fungus in the Pacific Northwest." Don't miss this opportunity to learn about these important members of the ecosystem and why they are essential for life on earth.

Dr. Glew has a BA in biology, a M.Ed. in science curriculum and instruction, and a Ph.D. in botany from the University of Washington. She is currently Assistant Curator of lichens and bryophytes at the University of Washington Herbarium, where she works both with historic collections and on processing lichens collected from the Russian Far East. In addition to her herbarium responsibilities, her research interests include studying lichens from island ecosystems and the structure of alpine communities on Mount Rainier. She heads a lichen study group which meets weekly at the University of Washington and is actively involved with conservation in the lichenological community. Dr Glew will teach a workshop on lichens for members of PSMS, either at the Spring Foray or at CUH later in the spring.

If your last name begins with the letters M to Z, please bring a treat to share.

SEWARD PARK FIELD TRIP

Colin Meyer

Seward Park is one of two locations in Seattle that have never been logged. The old growth forest includes Douglas Fir trees more than 350 years old. It is a fun park to walk through, with well maintained trails that traverse several different habitat types.

November 20 was a brisk day, during the first real cold spell of the fall season. It was about 37 degrees when we reached the park, and I was glad that I had grabbed an extra shirt on the way out the door. About thirty people signed up, including several first-time mushroom collectors. Host Tony Tschanz had hot coffee, tea, and pastries waiting for members. It was the hot coffee that saved us from certain hypothermia, or at least intolerable shivers.

Alissa Allen led a walk down the main trail through the woods where she pointed out different growing patterns, such as mycorrhizal mushrooms in the ground under conifers and lignicolous mushrooms on dead logs. Some people on the walk spotted orange chanterelles under the salal near the Douglas Firs.

Back at the shelter, Brian Luther identified mushrooms and talked in a very animated fashion, to fend off the cold. We moved the specimen table from the shade out into the open to take advantage of the little warmth that the sun's rays provided. Sixty three species were identified, which felt like quite a lot, given the dry, cold weather. There were piles and piles of *Inocybe pudica*, which quickly stains orange red when handled, but today was staining more slowly owing to the cold. Also present in large quantities were *Agaricus hondensis*, *Lactarius controversus* (with pink gills), and *Macrolepiota rachodes* var. rachodes (AKA *Chlorophyllum olivieri*). Brian took several interesting specimens home for further examination, including a slender *Pluteus* species with a bright yellow stipe.

Colin Meyer

WOMAN DIES AFTER CONSUMING WILD MUSHROOMS **Henry K. Lee & Wyatt Buchanan**

San Francisco Chronicle, November 30, 2004

A 70-year-old woman died Monday and her husband and two friends were hospitalized after they ate poisonous "death cap" mushrooms collected in the Oakland hills. The victims, all adults, fell ill after ingesting the toxic *Amanita phalloides* on Thanksgiving Day, said Sherri Willis, spokeswoman for the Alameda County public health department.

Yu-Chin Lai died at 2:35 PM Monday at Highland Hospital in Oakland. Lai's husband, Chin Chiang, 76, was released from a hospital over the weekend, said his daughter. Two women in their late 40s or early 50s who were visiting the couple during the holiday remained hospitalized: One was in critical condition, and the other was improving, according to Willis and a family friend.

According to the family friend, the women, who knew the couple from Taiwan, picked the mushrooms Thanksgiving morning during a hike near Merritt College. The four people ate the mushrooms at lunch and dinner that day, though Chiang ate only a small amount. By nighttime, the four began vomiting, and during the day Friday they saw doctors, who gave them medicine that didn't help.

