SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY
Number 501 **April 2014**

EIGHT REASONS WHY YOU DIDN'T FIND MANY MORELS TODAY—HINTS FOR BEGINNERS

Wren Hudgins

1. *You didn't study the preferences of your quarry.* You need to know that it fruits in spring, likes recent burn sites, likes a mixed conifer forest as well as cottonwoods, fruits mostly on the east side of the Cascade Crest, and starts low and moves higher in elevation as the season progresses.

2. *You didn't really study the physical characteristics of your quarry ahead of time* to make sure you can recognize it at different stages of development. Hold a real morel, examine it, read the descriptions in field guides, and actually look at the characteristics described. Make sure you understand what the field guides are saying.

3. *Your timing was off.* Eastern Washington morels, the subject of this article, need at least a consistent ground and air temperature of +40ºF to start fruiting. The timing of the fruiting varies from year to year, sometimes starting as early as March and in other years as late as mid May.

4. *You were at the wrong elevation*. Until you know where they are, you need to vary your hunting elevations and then, upon finding a morel, take note of your elevation and focus your search +/– a few hundred feet of that until you find a few more and can zero in on the sweet spot of elevation. If you're finding immature morels then you generally need to go lower; mature and over mature specimens might signal a need to go higher. In subsequent weeks, move up.

5. *You needed to look more carefully at exposure*. Sun exposure is critical, especially early in the season. Shadier and cooler spots tend to produce morels later. Warm, south-facing areas or slopes are far more likely to have earlier or more abundant fruitings, but this is also based on availability of moisture. If you can't seem to orient yourself, look at how the sun is tracking or use a compass or GPS.

6. *You found your first one and moved on.* Moving quickly is based on the assumption that you can recognize morels at a distance, but this takes practice. When you find your first morel, stop in your tracks, proceed slowly, and meditate on it. Look around carefully and take note of everything: habitat, slope aspect, elevation (#4 above), vegetation, proximity of water, degree of shade, etc.

- *You moved your eyes too quickly.* Your feet can be in one place and you can still miss morels because you are scanning too quickly.
- *You found only one*. Well, it's possible (especially on the west side of the Cascades), but morels are often social, fruiting in groupings.
- *You still think there was only one.* Stand your hiking pole up at the site of the first one and walk increasingly large circles around it. Look at the same terrain from different angles. Kneel or sit down. Look in ground depressions, burned out tree stump cavities, and underground humps. If the weather has been dry, look in shaded spots or depressions which may have held moisture longer than the surrounding slopes.

7. *Mistaken identity.* Morels look amazingly like fir or pine cones, especially erect ones, which are all around the correct habitat.

8. *They knew you were coming.* If you mention the word "morel" or worse yet, the phrase "morel hunting" or if you approach with an open knife in your hand, the morels in the area go into immediate hiding. They can disappear into the soil or transform themselves into conifer cones or less desirable mushrooms. You have to learn to sneak up on them from behind without betraying your intent.

If you don't notice this, you won't find this.

GOOD FUNGI KEEP BAD ONES IN CHECK IN HEALTHY MOUTHS

http://www.sciencedaily.com/, March 13, 2014

Human mouths contain a balanced mix of microbes which, when disrupted, can lead to oral diseases. A study published on March 13 in *PLOS Pathogens* compares the bacteria and fungi present in the mouths of healthy individuals with those from patients infected with HIV, and illustrates why oral candidiasis (aka "thrush") is a common complication of HIV infection.

Using high-throughput gene sequencing, Mahmoud Ghannoum, from Case Western Reserve University in Cleveland, USA, and colleagues catalogued the core oral bacteriome (the bacteria commonly present) and the core oral mycobiome (the fungi commonly present). They found little difference in the bacteria between healthy individuals and those infected with HIV (whose immune systems are compromised). In contrast, they saw clear and consistent differences in the oral fungi between both groups.

A genus of fungi called *Candida* was predominant in both groups, but present at higher levels in HIV-infected individuals. A second one, called *Pichia*, was present at fairly high levels in the mouths of healthy individuals but only at lower levels in people who were infected with HIV. This led the researchers to speculate that there was an antagonism between the two. And indeed, when they grew *Pichia* alone in a liquid medium and then filtered the fungus out, the "*Pichia* spent medium" (or PSM) was able to suppress the growth of *Candida* as well as several other disease-causing fungi.

