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APRIL 18

General Meeting Speaker: **Laura Bogar**

“Can Ectomycorrhizal Plants Choose Their Fungal Partners?”

Nearly all land plants rely on fungi to help them extract nutrients from the soil. This association, called mycorrhizal symbiosis, is an ancient interaction that probably began when early plants moved from the ocean to dry land around 400 million years ago. The fungi grow into or around the root cells of the plants, helping their hosts by extending into tiny soil pores where roots can't reach and using powerful enzymes to obtain nutrients. In exchange for these resources, plants send carbon fixed through photosynthesis to the fungi on their roots. Laura's work focuses on the ectomycorrhizal symbiosis, a mycorrhizal association that is crucial for the nutrition of many temperate forest trees. Although some ectomycorrhizal fungi are specific to particular host plants, the majority are capable of associating with a wide range of distantly related plants.

In this presentation, Laura will share some of her dissertation work, highlighting experiments that use next-generation sequencing and stable isotope enrichment to figure out what makes some plants and fungi more compatible than others. Her study fungi, *Suillus brevipes* and *Thelephora terrestris*, are common at her field sites in Point Reyes, and may be very different fungi from the perspectives of their plant hosts. How do plants and fungi decide who their symbiotic partners will be? Answering this question will lend insight into the evolution of mutualism itself, improve our understanding of forest ecology, and illuminate the details of carbon and nitrogen cycling through forested ecosystems.

Speaker's Biography:

Laura is a fourth year PhD student working with Kabir Peay at Stanford University. Originally from Seattle, she completed her bachelor's degree at Lewis & Clark College in Portland, Oregon in 2012. Her dissertation research is focused on the ectomycorrhizal symbiosis between land plants and soil fungi. Laura is interested in how ectomycorrhizal plants and fungi choose their symbiotic partners and negotiate their interactions, using genetics and physiology to understand small-scale mechanisms that can influence large-scale ecological processes.



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PRESIDENT'S POST

by *Brennan Wenck-Reilly*

Hello MSSF Members!

I hope this finds you well. After all the winter rains it is sure nice to have received a warm break in March.

If you are new to the society (2 years or less) then you may not know that our home is the Randall Museum located in Corona Heights overlooking the Castro. This has been our meeting spot for many years, until 2 years ago the Randall started a 1-year renovation project. Surprise, it took longer than a year. Currently the Randall is looking like it will be opening its doors the public in about November of this year. Until that time we will continue to meet at the County Fair Building.

I bring this up because when we left the Randall we had to shut down our library, named after the esteemed MSSF members; Bill and Louise Freedman. It really is an impressive list of about 800 books that can be viewed in the members' area of our website mssf.org. The Randall has consistently said that they will not be able to house our library once they reopen which has left the fate of our library the topic of MUCH discussion. I am now pleased to announce that our library has found a home at Cal State East Bay under the guardianship of Dr. Brian Perry, one of the societies Scientific Advisors.

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The library certainly will be more accessible than in its current state as it sits in a storage locker, and it will be somewhat more accessible than it was when it was housed at the Randall museum. Historically the library was only open for about 8 hours a month during the monthly meetings. Now under Dr. Perry's care the library will be open somewhat during business hours. (exact hours are TBD). You can easily look at books at the facility, or books can be checked out. The exact process for getting books from the East Bay to our general meeting has yet to be figured out, but eventually you will be able to reserve a book, and pick it up at our monthly meeting rather than getting over to CSU East bay.

We are very excited to once again make this collection available to membership at large. Now, is there anybody who would like to take on the duty of MSSF Librarian? If so, please let any of the council members know and we'd love to have you on board.

-Brennan - president@mssf.org

MUSHROOM SIGHTINGS IN MARCH 2017

by Pascal Pelous



Trichoglossum hirsutum
Salt Point, CA



Russula
Oakland, CA



Fomitopsis pinicola
Salt Point, CA



Black cup fungi
Oakland, CA



Craterellus calicornucopioides
Salt Point, CA



Craterellus calicornucopioides
Oakland, CA



Cantharellus californicus in Poison Oak
Oakland, CA

Send photos of your findings to mycenanews@mssf.org to be published in the next newsletter.

CULINARY CORNER

by Ruth Erznoznik

On March 8 at the Hall of Flowers in Golden Gate Park, 45 of the more fortunate members of the MSSF Culinary Group (an all-volunteer committee of the MSSF) were transported to the Burgundy region of east-central France. Hearty and flavorful in the best European tradition, the night's dinner was a most memorable evening of mushroom-laced fare, offered midway through one of the best mushrooming seasons we've enjoyed for years. Dinner Captain Mike Ahern, ably assisted by team chefs Kathleen MacDougal, Virgilio Cardona-Sanchez, Paul Lufkin, Ruth Erznoznik, Carol Hellums, and Carol Reed, welcomed the arrival of Spring with a gourmet feast theme of "Country French Dinner" that will be long remembered. The menu included Spring Greens with Radishes and Parmesan Sprinkles, Boeuf Bourguignon (aka Beef Burgundy), Portobello Potatoes and Onions, vegetarian Potatoes with Chanterelle Mushroom Gravy, Meyer Lemon Tart, Coffee, and Tea.

