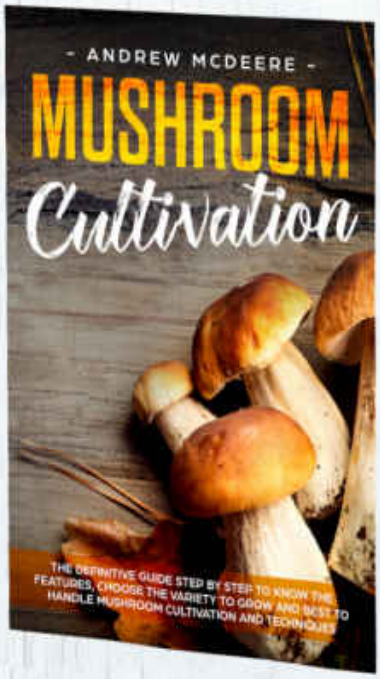
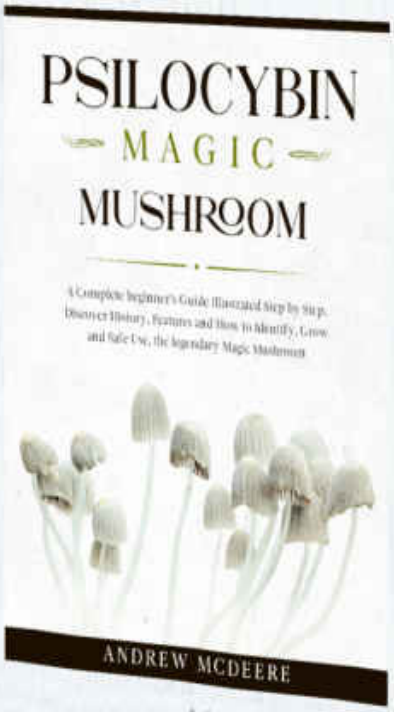
MUSHROOM Cultivation AND PSILOCYBIN Magic Mushroom

Discover How best to handle Mushroom Growing and How to Grow and Safe Use the Psilocybin Mushroom by this Complete - 2 in 1 - Step by Step illustrated Guide

2 BOOKS IN 1





- ANDREW MCDEERE -

MUSHROOM Cultivation ANDREW MCDEERE

PSILOCYBIN Magic Mushroom ANDREW MCDEERE

Andrew McDeere

Mushroom Cultivation and Psilocybin Magic Mushroom

A Complete - 2 in 1 - Step by Step illustrated Guide

Discover How best to handle Mushroom Growing and How to Grow and Safe Use the Psilocybin Mushroom

Table of contents

“Mushroom Cultivation”

“Psilocybin Magic Mushroom”

Andrew McDeere

Mushroom cultivation

A Complete Step by Step guide to know features, choose variety to grow and best way to handle mushroom cultivation and techniques

INTRODUCTION

Mushrooms develop in two phases: the vegetative stage when organic matter is grown and decomposed, and the fruiting stage when mushrooms (fruity bodies) are created. The cool, humid climate in the forests is perfect for the growth and development of mushrooms, and under these circumstances some species can be grown. The approach for the cultivation of mushrooms is to bring a desirable species into a increasing medium and to encourage its development, so that fruiting corpses are eventually created.

The method of increasing mushrooms can be split into four steps: the acquisition and maintenance of the mushroom tissue community (called mycelium) of the species designed for agriculture. A tissue culture is kind of like slicing a plant. Some growers begin with spores of mushrooms, which are more like the plants of a plant.

Using some tissue culture to start some mushroom spawn (a kind of fungus seed) which is generally cultivated on a tiny amount of sterilized grain or sawdust.

Using a spawn to bring mycelium mushroom into an organic material or substrate selected to promote the development of fruiting bodies.

Getting the fruiting bodies to shape and develop once the substrate has been fully colonized by mycelium mushrooms.

If you purchase a mushroom kit, you usually start at phase four. The commercial mushroom grower has already finished the previous measures and supplied you with a mushroom culture prepared to create fruiting bodies. You'll need to provide the right atmosphere,

generally refreshing and humid. Getting the mushrooms to shape can be simple or hard based on the species chosen. The genera Pleurotus (multiple species / variants of Oyster Mushroom) and Hypsizygus (Elm Mushroom) are among the hardest to bear fruit. Grifolafrondosa (Hen of the Woods or Maitake) and the genus Morchella (Morels) are among the most challenging ones; Shiitake lies somewhere in the center.

It is also feasible to begin with phase three by buying the starter spawn from the provider and using it to bring the increasing mushroom into the organic material that you have prepared yourself. There are a range of feasible substrates: straw, compost, logs, wood chips and sawdust, but individuals have also used products such as paper, carton, sterilized grain, coffee grounds, etc. based on the species of mushroom to be grown.

In particular, there are three wide types of grown plants: those which tend to develop on compost, (humus-inhabiting fungi), those which naturally develop on plant tissue, (wood-inhabiting fungi) and those which are mycorrhizal, forming a symbiotic relationship with the roots of plants. Mushrooms of the genus Agaricus, Blewits, Stropharia rugoso-annulata (Wine Cap Mushroom) and Coprinuscomatus (Shaggy Ink Cap) are the first group to develop easily on compost, but they will also develop on straw. Oyster Mushrooms, Shiitake, Maitake, Enokitake, Elm Mushroom, Laetiporussulphureus (Chicken of the Woods), Sparassiscrispa (Cauliflower Fungus) and Hericiumerinaceus (Lions Mane) all favor plant materials such as sawdust, wood chips or rocks. The third category are, of course, truffles which favor oak or beech trees in the

wild; they are commercially accessible as truffle plants (inoculated hazel or oak).

Importance: Mushrooms have been used as meals since time immemorial. They were regarded to be the delicacy. From the nutritional point of perspective, the mushrooms are put between meat and vegetables.

They are wealthy in protein, carbohydrate and vitamins. Mushrooms are small in caloric importance and are therefore suggested for cardiac and diabetic clients. They are wealthy in protein relative to cereals, fruits and vegetables. In relation to proteins (3.7 per cent), they also comprise carbohydrate (2.4 per cent), oil (0.4 per cent), minerals (0.6 per cent) and new weight water (91 per cent). Mushrooms comprise all the nine essential amino acids needed for human development. Mushrooms are great sources of thiamine (vitamin B1), riboflavin (B2), niacin, pantothenic acid, biotin, folic acid, vitamin C, D, A and K, which are maintained even after cooking. Because mushrooms have poor caloric importance, elevated protein content, high fiber content and elevated K: na ratio, they are best suited for diabetic and hypertensive clients. They are also noted to have anti-cancer operations.

India is mainly an agricultural nation with a diverse agri-climate, full of agricultural waste and resources, making it the most appropriate for cultivation of all kinds of temperate, subtropical and tropical mushrooms. Landless farmers, unemployed young people and other entrepreneurs can make a profitable start. It needs less soil than other agricultural plants and is essentially an indoor activity. These are the perfect instruments for the recycling of agricultural waste,

which could otherwise present a issue of disposal and atmospheric pollution.

Thus, the growing of mushrooms is not only of financial significance, but also has an significant part to perform in the integrated rural development program by enhancing revenue and self-employment possibilities for young villagers, women and housewives to render them financially autonomous.

In this book we are going to discuss in details step by step on how to go about mushroom cultivation, continue reading…

BEGINNER'S GUIDE TO GROWING MUSHROOMS

This manual is a step-by-step handbook for beginners who want to develop mushrooms. I haven't come up with most of these methods (actually, likely none of them) and I'm going to quote sources where feasible. I'm not attempting to take credit for any of this, I'm just aggregating data to create things simpler for individuals interested in developing because there's a ton of material out there, so I'm just going to simplify it down and demonstrate you what to do and when to do it. I suggest that you follow this precisely for your first effort, and if you feel like tweaking it, then you do it for your next effort to grow.

Step 1: Gather Your Equipment

The simplest, cheapest, and most affordable technique is "popcorn teak"(see here for more info: http:/www.shroomery.org/9035/Popcorn-Tek-w-pics) You can also use rye berries or something else, but let's just maintain it easy and concentrate on popcorn for that. To prevent misunderstanding, this list is for the jar / inoculation stage only. More things are going to be mentioned in another phase.

Here's what you're going to need:

• Pressure cooker

• 1qt wide-mouth jars-(I like the wide-mouth bottles, they have more space on the lid that you want)

• Scotch tape

• Polyfill (the things in the pillows-if you're not close the shop or someone who has it, purchase the cheapest $4 pillow on the goal and break it open. It's likely better that way anyway)

• A large transparent storage bin (for the still air box-m).

Step 2: Preparing the Jars

Once you've got all your things, the first thing you want to do is soak 2 popcorn cans. Simply throw 2 cans in a large bowl, stir it with water about 2 "above the bottom of the popcorn and wander back for about 24 hours. 2 cans should hold at least 7 containers, likely more. Note: you'll fill your containers up to about 2/3 complete of popcorn. Spore syringes are typically 12ml-each bottle will only need 2ml, so that's enough for 6 containers. Obviously, if you have 10ml syringes, it's en. (We're NOT cooking this pressure, but you can use your pressure cooker if you don't have a big enough container, but make sure the cover is off!) Bring the water to a boil. Once the water starts to boil, set the timer for 40 minutes. Make sure that it remains at a pleasant small boil, nothing too insane, and maintain stirring now and then to avoid cooking on the underside of the jar.

After 40 minutes, inspect a pair of corns by placing your finger nail in them to make sure they can sink in a little bit easily-you should be prepared to squish one between your teeth. When this is done, switch off the stove and throw the warm popcorn moist into a strainer. Don't rinse it here because, as a colleague informed me, it's like carrying meals out of a warm dishwasher, the hotter it's, the more steam goes out and dries it up. I like to get my corn up around the corners of the strainer and stir it around with a metal spoon for about 15-20 minutes, until it's basically dry to the fingertips. The goal here is not to get any excess of water in the jars.

Now, begin scooping popcorn into the containers, get them around 2/3 full-you want space on top so that you can shake the bottles

later-don't overfill them. Close your pads upside down as shown in the image.

Once all your jars are ready to go, cover them with your heavy duty aluminum foil.

Step 3: Pressure Cooking & Work Area Prep

Let's hope you read the manual for your pressure cooker, don't follow my tips on how to run this device. But now you're going to want to add a minimum quantity of water to run it securely (there's likely a row inside) and placed in your foil-covered containers. Depending on the size of your pressure cooker, you can carry up to 7 bottles at a time. You can placed a few bottles on the bottom of the sideways.

Lock the lid on, do everything the handbook says to do, and then placed it on the stove (or plug it in, or whatever you do with the stove you have). Wait until the pressure gage is up to 15 psi and begin your timer for 50 minutes. Don't wander away from this thing, stay in the same room for the next 50 minutes and adjust the heat on your stove to keep it at 15 psi, it's pretty easy to do, but don't just walk away from it. Maybe placed on a couple of headsets and listen to some Pink Floyd or something for the next 50 minutes, maintaining an eye on that pressure gauge.

After 50 minutes, switch off the heat and wander back. Don't open the PRESSURE COOKER! I let this settle down overnight, but I think a few hours will do the same. Of course, create sure there's no strain and it's cooled down for a long time before you open it or you're going to have a poor moment. Also, you want the corns to cool down so you can't inoculate them and blow up your spores, because well then you've spent a ton of moment.

While your bottles are cooling, you might as well be starting to prepare for your job region.

Get your large transparent bath and cut some large gaps in it that you can fit your fingers through and operate in, this is supposed to be your still air box (there are teaks out there for this if you need more guidance). The concept here is that when you inoculate, you do it inside this cabinet where the contaminants are not sweeping around. I'm using a large 5 "hole saw for this, but if you don't have it, feel free to look up" still air box teak "or check out google images for some examples. Put some foil on top of your desk or job zone to the hell of it, pour some of your lysol inside your box, over the foil, and around the space. Sing" The Sound of Music "while you do this if it helps you feel useful.

Step 4: Inoculate... Then Wait!

Once your bottles are lovely and refreshing, go ahead and softly spray the region with Lysol again, maybe 15-30 minutes before you begin. Take a shower, throw on some tidy clothes and make your final plans.

- Put the following inside of your still air cabinet:
- Scotch tape
- Lighter
- Your Jars (if you can squeeze them all in) In a convenient location outside of your still air box, have:
- A folded paper towel with alcohol on it.
- Your syringe(s) with the caps still on
- The gloves if you have them
- Hand sanitizer

Now I get a little additional smooth here, it might not be essential, but I'd rather be secure than getting the contams. What I like to do is: wash my fingers and ankles with a hand sanitizer, let it dry and placed on the gloves. Then I get in and pull the foil off the tops of the containers and bring it out of the cabinet. Next, I'm going to make a quick wipe over the scotch tape inoculation area with the rubbing alcohol, and I'm going to take the paper towel out with the alcohol (so it doesn't get all the flammable inside when we're using the flashlight). I'm going to take the gloves. Right next to me, outside the still air box, I've got a stack of trash comprising foil, an alcohol-soaked paper towel and a couple of gloves.

Now placed on a new couple of gloves and take your syringe. Shake the hell out of it difficult and quick for a minute or so, get all the spores spread out in the liquid, make sure there are no clumps.

Put your lock inside the still air box and extract the cap from the syringe. Lighter, keep it underneath the needle until it's red. Allow the needle to cool off for a few seconds until it is no longer green and puncture the scotch tape on your first container. Aim the needle to the side of the jar, so spray the spores / liquid against the glass and run down into the popcorn. Use only 2 ml of the syringe liquid. Remove the syringe and rapidly place a piece of scotch tape over the wound you just punctured. Move the bottle to the other hand of the smooth air box.

Now, turn the flashlight on and get the needle red-hot again. You'll do this every moment between bottles to avoid any feasible cross-contamination between bottles. Repeat until all your containers are full.

Once all the bottles are finished, remove them from your still air box and placed them in a closet or something, I placed the bottles back in the cabinet they arrived in individually and placed a towel on top of it. Ideally, you want to maintain these at around 73 degrees Farenheit, but anywhere between 70 and 86 is likely ok, some individuals claim it's nice to have them in the 1980s, and others say it makes them more vulnerable to contamination. I do understand that the low mid-70s are working okay.

Now go get all your shit out and wait! You're supposed to see mycelium forming in 5-10 days. Well, if it arrives soon, welcome it. If

nothing happens in 10 days, continue until 14 days or so, maybe more. But you'll generally see something within a week.

Step 5: Shake EmUp... And Wait Some More!

If you're anything like me, you're eager to check your containers every day. Well, look for contamination. If there's some green stuff, get the container up and toss it out. Take the financial hit and don't open it and let go of those hideous green spores, just throw it away. This happens from time to time, don't be discouraged if the jar or the two get contams, but instead be happy about the jars that aren't contaminated! There are other types of contams, so do some research on this, especially if you see something that isn't white in there.

Once the bottle is about 70% full of mycelium, shake it up. Shake side by side, bang the jar against something (some say, use a car tire) try not to shake it up and down, we don't want the corn to reach the polyfilm if we can prevent it. Once everything is shaken, your jar will look a little sad, but don't care, just bring it back where you discovered it and wait a few days-your mycelium will spread quicker and easier.

Wait until the container is 100% colonized by mycelium, and then... Wait another 5 days! Yeah, wait another 5 days to make sure all the corns in the middle that you can't see are colonized as well. But don't worry, we've got things to do in the next 5 days to prepare for the next door!

Step 6: Prepare Your Monotub(S)

Time to do some shopping, you'll need:

A few tubs depending on how many cans of corn you've got. (If you have 4 or 5 containers you can use 1 bath, somewhere around 66 or 70qt. If you have more, you can divided it into 2. I've used different dimensions and personally I prefer transparent ones so I can inspect them without opening them. Let's suppose you have 4 or 5 containers right now)

Some coir bricks

Some vermiculite

- Some big trash bags
- Micropore tape
- Polyfill (you should still have)
- Drill - around 1" +/- (or a knife to cut some holes)
- Scissors or a sharp razor
- Latex gloves (for the hell of it)
- A 5 gallon bucket with a lid
- A thermometer (a cooking/candy type is perfect)
- Temp/humidity monitor (pick one, doesn't have to be this one)

Preparing Your Tub(S)

Prepare your tub(s) by drilling 1 hole on each side, in the center about 4 "from the bottom. Tape over the holes with your micropore tape, I use 3 pieces of tape here so it doesn't allow any fresh air in, but it lets CO2 out. (You might just be able to use regular tape over these holes at this stage, I have some tubs where I haven't had any holes in them yet and they functioned perfectly)

Step 7: Prepare Your Substrate

Once your popcorns are 100% covered with mycelium (+5 days) it's time to add them to the tub.

Pasteurize Your Substrate

Take one of your vacant 1qt bottles (if you have any around it) and use it as a measuring cup, bring 4 quarts of water in a jar and placed it on a stove. While that's going on, open your coir boxes and put one in your 5 gallon tub.

Using your 1qt measurement scheme, scoop up 2 quarts of vermiculite and placed it in the pot as well (see Tek).

Once the water goes to a boil, thoroughly remove it from the furnace (you're a grown man, you understand how to do it securely, I hope) and throw it over the edge of the coir and vermiculite brick in a 5 gallon bath. Put your cover on the bottom of your basket and wander away for about 30 minutes.

30 minutes later, open the bowl and pour around the now-swollen coir / vermiculite-I use a large metal kitchen spoon for this, and I like to wear latex gloves for nice measure. Just create sure that any pieces of coir are broken up, and then close it back for another 3 or 4 hours.

After 3-4 hours, open your container and inspect the temperature with your candy thermometer. If it's over 80 degrees Fahrenheit, placed the cover back on and wait a few more hours.

Once the coir / verm blend is 80 degrees or less, we're prepared to move the popcorn to the tubs.

Step 8: It Puts the Corns in the Tub

Assuming you have 4-5 cans of mycelium-coated popcorn: wash your hands, put on your gloves, and throw all the contents of your 5 gallon jar into a big trash bag. Now, open the 1 by 1 bottles and put the corn in the pocket with the substrate.

Once all your corns have been poured into the bag, softly push it around and kind of' kneed' the bag from the outside-just blend the corn into the coir.

Next, break the bag down a little, so it's just a few inches above the coir / popcorn combination and position the bag inside the bath. At this point, I like to trim the edges so that the bag is under the air holes (remember the holes are still taped, we don't want fresh air in this thing yet) You can tape the bag along the sides if you want, I don't do that, but you can if you want.

Wedge the thermometer / humidity gage in there somewhere, placed the lid on the bath and placed it in a dark closet. I hold it at the same temperature as I did in the containers, somewhere in the mid-70s. Now you're going to wait another 7-10 days.

If your bath is evident, you can look inside a bit-the sides of the bath should be moist from the moisture-you should basically see the black coir getting more and more eaten by mycelium.

Step 9: Get a Little Fresh Air

After 7-10 days, you should have a bathtub that's fairly full of mycelium and it's time to begin getting fresh air (individuals call this FAE: Fresh Air Exchange). There are all sorts of views and teks out there for this, and I'm trying to inform you what I've seen at job.

At this stage, extract the paper from the compartments and fill it freely with polyfilling. Leave the tub(s) out in a space that has some natural light in it, there's no reason to get insane with lamps just bring it out in a space that has a window in it if you can.

Use a timer like this to switch the engine on 3x a day. For instance, 8 a.m. for 30 minutes, 12 a.m. for 30 minutes and 7 a.m. for 60 minutes. Don't get the fan extremely near, just get it in the space. The aim is to introduce fresh air, to get rid of CO2, yet to maintain the humidity that the coir / vermiculite continues to provide in the bathtub. Check your moisture meter and make sure it's over 92%. It can go down to 80 percent-85 percent while the fan is on, that's actually perfect, and when the fan turns off it should go back up in a couple of hours to 95 percent + If your humidity gets low (and stays low) you can mist the tub, but you shouldn't have to do that if everything is set up correctly.

So now we're going to wait another 7-10 days. After 7-10 days, you should have a bathtub that's fairly full of mycelium and it's time to begin getting fresh air (individuals call this FAE: Fresh Air Exchange). There are all sorts of views and teks out there for this, and I'm trying to inform you what I've seen at job.

At this stage, extract the paper from the compartments and fill it freely with polyfilling. Leave the tub(s) out in a space that has some natural light in it, there's no reason to get insane with lamps just bring it out in a space that has a window in it if you can.

Use a timer like this to switch the engine on 3x a day. For instance, 8 a.m. for 30 minutes, 12 a.m. for 30 minutes and 7 a.m. for 60 minutes. Don't get the fan extremely near, just get it in the space. The aim is to introduce fresh air, to get rid of CO2, yet to maintain the humidity that the coir / vermiculite continues to provide in the bathtub. Check your moisture meter and make sure it's over 92%. It can go down to 80 percent-85 percent while the fan is on, that's actually perfect, and when the fan turns off it should go back up in a couple of hours to 95 percent + If your humidity gets low (and stays low) you can mist the tub, but you shouldn't have to do that if everything is set up correctly.

So now we're going to wait another 7-10 days.

Step 10: The Fruits Of Your Labor

After about a week you will probably see some primordia forming in your bin, it's like little tiny white balls on/in your mycelium, these are going to turn to pins. A couple days later you'll see your first pins which will soon grow into big adult mushrooms.

HOW TO DEAL WITH MUSHROOM PESTS

Mushrooms are one of the greatest cash crops for tiny holdings and increasing activities to invest in as they evolve their company. Since these edible fungi do not need sunlight, they are cultivated inside and in a closely regulated setting.

Aside from ensuring the stable development of these fungi, these activities can be the perfect breeding place for a variety of pests that can decimate a mushroom plant. The control and eradication of these pests should be a major problem for the growers of mushrooms.

The Sciarid fly is one of the most common and most damaging insects encountered when growing mushrooms indoors. Also called fungus gnats, these flies can destroy a fungus crop, leaving mushrooms brown, leathery and inedible.

The large rise in both business and amateur mushroom growing in the United States over the last 30 years has increasingly led to the attention of growers the reality that grown mushrooms are severely

damaged by insects, mites, fungus weeds and illnesses. This circular deals mainly with the in-sects and mites that assault and regulate the mushrooms.

