



Symbiosis[©]

The newsletter of the Prairie States Mushroom Club

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Fall

<http://iowamushroom.org>

Great Forays - Plenty Rainy, A Little Slippery and a lot of Fungi

by Dave Layton

PSMC Forays were all great this year, starting with a scrub hillside with morels popping and ending with an ancient log covered with more *Hericium coralloides* than everyone could possibly want. FYI: That *Hericium* was found because I went exactly the opposite direction I thought I was on a trail.

Participating in the Mycoflora project made forays even more interesting with a lot of crawling around getting field photographs. We had amazing amounts of rain this summer. Unfortunately one foray even got flooded out.



Glens picture in Merrill Boots' One Trail Project

For me two forays stood out. They both were on the tail-end of major rains with the weather improving after the forays started. The final foray at

Eden Valley stood out for edibles including the previously mentioned *Hericium*. Some other abundant edibles were: *Laetiporus*, *Grifola*, *Ischnoderma*, oysters and *Entoloma abortivatum*. There were also a number of unusual mushrooms such as a single *Hygrophorus russula*. It's a good edible so others may have already been harvested, and there were some interesting *Gymnopilus*. Overall around 50 species were identified at that foray.

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From the Editor: What Mushrooms Do

by Dave Layton

2018 has been a fabulous year for Iowa's mushrooms with all the rain we've had. We documented many unusual species for the Mycoflora project and Sarah DeLong-Duhon was able to submit the 30 required samples for the NAMFP (North American Mycoflora Project) in time to apply for and be awarded the second round of funding for 2019. Congratulations to Sarah and all who participated in the project! If you weren't able to participate, or happen to be a new member, here's an explanation from the project website (<http://mycoflora.org>):

The North American Mycoflora Project is a collaboration between professional mycologists and citizen scientists to identify and map the distribution of macrofungi throughout North America. It allows the scientific community to tap into the vast amount of knowledge and data amassed by individuals and mycology clubs, and can provide a new focus for amateur efforts.

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Ho, Ho, Ho
Merry - huh?

photo by:
Roger Heidt



Grifola and Oak

by Dave Layton

I love oak trees. I also love finding the many mushroom species that grow on them or in association with them. It seems that almost everything mushrooms do in nature they also do with oaks. Whether they're symbiotically beneficial to oaks (mycorrhizal), decaying dead wood (saprobic) or feeding on live tissue (parasitic), they fascinate me and I love to harvest many for food. But, even as I enjoy eating parasitic honey mushrooms that were harvested from the trunk of a living oak, I know that oak's days are numbered and I feel a little sad.

I've seen entire stands of oak decimated with nothing left but dead wood and the tell-tale rhizomes of honey mushrooms blackening the surface where the bark has fallen off. I've also seen where a living tree can be infested with *Laetiporus* in dead branches but never affect the living tree. I collected it from an infested main dead limb of an old cherry tree 40 years ago. I harvested it for several years till the limb fell off. The rest of the tree remains healthy today. Of course fungi causing limbs to fall can create their own set of problems around structures and people. Of all the mushrooms that affect oaks, however, the one I wonder about the most is *Grifola frondosa* or just *Grifola*.

I've been familiar with *Grifola* for a long time, but it's just been in the last two decades that I've gotten better at spotting it and finding it in abundance. We enjoy eating it many ways and the idea that it may have health benefits seems like a plus. Every year I freeze a quantity of it, insuring that we have wild mushrooms as often as we want all winter long.



Killed by honey mushrooms



Living with *Grifola*, honey mushrooms and other parasites

In 2007, I found a huge ancient oak surrounded by clumps of *Grifola*. Before harvesting, I just looked at the tree and meditated on how much had changed in its life-time of possibly over 200 years. Then I wondered if its days were now numbered because of an obviously major fungal infection. Its crown had some deadwood, but, for the most part it looked pretty healthy. I became obsessed with knowing what the *Grifola* was doing to that oak which I called the "spirit oak." I searched for any info I could, but what I found was conflicting.

