



Journeys of the Arizona Mushroom Society

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President's Message

Dear friends and fellow mycophiles,

We are coming up on our first year as an incorporated non-profit society, and our annual member meeting is fast approaching. Our guest speaker this year will be mycologist Britt Bunyard, Ph.D., the publisher of FUNGI Magazine, and director of the annual Telluride Mushroom Festival. His lecture is entitled, "The Agony and the Ecstasy; or, Waiter, there's a fly agaric in my soup... and I love it!" He will be discussing a number of strange and wonderful mushrooms that exemplify the unique biochemistry of the Kingdom of Fungi, with its panoply of deadly poisons, savory flavors, mind-expanding psychoactives, economically important enzymes of fermentation, and healing contributions to western and alternative medicine. I look forward to seeing you there. (Note that the meeting date has been unavoidably changed from Dec. 3rd to Dec. 17th.)



As usual, we will have a potluck dinner and door prizes at the winter meeting. However, this year we are going to elect our new board of directors electronically before the meeting, using the Condorcet Internet Voting Service provided by Cornell University. You'll want to make sure that your email software allows messages from the email address "civs@cs.cornell.edu". The ballot email will be sent before the meeting, so check your spam folder if you fail to receive it. This year, the seats on the

Board that are held by Christopher May and Anton Stern are up for election. If you are interested in having your name on the ballot, please let me know as soon as possible.

I'm pleased to report that we now have 354 members in good standing, with a cash balance of \$7018.64 between our wells Fargo and Pay Pal accounts. Our members participated in 10 group forays, 2 mushroom dinners, a mushroom cultivation

workshop, and a scientific meeting at the Gilbertson Fungal Herbarium last year. Much more is on the way for next year, weather and climate permitting. I attended the North American Mycological Association meeting in September, and was gratified to learn that we are building a reputation as one of the most dynamic and exciting mycological societies in the country, as well as now being among the larger clubs in NAMA.

Next year we will be hosting a NAMA Regional Foray in the White Mountains on the Thursday through Sunday of Aug. 10-13. We will need volunteers to help with the operation of the event, which will afford you an opportunity to learn from some of the most well-known fungal experts in the nation. People living in the Show Low/Lakeside/Pinetop area are particularly sought, but there will be plenty of opportunity for any of our members to be involved if they wish. I hope you will be able to find time to help with this important "coming-out party" for our Society.

Moreover, I ask that each member gives serious consideration to participating in one of our many standing committees. There is so much work to be done to strengthen our Society and make it more appealing to mushroom enthusiasts of all skill levels. We will discuss this further at the member meeting next month.

If you bring a mushroom dish to the potluck, please be sure to follow the safety regulations posted on our web site.

Heavy rains and full baskets,

Christopher C. May, M.D.

President, Arizona Mushroom Society, Inc.

Mushroom of the Month

Don't put away your mushroom knife just yet...

With the summer monsoon season of 2016 fading to a fond memory and the winter months setting in, most of us southwestern mushroom hunters have called it a year. Until spring rains come, the only fresh mushrooms you would expect to find are in the grocery store. Yet, over the years, I have discovered that even in winter, there are wild mushrooms to be found in the outdoors. Yes, edible and medicinal fungi can be found, if you know where to look and time it just right.

In my experience, there is only one habitat type to look for fungi in during the winter - along rivers and streams in the lower elevations where nighttime temperatures stay above freezing. While I haven't roamed all of Arizona's natural

environs during the winter months in search of elusive fungi, it seems the riparian areas along streams include a number of tree species that support edible mushrooms.

I find that any streamside area with older cottonwood and dead and downed trees is a good place to visit after a soaking storm. If you do get a chance to visit one of these places in a timely manner, here's what to look for:



Oyster mushrooms (*Pleurotus ostreatus*) – Oyster mushrooms can be found in the high country during the summer months on aspen and Douglas fir. But a different species can also grow in the cool winter months after good rains. This species of oyster most often grows on dead cottonwood trees, but can also grow on other species such as willow. You'll find this species of oyster mushrooms to be more robust, a bit more chewy, and often less buggy than its high elevation relatives. They make a fine meal and can often produce a new crop with each new rain. I've been very successful in the Verde Valley and have also heard of good crops fruiting in the Prescott area and along Oak Creek. This species is sometimes referred to

as a medicinal mushroom because of its antioxidant and antimicrobial properties. **Figure 1.** *Pleurotus ostreatus* often have a tan or brown cap and can be quite meaty. This one was a bit pokey to harvest, but worth it.