Particularly in areas such as southeastern Pennsylvania, where more than 50 per cent of mushrooms are cultivated in the United States, where some mushrooms are cultivated at all times of the year and the sector is heavily focused, insects and mite pests are a continuous threat.

Mushroom flies (Sciaridae), manure flies (Phoridae), mushroom mites and long-legged mites are the most significant pests of cultivated mushrooms in the United States. However, in relation to these, there are several other pests of lower significance.

Extensive studies have shown that control of mushroom insects and mites, once developed in the house, 1 is very hard due to the excessive sensitivity of mushrooms to chemicals, and because the chemicals that have been in use so far and are known to be secure to use do not easily penetrate the beds. However, by means of sanitation, adequate composting and heating, and fumigation, these pests can be decreased in number or completely eliminated before eggs are produced and largely stopped from reaching homes thereafter.

1 The overall phrase "mushroom house," as used in this circular, relates to any place where the mushrooms are cultivated.

This circular is intended to inform the grower of the main mite and insect Proper composting of manure for the cultivation of mushrooms

is an important consideration in the management of plant pests. Composting is best performed on a concrete ground. This stops many pests from entering the manure from the floor, and if there is pests of the mushrooms, their life history in general, and the steps to be taken to prevent them from damaging the crop.

Propertance Importance Composting For Control Of Mushroom Pests

a gutter around the border that can be held full of water, many insect mags will be caught and submerged in it as they leave the manure.

The composting surface, whether on wood or on the ground, should be well brushed and washed, soaked with 1 gallon of formaldehyde to 50 gallons of water and permitted to sleep for 2 to 4 days before the manure is put on it.

Upon receipt, the manure should be well forked, all the lumps and cakes broken up and, if necessary, the straw added. The temperatures within the heap, except at ground level, are too big to allow insects and mites to survive, but both mites and insects can grow from 3 to 6 inches in the warmer outer layer. Therefore, the pile should be held well ripped up during composting in order to expose as little ground as necessary to assault. Along the ground temperatures are often below 100 ° F, oxygen is practically deficient, and the carbon dioxide concentration is very large. Under these conditions, the manure may remain uncomposted until it is turned and thrown out of the heap. This mixture of poor oxygen and elevated carbon dioxide concentrations, while possibly causing pests to become dormant, likely destroys very few of them and does not stop others from entering the earth.

One of the main problems faced by an enthusiast who con-templates increasing mushrooms in tiny amounts in a cave, shed or other building is the proper composting of tiny amounts of manure. This method is closely linked to the control of mushroom pests. Severe infestations of flies, mites and springtails may lead from the transport of eggs and larvae to the compost boxes, unless the compost is in good condition to undergo excellent secondary fermentation or "warmth" in the fields, to increase the temperature to the stage where insects and mites are murdered. Half a ton of medium value manure is adequate for a mushroom bed of 35 to 45 square feet, and it is highly hard to achieve adequate composting of less than that amount. One of the benefits of growing small-scale mushrooms is the practicality of tiny compost heaps with cheese cloth to exclude insects; the other is the ease with which a tiny concrete deck or 2-by-12-inch planks can be built, thereby stopping insects from entering the soil.

Precautions In The Preparation Of The Mushroom House Or The Cellar

Mushrooms are cultivated commercially in specially built houses, in numerous ancient houses built for the purpose, and in caves and mine galleries. Amateur growers usually make use of basements or sheds. General use is made of raised beds in thirds in houses. A room of between 6 inches and 1 foot should be left between the floor and the bottom of the lower table. This allows the upper bed to heat up faster and promotes adequate cleaning of the ground. It also enables room for the flow of fumigants, which is essential for the suppression of pests. In caves and mine galleries, the mushroom beds are usually built on the floor and are referred to as "ground beds." They can not be correctly heated or fumigated and are very hard to free from insect pests once they have been established. Special care should be taken to avoid pests from entering such areas. Small plants cultivated by lovers in cellars and other appropriate locations around their residences are particularly susceptible to insect assault, as these locations are rarely capable of being prop-erly fumigated. The space where the mushrooms are to be cultivated should, if necessary, be isolated from the remainder of the construction by partitions insulated with sawdust or cork, but in any event created as close as necessary with the construction of paper or other stuff.

Between the plants, the building, the cellar, or any other increasing area, it should be carefully cleaned and the bedboards and supports scratched, brushed and washed.

Syraying Of The House

Approximately 2 weeks before it is filled with compost, the space should be sprayed to remove any insects, mites, or fungi that might be left out of the previous plant. Several sprays have been used for this occasion, including: (1) Copper sulphate, at a speed of between 6 and 50 gallons of water.

(2) Calcium hypochlorite, at a frequency of 10 to 50 gallons of water.

(2) Mercury oxide, at the price of 8 normal pills per gallon of water or one-half pound of crystals per 50 gallons of water.

(4) Formaldehyde, at a frequency of 2 to 50 gallons of water.

(5) Lime-sulphur at a speed of 1 gallon of cooked lime-sulphur up to 10 gallons of water.

The finest sj)ray for mushroom buildings is cooked lime-sulphur, since this gel is a fungicide and bactericide, as well as an insect-cide, which is not the majority of the products listed above.

In caves, and in some of the mine galleries, where there is no risk of setting fire to the wooden supports, the flame-throwers have been successful-completely replaced by sprays. The beds are first cleaned, all loose spent compost is swept up, and the flame is played over the walls, ceilings, and floors, raising the temperature of these high enough to prevent any possibility of insect survival.

FUMIGATION OR STERILIZATION OF THE HOUSE BEFORE FILLING The building should, if necessary, be fumigated with either formaldehyde or sulphur immediately before the compost is carried in.

Circular 457 U.S DeptOf Agriculture

B/7 reproduction should be sterilized. This is not always feasible in caves, due to bad ventilation and floor beds, and in cellars, due to the likelihood of gas leakage. Formaldehyde is a good germicide and fungicide, but the sulphur-burning gas is approximately as great and is also a helpful insecticide and is particular to mites. Before the building or space is fumigated or sterilized, it should be as airtight as feasible by tightly locking all ventilators and other spaces and by pasting paper or plastering mud over all cracks. It is not advisable to use sulphur or other equipment as fumigants in cellars and other locations near dwellings, unless such areas can be closed tightly enough to avoid all fumes from fleeing. Sulfur should not be used where there is a chance that the vapors will reach-ing the mushroom fields in manufacturing, as the increasing mushrooms will be harmed.

Formaldehyde Fumigation

Formaldehyde is used at a frequency of 1 to 1,000 cubic feet of air room to be fumigated. One pound of potash permanganate is used for a quart of formaldehyde. Crocks, wooden buck-ets or other vessels with a capability of about 10 gallons are required, each of which will take care of 1 gallon of formaldehyde. Four pounds of permanganate is put in each of these, and a gallon of formaldehyde is put in a wide-mouthed jar next to it. Starting at the end of the house as far as the door is concerned, the operator pours formaldehyde into the containers with the permanganate as it moves towards the door, leaving the house or room at once, closing and sealing it. The reverse of this procedure, the drop of the permanga-nate in the containers containing the formaldehyde, is sometimes the easiest method.

Sulphur Fumigation

A nice grade of sulphur plants should be used for sulphur fumigation at a pace of 5 or 6 pounds per 1,000 cubic feet of water room to be fumigated. It is most commonly burned in pans or metal trays with the edges high enough to prevent the melted sulphur from flowing over the edge and setting fire to the house, or in oil drums cut in half lengthwise. A little extra or crumpled paper is put along the floor of four or five pans, and the sulphur is pushed along each side of the pan. Some growers tend to use less sulphur per jar, filling the top of each container with an inch coating of excelsior and sifting the sulphur over it. Another technique is to place the excelsior in the bottom of the container, and to position a sheet of rough paper over it, cover the panel with a sheet of paper, and pour the sulphur on it. The use of a bigger water-containing container, in which the smaller one holding the sulphur is positioned, is an efficient means of preventing flames and accidents. In the case of houses with dirt floors, the pits may be dug in and the sulphur may be burned as in the pans.

Sulfur should not be baked on concrete surfaces, as the heat is probable to cause the concrete to break and buckle, thus roasting the boiling sulphur around and putting the flre into the building.

In any method, the important thing is to get as complete a combustion as soon as possible. Recent studies have shown that it is very uncommon to have complete combustion by any technique of burning sulfur inside the house, and that the time needed for burning is approximately 3 hours in average. In firing sulphur in the building, a standardized level is scarcely achieved if ever, as the warm

sulphur dioxide gas from the pans increases to the peak of the building. By the moment the gas had dried adequately to settle on the ground, the complete concentration of sulfur dioxide gas within the building had reached a point too small to be of high importance. There is also a significant risk of fire in the combustion of sulfur within buildings by the techniques now frequently used.

An Effective! Device For Burning Sulphur

The use of the sulphur burner described below has been shown by experimentation to be an improvement over the methods now in com-A., Outside the sulphur burner in operation, with the door closed and the fan nected; B, Outside the sulphur burner with the door open to show the layout of the pans.

Moult used for the fumigation of mushroom buildings with sulphur. It generates a extremely focused gas in the building with less than one-third of the amount of sulphur needed by the pan technique, fires the sulphur entirely within about 30 minutes, decreases the fire hazard and ensures a totally uniform distribution of the gas within the building. The appliance comprises of a rectangular box 2 feet wide and 3 feet long, made of galvanized 18-gauge sheet iron on a li/^-inch angle steel base. The cone is 18 inches long at each end and ends in an accessible pipe, the drain pipe is 5 inches and the outlet pipe is 6 inches in diameter. Three trays, each 23 by 34 per cent by 2 inches, and each capable of carrying about 15 pounds of sulphur, are inside the cabinet, slipping on bases of lV^-inch angled iron riveted to the frame. The sides of the trays are reinforced with parts of 1 per cent-inclined brace of iron, and a piece of the same fabric is rolled from these crosswise under the center of each tray to avoid sagging. The gate on the side is cured by locks and wing nuts. In order to avoid the gas from leaking, a gasket of.asbestos cloth is put between the gate and the burner body. All seams and connections are strongly crimped or riveted, as the heat of the burning sulphur quickly melts any solder work. Preliminary experiments discovered

that the sulphur in the center tray rose quicker than in the upper and lower trays due to irregular water allocation. This situation has been fixed by baffles in the exhaust tank. The baffles are made of 18-gauge galvanized sheet metal cut to match the intake cone, with a section of three-thirty seconds of 1 per cent-inch ribbon of iron riveted to the middle of each, lengthwise. The ends of the belt are twisted with gaps and projected into the intake pipe, kept in location by locks, the nuts of which are outside, on the bottom of the intake tube (fig. 2), to allow for the modification of the baffles. The tops of the baffles lie on the backs of the table. The spacing of the baffles must be determined by screening or using an anemometer so that each container gets water at the same speed.

The fan used is a centrifugal form in a steel enclosure, straight connected to a one-twentieth horsepower electric motor operating at 1,750 revolutions per minute, with a horizontal disk load of 5 inches and a single suction of 6 inches. This fan has 150 cubic feet of water per minute. Since the outlet from the burner is an inch larger in diameter than the reservoir, the air supply is practically safe. In use, the pump is linked to the supply, and the stove pipe is moved from the shipping pipe to the building through the asbestos-lined opening in the fake wallboard gate. It is advisable to stretch the outlet, by means of several additional stove-pipe lengths, so that the supply of gas will be on the ground of the main alley. This provides a mildly stronger flow of gas and also muzzles any fire that could otherwise be compelled into the building.

Sulfur fumes have not triggered an appreciable corrosion of galvanized metal, of which most of the burner is comprised, during

the 2 years that it has been in use. The iron frame has corroded slightly, but the burner is likely to last for a long time under normal conditions.

The burner was intended to burn 32 pounds of sulphur blooms, the highest dosage allowed in a normal mushroom house of 16,000 cubic feet at peak heat. With this dosage, flame has sometimes been pushed through 10 feet or more of a pipe into the building. Therefore, when using the highest dosage, it was considered best to reduce the velocity of the motor by attaching one or two electric light bulbs to the row or by using a rheostat. Excellent fumigations have been achieved in empty buildings with as much as 20 pounds of sulphur flowers.

Heat Sterilization

In tiny areas and where amenities are accessible, heat alone may be used to eradicate mushroom pests before the building is filled. The origin of heat may be steam, or electricity, if the current is very inexpensive. A temperature of 120 ° to 125 ° F, if preserved for a few hours, should efficiently clear the space of all insects and mite pests. A 16-inch electric fan with blades; directed upwards at an angle of 45 ° should be retained operating during this moment to spread the water uniformly, otherwise the bottom of the room would be very warm and the water would be a few inches above the ground.

Pest Control During Process Of Filling And Heating Of Beds

The secondary fermentation occurs when compost is put in beds and the temperature begins to increase. A tiny amount of ma-nest in a big sunny location will not heat up as well as a larger quan-tit, nor will it greatly increase the temperature of the adjacent room. If the filling takes too long, significant energy is wasted. For this reason, the house was to be filled as quickly as possible, the aisles were tossed out and cleaned of all the loose manure, and the doors closed tightly. Some growers complete a portion of the room and wait a few days before entering the rest of the room. If manure is scarce, it is best to create storage heaps until a adequate amount is acquired to fill the building in one procedure.

Natural And Artificial Heating

It is most important that good heat is obtained in the compost when the house is filled because the heat is the cheapest and best way for the mushroom growers to fight insects and other closely related pests, as well as being necessary to "sweat" the manure and put it in the best condition for the spawn to "run." The ideal condition is to have the bottom beds at a temperature above 120.

And the top of the beds below 140 °. At these temperatures, all forms of insects and mite pests are either killed or driven to the surface of the beds where they can be reached with fumigants.

Since soil beds are very difficult to heat properly, the insects and mite pests contained therein can not be brought to the surface or killed by heat, and since the fumigants currently in use do not penetrate the compost more than an inch or so, the pests present in such locations will survive and re-infest the house. Consequently, if the ground beds can not be lifted 4 or 6 inches from the floor to allow the flow of warm water below, it is easier to leave them entirely. The temperature of the bottom beds is usually about 10 ° behind that of the top beds, and the air temperature is usually 15 ° or 20 ° lower on the ground than below the roof.

If the climate is very hot at the moment of opening or, as is often the case in professional mushroom culture, the amount of manure is too low and the insulation is inadequate to allow the tem-perature to grow, the building can be warmed artificially. Where steam or hot-water heat is not accessible, kerosene or oil burners have been successfully used, but the use of oil heaters should generally be avoided, as oil vapors sometimes have a damaging impact on the

development of mushrooms. Care must be taken to ensure that the beds do not dry too much while this is done.

Because the smaller rooms are packed first and loose much of their latent heat, and because the warm air obviously increases to the edge of the building, the upper beds heat quicker and reach a greater temperature than the lesser beds. More even allocation of heat can be achieved by using some form of forced air flow. Where electrical current is accessible, the finest technique is to position two or three 16-inch electric fans in the main alley. Most growers place the fans on the floor of the house along the center of the house, adjusted in such a way that the air current is directed upwards at an angle of 45 ° to 80 °. Better outcomes, however, have been achieved by putting the fans on the columns lying on top of the beds, with the air current driven directly down. This implies that the warm air in the middle of the building is pushed to the ground and forced to circulate through the lower rooms before increasing again to the edge of the building. When the upper beds have reached a temperature between 120 ° and 130 ° F. Fans should be began, operate for 5 or 6 hours, closed off to cool for 2 or 3 hours, and then operate for another 5 or 6 hours.

Precise thermometers should be placed into the upper and lower beds and placed in the main alley at the top and bottom of the house in order to maintain a check on the circumstances during the cooking phase. Judging from the preliminary results of the experiments now underway, it seems quite safe to state that air temperatures ranging from 120 ° to 125 ° F, if preserved for a few hours and uniformly distributed throughout the space, will kill all insects and mites that

are detrimental to mushrooms. Such temperatures on the ground of the building and just above the ground are hard to keep, therefore fumigation is essential. During this time, the manure in the beds will reach a much higher temperature, but should not exceed 145 ° C. The "bubble" disease (mycogon) will also be eradicated at a temperature of 120 ° for 48 hours.

There is a lot of moisture during the burning of the compost in the pillows. It is not advisable to try to reach a high temperature in the basement of the dwellings unless the room can be sealed tightly enough to prevent moisture and heat from deforming the floor above.

FUMIGATION

When the temperature of the chambers is as high as possible, the house should be fumigated with either sulphur or cyanide before the spawn is put in it.

SULPHUR

Sulfur is to be consumed at a pace of 2 to 2 pounds per 1,000 cubic feet of air room. The quantity used per 1,000 cubic feet, as ever, should not exceed 2 pounds. The ventilators should be opened within 5 or 6 hours after the sulphur has finished burning, the house allowed to air out, and then closed again to prevent too rapid cooling. Due to the slow pace of firing and the fast absorption of the gas by the moisture in the building, it is questionable whether effective fumigation can be achieved by boiling the sulphur in the pans.

House at the top of the heat. The external burner mentioned above (p. 5) will produce much stronger outcomes.

Sulphur fumigation tends to increase the acidity of the first one-half inch or so of the pillows (the boundary of gas entry) and often produces a coral mold. However, it quickly fades, and neither it nor the enhanced acidity of the ground of the seats seems to have any damaging impact on the subsequent development of the mushroom.

When a house to be fumigated is instantly contiguous to another in manufacturing, every precaution must be done to ensure that the smoke does not enter and harm the increasing mushrooms. The ventilators of the building in the pen should be accessible, and the building in the heat should be fumigated only if there is no wind or if the wind blows away from the building in the shed. In the case of a double house, the other half of which is in bearing or spawning, it is better to use cyanide rather than risk the damage caused by sulphur fumes.

HYDROCYANIC ACID GAS

The three commonly used components for hydrocyanic acid gas fumigation are calcium cyanide, potassium cyanide and sulphuric acid, and fluid hydrocyanic acid.

Since the implementation of liquid hydrocyanic acid needs unique equipment, as well as unique preparation on the portion of the user, and since it produces little stronger outcomes than calcium cyanide or sodium cyanide and acid, it may be left out of this debate.

The use of calcium cyanide at a rate of 1 pound per 1,000 cubic feet of air space is currently the most common method for fumi-gating mushroom houses at peak heat. As the hydrocyanic acid gas is readily captured by moisture, the building, though humid, should not be moist, with water floats sitting in the alleyways, or much of the gas will be wasted before it is released relatively. Experiments have shown that the highest level of gas is reached within 10 to 20 minutes of the dispersion of the cyanide. In perspective of the lethal nature and the fast evolution of this gas, every precaution should be given against crashes. In the case of a single house, the chem-ical should be scattered as evenly and quickly as possible in the central alley, starting at the back of the house and working towards the door. Special care should be given that the alleyway is free of obstructions before the fumigation begins, as a stumble over an obstacle while wandering backwards and dispersing the cyanide could easily be fatal. In the case of a double house, the material is scattered across the two main alleys, the workers starting together at the far end and working towards the doors, timing themselves to reach the doors at

the same time. After the providers have left the building, the gates should be shut and tightly locked and left for about 12 hours.

Caution: When reaching the home after fumigation, use a gas mash until the building has been fully opened.

The same precautions are essential as with sulphur to avoid smoke from entering and destroying increasing mushrooms, although this gas is not as harmful to them as sulphur fumes. In the case of a double house, the other half of which is in bearing, the doors should be gastight, all cracks and openings in the partition tightly sealed, and the doors and ventilators of the house in bearings opened. As a further precaution, it is important to fumigate when the wind blows away from the bearing building.

The so-called pot technique of fumigation, in which sodium cyanide and sulphuric acid are used, is almost as simple and comfortable as calcium cyanide, giving a faster release of gas and a much greater quantity. The material should be used at a rate of not less than 8 ounces of sodium cyanide to 12 good grade liquid ounces (66 ° B.) of commercial sulphuric acid and 16 ounces of water per 1,000 cubic feet of air room.

Three or four3-gallon covered hooks may be used for generators.

The required amount of water shall be evaluated and split among them. They are then laid at equal distances in the main alley of the building. Similarly, the acid is evaluated and the required quantity is put in a glass bottle beside each generator. The sodium cyanide having been likewise measured (it can be produced in 14-ounceor1-ounce "eggs" to save this job) and the correct quan-tit for each

container having been placed in a thick brown paper bag (the thickness of the plastic can be adjusted for extra safety by using two containers, one inside the other, for each payment), The driver holds the bent handles of the cans in his left side, enters the building, and pours the acid into each generator as it reaches it. Having reached the back of the building, he walked quickly to the gate, plac-ing one of the cyanide cans in each generator as he passed it.

The acid needs a short time to pass through the paper sacks, and the operator is generally well outside the gate before the first charge starts to produce gas.

Since the ground is always the coolest component of a building that heats or heats up, it is here that insects and mites are most probable to survive the heat. It is desirable, with any method of fumigation, that as much gas as possible be kept in the lower part of the house. Unless the motors are left working in the building at the moment of the fumigation, the gas, which is both warm and heavier than the atmosphere, will increase to the edge of the building. The highest outcomes were achieved by increasing supporters to the stage of the fourth or third bed, about 5 or 6 feet or more from the ground. In the event of the pot technique, the ventilator air blast should be aimed directly down over each generator. This leads the gas to explode on the ground and between the reduced seats. After 20 or 25 minutes, the concentration becomes almost uniform throughout the house, but for the first 20 minutes most of the gas is on the floor where it is most needed.

Unless the fans are of a fully fitted sort, it is best to wait about 10 minutes before switching them on, as there is a distant possi-ability

of gas and air forming an explosive combination that could be triggered by a flame. Experimental fumigation using chemically equal doses of calcium cyanide and sodium cyanide with mercury (1:1 per cent:2) showed that sodium cyanide and acid was much higher than calcium cyanide in the amount of gas acquired and was about twice as costly per fumigation.

Sodium cyanide is highly toxic and should be treated with excellent care. It should be placed under a hole where it is not available to kids or reckless individuals. The same precautions should be taken with acidic acid.

The same standards of operation and safety shall extend to fumigation at peak heat in cellars or other tiny premises as they apply during the preparation of the plant. Hydrocyanic acid gas should not be used in or adjacent to dwellings at all, and sulphur should be used only if there is no possibility of escape. In these places, it is better to depend on the heat of the mushroom-pest control at any time when the beds do not contain spawn.