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CALENDAR

April 8	Membership Meeting, 7:30 pm, CUH
April 14	Board Meeting, 7:30 pm, CUH Board Room
April 19	Field Trip (see website)
April 21	Monday night public ID begins, 4:00–7:00 pm, CUH
April 22	*Spore Prints* Deadline
May 10	Field Trip (see website)
May 13	Membership Meeting, 7:30 pm, CUH

BOARD NEWS

Marian Maxwell

Planning for the NAMA foray this Fall is moving ahead. Teddy Basladynski posted the introduction to the foray on our website. We will be announcing the opening of registration for the foray in the near future. Committee members are working on transportation and field trip locations. The program is complete, and we have a great line up of speakers and workshops. Election results will be announced at the March Survivors' Banquet and Annual Business Meeting. Larry Lee and Jon Hall have been working on an orientation for the new Board of Trustee members. Milt Tam presented a list of incentives to encourage people to step forward and volunteer as well as recognizing people who have stepped forward. We still need chairs for Field Trip Host Coordination and for Ecology & Sustainability. We will be having discussions on the direction and promotion of the Ben Woo Scholarship fund. Proposed changes to the bylaws regarding membership categories and the term of membership will be posted to the website early in April for a vote by the membership at the general meeting April 8.

MEMBERSHIP MEETING

Tuesday, April 8, 2014, at 7:30 pm at the Center for Urban Horticulture, 3501 NE 41st Street, Seattle.

Denis Benjamin.

As many of you know, Dr. Denis Benjamin canceled his talk at the February meeting because of illness, but has agreed to speak in April. His presentation is "The Art and Science of Mycophagy." Collecting and eating "wild" mushrooms is part of contemporary foraging and culinary chic. However, lore and urban legends still surround the edibility, nutritional value, and best ways to preserve and cook mushrooms. Denis will demystify the issues of mushroom edibility and cookery, and will clarify and describe ways to enjoy the bounty of field and forest.

Denis is a retired physician, long-time PSMS member, and self-professed curmudgeon. As a second career, he is now in demand as a speaker on the fungus foray circuit and to mushroom clubs. He grew up in South Africa and, as a young physician, found himself in the Pacific Northwest in 1970. He soon became interested in mycology and joined PSMS. He practiced pediatric pathology at children's hospitals in Seattle and Fort Worth, TX, and, after retirement, returned to Cle Elum to continue his passion for mushrooms, the outdoors, and natural history. He was a consultant to the regional poison control center, a former member of the PSMS Board of Trustees, and a past Chairman of the Toxicology Committee of NAMA. In addition to his nearly 100 professional publications, he regularly contributes to the lay literature and mushroom publications such as *Fungi*. He authored the landmark book *Mushrooms: Poisons and Panaceas* on the health effects of mushrooms, and a personal collection of anecdotes, lessons learned, and foraging essays in *Musings of a Mushroom Hunter: a Natural History of Foraging*.

Will all persons with last names beginning with A to K please bring a snack or treat to share after the meeting.

UPDATE ON THE PSMS EDUCATION PROGRAM

Danny Miller (Education Chair)
Steve Trudell (Scientific Adviser)

Danny Miller

Steve Trudell

Over the past couple of years, several factors have combined to affect the PSMS education program—the unprecedented growth of the membership and numbers of members seeking learning opportunities, the unfortunate loss of two key members of the already small education team, Patrice Benson and Hildegard Hendrickson, and the retirement of Dr. Joe Ammirati as the society's scientific adviser. Thus when Danny Miller took over Patrice's role as Education Chair and Steve Trudell became the new Scientific Adviser, the decision was made to revamp the education program from the ground up.

The initial goal of the education program is two-fold: (1) to enable all PSMS members to learn enough to be able to pursue mushroom hunting and mycophagy safely, and (2) to encourage as many members as possible to become intermediate or advanced identifiers and teachers. Once we have a program in place to address those two objectives, we hope to be able to expand the ID

offerings and to cover other areas of mycology and mushroom hunting, such as ecology and the increasing human uses of fungi, and to augment the cultivation and wilderness orientation classes, dyeing and photography workshops, and other opportunities already being offered.

A first major hurdle we needed to address is the fact that lots of people want access to classes, but we have only a small number of people with the necessary knowledge, willingness, and time to serve as teachers. In addition, it is best to learn about mushrooms when there are some available to observe, handle, and work with. However, the peak spring and fall mushroom seasons are also the peak times for mushroom activities such as forays and exhibits and so it is difficult to find room in already busy schedules. Thus we have had to think hard about how to teach about mushrooms when there aren't many around.

