SPORE PRINTS

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Number 523 **June 2016**

FIRE EFFECTS ON ECTOMYCORRHIZAL FUNGI AND SOIL

Mycolog, Humboldt Bay Myco. Soc., Mar. 2016

[*Summarized by Brendan Twieg from a talk given by Ariel Cowan to the Humboldt Bay Mycological Society in February 2016*]

Ariel Cowan provided a thought provoking talk on what fire can do to the forest soil environment—the environment that supports the fungi and provides the medium for the cycling of water and nutrients. For her recent Master's work at Oregon State University, Ariel researched how different burn intensities affect the soil environment and its ectomycorrhizal fungi (EMF) in a ponderosa pine forest of the Eastern Cascades in Oregon. Her research adds to our understanding of the role of fire in forest ecosystems, fueled by recent frightening increases in the frequency and extent of high severity fire—fire with impacts that may include complete mortality of trees over a large area (e.g., tens of thousands of acres), along with associated effects of undesirable alterations to wildlife habitat, hydrologic function, and aesthetic values. These impacts are the obvious ones that most see, but the effects of high-intensity fire aren't well understood in terms of severity on the soil and microorganisms.

Many forest types in the Pacific Northwest are adapted to fire, with several of our coniferous tree species making thick bark that allows mature trees to survive lower intensity fires, and many broadleaved species (e.g., oaks) having similar fire resistance and/or also being able to re-sprout from below-ground structures if their above-ground portions are consumed by fire.

Ariel summed up fire intensity in terms of a combination of temperature and duration. A fire running through grassy meadows interspersed with oak woodlands may burn at a high temperature, for instance, but the available fuel is combusted quickly and the fire's residence time at any location is short. However, buildup of woody debris on the floor of a forest, often spanning a wide range of sizes including large downed tree trunks, can produce fire that is both hot and burns in one location for a long time. And the less frequently a forest experiences lower intensity fire, the greater the probability is that if a fire does start, it will be intense and its impacts severe.

Dendrochronology studies have consistently shown that prior to our focused and effective fire suppression campaign, forest stands burned at fairly regular and surprisingly short intervals, keeping tree densities lower and woody debris accumulations low; in addition to lightning-ignited fires, native Americans used fire regularly as a tool to maintain a wide variety of natural resources and keep travel corridors open.

Like most ecological processes, fire is difficult to study in an uncontrolled setting; one never knows where it's going to start and where it will get to high intensity before someone puts it out. Thus, Ariel set her study up in an area that had already undergone a previous reduction of woody fuels, and then intentionally created fuel jackpots in predetermined locations. Her team assembled "megalogs"—piles of logs that had been cut two years prior to the study—to provide locations with high intensity fire. Thermocouples were installed into the soil at the surface and at 5, 10, and 30 cm deep; this was done under the megalogs, as well as in locations that would be subject to lower intensity broadcast (prescribed) burning, and in unburned locations. The megalogs were ignited, as was the broadcast burn area around them, and the fire consumed the megalogs.

Under the megalogs, the soil surface temperatures reached 750°C, and temperatures reached 150°C, 100°C, and 40°C at depths of 5, 10, and 30 cm (one foot), respectively. Considering that 80°C is considered the generally lethal temperature for fungi in dry soil (60°C in wet soil), the fungi were probably mostly killed off down to at least 10 cm deep. This is significant, as the majority of conifer fine roots and their EMF occur in the uppermost 10 cm of soil. Lethal temperatures were also achieved for long durations (sometimes over 8 hours) beneath the megalogs. In the lower intensity broadcast burn area, the temperature reached over 100°C, but was less than one-half the temperature lethal to fungi at 5 cm depth (and even cooler below).

Fire is known to have several effects on soil nutrients, some of which can be good for plant nutrition and others of which are detrimental. Ariel measured some soil properties that affect plants and their mycorrhizal fungi. She found that high intensity fire caused greater availability of magnesium and calcium, but carbon (important for soil nutrient cycling) and phosphorus were decreased; it has been shown before that at extreme temperatures, even soil inorganic phosphorus can be volatilized, along with potassium, sulfur, and organic phosphorus in nitrogen. Intense fire can also cause collapse of soil clay particles, which are important in a soil's ability to hold water and nutrients. Another significant effect of high intensity fire is that at temperatures between 175° and 300°C, a water repellent layer can be formed in the soil, caused by the migration of hydrocarbons from plant oils down into the soil profile and their condensation onto soil particles. The problem this causes is that a wettable soil layer remains on top of the water repellent layer, and this layer can slide right off in the rain, causing huge inputs of sediment into watercourses, while reducing water infiltration into the ground. Ariel discussed that fungi can increase soil aggregation in the top layer, and that small mammals searching for hypogeous (below-ground) fungal fruiting bodies can help break up the water repellent soil layer after fires.