The Culinary Group's next dinner will be held on Monday, April 3, 2017, also at the Hall of Flowers. On that evening, dinner captain Al Carvajal will escort the Group (and its guests) to France's neighbor to the southwest - serving a dinner themed, "Espana!" The planned menu includes a salad by George and Jane Collier, gazpacho by Carol Hellums, seafood paella by Captain Al (with a vegetarian main dish option), and an as-yet-to-be announced (always delectable!) dessert by Cat Ung. New MSSF members with an interest in mycophagy are especially encouraged to attend the dinner. To register, log into the MSSF website as a member and go to Members Area Features > Events > Event Registration. Cost of the dinner is \$18 (\$17 for seniors) payable at the dinner. Registration ends March 29 at 10 p.m. If you are a dues-paid MSSF member, you may attend a Culinary Group Dinner the first time without joining the Culinary Group (simply by registering online). If you plan to attend a second time, however, you must join the Culinary Group by paying nominal annual dues of \$10 per year (for membership Sept.-May) and volunteer to assist as a team member at a future dinner.

This month's recipe:

Sautéed Maitake Mushrooms with Red Chiles and Cilantro

(For original posting, see [Savour Magazine](#). As explained there, Cara Stadler of Tao Yuan in Brunswick, Maine uses meaty maitake mushrooms instead of meat for this dish. Keep the mushrooms in large chunks so they can brown to a crisp on the outside while remaining tender inside. If you can't find maitake mushrooms, use oyster, hen of the woods, or whole chanterelle mushrooms as a substitute. Serves 6-8; takes 25 minutes to make.)

Ingredients:

- 1/4 cup plus 2 tbsp. vegetable oil
- 10 dried chiles de arbol
- 8 whole star anise
- 2 lb. maitake mushrooms, torn in half by hand into large 3-4-inch pieces
- 2 tbsp. minced ginger
- 1 tbsp. plus 1 tsp. minced garlic
- 1/4 cup soy sauce
- 2 tbsp. vegetable stock
- 1 tbsp. plus 1 tsp. packed light brown sugar
- 1/2 cup loosely packed cilantro leaves
- 3 scallions, thinly sliced crosswise on the bias



In a wok or high-sided skillet, heat oil until it begins to smoke. Stir in half the chiles and star anise and toss in oil until fragrant, about 20 seconds. Add half the mushrooms in a single layer, toss in oil, and cook, undisturbed, until caramelized and crisp on the bottom, about 4 minutes. Toss again and cook, undisturbed, until caramelized and crisp, about 2 minutes more. Using a slotted spoon, remove the mushrooms, chiles, and star anise from the wok and transfer to a plate. Return the wok to the heat and repeat with the remaining chiles, star anise, and mushrooms. Return

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all the chiles, star anise, and mushrooms to the wok along with the ginger and garlic and cook, tossing, until fragrant, about 30 seconds. Pour in the soy sauce, stock, and sugar and cook, tossing, until the sugar dissolves and the garlic and ginger are tender, about 1 minute. Transfer the mushrooms, spices, and chiles to a large serving platter; sprinkle with cilantro and scallions.

CANDY CAP CHEESECAKE BARS & SHIITAKE RICE CRISPY TREATS

by Brennan Wenck-Reilly

Candy Cap Cheesecake Bars

Crust:

- 1 ½ Cups of finely ground graham crackers
- ½ Cup brown sugar
- ¼ Cup sliced almonds
- ½ Cup butter, melted
- ½ teaspoon cinnamon

Mix all ingredients well. Then press evenly into a large cookie sheet and bake for 10 minutes at 350 ° F. Set aside while you make the filling.

Filling:

- ½ Cup brown sugar
- 2 (8 oz) packages of cream cheese
- 1 Tablespoon lemon juice
- ¼ Cup milk
- 2 Eggs
- 1 teaspoon vanilla extract
- 2 Tablespoons Candy Cap Mushrooms, finely chopped.

To reconstitute the mushrooms add 2 Tablespoons of warm water to the finely chopped mushrooms and set aside.

Preheat oven to 350°F

Beat together cream cheese and brown sugar until smooth. Stir (by hand) in the lemon juice, milk, eggs, vanilla and mushrooms until well mixed. Spread over the baked crust and bake for about 25-30 minutes.

Shiitake Rice Crispy Treats

The key to adding anything to rice crispy treats is that it has to be completely dry or else the rice crispies will quickly absorb any residual water and be soggy. Dehydrated items are not dry enough, you are better off using freeze dried items. I often use this recipe and substitute freeze dried mushrooms for freeze dried strawberries and bananas or blueberries or even freeze dried pineapple (all found at Trader Joes)

I have only found one place in the bay area that sells freeze dried shiitakes; Vua Kho Bo (AKA Jerky King) in Cupertino (thanks for introducing me Wendy So). They come lightly seasoned, and its hard not to eat the whole bag on your drive home.

- ¼ Cup butter
- 1 Package of miniature marshmallows
- 5 Cups rice crispies cereal
- 1 Cup freeze dried mushrooms

You have to break the mushrooms into pieces, I use a rolling pin to crush the mushrooms into fairly small pieces.