I had seen *Grifola* on dead stumps so I knew it was saprobic. I soon learned that on living trees it mainly inhabits heartwood, which generally dies off naturally. When a fungus eats only the dead wood on a live tree it's also considered saprobic. However, some saprophytes are also parasitic and *Grifola frondosa* is considered one of those by many.

The first info I read from Iowa mycologists painted a somewhat ominous picture of *Grifola* as a parasite. In his book, *A Guide to Kansas Mushrooms* Dean Abel discusses pouring buckets of water laden with mushroom spores in his yard to see if they might propagate. Next he says, "One might think twice about infecting prized trees with wood rotting fungi however. I never pour water filled with *Grifola frondosa* spores close to our oaks" (p. 57). In another book, *Mushrooms and Other Fungi of the Midcontinental United States* (Huffman, Tiffany, and Knaphus) write, "*Grifola* causes a white rot and

(cont. on pg. 3)

Grifola and Oak

(cont. from pg. 2)

butt rot in living trees”(p.197). David Arora is even more ominous in *Mushrooms Demystified* when he says, “It causes a delignifying butt rot of both the heartwood and sapwood of its host” (p. 565). *MushroomExpert.com* by Michael Kuo seems to concur. Kuo says simply that *Grifola* is, “parasitic and possibly saprobic, causing white butt rot.”

Tom Volk’s website is much more informative and intriguing where he says,

Grifola is a parasite of the oak tree, getting its nutrients from the roots. Fortunately, it is a “good” parasite, not killing its food source but keeping it alive as long as possible in order to maximize its own life. Unfortunately, most of the time the host tree eventually dies, probably from a combination of the Grifola infection and environmental stresses such as drought and wind.

Several other sources simply called *Grifola* “weakly parasitic” without elaborating. All of this information led me to wonder how detrimental *Grifola* really is to oaks.

It didn’t seem like *Grifola* infection was really detrimental to the spirit oak. The crown was too vibrant, the base too solid. The tree just looked too alive and healthy, even though the trunk had many lumps and boles. If *Grifola* was weakening this tree it seemed that other factors must be keeping it strong. Since *Grifola* tends to grow on very old oak trees that have had to survive other challenges for many years, could it be possible that, even as *Grifola* consumes oak trees, it also somehow provides something beneficial to their overall health?

The more I learned about the relationship between *Grifola* and Oaks the more complex that relationship became. Paul Stamets didn’t think *Grifola* at all harmful. In his book *Mycelium Running, How Mushrooms Can Help Save the World*, he states, “Although found at the bases of dying trees and sometimes emerging from rotting woods, this mushroom is viewed by most mycologists as a saprophyte, exploiting tree tissue dying from other causes. Massive oaks, apparently healthy, often sport this mushroom at their base” (p. 236). Then Stamets increased the intrigue by saying, “—Maitake may protect its host trees from aggressive parasitic fungi. I would not

be surprised if some varieties of this mushroom are found to grow endophytically protecting the trees from plague fungi” (p. 239). What? *Grifola* could actually be good for oaks? I had to learn more!

I set about learning in several ways. I asked *Grifola* oak landowners of many decades if they ever saw problems caused by *Grifola* - Nope. Next I learned how the tap root and heart wood of oaks dies out naturally as the trees focus their energy into lateral feed roots that extend far beyond the crown and provide large oaks with their real stability. *Grifola* doesn’t affect those roots but stays at the base of the tree hollowing out the heartwood. Also the hollowing of trees is beneficial not only to forest inhabitants, it can sometimes benefit the trees themselves by making them more flexible in the wind.



I also researched what tree professionals say about *Grifola*. Here’s a typical opinion. When asked about *Grifola*’s detriment to trees, Dr. Chris Luley of Urban Forestry LLC, replied, “Tell them to warm up the sauté pan and not to worry about it too much.”