DUES RENEWAL TIME

Ann Polin

It is time to renew your PSMS dues for next year. Everyone will receive an invoice via email. Please watch for it, and renew your membership as soon as possible.

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CALENDAR

June 14	Membership meeting, 7:30 pm, CUH **(regular date)**
June 11–12	Field trip (see website)
June 20	Board meeting, 7:30 pm, CUH
Sept. 13	Membership meeting, 7:30 pm, CUH

BOARD NEWS — Luise Asif

IMPORTANT: **The June meeting is back at CUH on its regular day, the second Tuesday of the month, June 14.**

Plans are moving along for the All Sound Ben Woo Foray, October 21–23. Brady Raymond and the blog team are busy maintaining the exciting new PSMS blog. If you haven't checked it out, take a moment to do so. Kim is working on the Volunteer Guild and requesting nominations for charter members. The Guild is being created to recognize volunteers who are the backbone for making PSMS the outstanding club that it is. Work is continuing on improving the field trip experience and providing Brian Luther with the support he deserves, especially the need for recruitment of experienced members to help the many new foragers. Daniel Winkler needs a co-chair to help manage the Bridle Trails project and more people who are willing to commit to the study.

MEMBERSHIP MEETING

Tuesday, June 14, 2016, at 7:30 pm at the Center for Urban Horticulture, 3501 NE 41st Street, Seattle

Dr. Tatiana Sanjuan

Our speaker for June is Tatiana Sanjuan, an expert on tropical species of the genus *Cordyceps*, and her talk is titled "Revealing the Hidden Diversity in Parasitic *Cordyceps* Fungi and their Host Association with Insects & Spiders in the Neotropics."

Cordyceps are bizarre club fungi that parasitize a wide range of insects and spiders. After infection the fungus manipulates the insect's behavior, basically creating a zombie that moves to a location for optimal spore dispersion to the next victim and then dies. In the neotropical rainforest many display bright and vibrant colored fruiting bodies emerging from the leaf litter or decaying logs. Others are hidden away, attached to the underside of leaves.

For almost 20 years Sanjuan has traveled across the jungles of Colombia, Ecuador, and Brazil collecting, identifying, and describing new species of *Cordyceps*. In this talk she will share with us the diversity of neotropical *Cordyceps* and fascinating indigenous stories regarding *Cordyceps* and its relationship with insects and spiders; she will then analyze these folk stories in the light of the scientific theories.

Tatiana Sanjuan holds a Ph.D. in Biology from Antioquia University in Medellin, Colombia. She has published five articles describing eight new species of *Cordyceps* from the Amazon and their relationships with their respective hosts. Currently she is working on the pharmaceutical potential of a new species of *Cordyceps* which parasitizes Tarantula spiders.

Will people with last names beginning with the letter A–K please bring a plate of refreshments to share after the meeting.

PRESIDENT'S MESSAGE — Kim Traverse

June will be our last meeting before fall, and we managed to get our original day back—Tuesday June 14th at CUH. Please note that and don't show up any other time or place!

The Bridal Trails Study still needs a co-chair. We are working to make other duties clearer and come up with an easy-to-follow collecting protocol. If you are interested in helping to facilitate this project, contact Daniel Winkler at me@danielwinkler.com. The site has already proved to be quite rich in fungal species and should yield a bunch of surprises when we start looking more closely. Especially in the Kingdom of Fungi, things are seldom as they first appear. Hmm.

APRIL 30 FIELD TRIP — Brian S. Luther

When I arrived at 8:00 am, several members were already parked by the shelter, including our hosts Erin and Brady Raymond, who were all set up. A few of us worked at getting a campfire going right away since the morning was cool. Soon, however, it became sunny and warm. We sure couldn't have asked for better weather on this, the first of our six spring field trips. En route we had excellent views of glacier-covered Whitehorse Mountain looming

directly to the south, along with the impressive Mt. Pugh, White Chuck Mountain, and Sloan Peak to the east.

Brady and Erin provided us with a tasty spread of breakfast snacks, hot coffee, and juices, without which we would not have been prepared to head out into the woods. Thanks for hosting, Erin and Brady. We also found out that Erin is expecting—congratulations!

Forty-four members signed in, about six of whom were brand new to PSMS. We had two field trip guides, Dan Paull and Erin O'Dell, who graciously took groups out. Others who couldn't fit in with these two groups formed their own and went out in different directions. Many members found Oyster Mushrooms (*Pleurotus ostreatus)*, which were mostly in good condition although some were too far gone. I spent a lot of time going through everybody's collections showing them those that were decayed or past their prime and needed to be discarded. One group drove an hour to get to a burn site and came back with quite a few morels, again mostly in pretty good shape.