With all that said, we are happy to report that we have developed an initial structure for an ambitious curriculum and have already begun to implement the basic classes. To facilitate communication and give an idea of the order in which the classes should be taken, we decided to assign college-type numbers to them. Here is the initial plan:

Mushrooms 101: *Introduction to mushrooms and mushroom hunting*. Pretty much the current beginners class. It will be a pre-requisite for all of the identification classes.

Mushrooms 102: *How to know the common edible and poisonous mushrooms of the Pacific Northwest*. For those who aren't interested in becoming accomplished general identifiers. This will go into greater detail than the introduction given in Mushrooms 101, which is a pre-requisite.

Mushrooms 201a,b: *Basics of mushroom identification*. This is the beginning general ID class and takes two full-day sessions (a and b) to complete. Mushrooms 101 is a pre-requisite.

Mushrooms 301a,b,c...): *Intermediate mushroom identification*. Each class will focus on a different group—gilled mushrooms (separate classes for different genera or spore color groups), boletes, corals, polypores, etc. Mushrooms 201a,b is a pre-requisite.

Where we are now. Mushrooms 101 continues to be offered and we have had two well received sessions of Mushrooms 201a, each with 40 participants. A first session of Mushrooms 201b has been scheduled and will have been announced to the graduates of 201a by the time you read this. Mushrooms 102 and 301 remain to be developed, but they are at the top of our priorities list.

Other ideas we have had for possible classes include

Fundamentals of the fungi (basic mycology, focusing on the biology and ecology of fungi that produce mushrooms),

Introduction to MatchMaker and Mushroom Observer,

Advanced MatchMaker workshop,

Mushroom photography with a phone-cam or basic point-and-shoot camera,

Mushroom photography with an advanced point-and-shoot or single-lens-reflex camera,

Advanced mushroom identification workshop (ongoing, aimed at giving identifiers practice using microscopes and advanced literature in addition to gaining more experience with macromorphology, keys, etc.),

Mycology reading group (ongoing, participants would choose articles and topics on mycology, read them, and get together for discussion).

Whether, and how soon, these or other classes would be developed will depend in large part on the degree of interest expressed by the membership. The greater the demand for a class, the more likely it will be made a priority.

Our aim is to provide learning opportunities to meet the needs and interests of as many members as possible and, to do that, we need to know what those are. So please send comments, suggestions, reactions to our possible classes, and other ideas to Danny (education@psms.org) and also let us know if you have interest in becoming part of the teaching staff. The more teachers we have, the better we'll be able to make the education program work without burning folks out.

Candidiasis, *cont. from page 1*

Oral candidiasis is a common opportunistic infection in patients with HIV/AIDS, and even in the era of effective antiretroviral therapy, it compromises the quality of life of many patients. Making use of a mouse model of oral candidiasis, the researchers were able to show that mice treated with PSM had much less severe symptoms compared with untreated ones. Therefore, at least in this animal model, *Pichia*'s antagonism of *Candida* can suppress oral candidiasis.

The authors say, "Our findings have wide implications regarding the discovery of novel antifungal agents and will open the way to new therapeutic approaches for the management of fungal infections." They continue, "Detailed investigations are warranted to purify and characterize the specific *Pichia* factor(s) that can inhibit *Candida* and other disease-causing fungi."

PRESIDENT'S MESSAGE — Marian Maxwell

Election Results for 2014–2016

First I would like to thank all of the candidates who chose to run in the election this year! Daniel Winkler was elected as Vice-President, John Goldman was re-elected as Treasurer, and Danny Miller, Larry Lee, and Nicholas Herschberger were re-elected to the Board for another 2 years! In addition, we welcome James Nowak (aka: Animal) and Donna Naruo to the Board. Shannon Adams and Jeff Stallman will be our Alternates for one year in the event someone has to step down from the Board.

I would especially like to thank our outgoing Board members. Milton Tam served as Vice-President from April 2007–March 2014 and Ed Sakai served on the Board from 2010–2014. We will miss both of you! Thank you for your time, your input and hard work, and your dedication to our group!

