Newsletter of the North American Mycological Association

THE MYCOPHILE

VOLUME 56: 2 March-April 2016 www.namyco.org

The 2016 All California Club Foray (ACCF)

From the Mendocino Coast-North Coast of California

Debbie Viess & David Rust
Photo by Hugh Smith

It's a day in the woods. Another day in the woods! There aren't enough of these. It's not cold. The sun helps you keep your bearings in the deep shade. The forest is wet, soaking. There are Redwoods, Tan Oak, Chinquapin Oak, Douglas Fir, Rhododendron, Madrone. Not many flowers. It's winter. Everything is green, deep green... or dark wet brown. Listen! You hear that? The sound of the forest. Soothing. Calm. Tranquil. A Raven soars above. You can hear his wings whoosh with each flap. It's the only sound. Then, off in the distance his mate is vocalizing. It sounds like coconuts being knocked together quietly. Fascinating! Where'd you get the coconuts?

Small camouflaged birds flitter around in the bushes near the ground. You can't see them unless they move. They've always been there. Frogs occasionally sound off from a wet spot somewhere. A tree creaks in the breeze. Some other trees rub together, sometimes in a rhythm. I like to think I could walk through the woods until I hear those two trees rubbing. Then I would know I am in this place. I would say to you, "Meet me in the place where the two Tan Oaks rub together. I'll be there waiting for you". I've heard all of this before. And it's all new.

The All California Club Foray is another one of those great events in Northern California. What separates this event from the others is its scientific focus. While the other forays are more fun than I could ever hope (I love you Fungus Federation of Santa Cruz), this one is just as fun and more complete. The All California Club Foray is catered, so you don't have to think about cooking and cleaning up. The accommodations are number 1 when it comes to comfort and cleanliness, and at THIS event there are Wizards. Many Wizards. Wizards are those that know every mushroom, if not to species, almost always to genus. These are the people who can expand my knowledge and increase my vocabulary. Sure, they sometimes have different pronunciations than I would agree with, but this can make for a great debate on phonetics. (They say "Amaneeta" or "Amanyta", I say "a'MANata".)

This event is put on by the Bay Area Mushroom Society every two years... well, let's just say bi-annually. David Rust, current president of the North American Mycological Association (NAMA, http://www.namyco.org/) and one of the co-founders of the Bay Area Mushroom Society (BAMS, http://bayareamushrooms.org/) is also one of the co-founders of this foray. It is bi-annual and not often enough.

The rainfall this year has been normal or above normal. Every weekend since Halloween between Albion and Fort Bragg there has been some kind of event or foray relating to mushrooms. There's the Wine and Mushroom Fest, the Mushroom Fest, the Wine, Beer and Mushroom Fest and every kind of foray. This university, that university, this club and that! EVERY SINGLE WEEKEND!

(Continued on p. 3)

UPCOMING FORAYS & OTHER EVENTS

This section of **The Mycophile** is reserved for publicizing the annual forays of NAMA affiliated clubs and other events you may be interested in learning about. If you would like us to list your club's next big event, contact us with details you would like displayed here and send to Dianna Smith, editor of NAMA's bi-monthly newsletter: mycophile@namyco.org. See also http://www.namyco.org/events.php about posting on our website.

July 3-9: *Lichens and Lichen Ecology* with David Richardson and Mark Seaward at Eagle Hill Institute, Maine, http://www.eaglehill.us

July 28-31: Northeast Mycological Federation (NEMF) 40th Annual Sam Ristich Foray will be held at Fitchburg State University in central MA close to the NH border. Chief mycologist will be David Hibbitt of Clark University. Registration is now open at www.NEMF.org.

July 31-August 6: *Mushroom Identification for New Mycophiles: Foraging for Edible and Medicinal Mushrooms* with Greg Marley and Michaeline Mulvey at Eagle Hill Institute, Maine, http://www.eaglehill.us

August 7-13: Eagle Hill Institute Seminar on *Slime Molds: Miniature Marvels of Nature* with Steven Stephenson, http://www.eaglehill.us

August 18-21: Wildacres Foray (Note the August date - first time) Cost will be $240 per person, double occupancy. More details will follow in upcoming issues.

August 21-27: *Polypores and other Wood-inhabiting Fungi* with Tom Volk, Eagle Hill Institute, Maine, http://www.eaglehill.us

September 8-11: NAMA Shenandoah Foray located in the unique environment of the bio-regions of the Blue Ridge Mountains and the Shenandoah Valley of Virginia. Walt Sturgeon will be chief mycologist. The foray will be stationed at the Northern Virginia 4-H Center in Front Royal. http://www.nova4h.com/#landing. Registration opens Spring of 2016.

September 12-15: NAMA class on *Lactarius* taught by Dr. Andrew Methven at Wildacres, N.C. Contact Glenda O'Neil: glendakoneal@yahoo.com or by phone (423)-863-2742. (Please see p. 18 for further information).

September 22-25: Annual COMA Clark Rogerson Foray located in Copake NY in the Berkshires at the intersection of NY, CT and MA. Check for updates and registration online at www.comafungi.org.

October 17-22: 17th International Fungi & Fiber Symposium, Madeira Park, British Columbia. http://fungiandfibre2016.org.

IN THIS ISSUE

(Continued from p. 1)

Even after all of those weekends and the weekends to come, there is still fungus among-gus. (I probably should not be advertising this.) I probably could have made a living in the mushroom business. But, I don't sell them, and I am not interested in selling them. I would rather give them away to people that really appreciate eating mushrooms. (Any takers? No?) I've got far more mushrooms stored than I need. But then, I don't need any. I run 4 dryers. I've burned up many. I just can't help myself! Some say I'm off my chump.

I occasionally volunteer to lead forays. And I know that many people are interested only in finding mushrooms that are edible. It's in our genes, y'know, that hunter gatherer instinct. And even though I don't really eat them, I know I've got that instinct, too. It IS rewarding to find something that other people are looking for. Maybe I'm not off my chump.

It was a Friday night. I arranged to take a few (6) people on a foray to some of my hunting places. This is a very difficult thing to do. If I take people to some of my great spots, even though they live far away (Santa Cruz, Minnesota, Kansas, and even Belgium this time!) and don't come to the California's North Coast very often, some of them will remember where I took them and competition for my own hard earned discoveries will increase. What a dilemma. Saturday morning comes around and we're scheduled to go for the hunt at 9:00 (half the day gone already!). Saturday was an unsettled day weatherwise. It rained some, the sun showed, later there was a gusher. Underneath the forest canopy it's never raining as much as out in the open. Somehow I ended up with 16 people! It's not practical to blindfold all of them because they're not all in my car. Where am I supposed to take this many UMF's (unblindfolded mushroom fanatics)?

Now some people are in it just for the edibles. And some just aren't patient enough for a real hunt. (Some people want to pick, not hunt.) We ended up with a fair amount of edibles but lots of cool and different mushrooms too. There seem to be quite a few rare and unusual mushrooms this year. There were *Helvella lacunosa* (*dryophilus*), Witches Butter, Hygrocybes, Reishi (*Ganoderma oregonense*), giant Deadly Galerinas, Jellies, Cups and other neat Ascomycetes. The Slime Molds were out as well. It was a great hunt.

After a day of hunting everyone met in the woods for a social. There was wine, cheese, meat, crackers and other snacks and lots of tales, tall and otherwise. After the social event we returned to the Albion Field Station, our home, to rest and eat and watch the different species come in. The caterers were already at it in the kitchen preparing the night's meal. Everything had mushrooms in it! But I don't want mushrooms. May I have some lasagna and mushrooms with no mushrooms? How about that soup? May I have some of that mushroom soup with no mushrooms? No?

The caterers are excellent cooks though. The food was great! Was I just starving? No. I realize it's all about the chef. Mushrooms can be made tasty. What did I just say? I was full! Afterward we had dessert with Candy Cap whipped cream. Wow! Are you sure this is made with mushrooms? It tastes like maple syrup!