All told we had a nice selection of 35 different species displayed on a picnic table. An especially unusual find was a collection of two specimens of *Stropharia rugosoannulata*, which according to the collector were found wild on Mercer Island and brought to the field trip site for ID.

A fine potluck topped off the day at 4:00 pm. It would be hard for me to pick a favorite dish because they were all so good, but Bob Myers made an exceptional venison stew (from a deer he had taken) with home grown parsnips and other stuff thrown in that was truly amazing! After dinner some members stayed to help clean and straighten up the shelter area before we all headed home. We had a smaller than average group for this first outing, but everybody seemed to have a good time and most went away with some good mushrooms.

MAY 7 FIELD TRIP — Shannon Adams

The May 7 field trip was the first PSMS outing east of the Cascades in 2016. The 95 members who attended had sunny, dry conditions to explore the area from the field trip site through Blewett Pass. We were happy to see a large number of new members—some were lucky enough to find their first morels—and everyone had a chance to see some of the common early spring species including many impressively large *Gyromitra esculenta* and *Gyromitra montana*. The morels were not yet abundant, but there were some who went away with good collections and there were certainly enough to whet the appetites of all who attended.

There was a tense moment when Brian arrived with the supplies and told us he had had a run-in with a deer which badly damaged his vehicle. We were relieved he was safe and wished him well. He was sorely missed on table ID and, despite a good showing of snowbank species, our final species list was less complete than usual. Despite the setback, we enjoyed seeing a lot of diverse Ascomycetes, some spring Corts, *Tricholoma saponaceum*, Clitocybes, and a brightly colored *Hygrophorus purpurascens* among others.

Thanks to Randy Richardson who kicked off the day with a welcome and introduction, to Doug U'ren, our camp host, for setting up and keeping things running, to all our volunteer guides, and to those who brought a dish to share. The day ended with a delicious potluck—PSMS members know how to deliver good food!

MAY 13–15 FIELD TRIP — Brian S. Luther

I showed co-host Hans Drabicki my shortcut to the field trip site Friday evening, going over mountain logging roads from Eagle Creek, which saves a lot of time. Approximately eight members were already at the group camp when we arrived. I greeted these members, told them about the area, answered some questions, and helped them get a fire going before I had to return via the logging road.

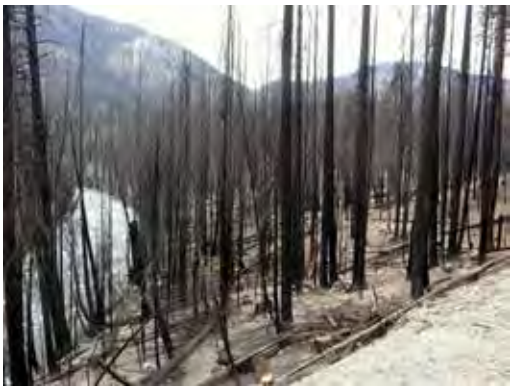
Saturday morning Pam and I arrived back at the campground about 8:10 am. Hosts JoAnn Ireland, Hans Drabicki, and Marcel Blabolil were already fully set up. Consequently we all enjoyed a fine selection of breakfast snacks, hot coffee, and juices. A great big thank you to JoAnn, Hans, and Marcel for starting our day off right!

Forty members signed in, and all thought the location was beautiful. I gave my usual Saturday morning orientation, then led the entire group up to the huge Wolverine Fire. I had been in close contact with the Forest Service which gave me instructions on how to legally access the burn. This required hiking in for a few miles, but was certainly worth the effort, and the exercise was good for us all. Most members found morels in abundance, and we had a very happy group of mycophiles. I personally was covered with charcoal stains all over my clothes at the end of the day, as were others.

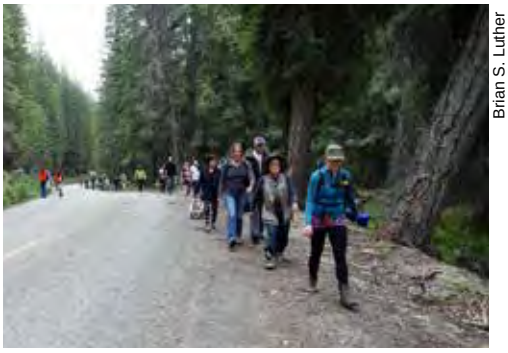
Several different anthracophilic (burn site) fungi were seen, along with only a few other species. All told, I saw and identified 13 species of fungi.