Turkey tail mushrooms (*Trametes versicolor* and *T. cervina*) – while not a common winter visitor, this hardy mushroom can often withstand colder temperatures. They will often grow throughout the season in spurts after rains and last through the winter until colder temperatures. I have found fresh growth of turkey tails growing off downed logs in the floodplains of streams near Sedona. I often dry

them and grind them into a fluffy pile that I use in warm medicinal tea during the cold winter months. Turkey tail mushrooms are one of the most popularly known medicinal mushrooms due to several in vitro and in vivo studies illustrating some level of enhancement of immune functions antiviral effects, and cholesterol-regulating effects.

Figure 2. *Trametes versicolor* found on a Ponderosa stump.



Split gill mushroom (*Schizophyllum commune*) – I have found split gill mushrooms year after year growing on dead trees along rivers in the Verde Valley. These are tough little mushrooms with white furry tops and intricately flayed gills. They are often noted as inedible in American guide books, but are commonly eaten in Mexico and several other countries as a chewy meat-like ingredient in numerous dishes. *Schizophyllum* has also been reported to have antimicrobial activities and has been researched clinically for anti-cancer activities.

Figure 3. Split gill mushroom showing characteristic intricately split gills.

Cottonwood mushroom (*Tricholoma populinum*) – As the name says, cottonwood mushrooms are often associated with cottonwood trees. They are a mycorrhizal mushroom that grows from the roots of cottonwoods in sandy soils, most often in the fall and winter. I have never found them, but have heard they grow in the canyons that cut through the broad flat mesas of the Agua Fria National Monument. *Tricholoma populinum* have been traditionally collected by at least one southwestern native tribe, and a study has found this species can inhibit severe allergic reactions such as hives.

– By Mike Dechter, Co-Chair Foray Committee

The Mushroom of the Month feature was provided by the Foray Committee of the Arizona Mushroom Society. If you are interested in helping to scout for foray locations consider joining them. [Click here for more information.](#)

Culinary Corner



The weekend of September 16-18, the Coppa Café held its annual Mushroom Dinner, a popular event among Flagstaff foodies. This year, they gave the Arizona Mushroom Society priority seating for the Saturday night meal. At 3:00 p.m. on the afternoon of the dinner, Chef Brian gave us a demonstration of mushroom preservation techniques including pickling, smoking, salt-curing and more. New to AMS members were techniques for dry salting and storing fresh mushrooms in rice.

If you are craving a wild mushroom dish but only have dried store bought options, here's Mary Smiley's recipe Hen of the wood Chicken Pot Pie. Society member Lisa Goodwin tells us she used dried mataike and it made the best wild mushroom dish she ever prepared. Remember to rehydrate your dried mushrooms before sautéing them.

Mary Smiley's Hen of the wood Chicken Pot Pie

1 ½ cup diced onion
2 cups Makitake Mushrooms
3 Carrots - sliced
Several tbsp Butter

Saute for about 10 minutes until carrots are tender and mushrooms cooked.

½ cup white wine

Add, simmer until liquid is absorbed (omit if you prefer to use Sherry).

2 tbsp Flour

Add, stir and cook for two minutes. Add:

2 ½ cups Chicken Broth

1 ½ cup Milk

(if you prefer to use Sherry, omit the wine and include ¼ of Sherry here).

Simmer on low until thickened, about 10 minutes. Add:

Shredded Rotisserie Chicken

¼ cup chopped Italian Parsley 2 tbsp fresh Thyme leaves salt and Pepper to taste

1 cup frozen Peas

1 cup frozen Pearl Onions

Fill 4 ramkins. Top w/favorite pastry crust. Brush pasty with:

Egg wash

Bake in 400 degree oven for 25 minutes or until golden brown and bubbly. Let cool 5-10 minutes before serving. Enjoy!