There are so many things to discover on California's North Coast... Banana Slugs (state mascot), Indigenous Snails, Worm Salamanders, Pacific Giant Salamanders, Newts, y'know, always something new! So here I am again, out in the woods… Listen! Do you hear it? The sound of.....nothing! The fall and winter months are frequently the best weather on the North Coast. Sunsets are best in the winter! But, once again, went to the coast, hardly saw the ocean. What's up with that?

Phalluscybe
Hugh (Who) Smith
(Hugh's photos of attendees and some of the mushrooms found during the ACCF event on p. 20.)
See http://bayareamushrooms.org/forays/accf_2016.html for an ACCF foray report by David Rust, a species list and links to more of Hugh's ACCF photos.

NAMA 2015 PHOTOGRAPHY AWARDS

Photos of the winning entries to the 2015 NAMA Award for photography: **PICTORIAL CATEGORY**
Mary Smiley, 1st Place for photo of *Boletus rubricitrinus*
Michael Beug, 2nd place for *Sarcomyxa sp. nov.* (near *P. serotinus)*
Dianna Smith, 3rd place for *Lactifluus corrugis*

Boletus rubricintrinus by Mary Smiley

Sarcomyxa sp. nov. (near *P. serotinus*) by Michael Beug

Lactifluus corrugis by Dianna Smith

HONORABLE MENTION

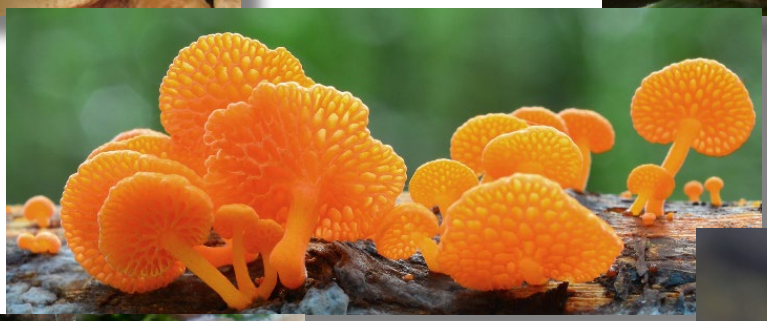
Andrew Parker for *Clavaria rosea,* George Morrison for *Hypomyces* on *Phylloporus rhodoxanthus*
Michael Beug for *Byssonectria cartilaginea* and *Cerrena unicolor*
Walt Sturgeon for *Polyporus squamosus,* Mark Bower for *Panus conchatus*
Mary Smiley for *Favolaschia calocera*

Clavaria rosea by Andrew Parker

Hypomyces on *P. rhodoxanthus* by George Morrison

Polyporus squamosus by Walt Sturgeon

Byssonectria cartilaginea by Michael Beug



Favolaschia calocera by Mary Smiley

Panus conchatus by Mark Bower

Cerrena unicolor by Michael Beug

Raindrops Keep Falling On Their Heads (Thanks To Mushroom Spores, That Is)

by Elio Schaechter, January 11, 2016 Small Things Considered blog

http://schaechter.asmblog.org/schaechter/

I have two purposes in discussing a recent paper[1] from the lab of mycologist Nik Money. One is to present a notion of the way mushroom spores may contribute significantly to rain making. The other one is introduce a noteworthy wrinkle in electron microscopy (previously unknown to me), namely the ability to look at wet objects under the electron beam. These two topics combine in this paper.

Mushroom spores are released into the atmosphere every day by the billions. In weight, this amounts to 50 million tons per year or, if you wish, about 1000 spores per square millimeter of the earth's surface. Together with pollen, bacteria, and other biological particles, they serve as nuclei for cloud formation and, therefore, rain (we leave the intriguing story of atmospheric bacteria for another time). Fungal spores come in different sizes but a diameter of 5 – 8 µm is rather typical. This size is small enough for the spores to be carried aloft even by gentle wafting breezes. Measurements made in Brazil show that fungal spores account for about 35% of the total particles of this size range. The figure is higher and varies less during the year for the heavily forested tropics than elsewhere.

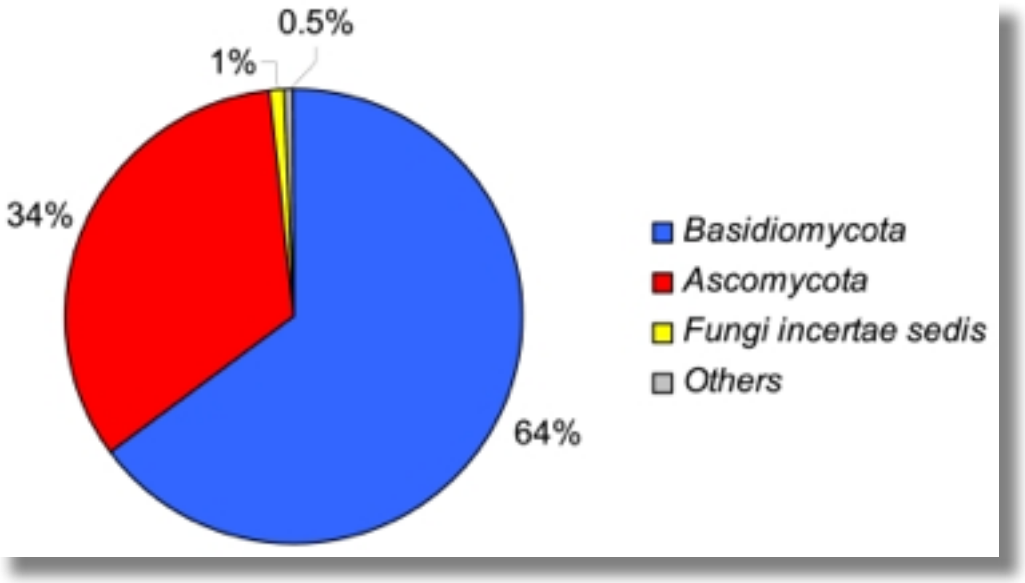


Figure 1. Distribution of fungal phyla represented by DNA in samples of airborne fungi[2]

The atmosphere may be a thin soup all right, but enough material can be gathered for analysis using high capacity filtration techniques and long sampling times (one week is typical). Interestingly, in the samples so collected, mannitol can be used as a suitable biomarker for the presence of fungal spores and, of course, so can DNA. In fact, the DNA analysis shows that about 2/3 of the fungal spores are from fruiting bodies of Basidiomycetes and about 1/3 from Ascomycetes (which include morels and some other mushrooms)[2]. So, mushrooms and other fungi are indeed the largest source of particulate matter acting as nuclei for raindrops in the atmosphere. The species found are quite diverse and include allergenic ones (not a surprise for people suffering from such allergies) and human and plant pathogens (e.g., *Candida*, *Puccinia* or cereal rust).

It doesn't make much difference here, but mushroom spores are made sexually, those of mold largely asexually. And their mechanisms of release into the air are different. Asexual spores – conidia they're called – are released

passively, that is, they simply detach from the hyphae that make them and are limited in their dispersal. Sexual spores of typical mushrooms (but not truffles, puffballs, etc.), on the other hand, are forcibly ejected from their maternal cells and are immediately swept out by air currents.

