SPORE PRINTS

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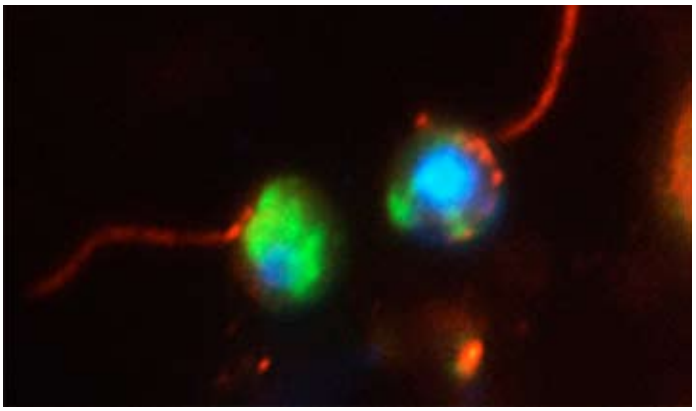
Number 473 June 2011

OLDEST, ODDEST FUNGI FINALLY PHOTOGRAPHED

Susan Milius
Science News, May 12, 2011

M. Jones



Two fungal cells, possibly from an ancient lineage, each show a curvy, taillike flagellum (red) during a mobile stage in their life cycle.

Images of little dots, some wriggling a skinny tail, give scientists a first glimpse of a vast swath of the oldest, and perhaps oddest, fungal group alive today.

The first views suggest that, unlike any other fungi known, these might live as essentially naked cells without the rigid cell wall that supposedly defines a fungus, says Tom Richards of the Natural History Museum in London and the University of Exeter in England. He calls these long-overlooked fungi cryptomycota, or "hidden fungi." Of the life stages seen so far, a swimming form and one attached to algal cells, there's no sign of the usual outer coat rich in a tough material called chitin, Richards and his colleagues reported online May 11 in *Nature*.

"People are going to be excited," predicts mycologist Tim James of the University of Michigan in Ann Arbor, who also studies an ancient group of fungi.

Other research indicates the new group exists, but the current study starts to reveal the biology. "The question is, is there another stage in the life cycle that does have cell walls?" he says.

By analyzing DNA pulled directly from the environment, Richards and his colleagues have confirmed that the hidden fungi belong on the same ancient branch as a known genus named *Rozella*. Although researchers have picked up DNA traces of fungi that didn't quite fit in any group for at least a decade, the organisms (so far) won't grow in labs. That in itself isn't astounding for fungi, which can be difficult to culture.

As the researchers examined DNA sequences from databases, the ancient group "just got bigger and bigger [in genetic diversity] until it was as big as all previously known fungi," Richards says.

Lakes in France, farms in the United States, and sediment deep in the sea have all yielded DNA sequences in this group. The one habitat it doesn't seem to like is open ocean, Richards says.

"The big message here is that most fungi and most fungal diversity reside in fungi that have neither been collected nor cultivated," says John W. Taylor of the University of California, Berkeley.

Exeter team member Meredith Jones spotted the hard-to-detect organisms by marking them with fluorescent tags. The trick revealed fungal cells attached to algal cells as if parasitizing them. One of the big questions about early fungi is whether they might have arisen from "some kind of parasitic ancestor like *Rozella*," says Rytas Vilgalys of Duke University.

Interesting, yes. But loosening the definition of fungi to include organisms without chitin walls could wreak havoc in the concept of that group, objects Robert Lücking of the Field Museum in Chicago. "I would actually conclude, based on the evidence, that these are not fungi," he says. Instead, they might be near relatives—an almost-fungus.

IS MUTATED FUNGUS KILLING AMERICAN BATS?

Andy Coghlan
New Scientist, May 24, 2011

Little brown bat with white nose syndrome.

A fungus blamed for killing more than a million bats in the US since 2006 has been found to differ only slightly from an apparently harmless European version. The minor genetic differences could hold the key to preventing future deaths.

Alternatively, European bats may have been exposed to the virus longer and evolved resistance.

Jeffrey Foster at Northern Arizona University in Flagstaff, and colleagues, compared the genomes of strains of *Geomyces destructans* infecting US and European bats and found that the strain thought to cause lethal "white nose syndrome" (WNS) in the US is almost identical to one that is harmless to bats in Europe..

"There were very few mutational differences between the North American and European samples, strongly suggesting they're related," says Foster. The team presented their preliminary results last week at a conference in Little Rock, Arkansas.