The Culinary Corner is a feature provided by the Culinary Committee of the Arizona Mushroom Society. If you are interested in organizing and directing dinners, tastings, cooking workshops, and other mycophagy-related events consider joining them. [Click here for more information.](#)

Cultivation & Medicinal/Mycoremedia

The Elixir of Life

There are countless ways wherein the consumption of any edible mushroom can engender a health benefit, whether that effect is an increase in the prevalence of "good" gut microbes or a decrease in the number of new blood vessels in a growing tumor. To narrow the scope, this AMS newsletter series will instead feature an article discussing a single so-called "medicinal" mushroom in the context of a few informed effects

on human health. With an expansive history of medicinal use underscored by 4 decades of contemporary scientific scholarship (35,000 citations in Google Scholar alone), the basidiocarp of *Ganoderma lucidum* seems like a great place to begin.



The mycelia of the *Ganoderma* genus can be found parasitizing living maple, or other hardwoods, and (more rarely) conifers such as hemlock (*Tsuga*) – or existing as a saprophyte on dying ones – resulting in a "white wet rot."¹ It grows nearly everywhere: its habitat includes the tropical forests of China, Argentina, and Taiwan, as well as the temperate forests of Japan, the USA, France, and the UK.² The fruiting body is a

tough, woody, and inedible (in the culinary sense) bracket mushroom that often elicits the phrase "laccate pilei" (lacquered cap) in taxonomists; in 1881, the mycologist Petter Adolf Karsten called the genus *Ganoderma*, meaning "shining skin."² Our most familiar name for it may be "varnished conk." But not all societies have guffawed at the shellacked shelf fungus with such an undignified moniker. In China, the species *Ganoderma lucidum* may be perhaps the most esteemed mushroom of all: *Lingzhi*, the "Mushroom of immortality."

Lingzhi has been revered for many different health benefits in the East; most generally, the mushroom is thought to enhance longevity and fortitude (i.e. "Fuzheng Guben").³ In the Western scientific literature, the most studied effects of *G. lucidum* include anti-cancer, anti-viral, anti-androgen (i.e. decreasing testosterone) and hypoglycemic effects.² The health benefits are attributed to two broad classes of compounds found in *G. lucidum*: β -D-glucose polysaccharides (beta-glucans) and triterpenoids. The former is a complex carbohydrate of linked sugars and latter is triterpene derivative with numerous functional chemical groups. The β -D-glucose polysaccharides naturally occur in the cell walls of fungi. When extracted from *Ganoderma lucidum* and applied to cancerous cell lines *in vitro*, the compounds are found to inhibit the growth of blood vessels in tumors.^{4,5} Interestingly, it is theorized that the polysaccharide is not toxic to cancer cells directly; rather, the β -D-glucose polysaccharides upregulate immune response and promote the biochemical signaling pathway that induces apoptosis (spontaneous cell death) in the tumor. The concentration β -D-glucose polysaccharides noted by the authors is 2.33%, but whether this value is for dry weight is not elaborated. Preliminary studies *in vivo* show that patients with advanced cancer exhibit increased immunological response activity when supplemented with *G. lucidum*.^{6,7}

The triterpenoids are also found to inhibit the growth of cancerous cell lines.⁸ There are dozens of triterpenoids that are discovered by extraction and analysis in a laboratory setting. A 2010 study in *Phytochemistry* evaluated the structure and pharmacological activity of 32 distinct triterpenoids (6 of which had not been known before) by extracting, separating and purifying the compounds. Each distinct triterpenoid was tested in varying concentrations against cancerous HeLa cells (an immortal cancer cell line). Of the 32 compounds studied, 14 of them elicited a significant decrease in cancer cell activity – again, not necessarily due to the toxicity of the compound but because of its indirect effects on biochemical signaling pathways. Of these 14 compounds, 4 appear to exist in appreciable concentration in the mushroom itself. The average concentration of these compounds was 0.0009% of the dry weight mass of the mushroom. While the authors extracted 2kg of air-dried, powdered lingzhi in 3 washes of 10L of 95% ethanol, a medicinal tincture may need to be concentrated to as much as 2kg dry mushroom per liter solvent to reach the pharmacologically active concentrations noted in the literature.⁸

