The Potomac Sporophore

Spring | April 2014 Volume No. 29 | Issue No. 2

The quarterly publication of the Mycological Association of Washington (MAW) | www.mawdc.org

What slime mold is spoiling milk? Find out on page 5.

In This Issue

Fungus Notebook: Sooty Witch Troll Cat Slime

William Needham
MAW Secretary

William Needham

Fuligo septica starts out as a bright yellow fungal mass and turns black with age. It's known by many strange names and has inspired folk tales.

Common Name: Scrambled Egg Slime, Dog Vomit Slime – Slime is any soft, gelatinous and formless mass — a descriptive term that has no biological specificity. Slime is an abbreviated form for the more descriptive full name slime mold; it is in a sense both slime and mold. The color and texture are metaphors for scrambled eggs if yellow and dog vomit as it turns a tan-brown color with age.

Scientific Name: *Fuligo septica* — The generic name is Latin for "soot" and the species name is derived from *septicus*, Latin for "putrid" (as in septic tank). The overall intent is to convey a black, particulate substance associated with the putrescence of bacterial decomposition; *F. septica* starts out yellow and gradually turns black with age, which may be why the genus is named "soot."

Like the centaurs and satyrs of Greek mythology, slime molds are an incongruous combination of two separate and

Continued on page 4

MAW Identifiers Share Guiding Insights

Willow Nero
Sporophore Editor

It's spring again, and, no doubt, as a mushroom aficionado, you're seeing strange or familiar unknown mushrooms everywhere – in the flower bed alongside your daffodils, with the weeds in your garden, on the neighbor's old stump, and among the morels in the woods. You probably pass these up, perhaps lamenting that you'll never be a pro. Even if you try to look up your finds in *The National Audubon Society Field Guide to North American Mushrooms*, you'll be met with pages of tiny white mushrooms, little brown mushrooms (LBMs), and other boring inedibles described with 10-dollar words and phrases like "adnate," "hygrophanous," and "cystidia (if present, thin-walled)."

Don't let the "detailed provenance" or "lexical babel" (as MAW Secretary William Needham refers to excessive use of scientific words) get to you. Take a pointer or two from MAW's identification team to get you headed in the right direction to finding what works best for you.

Visual identification

When you're on your own, you're likely to go straight to a mushroom field guide's illustrations – and those can get you part of the way to a successful identification, especially if your mushroom is an exotic color or shape.

"A key is not really necessary for the other fungi that do not have a cap and a stem – the polypores and other odd-bodied genera can be sorted out with sufficient detail by looking at pictures – and most books group them this way," notes Needham.

MAW Foray Chair Jon Ellifritz agrees the visual method yielded good results when he first got interested in fungi.

"I identified my first mushroom 31 years ago using Lincoff [*The Audubon Guide*], and then it was mainly going through the photos of the gilled mushrooms, picking out those that seemed most like my specimens in color and general appearance, and then going into the descriptions of those few that seemed to meet the criteria matching my specimens." As

Continued on page 2

Get it ID'd

MAW's identification team helps members identify mushrooms and avoid sometimes-lethal look-alikes. For any MAW tasting event, every mushroom not bought commercially must be checked by a MAW expert prior to cooking. The team is:

- ☐ Bruce Boyer
- ☐ Jon Ellifritz
- ☐ Mitch Fournet
- ☐ Ray LaSala
- ☐ Martin Livezey
- ☐ William Needham

Each identifier has his own strengths. Consult the entire team to get the timeliest identification from the most qualified person.

Science

Continued from page 1 any Ellifritz fan can relate, the "penultimate test was taste (quite bitter), and the final one was eating half a cap or so and waiting for the expected effect (dilated pupils and euphoria)."

But educated guess taste tests aren't for all of us — even if the end result promises to be euphoria. Former MAW president Ray LaSala says it's best to stick with a dichotomous key that has been tested and can result in only one answer, unless the mushroom isn't in the guide. It might seem easier to compare a handful of descriptions, but a key is designed to give a definite answer.

"Their systematic approach makes them more efficient than simply flipping through a book looking for a visual (and probably inaccurate) match or a text description that matches," LaSala says. "It's sort of a tortoise-and-hare kind of situation: flipping through a book in search of a match may seem fast and easy, but slow and steady systematic application of a key will usually get you to the right identification faster and more reliably."

Keying it out

Should you use a mushroom identification key? If you despise dichotomous keys, you're not alone even among the MAW identification team. Ellifritz and Needham both say keys tend to be labyrinthine headaches of "not as above" dead ends. "Drives me nuts!" says Ellifritz.