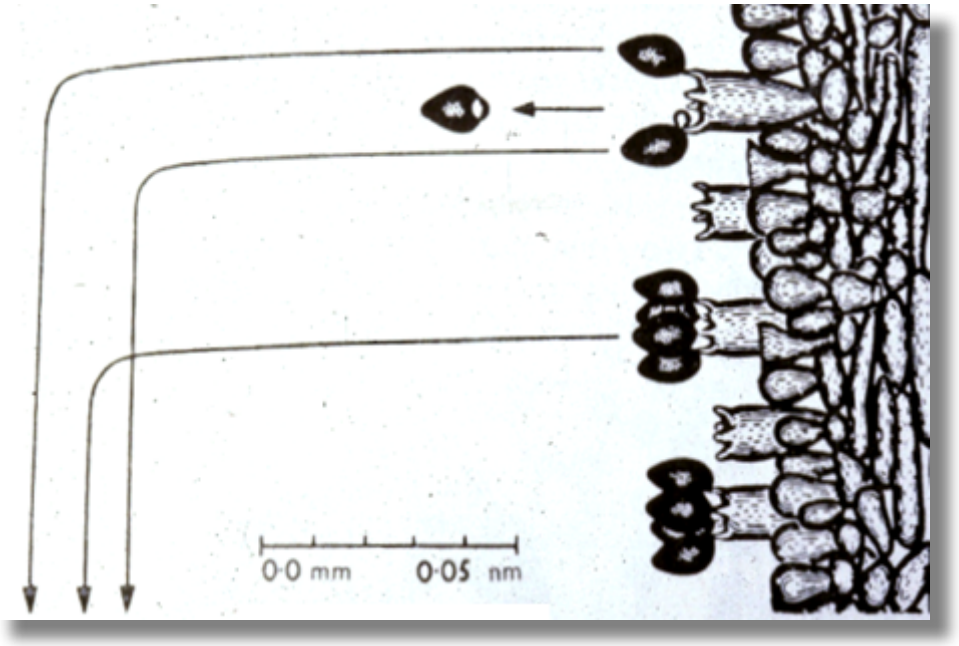


Figure 2. The trajectories of spores being ejected from the gills of a Basidiomycete mushroom. Notice the sharp break in the curve (something a baseball pitcher would dream of!). From AHR Buller, *Researches on the Fungi*, Vol. II, 1922

The mechanism of spore release in both the Basidiomycetes and the Ascomycetes defies the imagination. Basidiospores, as they're called, are ejected from the "gills" or pores found on the underside of mushrooms with an astounding force of over 10,000 x g and an initial velocity of close to 2 meters/second! Of course, the initial velocity is sustained for a very brief time, or else the spore would hit the opposite gill. In fact, the trajectory is interesting: the spores travel horizontally for a short distance, they then "hit a wall", when their momentum cannot overcome the viscosity of air. At this point, they drop vertically, to be caught by air current and carried over a long distance. The mechanism of release depends on the formation of a water droplet at the base of the still attached basidiospore. When this droplet increases in size due to the secretion of hydrophilic substance such as mannitol, it eventually collapses, transferring its center of gravity outwards. This impels the spore to take off at prodigious – if sustained extremely briefly – speeds.

Under internal pressure from maturing spores of cup shaped Ascomycetes and humidity, the contents of asci can simulataneously squirt spores into the air anywhere from a few millimeters to about 2 feet. Air turbulence created by the explosive discharge carries the spores further distances. Those of *Sphaerobolus*, aptly called the cannonball or artillery fungus, impel their spherical spores to travel over a 6 m. horizontal and 2 m vertical distance. The force is supplied by turgor built up by an increase in osmotic pressure in the spore-bearing tissue by conversion of glycogen into sugars. Overall, spore discharge over distances is more common among the basidios than the ascos.[2] The spore discharge mechanisms of zygomycetes can be even more spectacular than either of the major phyla. Impelled by pressurization, the spores of zygomycete *Pilobolus,* for example, can travel up to 2.5 meters. Nice, but what does this have to do with rain formation? The proposal from Money's lab is an explanation for the way fungal spores make for nuclei effective in the formation of raindrops. Before considering the possible mechanism, let's do some numbers. Are there sufficient spores in the atmosphere to make a difference?

The answer is yes. To repeat, fungal spores are dispersed every year to the tune of 50 million tons, enough to cover each square mm of the planet with 1000 spores. They are not distributed evenly, with forested regions accounting for the greater share of the production. So, the numbers seem to add up.

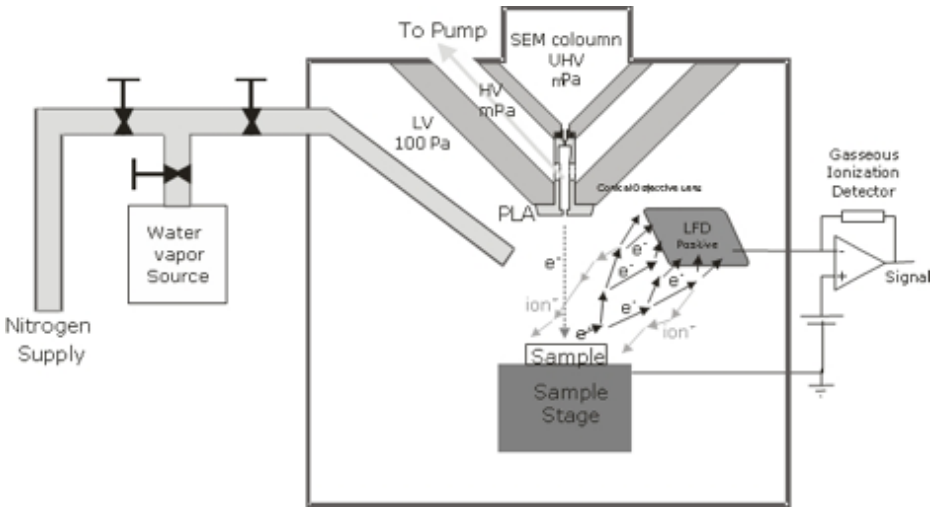


Figure 3. Schematic of the business end of an ESEM.

How to show how fungal spores make rain? The investigators measured the amount of moisture that accumulates on fungal spores at different levels of moisture. For this, they used a not so novel but relatively underused (and to me, previously unknown) variation on the electron microscope, namely one that allows to look at wet objects. Called Environmental Scanning Electron Microscope (ESEM), this machine overcomes the problem of conventional EMs, namely that the objects have to be dehydrated. A webpage by its main developer, GD Danilatos is found here[4]. In the ESEM, the specimens are placed in a small chamber that can be vented with gases, including water vapor. For this purpose, the EM needs considerable modification with regard to pumps and the detection system. It is commercially available, apparently not cheap. Microbes have been studied with the ESEM,[3] but best I can tell, it has only had limited use in microbiology. But this paper does it justice.

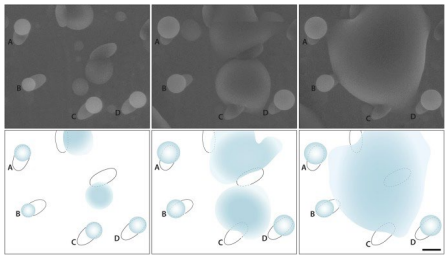


Figure 4. Droplet formation on basidiospore of *Suillus brevipes* in the ESEM at 101% RH.(A-D) Spores are orientated with adaxial surface facing away from surface of the specimen stub, allowing observation of droplets growing from this hygroscopic region of the spore. Note merger of droplets in second and third panels. Scale = 5 μm. [1]

The authors collected 8 species of mushrooms and placed the spores in the ESEM and altered the relative humidity (RH) in the specimen chamber. Droplets of water formed on the spores at RH values of 101 and 102%. Interesting is that these droplets formed precisely on the sites on the spore where they are seen before being discharged, namely the peduncle where the spore sticks to its mother cell and on its adjacent (adaxial) face. The drops evaporated when RH was lowered below 100%, only to reappear when RH was once again increased.

In time, the water droplet on the face of the spore reached large dimensions (13 µm). The authors also looked at the behavior of spores of basidios such as puffballs that do not forcibly discharge them. Here, the water makes a thin shell around the spores with no specific localization, suggesting that there are different ways whereby spores induce water droplets to form.

Does this benefit the mushrooms? The authors state: "There is no adaptive significance to the putative effect of spores on cloud formation. It is a consequence of the dispersal mechanism that happens to benefit the fungus beyond its effectiveness at distributing spores. If changes in climate reduce rainfall in tropical ecosystems, the resulting inhibition of fungal growth and spore release may exacerbate the frequency of droughts through this unexpected feedback loop". I guess one could argue whether this feedback loop has adaptive significance. Let me put it this way: No rain, no mushrooms!