Another thing I did which maybe wasn’t too smart was cut a slice of wood where the fruiting body was emerging directly. The wood was discolored and swollen right where the fungus emerged but seemingly unaffected even a half inch away. Unfortunately, I learned that wounds like the one I caused from the cut are how pathogens get into trees. I worried for a year until I got back to the spirit oak and saw that the wound was not only healed but the scar was barely visible.

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A book review by Mike Krebill

About author Tradd Cotter

Tradd's interest in mushrooms began at age 20 when his mother suggested that he take a 10-minute visit to a nearby mushroom farm. He was in college, interested in biology, and living with his parents. Not impressed at first glance with the cinder block walls and the metal roof, he saw the sterilizer unit that cooked the growing media, and traveled on to the colonization room. Finally, they arrived at the fruiting room, which Tradd described as a strange foggy room, where row out of row of shiitakes protruded from sawdust blocks. The magic and excitement and enthusiasm hit him, and he began asking the owner question after question. The owner caught up with him as he was about to pull out of the parking lot and head home. "Would you like to work here?" he panted.

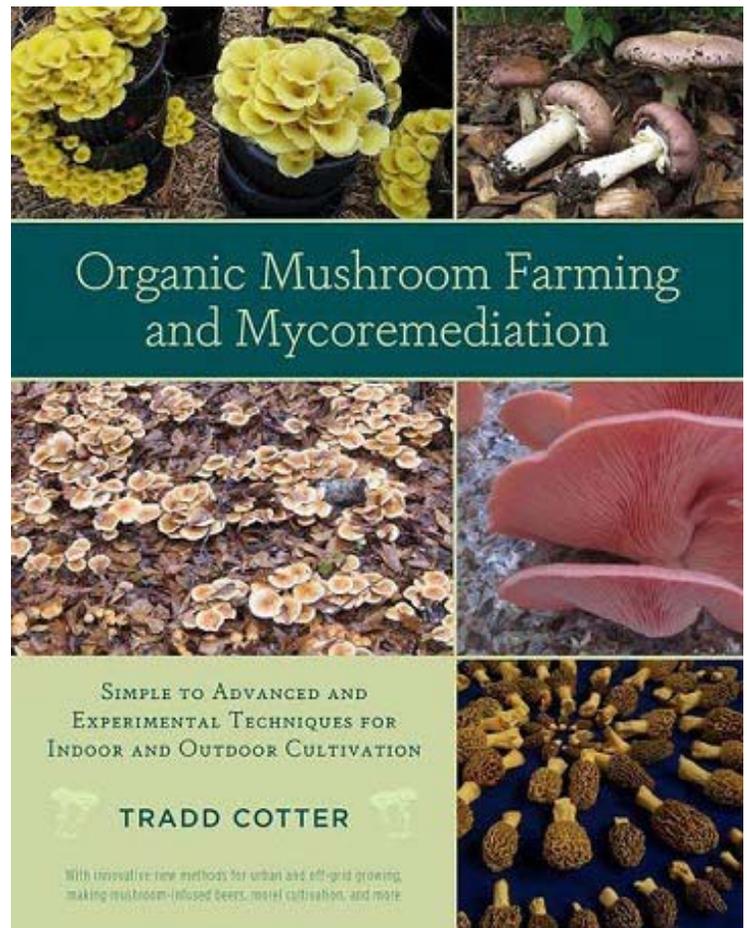
Now, more than 22 years later, Tradd has become an authority in the field. He is a professional mycologist and microbiologist. He founded Mushroom Mountain in 1996 with his wife Olga. At first, they began working out of their apartment. Their purpose is to explore applications of mushrooms in industry, for bioremediation of various pollutants, and as natural alternatives to chemical pesticides.