But keys do have their applications, especially if you're all alone and not getting any easy visual clues — or those clues have led to a standoff of sorts between five mushroom descriptions.

MAW President Bruce Boyer's advice to the beginner is to become familiar with the keys in mushroom guides you already own or use frequently. "Key out a mushroom that you just learned about on a foray or a meeting that was identified by another MAW member or a guest mycologist who was familiar with it," he says.

The best key is one you're familiar with, and each author's logic works a little differently. "Even if you don't find the name of the species that you have in hand, you will learn about similar species and can probably select a short list of possibilities," adds Boyer. "Remember that the mushroom you have in hand may never have been described before — by anyone."

Ellifritz echoes the sentiment that it's critical to keep an open mind if you're pretty sure you've nailed an identification except for one nagging detail. "Unusual conditions and even the site of a mushroom's eruption can cause an atypical shape, size, color, or growth habit," he explains. "Just because a field guide says cap size is 4 to 8 inches doesn't rule out a 15-inch cap caused by lots of moisture at the right time or an unusually nutritious substrate."

So don't pass up another potential world record by assigning it the diminutive LBM. Get to know the little guy.

Key to the Polyporaceae & Allies

1. Spore-bearing surface composed of closely-packed but discrete (separate) tubes that look like small pipes (use a hand lens if unsure and see photo at top of p. 553); flesh usually marbled or streaked when sectioned; fruiting body fleshy (*not* hard and woody) and often exuding a bloodlike juice when moist; found on or around hardwoods ..... ***Fistulina,*** p. 553
1. Not as above; spore-bearing surface not composed of tubes, or if composed of tubes then the tubes forming a united layer (i.e., not discrete); fruiting body fleshy, tough, woody, etc. .. 2
2. Fruiting body with a stalk(s) and cap(s) (but may appear fingerlike when emerging); found on ground, or if on wood then stalk usually central or off-center; cap and stalk not varnished 3
2. Fruiting body knoblike, hooflike, bracketlike, shelflike, or crustlike; stalk absent, rudimentary, or attached to side or top of cap (or if central, then varnished); growing on wood or roots 4

Dichotomous keys, such as the one above from *Mushrooms Demystified,* lead users through a series of traits, narrowing down the possibilities until the features describe a particular species.

Key guidance

There are plenty of different dichotomous keys to choose from. Nearly every mushroom field guide contains one, and even the Audubon Guide has a set of keys available online. (Download the key at www.mushroomthejournal.com/arcade/AudubonKey.pdf or access it online at www.mushroomthejournal.com/arcade/keys/AudubonFrame.html.) Needham recommends Roger Phillips' *Mushrooms and Other Fungi of North America* and Bill Roody's *Mushrooms of West Virginia and the Central Appalachians* because of their reliance on visual cues (size, shape, color, and configuration) before moving on to more challenging details. While it's more well-suited for the West Coast audience, David Arora's *Mushrooms Demystified* is a great text for dichotomous keys. Arora provides few visuals and even fewer photos in color, but he makes up with vivid descriptions. Surely a detail or two beyond color will stick after a while.

Before you're completely overwhelmed by the pages of text in a key, think like LaSala and keep it simple. "Just as you only need to read part of an entire map to see how to get

MAW Board of Directors

Write for MAW

The Mycological Association of Washington is a volunteer-run organization, which means its flagship publication *The Sporophore* needs member submissions to ensure the best quality and diversity of mycological topics.

Volunteer to review mycology books, films, and events or submit your own original idea or recipe.

from point A to point B, you don't need to scan an entire tree diagram (or identification key) to get to a final identification. Of course, there is an important difference — with an identification key, you don't know your destination until you're there!"

To further simplify or visualize the dichotomous key process, LaSala finds it useful to convert a key's outlines into decision trees that resemble family trees or flow charts. (See an example at www.wikipedia.org/wiki/decision_tree.) "Creating a decision tree familiarizes you with every part of the decision process even more than simply transcribing it," he says.

Morphology 101

Is the "painfully intricate" language of fungi getting you down? Decode some the science babble.

☐ Try Mushroom Expert's glossary at www.mushroomexpert.com/glossary.html.

☐ The Rogers Mushrooms website includes a helpful visual identifcation tool: www.rogersmushrooms.com.

☐ Many groups and individuals have created lists of mushroom characteristics to help in identification. Download Ray LaSala's list at www.mawdc.org/newsletter.html.