If it is the DNA differences making the US version of the fungus virulent, then finding a treatment will be easier than if the reason for the transatlantic difference is that European bats have evolved resistance, says Foster.

The answer should come from Craig Willis at the University of Winnipeg in Manitoba, Canada, who is currently testing both strains on little brown bats from the US to see if both versions cause WNS.

Irrespective of whether it is the nature of the fungus or evolved resistance, researchers in Europe told the meeting that they are

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CALENDAR

June 14 Membership Meeting, 7:30 pm, CUH
June 20 Board Meeting, 7:30 pm, CUH
June 25 Ostrom's Tour (registered people only)
Aug. 15 Board Meeting, 7:30 pm, CUH
Aug. 23 *Spore Prints* deadline
Sept. 13 Membership Meeting, 7:30 pm, CUH

BOARD NEWS — Denise Banazewski

The Board held a special meeting and proposed changes to our bylaws, which must be voted on and approved by the membership. We wanted to update the bylaws to reflect the way PSMS operates today, make other changes, and make the bylaws more easily readable. We want to give members a reasonable amount of time to discuss the changes before voting, so we will present the changes at the June membership meeting and the members will vote on the changes at the September membership meeting. We will make the proposed revisions available on our website in the Members area. In other news, the Board affirmed that Irwin Kleinman, our Golden Mushroom Award recipient, will receive a lifetime PSMS membership. Attendance at Mushroom Maynia! was up 20% over last year, but book sales were down. We have made a limited quantity of printed copies of the roster which will be made available at the June meeting to members who prefer a printed version. We will be drafting a privacy policy for our website. The Board approved $400 for the Project Vouchering Committee for the photography class honorarium and supplies, printing vouchering specimen tags, and handouts.

MEMBERSHIP MEETING

Tuesday, June 14, at 7:30 pm at the Center for Urban Horticulture, 3501 NE 41st Street, Seattle.

This month we welcome Leon Shernoff, who will speak to us on "Boletes Come of Age." Leon, a Ph.D. mycologist, is founder and editor of *Mushroom, the Journal of Wild Mushrooming*, a periodical dedicated to hunting, cooking, studying, naming and photographing wild mushrooms. His columns on wild mushrooms have appeared in *The Wild Foods Network* and *Mycophile*, the newsletter of the North American Mycological Association. He lives in Chicago and is a past president of the Illinois Mycological Association.

His talk will feature the incredible morphological and color diversity of the boletes from eastern North America. Boletes will be used as examples in an introductory discussion of how and why name changes occur in the fungi. Three hundred years ago, all gilled mushrooms were placed in the genus *Agaricus* and all pored mushrooms were placed in the genus *Boletus*. While *Agaricus* has long since been split into hundreds of smaller groups, the boletes have been expanded into only a few additional genera. But mycologists are now better at defining the species in small groups of mushrooms that were previously considered "complexes," for example, the honey and chicken mushrooms. As with the honey or chicken mushrooms, these new distinctions help us to better identify them and also determine their edibility. Come and learn what some of those new small groups in the boletes are, and why some of them are now being recognized as new genera.

FIELD TRIP REPORT, May 7–8 — Brian Luther

With an extraordinarily cold and snowy winter and early spring, conditions were not ideal for this otherwise wonderful location. There was still some snow in the woods, here and there. I kept a big fire going in the fireplace all day and it seemed to be appreciated. The less-than-favorable conditions were made up for by our eager, cheerful, and delightful hosts, Sue Lynette and Jon Hall. Doing their first hosting, Jon and Sue put out a great spread of welcome munchies and hot coffee for members. Thank you, Sue and Jon, for helping to make the day start out on the right track.

Forty-seven folks signed in, and it was a pretty good day. At least we didn't get any rain or snow at the campsite and occasional patches of blue sky kept our spirits up. Ross and Val Othus showed up with Jiggles and Crackers, offspring of the late Lynne Elwell's miniature Australian Shepherd (sooo, cute!). It was also great to see Gwen Heib continue her involvement in the PSMS field trips after the loss of her husband, Ted, last year.

Twenty-three species of fungi were identified, thanks to Danny Miller who helped with ID for most of the day. Nothing really extraordinary came in. The only fungi found in quantity were *Verpa bohemic*a and *Gyromitra gigas*, and I think this prompted some members to have a go at trying Verpa for the first time. A few true morels were found, but they were mostly immature. The exact same weekend at the same location last year was perfect timing, with morels abundant all around.

I counted 26 members at potluck, which was extra good, mostly owing to all the delicious, hot crock-pot dishes made possible because the group shelter has full power. Everybody seemed to have a good day.