Mix the mushrooms and the rice crispies cereal (do this first, because the melting marshmallows will require your full attention

Butter the edges of a cake pan and set aside.

Melt the butter in a large sauce pan over low heat. Add the marshmallows and stir constantly. This goo will easily burn so it requires constant stirring. Once the last marshmallow becomes liquid add the cereal/mushrooms mixture and continue to stir over the heat for a minute. Do not leave over the heat for too long or you'll burn the mixture. Pour the mixture into your buttered cake pan and evenly spread. I've found this is easiest to do with wet hands- The marshmallow wonts stick to your hands when they are wet.

Let cool and shovel into your face. Enjoy.

ACADEMIC QUADRANT - *ANCIENT MUSHROOMS IN ANCIENT DIETS AND MEDICINE*

by Jackie Shay

Up until 2015, it was rare to mention the use of mushrooms in the diet of the Paleolithic human. The discovery of a bolete mushroom embedded in a 50,000 year old calcified tooth from El Mirón Cave in Spain (Power *et al.* 2015) introduced the idea of ancient mushrooms in human diets (Fig. 1). Mushrooms are known as soft, putrefying, organisms and are an infrequent occurrence at archeological digs. Rare exceptions include studies by Watling & Seaward (1976) who found *Bovista nigrescent* and *Calvatia utriformis* (puffballs) from a dig in the UK and Peintner & Pöder (2000) who found a Copper Age ‘iceman’ with a bag of *Piptoporus betulinus* (birch polypore) used for food and pain killers respectively. Ancient texts first mention the use of mushrooms for both their hallucinogenic and poisonous properties in the Theophrastus era circa 371–287 BCE (Sharples and Minter, 1983). However, with such obscure data, it is difficult to see how important mushrooms could have been to humans or not. Modern advancements make it possible to explore the chemical composition of these findings to answer questions about ancient human uses of fungi for food and medicine.



Figure 1 - teeth

The use of mushrooms as diet and medicine was studied by Laura S. Weyrich (Fig. 2) at the University of Adelaide using ancient DNA from Neanderthal dental calcifications from various locales. She and her contributors found that there is variation in the microbial patterns of dental plaque from different regions (Weyrich *et al.* 2017). These findings contribute to known “hunter-gatherer” lifestyles of Neanderthals, and suggest different eating habits. The Belgian Neanderthals were found to have genetic deposits from reindeer, woolly rhinoceros, mushrooms and wild sheep, demonstrating their heavy intake of meat (O’Grady 2017). On the other hand, the dental plaque from Spanish Neanderthals contained genetic material largely from mushrooms. These people were eating more like vegans than their Northern relatives, which is a surprising finding since it has been assumed most Neanderthals ate a “paleo” diet (Fig. 3).



Figure 2 - Laura Weyrich

Keith Dobney, one of the authors on the Nature paper, made a connection from these findings to modern food-related health problems, like obesity. He stated “It hasn’t happened overnight; it’s part of the journey that we’ve been on for thousands of years. Major cultural changes like the beginnings of agriculture are still impacting our health today.” (O’Grady 2017). As scientists discover more about the oral microbiome in the context of geography, history, and available resources, they can begin to paint an elaborate picture of human evolution, and help people better understand their relationship to food, fungi and the microbes transferred from them. It is now up to researchers to continue to sample archeological findings so they can build a stronger genome and visualize the impact mushrooms have had on human life for the last 50,000 years.



Figure 3 - paleo diet

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MSSF SPRING FORAYS

by Curt Haney

Past **MSSF** President and Mendocino Woodlands Camp Director **Curt Haney** is planning on organizing two spring forays this year.

The first foray will be held in the Stanislaus National Forest with camping at; “The Pines Campground” (fees apply) near Yosemite National Park. This foray will be held on either the last weekend of April, (28-30) or the first weekend in May, (5-7). The date of the foray will be decided in Early April. It all just depends on when the snow melts and when the ground temperature raises enough to encourage mushroom fruiting.

The second foray will be held in the Shasta-Trinity National Forest, on the back side of Mt. Shasta near the town of McCloud, with free camping at Trout Creek Campground. This foray will be held on either the weekend before Memorial Day, (19-21 May) or the weekend after Memorial Day, (2-4 June). Again, it all just depends on the weather and conditions favorable to mushroom fruiting.

Additional information on these forays will be announced in the April edition of the Mycena News, on the MSSF website calendar, event registration section, and via e-mail announcements to all MSSF members. These forays will be open only to MSSF members in good standing, (dues paid up to date) and registered for the event through the event registration process on the MSSF website. Guests of members will not be allowed to register or attend these forays due to their popularity, and limited camping availability. Instead, encourage your friends to join the MSSF and reap the benefits of membership for only \$20 a year.