☐ MAW lists other good resources at www.mawdc.org/sites.html.

Family matters

All the MAW identifiers (and most of the membership) recommend a foray with live experts as the No. 1 way to learn mushrooms. But is memorizing *Amanita virosa* and little else really helpful? Beginning to identify the various genera means keys will become even more accessible for you.

"Go on forays with someone who is experienced enough to know a Russula from an Amanita," advises Needham. "And take it from there."

If you're really stumped, email the official identifiers, post to MAW's Facebook, Meetup, or Yahoo group — or, better yet, share your find with the world on Mushroom Observer. Keep in mind, it's most convenient to ask an expert, but don't pass up a valuable learning experience. Ask how the expert identified your mushroom. When did he first find it, and is it common where you found it? What characteristics did you miss?

NAMA Reports on FDA Fungi Code

It should come as no surprise that the Food and Drug Administration (FDA) is interested in regulating fungi as it does any other fruit or vegetable. But the FDA has been stumped by a number of issues, including how to certify expert identifiers or deal with cryptic species, for more than two decades, reports NAMA President David Rust in the January-February 2014 issue of *The Mycophile*.

Rust participated in the final meeting of the Wild Harvested Mushrooms Committee, during which participants discussed the mushroom-related recommendations in the 2013 Food Code. The code basically asks mushroom buyers to keep a log of the scientific and common names of purchases, the contact information of the identifier and seller, and a statement about the identifier.

A group of NAMA members pinpointed these issues not addressed by the current code:

1. The biggest danger to food safety is toxic look-alike mushrooms entering the food distribution system.

2. Care of mushrooms once they are made available for sale is key. Mushrooms in retail groceries are often a mixed bag because they are ephemeral and need to be inspected by the seller to remove rotting fruit bodies.

3. Establishing or enforcing code based entirely on mushrooms that grow locally is a bad precedent. Wild collected mushrooms are shipped globally within a day or two.

4. Mushrooms must be well cooked, with the exception of truffles. There is a new raw food craze; eating raw shiitake mushrooms can cause dermatitis. Mushroom cell walls are chitin, which must be cooked to be digested properly. Even raw button mushrooms are known to have a low level of hydrazines, a potential cancer-causing toxin.

5. As we discussed, some mushrooms have a cumulative toxic effect, and can take months to show symptoms. But, it is unlikely these mushrooms would be sold commercially.

6. People may have allergic reactions to popular edible mushrooms which appear after eating the same mushroom several meals in a row; or reactions can happen out of the blue.

7. Some mushrooms have been known to cause skin reactions from repeated handling, but it is unlikely that these mushrooms would be sold commercially.

Mixed Mushroom Stew

6–8 cups coarsely chopped oyster, honey, and royal trumpet mushrooms
1 onion, diced
⅛–¼ cup vegetable oil
¼ cup white cooking wine
2 potatoes, diced
2 carrots diced
1 stalk celery, diced
½ pint heavy cream
2–3 cups milk
4 cups water
1 vegetarian bouillon cube
1 stick butter
4-6 tablespoons flour
Salt and pepper, to taste
Pinch of nutmeg
Pinch of ground cloves
Dash of cayenne pepper

Clean and parboil the honey mushrooms. Drain the mushrooms, and discard the water. Chop cooled mushrooms coarsely.

Saute oyster and royal mushrooms and onions in vegetable oil until lightly browned, then lower the heat. Add the cooking wine, stirring to deglaze the pot. Add water, milk, cream, bouillon, potatoes, celery, and carrots. Add the precooked honey mushrooms, and simmer for 15 to 20 minutes.

Melt the butter in a separate pan. Add the flour, and cook until the butter and flour mixture begins to bubble. Take one to two cups of liquid from the mushroom mixture and slowly stir it into the butter and flour mixture, until smooth. Add this mixture to the remaining mushrooms, and stir to thicken. Add spices, to taste, and simmer on low for 10 to 15 minutes.

(Recipe contributed by MAW member Alan Remchuk. The dish was served at the Fall 2012 Mushroom Tasting.)

Fuligo septica (cont.)

William Needham

As Fuglia septica ages, it becomes darker and more sooty in color.

Continued from page 1

distinct physiologies, a fact that has confounded their proper classification within the hierarchical confines of taxonomy. Even the slime mold name conveys a notion of some sort of unholy union, a dichotomy of uncertain provenance. Slime molds start out as spores from a fruiting body that is fungal in form and function that would align them with the fungi.