Proposed Changes to Membership Section of PSMS Bylaws

The Board of Trustees has approved some changes to the PSMS Bylaws which will now be presented to the general membership for a vote at the April 8, 2014, meeting. These proposed bylaws changes are as follows:

Family Membership: Proposed change specifies up to 2 adults residing at the same address per family membership plus all children under 18 who reside at the same address. Children will be listed on the primary member's profile but information on children will

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RESUPINATE FUNGUS OF THE MONTH: The Genus *Sistotrema* ©Brian S. Luther

The genus *Sistotrema* can be pileate (with a cap) or resupinate (confluent like a crust on the substrate). The majority of species are resupinate. The surface of the hymenophore (the fertile area of the basidiocarp) varies widely. It can be completely smooth to granular, odontioid (with very fine tooth-like projections) to hydnoid (with more pronounced tooth-like projections), irpicoid (have a coarse irregular, tattered appearance), or even poroid (pored) with lamellate-poroid (an irregular combination of gill-like ridges that also form pores). All species have a monomitic hyphal system (only generative hyphae), often with clamps. The basidia are small, short, and urniform (shaped like an urn) with four, six, or eight sterigmata and therefore four, six, or eight spores. (Breitenbach & Kranzlin, 1986, report even fewer sterigmata.) The spores can be ovoid (egg-shaped) to subglobose (not quite spherical) to ellipsoid (elliptical) to short suballantoid (almost sausage-shaped) and are thin walled and smooth. Gloeocystidia may be present or absent.

The collection I'm reporting on in this article was found during my ongoing research on the resupinate fungi of Cypress Island for the Washington State Department of Natural Resources (DNR). Geologically, Cypress Island is part of the San Juan Island Archipelago but lies within Skagit County, WA. This is the fourth report I've written focusing on Cypress Island fungi (Luther, 2011a, 2011b, 2011c).

Description of Collection

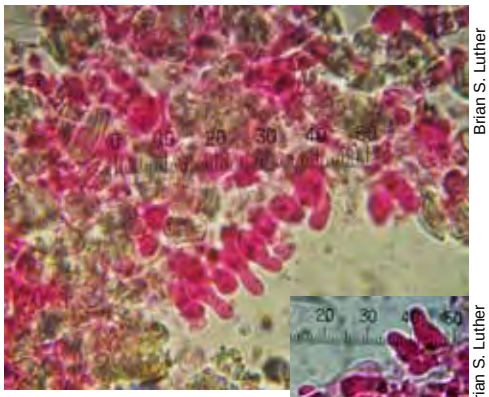
Sistotrema coroniferum (v. Hohn. & Litsch) Donk.
BSL coll. #2013-926-20. On the bark of a dead, fallen Alder (*Alnus rubra*) branch, trail from Duck Lake to Eagle Harbor, Cypress Island, Skagit Co., WA, Sept. 26, 2013. Elevation approx. 100 ft above sea level.

Basidiocarp: Resupinate, in small patches that become confluent with age and cover an area of approx. 1 cm sq. or more at maturity, very thin, fragile, and easily scraped off the substrate when fresh, but not peeling; the hymenophore appears mostly smooth to the naked eye but finely granular under magnification; it is more or less uniform, or very minutely wrinkled in more mature central regions as viewed under a dissecting microscope, and bright white overall or faintly cream-colored where more mature; the margin can be abrupt, diffuse, finely fibrillose, or arachnoid. See habitat photo.

Brian S. Luther

Close up habitat photo of Sistotrema coroniferum *on the bark of a dead Alder* (Alnus rubra) *branch. BSL coll. #2013-926-20.*

Microstructures: Hyphal system is monomitic, hyphae are 2–4 µm wide, hyaline, smooth, and mostly thin walled, but some slightly thicker-walled basal hyphae are seen; clamp connections are common on many, but not all, septa. Basidia are 9–19 x 3.5–6 µm, variable in shape at maturity, very short and in a low compact layer; when very immature they can be obpyriform (pearlike, but with the widest end down), becoming lageniform (bottle shaped) or often centrally constricted during development or at maturity, with both the base and apex enlarged or short clavate or urniform; with a basal clamp; sterigmata 6–8. Basidiospores 4–5.5 x 2–3 µm, elliptical to somewhat bean-shaped or suballantoid, hyaline, thin-walled, smooth, and inamyloid. Gloeocystidia are 32–55 x 4–6 µm, cylindrical to narrowly clavate at maturity, with the apex obtuse or slightly pointed, but developmentally becoming lageniform (bottle shaped) with an enlarged base and a narrow neck before maturing; they are SA– i.e, do not stain in sulfuric acid & benzaldehyde.* Refer to line drawings and photomicrographs.