A delightful potluck at about 5:30 pm was enjoyed by a hungry group of mushroom hunters. We had a great selection dishes, along with growlers of beer, and I can tell you that everybody was satisfied. Most members were spending another night at this shelterless location either in their tents, campers, or cars. Just at the end of potluck, about 6:30 pm, it began to rain, but this in no way dampened our spirits after such a fun, successful day.

Brian S. Luther



Wolverine fire area. Entiat River at left.



Brian S. Luther

PSMS members hiking to the Wolverine burn.

BHUTAN'S UNUSUAL 3-D MUSHROOM STAMPS

Brian S. Luther

Bhutan is a landlocked eastern Himalayan country which is sandwiched between China to the north and India all the rest of the way around. It has a climate varying from sub-tropical to arctic, which is amazing for its size (approximately one-fifth that of Washington State), with the highest mountain being 24,840-ft Gangkhar Puensum—over 10,000 ft higher than Mt. Rainier!

On September 25, 1973, Bhutan issued what are quite possibly some of the most innovative and peculiar official postage stamps ever made, and they happen to show fungi. All are photographic images with a thick layered plastic coating which was designed to produce a 3-D effect when moved. You'd never guess they could be used for postage because they're more like ornamental stickers. All show fungi as the main illustration.

The American Burt Todd was instrumental in helping the Bhutanese government establish a philatelic office in the 1960s to develop and sell stamps for desperately needed revenue. He came up with the idea for 3-D postage. The first set was issued in 1967 and had a space exploration theme. This was followed by the mushroom set described below. These unusual stamps were produced by Toppan Printing Co. in Tokyo through a 3-D process.

All catalog numbers in the following article are from the Scott Postage Stamp Catalogue; s/s = souvenir sheet; FDC = first day cover, an envelope (cover) with the stamps cancelled on the first day of issue, along with an illustration (cachet) of the same theme.

3-D Mushroom Stamps from Bhutan, 1973.

Scott Cat. No.	Value	Subject
154	15 CH	*Amanita caesarea*
154A	25 CH	*Boletus pinicola*
154B	30 CH	*Amanita muscaria*
154C	3 NU	*Macrolepiota procera*
154D	6 NU Air mail	*Cortinarius praestans*
154E	7 NU Air mail	*Clitocybe geotropa*
154f	15 CH	*Amanita caesarea*
"	25 CH	*Boletus pinicola*
"	30 CH	*Amanita muscaria*
"	3 NU	*Macrolepiota procera*
154g	6 NU Air Mail	*Cortinarius praestans*
"	7 NU Air Mail	*Clitocybe geotropa*

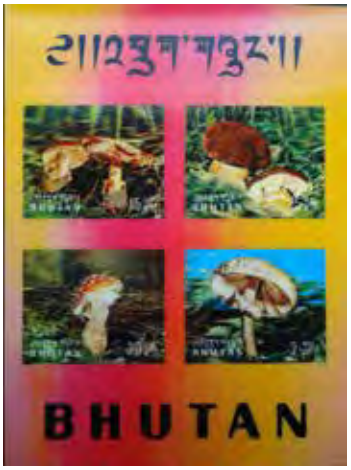
Comments

The species shown on the stamps are common in the northern temperate zone. There are six individual stamps and two souvenir sheets, as shown on the table above. Stamps Scott 154D and 154E are labeled "AIRMAIL" as is Scott s/s 154g. Scott s/s 154f has four stamps; because of the 3-D effect the color of the margin varies from a bright cherry red to deep orange to yellow, depending on how it's being held. The other souvenir sheet, Scott s/s 154g, varies from dark green to bluish-green and has only two (air mail) stamps. All these stamps lack marginal perforations, so they're permanently part of the souvenir sheets and cannot be taken off individually. Also, all the stamps and souvenir sheets in this set are self stick, which was another novel feature for postage back then. Separate FDCs were issued with both the individual stamps and the souvenir sheets, and all feature three stylized mushrooms on the cachet. I show only one of these below.

The mushrooms on Scott 154 and 154B were obviously picked well ahead of photographing them and laid down, not realizing that species in the genus *Amanita* quickly adjust themselves to maintain a vertical or negative geotropic alignment (so the gills always face down for maximum spore dispersal). By the time they were photographed, the stems had already curved up, and thus the photos aren't natural looking. Most people being unfamiliar with mycology, however, probably wouldn't even notice this.

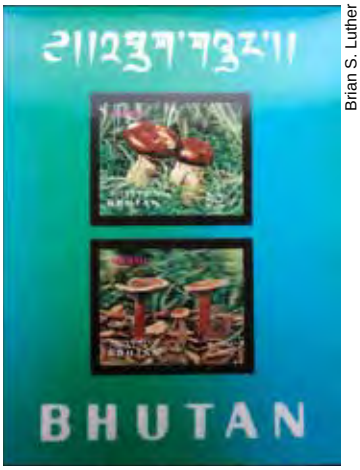
Brian S. Luther

Scott 154–154E.