When the fungi were afforded full kingdom status in the late 20th century, slime molds were placed in the phylum Myxomycota (Greek for "mucous fungi," a suitable synonym, essentially biological slime). It is for this reason that the slime molds are included under the rubric of mycology. However, when the fungus-like spores germinate, they do not form the filamentous hyphae of the fungi, but rather they transmogrify to single-cell nucleated amoeboids that move about with pseudopodia just like any other amoeba of the kingdom Animalia.

So slime molds are slime in the sense that they are viscous and mobile and mold in the sense that they are small fungi. In the continuous evolution of our understanding of the taxonomy of biological relationships, slime molds and other mostly unicellular, eukaryote (having a nucleus) anomalies gave rise to an interim taxonomy of things that were both plant and animal and therefore neither; they were placed in kingdom Protista.

Recent advances in biology, genetics, and evolutionary development have discombobulated the physical structure based taxonomy of Carolus Linnaeus — a process that is far from over. In the most recent rearrangement known as the six-kingdom model, the slime molds are in the kingdom Protozoa (kingdom Amoebozoa in some texts), the mobile amoebae products of the fungal spores having dominated the genetic phylogeny. To afford a measure of consistency, the slime molds retain their euphonious group name, as they are now in the class (vice phylum) Myxomycota, even though the kingdom has changed. This doesn't make the slime molds any less peculiar.

The mobile unicellular, amoeboid animalcules afford the slime molds their quixotic life cycle. They are phagotrophic, feeding on the even smaller bacteria for nutrition, the characteristic that aligns them with the Protozoa over the Fungi. The amoeboids can be in one of two forms: a myxamoeba that moves by the extension of the membrane wall (false foot or pseudopod) and an elongated form called a swarm cell with a whip-like flagella from one end or the other (or both) to enhance propulsion. In the absence of nutrients, the amoeba transforms into a thick-walled protective sphere called a cyst, a state in which it can persist for some time.

Under nutrient-rich, propitious conditions, two amoebae or swarm cells of compatible mating types (like the fungi, there are no recognizable male or female sexes) fuse together, the two haploid (n) gamete cells forming a diploid (2n) reproductive zygote. The resulting organism is called a plasmodium, the quintessence of the slime mold. The plasmodium is a single large cell that undergoes mitosis (nuclear division) without cell division, so a single cell that starts with the two nuclei of the original haploid gamete amoebae can multiply geometrically (2, 4, 8, 16) up to millions of nuclei all within a single cell membrane.

Plasmodia grow, like their amoeboid precursors, by eating bacteria in addition to yeasts (fungi) and algae (plants). In this form they can get quite large, able to engulf and ingest increasingly larger prey. It is the growth of the plasmodia that characterize the slime molds, as the growth is coupled to movement. According to Michael Carlisle et. al. in *The Fungi, 2nd Edition*, this streaming is observable in a microscope that shows "a torrent of protoplasm moving in one direction at speeds of up to one millimeter per second for about a minute." Curiously, the flow then reverses, like the Greek strophe, flowing in the opposite direction for about the same duration — a pulsating mass. The efficiency of consumption, movement and growth is such that a slime mold can grow to twice its original size every eight hours.

A large, moving, pulsating and growing blob of unknown origins has, on at least one documented occasion, resulted in high anxiety that was quite possibly triggered by association with the 1957 movie *The Blob* in which a formless mass terrorizes a small town and kills several people. The incident in question occurred in Garland, Texas, a small town near Dallas, in the backyard of Mrs. Marie Harris.

According to an Associated Press article printed May 30, 1973, described the mass as "something right out of an after-midnight television horror movie — a mysterious, encompassing ooze, dubbed 'The Blob.' — So far it appears to be friendly." *The Dallas Times Herald* first reported the incident, quoting Mrs. Harris as saying "It has multiplied itself 16 times over in two weeks ... blackish mucous … reddish with thick bub-gigs (sic.) on top … foamy like shaving cream." A neighbor named Edna Smith reported it climbed a telephone pole.

The origins of the tale have become apocryphal in the retelling, a mycological urban legend. According to *The Audobon Field Guide to Mushrooms*, the fire department was called and sprayed high-pressure water, encouraging the blob to grow even larger, at which point the "people demanded the governor call in the National Guard." The culprit was identified as a relative of many-headed slime (*Physarum polycephalum*), although this is also subject to conjecture. *The International Herald Tribune* reported on June 1, 1973, Fanny Hurst, a botanist at Baylor University determined "It could have been a Fuligo … usually seen in the yellow, pulsating form Mrs. Harris described to newsmen."