GENERAL SANITARY MEASURES

Precaution should be taken toavoid re-infestationby insects and other tightly associated pests, after the building has been "heated" and has been properly fumigated.

Doors and ventilators can be produced flicker-tight with a cheese cloth or, better, a 30-mesh copper display, if it is discovered necessary to do so-to interfere too much with ventilation. This stops the en-trance of flies, as well as of any mushroom mites they may carry.

Control of individual pest species is discussed under distinct headings.

When moving from a room infested with mushroom pests to one not so infested, excellent care should be given to ensure that no insects are performed on a individual or clothing.

All stem butts and discarded mushrooms should be removed and burned or placed in a hole, then covered with quicklime or kerosene and a layer of earth. They should never be permitted to stay in the building.

When the building has completed carrying and is about to be washed, it should be permitted to dry out carefully and, if possible, to fumigate. In any case, the spent compost should be transported to some distance from the houses and spread thinly over the soil so that as many pests as possible may be destroyed by the weather.

Control Of Mushroom Pests In Bearing Houses

After beds have been broken down, the temperature should be maintained rather small. It should be possible to maintain an air temperature ranging from 50 ° to 55 ° F for the highest outcomes. Temperature to be-low 55 ° F. It is more desirable than one above that stage, as the lower temperature appears to be favourable for the growth of mushrooms and is small enough to materially delay the development of insects and other pests of mushrooms.

The aim of the procedures and methods suggested in the preceding segments is to avoid infestation of beds. To date, no fully adequate techniques have been developed to regulate insects and mites in beds after eggs have been spawned.

Most of the chemicals used for this purpose either do not penetrate the bodies deeply enough or have a damaging impact on the spawn, which is very readily harmed.

PRINCIPAL PESTS ATTACKING MUSHROOMS ANDMETHODS FOR THEIR CONTROL

Pests in the planting of mushrooms may be approximately split into four groups: flies, mites, springtails and various.

FLIES

All stuff regarded, mushroom flies seem to be the most destructive tive insects to attack the mushroom plant. Injury comprises of supplying the maggots to the spawn in the fields and the tun-neling to the roots and caps of the mushrooms, making them unfit for use. There is no immediate harm to adult flies, but the indirect harm caused by the transport of mites and disease organs-isms from bed to bed and from room to house, although hard to esti-mate, seems almost, if not as significant. 2 Flies attacking grown mushrooms are of three particular types, known as mushroom flies or fungus mosquitoes, manure flies and gall mosquitoes.

Mushroom Flies Or Fungus Gnats

There are at least four species of sciarid flies (of the genus Sciara) that have been reported as severely damaged grown mushrooms in the United States. S is probably the most prevalent of these.

pauciseta Felt, man. Others that have been identified as defending the mushrooms.

They are much the same in appearance, practices, and history of existence, and can be considered as one species for practical reasons. Figure 3, 0, demonstrates the pattern of the adult fly. Sciarid flies are thin, with rather lengthy legs and antennae. Usually, when wandering or resting, they bring their wings folded flat on the back. They are black or yellow in colour. The males have a couple of claspers on the apex of the abdomen.

They are much the same in appearance, practices, and history of existence, and can be considered as one species for practical reasons. Figure 3, 0, demonstrates the pattern of an adult fly. Sciarid flies are slim, with rather lengthy wings and antennas. Usually, they hold their wings folded flat on the back while wandering or resting. They're black or yellow in colour. The males have a couple of claspers on the abdomen's apex.

The eggs in these flies are very small, rectangular, white or yellowish. They are laid in a compost or a spawn, in holes in a casing soil, or in a mushroom. Under favorable circumstances of temperature and humidity, the egg hatches into a legless white larva or mag in 4 or 5 days, with a glossy blackhead After eating for 10 to 14 days, the larva comes to the ground and spins a delicate silk

cocoon in which it is transformed into a pupa. In 5 or 6 days, the adult flies and is capable of mating within a few hours. Females may begin oviposi-tion within 24 hours.

Since each woman is capable of carrying from 200 to 300 eggs, and there is very little natural mortality among larvae, it will be noticed that the prospective level of rise is very high.

There is no recognized efficient technique of combating the maggots of these flies in houses. Control must be carried out by reducing the number of adult flies, thus reducing the number of eggs laid. Traps and insecticides are the main means of murdering adult flies.

TRAPS

Traps are many types, but they all rely on the light to attract the flies to them. They have been used successfully, but should only be regarded additional and not dependent on the exclusion of dusting. The simplest type of trap is a glass pane set in the south or east end of the house, usually in the door, about one foot or more above the floor. Fly paper or sticky tree-banding fabric is put around it to capture the flies as they come to light, or a container comprising a little kerosene may be put under it, into which the flies will drop and be murdered. The glass pane should not be too big, as the tops of the tables would then be too well lit and the woman snakes would often ovipose before going to the glass, or they would not be drawn to the glass at all. Experiments have shown that a glass pane of 72 square inches or less is most satisfying for carrying flies to daylight.

Another sort of trap is one in which the flies are attracted by an electric light, taken in by a fan, and kept in a pocket or bottle.

A trap of this sort, used experimentally in a very strongly infested house, captured more than 187,000 flies in a 24-hour span, 75% of which were female, and more than half of which had not laid all their eggs. As in the event of traps based on the daylight to attract flies, the lighting should not be too intense. The most satisfying results were obtained from a 40-watt white-frosted electric light bulb. If either the daylight or the artificial light used as a guide is not intense enough, the flies will not be drawn in large amounts, and if it is too intense, they seem to be happy before they genuinely reach the nest and do not get any closer to it.

XSECTICIDAL DUSTS

There are a range of insecticidal dust mixtures on the market that are used for mushroom protection. A dust consisting of 60 per cent pyrethrum, with 40 per cent of finely ground diatomaceous earth or clay as a carrier, has been discovered to be acceptable. Com-Mercially prepared dust varies in structure, but is generally based on this pyrethrum-carrier combination, sometimes with other drugs added. It is desirable to get as fine a dust as possible so that it remains suspended in the air for a long time, and also to get as light-colored a dust as possible, as darker dust sometimes settles on the mushrooms and renders them unsightly, thus lowering their market value.

The house should be carefully monitored and, as soon as a few flies appear, dust should be treated at a rate of 2 or 3 ounces per 1,000 cubic feet of air space. Most growers dust two or three times a week. Before dusting, the temperature of the house should be allowed to reach 60 ° F. Or rather, the dust should be applied, and the house should be left closed overnight. At any lower temperature, the flies are less active and the dust is more inert. A nice fan-type duster should be used, and the dust should be well spread throughout the building. If the dust is not accessible, a healthy distribution of the dust may be achieved by gently shaking the dust out of the pocket into the atmosphere out of the ordinary electrical engine, which is aimed towards the roof of the building.

FUMIG-ANTS

Calcium cyanide fumigation, at a rate of 2 to 2 ounces per 1,000 cubic feet, has been shown to be successful against adult flies if it is fully used, but is said to slow the growth of mushrooms if the fumigation is repeated more than four or five times. If this fumigant is used, it is best to use it between "flushes." In preparation for this fumigation, the beds should be allowed to dry for 2 days or so, all the salty mushrooms should be removed and the temperature allowed to rise to at least 60 ° F. The building should then be fumigated and kept tightly shut for a few hours. The paths should be moist, but not humid when the calcium cyanide spreads over them.

MANURE FLIES

At least three species of phorid flies (of the genus Megaselia) have been revealed to have caused economic harm to the mushroom plant-ings. They're M. Albiihalteris Felt, M. AgariciLintner, M.

Iroquoian Malloch. As in the event of mushroom flies, these three species of manure flies are almost the same in shape and biology, so that they can be considered as one species when their control is considered. They are often seen in huge amounts on the compost heaps and on the outside of the buildings. The adult flies black or blackish in color and are generally mildly narrower than the sciaridflies. They are much more compact, the fingers are stouter and not so long, and the head is rather tiny and the thorax big, offering them a hump-backed look. They're quite active, moving around all the time in a sequence of stupid runs.

The history of lives of these flies is understood only in a particular manner.

The time required by the various stages depends on the conditions of temperature, humidity and food, as is the case with mushroom flies.

The eggs are very small, white, and elongated-oval, and are placed in the soil of the compost or casing. They will emerge in about six days, under the usual mushroom-house circumstances. The eggs, or maggots, are shimmering pale or brownish, about one-fourth inch long when fully matured, legless and without head capsules. After eating for 10 days or more, the maggots quit eating and turn into

brown pupae, appearing almost like tiny plants. The adult flies arise from these, after another interval.

The infestation of mushroom beds by manure insects generally results from the advent of compost larvae that are not adequately heated to murder them, or from eggs set by adolescents that enter the home instantly after cooking. The harm is caused by the larvae and is approximately the same as that mentioned above for the sciarid larvae, except that since the pest infestation happens early in the growth of the eggs, the larvae may be stopped from running out of the larvae or the parts themselves may be demolished. The larvae also assault the increasing mushrooms more easily than the sciarid larvae. Most of the harm occurs soon in the summer, generally becoming less noticeable after beds are produced, although much damage can be achieved to both spawning and developing mushrooms during the warm climate at the end of the summer crop.

Control of manure flies (Phoridae) is approximately the same as for mushroom flies (Sciaridae), except that dust must be used more liberally, phorid flies being more susceptible to control interventions.

By light watering and appropriate temperature, particularly in early flushes, it is feasible to push the development of the mushrooms ahead of the devel-opment of the insect maggots, thus creating a plant despite the infestation. If dust to regulate adult larvae begins soon, all eggs will be deposited within a short time and the oviposition will be reduced to a minimum thereafter. When the maggots in the nests are pupped, the spawn is allowed to develop without further interference.

Bright yellow or orange, one-fourth inch or less long. They may sometimes occur in big amounts on the casing soil and the mushrooms, and if they are adequately abundant they may cause damage to the spawn and to the mushrooms by burning tiny gaps in the roots and caps.

Normally, however, these flies are small pests of mushrooms. Control interventions for mushroom and manure flies should also be effective against these flies.

MITES

Four mite species are significant fungal pests, one very serious, two less so, and the fourth sporadic and of minor significance.

MUSHROOM MITE

The fungus mite (Tyroglyphus sp.) often happens in large amounts in the planting of mushrooms and is capable of destroying the plant. The original infestation may be the consequence of the introduction of some phase of the mites into a room with a compost, or on the clothing of employees or other sons entering homes, or on the bodies of multiple species of flies coming from infested buildings.

This mite damages the mushrooms by leaving gaps in their caps and roots in the button phase, stopping them from growing or making them unmarketable, and by killing the mycelial threads in the spawn.

If these mites become very numerous, they may con-sume all the eggs and then feed on the manure itself, decreasing it practically to a pile of good strawberries.

With the exception of egg and hy-popical phases, the mites live in all. Since they are so tiny, mites in the mushroom beds are often ignored. Unless they are very numerous, the damage to the mushrooms can be slight and the damage to the spawn can only be reflected in a smaller yield, which can often be attributed to other causes by the grower.

The eggs are incredibly tiny, but rather big, relative to the parent mite. They are rectangular, blank or brownish, and are placed on the spawning soil or on the mushrooms. Egg hatches in a very tiny,

white, six-legged larva in 8 to 14 days. In another 8 or 10 days, the larva melts and becomes a nymph. The nymph is a little bigger than the larva and has eight feet instead of six feet. After a longer span of feeding and two more molts, the nymph becomes an adult mite.

Sometimes a migratory phase or illness happens between two of the molts of the nymph recognized as the hypopus. In the hypopial phase, the mite is elongated, with eight fingers, rudimentary sections of the body and a suction region on the ventral surface. Not every person passes through this phase, and the circumstances under which they are formed are not well known. Although unable to eat, the hypopus may live under negative circumstances for a long time to come. It will grasp and cleave to any moving item with which it comes into contact, and it will be capable of carrying flies and gammesid mites, as well as employees ' garments in the house of the mushroom.

Flies were seen to have been so covered with mites in the hypopial stage that they could not move. When the hypopus falls or is brushed off, it remains to develop into an adult mite if circumstances are favourable.

Preventing mushroom mite infestation is the only means of preventing crop damage. It is important that the beds go through a good heat, because the mites are almost always present in the manure and can be controlled most effectively by killing them at this time. Chemical control has been tried, but in most cases it has not been effective, or only partly.

LONG-LEGGED MITE

Long-legged mite (Linopodesantennaepees Banks) is less common than a mushroom mite. It's highly hard to control 1. In some places it happens sporadical, while in others, although almost always present, it is said to have a little dam-age. Since it is indigenous to this nation, a ring usually occurs under leaves and panels on the floor outside doors, it may be brought into almost any room of mushrooms, and if adequate conditions are present it may grow into a serious pest. The body is very small, yellow to reddish brown in color, and the arms, especially the front couple, are very long and slender.

Very little is understood about the background of this mite's existence. Mid-nut round eggs are placed in clusters in the casing soil and hatched into very tiny white larvae in about 8 or 10 days. They melt into nymphs in 6 or 8 days, with the front legs longer than the previous stage. These mites have never been found to be harmful to the spawn, and several efforts to raise them beyond the first nymphal phase of spawning have been ineffective, so it is likely that the operations of this species are almost completely restricted to the ground of the mushroom lakes. They harm the mushrooms by cutting off the feeder bones of the increasing mushrooms, allowing the stems to constrict at the base, and damaging or murdering the increasing mushroom.

Sanitation and avoidance of infestation are the finest ways of avoiding the harm caused by these mites. Milks are easily killed by heat, having been found to succumb to 100.4 ° F. One-half hour at 89% comparative moisture. However, if the temperature on the floor does not achieve this height, the mites at that place will restore and

reinstall the seats. They are very vigorous and capable of jumping into holes on the ground and walls to escape the heat.

Since these mites are discovered mainly on or near the ground of the beds, the control policies suggested for mushroom mites should be efficient against them.

In relation to the two mites referred to above, Rkizoglyphusphylloxerae Riley and Histiostomasp. Occasionally, they were seen as attacking mushrooms. Control techniques used against other species of mites are likely to be similarly efficient against these two species.

SPRINGTAILS

Springtails are, in particular, very tiny, gray, blackish or brown insects, varying from about one-sixty-fourth to one-sixteenth inch in size. Below the abdomen of each insect, there is a powerful springlike appendage which, when drawn, is capable of hurling the insect through the air many times its width. In a wild state, springtails usually reside in humid places under garbage and leaves, and most of them feed on fungi. It is likely that any of these "wild animals" that have been introduced into the mushroom buildings may prove to be severe pests. A variety of springtail species are frequently discovered in mushroom beds. These include AchorutesarmatusNic, PriostomaminutaTull., P. simplex Fols., Entomobrya sp., XenyllaqueiFols., X. Humicola (O. Fab.) Tull.,LepidocyrtusalbicansReit., L. Cyan-us Tull, L. Cyaneusvar, man. CinereusFols., L. Lanuginus (Gmel.).

All of these are capable of causing harm to spawning and mushrooming throughout the summer. Two of these springtails are shown in Figures 8, A and B.

Some growers believe that the existence of springtails in the houses is desirable; in other words, that springtails in figures are an indicator of a healthy plant. This may be accurate to the point that circumstances favourable to springtails also promote the development of mushrooms, but it is also true that these same favourable circumstances may allow springtails to multiply quickly enough to materially decrease the plant. Springtails cause harm by feeding the spawn and chewing the gaps in the roots and the mushroom caps. These pests are so readily ignored that the grower often attributes a reduction in output to some other cause.

The history of lives of these animals is very easy. The minute spherical eggs are placed in communities in the compost or in the spawn. In about 10 days, they hatch into minute adult replicas, except for their brighter color. After a span of development and several molts, they become capable of breeding. Almost from the time they hatch the egg, they're capable of carrying and damaging the eggs and the fungi.

Springtails are generally carried to buildings with compost, but may pass later through holes. For this reason, it is important that the surroundings of the mushroom houses be clean and free from garbage in order to offer as little shelter as possible to these pests. Al-Although they are capable of withstanding intense cold, they are readily killed by heat. In the case of Lepidocyrtuslanuginosus, a springtail found causing damage to commercial homes in Ohio, it

has been deterred-mined that the heating of infested mushroom houses at a temperature of approximately 104 ° F.

For 10 minutes, the majority, if not all, will be Mil. This is why it is. Is imbearing that the houses are going through a decent heat, and that the upper rooms and the floor are also well heated. Otherwise springtails fleeing from the bottom rooms will remain on the floor and b o 1 1 o m rooms and subsequently rein-f est the whole building.

As in the case of a mushroom mite, springtails in beds are very difficult to control, as insecticides do not penetrate the beds well, so only the insects on the surface are killed. Sometimes, by lightly brushing the nests with water 4 or 5 hours before therapy, springtails may be carried to the ground and more of them may be murdered by subsequent insecticide apps.

Calcium cyanide fumigation at a rate of 2 to 2 per cent ounce per 1,000 cubic feet of air space is also fairly effective.

Some springtail species have the practice of congregating in mushroom homes at moments in huge amounts, appearing like stacks of black dust in the shops. Whenever springtails are discovered, they should be picked up and placed or otherwise demolished in the halls of the building.

MISCELLANEOUS PESTS

A small mycetophagic beetle, Litargushalteatus Lee, has become a pest in at least two mushrooms in the West over the last 2 years. Very little is known about this insect or methods of controlling it. The meal moth (Pyralisfarinalis L.) was found to feed in a spawn on one occasion. Adults may be controlled by mixtures of pyrethrum dust, and would probably never have been of importance in houses that are regularly dusted for flight control.

Sow bugs, also known as "pill bugs" and "wood lice," are elongated, convex, slate-gray crustaceans with seven leg pairs. Fully cultivated specimens may be one-half inch long. Occasionally, they become numerous enough in mushroom beds to cause some damage by eating holes in the buttons and in the caps of matured mushrooms. In a cellar or other small area, sow-bugs can be controlled by hand-picking them off the beds. Where they are gathered in clusters along the edges of the beds, hot water can be poured on them. Pyrethrum dusts, as used for mushroom flies, will give some control if they actually come into contact with sow bugs.

When using dust, the beds should be allowed to dry slightly and should not be watered for approximately 24 hours after the insecticide has been applied. Light fumigations with calcium cyanide when the sow-bugs feed on the surface of the beds (usually at night) are said to be effective. Poisoned bait is also effective against these creatures, but its use in mushroom houses cannot be recommended because of the risk of accidental poisoning in the mushrooms.

Slugs rarely become numerous enough to be of importance, but when they do, hand-picking is the most effective remedy.

Crickets sometimes turn into pests in the mushroom beds by eating holes in the caps. They are not hard to discover and can be collected by hand-picking methods and destroyed.

MUSHROOM CULTIVATION SOME RECOMMENDATIONS FOR BEGINNERS

In the cultivation of mushrooms, it is essential to differentiate between two distinct phases: the preparation of substrates and the real manufacturing of mushrooms.

The companies that carry out these two phases of work are the so-called "closed loop mushroom farms;" they are usually quite large and require tens, even hundreds of staff.

The preparation of the substrate is based on a very advanced and costly scheme. In order to compensate for the cost of manufacturing, it is necessary to make the greatest use of such a scheme, which would not be feasible in tiny mushroom farms.

For this purpose, a coherent difference is being made in Italy, as in the whole of Europe, between the preparing of substrates and the real manufacturing of mushrooms.

New companies have therefore emerged, the so-called "composting regions," which specialize in the preparing of substrates. These companies provide substrate to middle-sized and family-run farms that literally reside on the products of these "yards."

For room problems, these websites are devoted to those who plan to start growing tiny to medium-sized mushrooms; instead, if you are interested in opening a closed loop mushroom farm, please email us for further data.

Mushroom Cultivation Field

It is prevalent conviction that only horse manure can be used for the growing of field mushrooms.

For economic and accessibility problems, this form of fabric has been almost entirely substituted by the so-called "synthesized substrate."

This is achieved by mixing and manufacturing very prevalent and readily accessible raw materials such as wheat straw, battery manure, gypsum and water.

So far, both this combination and horse manure have been tested on an open-air cement platform by means of unique devices and technologies that make it composting properly and make it a particularly appropriate substrate for the growing of mushrooms.

Nowadays, in some major and "eco friendly" companies, a fresh revolutionary scheme has been devised that allows the creation of a substrate within a closed space to avoid air pollution and to standardize and monitor all procedures using a laptop. This substrate is called indoor compost.

By the manner, whatever the operating technique of these raw materials-technically referred to as' free fermentation' or' stage 1'-at the end of the operating process, this substrate is prepared for the manufacturing of mushrooms, but it also carries pathogenic microflora. In order to get rid of this, this substrate is subjected to a sequence of abrupt modifications in temperature, also called "Phase 2" or pasteurization.

At the start of this process, when all microflora is dead, this substrate is inoculated (this stage is inappropriately called spawning) with mushroom spawning.

Now you've got your inoculated substrate.

Such inoculated substrate is then placed inside blocks coated with plastic wrap and transported to a farmer's mushroom farm, which then brings them inside growing chambers.

This substrate is then arranged on multi-level "cultivation beds" and kept at a temperature of 25 ° C for approximately 13-14 days.

During this era, fresh hypha or micelium threads (incorrectly called farmer roots or molds) are formed from tiny micelium agglomerates and begin to enter the entire substrate, which is then subjected to a gradual shift of color (from dark brown to reddish hue) and odor (from an unpleasant smell of compost to a more sensitive and pleasant smell of fungus). This stage is referred to as "incubation" or "stage 3."

As the incubation progresses, the mushroom spawn has totally penetrated the substrate; its color and smell shift as a consequence of elevated results.

At this stage, the compost is washed, pushed and coated with some suitable casing soil.

The substrate is then kept for another 10 days at a temperature of 25 ° C for incubation of the casing soil; during this phase, the mushroom pond is attacked. Incubation of the soil marks the transition from the vegetative to the sexual stage.

It is the ideal moment to generate the appropriate environmental circumstances for the germination of sporophores, that is, the edible portion that we all understand as "fungi."