FIELD TRIP, MAY 14 Brian Luther & Danny Miller

Danny Miller identifying

What do you get when you combine wonderful warm weather (with only an occasional sprinkle), fantastic hosts, a group of 41 cheerful and eager mycophiles, and a great place for mushroom hunting? Answer: a really fun day.

Andrea and John Goldman always make the day start right when they host. A great selection of goodies and the usual hot coffee along with their attentive care all day made going to this field trip a pleasure. Thanks, John and Andrea!

Josh & Angela Ashby with morels.

With the colder and snowier than normal conditions this year, it was expected that we'd be early at some locations. Surprisingly, the morels were a bit further along in this area than I would have expected for the elevation. Although a few true morels were found by several members, Josh and Angela Ashby hit the jackpot with maybe a third of a big paper shopping bag of prime *Morchella elata*, which, of course, elicited many "ohhs and ahhs." Fifty-two species were identified and displayed thanks to Danny and Adrian. The polypore *Cryptoporus volvatus* got a lot of comments from people who had never seen it before—it was definitely one of the hits of the table, as was the large black *Sarcosoma mexicana* with it's super thick, jet black gelatinous tissue. Interesting fungi included the beautiful *Calocybe onychina*, *Mycena overholtsii*, and *Clitocybula familia*.

Spring Beauty (*Claytonia lanceolata*) were in bloom, and Arnica and Brian Luther spent some time showing young Adrian Lee and Daniel Possek how to dig them to get the delicious tubers a few inches underground. Also called Indian Potato, some we found were over an inch in diameter, but they're known to get to three inches on older plants. Cleaned and roasted, these are a delicacy and were harvested in abundance by Native Americans for food. The entire plant is edible.

Claytonia lanceolata

Another delicious potluck was attended by a pretty good group. We were glad to see so many new members participating.

Bats, *cont. from page 1*

trying to find out why European bats are not getting sick. "We've been taking wing-punch samples in the field for analysis to see if there are clues to survival in the genetics," says Natália Martínková of the Institute of Vertebrate Biology in Brno, the Czech Republic.

Last week, the US Fish and Wildlife Service launched a national plan to provide state governments with guidance on how to manage and prevent outbreaks. "It provides a framework for the coordination of all the organizations involved," says FWS spokeswoman Ann Froschauer. She also revealed that the addition of Maine takes the number of states affected by WNS to 19, plus four Canadian provinces.

LOST OMAHA MUSHROOM HUNTER FOUND

Ann McIntire

WOWT.com, May 19,2011

It all started as a hunt for morel mushrooms. Michelle Smith and Thomas Hawke say their hunting trip was routine, something they do every year.

They headed out around 5:00 Wednesday evening, split up to look for the mushrooms, and then decided to meet back at the truck around dusk.

Smith got turned around and couldn't find her way back to her husband. "I thought I was going to die," she said. "I was scared, I just wanted to get out and see my family, and I prayed like I've never prayed before."

As she walked along the river, she got stuck in some mud, which went up to her waist.

Hawke was watching and waiting for her at their meeting place. "I'm thinking, ok, it's getting a little darker, a little darker, and finally, it's pitch black…."

He called 911. The Douglas County Sheriff's Department, rescue crews, and a helicopter all began to search for Smith.

"I was going through the worst case scenario, cause when they started looking down there in the river, I was like, no, no, no," said Hawke.

Smith, who had lost her cell phone, was turning her lighter on and off, in hopes someone would see it. "He said he'd seen my light flickering, and they finally found me, and oh gosh, I've never been so happy to see a police officer in my life," she said.

Smith was about three miles from the truck, and stuck out on an island. Rescue crews had to build a "bridge" of logs and tree branches to free her from the mud.

Shortly after 1:00 Thursday morning, Douglas County rescue teams pulled her from the creek, nearly three hours after the call to 911.

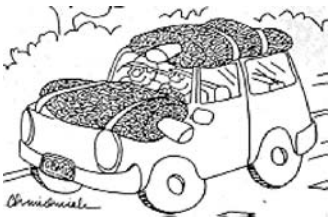
Paramedics checked her out on the scene and she returned home with her husband.

"Seeing my son for the first time, and seeing her was the two best things I ever seen in my life," said Hawke.

Smith said she is able to laugh about the situation now, even though she was terrified for several hours. Hawke teased her about her will to keep the mushrooms she had already picked. "I even bet the deputy, I said, you know I bet you a dollar she still has her bag of mushrooms with her, even though she lost everything else, I bet she's got those mushrooms."