That it is was more likely to have been scrambled egg slime is affirmed by Miller and Everhart in "Importance of Myxomycetes in Biological Research and Teaching" (Fungi Vol. 3 No. 1), who note "These yellow blobs were present for a three-week period and the fruiting bodies were finally

identified as *Fuligo septica* but not after concern that a lawn disease or an alien source had invaded the site."

The demise of the dreaded yellow blob was no less mundane. Again from the 1973 Associated Press article: "Mrs. Harris …recounted 'I got a call from a woman here in Dallas who said that tobacco mixed with water was an old-time remedy for killing insects in gardens. I figured I had nothing to lose and tried it. It started to dry up, and that's what's left.' She pointed to some white, crusty material at the edge of her garden. So much for the original blob."

Like all other slime molds, it probably ran out of food and sporulated.

The study of slime molds has lagged that of other organisms, their sub rosa habitat under tree bark and leaf litter seldom rising to the notice of early botanists (or zoologists for that matter), the blob story notwithstanding. The slime molds like *F. septica* that form a plasmodium are appropriately called plasmodial slime molds to distinguish them from the other two types of slime mold amoebozoans: the cellular slime molds (dictyostelids), and the protostelid slime molds (protostelids) —primarily epigeal soil dwellers that, though ubiquitous, are nearly invisible without magnification.

The larger plasmodial slime molds do on occasion draw attention (again, the blob story). According to Stephenson in *The Kingdom Fungi*, "in writings from the ninth century attributed to the Chinese scholar Twang Ching-Shih, there is a reference to a certain substance *kwei hi* (literally "demon droppings") that is of a pale yellowish color and grows in shady damp conditions." While a somewhat more scatological description, this clearly refers to the subject slime, which is not wanting for metaphor.

The leitmotif of offal seems to be as universal as is the global *F. septica*. In Scandinavia, it is associated with the superstition of the witch's troll cat, a chimerical beast that got its milk either directly from cows or stole it from households. The yellow slime mold was attributed to troll cat vomit and purportedly used by witches to spoil the milk of those they cursed. As testimony to the diversity of cultural norms, the Native Americans from Cofre de Perote in Veracruz, Mexico, call *F. septica* "moon scat" (*caca de luna)* but treat it more like the scrambled eggs of North American linguistics. They harvest it, cook it with onions and peppers, and eat the resultant concoction on a tortilla, reportedly with (gustatory) relish.

The plasmodium of a slime mold continues to grow only so long as there is nutrition. If adverse conditions prevail, a dormant state called a sclerotium forms to sustain the germ of life through the downturn. When conditions promoting reproduction prevail, the plasmodium gives rise to fruiting or spore-producing, bodies that resemble (though are much smaller than) those of the fungi.

Plasmodial slime molds are taxonomically classified according to one of four basic types of fruiting body: sporangium, aethalium (basically a mass of fused sporangia), pseudoaethalium, and plasmodiocarp (a vein from the plasmodium). *Fuligo septica* forms a massive aethalium (the second type), which gives it a prodigious spore production capacity —billons of ~7 micron spinulose spores released to the wind. Due to its propinquity to human habitations, its ubiquity, and the spiny tenacity of its spores, it has been subject to assessment as an allergen.

A study conducted by Rockwell et. al. and reported in *The Journal of Allergy and Clinical Immunology* found 40 percent of 250 participants had an allergic reaction to *F. septica* and concluded "Individuals hypersensitive to mold spores should use face masks to avoid contact with slime mold spores."

A second area of scientific evaluation of the properties of *F. Septica* is in bioremediation — not an uncommon consideration for fungi, which extract minerals from the environment as a matter of physiology. At the International Symposium of Metal Ions in Paris in 2008, a Finnish researcher reported *Fuligo septica* (commonly called *paranvoi* in Finnish, translating roughly to "belief being," thought to have something to do with the theft of butter) contained between 2,000 and 22,000 mg/kg (which is the same as ppm) of zinc. This was attributed to the fact that the yellow pigment fuligorubin A binds to zinc. *Fuligo septica*'s potential for reclamation of metal-contaminated soils awaits demonstration.

Hiker's Notebook Website

MAW Secretary William Needham publishes www.hikersnotebook.net, a wiki site full of articles like this one, focused on things hikers often will see on the trail. The articles are organized into several categories such as fungi, plants, trees and shrubs, creatures great and small, and geology and earth sciences.

Scholarship Update

MAW scholarship recipient presents laboratory slideshow.