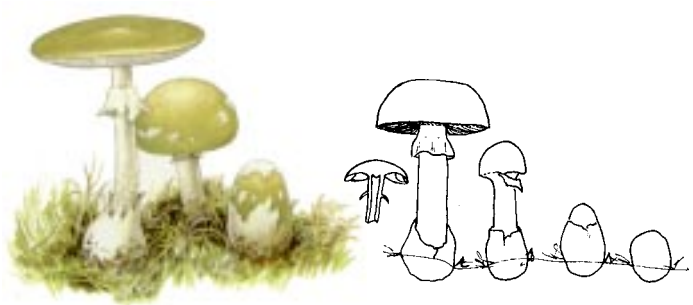
On Saturday, the sickness continued, and one of the visiting women went to the emergency room but had to wait nearly four hours after registering before being seen by a doctor. Once the doctor saw the woman and learned that she had consumed mushrooms, he asked that the three others immediately come in for treatment.

Although death from eating poisonous mushrooms is rare, two people in Sonoma and Santa Cruz counties died in 1996. In 1997, Sam Sebastiani Jr., a 32-year-old member of the Sonoma County wine-making family, died after he accidentally ate poisonous wild mushrooms gathered during an outing with friends.

Cases of mushroom poisoning most frequently occur among recent immigrants who mistake toxic mushrooms for the harmless ones that grow in their countries of origin, said Dr. Anthony Iton, county health officer. (The four people poisoned on Thanksgiving were immigrants from Taiwan.)

"We are particularly concerned for new immigrants or visitors from other countries who might be accustomed to collecting wild mushrooms in their native land," Iton said. Symptoms of poisoning—which often don't show up for eight to 16 hours—include nausea, vomiting, diarrhea, and severe cramps.

Anyone who develops symptoms after eating wild mushrooms should call the California Poison Control System at 1-800-876-4766 [Washington = 1-800-222-1222] and seek medical attention.



Amanita phalloides, *the Death Cap Mushroom.* A. phalloides *has a white stalk and a wide, smooth cap with yellow or greenish tints. It often grows under oak trees 0[chestnut in the PNW] and is especially abundant with the onset of the rainy season.*

ANGEL WING UPDATE

The Asahi Shimbun, November 30, 2004

The pearly white sugihiratake (*Pleurocybella porrigens*, or Angel Wing) mushroom has so far been blamed for at least 17 deaths in the Tohoku and Hokuriku regions of Japan this season. The deaths resulted from acute encephalopathy. The only things that the victims had in common were that they all had serious kidney ailments and that they had all eaten sugihiratake before experiencing symptoms.

A research group studying wild sugihiratake reported Monday that the fungi contain an unknown toxic potent enough to kill mice. In the experiment, mice were given large doses—about 10 times what they would normally eat—of wild sugihiratake collected from mountains in the Koshinetsu region.

In the first stage, the mushrooms were ground up and dissolved in water. Five of six mice died after eating the mixture.

Next, the mixture was boiled for 30 minutes at 100°C. All three mice that ate the stewed mushrooms died.

In the third stage, the mixture was filtered and separated into a high polymer mix and one with smaller particles. Three mice that ate the mix after the liquid was drained died. Three fed the filtered mix survived.

Although the experiment shows that the sugihiratake contained a multimolecular toxin that is water soluble and resistant to high heat, the experiment does not prove a link between sugihiratake and brain fever.

There have been sporadic cases of acute-brain disorder springing up in the past after the consumption of the popular mushroom. Specialists have been pointing out that trace components in mushrooms may surge owing to a shift in their environment.

"It is possible that the toxic level of the sugihiratake suddenly rose this year, prompted by outside stress factors such as a rise in temperature," said professor Hirokazu Kawagishi of Shizuoka University Kawagishi, one of the researchers. "We would like to pinpoint (the toxin) before next mushroom season starts."

A LEADER'S GUIDE TO FUNGUS FORAYS (or how to avoid identifying specimens) **Steve Kelly**

Field Mycology, October 2000

The following reasons are all genuine and have been used on fungus forays to explain difficulties identifying a fungus. I hesitate to accuse the users of evasion, prevarication, or downright sneakiness, but one does begin to have suspicions. No names have been changed to protect the innocent and all mycologists named are real—they know who they are!

Sorry, I know what it is, but it is out of season.

Not enough specimens.

What were they growing under? You have to know the host plant.

What was it growing on?