Smith said she did have the bag, until she had to crawl across the make-shift bridge. That's when she left them behind.

It was a very humbling experience, the couple says, and they are grateful to those who came to help.



Only in your dreams!

RESUPINATE FUNGUS OF THE MONTH:
Laurilia sulcata


B. Luther

Laurilia sulcata

The resupinate featured this month is a striking fungus, having a thick, perennial fruiting body that's zonate (stratified) in section and a trimitic hyphal system*; it also has thick-walled, heavily incrusted cystidia and strongly amyloid spores that are finely echinulate (spiny) or asperulate (warty).

Laurilia sulcata causes a white pocket rot of dead conifers (Gross, 1964). It is typically found in mountainous areas with conifer forests and is circumboreal in the northern hemisphere. Although mostly northern in distribution, it has been recorded from as far south as Texas and Louisiana in North America (Ginns & Lefebvre, 1993) and as far south as Portugal, Spain, and Italy in Europe (Bernicchia & Gorjón, 2010).

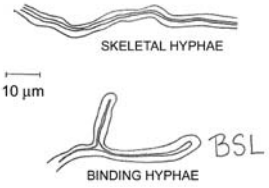
This is a distinctive resupinate which with some experience can be easily recognized in the field. I often find this species in mountainous and alpine locations, all the way up to timberline.

Description of Collection

Laurilia sulcata (Burt) Pouzar
Brian S. Luther coll. # 2009-104-1
On the exposed cut end of a large, old, dead fallen Mt. Hemlock (*Tsuga mertensiana*) trunk, Yellow Aster Butte Trail, North Cascades, Whatcom Co., WA, only a few miles from the Canadian border. Elev. around 4,000 ft. October 4, 2009.

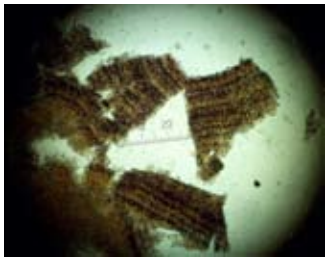
Basidiocarp: Perennial, resupinate to slightly effused-reflexed, covering several square inches, 1–1.5 mm thick, firm and leathery or corky when fresh, drying tough, pale tan, or beige as "Pale Ochraceous Buff" to "Pinkish Buff" to "Cartridge Buff," the surface can be smooth, irregular, lumpy, or tuberculate and in places rimose and splitting, having a very fine pruinose appearance as viewed under the highest power of the dissecting microscope owing to the abundant incrusted cystidia; when fresh becoming reddish where bruised (Peck, 1901; Overholts, 1939); context in cross-section sometimes has two layers visible, separated by a fine darker line; context a brighter ochraceous-orangish color as "Buff Yellow," "Warm Buff," or "Chamois"; margin concolorous or slightly lighter, abrupt and slightly swollen or slightly reflexed, or not, otherwise indistinct. Colors in quotes are from Ridgway (1912).

Microstructures: *Hyphal system* trimitic: generative hyphae 3–4 µm wide, thin-walled, hyaline, smooth, clamps present on some, but not all septa, often branching; hyphae of the hymenium pale brownish; skeletal hyphae 3–5 µm wide, thick-walled to solid; binding hyphae up to 5 µm wide, either thick-walled with a small lumen or more often completely solid, branching in a contorted manner and interwoven.



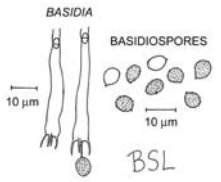
Hyphae

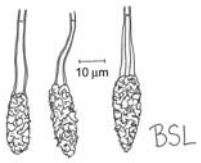
*For a brief introduction and review of hyphal systems in fungi, please refer to Luther (2008).


B. Luther

Thin section of Laurilia sulcata *under 100× magnification showing zonate context.*