Martin Hindel

Ilan Segal finds an Amanita at the 2013 Sequanota Foray in Jennerstown, Pa.

Ilan Segal, one of the five students promised a scholarship to complete a mycology course or laboratory at the National Institutes of Health (NIH), presented to the club April 1 a slideshow showing some of the work he and fellow classmates completed.

Segal shared some of the fun aspects of the course — like getting an official NIH badge and wearing a lab coat — but also showed members detailed mushroom descriptions, sketches, and photos from under the microscope. He detailed a few of the processes he learned, including growing specimens on agar plates, preparing and amplifying DNA samples via the polymerase chain reaction, and completing a gel electrophoresis to analyze DNA quality.

Get Social

MAW members are sharing their recent finds via Facebook, Meetup, and Yahoo. The beautiful ceramic tile parchment fungus (*Xylobolus frustulatus*), below, was found on the first 2014 foray in April.

Connie Durnan

Meeting File

Feb. 4 — Ophelia Barizo Explores Pioneering Fungal Research Projects

Willow Nero
Sporophore Editor

At the Feb. 4 MAW monthly meeting, club member and local educator Ophelia Barizo presented the early results of her mycology research opportunities made possible through the Albert Einstein Distinguished Educator Fellowship. She currently is studying at the National Science Foundation under the Directorate for Engineering and the Office of Emerging Frontiers in Research and Innovation.

Prior to Barizo's fellowship, she taught high school as the teaching chair of the science department at the Highland View Academy in Hagerstown, Md. Barizo has received several teaching awards, including PASCO STEM educator of the year given by the National Science Teachers Association.

To begin her presentation, "Fuel From Fungi and Other Emerging Fungal Research," Barizo made a few jokes about her background and how mycology entered her life. "My name is in there — except spelled with an *i* instead of an *e*: Mycophilia," she said.

Some of the most exciting research Barizo has looked into includes the National Science Foundation's efforts to extract a diesel-like fuel excreted by fungi fermenting cellulose. "We may drive on mushroom fumes," she said.

Researchers have shown *Gliocladium roseum,* an endophytic fungi found primarily growing inside the Ulmo tree from Patagonia, releases octane, heptane, undecane, dodecane esters, and other branch-chain hydrocarbons just using cellulose, "the world's most abundant" natural organic carbon. It even performs in low-oxygen conditions.

A hypoxylon species found on the *Persica indica* tree also has enormous fuel potential. As an additive, it helps fuel burn more efficiently. "It doesn't need sugar, starch, or corn to grow," Barizo said, "just leaves — agricultural waste."

While research is still in early stages, it's extremely promising. One of the problems researchers soon will face is scaling up production.

"We are not really extracting fuel from fungi right now to fuel our cars, but soon we could through alternative resources," said Barizo.

One team successfully has proven their fuel can run a 1919 Galloway engine. This drew an offer from entrepreneur Craig Venter, but the researchers declined, instead pairing with the U.S. Department of Defense.

"For Craig Venter to offer it … he sees the possibilities," Barizo noted.

Several other pioneering fungal applications include:

☐ Fungal pollution control. Teams of scientists are working on removing toxins from water using fungi. Certain ascomycetes react with naturally beneficial minerals, stripping out toxic ones like arsenic, cadmium, and cobalt.

☐ Fungal grass protection. Nematodes, insects, and droughts pose real problems to natural ground covers like Canadian wild rye. Scientists have identified endophytic fungi normally found inside these plants that appear to ward off herbivores and increase drought tolerance. Through bioengineering, these relationships could be better exploited and applied to other grasses.

☐ Green packing materials. Ecovative, the company responsible for the first mushroom-based alternative to Styrofoam packing peanuts, has ramped up production and found new strains of fungi that help their materials grow even faster.

Willow Nero

Ophelia Barizo has taken a year off teaching high schoolers to pursue a research fellowship.

Upcoming Events

April 25-27 — USA Science and Engineering Festival, Walter E. Washington Convention Center, Washington, D.C. MAW and NAMA will host a booth about fungi.

May 6 — monthly meeting. Guest speaker: Tina Ellor of Phillips Mushroom Farms.

June 3— monthly meeting. MAW scholarship recipients will present their research from the fall 2013 National Institutes of Health graduate school mycology course.

July 1 - monthly meeting.

MAW Tasting Event — This year's tasting again will be held at the GMU Nutrition Kitchen in Fairfax, Va. The date has yet to be announced.