[1.] *Mushrooms as Rainmakers: How Spores Act as Nuclei for Raindrops*. MO Hassett, MV Fischer, NP Money, PLoS One. 2015 Oct 28;10(10):e0140407. doi: 10.1371/journal.pone.0140407. eCollection 2015. http://www.ncbi.nlm.nih.gov/pubmed/26509436.
[2.] *High diversity of fungi in air particulate matter*, J. Froehlich-Nowoisky, DA Pickersgill, VR Despres, U. Poschi Procedings of the National Academy of Science, 2009 Aug. 4; 106 (31):12814-9: 10.1073/pnas.0811003106. Epub 2009 Jul 17. Abstract on PubMed. http://www.ncbi.nlm.nih.gov/pubmed/19617562.
[3.] *Advantages of environmental scanning electron microscopy in studies of microorganisms*. Microsc Res Tech. 1993 Aug;25(5-6):398-405. https://www.ncbi.nlm.nih.gov/pubmed/8400431.
[4.] *ESEM Development and its Future* by G D Danilatos http://www.danilatos.com.

You Never Know
(when a mushroom you find is going to be important)

By Dick Bishop

(Published in *MushRumors*, newsletter of the Oregon Mycological Society (OMS), Jan.-Feb. 2016.

I'll give you an example of a personal experience and then provide some guidelines for how you might respond when you find something you think might be unusual.

A few years ago Sallie Jones and I were surveying some Aspen groves at the Conboy Lake Wildlife Refuge. I should mention that you need to get permission to collect anything on the refuge. I was particularly interested in seeing what *Leccinum* species grew there. Over a period of three years we collected a number of different species of *Leccinum* but also many gilled mushrooms. On one occasion we were looking in a dry ditch that ran through a particular Aspen grove and found a group of *Cortinarius* of varying age from buttons to mature enough to be shedding spores. We didn't think we had seen this species before so I took lots of pictures and collected several of varying ages. We took the mushrooms home and checked them out macro and microscopically but failed to come up with a name. This is not particularly unusual with *Cortinarius*.

Because we had a good collection of varying age I decided to send pictures of it to a few people that might know what it was. One of the people that I sent it to was Michael Beug because I knew the Michael had worked with Dr. Joe Ammirati, a *Cortinarius* expert and mycology professor at the University of Washington, collecting *Cortinarius* near the same area where we were surveying.

Cortinarius argutus found at Conboy Lake Wildlife Refuge
Photo by Dick Bishop

Michael hadn't seen it before so he sent my pictures to Joe Ammirati. Dr. Ammirati thought he knew what it was and ask me to send some of the specimens to him. He in turn sent the some of the material to some researchers in Finland for a DNA comparison with type material from Europe. Once it was determined that the species we had found was the same as the European material it was decided to compare some similar collections of Dr. Ammirati and Dr. Cathy Cripps, Montana State Mycology Professor. Dr. Cripps collections had also been found with Aspen but Dr. Ammirati's were found with Willow. The results of this comparison was judged important enough to be published in the journal *Botany* (formerly the *Canadian Journal of Botany*) in an article written by Dr. Cathy Cripps.[1]

What can you do when you find a nice collection of mushrooms that defy your attempts to identify? First of all realize that this is not necessarily a bad thing. If we had been able to identify the mushroom in the example above no scientific knowledge would have been gained. Taking good pictures of your collection when they are fresh is the all important first step. You need to show each part of the mushroom including the flesh and any bruising reaction on any part of the mushroom. Note the habitat by taking additional pictures or collecting pieces of the foliage or cones. Note the location either by GPS or by written notes. If you have a microscope collect as much microscopic data as you feel competent to do.

Now that you are armed with information who will you ask to help? One of the easiest ways to get help is to post your pictures and information on internet sites such as *Mushroom Observer*. Mycologists sometimes watch these sites when they are doing research and may contact you if they see something that is of interest. If you think your collection might be of use to someone you will need to dry it in a food dehydrator set at low temperature (about 100 F) until it is crispy dry.

Cortinarius argutus Photo by Dick Bishop

1. "Intercontinental distributions of species of *Cortinarius*, subgenus *Phlegmacium*, associated with *Populus* in western North America" by Cathy L. Cripps, Kare Liimatainen, Tuula Niskanen, Bálint Dima, Richard F. Bishop, Joseph F. Ammirati, *Botany*, 2015, 93(11): 711-721, 10.1139/cjb-2015-0089. Full article can be found at http://www.nrcresearchpress.com/doi/abs/10.1139/cjb-2015-0089?journalCode=cjb#.VsnZc8daZU0.

Brain Chemistry and Mycophilia

By Bob Sommer from MSSF's *Mycena News*, Dec. 2015, Vol. 67/04

In the May 2015 *Atlantic*, Sam Kean, author of *The Tale of the Dueling Neurosurgeons: the History of the Human Brain as Revealed by True Stories of Trauma, Madness, and Recovery* wrote an article about the physiological basis of exaggerated interests. According to Kean, Dr. Andrew Lees, a London neurologist and the world's most highly cited Parkinson's researcher, prescribed Pramipexole to several patients suffering from Parkinson's, a disorder of the nervous system that causes difficulties with movement, muscle control, and balance. One of these patients was an anonymous 58-year-old naturalist who, after taking the drug, began "writing obsessively about mushrooms and toadstools — sometimes for 48 hours straight." The patient started distributing sandwiches to drug addicts he encountered while walking around London and giving away money. All these activities were unusual for the man. When Dr. Lees reduced the dosage of Pramipexole, the patient's unusual indulgences declined.

At a personal level, I hoped that Lee's research could explain my obsession with all things fungal. I cannot walk around town without looking for mushrooms on watered lawns or around city trees, mushrooms which I am driven to collect, (sometimes illegally), paint, and, write about. I have over 600 scanned watercolors of fungi on the MSSF website with the originals housed in the MSSF library and hundreds more in file boxes at home. Friends and family cannot understand my preoccupation with fungi, most of which I don't eat. I endure all manner of hardship — rain, mud, poison oak, ticks, and fear of arrest for trespassing or vandalism. When in the woods, I am always looking down at the ground, missing mountains and other scenery. I seek out year-old forest fires, traipsing through ugly burned areas covered with char in search of barely visible morels. The median number I have found per trip is zero, but no one writes about that. I learn Latin names which professional mycologists debate and change (seemingly) arbitrarily. My obsession has continued unabated for several decades. I also travel to distant locations in the company of fellow mycophiles to forage and discuss fungi we won't be eating.

In his *Atlantic* article Sam Kean wonders if this type of obsession is a form of mental derangement. Based on Lees' patient's mushroom craving which worsened after taking the drug and got better when the dosage was reduced, he answers the question negatively. Lees attributes this change to the drug's role as a dopamine antagonist. The pleasure and reward centers are damaged in Parkinson's, reducing the patient's ability to enjoy life, and when the drug restores the balance and the dopamine starts flowing, this brings a rush of excitement, culminating in exaggerated interest in things. I am inclined to agree with Lees' assessment. I experience a heightened mycophilia when the rainy season starts and withdrawal symptoms if I can't get to the foothills or mountains. This condition has been exacerbated by the California drought where I have nothing to write or paint about. I find myself using the writer's gambit (as I am doing here); when blocked, write about not writing.

Although I accept Kean's argument that excessive interests may have a physiological basis, I don't believe that mycophilia represents a condition that requires treatment. After all, gambling disorder is the only non-substance related addiction listed in the current edition of the American Psychiatric Association's diagnostic manual (DSM-V) used by the government and insurance companies to decide benefit claims. I am not sympathetic to the current diagnostic inflation, the tendency to medicalize ordinary human experience. When mushroom season comes around, I will to go into the woods rather than take a pill.

Split Split Gills and Ground Ground Nuts on a Fine Fine Day

By Wendy So and David Arora

[In which we describe a popular preparation of Split gills (*Schizophyllum*) and ground nuts (what Americans call peanuts) from the border region of the Congo, Angola and Zambia.]