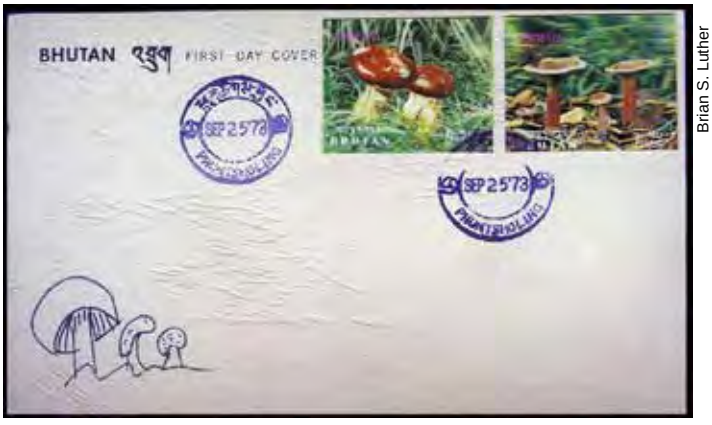
Brian S. Luther

Scott s/s 154f.



Brian S. Luther

Scott s/s 154g.



Brian S. Luther

Bhutan 1973 FDC.

Bhutan has issued other myco-stamps, including beautiful sets from the years 1989, 1999, and 2002. But these would require a much larger article to show and discuss in detail.

THIS BALL OF SLIME IS SO SMART, IT'S ALWAYS LEARNING NEW THINGS **Amina Khan**

Los Angeles Times/*Tribune* News Service
via http://www.star2.com/, May 16, 2016

You don't need a brain to learn something new—not if you're a slime mold, anyway.

Scientists who watched *Physarum polycephalum* search for food found that the slime mold could learn to ignore certain chemical threats. The findings, described in the *Proceedings of the Royal Society B*, contradict the idea that learning always requires neurons, and may shed light on the early evolution of learning in living things.

Learning and memory are essential tools in this critter-eat-critter world; they allow animals to use information from their past experiences to make better decisions in the present. And for a long time, scientists thought only creatures with nerves and noggins truly had access to these special skills.

"We usually think of learning as a trait that is limited to organisms with brains and nervous systems," the study authors wrote. "Indeed, learning is often equated with neuronal changes such as synaptic plasticity, implicitly precluding its existence in non-neural organisms."

But that view has been changing in recent years as scientists have been confronted with the astounding abilities of brainless creatures.

Take the slime mold, for example. It's an amoeba-like, single-celled organism filled with multiple nuclei, part of a primitive lineage that's been munching on bacteria, fungi, and other forest detritus for hundreds of millions of years.

And yet, this very simple living thing manages all kinds of intellectual feats. For example, Japanese researchers have found that slime molds can accurately "design" an efficient rail system when yummy oats are placed where major cities would be on the map. Slime molds can also solve mazes, backing up from dead ends until they find the food at the end, and even anticipate predictable changes, such as a light turning on at regular intervals.

They're capable of remarkable physical feats as well, able to create tubular structures called pseudopods (meaning "fake foot") and crawl along until they find a more satisfactory spot. And they grow fast: Given enough food, they can double their surface area in a day.

"What's interesting about slime molds is they appear to be simple, because there is only one cell, but they are capable of amazing stuff, things that we thought were only possible with nervous systems or brains," said lead author Romain Boisseau, a master's student studying evolutionary biology at Ecole Normale Superieure in Paris. "These guys are very cool."

Cunning as the slime mold may seem, can it actually learn?

To find out, scientists at Toulouse University in France tested slime molds' behavior in the lab, focusing on a very basic form of learning: habituation, when a living thing's behavioral response decreases to a repeated stimulus—whether good or bad—over time.

Physarum polycephalum on the move. As it eats, it grows, seeking out new food sources.

The researchers placed the slime molds near a bridge; across the bridge, they placed a delicious pile of oats. Some of the bridges were made of plain agar gel, and the slime molds crossed those with ease. But for other slime molds, the scientists left an unpleasant surprise: bitter-tasting quinine or caffeine, which in large amounts can be toxic for some creatures.

At first, there was a clear difference between the slime molds with a bitter bridge and those without. With a plain agar bridge, the slime molds sped across and pounced on the oats in about an hour. With quinine, slime molds entered the bridge only after two and a half hours, and it took them four hours in all to cross. On caffeine-covered bridges, the slime molds took almost five hours to enter the bridge but then quickly sped across.