Mark Your Calendar:

Aug. 8-10 — Third Annual Joint Appalachian Foray, 4-H Center, Front Royal, Va. Details and registration forthcoming.

Sept. 26-28 — Annual Camp Sequanota Foray, Camp Sequanota, Jennerstown, Pa.

Unless otherwise noted, monthly meetings are held on the first Tuesday of each month at the Kensington Park Library in Kensington, Md.

Forays

MAW regularly holds forays in the D.C. area. Many forays are announced on short notice. Check the listings at Meetup.com/MAWDC-Public or email forays@mawdc.org to receive email notices.

Next up: morels. Keep checking your favorite morel patch for these elusive ascomycetes. Share your photos on Facebook (www.facebook.com/MycoDC), Meetup.com, and/or the MAW-Mail Yahoo group.

March 4 — Meeting Canceled After Late-Season Snowstorm

Michael Beug, head of the North American Mycological Association's Toxicology Committee and author of the new book Ascomycete Fungi of North America, was scheduled to speak to MAW March 4, but a late-season snowstorm coincided too perfectly with his arrival. MAW hopes to reschedule speakers later in 2014 to accommodate Beug. His planned presentation title was "For the Love of Ascomycetes."

April 1 — Paul Goland and Michael Smith Wow Members With Mushroom Cultivation Tips

Willow Nero
Sporophore Editor

More than 60 MAW members turned out April 1 for the doubleheader of mushroom cultivation presentations by Paul Goland and Michael Smith.

Goland, a former MAW board member who has grown shiitake mushrooms on logs for more than 30 years, led members through his detailed process, demonstrating at the same time.

Willow Nero

Paul Goland shows MAW members how he innoculates logs with shiitake mushroom spawn.

First, Goland says, you should find a good log and locate a place in your yard with either shade or just a dapple of sunlight to keep the inoculated logs. Some of his most highly recommended tree species include oaks, especially white oak; sweet gum, sugar maple, and iron wood. It's important to get green wood, and many beginners make the mistake of using wood that's too old.

Next, locate a good source of shiitake spawn, which is sold by various groups and available from Goland in smaller containers.

"It takes lab work," he says. "I'm not a lab type. They're getting the pure culture from the American Type Culture Collection."

The inoculation process is fairly simple. Goland starts by marking the edge of each log to keep track of where he will drill rows of holes for the spawn. He spaces the holes by approximately four inches. Goland doesn't quite fill each hole and is careful to not pack the spawn too tightly before using a chunk of backing rod to plug the hole.

"I don't believe in wax anymore," says the shiitake expert.

Once a log is complete, Goland says to leave it in your yard to complete a spawn run for 5 months. Then shock the log by soaking it overnight.

"When a hurricane comes through, that's the best," he says. "It may throw your schedule off, but oh well."

You can try spritzing water onto the log, he adds, "But you've got to use a whole lot of water because you've got to spritz all night."

Willow Nero

Michael Smith holds up a piece of cardboard teeming with oyster mushroom mycelium.

Audience members quizzed Goland on various types of wood, and sweetgum came out highly recommended.

"They do a lot of it in North Carolina, especially if you have sweetgum you might want to get rid of it because it's awful wood," he said. "It's invading this whole area. Cut it down and grow shiitake on it!"

Smith, also a MAW member, inspired the crowd with different mushroom cultivation techniques he's experimented with over the years. He said he's found the process relatively simple.

"Those are the same culturing techniques that you use if you make sauerkraut, bake bread and let it rise, home brew, or culture yogurt," he explained.

Before getting started with an expensive kit, Smith recommends pinpointing your goals and letting your substrate (whether straw, wood chips, leaves, logs, or nut hulls) come to you.

"If you want to make it easy, if you want to make it cheap, let luck decide what you want to grow," he said. Some substrates naturally pair well with certain strains of fungi.

Like Goland, Smith is a fan of storms, but not because it spurs a fungal bloom. He's first on the scene to collect limbs and logs.

"Decide on your goal then let your substrate fall upon you — fall into your hands — and off you go!" he advises.

As for the goals, they can range from growing edible mushrooms to improving soil conditions for your favorite vegetable.

Smith finds the easiest mushroom he's cultivated is the blewit (*Clitocybe nuda*). "If you know how to rake leaves into a pile, you know how to grow a blewit," he says. His process includes placing blewits into wetted cardboard tubes (with no ink on them) and letting the mycelium go wild. Then he adds fallen leaves and waits for blewits to pop up.