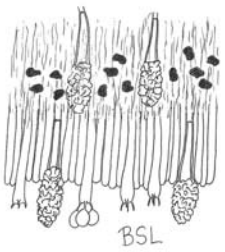
Context in thin section distinctly zonate as viewed under 40, 100, and 400× magnifications on a compound microscope, with several (8–10) narrow dark zones consisting mostly of strongly blackish amyloid granular inclusions and old spores which are abundant, along with cystidia; thickness of each zone varies from 30 to 60 µm. *Basidia* 35–40 × 5–6 µm, narrowly clavate, sometimes slightly constricted, hyaline to light brownish, thin to slightly thick-walled, with a basal clamp, but this is often difficult to see, extending up to 15 µm above immature basidia (including sterigmata); sterigmata four, up to 5 µm long. *Basidiospores* 5–6.5 × 4.5–5.5 µm, broadly ellipsoid to subglobose to nearly globose on some, sometimes slightly flattened, truncated or collapsed, strongly amyloid (bluish-black) in Melzer's Reagent, thin to slightly thick-walled, very finely echinulate or asperulate, but sometimes appearing smooth, apiculi sometimes prominent. *Cystidia* (metuloids or lamprocystidia), 50–60 × 8–10 µm, often subulate and conical, but sometimes rounded at the apex, thin-walled below but thick-walled above, up to 3 µm or more, apical lumen sometimes narrow, hyaline to lightly colored, heavily incrusted with coarse crystalline matter over the top third to half, often found in the hymenium and usually equal to, but sometimes extending beyond, the basidia, also buried in multiple layers within the context. Refer to line drawings and photomicrograph.





Cystidia

Sectional view of basidiocarp showing the hymenium and some of the many layers of cystidia and spores imbedded in a small portion of the stratified context.



Classification History

Originally described by Burt (Peck, 1901) as *Stereum sulcatum*, the featured fungus was maintained in that genus until Killerman (1928) transferred it to *Lloydella*; however, this name has not been accepted. Since it was clearly unrelated to any of the other species of *Stereum*, Eriksson (1958) maintained it should be transferred to a genus of its own. This was apparently picked up by Pouzar (1959), who created a new genus to accommodate the species. He called this genus *Laurilia*, after the Finnish mycologist Matti Laurila, who died very young (Eriksson & Ryvarden, 1976). *Laurilia* was widely accepted and is the currently recognized genus for this species.

Laurilia is in the family Echinodontiaceae, which was described by Donk (1961, 1964) for the pileate, coarsely toothed *Echinodontium tinctorium*. Much of the micromorphology of the genera *Echinodontium* and *Laurilia* is basically indistinguishable (except for differences in hyphal systems), although their fruiting bodies appear as different as night and day.

Gross (1964), in an excellent yet somewhat revolutionary article for the time, proposed amending the genus to include species having resupinate fruiting bodies with a smooth, or at least non-toothed,

hymenium, and transferring *Laurilia sulcata* to *Echinodontium*, as *E. sulcatum* (Burt) Gross. For the most part—primarily because he placed a fungus that is often resupinate or slightly effused-reflexed (resupinate but with marginal pilei) and mostly with a smooth hymenium into a genus characterized by a pronounced pileus and large peg-like teeth—this change was not accepted by the mycological community.

Laurilia vs Echinodontium

The trimitic hyphal system found in *Laurilia sulcata* is highly unusual in resupinate fungi and is one of the distinctive features of the genus that separates it from *Echinodontium*, in addition to the characters previously mentioned. When viewed under a scanning electron microscope, the ornamented spores show two sizes of fine echinulations some slightly smaller than the others (Eriksson & Ryvarden, 1976, p. 792). In addition, *Laurilia sulcata* is found only on dead wood and is not known to be parasitic, whereas members of the genus *Echinodontium* are all active wood-rotting fungi on living trees. (Even *E. tinctorium*, which causes vast decay in susceptible living trees, is still decomposing only the dead xylem cells in the heartwood of its host.)

Eriksson & Ryvarden (1976, p. 787) summarize the reasons the genera should remain separated. Tabata et al. (2000) and Larsson & Larsson (2003) describe DNA studies that found the genera *Echinodontium* and *Laurilia* to be distinct. Another recent study shows that the genus *Echinodontium* and *Laurilia* are essentially side by side genetically (Miller et al., 2006). A related article by Shernoff (2007) compares the morphology and DNA studies of these two genera.

Comments

We have two species of *Laurilia* in North America (Ginns, 1998): *Laurilia sulcata,* which is featured here, and *L. taxodii. Laurilia taxodii* is only found on Bald Cypress (*Taxodium distichum*) in the southeastern US (Ginns & Lefebvre, 1993), but is also known from Japan and Taiwan on other members of the conifer family Taxodiaceae (Imezeki, 1939; Gross, 1964).

In addition to the photograph, description, and line drawings provided here, other descriptions, illustrations, or photographs of this species are given by Burt (1920), Imazeki (1939), Overholts (1939), Lentz (1955), Eriksson (1958), Gross (1964), Eriksson & Ryvarden (1976), Hansen & Knudsen (1997), Shernoff (2007) and Bernicchia & Gorjón (2010). The first five of these references treat it in the genus *Stereum*, the sixth in *Echinodontium,* and the last four in *Laurilia*.