The correct identification of lingzhi is an important point since not all varnished conks will contain these important secondary metabolites. Lingzhi has many close relatives in the genus *Ganoderma*. In a 2015 study conducted by the Chinese Academy of Sciences, the genetic material of 32 specimens of varnished conk in the *Ganoderma* genus were evaluated for their evolutionary heritage (phylogeny).⁹ The analysis revealed 13 distinct species, of which 3 unique "clads" (or closely related groups) could be identified. In the first clad, we find that *G. lucidum* (lingzhi) is most closely related to *G. oregonense*, and *G. tsugae*. The second clad contains *G. boninense* and *G. zonatum*. The third and largest clad includes *G. tropicum*, *G. multipileum*, *G. lingzhi*, *G. curtisii*, *G. flexipes*, *G. sichuanense*, *G. resinaceum*, *G. sessile*. Of the 32 specimens sent for identification 12 were from the United States, and none were identified as *G. lucidum*: 4 specimens were identified as *G. sessile* (2 Arizona, 1 New York, 1 Connecticut), 2 were identified as *G. zonatum* (Florida), 2 were found to be *G. curtisii* (North Carolina). The remaining 4 specimens were *G. tsugae* and *G. oregonense*—notably, the two closest relatives of *G. lucidum*. Two specimens of *G. tsugae* were found in Connecticut, while *G. oregonense* was found in both Oregon and Washington. It is important to note that these are very small sample sizes (2-3 specimens) and we cannot make conclusions regarding prevalence of any species from them. The reader is referred to Reference 9 for more detailed information.

The medicinal use of lingzhi appears to be supported in the literature in controlled *in vitro* studies. However, epidemiological work will need underscore laboratory work. Moreover, lingzhi is frequently misidentified and care must be

taken in aggressively harvesting related mushrooms that are not medicinally important. The extraction methods utilized in laboratory conditions (boiling water, or soaking in ethanol) appear to lend support common homeopathic ways of administering lingzhi (i.e. tea or tinctures) though concentrations should be kept in mind.

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By Burcu Yavuz, Cultivation & Medicinal/ Mycoremedia Committee Chair

The Cultivation & Medicinal/ Mycoremedia Committee plans and implements

activities for those interested in studying mushroom cultivation, the medicinal and health effects of wild mushrooms, and mycoremediation with fungi. They will be providing articles of interest to Arizona Mushroom Society members as a regular feature for this publication. If you are interested in contributing to these activities, consider joining them. [Click here for more information.](#)

Workshops and Education

The North American Mycological Society has an extensive list of recommended books on fungi, both region specific and species specific. [Check out this great resource for mycophiles.](#)

The Program and Education Committee organizes and directs educational classes, workshops, exhibits, mushroom festivals or fairs, and other such educational activities, and coordinates the Society's participation in similar activities sponsored by outside organizations. We have a large number of members interested in helping and would love to be doing more in this area, but we need someone to step up and organize the committee members. If you are interested in bring this type of opportunity to the Arizona Mushroom Society contact a Board member about chairing the committee. [Click here for more information.](#)

Newsletter Contest

The winner of our Newsletter Contest is Lisa Leathers-Cox! Many thanks to all the members that entered and to the AMS Board and Communications Committee for helping us select our new name:

Journeys of the Arizona Mushroom Society



Did You Know?

AMS White Mountain Foray Species List is Available

The Scientific Committee is responsible for recording a genus and species list of mushrooms found at forays.



With many thanks to Terri Clements and visiting mycologist Debbie Viess for countless hours devoted to identification of the specimens found, the AMS has release the [species list for the White Mountains Foray August 11-13, 2016.](#)

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14607 E. Paradise Dr. • Scottsdale, AZ 85268

news@arizonamushroomsociety.org

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