For both bitter bridges, the slime mold didn't simply move its body across; it extended a long, thin tendril across the bridge, minimizing the area that touched the surface, as if it were trying to tiptoe over hot sand.

When it reached the oats, it quickly moved the rest of its body over through that tendril and over to the oats. Once the slime mold had consumed the food source, the scientists connected it to another bridge, with a fresh food source at the other end. If the slime mold wanted its next meal, it would have to brave the bridge again.

Here's the strange thing: The slime molds dealing with the alarmingly bitter compounds seemed to get used to it, realizing that it wasn't a threat. With every bitter bridge they crossed, they moved more quickly and easily and seemed less concerned with minimizing their "footprint" that touched the surface.

By the sixth day, Boisseau said, the slime molds were acting essentially as if the bitter compounds were not there.

So had the slime molds learned anything in the first place? Or was it simply that their receptors became dulled to the chemical onslaught, or that they grew too tired to keep their bodies away from the bitter compounds?

To make sure, the scientists took slime molds that had learned to cross a quinine bridge without flinching and exposed them to caffeine. After all, if the slime molds were simply just tired from the effort of carefully crossing the bridge, they should react to the caffeine the same way they did to the quinine, with nonchalance.

But no dice: Slime molds that had been habituated to the quinine reacted with extreme prejudice to the caffeine. The slime molds, it seemed, really had learned a specific reaction to a specific chemical.

cont. on page 6

Slime Molds, *cont. from page 5*

The researchers also gave the slime molds a couple of days of rest, allowing them to potentially "forget" this lesson. Sure enough, after a couple of days away from the bitter compounds, the slime molds reacted to a quinine- or caffeine-laced bridge as if they had never touched one before. They had forgotten that the bitter bridges were safe.

"They were behaving as if it was the first day they had ever encountered the bitter compound," Boisseau said.

How these critters manage this feat is still a great mystery to scientists, Boisseau said, and will have to await future study. But it does show that we may have to start thinking about the nature of this particular aspect of intelligence in a very different light.

"That's what is exciting here, because maybe this mechanism appeared really early in the history of life," Boisseau said. "Probably learning abilities evolved first, before the evolution of neurons and nervous systems."

FUNGUS BEER? NO REALLY. Kristen Inbody

Great Falls Tribune, May 10, 2016

SIDNEY, MONT. - When it comes to unusual beers, it's hard to beat Meadowlark Brewing's new Fungus Shui.

The amber/gold ale is brewed with local honey and, most interestingly, mushrooms.

"Like a lot of beers we make here, we begin a discussion and throw ideas onto the white board," brewery founder Travis Peterson said. "I had a moment one night thinking about mushrooms and a smoked oyster stout."

However, brewer Tim Schnars knew about candy cap mushrooms, which have a maple syrup flavor. Maple syrup itself would make for a sugary beer, but the mushrooms were an intriguing option.

Soon Peterson's wife was kissing him and smelling maple syrup, Peterson said. The whole brewery took on the fragrance.

The mushrooms, $200 a pound, combined with honey and honey malt for a beer that's "like eating pancakes," Peterson said. "The big flavor you get is maple syrup. During fermentation, it tastes like waffle crisps. Then the sugars start to disappear, but the maple flavor and the grain really shines through."

The beer is fun and doing well, Peterson said. It's become his mom's favorite. She steered him away from using the mushrooms in an amber and toward a blonde for a better butter, pancakes, and maple syrup vibe.

"With a name like Fungus Shui and people knowing the star ingredient is mushrooms, we had a big hurdle," Peterson said.

The fungus beer was the first of Meadowlark's kegs to empty at the recent Bakken Brew Fest and placed second only to Bowser Brewing Co.'s Jalapeno Hefeweizen.

Fungus beer ingredients: Candy caps (left) and malt (right).

SINGLE DOSE OF HALLUCINOGEN MAY CREATE LASTING PERSONALITY CHANGE

Labsapces.net via *Mycolog*, Humboldt Bay Myco. Soc., April 2016

A single high dose of the hallucinogen psilocybin, the active ingredient in so-called "magic mushrooms," was enough to bring about a measurable personality change lasting at least a year in nearly 60 percent of the 51 participants in a new study, according to the Johns Hopkins researchers who conducted it.

shroomery.org

Psilocybe cubensis.

Lasting change was found in the part of the personality known as openness, which includes traits related to imagination, aesthetics, feelings, abstract ideas, and general broad-mindedness. Changes in these traits, measured on a widely used and scientifically validated personality inventory, were larger in magnitude than changes typically observed in healthy adults over decades of life experiences, the scientists say. Researchers in the field say that after the age of 30, personality doesn't usually change significantly.