Classification Hierarchy

Kingdom Mycota
Division Basidiomycota
Subdivision Agaricomycotina
Class Agaricomycetes
Order Russulales
Family Echinodontiaceae
Genus *Laurilia*
Species *sulcata*

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A mushroom expert is not just anyone who says they are. They eat the mushrooms first.

—Pat Neal, *Sequim Gazette*, 11/13/02

RESEARCHERS GROW COLORFUL, MORE NUTRITIOUS TREMELLA Sophia Chen & Ann Chen

Focus Taiwan News, May 24, 2011

Colorful Tremella

Taipei (CNA) - A research group at the Asia University in central Taiwan's Taichung City unveiled Tuesday new strains of pink, purple, and yellow *Tremella fuciformis*, otherwise known as the Edible White Fungus or Snow Mushroom.

Lin Chien-Yih, dean of the College of Health Science, said he and his team have developed a pesticide-free growing method for the popular fungus as well as a new technology for growing colored fungi following four years of research.

Tremella fuciformis is a common ingredient in Taiwanese desserts. Advocates claim the fungus is rich in polysaccharides and antioxidants. According to Lin, the darker the color, the better the antioxidant benefit.

The team has signed memorandums of understanding with a biotechnology farm for commercial growing and with a biotech firm for producing a line of cosmetics and health food products based on *Tremella* extract.

PRESIDENT'S MESSAGE Marian Maxwell

Morels are late this year after an unusually cold spring. They were just beginning to show at the end of May, and here we are in June already!

Website Transfer

Your PSMS Board of Trustees and Committee chairs have been busy working through the spring on the transfer of our website to a website-management location, which involved transferring not only our website but our financial records from Quicken to QuickBooks online.

I would especially like to thank John Goldman for his countless hours (no exaggeration here) being the point man for this transfer and also for ensuring that all went smoothly in the transition for our other Committee Chair people. Evelyn (our webmaster), Ann (our Membership chair), Patrice (our immediate past president and Education chair), and Jim Hughes (a Board of Trustees member) all spent many hours testing, tracking, transferring, and working with John to make this happen. John's computer crashed throughout this ordeal, and he had to set up a temporary computer to ensure a timely transfer since we were already well into the process. (Luckily he had just finished the financial transfer portion only days before the crash!) Thank you all for a job well done AND for your *many hours* in this process!

If any member has not received their individual user name and password to access our members' pages on the new site, please contact me at president@psms.org .

Mushroom Maynia!

Mushroom Maynia! last month at the Burke Museum was again a success! Thank you, Joanne Young and Dr. Joseph Ammirati, for your leadership in this endeavor! The alliance between The Burke Museum and our Society has been a good one! Thank you Carl Sander (Public Programs Manager at the Burke Museum), MaryAnn Barron (from the Burke who helped in the advertising), and Julie K. Stein (Executive Director of the Burke Museum), who all helped to make this collaboration a success again this year resulting in a 20% increase in attendance!

Vouchering Project

Carlos Cruz led the Project Vouchering Committee in its first successful venture at the Point Defiance Zoo and Park Bioblitz on May 21st. Thank you Carlos, Danny Miller, Paul Hill, Kim Traverse, and Tim Sage! We're off to a great start!

Proposed Bylaws Changes

At Kim Traverse's urging, the Board called a special meeting this Spring to review our bylaws. We found some wording that needed to be refined and some areas that we felt should be changed. We will have some copies of these proposed changes available at the June meeting, as well as on our website in the members section. Please review the changes and be prepared to come and vote on them in person at the September meeting.

Once you have read them, if you have questions about the changes or why we felt it important to make the change, please e-mail me or call me at 425-235-8557. Bylaws changes require a two-thirds majority vote at a membership meeting to be enacted. Those of you who do not have website access can call me at the number above and I will send you a copy of the current bylaws as well as the proposed changes.

Summer Break

Remember that June is our last general meeting until we resume again in September!

Even though PSMS does not have General meetings in the summer, many of the committees continue to work during that time. Lisa Page Ramey will be working on the poster for next year, and the preliminary designs are amazing (again!). The Board meets in August. The Show Committee under Kim Traverse will forge ahead in planning for the show. Patrice Benson, chair of the Education Committee has new classes planned for the Fall. The ID Clinic Committee under Hildegard Hendrickson met on Mondays throughout the spring and will be ramping up again in the Fall.