Last year, they graduated to a 50,000 square foot lab, classrooms, and indoor growing facility. Its purpose is to explore applications of mushrooms in industry, for bioremediation of various pollutants, and as natural alternatives to chemical pesticides. They currently maintain over 250 species of fungi for this purpose and for food production. In addition to a tour of their FDA and EPA certified building, home videos on their website (<http://mushroommountain.com>) and Facebook page (<https://www.facebook.com/MushroomMountainFarm>) are worth watching. One of them that I just watched is clearly a home video, but it is fascinating nonetheless: (<https://www.facebook.com/MushroomMountainFarm/videos/10156064575281617/>),

This one is particularly appropriate for this time of the year. It not only shows appreciated gifts of inoculated spawn for easy culturing of mushrooms, but also how to get them started. (These are available online from their website, and they may have the largest selection in the country from which to choose.) On this home video, Tradd even does a show and tell on how to turn wrapping paper and cardboard waste from packaging into blue oyster mushrooms and compost for the garden or worm bin. All of this is non-technical. He is an experienced presenter, and the facility that he and Olga operate in South Carolina has become a mecca for travelers and those wanting to get into becoming certified to own and operate their own lab and production facility. They intend to set up an online teaching facility next year, which will be known as Mushroom Mountain University.

Tradd has written several books. This one contains technical information, yet explains things very well. The subtitle sums it up: "Simple to Advanced and Experimental Techniques for Indoor and Outdoor Cultivation." Part I covers the fundamentals and stages of mushroom cultivation; choosing a mushroom to cultivate; how to handle and store spawn;

(cont. on pg. 11)



Minutes of the 2018 Annual Meeting

by Glen Schwartz, PSMC Secretary

The 2018 annual meeting of the Prairie States Mushroom Club was called to order by Vice President Marty Augustine, as PSMC President Dean Abel was not in attendance. There were eight club members present for the meeting.

A motion was made, seconded, and approved to move the previously agreed upon \$300 to be spent on the Mycoflora DNA project from 2018 to 2019.

PSMC Treasurer Roger Heidt gave a report on the club finances. The current balance is \$2927.29, a gain of about one hundred dollars over the previous year. See the Treasurer's Report for additional details of the club finances.

A motion was made, seconded, and approved to donate \$50 to the Clinton County Conservation Board for the use of the Eden Valley Nature Center where we held our public foray and annual meeting.

All 2018 PSMC officers agreed to run for reelection to the same position for 2019. Since no other club members expressed an interest in becoming an officer, all current club office holders were reelected by acclamation. Sarah Delong-Duhon was nominated, seconded, and elected to the open At-Large Board member position.

Roger passed out forms for anyone interested in participating in a stinkhorn project being conducted by Michael Kuo.

A lengthy discussion occurred concerning the possibility of creating a mushroom calendar again. A motion was made, seconded, and approved to provide club funds to purchase calendars in 2019 if one gets designed. Note that the calendars would be for 2020.

A motion was made, seconded, and approved to adjourn.



Prairie States Mushroom Club 2018 Annual Report

Beginning Balance: \$2836.24

Income:

Membership Dues (2018 & 2019)	\$ 430.00
Donation (Janet Monk)	<u>40.00</u>
Total Income	\$ 470.00

Expenses:

Web Site	\$ 119.40
NAMA Dues	30.00
SmugMug (Photo site)	71.40
Postage	33.99
Printing (Newsletter)	48.77
Mileage	71.88
Office Supplies	<u>\$ 3.52</u>
Total Expenses	\$ 378.96

Ending Balance \$2927.29

\$300 budgeted for Mycoflora Project
None spent in 2018

Membership	31	2018
	12	2019
	43	

My New Favorite Mushroom: Sweetbread Mushroom!

By Dave Layton

I have what might be called a bucket list of supposedly delicious mushrooms that I hope to find in enough abundance to really explore their edibility. After 45 years of mushroom hunting it seemed less and less likely that any such mushroom find would turn up in a woods I've hunted for decades. Yet some times the stars just line up.