For this purpose, the temperature of the room is lowered until the substrate reaches a temperature of 16 °-18 ° C. In the meantime, it is important to ventilate with some fresh air to get rid of the high level of carbon dioxide produced during the incubation phase.

After a couple of days, what a pleasure! Mushrooms are starting to develop, at last!

It is expected to occur on the 36th day after the first spawning; the mushrooms will multiply every 8 days for about 4-5 complete harvest cycles over a span of about 10 decades.

Cultivation Of Oyster Mushroom

It is also essential to differentiate between two distinct phases in the development of oyster fungi: the preparation of substrates and the real manufacturing of mushrooms.

The raw materials required for the preparing of the substrate are straw wheat and water. These two components, milled together and blended together, are operated, pastorized and inoculated.

At the end of the spawning phase, such inoculated substrate is placed inside boxes coated with plastic wrap and transported to a farmer's mushroom farm, which predisposes it to incubation.

This substrate, which has been arranged on the floor, is kept at a temperature of 28 ° C for approximately 13-14 days.

During this time span, this substrate undergoes the same method as the field mushroom layer: in other words, fresh hypha or micelium threads are formed from tiny micelium agglomerates and begin to enter the whole substrate, which is then subjected to a gradual shift of color (from dark brown to pure white color) and odor (from an unpleasant smell of compost to a more sensitive odor). Oyster mushroom is also undergoing incubation.

As this method advances, the mushroom spawn has totally penetrated the substrate; its color and smell alter as a consequence of elevated efficiency.

It is time to generate the appropriate environmental circumstances for the germination of sporophores, that is, the edible portion that we all understand as "fungi."

For this purpose, the temperature of the room is lowered until the substrate reaches a temperature of 14 °-16 ° C. In the meantime, it is essential to ventilate with some fresh air.

After a couple of days, what a pleasure! Mushrooms are starting to develop, at last!

It occurs between the 30th and the 45th days after the first spawning; the mushrooms will continue to develop for about 3-5 complete harvest periods over a span of about 100 days.

What Mushrooms I Cultivate?

Field and oyster mushrooms are the two most commonly grown mushrooms in Italy.

Commercially talking, field mushrooms offer greater efficiency outcomes, particularly when they relate the weight of the substrate to its moment of success. In addition, field mushrooms have a less dangerous and more frequent pattern than oyster mushrooms. The latter needs cheaper operating technologies, a easier cultivation method, few employees, but also a smaller manufacturing period (fall–summer) and a longer cultivation cycle. Although field and oyster mushrooms are the two most prevalent grown mushrooms in Italy, fresh growing varieties such as king mushrooms, poplar mushrooms, shii-take, golden fungi and love fungi are mentioned here.

Growing Mushroom

In contrast to what most individuals believe, spaces such as stables, basements and barns are not appropriate for the growing of mushrooms unless they are greater than 1500 mq in length.

Nowadays, fungi are grown through advanced mechanical structures, which, for technical purposes, are to be installed in a single room.

The most modern place to start cultivation of mushrooms is a mushroom farm; don't let that "old-fashioned" word trick you into: these farms are very advanced and extremely technological.

These regions, whether single or multi-layered, are coated by a double fiberglass sheet coupled with glass wool or with a single plate and sprayed with polyurethane.

The air conditioning and humidification system is governed by the machine. If you are dealing with field mushrooms, regions may also be supplied with a winter conditioning unit.

Field mushroom farms are also equipped with 3 or 5 ground racks as portion of the bed scheme; their aim is to manage the mechanical charging and unloading of the substrate, as well as the cutting and harvesting of the mushrooms.

Growing Rooms And Productivity Rate

To ensure a constant daily output and pay off system manufacturing expenses, you must have 8-10 mushroom farms at your disposal.

If it's 8 m. It's big and 30 m. Long, plus 3 bed lines with 5 cultivating layers each, you can expect 15 quintals of manufacturing per day.

You need 10 to 14 mushroom farms to achieve periodic and constant manufacturing of oyster mushrooms.

By the manner, the manufacturing of mushrooms is seasonal and usually lasts three seasons, from autumn to spring. It then shifts according to the weather conditions of all Italian regions.

In any event, please do not hesitate to contact Funghi Mara: our engineers are at your full disposal for any further data you may need!

HOW TO IDENTIFY POISONOUS MUSHROOMS

The same mantra is repeated by the very fungus specialist: "Never consume a mushroom unless you can recognize it favorably." Identification is not always simple, though. Around 14,000 different species of mushrooms have been cataloged globally by mycologists and categorized into a set of separate genera. Each genus typically involves edible and inedible species, and many of them appear comparable. The Amanita genus is a case in point. It involves the toxic Destroying Angel (Amanita virosa), the sweet Caesar plant (Amanita caesera) and the hallucinogenic Fly Amanita or toadstool (Amanita muscaria). How do you understand which one of these you've just come across?

A mushroom guide is a must for anyone interested in foraging mushrooms. It's useful if the handbook contains photos of poisonous mushrooms, but because of the pure amount of opportunities, it's even more helpful if the guide can give zero on the species as you

access data about the sample you've discovered. One such mushroom manual, published by scientists at the University of Aarhus and the University of Copenhagen, Denmark, is accessible online. It's called MycoKey, and it's not the only handbook like that.

A variety of variables are included in a favorable identity. They include not only appearance, but also place, season and increasing circumstances. Even if you can not create a favorable identification, some particular features may alert you to the probability of a hazardous species.

Neither Plant Or Animal

A mushroom appears to be growing like a plant, but it's not a plant. Genetically, the bodies of the mushroom are closer to those of the animals, but the mushroom is not an animal either. This is a fungus. In reality, a mushroom is not something that develops separately. It's only the fruiting component of a concealed organism called mycelium. Mycelium is a weblike construct that develops underwater or inside the decaying wood pores, and can develop very big. Mycelium, which develops in the Blue Mountains of Oregon, is 2.4 miles across and is probably the largest living organism on Earth.

Due to the correct circumstances and adequate moisture, mycelium sprouts its fruiting bodies, which penetrate the surface of the increasing medium and develop into buildings distinctive of the species. Structures differ, but typically include the following components: cap–this may be parasol-shaped or cup-shaped, conical or round, and may be mottled, soft or coated with tiny nibs. It may or may not have a skin that is easy to peel off.

Stem–The stem goes from the cap to the increasing medium. It could be long and slim or brief and fat. It may or may not have been hollow. Not all of the mushrooms have a stem. Those who grow on decayed wood often don't, or do, puffballs that are large, round and mostly edible (though some poisonous mushrooms look like puffballs when they're younger, so you can't suppose that the puffy stuff on the floor is secure to consume).

The gills are the spore-producing component of the mushroom. They are on the bottom of the cap and can be ribbed or made up of a big amount of tiny gaps. Some of the mushrooms have protuberances

called teeth instead of gills, and some, such as chanterelles, have veins.

Ring or Annulus–When the circle is present, it is generally placed around the stem just below the cap. It's a remnant of the universal veil that the mushroom had to break through as it sprouted.

Volva–Volva is a swollen part of the foundation of the stem. It's very often undercover. The existence of a volva, particularly one with a circle around it, is often a sign that the species is toxic.

Two Tips To Help Identify Poisonous Mushrooms

If you come across a mushroom, a few identifying features can assist you determine the potential for it to be toxic. These are not definitive in that many edible species also show these features, but if you notice them, they are a useful sign that you should leave the mushroom alone. You might lose a delightful treat, but more importantly, you're not going to die. And don't make a error: death is a true chance. Some 60% of the instances affecting Amanita and other animals lead in mortality. The instructions are as follows: white gill mushrooms are often toxic. So there are the ones with the cap around the stem and the ones with the volva. Because the volva is often underwater, it is essential to dig around the foundation of the mushroom to search for it.

Mushrooms with a black color on the cap or stem are also either toxic or highly hallucinogenic. The most famous red-colored mushroom is Amanita muscaria, which has been used to generate images for thousands of years. Even this "magic fungus" can be deadly in big quantities. Other Amanita species have this coloring, too, and are far less benign.

THE WILD EDIBLE MUSHROOMS

The next two presentations will be on mushroom consumption. The word "fungus" is used here in a wide context as used in common mushroom guides and includes members of the Basidiomycota who generate fruiting organs and some members of the Ascomycota as well.

1a:Sarcoscyphamesocyatha

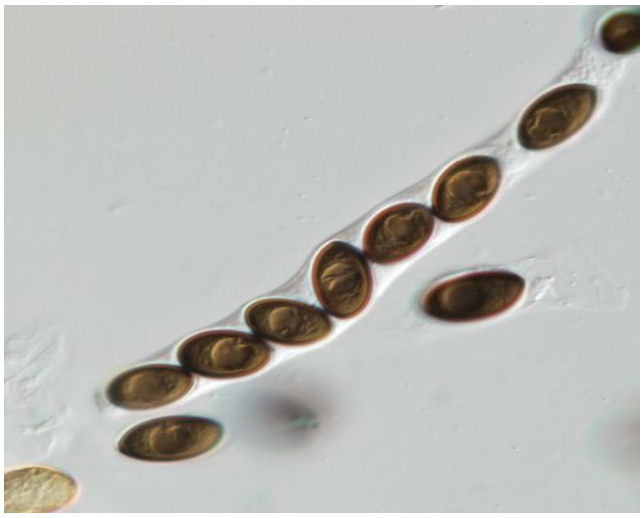
1b:Leotialubrica

1c:Tuber magnatum

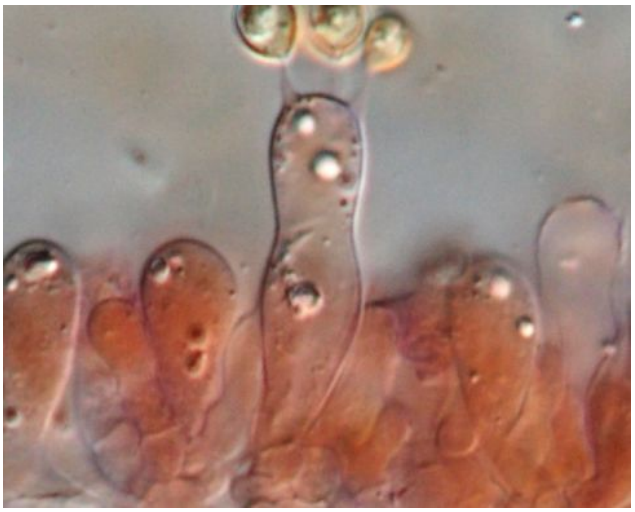
1d:Morchellaesculenta.

The latter, as you should remember, generate asci and ascospores (Fig. 2a) during sexual reproduction, while mushrooms and other parts of Basidiomycota generate basidia and basidiospores (Fig. 2b). In fact, not all members of Basidiomycota are mushrooms with stalks, caps and gills. Coral fungi (Fig. 2c), polypores (Fig. 2d), puffballs (Fig. 2e) and boletes (Fig. 2f), just to mention a few. The Boletes are a group that we haven't debated before. As you can see

in the picture below, the boletes are very comparable in shape to the mushrooms. The most evident distinction is that they have pores, like polypores, instead of gills. However, instead of getting fruit bodies that are leathery to woody, the boletes are fleshy like mushrooms and there are a range of extremely desirable species with regard to their edibility. Obviously, species such as Pycnoporussanguineus and Geastrum indicate that they cannot be consumed because of the texture of their fruit bodies and the powdery mass of their spores, but have traditionally been included in famous mushroom guide novels since one of the aims of the writers of such novels is also to demonstrate the viewer the variety that remains in mushrooms.



2a



2b

2c

2d

2e

2f

Figures 2a and b: Asci and ascospores and basidia and basidiospores, respectively. Figures 2c-f: *Ramariafragilima*, a coral fungus, *Pycnoporussanguineus*, a polypore, *Geastrumtripex*, a puffball and *Suillussalmonicolor*, a bolete, are examples of members of the Basidiomycota that you may not think of as being "mushrooms".

Although the subject of eating mushrooms is inevitably linked to the toxicity of mushrooms, this subject will be discussed in a subsequent lesson. This is a very intriguing subject, because there are many individuals who are fascinated by eating wild mushrooms and going out every day and foraging for them, despite the likelihood that they may accidentally consume poisonous mushrooms. Despite this risk, the amount of individuals in this nation who consume wild mushrooms is increasing every year. However, while occurrences of mushroom poisoning continue to happen every year, sometimes with deadly outcomes, mushroom poisoning is still not a significant issue in the United States. Even with an rise in the amount of individuals traveling out to gather mushrooms, there is no proof that the amount of occurrences of mushroom poisoning has risen in latest years.

The habit of eating mushrooms likely started during the hunting and gathering era, in our prehistory. They were gathered along with fruit and berries, as well as other plant material that could be eaten. Also, like crops, the gatherers discovered which crops were edible and which were toxic, and whether there were other uses for mushrooms, i.e. recreational or religious uses. However, unlike crops, mushrooms must have been enclosed in mysteries because, unlike crops, there was no apparent way they could be cultivated. Even much later, in the dark ages, the mushrooms became more strongly integrated in the mythology of the supernatural. A lot of myths emerged because of their seemingly supernatural features and weird habitat. Their development was fast, and they seem to appear overnight, as if they were from nowhere. Thus, their source seemed to be magical. They sometimes created circular shapes or "circles" like those of Chlorophyllummolybdites, where the grass

inside the circle is greener (Fig. 3a). Some of them shine in the dark (Figs. 3b-c). Many have strange forms, and they're ephemeral. They have become component of the life of fairies, elves and witches. This idea is obvious even today in the common name of mushrooms, such as "Fairy Ring Mushroom" for Marasmiusoreades (Fig. 4a) and "Witches Butter" or "Fairy Butter" for Tremellamesenterica (Fig. 4b).

Figure 3a: Fairy ring' of *Chlorophyllum molybdites*. Note grass is greener inside the fairy ring. Figure 3b-c: Pictures in middle and on right are of *Omphalotus olivascens*. This species is noted for its gills that glow in the dark. Middle picture is cluster of mushrooms in its habitat, growing at base of Madrone tree. Picture on right is the same cluster of mushrooms showing how the gills can glow at night.

Figure 4a: *Marasmius oreades*, "The Fairy Ring Mushroom".

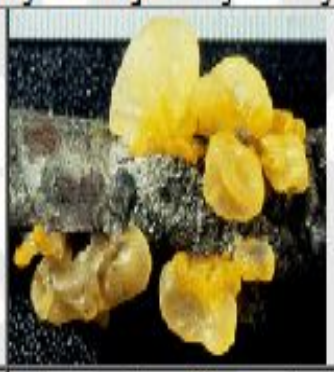


Figure 4b: *Tremella mesenterica*, "Witch's Butter".

Because so little is known about the mushrooms, many misconceptions about the edibility of the mushrooms have evolved. Some of the more popular types are shortly discussed below:

There is a foolproof test to distinguish edible from poisonous mushrooms. The most popular ones that can be found are that "a poisonous mushroom turns silver black while it's boiled," "if you can cut a mushroom cap, it's secure to eat" and "watching which fungi that feed livestock consume will inform you which species are secure to eat." While there are some generalizations that can be created within certain communities of mushrooms, there is no foolproof test that can be used for all mushrooms. Those species of mushrooms that are edible are considered to be edible because someone had attempted it at one moment and found it safe to consume.

Most of the mushrooms are toxic. Of the thousands of recognized species, perhaps 60 or so are toxic, and only a couple of them will be deadly if eaten (the figures will differ based on your source). However, it doesn't involve a bunch of mushroom to poison a bunch of individuals. In Europe, 90 per cent of those dying of mushroom poisoning are likely to die as a consequence of mistaking Amanita phalloides (Death Cap) for Amanita calytroderma (Coccora). However, the surviving species are not necessarily nice to consume. I use edible here to mean non-poisonous and not necessarily healthy to consume. Thus, the edible mushroom may have a powerful sour, peppery or some other uncomfortable smell, be soft or have no flavor at all.

There are a big amount of individuals who die every year from mushroom poisoning. "Large" here is a bit vague. If we talk about the number of people who go out to collect mushrooms each year in this country, then the number of people who die as a result of mushroom poisoning is small relative to that number.

Poisonous mushrooms have a poor flavor. As stated above, many non-poisonous mushrooms may have a very poor flavour. The reverse may be accurate, too. Amanita phalloides is said to have a pleasant flavour, but it is one of the deadliest species of poisonous mushrooms.

You may be killed by touching a poisonous mushroom. As fatal as some toxins might be, touching the mushroom is harmless. It is necessary to consume damaging toxins in mushrooms in order to damage you.

Collecting mushrooms for consumption is dangerous and even specialists have died from harvesting the incorrect mushrooms. This latest misconception remains to be perpetuated by the news media every year. You can probably read a title every year that says something like "Expert Mushroom Hunter Dies From Eating Deadly Mushroom." However, after deeper examination of such a tale, it is often the situation that the individual who killed is far from being an expert. Even those who are enthusiastic enthusiasts who have been foraging wild mushrooms for a brief span of moment are unlikely to suffer from mushroom poisoning if they have even had a minimum practice in do's and mushroom collection, and if common sense is used. There are a number of species that are very good to eat, which cannot be confused for other species. If the hunters adhere to these species, the toxicity of the mushroom is extremely probable. New species can be tested by interacting with other hunters who have consumed other species.

Species that are determined to be edible are always secure to consume. When a fresh species is first attempted, even if it is one

that is extremely considered and is said to be very tasty, it is better to be careful. Just try a few bites and wait 24 hours before you consume more. There are a large amount of compounds in wild mushrooms that may trigger negative responses when eaten by a few people, but are secure for the general public. There is also the chance of an allergic reaction to a specific species. Other precautions to be taken: when preparing mushrooms for a dinner, always check the mushrooms to determine whether they are solid and new. Bacterial and fungal decomposition may occur in ancient mushrooms.

Evitate to eat raw mushrooms. Many of the edible species have toxins that are heat susceptible and will be made safe by boiling the mushroom. Also, the cell wall of the mushrooms is composed of chitin, which can not be broken down by the human digestive system. It also needs to be degraded by heat so that we can store nutrients inside the cells. If the cell walls stay untouched, the nutrients in the mushrooms merely move through our digestive system. Cooking will break down the cell wall and discharge the contents that are digestible.

Mushrooms are of no dietary importance. Although mushrooms are never going to be one of the world's staples, they have been a food supplement in different societies. Nutritionally speaking, mushrooms are among the finest vegetable and animal protein sources. Their protein content may differ anywhere between 15-40 per cent of dry weight (bear in mind that mushrooms are more than 90 per cent water). However, all essential amino acids are present in mushrooms, as well as water-soluble vitamins and all the minerals

that our bodies require. A generous serving of mushrooms (0.5 lb) of new mushrooms offers about 70 kcal.

Why Do You Eat Mushrooms?

While some individuals may hype the dietary importance, or even the medicinal value, of mushrooms as a cause for consumption, this does not appear to be the primary reason to go out and gather wild mushrooms. There are currently a nice amount of species that have been grown. Many of them have researched their elevated dietary importance as well as their medicinal value. So why don't you consume only grown mushrooms instead of running the danger that you might be sick eating hazardous mushrooms or that you might even be deadly killed? This seems to be an unlikely issue to answer as far as personal collectors are concerned. Maybe it's the enjoyment of hunting, or the concept of heading home to nature and gathering uncultivated meat. There are likely many factors why an person would be involved in gathering and eating wild mushrooms. However, if we look at this issue from a cultural point of view, according to R. Gordon Wasson, the dad of ethnomycology (in his easiest description, the research of the connection between humans and insects), how easily a individual collects and consumes wild mushrooms depends on the culture in which they are grown.

Wasson thought that societies could be split into two classifications with regard to fungi: 1.) Those who are mycophilic may view mushrooms as the epitome of gastronomy; and 2.) those who are mycophobic may despise and view them all as toxic and would surely cross the path just to stumble life out of them. With the exception, potentially, of a single species that has been grown

(Agaricusbisporus), those countries that belong to the latter group will generally have nothing to do with mushrooms. While Wasson genuinely thought that there was such a drastic likeness or dislike of mushrooms, Benjamin (1995) pointed out that there are societies that do not like or dislike mushrooms when it comes to their use as meat. In a few societies, mushrooms have even been considered magical and used in spiritual rituals. This is another subject that will be discussed in future lessons.

The statement that distinct cultures may differ in their attitudes towards the consumption of mushrooms was produced by R at the end of the 1920s. Gordon Wasson and his spouse Valentina, during their honeymoon in the Catskill Mountains, New York. Wasson made a somewhat humorous account of this observation in 1968 in his book, Soma, The Divine Mushroom of Immortality: We were married less than a year and we were off on our first holiday, at the Big Indian in the Catskills. On that first day, as the sun was falling in the south, we put out on a walk, the forest on our left, and the clearing oil on our right. Although we've known each other for years, we've never discussed mushrooms together. Suddenly she jumped from my side, crying ecstasy, and soared to the forest glade, where she had found mushrooms of multiple types carpeting the floor. She had seen nothing like it since Russia. Left settled on a mountain trail, I called her to take care of herself, to come home. They were toadstools that she had gathered, toxic, putrid, hideous. She just laughed the more: I can hear her now. She stood in adoration poses. She spoke to them with dear Russian diminutives. She collected the toadstools in a kind of pineapple she was carrying, and she took them to our house. Some of them tied on threads to stick up and dry

for summer use. Others eaten that evening, either with soup or meat, according to their kind. I denied to contact it.

After this event, the pair talked about the distinction in their behavior towards the mushrooms. During further discussions with close colleagues, from different societies, they found a connection between their ethnic identity and their likeness or displeasure with regard to mushrooms. Their obsession with this subject would turn out to be a lifelong interest and contribute to the emergence of a fresh area of research, ethnomycology. Some of the behaviors of distinct societies are briefly summarized below, from Benjamin (1995), in order to prove some of these distinctions.

Anglo-Saxon

Historically, the British and their colonies, i.e. English-speaking countries, were commonly acknowledged as mycophobic or at least not very interested in the use of mushrooms. It is also true that, for the most portion, these societies depend on domesticated animals rather than forage for wild food. Those people in these nations who may be interested in gathering wild mushrooms as well as crops for consumption are generally descendants of Asian and Slavic societies in Eastern Europe and Russia. In the United States, such individuals are generally seen as excentric.