Schizophyllum, are widely harvested here in central Africa, and sold dried in the local markets; typically they are wild, not cultivated as in SE Asia. The local people like to boil them for two hours (throw them in a pot of water and simmer over charcoal while doing other things, so "not worth the effort" doesn't apply), then they pinch off the tough base and split the split gills into little strips. These are seasoned with salt, put into a frying pan with some of the soaking water, and then ground ground nuts (widely sold in little packets as peanut meal) are stirred in, one small chili is added and they are cooked briefly. The result is delicious! The *Schizophyllum* provide chewy meatlike morsels as well as flavor. Grace, who cleans our cottage and told us how to prepare them, approved of our effort at preparing this local dish. When we offered her a taste she ate the whole bowl!

Later, it poured. We retreated indoors from our veranda and were discussing dessert options when termites swarmed. Attracted by the veranda light, they crawled under the closed doors by the hundreds. Small ants suddenly materialized from the walls and attacked the termites. Carnage ensued, with ants biting the termites' heads, and then dismantling and devouring some on the spot and dragging others away like chain gangs hauling logs.

Knowing that winged termites are a popular seasonal delicacy, we decided to try some, but had to act fast because the ants weren't going leave us any. So, we gathered up a bunch of live termites, drowned them in a bowl of water and then pulled off their wings. Fried very briefly, for one minute only, they had a sweet, nutty taste and were crunchy like fried pork rinds. The only drawback was that these were not very big termites. The locals eat the biggest kinds only, as otherwise it is a lot of work for just one or two bites.

In our cottage there are also these amazing paper-thin spiders. They hang around doorways and I have never seen something so flat that wasn't squished! They are perfectly adapted to squeezing through the narrowest gaps so they can come indoors to feast on mosquitoes and other insects. Geckos also abound. The locals don't eat these, so we didn't either.

Oregon Truffles: Love at First Sniff

By Michael W. Beug

On a recent guided foray with Umami Truffle Dogs, I discovered that not just Oregon Pinot Noir is world class. The unique Oregon white truffles are equal to the best truffles in the world. In a two-hour hunt, two truffle dogs unearthed just over one pound of Oregon winter white truffles. Their aroma is hard to describe. It is penetrating, earthy, oily, cheesy, mildly of garlic, redolent of sex. I feel that I should be repulsed by the odor (some are), but it stirs an unquenchable longing. Our guides had prepared a lunch of truffle-infused cheeses. There was butter and cream cheese containing micro-planed white truffles. We snacked and visited for an hour and one half. Don Moore and Pam Buesing had invited me on the hunt. Five other members of the Oregon Mycological Society shared the adventure and the incredible experience.

I have had fresh French black truffles, genuine white and black truffle oil (what you buy is often imitation), and Italian cheese in olive oil with truffle slices. All were gifts of my good friend and former student Paul Stamets. All were delicious. Still, nothing had prepared me for Jan 27, 2016 – the day of our truffle hunt. The Oregon winter white truffle is sublime.

Linda Gallacher, Don Moore, Kris Jacobson, Bella and Lisa Photo by Michael Beug

Arriving home that evening, I cleaned the truffles. The weight was 2.5 ounces. Had they been morels, there would not have been enough for even one decent meal. However, Kris Jacobson, owner of Umami Truffle Dogs told me how to first use the truffles to infuse fatty foods and only later consume the truffles themselves. Infusing involves placing fatty foods in a sealable container with the truffles nested in a paper towel so that the truffles do not touch the food. Over the next six days, I infused 1.5 pounds of butter, about 1 pound of Asiago cheese, about 1 pound of Gouda cheese, 8 ounces of cream cheese, 6 ounces of Chevre, 6 ounces of goat brie, four jumbo avocados, three raw eggs (whole), and four hard boiled eggs (peeled). Only after all of this did I consume my first truffles.

Kris Jacobson had advised that when using truffles, simple is best. The aroma is everything. Add truffles at the end of the cooking process. Cooking would dissipate the marvelous odor. The truffles themselves have little or no flavor.

For dinner on day six, my wife, Ann, cooked organic Einkorn Pasta. I tossed the pasta with one pat of truffle-infused butter; about ¼ cup finely grated truffle-infused Asiago cheese and 1/3 ounce of finely grated Oregon winter white truffle. The meal was sublime. There were other incredible meals. The first was breakfast of scrambled, truffle-infused eggs accompanied by toast with truffle-infused butter and toast with truffle-infused cream cheese. The cheeses, eggs and butter had merely been stored for 36 hours in the refrigerator in a sealed container with 1.25 ounces of truffle nested in a paper towel. No grated truffle was consumed, yet the breakfast was marvelous. Days later, we repeated the breakfast with plain eggs scrambled in plain olive oil, but with a pat of truffle-infused butter, 1/3 cup grated truffle-infused Gouda cheese, and 1/3 ounce of grated truffle added at the last minute. This was another incredible breakfast.

Tuber oregonese with metric scale Photo by Michael Beug

Finally, Don Moore had mentioned how wonderful grated truffles were on an egg-salad sandwich. I made egg salad with three truffle-infused hard-boiled eggs, mayonnaise and 1/3 ounce grated truffle. I used half of the mix on a sandwich. The truffle flavor seemed subtle. Was I getting satiated? After a day sealed in a container in the refrigerator, the aroma of the remaining egg salad was much stronger of truffle. I also enriched the sandwich with slices of truffle-infused avocado. That lunch was superb.

After seven days of incredible treats of truffle-infused cheeses, truffle-infused avocados, and eggs, and four meals with grated truffle, I still had over 1.5 ounce of whole truffles. I had 1.25 pounds of truffle-infused butter, 4 ounces of truffle-infused Chevre, ¼ pound of truffle-infused Asiago cheese, and ¼ pound of truffle-infused Gouda cheese that we (with the help of half a dozen friends) had not yet consumed. I wrapped the remaining items in waxed paper, placed them in double Zip-loc® bags, and put them in the freezer. Kris Jacobson says that they will keep for up to a year. I will be pulling some out from time to time for special friends.

I could have infused olive oil and mayonnaise. However, infused products do not have a long shelf life. I focused on things that either I could freeze and keep for an extended period or would be eating promptly.

The Oregon winter white truffle is one of four culinary truffles found under Douglas fir west of the Cascades from northern California to southern British California (one species, the rare Oregon brown truffle, seems con-

fined to the region south of the Columbia River). At least three culinary truffles occur in eastern North America. A well-trained truffle dog will locate any ripe truffle, culinary and otherwise. The trained dogs ignore unripe truffles. The foragers who rake for truffles dig up both unripe tasteless truffles and ripe ones, damaging both the habitat and the culinary reputation of truffles. I once went to a very famous wild mushroom restaurant near McMinnville, Oregon and ordered several expensive truffle dishes. All were bland and uninteresting. The owner rakes his own truffles. I will never return to his restaurant. If you ever buy fresh truffles, buy them in person and insist on smelling them first. Raked truffles will usually be flavorless. Fresh dog harvested ones are superb.

Prior to my outing with Kris Jacobson and her friend Linda Gallacher with their dogs, Ilsa (a Belgian Malenois) and Bella (a Nova Scotia Duck Tolling Retriever), I did not see why good truffles command such high prices. Now I know. The famous Italian white truffle, which can command prices up to $4,000 per pound, has a different odor and different uses from the two culinary Oregon white truffles, which command prices up to $800 per pound. However, I am convinced that the Oregon white truffles are every bit as fantastic as the Italian whites are. They are also far more versatile. To learn more, watch for my forthcoming article about truffles to appear in *Fungi* magazine.