So stay tuned….Don't touch that dial.

OYSTER MUSHROOMS CAN BREAK DOWN 90% OF DIAPER MATERIALS WITHIN 2 MONTHS

Michael Graham Richard

Treehugger, May 24, 2011

Sometimes, discovery is about putting things together in new ways. We know that mushrooms can be great at breaking down pollutants, and we know that disposable diapers are a huge problem, with mountains of the slow-degrading poop-containers filling up landfills. So how about finding a kind of mushroom that feasts on diapers? That what researchers at the Metropolitan University in Mexico City have apparently done.

In an article published in *Waste Management* (the journal, not the company), Alethia Vázquez-Morillas notes, "Cultivating the right type of mushroom on soiled nappies can break down 90% of the material they are made of within two months. Within four, they are degraded completely."

What is more, she says, despite their unsavory diet the fungi in question, *Pleurotus ostreatus* (better known as Oyster mushrooms), are safe to eat. To prove the point she has, indeed, eaten them.

Oyster mushrooms are good at this job because they feed on cellulose, the main material used in disposable diapers. In the wild, the Oyster mushrooms grow on dead trees, so they have the enzymes to break down cellulose.

THE LEGEND OF GLORIOUS BEAUTY BARK MUSHROOMS

Jim Kershner

The Spokesman-Review, May 21, 2011

We went morel mushroom hunting three times this week. Yeah, it's been grueling.

Had to walk out the back door, take a couple steps to the garden, load up with morels, and walk all the way back into the house.

We can hardly believe our luck. We've been having a bodacious morel harvest right in our own city yard.

Dinner has been pretty easy around our house. A couple of days ago, we had morels sautéed in butter. Yesterday we had morel-asparagus-cream sauce with rigatoni. Today? I don't know. A nice bowl of morel risotto sounds nice.

And we owe it all to beauty bark.

Last summer we spread a fresh batch of beauty bark on our garden. It came from a dump truck from a landscaping supply yard, which got it from a sawmill or barking operation, which got it from a magical glade where morel spores drift around on the breeze and nestle in the cracks of tree bark.

All I know is that, sometimes, the first year after you spread beauty bark, morels pop up in places where morels wouldn't normally pop up.

When we first found them, the morning after a dousing rain, we remembered that we had split this truckload of beauty bark with our neighbors, Jack and Claire.

"We should go tell Jack and Claire to look in their garden," my wife, Carol, said. "I'll bet they have some mushrooms, too."

"Actually," I said. "Let's not be hasty. Let's think this through. Before we mention anything to them, why don't I just go over there and, you know, scout out the situation first?"

Carol glowered at me, arms crossed. She asked me what lame excuse I planned to spout after they found me lurking in their back garden, a knife in one hand and a basket in the other.

So, yes, we went ahead and told Jack and Claire. Turns out, they were already on top of the situation. Dinner at their house the night before had been morel pizza.

Clearly, this had been one ultra-special batch of beauty bark.

One thing's for sure, I'm buying another load of that bark—that beautiful, beautiful bark—next year.

SNEAKY ORCHIDS FAKE FUNGUS INFECTION TO FOOL FLIES

Jane J. Lee

Wired Science.com, April 25, 2011

An endangered slipper orchid in southwestern China fakes the look and smell of a fungal infection in order to attract one particular pollinator, the flat-footed fly.

Black-brown spots mark the leaves of the orchid, mimicking the diseased look of a plant covered with fungus. The flowers even smell like they are rotting. When a fly lands on the orchid intending to dine on the infected patches, the deceived insect comes away hungry and covered in pollen.

"This is the first time we've seen an orchid that uses both its flowers and leaves in the deception," said orchid researcher Peter Bernhardt of Saint Louis University, co-author of a study published April 25 in the *Proceedings of the National Academy of Sciences*. "And it's pollinated by a group of insects that have not been associated with flower pollination previously, to the best of our knowledge."

Usually the flower-pollinator system involves an exchange of services: The flowers provide something insects need, while the insects help the flowers to reproduce. But *Cypripedium*, the genus of orchid in the new study, is a group that does not provide any kind of reward to potential pollinators.

Lead study author Zong-Xin Ren of the Chinese Academy of Sciences hiked Yaoshan Mountain in southwestern China every summer for four years, performing fertilization experiments on the orchids, watching them to see what pollinated the flowers, collecting the pollinators, and analyzing the scents given off by the orchids.