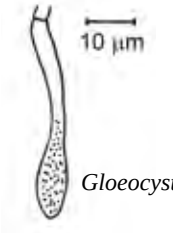


Brian S. Luther

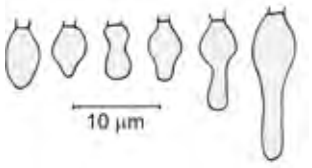
Immature basidia and gloeocystidia. 1000x, ammonium hydroxide and Phloxine.

Brian S. Luther

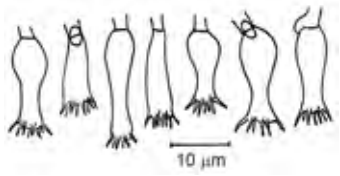
Basidium with six spores, four visible. 1000x.



Gloeocystidium.

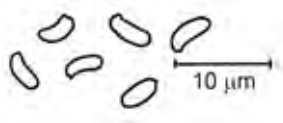


Immature basidia & gloeocystidia.



Basidia with 6 to 8 sterigmata.

Hyphae.



Basidiospores.

Comments

This species is treated by Bourdot & Galzin (1927), Christiansen (1960), Lindsey & Gilbertson (1978), Breitenbach & Kranzlin (1986), Hansen & Knudsen (1997), and Bernicchia and Gorjón (2010). The first reference has only a description (in French); the second and third have descriptions and line drawings; the fourth has a description, color photograph, and line drawings; the fifth treats this species only in a key with a brief description, and the last has a description and line drawings.

*See Luther (2011b) for a description of this micro-technique.

Sistotrema coroniferum is found on both conifer and hardwood substrates, growing on bark as well as on decorticated (barkless) wood. The collection discussed here was especially striking in appearance because of the contrast between the light colored basidiocarp and the dark Alder bark.

Mature gloeocystidia are rare in this collection, but gloeocystidia have been reported as frequent, uncommon, or rare in different collections. This is pointed out by Bourdot & Galzin (1927, p. 264), when they state "gleocystides eparses, souvent rares et peu differenciees" (gloeocystidia scattered, often rare and poorly differentiated). Hansen & Knudsen (1997) agree, saying gloeocystidia are "often difficult to find." Lindsey & Gilbertson (1978) reported a collection that had "frequent" gloeocystidia. The dimensions of the gloeocystidia in my collection most closely match those given by Breitenbach & Kranzlin (1986). The gloeocystidia can be difficult to distinguish from the basidia when very immature, but the gloeocystidia usually are more distinctly lageniform during development compared with the basidia. Only when mature can these structures be clearly differentiated side by side.

When very immature the basidia are characteristically squat ampulliform (ampule shaped) or obpyriform; they then appear to go through a lageniform developmental stage (like the gloeocystidia), but at maturity they become enlarged below, constricted in the middle, and enlarged above; some are also simply clavate when mature, so there is variation here (see the line drawings of mature basidia). The basidia are basally clamped, but this feature is difficult to observe owing to how small and closely packed the cells are. This species can have basidia with four to eight sterigmata (or sometimes fewer, as noted by Breitenbach & Kranzlin, 1986). Since most Basidiomycetes produce basidia with four sterigmata, the variation in the number of sterigmata is curious. Lindsey & Gilbertson (1978) give basidial measurements that are much larger than what's normally encountered for this species.

Breitenbach & Kranzlin (1986), point out that the basidiospores in this species can vary in size but don't give the reason. The difference in spore size depends on the number of sterigmata. The fewer the sterigmata, the slightly larger the spores. Lindsey & Gilbertson (1978) may give basidiospore measurements that are much larger than what's usually reported in the literature because they documented spores from basidia producing fewer sterigmata, although they describe the basidia as "6–8 sterigmate."

According to Ginns & Lefebvre (1993), *Sistotrema coroniferum* has been recorded from Colorado, Arizona, and Oregon in the western US. It has not been previously reported from Washington State and thus my collection appears to represent a new record. Ginns & Lefebvre (1993) list only one resupinate species of *Sistotrema* from Washington State, namely *S. raduloides*, but say a number of other species in the genus have been found in nearby states or Canadian provinces. However, Ginns & Lefebvre (1993) document only resupinate species. We also have *S. confluens* here in Washington State, which is stipitate pileate (i.e., has a stem and a cap).

DNA studies show that the genus *Sistotrema* is in the order Cantharellales and closely related to the family Hydnaceae (Moncalvo et al., 2006). A recent study also found that the genus *Sistotrema* is mycorrhizal (Di Marino et al., 2008). According to the Cortbase website, currently 50 resupinate species are accepted in the genus *Sistotrema* worldwide.