You must collect the whole fungus.

It's in poor condition.

Too young…

Too old…

There're over 200 different ; nobody does them.

Psathyrella all look the same (throw away).

Coprinus…hmmm. Derek would like to see that.

That's interesting. May I take it away?

That's a good find. I will take it to Kew.

Were there more like this?

That should not be growing here.

You really can't name those without a microscope.

Its name is on the tip of my tongue.

We had another one just like that 20 years ago. I will have to check my records.

That one is too small to see. I will give it to Kerry. (Substitute mycologist of your choice.)

I am waiting for the new key to those.

Did you find it here? Strange….

Your best find ever? Sorry but someone else just found it.

I've seen that in a book, but cannot remember its name.

Do you know the (a) tetrad, (b) size, (c) name of collector, (d) date, (e) smell, (f) color, (g) color when bruised, (h) pH of soil, (i) substrate, (j) what you had for breakfast?

Unlabelled material can cause confusion and is of no value.

I have only seen that once before, and the name eludes me.

The weather as been too wet/dry.

One dried *Ramaria* looks pretty much like another.

They are not easy.

That looks too distressed to identify.

I need my computer to key it out.

Frost-hit. Sorry.

You have had this in your basket the wrong way up.

It should smell of bedbugs or a nurse's blouse.

THE USEFULNESS OF SHELF FUNGI IN PRIMITIVE FIRE MAKING

storm

(previously published in *Mushroom: The Journal*)

Five thousand, three hundred years ago Ötzi, also known as the Ice Man, died at 10,500 feet in the Ötztal Alps, which divide Italy and Austria. The 1991 discovery of this mummified Neolithic time capsule yielded a treasure trove of artifacts to anthropologists and challenged current theory regarding that transitory period between the Stone Age and the Iron Age. Among Ötzi's possessions were various species of shelf fungi (otherwise known as conks and polypores—named for the tiny pores on the underside of these wood-inhabiting fungi) commonly found in the surrounding lowlands. Why did he carry such fungi? Was he aware of their inherent medicinal value? In such a barren, wood-less tundra, would a trek through this inhospitable landscape necessitate the importation of fire-starting materials or cooking fuel? My intentions with this article are threefold: to address potential ancient uses of polypores, to share my experiences incorporating Kingdom Fungi into my primitive skills practitioning, and to unite the disciplines of mycology and primitive technology in order to assist mycophiles and "abo's" in recognizing a primal link between mushrooms and humanity.

Being both a lover of mushrooms and a stone-age skills practitioner for a couple of years now, it was inevitable that these two passions would merge. As I wander the temperate rain forests here in the Olympic Peninsula of Washington, my foraging eye is constantly searching for useful natural items, be it straight branches for friction fire (as thimbleberry and big-leaf maple often provide), stones for flint-knapping, or lichens, insects, and mushrooms for the table.

During the winter of 1999 I was fortunate enough to teach at an outdoor school in southern California with Jeff Stauffer, ethnobotanist, amateur mycologist, and an adjunct primitive skills instructor for Raven's Way Traditional School in Arizona. It was then that I first became aware that fire lay dormant within sticks, ready to expose itself with a little coaxing from us. Surrounded by sand, sage, and seep willow, Jeff would reverently produce a stout, slightly curved bow, whose ends were loosely connected by a length of twisted desert agave fibers. He would loop once the desert agave cordage around a half-inch thick, six-inch long wooden spindle, made from the flowering stem of California fan palm tree, and lay this apparatus aside while he prepared the rest of his friction-fire bow drill kit: a rectangular, three-quarter inch thick, foot-long hearthboard of the same wood and a palm-sized, wooden hand-hold containing a small, carved, central depression.