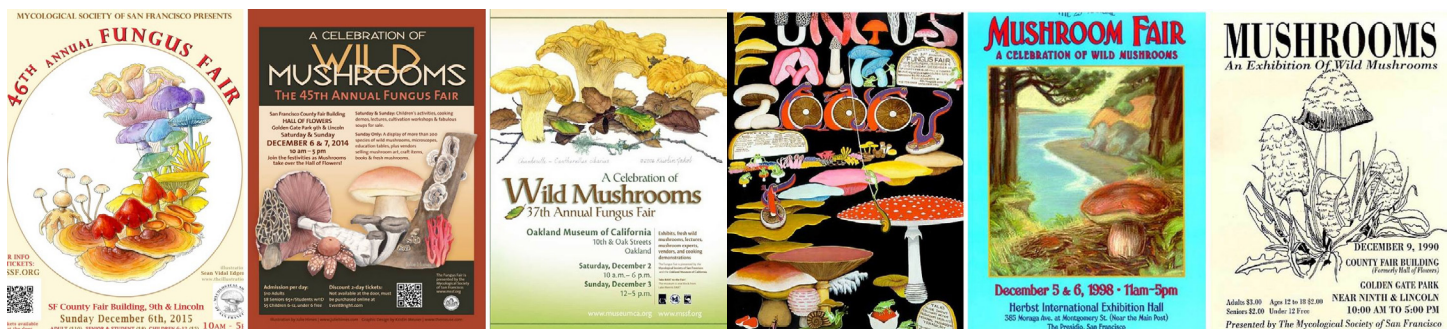
Look for final foray announcements from Curt again in Early April.



CALL FOR FUNGUS FAIR 2017 POSTER ART - DEADLINE APRIL 30TH, 2017

by Mahdu Kottalam

Although the 2017 Fungus Fair isn't until December, we are looking for artists interested in doing this year's fair artwork. Your artwork would be featured on this year's t-shirts and posters. Whether you're a professional science illustrator or you simply enjoy drawing mushrooms, please consider submitting examples of your work or a portfolio link. Perks include having your own guaranteed spot as a vendor at the 2017 Fungus Fair, 2 tickets to the Mendocino Woodlands Foray, and an Artist Profile in the Mycena News. You may submit past work for the selection process, but official FF2017 art must be new and original artwork created specifically for this year's fair. Please send your submissions to fungusfair@mssf.org by April 30th, 2017.



CULTIVATION QUARTERS

by Ken Litchfield

This month's Cultivation Quarters is devoted to how to grow the Garden Giant mushroom in your own garden which spawn you may have picked up from the Far West Fungi Farm Field Trip Potluck BBQ last month or order it from the shop in the SF Embarcadero Ferry Building. You can also obtain the mycelium from Bay Area Applied Mycology at one of their seminars or at the Omni Commons BAAMlab. It is the perfect mulch mushroom for beginners and advanced gardeners to grow in their local back yards, parks, or school gardens for loads of huge edible mushrooms, soil building, and mycoremediation.

The Gardener's Guide to Growing the Garden Giant Mushroom

by Ken Litchfield - ©2017

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About the Garden Giant Mushroom

The Garden Giant is the easiest, most satisfying mushroom for the average beginning or experienced mushroom gardener to grow. Its scientific name is *Stropharia rugoso-annulata* Farl. ex Murrill and its family is the Strophariaceae. Its best known common name is Garden Giant because it can get quite huge, a foot or more across the cap, and hefty in poundage. It is also known as the King Stropharia because it is the largest of the Stropharias and quite regal in appearance, similar to a King Bolete, but with gills. It is also called the Burgundy Cap or Wine Cap because when young and fresh, with the edges still turned down button mushroom style, it is a dark burgundy or maroon purple that suggests a dark wine. It fades to a lighter tan as the cap matures and flattens out, looking reminiscent of an *Agaricus* portobello mushroom. Rather than the dark chocolate brown spore bearing gills under the cap of the *Agaricus* portobello, under the Garden Giant cap are gills that have a dark blackish purple cast characteristic of the Strophariaceae family of mushrooms which also include the *Psilocybe* magic mushrooms. The Garden Giant mushroom doesn't stain blue when you rub or bruise the stem like a *Psilocybe*, with which it has been classified in the past, but it does have a tan veil or skirt around the stem the same color as the stem that often falls away as the mushroom enlarges. The veil connects the edge of the cap to the stem protecting the gills when the cap is still young, similar to young *Agaricus* button mushrooms where the veil protects the young pink gills. In the Garden Giant this veil or ring often has ridges or wrinkles giving it a rugged appearance, hence the name *rugoso-annulata*.

The Garden Giant's favorite place to grow is in your wood chip or straw mulch. It produces regular looking capped mushrooms with gills underneath that look and taste like large tight store bought *Agaricus* button mushrooms when small, and big flat portobello mushrooms when fully mature. When you harvest this mushroom all you have to do

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is pull up the mushroom, cut off the base, and slice or dice the stem and cap and cook it any way you would button mushrooms in sautees, sauces, or soups. Or if it has matured it can be grilled like fully developed portobellos, which are *Agaricus* button mushrooms that have fully unfurled. The Garden Giant is similar in many respects to *Agaricus* button mushrooms with the one major difference being that Garden Giants like to grow on raw cellulose materials like straw and wood chips, whereas *Agaricus* button mushrooms are grown on compost or manure, basically cellulose broken down by digestion of a grazing animal or by composting, or by digestion of raw cellulose by the Garden Giant. You can grow both compost feeding mushrooms and mulch feeding mushrooms in the same garden bed; the Garden Giant grows in the raw cellulose mulch of your garden and *Agaricus* button mushrooms or Shaggy Manes or Shaggy Parasols grow in the composty soil under the mulch produced by the Garden Giant digesting the mulch into compost.