Acknowledgments

My daughter Arnica has been a devoted research companion and assistant, helping with collection documentation and taking time off her work to come on almost all of my visits exploring Cypress Island and sampling from various habitats. Thanks are also due to Paul McFarland and his staff from the Washington State Department of Natural Resources for providing boat transportation to and from Cypress Island.

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SPRING ID CLINICS START THIS MONTH

Brian S. Luther

The Hildegard Hendrickson ID Clinics will begin on Monday, April 21, at the Center for Urban Horticulture (CUH) in the Miller Library atrium area. CUH is located at 3501 NE 41st St., south of University Village on the east campus of the Univ. of Wash. The hours will be 4:00 to 7:00 pm. Please note that the ID Clinic will be **closed on Monday, May 26**, because of the Memorial Day holiday. As always members and the public are invited to bring in mushroom collections for identification, and as usual a staff of mushroom experts will be on hand.

VIETNAMESE MUSHROOM POISONING Le Ha

http://english.vietnamnet.vn, March 18, 2014

VietNamNet Bridge - The Bach Mai Hospital in Hanoi recently received four additional patients from Tuyen Quang province who were severely poisoned with mushrooms, bringing the total number to 14 people within a week, including two deaths.

Mushroom responsible for the poisoning.

Dr. Pham Due, Director of the Poison Control Center of the Bach Mai Hospital, said that the four patients from Tuyen Quang are in the same family. They were transferred to the hospital on March 16.

They all ate white mushrooms. It was unclear what kind of mushroom it was, but it apparently had a sweet taste. As they were shifted to the hospital late, 58 hours after the first poisoning symptoms appeared, they were in very serious conditions, with liver failure.

The 14 patients with mushroom poisoning are divided into three groups. The first group consists of five people from Vo Nhai district of Thai Nguyen province, who were hospitalized on March 9. Of these, two died, including a 13-year-old boy and a 60-year-old woman.

The second group was hospitalized on March 12, 24 hours after eating mushrooms, including five people from Thai Nguyen.

The third group is four people from Tuyen Quang. All of them ate a species of white mushroom, which looks like a normal mushroom but is highly toxic, with slow effects on humans.

"Only one of the 14 victims is now out of danger. The others are at very high risk of death. One of them works at the health station of Vo Nhai district, Thai Nguyen province. This patient was trained on poisonous mushroom but after the village elders declared that the mushroom was eatable, he ate it," said Dr. Due.

According to Dr. Due, the center has mobilized all resources to rescue these patients, but the fatality risk is very high because the victims ate too much mushrooms, were hospitalized late, and on-the-spot aid was inaccurate.

FORESTS AROUND CHERNOBYL AREN'T DECAYING PROPERLY Rachel Nuwer

smithsonianmag.com, March 14, 2014

It wasn't just people, animals, and trees that were affected by radiation exposure at Chernobyl, but also the decomposers: insects, microbes, and fungi.

Nearly 30 years have passed since the Chernobyl plant exploded and caused an unprecedented nuclear disaster. The effects of that catastrophe, however, are still felt today. Although no people live in the extensive exclusion zones around the epicenter, animals and plants still show signs of radiation poisoning.

Birds around Chernobyl have significantly smaller brains that those living in non-radiation poisoned areas; trees there grow more slowly; and fewer spiders and insects—including bees, butterflies, and grasshoppers—live there. Additionally, game animals such as wild boar caught outside of the exclusion zone—including some bagged as far away as Germany—continue to show abnormal and dangerous levels of radiation.

However, there are even more fundamental issues going on in the environment. According to a new study published in *Oecologia*, decomposers—organisms such as microbes, fungi, and some types of insects that drive the process of decay—have also suffered from the contamination. These creatures are responsible for an essential component of any ecosystem: recycling organic matter back into the soil. Issues with such a basic-level process, the authors of the study think, could have compounding effects for the entire ecosystem.

The team decided to investigate this question in part because of a peculiar field observation. "We have conducted research in Chernobyl since 1991 and have noticed a significant accumulation of litter over time," they write. Moreover, trees in the infamous Red Forest—an area where all of the pine trees turned a reddish color and then died shortly after the accident—did not seem to be decaying, even 15 to 20 years after the meltdown.