Jeff carefully inspected the length of the hearthboard, along which were circular sockets of varying depth and charred condition. A triangular notch, cut all the way through the thickness of the board with a piece of sharp stone, connected each socket to the board's edge. The arrangement of the socket and notch are reminiscent of a traditional-style keyhole, with one point of the triangular notch intruding into the round socket. Selecting one of the newer, shallow sockets, he placed the hearthboard on the ground, taking care to avoid any moisture-laden grassy areas which would conduct heat away from the hearthboard and render the attempt at friction fire much more difficult. To control conditions further, Jeff placed a thin piece of bark underneath the socket and notch that he would use to house a rotating wooden spindle in hopes of coaxing a glowing coal from desert wood.

Momentarily fingering the deep calluses on his palms, Jeff turned his back on the prevailing wind in order to shelter this ancient attempt with his body. Picking up the spindle, which was still wrapped once by the bow's cord, he placed one end into the socket, while bringing the hand-hold to rest on top of the spindle's other end. The spindle was sandwiched between the hand-hold and hearthboard, perpendicular to the ground. With one foot on the hearthboard to steady it, he gently, steadily pushed and pulled the bow, toward himself and away from himself, again and again, allowing the spindle and hearthboard socket to warm up as friction slowly carbonized and disintegrated the cell walls of the fan palm wood. These small, darkened, powder-like wooden particles, or char, which would fuel the future coal, fell into the notch, which protected the char from energy-sapping wind and allowed heat to accumulate here from the frictional process.

Using his index and middle fingers on his bow-hand he took up the slack from the stretching cordage, which secured the cord's grip on the rotating spindle. Pressing the hand-hold down harder with his other hand, Jeff

increased the speed of the bow-draw. Whitish-buff smoke emanated from the socket as more char poured into the notch. After a few more seconds a hint of bright red color emerged from the notch as the char reached approximately 800ºF and spontaneously combusted.

Now it was time to add the coal, or fire-egg, to a nest of fuel from which it could hatch into fire. Earlier in the day Jeff had kneaded some dry sagebrush bark into a bowl-shaped mass. He then filled the depression in the middle of this bark nest with shredded bits of red-belted conk (*Fomitopsis pinicola*). On top of this a pinch of flowering cattail fluff was added to ensure a gentle gradation of fuel sizes so that the coal could grow hot enough to produce flame.

Using a thin stick to separate the coal from the confines of the hearthboard, while cradling the coal on the thin piece of bark, Jeff transferred the ember to the nest. As he blew gently on this tinder bundle, the coal engulfed the fuels and produced flame in just a few seconds. A spark was planted inside me at that very moment.

Bow drill fire-making tinder is but one primitive use of polypores. Recently I've focused my efforts on a variety of fire-making ways, from flint and steel (spark-based) to fire plow (lateral friction—as Tom Hanks demonstrated in the movie *Castaway*) to bow drill and hand drill (rotational friction), among others. Having experimented with a few thousand combinations of woods available here and the central coast section of California (my former residence), I find myself yearning to include lesser-tried natural materials—which brings me to the pyro-properties of polypores. The most common sizeable conks around here are red-belted conk (*Fomitopsis pinicola*), hemlock varnished conk (*Ganoderma tsugae*), and artist's conk (*Ganoderma applanatum)*, of which all are currently (August) blossoming in a burgeoning bouquet of baby buttons on stumps and downed logs. Also, I was sent some birch polypore (*Piptoporus betulina*) and tinder fungus (*Fomes fomentarius*) from Ohio to experiment with.

I have already explained the bow drill process, which can be seen in the accompanying photos. Aside from being used as tinder, certain polypores can also be used as hearthboards (see photos). Compared to other esoteric hearthboard materials (rock, shell, antler, bone) that I have used, shelf fungi work better by far. The following polypores have generated coals in conjunction with a wooden spindle: artist's conk, red-belted conk, birch polypore, and tinder fungus. Casual observation indicates that these fungal hearthboards produce hotter, longer-lived embers than those derived solely from wood.