And so they did this fall. The honey mushrooms, knotholes, Grifola and blewits in this wood were pretty much played out, but I returned to photograph oaks for my *Grifola and Oaks* article. I was soon pleasantly surprised by oysters and velvet stems (wild enoki). Then I noticed some white funnel shaped caps, one leaving salmon colored spores on the cap below it, so I knew right away they weren't clitocybes. I thought sweetbread mushroom (*Clitopilus prunulus*), but —

I'd found similar mushrooms often and I'm sure I'd found sweetbreads before too, but I never found them in a fresh abundance and I never put enough effort into identifying them to be certain what I'd found was not a poisonous entoloma or other unknown. Plus I didn't have a microscope.

That all changed this year. I found two more patches that day harvesting enough fresh ones to make a couple meals, so it was worth my effort to get a positive ID. Fortunately, I now have a microscope, which made confirmation easy. The spores were football-shaped, with some showing dark lengthwise lines or ridges meaning *Clitopilus*. *Entoloma* spores are angular. I'd scored a bucket list mushroom!

Once I saw the spore shape it seemed that the identifying macro features became more obvious. Those features on fresh Sweetbreads include:

- Cream to rusty gills that detach easily from the cap and run down the stem slightly.
- Salmon or brownish pink spore print. Fortunately, these can produce abundant spores within hours of picking.
- White, gray, or flesh-colored cap with in-rolled and occasionally lobed cap margins.

- Cap feels like soft suede. The feel is distinctive if you have other fungi to compare it to.
- Distinctive somewhat fruity sweetbread dough rising smell – hence the common name: sweetbread mushroom or miller.

It also helped my identification that this year I'd already seen several species that these might be confused with, including *Lyophyllum*, *Entoloma* and 3 *Clitocybes*: *rivulosa*, *odora*, and *subconnexa*.. *Clitocybes*, especially *rivulosa*, can look so much like sweetbread that only sweetbread's spore color can provide certain ID at first. Once I was certain of some by their spore color, I used smell and cap texture to make sure every cap I picked was the same. This is especially important because *C. rivulosa* could be growing right next to it, and *rivulosa* is dangerously poisonous, but *rivulosa* has an unwholesome faintly mealy rancid flour smell.

So how good is Sweetbread mushroom? Outstanding! It's in the same league as morels, ceps, and candy caps. It is a perfect texture, tender and easy to digest, with a rich but light mushroom flavor.

To test new varieties of mushrooms I sauté a couple caps in a little butter. These were surprisingly good. Next I sautéed a few more and tried them on grilled cheese. Sally and I gave them two thumbs up! Finally, I included them in a large batch of mixed mushrooms with sweetbreads being the largest component. They are definitely better than *Grifola*, blewits and knothole mushrooms. In my opinion, they're even better than shaggymanes, *Lyophyllum*, and oyster mushrooms. Comparing them to oysters is kind of an apples and oranges comparison, and Sally might disagree since oyster mushrooms are one of her favorites.

A couple days later I went back and scoured the area where I'd found them before. Sure enough I found several more fruitings, enough to cook and freeze a couple packets plus make a wonderful dinner omelet. Unfortunately, I found these a week or so too late.

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Enchanted Grifola and Hen of the Woods Jerky

Enchanted Grifola

Bao Cheng Lee, executive chef

SAO ASIAN BISTRO, MARION, ILLINOIS

This centerpiece for an autumn banquet relies upon that greatest of discoveries: A perfect Hen-of-the-Woods, fresh and clean and without any sign of serious intrusions from alien life. This steamed bouquet of *Grifola frondosa*—also known as Maitake—draped in a soy-based garlic brown sauce, will honor any occasion you can invent. Maitake is known as the dancing mushroom, perhaps for this very reason. Carve slices of it onto beds of fried rice for your guests, and modestly acknowledge the due credit for finding the perfect fall mushroom.