Ren and his colleagues found that the flat-footed fly, which feeds on fungus, was the only insect to visit these slipper orchids. "The flies are very rare," said Ren, who was able to catch only five for the study.

When they analyzed the flies, Ren's team found fungal spores on the mouth parts, head, feet, and the pads between the claws on the insect's feet. The flies also had packets of pollen from the slipper orchids on their backs.

The orchid scents Ren collected also contained chemicals similar to those given off by a species of fungus that produces black spots of mold on the leaves and fruit of infected plants.

"These infectious fungi are usually very specific as to their hosts," said Bernhardt. "It's unlikely an orchid would pick up a disease that's hard-wired to attack a bush or another wildflower."

Ren would like to find out why this fungus doesn't infect the slipper orchids after visits from a fungus-spore-covered flat-footed fly. He also plans to further explore the fungus/slipper orchid/fly web and study how these relationships contribute to the rare status of both the orchid and the fly.

The subtlety of this deceptive pollination strategy surprised botanist Kingsley Dixon of Kings Park and Botanic Garden in West Perth, Australia, who specializes in conserving rare and threatened plants. "To mimic a fungal food resource using leaf pattern, microanatomy, and fragrance chemistry is elegant to the point that I think Darwin himself would have a wry smile at the thought that orchids had concocted such a system for pollination," Dixon said.

srgc.org.uk

Lady's slipper orchid (Cypripedium fargesii) *with brown spots mimicking* Cladosporium *fungus infection.*

Z.-Y. Ren

Flat-footed fly (Agathomyia *sp.)*

CANOLA FUNGUS GENES SEQUENCED

http://www.farmandranchguide.com, Apr. 11, 2011

The genome of the Blackleg fungus, *Leptosphaeria maculans,* has been sequenced for the first time by a team of French and Australian scientists. Professor Barbara Howlett from the School of Botany at the University of Melbourne, who led the Australian research team, said the discovery was a significant step toward controlling the rampant Blackleg disease.

Blackleg disease is the leading cause of damage to canola crops worldwide. In 2003 it caused 90 percent yield losses in some regions of Australia. The fungus reproduces so prolifically that it develops into genetically diverse populations that can quickly overcome the efficacy of disease-resistance genes in canola crops.

The study not only identified the 12,500 genes that constitute the genetic blueprint for the fungus, but revealed that the genome is compartmentalized into discrete alternating blocks that are either gene-rich or gene-poor. "Such a feature has not been seen previously in a fungal genome," Professor Howlett said.

The gene-rich areas contain the pedestrian but essential genes necessary for an organism to survive. The gene-poor regions contain few active genes, but those that are present play important roles in Blackleg disease.

"…it is the location of the disease-related genes within the junk DNA which allows the genes to be readily mutated, lost, or gained. This enables the blackleg fungus to cause disease outbreaks in canola varieties with particular resistant genes," says Howlett.

Using information from the genome sequence, researchers have developed molecular markers that can predict whether disease outbreaks will occur. "If an epidemic is predicted, then farmers can plant a different canola variety, which will not readily succumb to disease."

MUSHROOM AND CARAMELIZED ONION BRUSHETTA

Michael Blackwell

1 loaf	Italian bread	3 oz.	Crimini mushrooms
2 oz.	Extra virgin olive oil	3 oz.	Royal Trumpet 'rooms
1	Clove garlic	2 oz.	Roasted red peppers
2 each	Large onions, sliced	2 oz.	Red wine
3 oz.	Oyster mushrooms	1 oz.	Marinara sauce
3 oz.	Shiitake mushrooms		

As needed:

Fresh herbs mixture (e.g., basil, oregano)
Extra virgin olive oil
Salt and pepper to taste
Reggiano parmesan, grated

Preparing the Brushetta Croutons:

Preheat oven to 350°F. Slice Italian bread on bias into 1-inch slices. Paint the bread with olive oil using a pastry brush. Sprinkle with fresh herbs, season with salt and pepper. Bake in oven for about 8 minutes until crisp and golden brown. Can be prepared 24 hours in advance and warmed for service.

Preparing the Mushroom Mixture:

In large sauté pan, sauté onions in extra virgin olive oil until caramelized, stir often (about 20 minutes). Add garlic and sauté until translucent. Add mushrooms and cook for 3–5 minutes. Finish with roasted peppers, red wine, and tomato sauce; salt and pepper to taste. Can be prepared 24 hours in advance and warmed for service.

Combine:

Spoon warm mushroom mixture onto the baked croutons. Garnish with Parmesan cheese.

This will be the last Spore Prints *until September.*
Have a great summer!

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