In general, the amount of effort required to produce fire by utilizing shelf fungi as hearthboards and tinder is less than that expended using wood. I suspect this is because shelf fungi can dry out more quickly than wood, since the pore layer (from which the mushroom's spores fall) provides a conduit for the quick evaporation of moisture. One might also consider the diet that certain members of this mushroom family enjoy. As a shelf fungus infects the trunk of a tree, it either digests cellulose (the substance that plant cell walls are made out of), leaving a *brown rot*, or digests cellulose and lignin (the glue that holds plant cell walls together), creating a *white rot*. I've had more success with the bow drill and hand drill on species that digest cellulose and lignin to produce a white rot (e.g., the red-belted conk). Cellulose is comprised of glucose molecules linked primarily by glycosidic bonds. When metabolized, it decomposes into fatty acids, which are said to be volatile.

The hand drill is structurally similar to the bow drill, but the bow and handhold are replaced by your strength. Bearing down on a longer, thinner spindle requires more stamina and power in order to achieve a coal. However, the intrinsic mystical simplicity of "rubbing two sticks together" and creating fire, without the technological evolution of the bow, strongly endears me to this method of friction fire. To date, I've only used the artist's conk as a hearthboard successfully with a hand drill. How amazing it would be to drill an ember on a shelf fungus while it remained attached to the host tree!

Before the match was invented in 1826, flint and steel was the prevalent method used to start a fire. Taking a piece of flint, quartz, pendantlite, marcasite, or other hard iron pyrite, one can strike a piece of these minerals against a high-carbon steel (e.g., a file or older knife blade). The mineral tears off small particles of the metal, causing these pieces to heat up and hopefully land on dry tinder (mind your aim!). Traditionally, a char cloth was used to catch the hot sparks. Char cloth can be made by burning a piece of cotton fabric while it lies inside a reasonably airtight container. The cloth blackens as it burns incompletely and readily catches fire when introduced to an intense heat source.

There may be ways to primitively craft an easily combustible, charred material, but one can turn to the gastronomic workings of the fungus gnat larvae for an effortless flint and steel tinder alternative. Probably anyone who has left dried conks in a bag for months can attest to the ravages that hidden insects can inflict on a poor, defenseless polypore and the subsequent powdery debris that settles to the bottom of the bag. Recently I collected some dried sulfur shelf (*Laetiporus sulphureus*) fungi that had enjoyed protection from the elements by growing on the underside of a large, slightly elevated log. I was demonstrating flint and steel to school groups at the time and thought these specimens could prove useful. After storing the sulfur shelf in a basket for a while I noticed small piles of whitish powder accumulating on the floor. Upon inspection I discovered small holes running through the fungi (and many more fungus gnats flying around my place than usual). Thinking that this powder might burn, I cranked out a few hand drill embers and placed them on top of the powder. The embers steadily engulfed the new fuel, extending the lives of the coals (hence the oft-used term in primitive circles, *coal extender*).

Considering this success, I wondered if the sulfur shelf, in its whole, intact, unprocessed condition, would catch a spark and grow a coal. Well, not only did the sulfur shelf catch sparks easily and burn quickly, but blowing on the polypore and even smothering it would not put it out—I found this out by discovering the extinguished (not!) fungi fully engulfed in flame on my front steps 20 minutes after I supposedly put it out! Only dousing it in water would lay the fire to rest. Tinder fungus and birch polypore also work well in this manner. It was very satisfying to have a nine-year-old girl from inner-city Seattle successfully make fire with flint, steel, and sulfur shelf later that week.

Polypores also generate a by-product that is useful to these efforts. White and brown wood rots can be ground up and applied to a friction-fire-generated coal in order to extend its life, giving a person more time to construct a tinder nest in which the coal will hopefully be blown into flames. Wood infected with brown rot burns slowly and doesn't create flame by itself. Preliminary trials that I have conducted show that brown rot is more effective than white rot as a coal extender. When an ember is placed on a chunk of white rot, the wood bursts into flame. Perhaps some of you can enlighten me as to why this might be so—I'm not up on the specific roles that cellulose and lignin play in the combustion of wood. This has important foraging implications in primitive or survival situations. We get 92 inches of rain per year here, and up to 160 inches just 50 miles to the west. Imagine yourself in such a wet environment, in need of a fire. You are searching for dry fuel—all wooden surfaces in the forest are useless. But dig into a log, especially a *rotten* log (which is infinitely easier to dig into), and pull out some fluffy, dry, punky, white wood...congratulations, you're warm!