Grifola frondosa appears in the autumn under oaks, and, if your timing is right, you might discover a perfect one, without a blemish on it anywhere. Unfortunately, years might pass before you find that perfect one. A full cluster of Hen-of-the-Woods can be utilized for this recipe (smaller, young specimens are best), providing the mushroom is free from organic debris, insects, and so on. Because perfectly clean and fresh specimens of *Grifola frondosa* are rather uncommon, soaking the mushroom in lightly salted water for 15–20 minutes can help evict unwelcome guests from within. As an alternative, a portion of a cluster can be cut out and utilized, making it possible to visually inspect the interior. If salted water is used to clean the mushroom, skip adding salt to the water for steaming.



Ingredients

Hen-of-the-Woods mushroom, cleaned and/or soaked (p. 35)
¼ cup soy sauce
1 Tbsp. diced garlic
1 Tbsp. cornstarch
1 Tbsp. sugar
1 Tbsp. sesame oil
½ cup white wine

Preparation

Steam the cleaned mushroom in lightly salted water for 7–10 minutes or until cooked and tender (use unsalted water if mushroom has been previously soaked in salted water). Drain. For the garlic brown sauce, combine the remaining ingredients and simmer until thickened slightly. To serve, arrange mushroom on a platter with your choice of garnish and cover with a generous helping of the sauce. Individual portions can be served over stir-fried or plain white rice.

Hen of the Woods Jerky

original recipe created by the 3-Foragers in 2013

Marinade ingredients (Makes about 2 cups marinade, enough for a large hen.)

- | | |
|--|--|
| 1 c. sweet apple cider | 1/2 tsp. ground fennel (Alternative, finely chop |
| 3/4 c. low sodium soy sauce, or tamari | 1/2 tsp. fennel seeds - Mike Krebill) |
| 2 - 4 cloves of garlic, chopped | 5 Tbsp. maple syrup |
| 1/2 tsp. ground white pepper | 1/2 - 1 Tbsp. Sriracha chili-garlic sauce |

1. Place all marinade ingredients in a blender, and puree for a minute. Pour the marinade in a glass or non-reactive shallow pan, preferable one with a cover.
2. Clean the hen of the woods mushrooms, making 1/8" thick slices of the core and the larger fronds. All parts can be used, but they will dehydrate at different rates and shrink up quite small.
3. Boil the mushroom for 10 minutes, and drain completely. Place the boiled hen pieces in the marinade while still hot, and refrigerate for 4 - 6 hours.
4. Remove the pieces of hen from the marinade and drain the excess liquid off before arranging on dehydrator trays. If drying in the oven, use wire racks placed on a sheet pan. Arrange the marinated mushroom on the trays and dehydrate at 120° - 130° for 6 - 12 hours, until dried and leathery. The time will vary depending on the thickness and sizes of the pieces, so check it often.
5. Store in an airtight jar or vacuum pack.

We often have more mushroom pieces than the dehydrator can handle at once, so we use the marinade one more time to flavor another batch, the second batch getting soaked a bit longer, until we use up all the hen. 

My New Favorite...

(cont. from pg. 6)

Though there were many still for me to harvest, many more were too far-gone and they were the big ones. I didn't waste those either though. I threw many of them like Frisbees as far as I could, trying to spread their spores and create new patches for next year. I wonder what someone would have thought if they saw me rooting around in the woods then throwing old floppy mushrooms everywhere. Would they realize how insanely happy I was, or would they just think



Salmon spores on cap in field



Large specimen



Washed ready to cook



Great forays...

(cont. from cover)

The Maquoketa caves foray was even more fascinating for me. We identified over 60 species, more than half of which were mycorrhizal. Actually, the abundance of fungi in one patch of woods kept us from going to far. The amount of unusual fungi also really absorbed our attention, so much so that possibly some common species that we always find may not even have been documented.