Propagation

It is very easy to propagate the Garden Giant mushroom. Just plant that cut bulbous base of the harvested mushroom with the white fuzz and wood chips hanging off the bottom in fresh damp mulch like it is the bulb of a plant and it will grow into the fresh mulch. You can also lift up a matted layer of mycelium and transplant it to a freshly mulched bed of damp wood chips.

Mycoremediation

Besides growing the mushrooms for food you can use the fuzzy white mycelial body to break down your wood chip or straw mulch into rich composty garden soil. And if you have heard of bioremediation, this is one of the main mushrooms that makes a mycelial mat in wood chips that can filter and eat bacteria in contaminated runoff from grazed pastures and restore or remediate the health of the land. Once you have it growing in your garden or on your farm, all you have to do is keep it fed regularly with properly applied fresh wood chips or straw mulch and it will continue breaking it down, building your soil, remediating the soil, and providing you with mushrooms like a pet livestock blob, especially if you already are familiar with organic gardening methods, and primarily mulch methods.

Getting Started With Your Garden Giant Spawn Bag from Far West Fungi Farm

The bag of garden giant spawn is about 5 lbs of damp sawdust with some extra nutrients and the Garden Giant mycelium growing in it. The mycelium, also known as hyphae, is the white fuzz that makes up the body of the fungus that produces mushrooms. This fuzz or mycelium impregnated in its substrate food is called spawn and is not spores, which are dustlike unicellular “seeds” that are produced from the fruiting mushroom.

The spawn growing in the bag is isolated from the outside world as a sterile culture and it breaths air through the filter patch on the side of the bag. It can stay in the bag for several days to several weeks before you plant it but it is best during that time to keep it cool or refrigerated to slow down the mycelial metabolism.

This is the material that you are going to add to more food substrate for the mushroom mycelium to eat and enlarge or “ramp up” into more mycelium. The mycelium is the part of the mushroom body that corresponds to the “apple tree” with plant gardening. When the mycelium fruits or produces a mushroom this is the “apple.” You could fruit the Garden Giant right out of the bag similarly to getting an Amaryllis bulb to bloom from the buds stored in the dormant bulb, but it is better to grow the bag of mycelium to a larger size by “ramping up” the mycelium. This is done by adding the bag of mycelium to more food substrate that the mycelium likes to eat. The mycelium will invade and incorporate the new food to be a part of its body by running its digestive tentacles through it like a tentacled blob, which is why we sometimes say that the Fungi are the Kingdom of the Blobs. They aren't plants or animals but have characteristics similar and different to those kingdoms. Your plastic bag contains a mycelia tentacled blob waiting in the bag to be allowed out to start extending out its tentacles and eating into the raw cellulose of the mulch in your garden bed.

The Structural Food Substrate for the Garden Giant

Substrate is the word used by mushroom growers to refer to the material that the mycelium feeds on and that provides the structure to the mycelial body of the fungus. Primarily, this is compost or manure for humus or duff lov-

ing *Agaricus* button mushrooms and raw cellulose for tree trunk heartwood feeders like oysters, reishi, lion's mane, and maitake. In the wild the Garden Giant tends to feed on thatch and other raw cellulose so it isn't usually found on trees. Raw cellulose substrate or compost/manure substrate for mushroom mycelium is similar to the soil being the substrate for the roots of plants to grow in. Soil provides oxygen, moisture, nutrition, and support for the roots of the plant similar to the rootlike mycelium of the fungus. The tops are different for plants in that they have leaves with chlorophyll for photosynthesis so they need to be in air and sunlight. The air and sunlight are the "substrate" for the plant's tops.

The Garden Giant's favorite food substrate is raw cellulose like landscaper wood chips, or aspen wood shavings from a pet store (already baked sterile), or straw from a straw bale, or sawdust from a carpentry shop, shredded unwaxed cardboard or egg cartons, layered or wadded burlap bags, or combinations of those. Wood shavings or straw used for stable bedding works if there isn't so much manure in it or if you remove most of the manure and soak the straw to leach out the urine and manure fertilizer which can be poured into garden plants like manure tea. Then the leached shavings or straw can be used for the garden giant.

It is best to soak the substrate material in water to penetrate into the chips, shavings, dust, straw, cardboard, etc. This might be for a few minutes or an hour for dust, shavings, straw, cardboard, burlap, or overnight for chips. (See "Neutralizing Chloramine in Municipal Tap Water" below for the information about neutralizing the antibiological chloramine in your tap water if that is what you will be using to soak your substrate.) It is best to not leave the substrate submerged for longer than 24 hours at a time so it doesn't become anaerobic. (For a sustainable anaerobic method of sterilizing your substrate see "The Anaerobic Sauerkraut Method of Sterilizing Substrate" below.) After soaking, the material should be well drained so it isn't soggy, just damp. The material is best if it is chips or shavings or straw by themselves or mixed in equal parts. With sawdust it is best to mix that with chips and/or straw to open up the texture so it has more air in it, as straight sawdust can become too compacted by itself. Generally, chips that range from the size of little finger joints to thumb or big toe joints mixed are good, and also if those are mixed with shavings and/or straw.