"Apart from a few ants, the dead tree trunks were largely unscathed when we first encountered them," says Timothy Mousseau, a biologist at the University of South Carolina, Columbia, and lead author of the study. "It was striking, given that in the forests where I live, a fallen tree is mostly sawdust after a decade of lying on the ground."

Wondering whether that seeming increase in dead leaves on the forest floor and those petrified-looking pine trees were indicative of something larger, Mousseau and his colleagues decided to run some field tests. When they measured leaf litter in different parts of the exclusion zones, they found that the litter layer itself was two to three times thicker in the "hottest" areas of Chernobyl, where radiation poisoning was most intense. But this wasn't enough to prove that radiation was responsible for this difference.

To confirm their hunch, they created around 600 small mesh bags and stuffed them each with leaves, collected at an uncontaminated site, from one of four different tree species: oak, maple, birch or pine. They took care to ensure that no insects were in the bags at first, and then lined half of them with women's pantyhose to keep insects from getting in from the outside, unlike the wider mesh-only versions.

Like a decomposer Easter egg hunt, they then scattered the bags in numerous locations throughout the exclusion zone, all of which experienced varying degrees of radiation contamination (including no contamination at all). They left the bags and waited for nearly a year—normally, an ample amount of time for microbes, fungi, and insects to make short work of dead organic material, and the pantyhose-lined bags could help them assess whether insects or microbes were mainly responsible for breaking down the leaves.

The results were telling. In the areas with no radiation, 70 to 90 percent of the leaves were gone after a year. But in places where more radiation was present, the leaves retained around 60 percent of their original weight. By comparing the mesh with the panty hose-lined bags, they found that insects played a significant role in getting rid of the leaves, but that microbes and fungi played a much more important role. Because they had so many bags placed in so many different locations, they were able to statistically control for outside factors such as humidity, temperature, and forest and soil type to make sure that there wasn't anything besides radiation levels affecting the leaves' decomposition.

"The gist of our results was that the radiation inhibited microbial decomposition of the leaf litter on the top layer of the soil," Mousseau says. This means that nutrients aren't being efficiently returned to the soil, he adds, which could be one of the causes behind the slower rates of tree growth surrounding Chernobyl.

Other studies have found that the Chernobyl area is at risk of fire, and 27 years' worth of leaf litter, Mousseau and his colleagues think, would likely make a good fuel source for such a forest fire. This poses a more worrying problem than just environmental destruction: Fires can potentially redistribute radioactive contaminants to places outside of the exclusion zone, Mousseau says. "There is growing concern that there could be a catastrophic fire in the coming years," he says.

Unfortunately, there's no obvious solution for the problem at hand, besides the need to keep a stringent eye on the exclusion zone to try to quickly snuff out potential fires that break out. The researchers are also collaborating with teams in Japan to determine whether or not Fukushima is suffering from a similar microbial dead zone.

T.A. Mousseau & A.P. Møller

Fallen trees in Chernobyl's infamous Red Forest.

FUNGUS IS GOOD FOR GRASS, NOT FOR GRAZERS

http://www.cattlenetwork.com/, March 18, 2014

Tall fescue is a robust perennial, providing millions of acres of pasture for livestock. Its hardiness in part comes from its relationship with the fungus *Neotyphodium coenophialum* (formerly called *Acremonium coenophialum*). It thrives on popular varieties of the grass and in return helps the fescue resist insects, heat, and drought. But what is good for the grass is bad for the grazer.

An endophyte, the fungus causes fescue toxicity, a condition that diminishes growth, health, and reproduction in cattle as well as horses and sheep. About 8.5 million head of cattle graze on it. Infected fescue may lead to losses of as much as $1 billion yearly in lost body weight, illness, and fewer pregnancies, according to beef industry estimates. Symptoms occur typically during the hot months—"summer slump" is the cattlemen's diagnosis.

Much of the research on fescue toxicity has focused on females, which can fail to become pregnant or spontaneously abort their offspring. The failure rate for cows can run as high as 35 percent. Some researchers have turned their attention to males. It made sense to study both sexes, of course, but there was another realization. One bull can have more impact on the problem than one cow. A bull can cover as many as 25 cows via natural reproduction.

"In a race that requires sprinters, these sperm were barely walkers," said a researcher from Southern Illinois University, referring to her work with infected bulls.

At Clemson University, Scott L. Pratt looks at the bulls from another angle. A molecular reproduction physiologist, Pratt focuses on the chemical molecules that deal with animals' reactions to the toxin. The consumed infected grass and hot summer temperatures hamper the bulls' ability to maintain normal body temperatures. Particularly heat sensitive are the testicles, where body temperature can affect sperm.