People fascinated by colorful fungi found at Maquoketa Caves

All of this year's forays were well attended with many new faces. The amazing colorful fungi spread on a picnic table

near the entrance to Maquoketa caves drew dozens of interested visitors including Andy Abeyta who was photographing trail users for the Merrill Boots One Trail Project. It just so happened that Glen was wearing Merrill

Boots and Andy noticed how photogenic Glen really is. So now Glen's mug can be viewed at the Merrill Boots One Trail Project <https://onetrail.merrell.com/>

These forays were amazing. However even a June foray at Indian Creek Nature Center had fascinating fungi. Including *Volvariella Bombycina* which was one of many mushrooms sampled for MycoFlora. Personally, I believe that PSMC forays are constantly getting better for camaraderie, scientific discovery, public education and all around fungi fun!



Several others harvested all the *Hericium* they wanted at Eden Valley before this lady got there.



Silky *Volvaria* (*Volvariella bombycina*)



From the Editor...

(cont. from cover)

Key components of this project include careful documentation and preparation of specimens (vouchering), depositing these specimens in a herbarium, and DNA sequencing to complement the morphological observations that amateur mycologists already use.

In this issue, Mike Krebill reviews Tradd Cotter's book, ***Organic Mushroom Farming and Mycoremediation*** (Chelsea Green Publishing, Vermont, 2014.) Cotter, who raises mushrooms indoors and out, describes his techniques, and provides advice on marketing for those who want to consider it as a business. He explains what mushrooms do and can be made to do in terms of

mushroom products and cutting-edge applications. These include mushroom-infused beer, wine and spirits, edible mushroom powders and medicinal extracts, antimicrobial cutting boards, packaging, insulation, biotextiles, and mycoremediation of toxic wastes.

We'll also discuss what I believe *Grifola* does to trees in my article *Grifola and Oaks* that details my 10-year study of that relationship. Finally, I'll share what finding a new delicious mushroom does to me – Think happy dance. We hope you will enjoy learning some of the fascinating things that mushrooms do along with reading about great PSMC Forays this year, and will feel rewarded when you try a couple of tasty *Grifola* recipes we like.



Grifola and Oak

(cont. from pg. 3)

I thank my lovely librarian wife for my biggest breakthrough. While she was a library student at the University of Iowa she came home one day with an obscure book for tree professionals: *Fungal Strategies of Wood Decay in Trees*. My breakthrough came in two main passages. The first being selective delignification which targets the tree's lignin but leaves cellulose and vital cell structure such as fiber tracheids intact. *Fungal Strategies* states:

Fiber tracheids are cell structures that are fundamental for transporting water and nourishment, meaning *Grifola* does not appear to inhibit an oak's life process severely even near areas of infection. Microscopic photos show *Grifola* growing in the lignin (tough connective tissue) in and around the cell walls but not in the lumen or interior of the cell where water and nutrients are transported. Fiber tracheids are fundamental for transporting water and nourishment.



The next important observation from *Fungal Strategies* was barrier zones. A picture from the book showed a section of trunk infected with *Grifola* at the heart but surrounded and possibly contained by a moist orange colored barrier zone. That zone was created because the *Grifola* triggered the tree's immune system. In this picture, the vast majority of the trunk appears to be healthy wood. The book calls barrier zones an

important strategy of trees for fighting fungal infection saying, "One important method is reaction or barrier zones. Sometimes these zones actually prevent the spread of fungal infection." The discoloring and swelling that I saw around the mycelial strand in my slice from the spirit oak

was actually a barrier zone caused by the tree's immune system reaction to the *Grifola*. It might help to account for the total healing of the cut I made in just one season. It's very possible that this boosted immune system reaction could also help protect oaks from other pathogens – but how was I to prove this? Maybe I'd see something in the changes in trees over time. That was 10 years ago.

During my research on *Grifola*'s method of tree decay, I learned about a Visual Tree Assessment (VTA). A VTA is a tool that professionals use to determine the health and structural soundness of a tree. It's performed in stages. The initial stage of a VTA involves assessing external appearance of a tree and its immediate environment. This includes looking for flat spots or irregularities in the trunk, which could indicate root damage on that side, crown die-off, soil irregularities and erosion and windward soil cracking indicating fractured roots. Though I'm not qualified to perform later stages of VTA, I could use the initial stage assessment with trees I found *Grifola* around. I did initial VTAs of many trees and repeated the VTAs many times over the decade. I found no change in any of the trees during that time. However, one very hollow tree that appeared to have both *Grifola* and *Laetiporus* blew down in a windstorm last year.