Many people worry that the wood chips need to be hardwood like oak or maple or sycamore etc and that supposedly you can't use conifer "softwoods" like Monterey cypress, Monterey pine, or Eucalyptus that are the main woodchips available from tree trimmers in the bay area. These are considered to have antibiological oils in them. However, Garden Giants and Oyster mushrooms are used in mycoremediation of oil spills and these oils are simply hydrocarbons like cellulose that they can break down and use for food. The wood chips begin volatilizing the oils into the air as soon as they get chipped and are leached of oils after a few waterings or rains on them in the garden anyway. You can also soak fresh woodchips a couple times overnight if you are worried about this.

More important is to use chippy wood chips of whatever species as this is from the internal sterile heartwood of the tree which is more pure raw cellulose and doesn't have as many organisms for the mushroom mycelium to compete with as there would be with leafy, twiggy, and barky materials that have all kinds of organisms living on the outside of the tree.

Once you have the substrate prepared you can then use it in a number of methods like mother beds or worm bins to "ramp up" the mycelium to larger quantities.

"Mother Bed in the Garden" Style of Ramping Up

For this method you need a garden space of about 4' by 4'. It is best to situate it in the wind-blocking corner of a fenced garden under a shade tree where the mother bed is less likely to dry out quickly in the sun or wind. The space is ideal if it is too shady to grow most other garden plants anyway. Fungi don't photosynthesize and they only need a small amount of light for directional fruiting. If your space is sunnier that is OK. You can shade it and keep the wind out by tenting a layer or more of burlap over it on stakes or poles staked around the bed. You'll need enough substrate to make a layer of substrate 6" to a foot deep or more in the 4' x 4' space.

You can dig up and turn the soil in the spot so it is fluffed with air and the weeds chopped in with the digging.

You could also just lay down several layers of unwaxed cardboard over the bed to smother weeds and provide more raw cellulose for the mushroom to eat. If the bed is sunny and you want to use it as a garden for growing plants, it is best to dig up the area and fluff it rather than lay down cardboard as the resulting soil will have a bottom zone of compacted soil, a transition zone of cardboard that will take time to break down, and then the rich soil built by the Garden Giant on top. If you go ahead and dig up and fluff the existing soil, and leave out the cardboard, the worms will be able to come up from below into the fluffed and oxygenated soil. They will continue rototilling it and mixing in the bottom of the mulch layer into the top of the soil layer in a continuous transition of soil, compost, organic matter, and mulch with a gradual transition zone without the cardboard layer, as is found in nature.

When you have your substrate mix prepared by combining raw cellulose mixes and soaking them then you can pour the water and two thirds of the substrate from the container onto the soil of the space where you are making the mother bed. If you are using cardboard in the bed, pour the strained water into the soil of the bed then put down the cardboard and then dump on two thirds of the soaked substrate and level and even it out. Open the bag of garden giant mycelium and break it up and scatter the pieces over the surface of the raw cellulose substrate. Press the pieces into the substrate to give the mycelium contact with the fresh food. Then you can add the rest of the substrate. When all of the bed of substrate is finished then smooth down the surface so it is flattened and the peaks are less likely to dry out. You can add a humidity later of tented burlap draped over staked poles inserted around the bed. Water the bed with a rain nozzle to settle it and then water periodically to keep the substrate damp.

If you would like to add an extra jump start to your mother bed then on top of the two thirds layer add a layer of soaked aspen shavings and mix the spawn into that layer and add the other third of substrate to the top of the aspen/spawn layer.

Periodically monitor the bed to observe the progress of the mycelium through the substrate. When it is fully infiltrated and making a bed of matted wood chips that can be lifted up as a layer then you have a successfully infiltrated mother bed that you can use to inoculate other areas. Next see below on the Mycelial Garden Blob Livestock Pet.

Worm Bin Style Ramping Up

You can also use discarded or recycled worm bins as another method to ramp up your garden giant spawn. Fill three worm bins to the rims with prepared and wetted substrate and mix in one third of the bag of garden giant spawn into each bin. Then stack the bins so that each bin's bottom is in contact with the top of the substrate of the bin below. Set the stack of bins on a plank of plywood so it doesn't sit directly on the ground and cover the whole stack with a black plastic garbage bag to keep it damp. Check it periodically until it has fully grown through each bin. When the mycelium is fully grown through the bins they will grow into each other through the mesh bottoms of the bins. Each bin can be used as a fruiting box or can be used as a mother bin to inoculate one or more 4' x 4' mother bed sections of a larger garden bed.

If you don't have any used worm bins you can substitute with stacked wood-slatted bushel baskets, wooden wine boxes, plastic milk crates, or tack hardware cloth or bird wire to the bottoms of open boxes made with 1" x 6" boards.