Even the pore layers of shelf fungi have a luminescent use. If you look closely at the photo of the stone oil lamp, you can see the brown lump of a wick that sits in the fuel (be it rendered deer fat, asphaltum, or olive oil). This wick is a piece of red-belted conk, whose pore layer siphons the liquid fuel into the flame that dances atop the fungal mass.

Lastly, we come to the conk stove. Simply place a burning coal on top of any large conk and watch the fungus slowly become engulfed in flame. Better yet, procure a piece of hollow elderberry or bamboo stem, blow gently on the burning mass, and watch the fungus *quickly* become engulfed in flame. Then set a pot of water directly on the conk and *voila*, it boils within ten minutes.

I hope this article has warmed you to the possibilities of extending your love for primitive skills toward Kingdom Fungi and discovering fungi's role in our prehistoric relationship with our environment. To learn more about stone age skills please visit the following excellent resources:

- Ron and Karen Hood's website (including their award-winning video series): *www.survival.com*
- Thomas Elpel's Hollowtop Outdoor Primitive School: *www.hollowtop.com*
- The Society of Primitive Technology: *www.primitive.org*
- This is one of the best organizations in the country from which to "learn the old ways": they publish the *Bulletin of Primitive Technology* as well as two fantastic books. Become a member!
- Vince Pinto's Raven's Way Traditional School: *www.hollowtop.com/ravensway.htm*
- *www.primitiveways.com* This website is maintained by a core group of top-notch primitive skills practitioners/instructors. They answer and post your primitive skills questions.

Storm is a naturalist, stone age technologist, and writer living on the Olympic Peninsula of Washington.

MUSHROOM OF THE MONTH: *AURICULARIA*

Rick Ges

Spores & Stipes, North Idaho Myco. Assoc.

Commonly known as Wood Ears or Tree Ears, *Auricularia* mushrooms are a centerpiece of Asian cooking. Asian mycophagists have used these mushrooms for centuries. They were traded extensively in the late 1800s from New Zealand to China and Hong Kong. They are not flavorful but rehydrate well and are used in soups and sauces for texture. *Auricularia polytricha* is the species prized in Asia. This mushroom is thought to be one of the first species cultivated according to records in China dating back to around 600 AD.

Auricularia species are Basidiomycetes and belong to the order of Tremellales, which are the jelly fungi. The name *Auricularia* comes from the Latin word for ear. *Auricularia auricula-judae* has been called the Jews Ear, as it grows on elder, the tree on which Judas Iscariot is said to have been hung.

There are several species, including *A. polytricha*, *A. auricula*, and *A. mesentica*. *A. polytricha* is common in the Americas through Mexico and on to Argentina. *A. auricula* is a northern temperate species. It is not cultivated like *A. polytricha* but is collected in the wild. It has hairs on the underside which are shorter than those on *A. polytricha*. *A. fuscosuccinea* is found in the southeastern U.S. on south to Argentina.

Often *A. auricula* and *A. polytricha* are mistaken for each other. Though they are quite similar to the eye, closer examination shows differences in spores and hairs, and they grow on different types of trees.

The *A. auricula* fruiting body is 6–10 cm (1–6 in.) and ear shaped, lacking a stalk but having a short peduncle. The outer surface is sterile and pubescent. The inner surface is fertile, reddish brown, at first smooth and then venose. It is pruinous because of the spores. The flesh is gelatinous, slightly elastic, and translucent. It has no particular odor or taste.

The spores are white, cylindrical, and smooth, measuring 12–17 × 4–5 µm. The season is between May and June as well as September through December. The habitat is broadleaf wood, and the fungus is especially present during the rainy season.

It is edible, but its value is in its texture, not its flavor. Upon drying it tends to turn violet and circumvolute. It is fragile when dry but readily revives with hydration.