"Normally, if anything, openness tends to decrease as people get older," says study leader Roland R. Griffiths, a professor of psychiatry and behavioral sciences at the Johns Hopkins University School of Medicine. The research, approved by Johns Hopkins' Institutional Review Board, was funded in part by the National Institute on Drug Abuse and published in the *Journal of Psychopharmacology*.

The study participants completed two to five eight-hour drug sessions, with consecutive sessions separated by at least three weeks. Participants were informed they would receive a "moderate or high dose" of psilocybin during one of their drug sessions, but neither they nor the session monitors knew when. During each session, participants were encouraged to lie down on a couch, use an eye mask to block external visual distraction, wear headphones through which music was played, and focus their attention on their inner experiences.

Personality was assessed at screening, one to two months after each drug session, and approximately 14 months after the last drug session. Griffiths says he believes the personality changes found in this study are likely permanent since they were sustained for over a year by many. Nearly all of the participants in the new study considered themselves spiritually active (participating regularly in religious services, prayer, or meditation). More than half had postgraduate degrees. The sessions with the otherwise illegal hallucinogen were closely monitored and volunteers were considered to be psychologically healthy

"We don't know whether the findings can be generalized to the larger population," Griffiths says. As a word of caution, Griffiths also notes that some of the study participants reported strong fear or anxiety for a portion of their daylong psilocybin sessions, although none reported any lingering harmful effects. He cautions, however, that if hallucinogens are used in less well supervised settings, the possible fear or anxiety responses could lead to harmful behaviors.

Griffiths says lasting personality change is rarely looked at as a function of a single discrete experience in the laboratory. In the study, the change occurred specifically in those volunteers who

had undergone a "mystical experience," as validated on a questionnaire developed by early hallucinogen researchers and refined by Griffiths for use at Hopkins. He defines "mystical experience" as among other things, "a sense of interconnectedness with all people and things accompanied by a sense of sacredness and reverence."

Personality was measured on a widely used and scientifically validated personality inventory, which covers openness and the other four broad domains that psychologists consider the make-up of personality: neuroticism, extroversion, agreeableness and conscientiousness. Only openness changed during the course of the study.

Griffiths says he believes psilocybin may have therapeutic uses. He is currently studying whether the hallucinogen has a use in helping cancer patients handle the depression and anxiety that comes along with a diagnosis, and whether it can help long time cigarette smokers overcome their addiction. "There may be applications for this we can't even imagine at this point," he says. "It certainly deserves to be systematically studied."

NEW ZEALAND MOTHER OF THREE DIES OF RARE WOOD FUNGUS DISEASE Deidre Mussen

stuff.co.nz, May 17, 2016

WELLINGTON, NZ - An extremely rare infection from the wood fungus *Schizophyllum commune* has claimed the life of Wellington mum Moreen Naidu. She is believed to be New Zealand's only case.

Naidu had long hoped to beat the infection, which started in her lungs and caused one to collapse, as well as growths in her brain that had to be cut out.

Her doctors desperately sought international medical advice on treatment, but by last December, her condition was deemed terminal because the fungus had spread into her heart. Doctors gave her only six months to live, and told her only a couple of people worldwide had died from the fungus.

Naidu was admitted to Mary Potter Hospice in Newtown last week and died in her mother's arms on Saturday morning, surrounded by her three young sons. "She was very peaceful in my arms," Krishna said on Tuesday.

While doctors were unsure how or when she contracted it, most cases internationally were believed to be caused by people inhaling spores from the mushrooms, which had been released into the air.

Krishna, a taxi driver, said her three grandsons had been staying at her family's Newlands home for the past few weeks because her daughter had been too unwell to care for them, and they would continue living there permanently.

She said her daughter and their whole family were very grateful for the support offered to them by the community, including 160 people donating more than $6000 to their Givealittle fundraising page Help4Moreen, which was started last Thursday for Naidu's three sons Rohan, 11, Moulik, 5, and Elijah, 4.

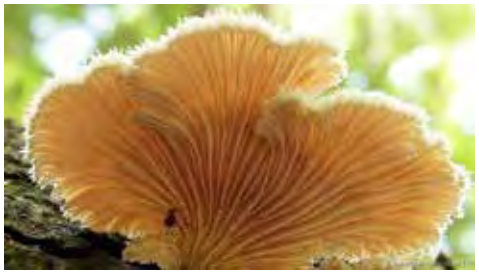
"She was happy knowing about the fundraising. She brightened up about it—I think it made it easier for Moreen to let go," her mother said.