Fruiting the Garden Giant Mushroom

The Garden Giant can begin fruiting at any time after it has fully infiltrated the substrate or has gotten concentrated in certain areas. The best way to initiate fruiting is to water the mulch substrate regularly so it soaks up the water like a sponge. You water enough so the mulch soaks up but not so much that it drains through to the soil beneath. This usually involves several short waterings, or foggings with a Foggit nozzle, per day for a few days, so not much water is being used, but it is to soak the mycelium impregnated mulch and not the soil below. Soon the garden giant mycelium will begin making what looks like velvety chocolate marbles on the surface of the mulch substrate in humid areas of the burlap cover or under vegetation cover. Keep the bed sprinkled regularly after the little mushrooms develop and once they reach big button size you can stop watering the mulch and only spray the burlap tent to keep the air humid. You can harvest them at any stage from big button to fully unfurled portobello. Lift the mushroom up out of the mulch,

cut off the base to transplant to other areas of fresh mulch and cook the stems and tops any way you would buttons or portobellos. Usually you will get so many mushrooms that you can't eat them in one meal so you can slice and dice and freeze them in ziplocks in the amount you would use in a mushroom dish. Put the frozen block in the pan or soup pot so it thaws directly in the pan or pot as it is cooking. Garden Giants taste like "regular" mushrooms to most folks, but some consider them to have a flavor reminiscent of asparagus.

Maintaining Your Mycelial Garden Blob Livestock Pet

As you ramp up the mother beds into more mushroom beds and you have a fully myceliated mulch bed then you can fruit them any time after they are fully infiltrated. You can also maintain the mycelium in the beds by adding fresh raw cellulose substrate to the top of the garden mulch bed. The best way to do this is to add 1-3" of fresh soaked substrate to the whole bed and then use a spading fork to stab the mulch bed over the whole surface. Properly, you stab the surface to the depth of the spading fork's tines and then twist the fork as you pull it out of the mulch bed. This opens up the mycelial mat in the mulch and allows the new substrate to fall down into the mycelially matted mulch to give it fresh food. Then smooth out the surface and water to settle. The broken mat of mycelium will leap up and invade the new substrate and heal over the mat within a week when it is vigorously growing. Perhaps the bed needs substrate refreshing every month or couple weeks or couple months, depending upon its vigor.

What you have now created is your own pet blob of livestock mycelium that can be maintained at quite a large size. We have done this in mulch beds as large as 10'x20', 20x20', and 5'x60' simultaneously. These size beds are each big enough to produce armloads of mushrooms every couple weeks. What you have is a bed of substrate these sizes and 6" to 24" deep with a mycelially matted blob hovering in the substrate. The life force of the mycelium hovers at the level it best likes so if the mulch is drying out it sinks lower into the mulch and if the mulch is wetter or there has been rainy weather for several days the mycelium may actually come out of the mulch and carpet the surface of the mulch. It devours more substrate that you add to its dorsal surface, digests it, and poops off of its ventral surface the broken down cellulose as compost that builds the soil below. This pet blob will continue to fruit off its dorsal surface and build your soil below as long as you provide regular feedings of the substrate to its dorsal surface.

"Pizza Garden" Growing for Mushrooms

Some folks like to grow a Pizza Garden with all the ingredients for pizza, including mushrooms, in one garden bed. For this garden you plant your vegetables "audience" style with the tallest plants in the back and the shortest in the front, in relation to the east to west movement of the sun in the daily sky. The rows go east west so the tallest are on the north side of the garden bed and the shortest on the south side. The order of planting for height would be tomatoes in the back, then a band of eggplant and peppers, then a band of basil, then a band of onions and garlic, and then chives and the creeping herbs like oregano and marjoram at the front. When the plants have been planted out in the spring they will all be relatively small and with space between them. You mulch the garden with Garden Giant substrate with spawn mixed in from one of your ramping beds or bins. As the plants grow you can continue to add substrate to the mulch bed while leaving some stepping stones scattered around for future access. When the plants have grown through each other there will be a vegetation humidity chamber that breaks the wind and holds the humidity. You can dig around from the back side under the tomatoes to get to the mushrooms or from the front amongst the garlic and onions to get to the mushrooms under the basil, peppers, and eggplant. These will be veggie pizzas unless you add snail ranch ed escargot to the mix.

Rejuvenating an Old Bed of Garden Giant Mushroom Mycelium

Occasionally, you may have to leave your garden unattended for a period. The plants and fungi can usually take care of themselves for quite a while but they will tend to go feral and do things that may not be totally according to your plans as the garden manager symbiont. As the Garden Giant uses up most of its raw cellulose that is smaller, thinner, finer, and more quickly broken down it will be left with the larger chunks of wood chips or pockets of raw cellulose that didn't get digested as fast. You can dig through the broken down compost mulch and scrounge up the various patches and pieces of mycelium that you find. The Garden Giant has the fine unicellular fuzz of the regular mycelium but also makes ropey rootlike "rhizomorphs" that often look like tangled and branching kite strings. These

are like multilane mycelial highways and have a better ability to withstand drying or other adversity than the unicellular fuzz. This makes it one of the fungi that can be recognized by its mycelium without mushrooms being present. However, the Stinky Whiffleball or Lattice Stinkhorn, *Clathrus ruber*, also makes these rhizomorphs so it is a mycelia lookalike to the Garden Giant.