A. polytricha is grown commercially in the Orient where it is called Mu Ehr among other names. It is used in soups and vegetable dishes. Used as a folk medicine, it is touted for smoothing coughs and for generally improving the physical condition. In Paul Stamets' book *Growing Gourmet and Medicinal Mushrooms*, it is reported that this mushroom is 80% effective against Erlich carcinoma and 90% effective against sarcoma.

It was discovered to be an anticoagulant when the blood of a student who had eaten Chinese food the night before taking a blood clotting test wouldn't clot. This led to the development of a new anticoagulant. *A. polytricha* may contribute to the low incidence of coronary artery disease in China.

Nutritionally, *A. polytricha* is 8–10% protein, 0.8–1.2% fat, 84–87% carbohydrate, 9–14% fiber, 4–7% ash, and approximately 90% moisture.

I found that the dried *A. auricula* is better than fresh in texture. It seems to improve when reconstituted. To reconstitute, soak in warm water about 20 minutes. Wash thoroughly and cook well as they have a gelatinous texture. I use them in stir frys or in soups. A sauce can be made of onion, garlic, basil, and finely sliced Wood Ear thickened with a little cream.

ANCIENT FUNGUS REVIVED IN LAB

BBC News, October 19, 2004, via *Fungifama*, South Vancouver Island Mycological Society

A fungus from a deep-sea sediment core that is hundreds of thousands of years old can grow when placed in culture, Indian researchers have discovered. The fungi come from sediments that are between 180,000 and 430,000 years old, and are the oldest known fungi that will grow on a nutrient medium. The finding adds to growing evidence for the impressive survival capabilities of many microorganisms.

The core was drilled from a depth of 5,904 m in the Indian Ocean's Chagos Trench. Dr Chandralata Raghukumar and colleagues from the National Institute of Oceanography in Goa, India, and the Indian Institute of Chemical Technology in Hyderabad carefully deposited 5-cm-long portions of the core into plastic bags, which they then sealed to avoid contamination with present-day microbes. The scientists then attempted to isolate bacteria and fungi from the middle of the 5-cm-long "subsamples" because this region had not been in contact with the pipe used to extract the core—and therefore any modern microorganisms on it.

Diluted malt extract agar was used as a nutrient medium to grow the fungus on. The team was able to culture fungi from six out of 22 subsections of the core.

At core depths of between 15 and 50 cm, the scientists found a kind of fungus that does not produce spores. At a depth of 160 cm (corresponding to 180,000 years ago), they found high densities of a spore-producing fungus known as *Aspergillus sydowii*.

Considerable densities of this fungus were also found at depths of 280–370 cm corresponding to an age between 180,000 and 430,000 years ago. The researchers think the fungi may have been blown off the land into the sea. They then sank to the sea floor and were covered in deep-sea ocean sediments.

The oldest microorganisms found alive are thought to be bacteria isolated from 25–40 million-year-old bees trapped in amber. In 2000, U.S. researchers claimed to have found bacteria that had remained in suspended animation for 250 million years in salt crystals. But the claim was disputed almost as soon as it was made.

Microbiologist Dr Scott Rogers, of Bowling Green State University in Ohio, U.S., was unsurprised by the study, saying his own team had obtained similar dates for ancient fungal organisms they had recovered in ice.

Viable and perhaps actively growing microorganisms are also thought to survive in the depths of Lake Vostok in Antarctica. If so, they may have been isolated from outside communities of microorganisms for up to one million years.

Studying the distributions and numbers of fungal organisms in cores could tell scientists about past climatic conditions on Earth, say the authors of the study.

JAPANESE RESEARCHERS TAP MUSHROOMS FOR RUBBER

Reuters, December 2, 2004

Japanese researchers say they have produced rubber from a natural substance extracted from an edible, wild mushroom.

Researchers at Gunma University, west of Tokyo, not only have produced rubber from the chichitake mushroom [*Lactarius volemus*], but the end-product has the advantage of not containing a protein that can cause allergies, said Hiroshi Mitomo, head of the research team at the university's biological and chemical engineering department. "We are working on this project with the aim of trying to commercialize the product," Mitomo told Reuters.