Mushrooms were often strongly connected with toads, snails, snake spiders and witches in western mythology. Although witches have never been a very common figure in any nation or culture in which they have been acknowledged, it was only in some nations that there was a deep-seated fear of them. This aversion may have to do with the connection of witches with the devil. It was mainly in German, Celtic and Anglo-Saxon nations, such as Germany, Switzerland, Scotland, England, and then America, that witches were deliberately and systematically hunted.

The source of this mycophobe approach for any nation is unclear. However, the fact that it is a deep-seated reaction can be seen in the English literature for centuries: they are all very hot and humid and therefore touch the venomous and maternal bodies and, if consumed, ingender clammy and cold nutrients. –John Gerard, Herball or General Historie of Plants (1597) But whatever dressing one provides to the animals, whatever sauce our apiciuses placed on them, they are really nice, but to be sent back to the garbage pile

where they were raised. Louis de Jacourt, Champignon (1753) It is possible to suggest that this text may have influenced the behaviour of the English. This is doubtful, however, since most of the individuals at that moment had no access to such texts, and few would have been willing to read it if they had. It is suggested that the sexual connotations connected with some mushroom have contributed to their refusal by a prudish Anglo-Saxon culture. Undoubtedly, the phallic elements of many mushrooms have not gone unnoticed. Some species have also been considered aphrodisiacs. While this may be a sensible reasoning when referred to the era in the history of Victorian England, it does not describe the mycophobic approach of its previous and subsequent history, nor does it justify the same stance in America One specific mushroom was even considered as obscene to the morality of Victorian England, Phallus impudicus, one of the many species of chicken horns. However, it is evident that it is not the species in question, but rather the similarity of any species of smellhorn to the masculine body (Fig. 5) that has irritated Victorian England.

There is a kind of toadstool in our indigenous forest called the Stinkhorn vernacular (though in Latin it carries a grosser title). The name is justified because the fungus can be chased by a scent on its own, and this was Aunt Etty's excellent creation. Armed with a basket and a pointed stick, carrying a unique hunting cloak and gloves, she would sniff her way through the woods, pause here and there, her nose twitching as she got a whiff of her prey. Then she would drop on her victim with a lethal gun and punch his putrid carcass into her basket. At the end of the day's sport, the catch was brought back and burned in the deepest secrecy on the fire in the

living room with the door locked–because of the morals of the maid!!
–Gwen Raverat, Piece Period (1952)

Guidelines For The Identification Of Toxic Mushrooms

The implications of misidentifying a mushroom are serious, so it's essential to ask yourself a number of issues before you even touch on one that you've come across. Where does the mushroom grow? If it is under a tree, what kind of tree is it? If it grows on wood, what kind of wood? For instance, hens and chickens fungi are generally secure even medicinal but they have the ability to make you ill if they grow on conifers, eucalyptus or cedar trees. You should also remember whether the plant grows alone or in a cluster, in sun or shade, and what moment of year it is. If you feel comfortable enough to manage the plant–preferably with gloves–you can examine the fins, inspect the bands for the stem and look for the volva. Press the cap or create a tiny chop with a fork. Does the cap alter colour, and if so, what colour does it alter? You could also chop off a tiny chunk and smell it. Poisonous mushrooms often have an uncomfortable, acrid odor, while benign mushroom-like smells. You can also get data by pulling off the stem and putting the cap on a piece of paper gill-side down for a couple of hours to write the spore. A black spore print is a telling indication of the Amanita species.

Use The Online Mushroom Guide

It is worth repeating the caution that you will never consume a mushroom until you can recognize it favorably. The use of an online catalog is an effective way to create a favorable identification. You can identify a hazardous species by looking at pictures of poisonous mushrooms, but if you can't discover any, navigate to a page that enables you to access the sample data so that you can get zero on the species. The quest generally starts with the overall form of the sample and its gill structure, and then continues with details such as cap and gill color and texture, size and increasing circumstances. Once you have entered the genus and the species, you can look up data about the edibility or absence thereof of the sample.

Remember that mushrooms can be both deceptively lovely and harmful. The wisely labeled Destroying Angel is a nice illustration of this. Dangerous mushrooms can also sound like benign ones. For example, the sprout of Amanita looks like a young buffalo, and you can't say the distinction until you penetrate the veil and look for gills inside, which means that the sample is likely poisonous. If you're not sure about that, just leave the mushroom alone.

7 DELICIOUS MUSHROOMS FOR A LONG, HEALTHY LIFE

While almost any edible mushroom will offer you a boost in nutrients, these seven nutrient-dense mushrooms are filled with antioxidants and may assist you stay longer and healthier.

The concept of meat as a medicine may be a little difficult to swallow, particularly if you have a gourmet palate. What if you could combat a host of illnesses and even boost your longevity, just by adding a few delightful mushrooms to your diet every day? Not to care–these mushrooms are the dreams of French cooks!

Paul Stamets, a famous mycologist (who is a mushroom specialist) and TedTalk'sfavourite, fervently thinks that mushrooms can save the earth.

It defines fungi as "the great molecular disassemblers of nature" owing to their transformative capacity to produce humus soils from decomposing organic products. Fungi transform nature's decomposition into nutrients for crops, trees, livestock and people alike.

As part of this incredible biosynthesis dance, mushrooms alchemize Earth's most strong components for the advantage of humanity. Fungi produces our finest antibiotics and has a therapeutic capacity for a host of illnesses.

Certain types of mushrooms contain psychotropic characteristics that have been valued since at least the start of recorded moment, with

some researchers even proclaiming that "magic fungi" are the key to human evolution. But these useful characteristics simply scratch the surface of what the fungi kingdom is up to, which is appropriate, as most of the fungi's prolific operations take place below where our eyes can see.

The fungi kingdom is a distinct type of organism, separate from livestock, crops, and bacteria. Like humans, fungi take nutrients from the atmosphere and, in the event of mushrooms, excrete digestive acids into the adjacent soil.

Mycelium is the invisible component of the mushrooms that lie beneath the soil. Strongly resembling neural networks, thread-like roots recognized as hyphae can spread to Earth for miles, storing nutrients and decomposing organic products.

In his book Mycelium Running: How Mushrooms Can Help Save the World, Paul Stamets thinks that mycelia is a "neurological network of nature." Paul thinks that mushrooms are sensitive to the requirements of their visitors, "developing varied enzymatic and chemical reactions to complicated problems" experienced in their setting.

Beyond sentience, Paul describes that mushrooms have a co-creative consciousness, and it would significantly help humanity to know how to interact: "Because these externalized neurological nets feel any impact on them, from footsteps to dropping tree limbs, they could relay vast quantities of information on the movement of all species through the landscape."

Mushrooms are prebiotic, boosting the beneficial bacteria of the microbiome, such as Acidophilus and Bifidobacterium, enhancing digestion and general wellness.

Recent independent research demonstrates that certain types of mushrooms are also our finest nutritional source for powerful antioxidants, such as sulphur-rich ergothionine and the main biological antioxidant, glutathione.

A diet rich in antioxidants such as ergothionine and glutathione saves cells from free radicals, assisting the body resist ordinary oxidative stress that damages good cells. In relation to boosting longevity, mushrooms have a severe dietary impact, offering a excellent source of vitamin D, which is vital for a powerful immune system feature.

Adding almost any sort of edible mushroom to your diet will give you a good amount of nutrients, but there are some mushrooms that stand out from the remainder.

A fresh research undertaken at the Pennsylvania State University College of Medicine screened eleven species of mushrooms to determine which varieties had the greatest antioxidant characteristics. Of the 11 species studied, the top 7 mushrooms with the greatest antioxidant components are also some of the most nutritionally thick.

What Are The Best Mushrooms To Eat?

1. Porcini

Porcini is a large mushroom with a cap that can reach up to 12 inches in diameter. Popular in Italian cuisine, porcini mushrooms are a few different kinds, typically reddish-brown in color, have a thick stem and are slightly sticky to the touch.

This sort of mushroom fruit is available from spring to fall, so you can find it most of the year in specialty stores. Look for porcini mushrooms in the mulchy undergrowth of hardwood forests with pine, plum, hemlock and palm plants if you're a forger.

2. Golden Oyster

Golden Oyster mushrooms are usually cultivated rather than wild-harvested, making them an outstanding home-grown mushroom. They grow in almost anything, using straw pads and ordinary compost, with mushroom "starters" from inoculation kits that can be purchased from specialty stores. They have a yellow hue, grow in clusters, and a nutty, slightly bitter smell.

3. Pioppino

Pioppino mushrooms, often called Velvet Pioppino because of the velvety-brown form of their small capes, grow on decaying wood or on the mulchy foundations of hardwood forests.

Pioppinos have a mild, slightly peppery flavour, making them a popular choice to add to the meals. They grow in clusters with long, solid stems, are smaller in size (caps are only about 2 centimeters wide) and retain a powerful texture when cooked.

4. Oyster

Oysters are one of the most common and varied mushrooms in the world. Easy to create, the oysters grow mainly on decaying wood and have a slightly sweet, anise-like flavor.

Called "oysters" because they look similar to ocean animals, mycelia of oyster mushrooms eat small roundworms and bacteria, making them one of the few species of carnivorous mushrooms.

The colors differ from green, to violet, to yellow, depending on the sort. Fluted caps vary from two to eight inches, with black gills on the underside and a short, stubby stem.

5. Lions Mane

It's easy to see the name of the Lion Mane flower! Thanks to its ability to increase the Nerve Growth Factor (NGF) synthesis, this renowned edible and medicinal mushroom has excellent neuroprotective capacities. NGF is a protein that plays a key role in the retention, conservation and regeneration of neurons in the primary and peripheral nervous systems.

Known for improving memory and mood, Lion's Mane mushrooms are a staple in traditional Chinese medicine and can be found as a powder or tincture supplement in many health food shops. If you love to enjoy their meaty texture at lunch, sauté them in butter to boost the taste, or boil them as a meat substitute in soup or stew.

6. Maitake

Found in clusters, generally at the bottom of oak forests, mayonnaises have strong anti-cancer properties.

Polypore mushrooms may not have distinctive gills on the underside of the cap. Multiple caps are formed by a single, thick underground stem in layers, and can grow quite large. The whole "fruit body" can weigh 50 pounds or more, with a single cap extending as wide as 12 inches in diameter.

The caps range from white to brown, are semi-firm when cooked, and have a slightly earthy flavor that suits the taste of your chosen cooking medium. Maitakes has been explored for a variety of health benefits, including lowering cholesterol concentrations and lowering blood glucose concentrations in rats.

7. Shiitake

Shiitake mushrooms are, for an outstanding purpose, one of the most prevalent mushrooms in the world. Revered for millennia in Asia for its strong medicinal properties, shiitake mushrooms have become a symbol of longevity in some cultures.

Hearty and versatile, shiitakes can be consumed raw or cooked, and are found in powdered supplements in many herbal pharmacies. Shiitakes grow in clusters of decaying hardwood trees and are also commonly cultivated for meat and medicinal purposes.

A classic type of parasol, the shiitakes are both beautiful and important. The caps are black to light blue with white highlights and can be up to 8 inches in diameter. Cooking provides off a "garlicpine" aroma and a rich, earthy taste. Good luck to us, shiitakes are available all year round in most areas.

PRESERVING MUSHROOMS

There are more methods to maintain the mushrooms than the eye first encounters. Today, we share some of the most common techniques for maintaining mushrooms. This is useful data for mushroom growers and foragers out there who would like to save their sweet mushrooms for future use.

The techniques of preservation of mushrooms mentioned below include:

- Drying mushrooms
- Freezing mushrooms
- Tincturing mushrooms
- Pickling mushrooms
- Powdering mushrooms
- Making mushroom ketchup

Drying drying mushrooms enables them to be preserved and used for a longer period of moment than when new. For example, if you develop mushrooms during the autumn and end up with a large return, or if you discover a large splash during the same moment of year, you can wash these mushrooms to have delightful meals to consume all summer long.

Drying mushrooms is a good choice when you've got plenty of them. The drying process can be as simple as putting the mushrooms out to dry in the sun or putting them in a dehydrator at around 115 –120 ° F overnight. They will be correctly frozen as soon as they become mildly crispy as a chip.

Take the mushroom of the black trumpet. This mushroom is very aromatic while drying and has a very complicated scent, mixing a wealthy smoky flavor with a pleasant fruity scent. These mushrooms can be discovered abundantly in the Northeast U.S. and can be forged in the summer and dried to be enjoyed in the summer.

How to prepare eggs: frosting mushrooms The best way to store most mushrooms is to boil them before placing them in the freezer. This can be performed by bleaching, steaming, or frying.

Mushrooms need to be prepared to freeze. Start by choosing the mushrooms that you want to freeze. Cut off any decay places and wash the mushrooms softly, either by cleaning them softly or by rubbing them dry with a mushroom comb. If you're dealing with very big mushrooms, be sure to cut them into lower parts. 1 "or bigger mushrooms will be the finest shape to freeze your mushrooms.

You need to boil the mushrooms. It should take between three and five minutes, based on the size of the mushrooms, regardless of the cooking technique you use. Once the mushrooms have been cooked rapidly, laid aside to dry and drain any surplus liquid. Once dried and dried, you can pack, lock and position the mushrooms in the freezer. Check out this post to know more about frosting mushrooms, including a manner to better maintain the colour of your mushrooms.

How to maintain fungi: Tinctures and extracts Extracts and tinctures are another way to maintain the useful components of mushrooms. Many of the fungi that are tinctured contain a range of compounds that individuals are interested in. These include but are not restricted to: polysaccharides Beta-glucansTriterpenes Phenols Sterols Statins, indole compounds Enzymes The tinctures we give are fully

extracted so that they become extremely focused. Our tinctures require the removal of alcohol and water for the proper preservation of the different components. Take our reishi mushroom tincture, for example. For this purpose, we use a triple extraction process that includes alcohol, hot and cold water. Some reishi herbal ingredients are obtained only in water, as others are extracted only in alcohol. Using this triple extraction technique, we are trying to obtain the largest number of accessible electoral districts in the liquid type accessible to our clients.

Pickling mushrooms You will need a canning jar for this one, as well as some extra components. A quart-size mason jar with cover and band is suggested, and you will need to sterilize the bottle before use. You can do this by stirring the water and putting the container in the boiling water for 10 minutes. Remove the bottle from the cooking water with tongs and lay aside the bottle on a smooth towel.

The other components needed are: four sprigs of thyme, 10 peppercorns, one clove of garlic, boiled warm red chili and kosher salt. One cup of white wine vinegar, three tablespoons of olive oil and one tablespoon of granulated sugar shall also be used.

Prepare and tidy the mushrooms as outlined above. Use six cups of mushrooms and attempt a range if you want to have a more flavorful experience. Boil the mushrooms for a little longer than you would have done with the other techniques, say 5-10 minutes.

Use a tiny sauce for all the other components and take to a boil with half a cup of water. Once the blend is cooking, throw it over your pre-cooked mushrooms. Fill the bottle until all the mushrooms are coated. Put the cover on the bottle and enable the blend to cool

down to room temperature. Then refrigerate your pickled mushrooms.

I hope you've got a stronger concept of how to maintain the mushrooms now, so you can experiment with your favourite technique. Try using different mushroom types with each technique of conservation to find out what suits your lives (and flavor buds) best!

CONCLUSION

Mushroom cultivation is, in financial terms, perhaps the most significant microbial technology after yeast fermentation. It vows to deliver meat with high-quality protein generated from meaningless lignocellulosic waste of a variety of roots. Newer mushrooms are probable to be incorporated in the future in order to diversify the portfolio of grown mushrooms, and the output of currently eaten mushrooms will boost with the genetic improvement of the species and the advancement of the breeding technology. Modern biotechnological instruments and computer-aided environmental monitoring will break down the obstacles to supply. Share of specialty mushrooms, including medicinal mushrooms, will increase further and the production of mushrooms is probable to distribute throughout the globe. Newer techniques of culture conservation, spawning and substrate preparation for mushrooms are being worked on. Modern advances in packaging, storage, transport and handling, including the value-added of food products, will be expanded to mushrooms, which will further increase their consumption and manufacturing. Research into the use of post-mushroom substrate has shed light on the enormous usefulness of this undertaking for the manufacturing of meat, feed, fuel and fertilizer from waste through the agriculture of mushrooms.

Have a happy cultivation

Andrew McDeere

Psilocybin Magic Mushroom

A Complete beginner's guide illustrated Step by Step.
Discover History, Features and How to Identify, Grow and Safe Use, the legendary Magic Mushroom

INTRODUCTION

It is not often that something as frail and culture-bound as a theological mystery will rise from the ashes of near extinction. Even the natural life of a supernatural mystery concludes at last in the dissolution of the link with the mystical guiding force of some archetype. But there are few mystical legends long enough to witness this decadence. Most of them are suppressed by existing orthodoxies already in place or newly introduced by conquest. This latter condition is a fitting description of the role of the Meso-American mushroom faith at the time of the Spanish conquest.

In the case of the Meso-American use of mushrooms, the ancient shamanic religion, of which we know almost nothing, confronted the Spanish Catholicism, whose relatively advanced technology meant the complete subjugation of the people, the complete breakdown of the ancient gnosis. Practitioners of the cult of mushrooms were burned as heretics. The Indians ' fixation on the mushroom as the "flesh of the gods" must have particularly excited the heretic hunters and perhaps made them not a little nervous as they went about their bloody business. After all, the "flesh of the gods" is a claim made specifically for the Christian Eucharist, yet the imaginative medium is not nearly as effective as the despised mushroom.

The use of the fungus has returned to the remote mountainous peripheries of Spanish Mexico. The custom itself was all but forgotten under a stratum of Christianized connections. The mushrooms were called "Jesus" or "St. Peter "-their original names, the names of the celestial gods of the Mayans, were forgotten.

So the matter has been going on for centuries. In the 1950s, Wasson made an initial discovery of the slumbering mystery, followed by more than two decades of mostly academic "ethnomycological" study. This book, first published in 1976, opened a new step in the regeneration of the religion of mushrooms by bringing experience of cultivation into the body of publicly available information. More than a hundred thousand copies of this hook were sold, many imitations were made, and it continues to sell well. This means that there are now thousands of mushroom farmers in the country. It is reasonable to suppose that more people are now actively involved in the mystical pursuit of using psilocybin than ever before in history. This is a complete revival of a supernatural phenomenon that has taken place in less than a decade! What are the ramifications of this appearance of a mystic mystery in the banal realm of modernity? What are its implications for those closest to this decisive, historic shift, those who, by cultivating and teaching others how to cultivate, are making change happen?

It is clear that pharmacology intends to provide an ever-expanding repertoire of psychoactive chemicals for the future. Yet I wonder if new drugs or the confidence to shamanically apply the botanical hallucinogens already approved by centuries of folk use are required. No laboratory products will be shown to be as somatically benign as psilocybin or to be structurally similar to those substances naturally occurring in the human brain and responsible for "normal" consciousness.

Once a mushroom has actually grown, it becomes obvious that the mushroom employs the same technique, whether it is enveloping a

Petri dish or a culture. A tiny part breaks away from the main body, it becomes a new center of radiative development that grows until it reaches a critical limit, and then, too, breaks away particles with a life of its own. By this process-usually involving spores, but in cultivation involving the distribution of mycelial varieties, and at a different level involving the teaching of cultivation techniques through one individual to another - the mushroom has its way into the world.

This implies an analogy: that knowledge of how to cultivate spreads throughout society in the same way that mycelium spreads through rye in a jar or a bed of compost. There is an apocalyptic corollary: when the technique is ubiquitous in society, "fruiting" will occur, which means that the true power and import of human relations with the mushroom will suddenly be revealed.

More than twenty-five years have passed since Albert Hofmann isolated the hallucinogen psilocybin. Hofmann's psilocybin was isolated from various species of mushrooms whose occurrence and ceremonial use in the mountains of Oaxaca was discovered by Gordon and Valentina Wasson in the summer of 1953. Of the many species in use in Oaxaca, subsequent laboratory tests showed that only one species was readily grown and able to produce fruit under a range among artificial conditions. The one genus is Stropharia cubensis, a starborn fairy mushroom. This book is the guide to this mushroom; how to cultivate it, and how to put it in your life like the bright light that it is. The following sections include specific, unfailing guidance for growing and sustaining magic mushrooms. We have kept these guidelines as simple and straightforward as possible; what is defined is only slightly more complicated than canning or jelly

making. These instructions may be adapted to undertakings of any size, from a few jars to thousands.

But before all these details, there should be a chat about what this really is all about. We're hoping that if you're avidly reading this book, it's presumably because you've taken dried mushrooms or been introduced to fresh mushrooms in Latin America, so we're not beginning with readers unfamiliar with the joys of mushroom trips. Our guidelines are a synthesis of research into other people's cultivation methods and processes that we have developed, tested and found to be of use to ourselves. Nothing that we endorse is untested by us. There may be other ways in which small-scale cultivation can be carried out indoors, but either there are variations on our method that are less direct or unknown to us. Stropharia production outside of manure is possible in the U.S. if the local temperature is high during the growing season. But the production of compost is an art in itself and needs more space, more energy and more public exposure than our indoor process. Getting involved in composting a lot of manure is not a necessary part of growing vast quantities of great magic mushrooms!