Don Moore, Kim Brown, Michael Beug, Nick Iadanza, Lisa Lee, Eva Van Dyke, Pam Buesing, Kris Jacobson, Maggie Iadanza, and Linda Gallacher Photo by Michael Beug

Many of you are receiving this edition of *The Mycophile* despite not yet updating your membership status for 2016. For the first time ever, we have extended the deadline to renew your NAMA membership to April 15. Please sign up without delay to continue your membership benefits and to support our work throughout 2016 by logging onto http://mms.namyco.org/members/renewal_req.php?org_id=NAMA. If you have lost or forgotten your NAMA ID, contact Steve Bichler at membership@namyco.org for help. Checks should be sent to: Steve Bichler, NAMA Membership, 6018 Illinois Lane SE, Unit B, Lacey, WA 98513-3617. Honestly, we would hate to see you go.

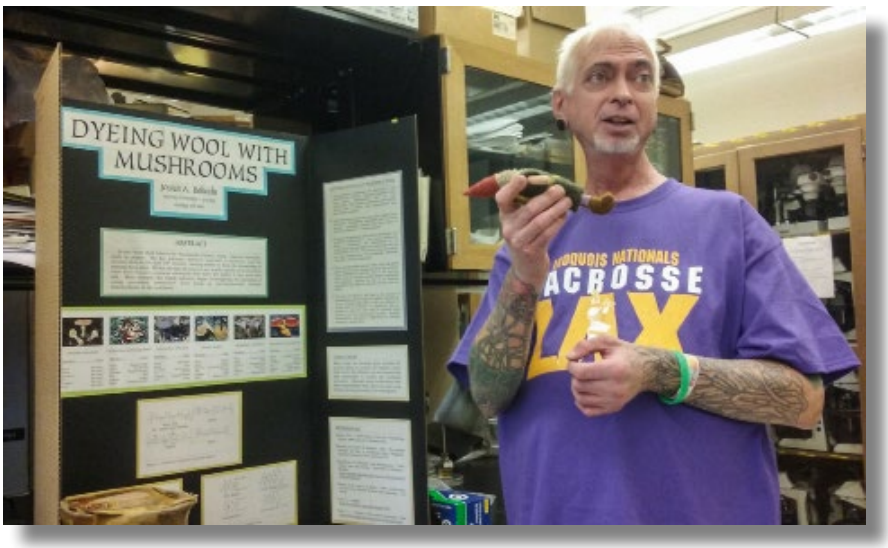
Introduction to Mycology: A Mycophile's Journey Into the World of Science

By JJ Murphy

On day one, students in Dr. Thomas J. Volk's mycology class stood around a lab table sorting an array of fungi by color, shape, texture, and later sorting gilled, pored and toothed fungi. I stood back and watched. It would be my only day of leisure in Biology 412 at the University of Wisconsin, La Crosse.

Fall semester took me on a journey into the lives of fungi which I was literally not prepared to take. I earned my M.A. in Journalism back in the 1970's. But beyond being a respected mycologist, Tom Volk is a gifted teacher. Gifted teachers are rare. I am profoundly grateful to the mentors in my early school years for helping me develop critical thinking skills and effective study habits essential to taking this class.

I had to learn the biological vocabulary already familiar to my classmates – haploid, diploid, plasmogamy, karyogamy. I've never noticed anyone discussing the ploidy level of the fungi we find during mushroom walks or ID sessions. I'm still baffled by mushroom sex and plan to take an actual biology class to try to understand fungi from a mycologist's perspective.

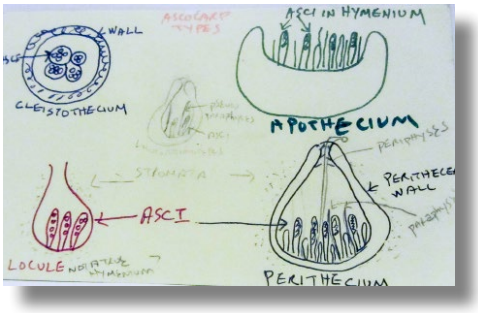


Thanks to NYMS and COMA for my familiarity with some vocabulary - saphrotrophic, mycorrhizal, hyphae, mycelia. Tom wants me to think (in Latin) instead of reaching for reference material, but I still need my vocabulary flash cards to sort out cystidia, conidia, capillitium and list of other similar sounding terms.

I had to grasp the biological concepts my classmates have worked with for two years, like taxonomic rank (Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species (and their mycological suffixes) as well as biological survival strategies, like convergent evolution. I compared flash cards from an alumnus who took Dr. Volk's class in 2006 to my own flash cards. In 2006 there were four phyla in the fungi kingdom and slime molds were still considered fungi. The differences showed me just how quickly things change and how much we still have to discover about fungi.

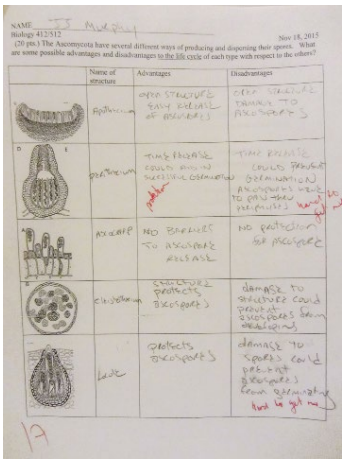
Taxonomy is in flux, so I had to remember that Dr. Volk wanted us to study the old Ascomycota classification system, even though we were also introduced to the newest one during lecture. And I had to remember that *Pencillium sp.* and *Aspergillus sp*. are classified as both Ascomycota and Deuteromycetes, which is why Dr. Volk repeated "Alternate classification scheme. Write that down." at least three times during one lecture.

Using left over paper that had covered lab tables in past years, I drew charts for the Basidiomycota and the Ascomycota, which hung in the hallway outside the graduate student office. When I got to the remaining phyla, I could not figure out how to draw any kind of chart or relationships. That paper remained blank for the rest of the semester.

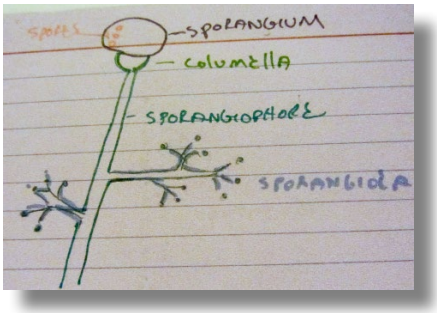


Over the next four months in addition to collecting fungi, sorting through keys, poring over reference books, and making our own slides, we would look at prepared slides, study life cycle charts and study posters made by former students who won awards for their posters. Part of our homework was to prepare a collection of twenty specimens.

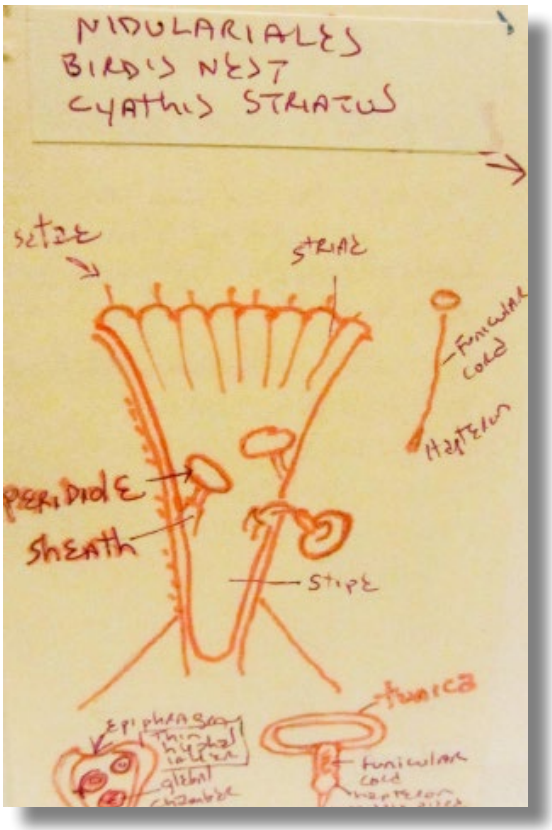
Tom had to see each fresh specimen to confirm our identification and we had to write a description of the fungus, provide a spore print if possible, describe and draw the spores, and explain why the fungus belongs in that particular genus. I'm still amazed at how little tissue is necessary to make a slide. I need a lot more microscope time as well, but at least I got a sound start.