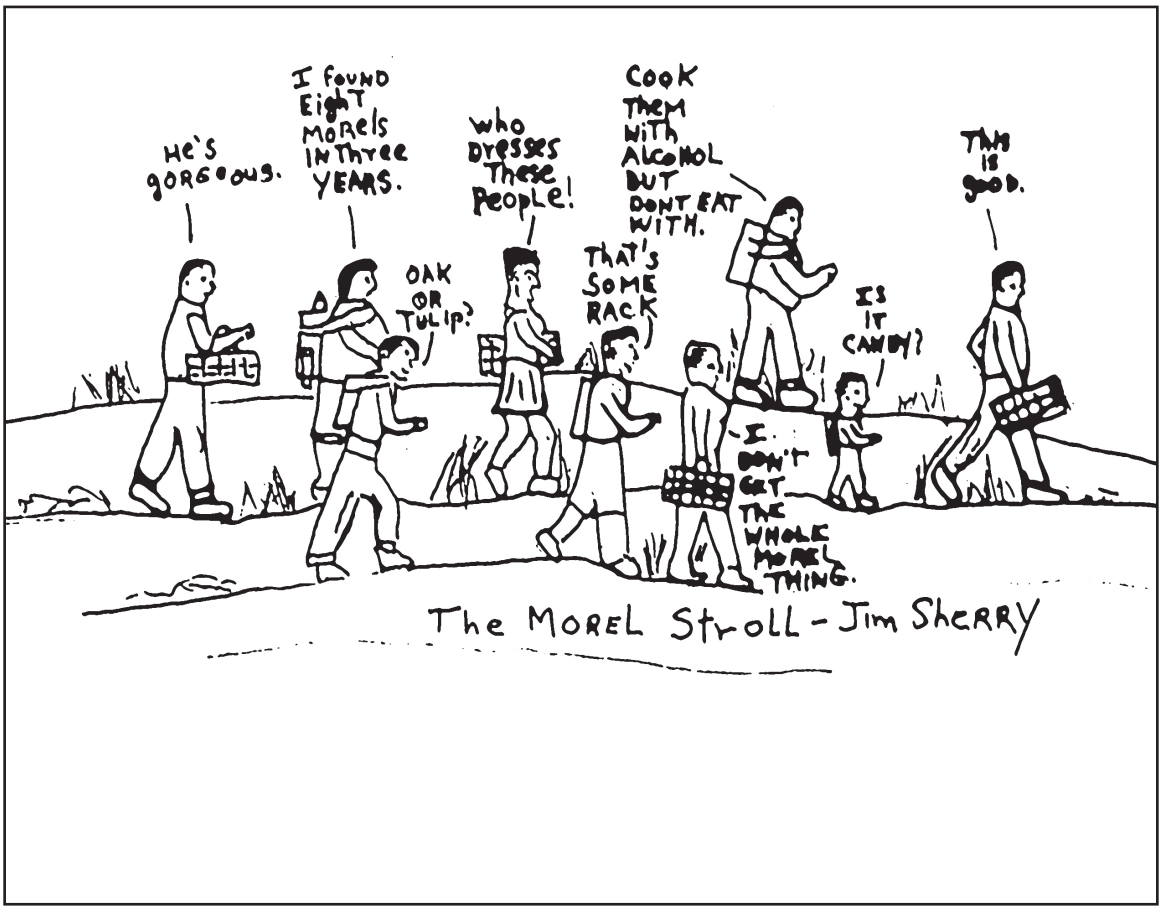
Another easy technique is growing oyster mushrooms in a bag of straw. Start with pasteurized straw fermented for three days. Add this to a plastic bag suspended from a pole. Layer in mushroom spawn, and cut small X-shaped holes at regular intervals. Once the spawn run is completed in a cool, dark area, "shock" the mycelium with an ice water shower and place the setup outside in the shade. You'll have fresh oyster mushrooms before long.

Experimentation goes a long way. Smith has learned most of what he knows from trial and error, with lots of guidance from mushroom cultivation catalogs. He also tries to pair his mushroom knowledge with cultivation techniques.

"Know the natural histories of the mushroom as best you can and then try to recreate that history," he says.

In closing, Smith challenged members to try cultivation, even in nontraditional environments like a public park or a 10-foot by 10-foot city lot.

"We should be the Johnny Appleseed of the mycological world," he said.


He's gorgeous.
I found Eight Morels in three years.
Oak or Tulip?
Who dresses these people!
That's some rack
Cook them with alcohol but dont eat with.
I don't get the whole morel thing.
Is it candy?
This is good.
The Morel Stroll - Jim Sherry