Our approach is empirical, but our views on Stropharia cubensis are not. Our views in this matter do not depend on the opinions of others or on anything written in any book; rather, they are focused on the perception of five dried grams of this psilocybin mushroom; at that point, a strange phenomenon occurs. It is the development of an I-Thou relationship between the person taking the psilocybin and the mental state that it evokes. Jung called this "transference" and it was a necessary condition for the early and barbaric connection of

mankind to its gods and demons. The mushroom talks, and our thoughts rest on what it says eloquently of itself in the cool night of the mind: I am ancient, older than thinking in your genus, which is itself fifty times older than your past. Though I've been on Earth for ages, I'm from the stars. My house is not a single planet, because many planets spread through the shining disk of the galaxy have conditions that allow my spores a chance of survival. The fungus you see is the part of my body given to sex thrills and sunbathing, my true body is a fine network of fibers rising through the dirt. Such networks will occupy acres and may have far more links than human brain numbers. My mycelial network is almost immortal-only the sudden toxification of the earth or the eruption of its parent star will wipe me out. By means impossible to understand, because of certain contradictions in your model of reality, all of my mycelial networks in the galaxy are in hyperlight connectivity through space and time. Mycelial body is as delicate as spider web, but mutual hypermind and memory is a massive historical repository of the occupation of emerging intellect on many worlds in our spiral star swarm. Space, you see, is a vast ocean to those hardy life forms that have the ability to reproduce from spores, because spores are covered with the hardest known organic substance. Across the eons of time and space, many life-forms in suspended animation have been floating for millions of years before contact is made with an appropriate environment. Few such organisms are involved, only myself and my recently evolved close relatives have attained the hyper-communication mode and memory capacity that makes us leading members of the Galactic Intelligence community. How the hyper-communication mode works is a mystery that will not be given to

humans. But the reason should be obvious: it is the presence of psilocybin and psilocin in the biosynthetic systems of my living body that opens vision screens to many realms for me and my symbiots. You as an entity and Homo sapiens as a species are on the verge of establishing a symbiotic relationship with my genetic material that will eventually bring mankind and the world into the planetary mainstream of higher civilizations.

"Since it is not possible for you to consider certain types of intellect around you, the more sophisticated conceptions of politics and society have progressed only as far as the notion of collectivism is concerned, but beyond the unity of the representatives of a group into a single social unit, there are finer and even more baroque evolutionary possibilities.

It seems typical of our nature that human beings, in whatever circumstance or spiritual setting they may consider themselves, feel an impulse to make contact with the fundamental uncertainty underlying the reality of being. Yes, the entire odyssey of our race, both phylogenetic and historical, can be seen as a groping to some kind of transcendent fulfillment. The story of the human race-our literature, technology, philosophy, culture and religion-is essentially the tale of this search for contact with the divine, numinous, and self-transcendent. It is a search at least as old as our species; evidence showing that early humans shared religious awareness has been discovered dating back to the Middle Paleolithic. Archeological evidence clearly shows: human beings have been at home with the concept of the sacred long before the advent of writing, agriculture, civilisation, or science; it is a concept that has remained in human

imagination, guiding us from the earliest childhood of humanity, contemporary with, and possibly preceding, the early use of tools, fire, and even language itself.

The life of pre-literate people is one in which nature exists as the primary condition of existence; one is surrounded by it, one is immersed in it, one depends on it for one's very survival. The quest for food and for the basic necessities of life must be a relentless and never-ending one for human beings in general, a search in which every plant and animal that one meets falls under the microscope of intense curiosity. In view of this situation, it was inevitable that, sooner or later, in search of food, women and men would accidentally ingest certain plants containing compounds affecting the central nervous system-and suddenly find themselves transported to the realm of the most profound rapture and strangeness. In fact, the ethno-mycologist R. Gordon Wasson (1958, 1961) suggested that the accidental ingestion of a hallucinogenic plant, probably a mushroom, constituted the first encounter of human beings with the numinosum, and directly led to the formation of the concept of deity and the supernatural. This idea is not without a certain rational appeal: there is reason to believe that the anxious, roving eyes of human beings, searching nature for new sources of food, will easily seek out the lowly mushroom, so unusual in shape, and so unlike the rest of the plants they were acquainted with. With a few thousand years of spontaneous experimentation (a relatively short period in the prehistory scale), they will eventually discover and consume fungi containing centrally active compounds, undergo hallucinogenic activity and create a bond with the numinosum.

Of example, the scenario described is fictional. They can not know the exact circumstances under which people first experienced psychedelic contact. We do learn, thanks to the work of Wasson and his colleagues in the 1950s (see V. P. & R.G. Wasson, 1957, R.G. Wasson & R. Heim, 1958, & Wasson, 1957), that a religious cult centered around the ceremonial consumption of hallucinogenic mushrooms has existed in the highlands of Central Mexico at least since the Conquest, and is perhaps much more old than that, since its true origins have been the same. But the fact remains that, whether it was through the consumption of a mushroom or some other herb, or through some naturally induced altered state of consciousness, the direct experience of the transcendent had and is having a profound impact on human culture, perhaps even on human evolution. The desire to ascend-and the complex conflict that occurs between the need to conquer and the temporal needs that force themselves on the primary reality of the biological being-is, in a way, what all nature, all culture, literature, ideology, invention and science-in short, all human thought and civilization-is all about. The desire to go beyond what is known and unknown is irredeemably woven into the fabric of human history. It is this desire that has built the Pyramids, Stonehenge and the Gothic Cathedrals. The same impulse pushed feeble ships across the trackless seas to the coast of a new world, and the same desire in our own time has driven us to sail a tiny bubble of light and air across the enormous and howling abysses of space (the celestial milli-micron) that divides our earth from its moon. It is the same urge that stirs the shiver along our spines as we look with wonder and longing at the star-dusted sky on a clear winter night.

Now, we are standing on the edge of the stars. It slowly emerges in mass consciousness that the next evolutionary step forward will transform humanity in such a way that all that has gone before will seem but a prelude. We stand at the edge of history ready to propel our human experience into the vast chasm of darkness that engulfs our world, the lessons of our revolutionary journey already ringing through the halls of time. We are about to embark on the greatest adventure we have ever experienced, one that will transform our entire notion of what it is to be human; yet we should not forget that there are only seconds of cosmic time between us as we climb the ramp of the spaceship and our mushroom munching ancestor staring into his Paleolithic sun.

This book is essentially a manual for those who have the interest, time, and patience to cultivate "magic mushrooms" in their own homes. It is for people who feel that they can still experience something by seeing the primordial dreams of their ancestors, and feel strongly enough that they are willing to invest a little time, money and effort to understand the dream. The term "magic mushroom" refers to the mushrooms which are members of the Psilocybe genus and the closely related genera Stropharia, Conocybe, Panaeolus and Copelandia. Some members of these genera include the compounds psilocybin (4-phosphoryoxy-N, N-dimethyltryptamine) and psilocin (4-hydroxy-N, N-dimethyltryptamine) as potent hallucinogenic agents (Fig. 1). Such molecules contain the basic indole structure typical of most hallucinogens found in nature (see Schultes, 1973, p. 17 ff.), including numerous amides of lysergic acid (of which LSD is a semisynthetic agent), N, N-dimethyltryptamine, harmine and its analogs, and ibogaine. The most notable exception

to this basic structure is mescaline, which is chemically 3,4,5-trimethoxyphenethylamine, and is therefore in the same class as amphetamine (ш-methylphenylethylamine).

The cultivation knowledge in this book applies only to one genus of magic mushroom, Stropharia cubensis Earle. (The mycologist Rolf Singer has recently reclassified this species to the genus Psilocybe. Therefore, in some sources, it is referred to as Psilocybe cubensis Earle ex. Singer.) It is possible that, with suitable modifications, the techniques illustrated here could be successfully applied to the cultivation of other plants. Nevertheless, our experience has shown that Stropharia cubensis is the easiest to grow. The Mushroom Cultivator by Stamets and Chilton, published by Agarikon Press, Olympia, Washington, 1983, should be read by those involved in the cultivation of other mushroom species. Nevertheless, our restriction of the topic to one fungus is not as disappointing as it may seem, because Stropharia cubensis is not only one of the most hallucinogenic mushrooms, but also one of the most common and readily available. This habitat is cow-dung in nature and can be found in pastures during the wet, warm seasons in areas as varied as the Southeastern U.S. and Cambodia, Australia and Colombia. Unlike other endogenous psilocybin-containing genera with few exceptions, the distribution of Stropharia cubensis is worldwide (Pollock, 1975). In addition, since its natural habitat is cow-dung, its circumtropical distribution has certainly been facilitated, if not induced, by the world cattle industry. Amusingly enough, Stropharia could be said to exist as a "weed" in high-tech cattle-raising cultures. This close relationship with humans through domesticated cattle has

possibly existed for as long as mankind possesses pastoral technology.

The procedures outlined in this book will work for Stropharia cubensis if followed with care and persistence. The procedures can be carried out by anyone in their own home, with a minimum of equipment and a few supplies and common chemicals that are no more than moderately difficult to obtain. No special training in mycology or microbiology is required. What is required is to follow the instructions closely and carefully.

In general, the method mentioned here consists of four key steps. This starts with spores and outlines step-by-step directions for growing spores of full-size mushrooms within six weeks. The first step includes finding the fungus, gathering and germinating the spores, and isolating the mycelium or fungal threads formed by the spores. The next step includes the production of mycelium on agar, a solid fertilizer, to be used for inoculation. In the third step, mycelium grown on agar is then grown on a sterilized medium containing whole rye grains. In the fourth and final stage, rye-grown mycelium is broken down or filled with soil, a process that induces the growth of mushrooms. The book describes each of these steps in detail and can be put into practice by anyone who can read and closely follow the instructions so that they can acquire spores or specimens of Stropharia cubensis.

HISTORY

Prehistoric rock art near Villar del Humo, Spain, offers a hypothesis that Psilocybe hispanica was used in religious rituals 6,000 years ago, and that art at the Tassili caves in southern Algeria from 7,000 to 9,000 years ago may show the species Psilocybe mairei.

Pre-Columbian mushroom stones

Hallucinogenic species of the Psilocybe genus have a history of use among the native peoples of Mesoamerica for religious communion, divination, and healing, from pre-Columbian times to the present day. Mushroom stones and motifs have been found in Guatemala. A statuette dating from ca. 200 CE. and depicting a mushroom strongly resembling Psilocybe mexicana was found in a west Mexican shaft and chamber tomb in the state of Colima. A Psilocybe species was known to the Aztecs as teōnanācatl (literally "divine mushroom" agglutinative form of teōtl (god, sacred) and nanācatl (mushroom) in Náhuatl) and were reportedly served at the coronation of the Aztec ruler Moctezuma II in 1502. Aztecs and Mazatecs referred to psilocybin mushrooms as genius mushrooms, divinatory mushrooms, and wondrous mushrooms, when translated into English.[8] Bernardino de Sahagún reported ritualistic use of teonanácatl by the Aztecs, when he traveled to Central America after the expedition of Hernán Cortés.

After the Spanish conquest, Catholic missionaries campaigned against the cultural tradition of the Aztecs, dismissing the Aztecs as idolaters, and the use of hallucinogenic plants and mushrooms, like other pre-Christian traditions, was quickly suppressed. The Spanish believed the mushroom allowed the Aztecs and others to communicate with devils. In converting people to Catholicism, the Spanish pushed for a switch from teonanácatl to the Catholic sacrament of the Eucharist. Despite this history, in some remote areas, the use of teonanácatl has persisted.

The first mention of hallucinogenic mushrooms in European medicinal literature appeared in the London Medical and Physical Journal in 1799: a man had served Psilocybe semilanceata mushrooms that he had picked for breakfast in London's Green Park to his family.

WHERE TO FIND AND HOW TO IDENTIFY PSILOCYBIN MAGIC MUSHROOM

How To Safely Identify Psilocybin Mushrooms

Have you ever heard of people ending up in the ER due to mushroom poisoning?

These frequent accidents occur due to the fact that people think they “know” which mushrooms are safe to eat and which are not. Reality shows us that many of them are wrong.

Things get even more complicated when it comes to psychoactive mushrooms (also called “magic mushrooms”) due to the fact that the psychological profile of the persons willing to try this type of mushrooms includes a higher tolerance for risk.

That is why it is crucial to invest a lot of time in getting to know the specific characteristics of psilocybin mushrooms before you head out to pick them up and eat them. This can make the difference between having a pleasant spiritual experience of ending up in the ER with serious poisoning.

What are Psilocybin Mushrooms?

Dried_Cubensis

Before we go into more details, what exactly are psilocybin mushrooms? Psilocybin mushrooms are the most popular “magic mushrooms”, which means that they are mushrooms with psychoactive properties. They are considered sacred medicine among indigenous tribes, having been used extensively in the past in religious and spiritual ceremonies, especially in Central and South America.

Although currently they are classified as a Schedule 1 drugs in the United States (and many other countries, except the Czech Republic), recent John Hopkins research seems very promising. Some studies have shown that consuming psilocybin mushrooms can have a beneficial effect for individuals suffering from various psychiatric disorders, from anxiety to OCD and depression.

Another study from Johns Hopkins University showed that most of the participants rated this as one of the most significant spiritual experiences of their lives. It also proved that ingesting psilocybin mushrooms creates long-lasting positive personality changes in the users.

Here are a few important pointers on how to differentiate between psilocybin mushrooms. Make sure you extensively study pictures of these mushrooms and notice the differences between them.

Exercise Great Caution When Dealing With Psilocybin Mushrooms

Please exercise maximum caution when it comes to cultivating or growing psilocybin mushrooms. There is a very real risk of poisoning and even death. It is best to spend as much time as possible in studying extensively the characteristics of these magic mushrooms if you are serious about identifying and consuming them.

A great book on the subject is Paul Stamets' reference book on identifying psilocybin mushrooms around various parts of the world.

Make sure you also identify the visual differences between the mushrooms and become quite proficient at it before ingesting any type of psilocybin mushrooms.

PSILOCYBE SEMILANCEATA

These mushrooms are also known as “Liberty Caps” due to their large caps. They are known to be among the most potent psilocybin mushrooms. They also grow frequently in North America and throughout Europe.

These mushrooms usually grow in meadows and pastures, often in those grazed by sheep. However, unlike psilocybe cubensis, psilocybe semilanceata do not grow directly out of dung.

PSILOCYBE MEXICANA

These mushrooms grow especially in Central and South America, where they have been used ceremonially for millennia. They are also called “teonanacatl”. Similar in aspect to psilocybe semilanceata, it is hard to distinguish them from the latter.

PSILOCYBE CYANESCENS

This specific type of psilocybin mushrooms are also known as “Wavy Caps”.

According to Jacob Akin from the University of Wisconsin, there seems to be evidence of this type of mushrooms at the ancient Egyptian hieroglyphs. Research is showing that these mushrooms were used by the ancient Egyptians for their psychoactive properties during religious ceremonies.

These mushrooms are also found in many areas throughout the world and are known to be quite potent when it comes to their psychedelic effects.

PSILOCYBE AZURESCENS

This type of mushroom is also known as the “Flying Saucer Mushroom”. It is also known as the most potent psychoactive psilocybin mushrooms due to the fact that it has the highest concentration of the psychoactive biochemicals, psilocybin and psilocin.

It often grows along the northern Oregon Coast, favoring the beachland interface. Psilocybe azurescens prefers to grow in dune grasses. It also causes the whitening of wood. Fruitings begin in late September and continue even after the first frost occurs, until late December or even January. It is a very adaptive species.

PSILOCYBE BAEOCYSTIS

This type of mushroom is also known as “Knobby Tops”. It is usually found on decaying conifer mulch, in wood chips, or in lawns with high lignin content.

It can also occasionally grow from fallen seed cones of Douglas fir.

You can normally find these mushrooms in fall, even ranging to early winter but rarely in the spring.

PSILOCYBE CUBENSIS

This is the most popular species of psilocybin mushrooms, also known as “Golden Teacher”.

You may find it throughout southeastern United States, Central America and northern South America. It also grows throughout southeast Asia, in countries such as Thailand, India, Cambodia and Vietnam.

Normally, these mushrooms grow at their maximum size in the two months prior to the hottest period in the year. In the United States, this means you can find them in May and June most frequently, although they can also be found up until January.

PLUTEUS SALICINUS

There are at least six species of Pluteus comprising psilocybin:

- Pluteuscyanopus
- Pluteusglaucus
- Pluteusnigroviridis
- Pluteusvillosus
- Pluteusbrunneidiscus
- Pluteusphaeocyanopus

Distribution: British Isles; Northern Europe; commonly spread across the U.S. mainland.

Identification: 3-7 mm wide convex cap. Becomes more convex with your era.Gray yellowish to gray or salmon to pink salmon. Scaly close the center, neat at the bottom of the cap. The stem is between 40-100 mm long and 2-6 mm wide. White to gray-green, often turning blue. Flesh is very purple when it's scratched, particularly at the base. Unattached larvae, when matured with spores, are pallid or salmon.

Season: late spring and early autumn, based on seasonal rainfall.

Habitat: deciduous forests, particularly alders (Alnus) or willows (Salix) or their woody vegetation.

Dosage: unfamiliar.

PSILOCYBE ANTIOQUIENSIS

Distribution: at the moment of publication, the only recognized habitats are Antioquia, Colombia; Vera Cruz and Jalisco, Mexico; Angkor Wat, Kampuchea.

Identification: 5 mm min to 30 mm max cap diameter. Usually 10-15 mm. Conic or globular at first, then convex when mature.Orange brown or ochre orange. The sides are parallel lines. Stem is 45-180 mm long and 3 mm dense. Gills are pale ochre to violet with white corners.

Season: event of the monsoon. May through the month of October.

Habitat: lonely or in tiny organizations. Clay or sandy soil, particularly in cattle, horses, Brahman cattle or water buffalo farms.From manure soil, but not from manure itself.Subtropical, wet, 1000-1600 m altitude.

Dosage: 15-20 fresh or 1-2 g dry.

PSILOCYBE ATLANTIS

Distribution: Fulton County, North Atlanta, Georgia.

Identification: cap 25-45 mm in diameter. Dry, pale gray with lighter striations.Generally convex, but sometimes concave like a parasol inside. Stem is 40-60 mm in length and 2-4 mm in thickness. Brownish red to grayish brown, coated in scales from cap to base. Blues when it's harmed. The gills are thick, brownish and colored like a cap on the corners.

Season: the month of August.

Habitat: in flocks in groundwater.

Dosage: unfamiliar.

PSILOCYBE AUSTRALIANA

Distribution: the state of Southern Australia.

Identification: cap 16-30 mm. Convex to bell formed at the center with a mildly lighter umbo. Fading from black buff to light yellow ochre at the corners. The margin could be red colored. Stem is 45-110 mm long, 2-3 mm uniformly round. Bulbous foundation, man. Very blue after all the harm. Galls develop together-yellow or olive, then dark brown or purple with era.

Season: April and May (southern) Habitat: cultivation of Pinusradiata. A temperate and subtropical rainforest. It grows on the humus and the leaf litter. Found adjacent paths and roads.

Dosage: one or two big new samples. It's 1 frozen gram.

PSILOCYBE AZTECORUM

Distribution: found only in the hills of central Mexico. Rio Frio,Popocatépetl, Paso de Cortés, Nevado de Toluca and La Malinche.Puebla and Tlaxcala in the Mexican States.

Identification: 5-30 mm diameter caps, usually 15-20 mm. Convex or bulbous, becoming striated as they grow. Yellow brown-yellow gold with little purple bruising on the corners. The stems are 55-75 mm long and 3-5 mm thicker at the root. When scratched or early in maturation, the stems turn purple or yellowish. Gills are light purple gray to dark purple brown and sometimes chocolate purple. They grow together, and they don't achieve the stem.

Season: from August to October.

Habitat: grows on soil with forest litter and leaves in gregarious communities of 5 to 20 samples. Sometimes on very rotten logs at an altitude of 3000-4200 m in Pinushartwegii woods with lengthy, abundant grass.

Dosage: Unknown, but used for millennia by indigenous Mexicans. The name aztecorum is in homage to the holy people who used these mushrooms at significant celebrations.

PSILOCYBE CAERULESCENS

Distribution: Mexico, Brazil, Venezuela and Alabama.

Identification: 2.5-9 mm cap with color variety. Black or dark blue, cinnamon to oxidize. Cone formed when immature with a curved edge. They flatten out and the colors alter as they mature and grow. 35-100 mm long roots are 3-5 mm in diameter, cream-colored, hollow and coated with fibrous hair. The veil is falling off in elderly samples. Gills are near together and white on the corners. Light cinnamon transforms into lighter brown when mature.

Season: late spring and late summer.

Habitat: seldom lonely, often growing thick like turf in clumps and tufts. It prefers mudslides and orange brown soils. Doesn't like contest from grassy species like grass.

Dose: 1-7 new fungi.

PSILOCYBE CYANOFIBRILLOSA

Distribution: from Northern California to British Columbia in Canada.

Identification: cap1-3.5 cm. Cone formed when young, becoming convex or very convex when mature, almost hemispheric. Chestnut brown with lighter striae.Fades to yellowish brown or grayish white when dry. 30-70 mm long roots are 2-4 mm in diameter-straight, smooth and coated with slender fibrils and bulges at the bottom. Blue bruising when it is harmed. Before entering the stem, the Gills expand together and become smaller. Light grey, aged to purple brown with black corners.

Season: September to December Habitat: dispersed or populated colonies. Alder, grass and bush lupine in wood chips and a tree litter. Common in rhododendron farms and on the corners of flooded estuaries or flood plains.

Dose: 2-5 tiny or 1 big new sample. Dry consumption is not advised as this species loses 70% of its power during dehydration.

PSILOCYBE FIMETARIA

Distribution: Oregon; Washington, DC. British Columbia, Canada. Denmark; United Kingdom; Scandinavia.

Identification: cap 0.5-6 cm, generally 1-2.5 cm. Cone formed when young, turns into a convex bell. Turns widely convex with the center elevated.Pale dark brown, sweet and dark ochre. Translucent when it's wet. Dry to yellowish olive or yellowish brown. Blue bruising when it's harmed. 20-90 mm long stems are generally 40-65 mm long. 0.5-4 mm in diameter, generally 2-3 mm straight, solid white, yellowish brown or honey colored with a bulbous finish. Each stem has blue-green to deep-sea green shades and blue to dark-green bruising when harmed. Gills develop in the form of a hook and are purplish gray with black sides.

Season: October to December Habitat: scattered separately or in big circles. It grows well around horse manure and grassy regions with wealthy soils.

Dosage: 15-30 of 14 g fresh or 1-2 g dried samples.

PSILOCYBE LINIFORMANS

Distribution: Washington; Oregon; British Columbia, Canada. The Netherlands, Italy.

Identification: 1-2,5 cm, widely convex with elevated center. Smooth, dark gray brown to olive brown. Sticky when it's wet. The blue green bruises. Fades to pale gray straw when it's dry. 14-30 mm long stem 1-2 mm in diameter. White to light brown blue bruising when harmed.Straight, swollen at the foundation.Gills is dark chocolate to purplish brown.

Season: Summer through fall.

Habitat: individual tufts and clumps in horse manure or well-manured farms and farms.