We also had to prepare five cultures. I have tremendous respect for scientists who persevere despite contamination and other challenges to their research. I did manage to get five cultures after preparing dozens of plates and using several yards of parafilm.



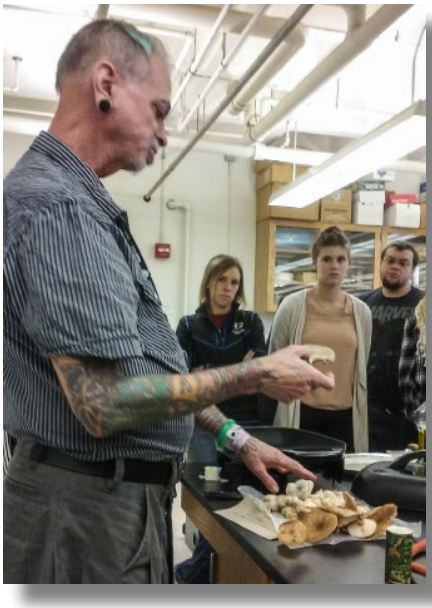
Back in the 1970's faculty used black boards, overhead projectors and handouts to communicate. Students used paper and pencil or pen to take notes. In the 21st Century, lectures are made of up of PowerPoint images and students use electronic devices to take notes, make flash cards and as reference books. We viewed nearly 1200 PowerPoint files slides (1191 to be exact) over the semester. That's more material than I can even try to memorize, let alone understand in just 12 weeks. I have everything saved to a thumb drive and continue to work my way through the material.



Dr. Volk expects students to comprehend the material, not simply memorize it. I'm a long way from comprehension. It took me over four weeks just to understand how fungi digest their food. When I finally did "get it," I approached Tom, standing up straight and said, "I am a hypha. The vesicles are transporting exoenzymes to my tip," as I moved my arm from foot to head, tapping my head. "And the exoenzymes go into the substrate, breaking down the material, which I then absorb."

"That wasn't so hard," he said.

Well, it felt like hard work to me.



My fellow students have my deepest respect. I was devoting more than eight hours a day outside of class time just to study mycology. Imagine having at least three other science classes when grades matter, working part time and trying to have the social life of a young adult. That's a lot of pressure.

Dr. Volk understands how to get an overworked student's affection. We enjoyed edible mushrooms as we began the study of each phylum. In addition to being a brilliant scientist, an inspiring teacher, and a great cook, Tom's got a great sense of humor. His flagellum dance performance made the mushrooms and slime molds most of us overlook more memorable.

I am grateful to Tom for giving me keys to the science building, the grad student office, the lab and his vast library. Many of those library books are out of print. Some are even out of date. But the two volume North American Polypores by Gilbertson and Ryvarden had drawings of hyphal structure I have not found in any Internet search. It's one thing to know that a hypha is a filament-like structure. It's quite another to look at drawings of the different types of hyphae and understand how they create the fungal structure. I stared at those wiggly lines for weeks and tried to match those images to what I saw under the microscope.

I'm under a mycological spell. The more I learn, the more I want to learn. Dr. Volk is demanding, but he is also compassionate. I did well in my homework assignments, but poorly on the tests. There is a lot I do not understand – yet. I have a very accurate map of what I need to learn, along with a deep awareness that what I learn today will very likely not be true in just a few years.

Wishing For More?

NAMA is pleased to announce an in-depth class on the genus *Lactarius*, to be taught by Dr. Andrew Methven in early fall from September 12 through September 15, 2016, at Wildacres Retreat, located just off the Blue Ridge Parkway near Little Switzerland, North Carolina. (This is the same location as the annual NAMA Regional Wildacres Foray.)

Participants will develop an in-depth appreciation of the classification and phylogeny of *Lactarius* species that occur in the southern Appalachian Mountains. Emphasis will be placed on the analysis of macro- and micro-morphological features in the identification of taxa. The daily routine will consist of a morning lecture followed by a field trip until early or mid-afternoon. Collections will be examined and identified after returning from the field and an opportunity provided to assemble a collection of dried specimens. The laboratory will remain open in the evenings for additional work on collections.

Attendees must be NAMA members, have basic fungal microscopy knowledge and provide their own microscopes and necessary materials.

Class is limited to ten (10) participants. Cost per person is $250. The registration deadline is August 1, 2016.

For more information and to register, contact Glenda O'Neal : glendakoneal@yahoo.com or by phone (423)-863-2742.

17th International Fungi & Fibre Symposium

October 17-22, 2016 Madeira Park, British Columbia

Mushroom dyers from all over the world will gather on BC's Sunshine Coast this fall for the 17th International Fungi & Fibre Symposium, the first time this event--held somewhere different in the world every two years--has been held in Canada. Participants can choose each day's schedule from an array of forays, dye sessions, and workshops.

Workshops will range from West Coast-inspired sessions, such as weaving baskets from cedar bark or learning survival skills from a self-described "bushman"; to mushroom-related classes (basic ID, the chemistry of mushroom pigments, crafting jewelry with *Trametes versicolor*); to fibre workshops (felting whimsical mushrooms, spinning with a drop spindle, Nuno felting).

Daily dyepots using mushrooms found in BC's rainforests (and perhaps a few brought from elsewhere) will yield a gorgeous rainbow of colors, and every registrant will go home with a collection of striking samples. Mushroom-dyeing maven Alissa Allen will also conduct a workshop about the magic of dyeing with lichens.

Evenings will feature gourmet meals, complete with presentations or entertainment. Guest speakers and foray leaders include Daniel Winkler, who will talk about some of his exotic finds, and Paul Kroeger, with his presentation on the mushrooms of Haida Gwaii.

Socializing and catching up with old friends is an important feature of this gathering, and we have the perfect venue for that. Attendees will stay in upscale waterfront condos at the Painted Boat Resort, where almost everything is within walking distance (we'll provide transportation to those events that aren't).

Registration includes gourmet lunches and special evening meals, choice of workshops/forays, along with a few pleasant surprises. Registrants will arrive in Vancouver and make their way to Horseshoe Bay (a short distance north of the city), where they'll take the ferry to the Sunshine Coast, 40 minutes and a world away from Vancouver. Transportation to and from the Langdale ferry terminal will be provided for those who aren't driving.

The 9th annual Sunshine Coast Mushroom Festival will be held October 14-16, for those who may wish to arrive early and rub shoulders with members of the Sunshine Coast Society for the Hunting, Recognition and Observation of Mushrooms (SHROOM).

Registration opens March 1; early registration is recommended. Details can be found at http://fungiandfibre2016.org.

(Note that the Canadian dollar has dropped in value compared to its US counterpart, making the registration fee even more attractive to those who live south of the border!)

Some Photos from the All California Club Foray

taken by Hugh Smith

Hygrocybe sp.