Before that happens, however, there are a few issues that need to be addressed. It takes more than 10 kilograms (22 lb) of mushrooms to make to make 1 kilogram (2.2 lb) of rubber. Also, the mushrooms are not grown commercially, are found only at the height of summer, and rot after only 10 days.

Currently, producing rubber from the mushrooms is more than 10 times as costly as getting it by tapping rubber trees or making it from petroleum product.

"The biggest obstacle will be trying to reduce production costs," Mitomo said.

NEW WEBSITE

Mycologist Roger Phillips, author of *Mushrooms of North America*, has launched a new, pay Website on mushrooms and other fungi at *www.rogersmushrooms.com.* The site features text and photographs of North American and European fungi and contains over 3000 pictures in all. You can see all the text or, by registering, check out the pictures, too. All NAMA members get a special discount. For a special discounted membership, insert this code, B886R, when prompted during registration.

AMANITA RESEARCH

***Mycophile*, Nov./Dec. 2004**

In the August 2004 issue of *Mycological Research* (*108*[7]: 885–896), Oda and others examined the phylogeny and biogeography of two globally distributed species familiar to most of us: *Amanita muscaria* and *A. pantherina.* They found three main groups of *Amanita muscaria*—Eurasian, Eurasian subalpine, and North American. *A. pantherina* seemed to comprise two global groups, North American and Eurasian.

The authors believe that the global migration of *A. muscaria* has been a much more recent occurrence than that of *A. pantherina.* Furthermore, they could not be certain whether *A. pantherina* has its origins in North America or Europe. However, the researchers hypothesize that *A. muscaria* originated in Europe and spread to North America, probably through land bridges during the late Cretaceous and Tertiary periods. This is supported by the widely accepted belief that the plant hosts for *A. muscaria* (both species of *Amanita* are ectomycorrhizal on trees, mostly of the families Pinaceae, Fagaceae, and Betulaceae) also migrated to North America about this time.

To settle the longstanding controversy over the taxomony of the notaby smelly Hygrophorus cossus, *Ellen Larsson and Stig Jacobsson analyzed DNA from the original type specimen—collected in 1794.*

—Mycological Research, 108*[7]:781–786*

CHINESE CRAB SALAD

Kay Shimizu

Cooking with Exotic Mushrooms
via *Wild About Mushrooms*, Myco. Soc. of San Francisco

A snappy salad with the taste of the sea. The Wood Ears remain firm and chewy. Serves 4 as a first course.

Salad

1/2 cup dried Wood Ear mushrooms (*Auricularia*)
1 medium-sized cucumber, peeled
Salt
1/2 cup fresh cooked crab meat, shredded

Dressing:

1-1/2 teaspoons sugar
1/2 teaspoon grated fresh ginger
2 tablespoons soy sauce
1 tablespoon rice vinegar or Chinese red vinegar
1 teaspoon Asian sesame oil
Cilantro sprigs

Soak the wood ears in hot water to cover until soft, about 15 to 20 minutes. After reconstitution, clean under running water with light finger pressure to remove debris. Cut off any fibrous material adhering to the base of the mushroom. Drain and slice.

Cut the cucumber in half lengthwise. Slice very thin diagonally. Sprinkle lightly with salt. Allow to stand for 5 minutes; drain well. Squeeze to remove the excess moisture. Place the cucumber slices in a circle on a plate. Put the sliced wood ears in the center. Arrange the crab meat neatly on top of the mushrooms.

Mix the dressing ingredients together and drizzle the dressing over the salad. Garnish with cilantro.

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 mushroom known as Fairy Ring
Grows in a circle round,
Where some say fairies dance within,
Or buried treasure's found.

But the magic's in its feeding threads,
Which grow beneath the ground.
They form a circle as they spread,
And toadstools sprout around.

—*Your Big Backyard*, September 2004

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