Dosage: Slightly active animals. 10 to 20 live samples.

PSILOCYBE SILVATICA

Distribution: Southern Oregon; British Columbia, Canada.

Identification: 0.8-2 cm wide, irregular conical cap with a pronounced center of umbrate. Tawny dark brown and soft, drying to a pale brown colour. Sticky slender cuticle when it's wet. The brittle stem is 20-80 mm long. Dark brown, mildly inflammation at the foundation. The gills differ in size and shape a grayish brown to cinnamon or a lighter brown color when aged with white speckled sides.

Season: from late September to December.

Habitat: Well-populated, but does not shape mats. It grows on wood chips, particularly alder detritus. Will develop on a decayed conifer substrate.

Dosage: 20-40 g fresh or 2-4 g dry.

PSILOCYBE PELLICULOSA

Distribution: United States Pacific Northwest, British Columbia, Canada; Finland.

Identification: 0.8-2 cm of strong conical cap widens as it grows. The title relates to the gelatinous cap film. Translucent radial striations split the umber to a dingy yellow cap that dries to a pale yellow cap. The 20-80 mm long stems are 1,5-2 mm in diameter, fairly straight with a small curve at the top. Gills are light cinnamon when young, then dark brown when mature, separating from the stem.

Season: from September to December.

Habitat: Moss cluster, forest debris and wealthy humus in coniferous forests. Fruiting bodies can be discovered along forest paths and ancient logging paths. Usually not discovered in grasslands.

Dosage: It's a comparatively fragile mushroom. 20-50 g fresh or 2-5 g dry.

PSILOCYBE STRICTIPES

Distribution: United States Pacific Northwest; Chile; United Kingdom; France; Germany; Scotland; Slovakia; Sweden; Siberia.

Identification: 5-30 mm cap starts as a cone, becomes bell-shaped, then matures widely convex. Smooth to the touch, walnut to brown rusty with radial translucent striations close the corners. Bruising blue when it's dealt with. It has a removable gelatinous membrane. The 4-10 cm long stems are just 0.25 cm in diameter. The cream is dark gray in color and fibrous. The gills are cream-colored, maturing to purple and thinning as they are attached to the stalk.

Season: at the end of September to December.

Habitat: well-manured lawns, open areas and farms. Doesn't develop straight in manure.

Dosage: unfamiliar.

PSILOCYBE SERBICA AKA BOHEMICA

Distribution: Austria; Bosnia; Czech Republic; Germany; Greece; Netherlands; Hungary; Italy; Kosovo; Romania; Serbia; Slovak Republic; Slovenia.

Identification: cap 2-4 cm, conical when young. Becomes bell-shaped, then more convex. Edges curve when young and flatten with era. Buff brown to ochre brown, with the caps dry to pale ochre. Smooth and yellow to cream colored, the cap does not have a gelatinous cuticle to dissolve. Blue bruising when treated. 45-100 mm long roots are 2-10 mm in diameter, straight, thick and thick at the bottom. It's white with a silk glow that's losing its veil with era. Gills are near to each other and often connect to the stem. Light brown when young, they become lighter brown to purple with white margins when mature.

Season: from August to November and from December.

Habitat: found in clusters of deciduous coniferous forests on decayed forest litter, leaf mulch, leaves and compost. Likes damp areas along the sides of the creek and surrounding forest routes and trails.

Dosage: Unknown, but psilocybin concentration is between 0.11 and 1.34 per cent.

PSILOCYBE CAERULIPES

Distribution: Northeastern United States; Cloud forests of Mexico.

Identification: cap 1-3,5 cm. Cone formed when younger, then convex and widely convex when matured. The corners are folded in at first, then flattened with an era with a slight core nipple. Sticky at first with a gelatinous layer, which will quickly dry to be soft. Cinnamon to dingy brown with a purple tinge on the sides and a yellowish tint generally. Blue bruising, but very slow. 30-60 mm long stems are 1,5-3 mm in diameter, pale or cream, comparatively straight to the foundation. Slowly, they bruise blue and dry to powdery blue. Each stem is pithy and strong and has a good white-gray, downward-facing fibrillation. Gills are slender, tightly packed and varying in shape. Some of them bind to the stem while others do not. Light brown, then ripening to profound cinnamon with white fringed corners.

Season: from late May to December.

Habitat: it can be discovered singularly or in big mats in deciduous forests. Birch, birch and birch stump or timber chunks and decay crop material. Found developing around rotten logs.

PSILOCYBE HEIMII

Distribution: subtropical forest of Mexico.

Identification: 15-35 mm diameter caps are convex when young, then more rounded and convex when they are older. Dark brown to yellowish brown with trimmed corners and lobular with translucent striations. Gills are dark brown to purple with pale corners. 50-80 mm long stems are 1,5-3 mm in diameter, yellow to gray or brownish purple, feathered with downy fibrils. Bruise profound blue to blackish when used.

Season: June to August

Habitat: individual or small clusters of muddy soil in deciduous subtropical forests at an altitude of 500-1,400 m.

Dosage: unfamiliar. However, it has been used by indigenous Mexicans for ceremonies and ritual practices for hundreds of years.

PSILOCYBE MORAVICA

Distribution: only at five places in the Czech Republic.

Identification: 2.5-3.5 mm cap is conical when young, then swells to be semi-hemispheric. Then hemispheric and mildly bell-shaped, with the margin attached to the stem with a nice white veil. Edges become slightly waxy and striate when wet. Changes color rapidly, sometimes bluish, sometimes bluish green with a red dot in the middle. Dark brown when humid, then reddish brown or yellow ochre with purple highlights. The 50-90 mm long stems are 2-5 mm, cylindrical, with a separate curve. White to white and lanky with a scabrous layer and no notch at the bottom.

Season: late September to November / December, depending on temperature.

Habitat: in clusters of woody debris in deciduous or blended woodlands. They often discovered where beings removed, then stacked up wood waste. Only recorded at heights of 230-700 metres.

Dosage: currently unidentified.

PSILOCYBE NATALENSIS

Distribution: only collected at two locations 250 km east of Natal in South Africa.

Identification: 1-6 mm cap is unevenly conical when young, then hemispheric, wide and curved. Yellow to white with a bluish boundary, colors do not alter with era. 40-120 mm lengthy stems have a diameter of 1-10 mm. Smooth, dry, white, hollow, usually bent. Easily stains the blue, particularly the reduced part of the stem. Undefined gills are buff when youthful, then purplish black with a white edge when ripe.

Season: the month of January.

Habitat: dispersed in wealthy manure, fertilized farms and crops, but not straight in manure.

Dosage: reported to have been comparable to cubensis.

PSILOCYBE SAMUIENSIS

Distribution: KohSamui Island and surrounding areas of Thailand, including Ranong Province; Angkor Wat, Cambodia Identification: 1.5-7 cm cap. Convex and bell-shaped, creating a elevated papilla as it develops. Buff brown with a loose membrane of dirt and translucent when wet. When babies, the ##s are striated.40-60 mm long and 1-2 mm straight.White-yellow with good fibrils. Part veil fades with era. The gills develop together, are golden brown, then dark purple brown with pale corners when old.

Season: late May to September, sometimes in October.

Habitat: soils of manured clay, such as rice paddies or grass fields.

Dose: up to 20 new samples.

PSILOCYBE OVOIDEOCYSTIDIATA

Distribution: to date, Pennsylvania; Ohio and West Virginia, United States.

Identification: 10-45 mm cap, generally 15-25 mm convex with core boss projection. Orange brown to orange brown purple when ripe or dry. 15-90 mm long stems are generally 25-60 mm and 1-10 mm in diameter, cylindrical and mildly bulbous. Smooth with pale ochre and yellowish colors over lighter brown to purple hues. Below is Scaly. The red bruises when they're harmed. The gills are uniform in color, pale brown to profound black purple.

Season: from April to August / September.

Habitat: among herbaceous crops in deciduous forests on forest litter and forest mulch. Along the paths, the river banks and the plains.

Dosage: Treat per cyanescens.

PSILOCYBE STUNTZII

Distribution: North of San Francisco to Oregon, United States and British Columbia, Canada.

Identification: cap 15-50 mm. Conical when youthful, extending to flat, sometimes mildly convex with a elevated centre. Dark brown or olive yellowish, pale to striated edges. The edges are transparent when they are wet. Sticky when wet with a gelatin membrane. Fades to light green when it's dry. 30-60 mm long stems are 2-4 mm in diameter, filled with a black pit. Easily hurts the pale blue color to which the cap scar is applied. The gills are moderately wide, stretch together and become thicker at the stem.

Season: late July to September for wooded fields and lawns. At the end of September to December, in the deeply mulched gardens.Can develop all year round in some areas of the Pacific Northwest, based on seasonal differences.

Habitat: grows in well-populated clusters of ader bark mulch and conifer wood chips. Appears in lawns of newly placed soda and deeply mulched, woody debris.

Dosage: 8 g new or 20-30 samples. 1-3 g of the frozen.

PSILOCYBE SUBCUBENSIS

Distribution: is a subtropical and cosmopolitan species. Founded in Mexico; Bolivia; Colombia; Ecuador; Honduras; El Salvador; Australia; Nepal; India; Thailand; Cambodia; Vietnam and some of the Philippines.

Identification: from 18 to 50 mm. Cone formed when youthful, then very convex, ripening to simple. The center is copper colored, fading to light golden brown and pale yellow at the corners. Bruises blue at the corners when wounded. The 50-80 mm long stems have a diameter of 4-6 mm. Hollow, directly. White to creamy, white and pale yellow when aged. Fibrous in the reduced areas and, when treated, readily marks blue. Gills begin to be light gray, then become profound violet when mature and sporadic. Mottled to yellow on the corners.

Season: Generally in summer, but may differ from nation to nation.

Habitat: rarely lonely or dispersed, it develops prolifically on cow dung, but not on horse manure. Rich crops and grasslands on roads and paths and in dung heaps.

Dosage: 25 g or more new. 1 g dried to 3-5 g with a complete ceremonial dose.

GENERAL GUIDE ON HOW TO GROW PSILOCYBIN MUSHROOMS

SPORE SYRINGES

The one thing you might have trouble getting is a decent spora syringe. This will hold the magic seeds of mushrooms and will be used to "sow" them into the soil. Some growers reported pollution concerns, misidentified varieties, and even syringes containing nothing but water. But, as long as you do your research and find a reliable source, you're not going to have any issues.

WHAT VARIETY SHOULD I CHOOSE?

When you know how to cultivate mushrooms indoors, you're going to want to settle on a genus and strain. Many vendors have a variety to choose from, but Psilocybe cubensis B+ and Golden Teacher mushrooms are among the most common for beginners. While not as strong as some others, such as Penis Envy, they are claimed to be more tolerant of sub-optimal and changeable conditions.

WHAT YOU WILL NEED

INGREDIENTS

Spore syringe, 10-12 cc

Organic brown rice flour

Vermiculite, medium/fine

Drinking water

EQUIPMENT

12 Shoulderless half-pint jars with lids (e.g. Ball or Kerr jelly or canning jars)

Hammer and small nail

Measuring cup

Mixing bowl

Strainer

Heavy duty tin foil

Large cooking pot with tight lid, for steaming

Small towel (or approx. 10 paper towels)

Micropore tape

Clear plastic storage box, 50-115L

Drill with ¼-inch drill bit

Perlite

Mist spray bottle

HYGIENE SUPPLIES

Rubbing alcohol

Butane/propane torch lighter

Surface disinfectant

Air sanitizer

Sterilized latex gloves (optional)

Surgical mask (optional)

Still air or glove box (optional)

INSTRUCTIONS

The basic PF Tek method is pretty straightforward: Prepare your substrate of brown rice flour, vermiculite, and water, and divide it between sterile glass jars. Introduce spores and wait for the mycelium to develop. This is the network of filaments that will underpin your mushroom growth. After 4-5 weeks, transfer your colonized substrates, or “cakes”, to a fruiting chamber and wait for your mushrooms to grow.

NOTE: Always ensure good hygiene before starting: spray an air sanitizer, thoroughly disinfect your equipment and surfaces, take a shower, brush your teeth, wear clean clothes, etc. You don’t need a lot of space, but your environment should be as sterile as possible. Opportunistic bacteria and molds can proliferate in conditions for cultivating shrooms, so it’s crucial to minimize the risk.

STEP 1: PREPARATION

1) Prepare jars:

With the hammer and nail (which should be wiped with alcohol to disinfect) punch four holes down through each of the lids, evenly spaced around their circumferences.

2) Prepare substrate:

For each jar, thoroughly combine ⅔ cup vermiculite and ¼ cup water in the mixing bowl. Drain excess water using the disinfected strainer.

Add ¼ cup brown rice flour per half-pint jar to the bowl and combine with the moist vermiculite.

3) Fill jars:

Being careful not to pack too tightly, fill the jars to within a half-inch of the rims.

Sterilize this top half-inch with rubbing alcohol

Top off your jars with a layer of dry vermiculite to insulate the substrate from contaminants.

4) Steam sterilize:

Tightly screw on the lids and cover the jars with tin foil. Secure the edges of the foil around the sides of the jars to prevent water and condensation getting through the holes.

Place the small towel (or paper towels) into the large cooking pot and arrange the jars on top, ensuring they don’t touch the base.

Add tap water to a level halfway up the sides of the jars and bring to a slow boil, ensuring the jars remain upright.

Place the tight-fitting lid on the pot and leave to steam for 75-90 minutes. If the pot runs dry, replenish with hot tap water.

NOTE: Some growers prefer to use a pressure cooker set for 60 minutes at 15 PSI.

5) Allow to cool:

After steaming, leave the foil-covered jars in the pot for several hours or overnight. They need to be at room temperature before the next step.

STEP 2: INOCULATION

1) Sanitize and prepare syringe:

Use a lighter to heat the length of your syringe's needle until it glows red hot. Allow it to cool and wipe it with alcohol, taking care not to touch it with your hands.

Pull back the plunger a little and shake the syringe to evenly distribute the magic mushroom spores.

NOTE: If your spore syringe and needle require assembly before use, be extremely careful to avoid contamination in the process. Sterilized latex gloves and a surgical mask can help, but the surest way is to assemble the syringe inside a disinfected still air or glove box.

2) Inject spores:

Remove the foil from the first of your jars and insert the syringe as far as it will go through one of the holes.

With the needle touching the side of the jar, inject approximately ¼ cc of the spore solution (or slightly less if using a 10 cc syringe across 12 jars).

Repeat for the other three holes, wiping the needle with alcohol between each.

Cover the holes with micropore tape and set the jar aside, leaving the foil off.

Repeat the inoculation process for the remaining jars, sterilizing your needle with the lighter and then alcohol between each.

STEP 3: COLONIZATION

1) Wait for the mycelium:

Place your inoculated jars somewhere clean and out of the way. Avoid direct sunlight and temperatures outside 70-80 °F (room temperature).

White, fluffy-looking mycelium should start to appear between seven and 14 days, spreading outward from the inoculation sites.

NOTE: Watch out for any signs of contamination, including strange colors and smells, and dispose of any suspect jars immediately. Do this outside in a secure bag without unscrewing the lids. If you're unsure about whether a jar is contaminated, always err on the side of cautioneven if the substrate is otherwise healthily colonized as some contaminants are deadly for humans.

2) Consolidate:

After three to four weeks, if all goes well, you should have at least six successfully colonized jars. Leave for another seven days to allow the mycelium to strengthen its hold on the substrate.

STEP 4: PREPARING THE GROW CHAMBER

1) Make a shot gun fruiting chamber:

Take your plastic storage container and drill ¼-inch holes roughly two inches apart all over the sides, base, and lid. To avoid cracking, drill your holes from the inside out into a block of wood.

Set the box over four stable objects, arranged at the corners to allow air to flow underneath. You may also want to cover the surface under the box to protect it from moisture leakage.

NOTE: The shot gun fruiting chamber is far from the best design, but it's quick and easy to build and does the job well for beginners. Later, you may want to try out alternatives.

2) Add perlite:

Place your perlite into a strainer and run it under the cold tap to soak.

Allow it to drain until there are no drips left, then spread it over the base of your grow chamber.

Repeat for a layer of perlite roughly 4-5 inches deep.

STEP 5: FRUITING

1) “Birth” the colonized substrates (or “cakes”):

Open your jars and remove the dry vermiculite layer from each, taking care not to damage your substrates, or “cakes”, in the process.

Upend each jar and tap down onto a disinfected surface to release the cakes intact.

2) Dunk the cakes:

Rinse the cakes one at a time under a cold tap to remove any loose vermiculite, again taking care not to damage them.

Fill your cooking pot, or another large container, with tepid water and place your cakes inside. Submerge them just beneath the surface with another pot or similar heavy item.

Leave the pot at room temperature for up to 24 hours for the cakes to rehydrate.

3) Roll the cakes:

Remove the cakes from the water and place them on a disinfected surface.

Fill your mixing bowl with dry vermiculite.

Roll your cakes one by one to fully coat them in vermiculite. This will help to keep in the moisture.

4) Transfer to grow chamber:

Cut a tin foil square for each of your cakes, large enough for them to sit on without touching the perlite.

Space these evenly inside the grow chamber.

Place your cakes on top and gently mist the chamber with the spray bottle.

Fan with the lid before closing.

5) Optimize and monitor conditions:

Mist the chamber around four times a day to keep the humidity up, taking care not to soak your cakes with water.

Fan with the lid up to six times a day, especially after misting, to increase airflow.

NOTE: Some growers use fluorescent lighting set on a 12-hour cycle, but indirect or ambient lighting during the day is fine. Mycelium only needs a little light to determine where the open air is and where to put forth mushrooms.

STEP 6: HARVESTING

1) Watch for fruits:

Your mushrooms, or fruits, will appear as tiny white bumps before sprouting into “pins.” After 5-12 days, they’ll be ready to harvest.

2) Pick your fruits:

When ready, cut your mushrooms close to the cake to remove. Don’t wait for them to reach the end of their growth, as they’ll begin to lose potency as they mature.

NOTE: The best time to harvest mushrooms is right before the veil breaks. At this stage, they’ll have light, conical-shaped caps and covered gills.

STORAGE

Psilocybin mushrooms tend to go bad within a few weeks in the fridge. So if you plan to use them for microdosing or you just want to save them for later, you'll need to think about storage. The most effective method for long-term storage is drying. This should keep them potent for two to three years as long as they're kept in a cool, dark, dry place. If they're stored in the freezer, they'll pretty much last indefinitely.

The lo-fi way to dry your mushrooms is to leave them out on a sheet of paper for a few days, perhaps in front of a fan. The problem with this method is they won't get "cracker dry." That is, they won't snap when you try to bend them, which means they'll still retain some moisture. They may also significantly diminish in potency, depending on how long you leave them out. Using a dehydrator is by far the most efficient method, but those can be expensive. A good alternative is to use a dessicant as follows:

Air dry your mushrooms for 48 hours, ideally with a fan.

Place a layer of dessicant into the base of an airtight container. Readily available dessicants include silica gel kitty litter and anhydrous calcium chloride, which you can purchase from hardware stores.

Place a wire rack or similar set-up over the dessicant to keep your mushrooms from touching it.

Arrange your mushrooms on the rack, ensuring they're not too close together, and seal the container.

Wait for a few days, then test to see if they’re cracker dry.

Transfer to storage bags (e.g. ZipLoc, vacuum sealed) and place in the freezer.

REUSING THE SUBSTRATE

After your first flush, the same cakes can be re-used up to three times. Simply dry them out for a few days and repeat Step 5.2 (dunking). But don’t roll them in the vermiculite; just place them back in the grow chamber and mist and fan as before. When you start to see contaminants (usually around the third re-use), drench the cakes with the mister spray and dispose of them outside in a secure bag.

MAKING SPORE SYRINGES

Filling your own psilocybin spore syringes is about as self-sufficient as it gets.

First, you'll need to take a spore print from a mature mushroom, i.e. one that's been allowed to grow until its cap has opened out and the edges are upturned. You should also notice an accumulation of dark purple deposits around the base. These are the magic mushroom spores.

To collect them, remove the cap with a flame-sterilized scalpel and place it gills down on a sterile paper sheet. Cover with a disinfected glass or jar to protect it from the air and leave for 24 hours. Keep the resulting spore print out of light in an airtight plastic bag. To load a spore syringe, scrape some of the spore print into a sterile glass of distilled water. You can find this at auto supply stores. Then fill your syringe (which should also be sterile) and empty it back into the glass several times to evenly distribute the spores. Fill it a final time and place it inside an airtight plastic bag. Leave at room temperature for a few days to allow the spores to hydrate. You can then keep the syringe in the fridge until you're ready to use it. It should last at least two months.

ADAPTATIONS AND ALTERNATIVES

Numerous modifications have been made to the PF Tek method, both to increase yield and to make things easier. Different species also tend to produce better with different substrates and conditions.

The main alternative to the basic PF Tek is the monotub method, which involves spawning to bulk on coir (coconut fiber extract), manure, straw, or some other fresh and nutritious substrate. Eventually you may want to experiment with some of these other methods, but the PF Tek is a good introduction for now.

GUIDE ON HOW TO CULTIVATE STROPHARIA CUBENSIS

STEP I - LOCATING AND IDENTIFYING THE FUNGUS: COLLECTING AND GERMINATING SPORES

In the New World, Stropharia cubensis can be found in appropriate habitats throughout the Southern U.S., all through the Coastal regions of Mexico, and throughout coastal and equatorial regions of South America. In the U.S., it has been reported from Texas, Louisiana, Alabama, Mississippi, Arkansas, Florida, Tennessee, and Georgia. Its distribution would probably be even greater were it not for the fact that its environmental requirements limit it to regions of mild temperatures and high humidity.

Because of its specific habitat and singular appearance, Stropharia cubensis is one of the easiest mushrooms to locate and identify. As already mentioned, it can be found growing out of cow-pies in pastures during rainy warm seasons. Other dung-growing mushrooms may also be found in the same pasture, but these bear little resemblance to Stropharia. The following botanical description of Stropharia cubensis is taken from Mushrooms of North America by Orson K. Miller, Jr.:

Cap pale yellowish, viscid; persistent ring; blue-staining stalk.