You can add these Garden Giants rhizomorphs and mycelial pieces and undecayed patches to a new mother batch of damp aspen wood shavings in a plastic bag like you are using tinder to start a fire. As the mycelium grows you can observe its progress in the bag and then ramp it up by any of the other methods covered here already. Or you could rake up the old mulch bed and spread a layer of new mulch substrate over the whole bed and see what begins digesting it.

Addenda

The Anaerobic Sauerkraut Method of Sterilizing Substrate

If you would like to sterilize your substrate to give the mycelium less competition from other organisms it isn't necessary to boil it or use hydrogen peroxide. You can soak the substrate in a 55 gallon drum of water (see below for info about chloramine in tap water) for 10 days to two or more weeks or for as long as you like, the smellier the better. After a couple days the oxygen in the water will be used up by aerobic organisms which will then drown or die of asphyxiation. Then anaerobic organisms will take over and use the substrate for their own different methods of metabolism. As long as the substrate is submerged in the anaerobic water by weighing it down with cinder blocks on a plank or some such, it will all look pretty much as fresh as the day you put it in the water. If you use only straw from a straw bale it will remain tan colored very much like sauerkraut for weeks or months in submergence. When you are ready to use the substrate dump the barrel over and spread out the substrate so that it is exposed to the air and rinse it with water. The oxygen in the air will kill off the anaerobic organisms and now your substrate is sterile. The only expense is water and time, no expensive dangerous chemicals, or heat from propane.

Neutralizing Chloramine in Municipal Tap Water

It used to be that most municipal water supplies were treated with chlorine to kill pathogens. It would also kill any other organisms so that if you wanted to use tap water in your aquarium you had to fill the empty aquarium and let it stand for 24 hours so the chlorine evaporated before you put the fish in the water. Now the chlorine has been replaced with chloramine which doesn't evaporate from the water. So the aquarium water now has to be treated with a special neutralizer that comes in a dropper bottle available at the aquarium store. You can also neutralize it for free by using any garden clay that you bake in the oven to sterilize for a couple hours at 300 degrees. You can sift this powder and add a pinch to your glass of drinking water to neutralize the chloramine's antibiological activity for your health.

You can also stir in about a tablespoon or two of this clay powder to a 55 gallon drum, or a bathtub, or a wheelbarrow of tap water for soaking substrate. The antibiological activity of the chloramine in the water is instantly deactivated or neutralized by the clay particles that bind to the chloramine. When watering your mushroom mulch bed you can probably successfully remediate the sprinkling water by scattering a hand full of clay powder over the top of the mulch before watering. It is unclear how much effect the tap water may have in the garden and it is also leached and neutralized by rain water falling on the garden.

Garden Giant Mushroom Images

For images of the garden giant mushroom you can do a google images for:

Garden Giant Mushroom

Stropharia rugoso-annulata

King Stropharia

Burgundy Mushroom

Wine Cap Mushroom

[example](#)



MSSF Calendar April 2017

Monday, April 3, 7:00 p.m. - 10:00 pm
[MSSF Culinary Dinner](#)

Theme: Espana!

Hall of Flowers, County Fair Building
 Golden Gate Pk., 9th & Lincoln, S.F.

Tuesday, April 18, 7:00pm - 10:00 pm
[MSSF General Meeting](#)

Speaker: Laura Bogar

Hall of Flowers, County Fair Building
 Golden Gate Pk., 9th & Lincoln, S.F.

MSSF VOLUNTEER OPPORTUNITIES

Join the Council leadership, learn the inner workings of the MSSF and help make decisions that shape the future of the society. Do your part by contributing your time to this 100% volunteer organization!

To learn more about all council and committee positions, go to: www.mssf.org members-only area, file archives, council member position descriptions. Or email president@mssf.org.

Photo Credit: on page 1, *Stropharia rugosoannulata* (Giant Garden Mushroom) by H. Krisp [CC BY 3.0, via [Wikimedia Commons](#)]

ANNOUNCEMENTS / EVENTS

Herbal Mead Making

7pm-10:30ish Every Wednesday Night
 at Omni Commons Lab
[4799 Shattuck Ave, Oakland](#)

Contact Ken Kitchfield
litchfield.ken@gmail.com for more info

The **Mycological Society of San Francisco** is accepting nominations for the officer positions of President, Vice President, Secretary, Treasurer, and two at large councilor positions.

If you would like to offer your nomination of a person willing to serve please contact any of the following members of the nominating committee:

Colleen Sudekum - <sudekum@sbcglobal.net>
 Alan D'Souza - <subatomicelphant@yahoo.com>
 Madhu Kottalam - <madhu.kottalam@gmail.com>
 Ken Litchfield - <litchfield.ken@gmail.com>

Nominations will be announced in April for elections at the May 16th general meeting.



Mycena News

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Please e-mail photos, comments, corrections, and correspondence to mycenanews@mssf.org

To subscribe, renew, or make address changes, please contact

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Past issues of *Mycena News* can be read online at <http://mssf.org/mycena-news/issues.html>

Mycological Society of San Francisco
 The Randall Museum - 199 Museum Way, SF, CA 94114

Submit to *Mycena News*! The submission deadline for the May 2017 issue is April 16th. Send all articles, calendar items and other information to: mycenanews@mssf.org

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