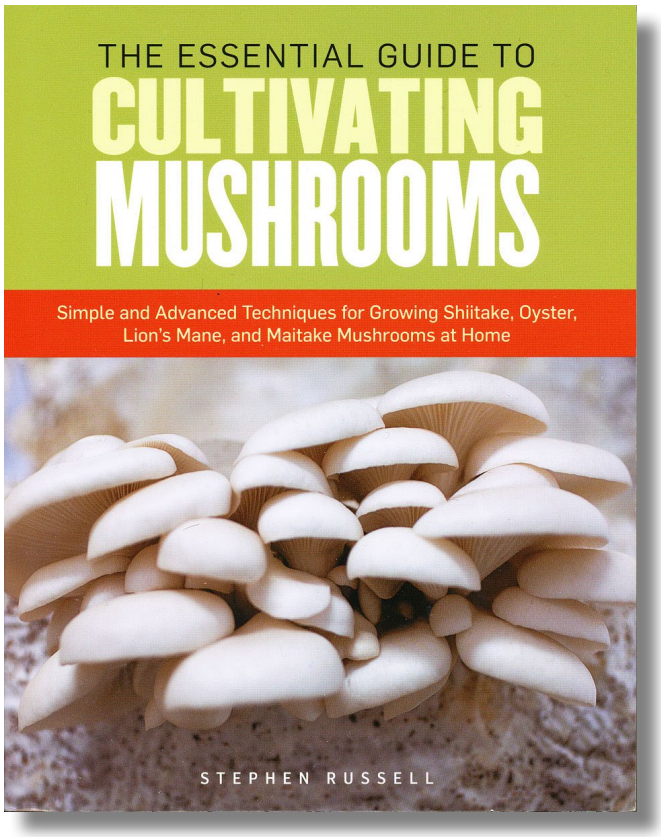
Ganoderma oregonense

Happy ACCF attendees

Pseudohydnum gelatinosum & cricket

Galerina marginata

The Essential Guide to Cultivating Mushrooms: Simple and Advanced Techniques for Growing Shiitake, Oyster, Lion's Mane, and Maitake Mushrooms at Home



Stephen Russell
Storey Publishing (www.storey.com / 413.346.2100)
2014; 232 pages; ISBN: 978-1-61212-146-8 (paper)
$24.95

Anyone can grow mushrooms at home. The proof is that I did it and if I can do it, then anyone can. However, the method I used was a quick and dirty one using kitty litter and oyster mushrooms, which are very aggressive and will grow on almost anything. If one wants to expand her/his repertoire beyond oysters, different more-demanding procedures are needed. Stephen Russell's recent book provides an introduction to mushroom cultivation and considerable how-to detail intended to help a beginner get started (or a non-beginner to become more advanced at) growing a variety of species.

In the Preface, Russell explains his motivation in writing the book. "When I began growing mushrooms a decade ago, the best references were Paul Stamets's books The Mushroom Cultivator and Growing Gourmet and Medicinal Mushrooms. … However, … they did not fully elaborate on many of the most beneficial methods for small-scale, at -home cultivation. They also did not address many of the unique challenges home growers often encounter."

The book is divided straightforwardly into three parts—Basics for Beginners, Intermediate Methods, and Advanced Methods. Part 1 includes four chapters—Getting to Know Mushrooms (a brief primer including some biology, human uses of mushrooms, an overview of the cultivation process, and summary information about the four mushrooms mentioned in the book's subtitle); Basic Growing Options (including ready-to-grow kits, using pre-made grain and plug spawn, growing on logs, and using spore or liquid culture syringes for inoculation); Combating Contaminants (the importance of sterile technique and a summary of common fungal and bacterial contaminants); and Your First Grow (a step-by-step guide to the "PF Tek" method).

For those ready to progress beyond the basic method, Part 2 includes six chapters with self-explanatory titles—Pressure Cookers and Flow Hoods, Grain Spawn, Casings, Liquid Cultures, Working with Sawdust, and Midsize Fruiting Chambers.

Part 3 presents information for those who want to get very serious about cultivation with three chapters—Agar Cultures (developing and maintaining your own library of strains), Large-scale Grain Spawn, and Bulk Substrates (the last two chapters for those who want to produce large quantities of mushrooms). A short list of resources and a general index follow Part 3.

The strength of the book lies in its being based on Russell's own experiences as he progressed from a beginner to an expert in cultivation. Overall, it is fairly clearly written (there are places where some editing would have improved things) and is illustrated with lots of useful color photographs. Thus it should be effective in helping most people learn the basics of cultivation. However, don't be misled by the subtitle. This isn't a guide focused on "Growing Shiitake, Oyster, Lion's Mane, and Maitake Mushrooms" although the information provided in the book will allow one to do that. You just have to put some work into pulling together the necessary information from different parts of the book.

The basic approach presented in Chapter 4 (Your First Grow) is the PF (Psilocybe Fanaticus) Tek method developed for growing "magic" mushrooms, which happens to be illegal. Although it does provide an introduction to most aspects of growing mushrooms, it isn't a method that would normally be used for any of the four focus species in the book's subtitle, especially not for producing them in quantity. Although nearly all the steps in the method are well illustrated, there are no photos of the end product—mushrooms fruiting. Thus, one might wonder why this particular approach was taken as an introduction, rather than one of the many other simple methods available or perhaps just a general treatment.

In reading through the book and envisioning myself trying to follow the methodology, there were places where some additional explanation would have been helpful. For instance, there are numerous references to "PF jars" in the early part of the book, which led me to think that these must be some special thing. But no, in Chapter 4, I learned that they are merely ordinary, wide-mouthed, half-pint canning jars. Russell refers to them as PF jars because they are the containers used in the PF Tek method. A glossary would have been useful in this case.

There are a number of places where I would take issue with the way terms are used (for instance, the "flow hood" he describes is not a hood at all, merely a blower box) and the explanation of the underlying science (for instance, spores don't mate), but these shouldn't prove to be impediments to the practical use of the book.

If you think you might be interested in growing your own mushrooms, this might be a good place to start.

Steve Trudell

Recommended Online Articles

The Mycobiome, http://www.the-scientist.com/?articles.view/articleNo/45153/title/The-Mycobiome/.

The Year in Fungi, http://www.newyorker.com/tech/elements/the-year-in-fungi-2015.

Antarctic Fungi Survive in Martian-like Conditions on the International Space Station,https://www.sciencedaily.com/releases/2016/01/160128113815.htm.

Are Mushrooms Medicinal by Nicholas P. Money, (Open Access Corrected Proof - available online January 21, 2016), http://www.sciencedirect.com/science/article/pii/S1878614616000180.

Lichen Basics by Dorothy Smullen http://www.namyco.org/lichens.php.

NAMA 2016
Shenandoah Foray

September 8-11 in Front Royal, VA

Save the date to join us for NAMA's 2016 foray at the Northern Virginia 4H Center, just minutes from Shenandoah National Park and the Appalachian Trail, and just 60 miles from Washington, DC's Dulles Airport.

We'll explore rolling hills, mountain streams, and hardwood forests that make up some of the over 200,000 acres of protected land in the beautiful Shenandoah mountains and Shenandoah Valley. Come find out why they say Virginia is for lovers!

Chief Mycologist:
Walt Sturgeon, well-known field mycologist and author

Hosts:
the Mycological Association of Washington, DC and
the New River Valley Mushroom Club

Registration opens in May and will fill up quickly — look for details in the May *Mycophile!*

North American Mycological Association
Steve Bichler
6018 Illinois Lane SE, Unit B
Lacey, WA 98513-3617

Change Service Requested

Newsletter of the North American Mycological Association
THE MYCOPHILE

Mushroom of the Issue

Phaeolepiota aureus Photo and text by Bill Yule (CVMS)

Without question it is one of the most unusual and distinctive mushrooms anywhere, this bright golden mushroom is found in Taiwan, Great Britain, Europe and scattered parts of North America. Throughout its range it is considered rare to uncommon with the exception of Alaska where it can be common and abundant. In North America it is most often encountered in the Pacific Northwest and it is very rare east of the Rockies.

P. aureus is a saprobe that usually fruits in big tight clusters in disturbed ground and open spaces. It is often mistaken for *Gymnopilus junonius (G. spectabilis)* and sometimes misidentified as a *Cystoderma.* This mushroom has long been a taxonomic curiosity and has been classified as *Pholiota*, *Gymnopilus* and *Cystoderma* among others before landing as the sole member of the genus *Phaeolepiota*. The family affiliation of the monotypic genus *Phaeolepiota* is unresolved and has been assigned variously to Agaricaceae and Strophariaceae and sometimes Tricholomataceae.

All parts of this mushroom are gold to golden brown and covered with a grainy sheath almost like sandpaper. The partial veil is tough and persistent and drops to form a ring only when the fruitbody is mature. The sporeprint is light brown. The USDA Forest Service field guide recommends it as edible but there are reports of people becoming ill from it and recent research indicates the presence of hydrogen cyanide which may, or may not, be rendered harmless by cooking. The following link has general information: http://www.discoverlife.org/mp/20q?search=Phaeolepiota+aurea