Possibly more tellingly I witnessed some living oaks that had become infested with honey mushrooms die within a few years of infestation, but two gnarly old oaks in the same woods were infested with both honey mushrooms and *Grifola*. These trees had huge burls, gaps showing the hollow center, and exposed dead wood where bark was missing, but their crowns had as much life as they had a decade earlier. One of those trees displayed other fungal pathogens too.

Whatever the honey mushrooms and other pathogens were doing, they weren't killing the trees – not yet anyway. Could this be because the trees were keeping the pathogens from the live sapwood because of *Grifola*-induced barrier zones? Maybe Stamets was onto something.

Two more things I've learned in my last decade of observations. The first was that trees infected by *Grifola* more often than not display other environmental stressors,

(cont. on pg. 11)

Grifola and Oak

(cont. from pg. 10)

especially younger trees. This may be as simple as crowding or wind damage or even cow hoofs or mowers damaging the base of their trunks. I've paid more attention to these factors after learning about VTAs. Many of these trees had long since made peace with the original stressors and seem quite healthy, but I've also found *Grifola* at the base of recently dead trees that were obviously killed by some serious pathogen – maybe oak wilt. Whatever *Grifola* does to or for oaks it didn't help these. It's not a panacea.

I've also learned that many more trees are infected with *Grifola* than I find fruiting bodies around. Some of my trees fruit faithfully every year, but many others fruited years ago and not again. Still others have fruited only a couple times in the last decade. Also, I'm not the only *Grifola* hunter out there. It's grown in popularity around here – due in small part to my telling friends about it. I know I'm not seeing some *Grifola* because others have

already harvested it. Plus the season can go from early September into November so some woods I just couldn't get to at the right time. Taking all that into account, I'd guess that 20 – 30% of mature oaks are infected with *Grifola* in some of my favorite stands. For the most part those trees look good. Conversely, in the woods that had been decimated by honey fungus I found no *Grifola*. Could there be a correlation? Honey mushrooms grew in the healthy woods too – just seldom on oak trunks. Right now I'm just guessing about all this.

So I'll keep watching my *Grifola* trees and making VTAs. Maybe in another decade, I'll have a better idea of just what *Grifola* does to those trees. In the meantime I plan to eat plenty of *Grifola*. No matter what it does for the immune system of trees, I'm hoping it helps to keep my own immune system strong and improves my chances of making it to those future decades. 

A Book Review

(cont from pg. 4)

cultivating mushrooms outdoors on logs, stumps, and wood chips; cultivating mushrooms indoors on sterilized media; and natural pest control and disease management. Part II considers innovative applications and products using fungi: recycling, composting, and vermicomposting; urban mushroom cultivation; shroomin' off the grid; products and cutting-edge applications; mushroom-infused beer (four recipes are included), wine, and spirits; marketing; and fungi in the classroom (If I had encountered this book before retiring from 35 years of teaching science, I would have tried several of Tradd's suggested activities.) Part III focuses on advanced technique and research beginning with setting up your own laboratory; starting cultures and generating spawn; storing

your cultures; advanced cultivation and research strategies; (The following bold-faced italics are my own) ***Morel Cultivation: Research Update***; and introduction to mycoremediation. Part IV is a four-page introduction to each of 23 genera and a combination of conks that are dealt with together. Finally, following the acknowledgments, there is a glossary, bibliography and a one-page list of resources and suppliers.

The photography, with one exception, is excellent. The one exception is the spore print on page 178. Perhaps Tradd and Olga will want to replace it if the book should be reprinted. 

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PSMC Web Site:
<http://iowamushroom.org>



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