Schizophyllum commune grows on dead or dying wood or vegetation in all parts of the world, apart from Antarctica. European and US guidebooks list it as inedible, probably because of its tough texture, but it is widely consumed in Mexico, India, and elsewhere in the tropics.

The mushrooms, nicknamed split gill, release spores into the air that can be inhaled by humans.

Almost all cases of disease are found in the respiratory tract, with some cases spreading to other organs, including the brain.

Many reported cases are in people with already compromised immune systems.



Schizophyllum commune.

CHYTRIDIOMYCOSIS MAY CAUSE MALE FROGS TO SING

http://myctor.org/u27

via *The Mycelium*, Myco. Soc. Toronto, April–June 2016

Chytridiomycosis is a fungal disease caused by *Batrachochytrium dendrobatidis* (Bd) that has had a devastating impact in frogs around the world, causing disease in amphibians that has been related to population decline and species extinctions. The disease infects the skin of the host causing symptoms that can include behavioral changes like lethargy and lack of coordination. Finally, the host dies of cardiac arrest. However, despite harboring Bd infections, amphibian communities in Asia show little signs of the disease.

In order to study the effect of Bd on Japanese tree frogs (*Hyla japonica*), scientists at the Seoul National University recorded the mating calls of infected male frogs. Contrary to what was expected, Bd-infected males produced longer and more frequent mating calls, which are preferred by the females. This preference can result in a higher rate of Bd transmission. However, whether Bd is actually manipulating the frogs' behavior remains to be seen.

MICHIGAN-SHAPED MOREL OFFERED FOR $10,000 ON eBAY Nate Reens

http://www.mlive.com/, May 17, 2016

MANISTEE, MI - When Lance Miller lies down at night, he sees morel mushrooms as he closes his eyes. But the best fungus find the Manistee man has made—a spitting image of the Lower Peninsula—took him a day to realize.

And now the delicacy is on eBay and available for $10,000.

"It's a joke," said Miller, an outdoorsman who relishes the hunt for morels. "It's getting people talking and having fun."

The highest bid so far is $1, Miller said, noting he has no real intention of selling, or eating, the morsel.

VALLEY FEVER ORIGINATED IN ARIZONA

http://science.kjzz.org/, May 10, 2016

Valley Fever is named for California's San Joaquin Valley, but the fungus that causes the disease actually originated in Arizona. That finding is the result of genetic testing performed by Flagstaff scientists.

Scientists at the Translational Genomics Research Institute (TGen) tracked the origins of Valley Fever with genetic sequencing, to help predict how the disease might spread.

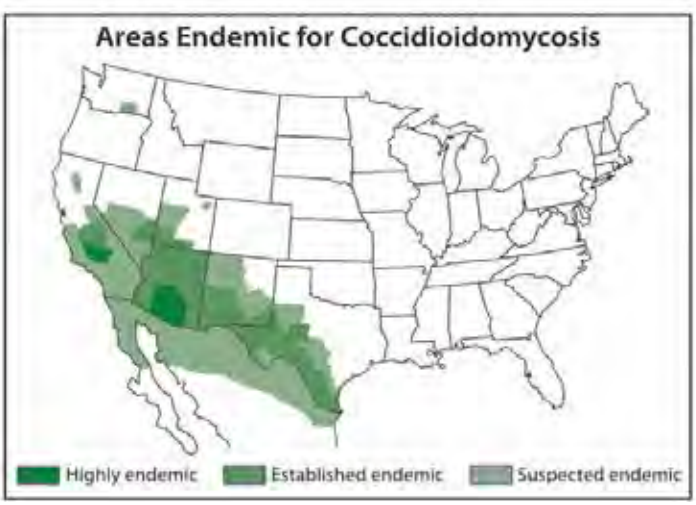
It's caused by a fungus found in desert soils and affects thousands of people each year.

David Engelthaler, the study's lead author, said the Arizona species of the fungus is almost 1 million years old.

"The populations of this fungus in southern Arizona seem to be the oldest populations, and that's likely where *Coccidioides*—that's the name of the fungus—first really emerged and started to radiate," he said.

Valley Fever spores likely migrated from Arizona to California after the Central Valley drained its ancient inland sea. There the fungus diverged into a separate species.

Valley fever is now found in Mexico, parts of Central and South America, and most recently Washington state. Engelthaler thinks animals carry it to new locations



Areas endemic for coccidiodomycosis (aka Valley Fever) in the U.S. The fungi that cause ValleyFever—Coccidioides immitis or Coccidioides posadasii—are also endemic to parts of Central and South America, areas with mild winters and arid summers. Their spores are extremely small and can be carried hundreds of miles by the wind. Once inside the lungs, the spores reproduce, perpetuating the cycle of the disease.

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

Dues are due!
Watch for the renewal form in your email.

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