Pratt is working on finding genes and gene pathways that are affected by the toxin.

"The work we are doing to identify biochemical markers that are indicators of bull fertility may help with inconsistent breeding soundness exams, which is big problem," Pratt said. "All labs have seen mild to no effects on the exams. Bulls on toxic tall fescue will pass a breeding soundness exam, but still be subfertile."

His work could lead to better bull management strategies to maintain bull fertility while grazing toxic tall fescue.

It would add another way to deal with fescue toxicity. Currently, a cattle producer must take his animals off an infected pasture months before breeding. There are nontoxic fescues available, but planting them requires completely replacing a pasture, which can be costly and time consuming.

STUDENT CONTRACTS RARE, AIRBORNE FUNGUS

http://www.myfoxphilly.com/, Mar 13, 2014

ROCHESTER, Minn. (KMSP) - Nearly five months ago, an Augsburg University student was living the life of a normal 21-year-old. Then, he got sick with a rare airborne fungus and has been hospitalized ever since.

Although Nick Sam is on the mend, doctors do not know if he'll be able to get back to the "normal" college life any time soon. In fact, Sam told Fox 9 News it could take him another year, which would mark 18 months from the day he got sick from a soil fungus that is known to kill dogs and humans.

After nearly half a year of hospitalization, Sam uses his sense of humor as therapy—but the illness that overtook him last year is no joke. It began with headaches, spinal pain, and finger numbness. For months, doctors struggle to pinpoint the cause.

"Big mystery," Sam's mother, Lori Schwegman, said. "It's an elusive monster."

On Oct. 23rd, things took a serious turn.

"I got right on the edge of the bed, and that's when it happened," Sam recalled. "I collapsed right there."

According to Schwegman, Sam was very close to death—and diagnosis didn't come until 6 weeks ago. The culprit was blastomycosis, a fungus that is found in soil and can attack the central nervous system. In fact, it's the same infection that claimed the life of their dog in 2012.

Schwegman said the spores that are in the ground near their riverfront home become airborne once the water recedes, but it's still impossible to tell where he picked it up.

"It's more scary than anything because it can happen anytime, anywhere to anyone," he said.

cont. on page 8

Blastomycosis, *cont. from page 7*

Now, Sam is a shell of his old self. The infection caused fluid to build up in his brain, and that has left him weak in his limbs—even the trunk of his body. That means he can no longer golf, fish, or play basketball—but he's not giving up. Instead, he's improving. Just two weeks ago, he walked for first time since his hospitalization.

"I think I might be even better than I was," he said. "Sounds weird, but I will be."

President's Message, *cont. from page 3*

not be posted to the roster. Currently the bylaws state all family members of a household may register on a family membership. Reason for change: Some members have been listing many unrelated adults (6–8) on a family membership, and some people have been listing two families at different addresses on the same membership.

Single Membership: Unchanged: A single adult.

Full-time Student Membership: A single full-time student who is at least 18 years old. Currently the bylaws state that a student membership can include a household where the adult is a full time student.

Term of the annual membership: The Board is proposing changing the term of membership from January 1–December 31 to July 1–June 30. This new term will eliminate many of the problems we have had with people signing up in the fall. We will discuss problems that we have had with the current membership term at the April meeting.

Please check the bylaws section of the PSMS homepage prior to the April meeting for the verbiage of the bylaws changes.

Volunteering on PSMS Committees

We have had a favorable response to our request for forming a Mycophagy Committee from people who checked the "interested in cooking" box on our membership form when they joined PSMS. Look for some exciting developments in the coming months in regard to this committee, which is re-energizing!

We are still looking for help in these areas:

Ecology and Sustainability Committee: Keeping abreast of political and ecological issues and laws in our state that affect mushrooming or our society, partnering with our active cultivation group (sustainability in cultivating one's own mushrooms), helping to impart knowledge or find people who can help our group understand ecological concerns regarding mushrooms, promoting permaculture, etc.

Field Trip Host Coordinator: Jon Hall has graciously offered to step forward to fill the shoes of Debra Lehrberger in coordinating hosts for the field trips. Thank you, Jon! A special thank you to Debra Lehrberger for all the time and energy that she put into coordinating hosts (and making sure everyone had their supplies!) during the past several years so that the field trips went smoothly and were enjoyed by all who attended.

RETURN SERVICE REQUESTED

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