Cap 1.5-8 cm broad, conic, bell-shaped, convex in age, viscid, without hairs, whitish to pale yellow, light brownish in age, stains bluish in age. Flesh firm, white, bruises blue. Gills adnate (attached) to adnexed (notched), close, grey to violet-grey in age with white edges. Stalk 4-15 cm long, 4-14 mm thick, enlarging somewhat toward the base, dry, without hairs, white staining blue when bruised. Veil white, leaving a superior membranous ring. Spores 10-17 µ x 7-10 µ elliptical to oval in side-view, thick-walled, with a large pore at apex, purple-brown spore print. Cystidia (sterile cells) on gill edge club-shaped with rounded heads.

Miller places this species in the genus Psilocybe, after Singer.

The flesh of this mushroom exhibits the property of staining a bluish color when bruised or broken. This blue-staining reaction is apparently an enzymatic oxidation of psilocin to an indole diquinone (Bocks, 1967) and is a fairly reliable indicator of the presence of psilocybin, not only in Stropharia cubensis, but also in other closely related genera (members of the family Strophariaceae) (cf. Benedict, et al., 1967). Other mushrooms, such as members of the genus Russula, section Nigricantinae, and Boletus, exhibit a similar blueing. The blueing in these cases, however, is not due to the presence of indole substrates and these mushrooms otherwise bear no resemblance whatever to Stropharia cubensis or related species (Singer, 1958, p. 247).

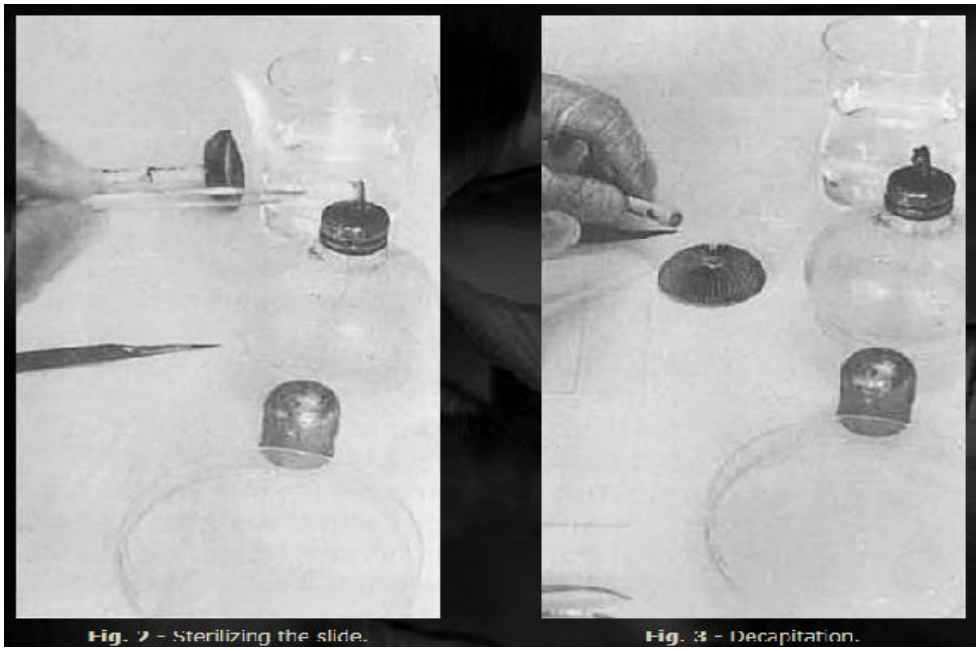


Fig. 2 - Sterilizing the slide.

Fig. 3 - Decapitation.

Once one has located a specimen or specimens of Stropharia cubensis, and been satisfied as to its identity in all particulars, it is necessary to collect spores for cultivation. Spores can be easily collected in the following manner: Take one or more fresh specimens with the caps fully open; using a sharp knife, cut off the stipe as close to the gills as possible (see Fig. 3) and place the cap gill side down on a clean sheet of white paper, and leave for 24 hours. It doesn't hurt to cover the caps with a small bowl while taking the spore print in order to prevent dessication. When the caps are removed, a dark-purplish, radially symmetrical deposit of spores will remain on the paper where the gills contacted it. The paper should then be folded and sealed in an envelope in order to prevent further contamination by airborne spores of other species of lower fungi. A single spore-print contains tens of millions or spores, and is sufficient to make hundreds of spore germinations.

The following variation on this method was suggested to us as a way of enhancing the sterility of the spore print: Take four standard flat

microscope slides, swab with alcohol and flame in an alcohol flame or butane torch (Fig. 2). On a clean flat surface, such as a table-top swabbed with Lysol lay the slides side by side and end to end, so that they are arranged as in Fig. 3. Place the fresh cap in the exact middle of the slides so that approximately ¼ of the cap covers each slide (Fig. 4). Cover and wait 24 hours. When the cap is removed, the end of each slide will be covered with spores, and the slides can then be sealed, together or separately, in plastic or paper. One can easily substitute glass microscope coverslips for the slides to maximize compactness. Do not use plastic coverslips, since static electricity associated with them makes it difficult for the spores to adhere to them.

Once the spore-print has been collected, it is necessary to germinate some spores in order to begin the life cycle that will eventually culminate in the production of more mushrooms. Before we outline procedures for germinating the spores, a brief discussion of the stages in the life cycle of these higher fungi follows; readers who do not care to read this somewhat technical portion may skip the next three paragraphs.

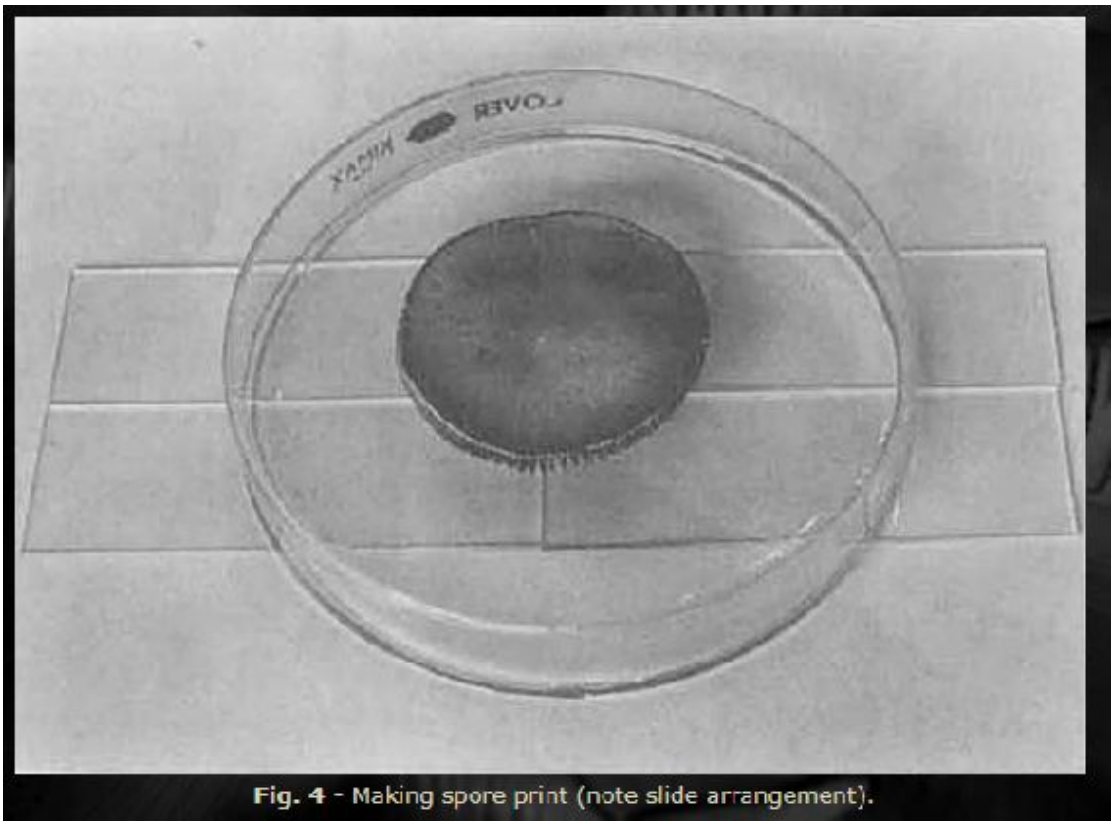


Fig. 4 - Making spore print (note slide arrangement).

All gilled fungi are members of the class Basidiomycetes, i.e., they are characterized by the production of spores on club-shaped appendages called basidia. Spores borne on basidia are called basidiospores. Most of the conspicuous fungi that one encounters, such as mushrooms, puffballs, and bracket fungi are members of the subclass Homobasidiomycetes. Of the members of this subclass, the gilled mushrooms are placed in the order Agaricales. The life cycle of a typical homobasidiomycete is illustrated on the facing page. The basidiospores germinate to form a monokaryotic hypha. A hypha is a tubular filament; an aggregation of these hyphae collectively comprise a mass of thread-like filaments referred to as the mycelium. The mycelium comprises the main body, or thallus, of the fungus. The stalked, capped structure which we call the mushroom is actually only the "fruiting body" or the spore-producing

reproductive structure, and constitutes only a small portion of the total mass of the fungus; the great bulk of the organism exists underground in the form of a network of mycelium, which occasionally "fruits," or produces mushrooms, under appropriate conditions.

The basidiospores germinate to produce a monokaryotic mycelium, i.e., a mycelium having only one nucleus per cell. This mycelium grows out until it encounters another monokaryotic mycelium, germinated from another spore, that is a compatible mating type. If the monokaryotic mycelium does not contact a compatible monokaryotic mycelium, it eventually dies. In situations where two compatible monokaryotic mycelia do make contact, however, a process called somatogamy, or the fusing of the somatic cells of the two mycelia, takes place, but fusion of the nuclei does not take place. The result of somatogamy is the establishment of a dikaryotic mycelium, i.e., a mycelium possessing two nuclei, one from each of the monokaryotic mycelia, in each of its cells (see facing page). The dikaryotic mycelium stage is the most prolonged portion of the life cycle and is also the main assimilative stage of the fungus. The dikaryotic mycelium can propagate vegetatively indefinitely without going through a sexual (spore-producing) stage. Given appropriate conditions, however, the dikaryotic mycelium can be induced to "fruit": the undifferentiated mycelial thallus of the fungus begins to weave itself together into an articulated, spore-bearing "fruiting body," in this case, into a mushroom. The mushroom continues to enlarge and thrust above the ground, incorporating more and more mycelium while at the same time expanding by absorption of water. At a certain stage in the growth of the mushroom, or basidiocarp,

club-shaped structures called basidia form on the underside of the gills. At this point, karyogamy, or fusion of the two nuclei of the dikaryotic mycelium takes place within the basidia (see preceding page). This is the only diploid, or 2n, stage in the life-cycle of the fungus, and is also the briefest stage, for meiosis, or reduction division of a diploid (2n) nucleus to 4 haploid (n) nuclei occurs immediately following karyogamy. The result of meiosis is the production of four haploid nuclei within the basidium; these are then pushed out of the basidium and become surrounded by hard sheaths to form the basidiospores. The result is the basidium bearing four basidiospores on its outer surface as in the "Life Cycle" drawing. These basidiospores eventually detach from the basidium to begin the life cycle again.

The basidiospores germinate to produce a monokaryotic mycelium, i.e., a mycelium having only one nucleus per cell. This mycelium grows out until it encounters another monokaryotic mycelium, germinated from another spore, that is a compatible mating type. If the monokaryotic mycelium does not contact a compatible monokaryotic mycelium, it eventually dies. In situations where two compatible monokaryotic mycelia do make contact, however, a process called somatogamy, or the fusing of the somatic cells of the two mycelia, takes place, but fusion of the nuclei does not take place. The result of somatogamy is the establishment of a dikaryotic mycelium, i.e., a mycelium possessing two nuclei, one from each of the monokaryotic mycelia, in each of its cells (see facing page). The dikaryotic mycelium stage is the most prolonged portion of the life cycle and is also the main assimilative stage of the fungus. The dikaryotic mycelium can propagate vegetatively indefinitely without

going through a sexual (spore-producing) stage. Given appropriate conditions, however, the dikaryotic mycelium can be induced to "fruit": the undifferentiated mycelial thallus of the fungus begins to weave itself together into an articulated, spore-bearing "fruiting body," in this case, into a mushroom. The mushroom continues to enlarge and thrust above the ground, incorporating more and more mycelium while at the same time expanding by absorption of water. At a certain stage in the growth of the mushroom, or basidiocarp, club-shaped structures called basidia form on the underside of the gills. At this point, karyogamy, or fusion of the two nuclei of the dikaryotic mycelium takes place within the basidia (see preceding page). This is the only diploid, or 2n, stage in the life-cycle of the fungus, and is also the briefest stage, for meiosis, or reduction division of a diploid (2n) nucleus to 4 haploid (n) nuclei occurs immediately following karyogamy. The result of meiosis is the production of four haploid nuclei within the basidium; these are then pushed out of the basidium and become surrounded by hard sheaths to form the basidiospores. The result is the basidium bearing four basidiospores on its outer surface as in the "Life Cycle" drawing. These basidiospores eventually detach from the basidium to begin the life cycle again.

Fungi of the family Strophariaceae, which includes Stropharia cubensis and most other psilocybin-containing genera, are genetically complex with respect to the mating compatibility of different monokaryotic mycelia. These fungi are heterothallic and tetrapolar, that is, their sexual cycle is dependent on the fusion of two compatible monokaryotic mycelia, and their sexual compatibility is governed by two sets of factors:

In tetrapolar heterothallism, two sets of factors, the A's and B's, are involved. If a sexually reproducing thallus is to be established, somatogamy must occur between mycelia differing in both sets of factors - for example AB x ab. The number of mating classes is somewhat greater than in bipolar forms, since four types typically arise from spores of a single basidiocarp. Obviously these mating types, numbering in the hundreds in both bipolar and tetrapolar species, cannot be designated as sexes! (Scagel, et al., 1967, p. 69.)

Keeping this information pertaining to the sexual characteristics of these fungi in mind, let us return to the problem of spore germination; the relevance of our digression into the matter of life cycle and sexual compatibility will be seen shortly.

Once one has obtained a spore print from Stropharia cubensis, the monokaryotic mycelium can be easily obtained by germinating the spores on an appropriate solid nutrient medium, such as Potato Dextrose Agar or Malt Extract Agar. A more detailed discussion of various kinds of nutrient agars and how to prepare them will be given below in the section of Growing Stock Inocula. For the present, however, simply assume that one has several clean, sterile Petri plates which have been filled with an appropriate solid nutrient medium (see Fig. 5). Spores can be transferred most readily using a clean, sterile #11 scalpel, inoculating loop, or similar instrument. Flame the blade of the scalpel in an alcohol flame, then reach into the petri dish and cut a small square of agar (2-3 mm2) from the center of the dish. Spear the agar square on the blade of the scalpel, and use it to lightly touch the surface of the paper or slide on which

the spore-print is deposited. Replace the agar square on the medium close to the place it was cut. It is sometimes convenient to inoculate four agar squares in each dish, one in each quadrant. Care should be taken to do this as quickly as possible, keeping the cover off the Petri plate for the shortest time necessary, in order to minimize the chances of contaminating the plate with the airborne spores of contaminants. A variation on this method can also be used: Instead of scraping the spores directly onto the plate, they can first be scraped into about 10 ml of sterilized water. Shake this vigorously, then dilute to 100 ml by adding sterile water. Using a sterilized pipette or syringe, take up 2-3 ml of diluted spore solution, and point-inoculate the Petri plate by placing a drop of the solution at two or three separate points on the plate.

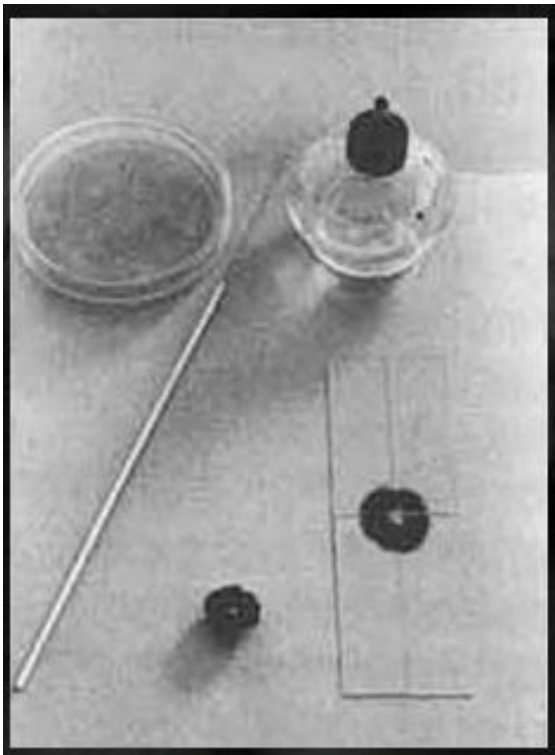


fig. 5 - Completed spore print and inoculating equipment.

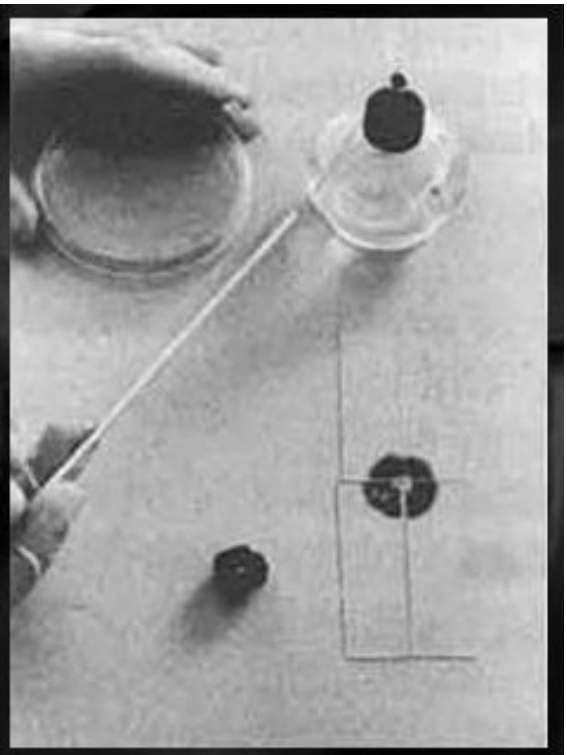
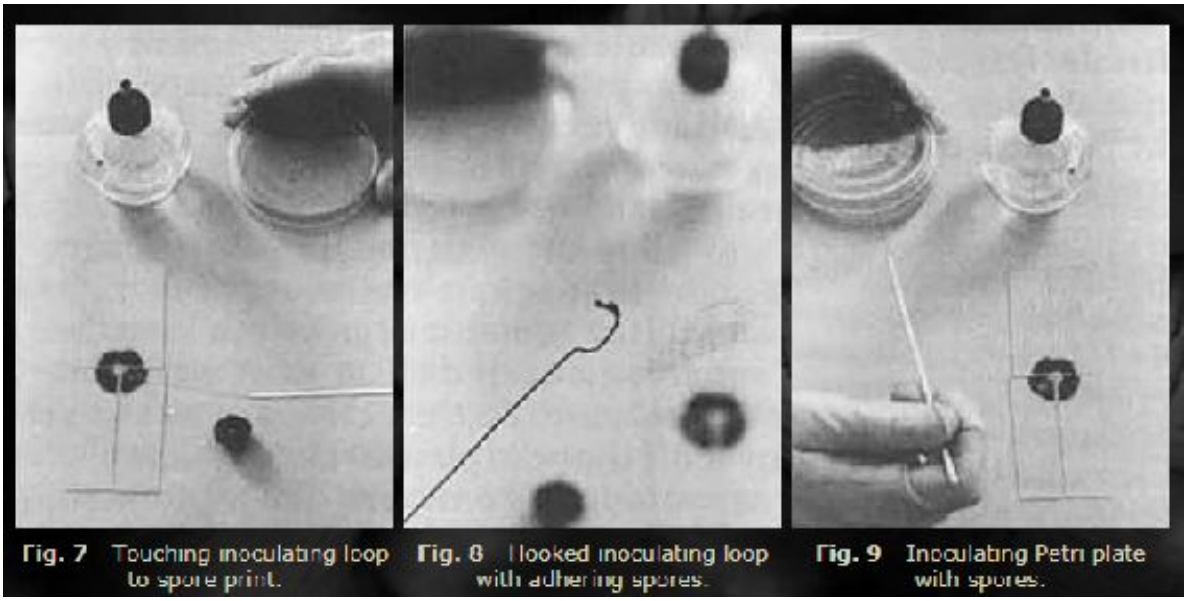


fig. 6 - Flaming the inoculating loop.

If possible, incubate the covered inoculated plate at 86 degrees F. for 24 to 36 hours. This will break dormancy and force the spores to germinate faster. Spores will germinate without this incubation, but may take up to 24 days. During this time, the spores will germinate and monokaryotic mycelium will grow radially outward from each point of inoculation. The plate should be left undisturbed until the mycelia from two different spores or two different points of inoculation have grown together and made contact. A few days after contact has occurred, one can be reasonably sure that somatogamy has taken place and that a dikaryotic mycelium has been established. Since in practice one transfers clumps of spores rather than single spores onto the plate, waiting for two different inoculation spots to make contact is not really essential; by the time mycelial growth is well established on the plate, one can be confident of isolating dikaryotic mycelium.



In cultivating the fungus to the fruiting stage, one works primarily with a single strain of dikaryotic mycelium. However, because spores of several different mating types are produced by a single mushroom, a

Petri plate inoculated with spores will have possibly several dozen different strains of dikaryotic mycelium growing on it. It is therefore necessary to isolate one of the strains so that one can grow out stock inocula from a single, uniform strain. This can be accomplished using a scalpel, dissecting needle or inoculating loop in which the loop has been bent to form a hook (Fig. 8). The implement is first sterilized in an alcohol flame; then the Petri plate is opened slightly and a very small piece of mycelial tissue is snagged on the end of the blade, needle, or hook, and transferred rapidly and deftly to a second clean sterile Petri plate containing an appropriate solid nutrient medium. Dikaryotic mycelium is isolated using exactly the same techniques as are used in transferring mycelium from one Petri plate to another; for figures illustrating this procedure, see Step II, Figs. 13-16. By selecting a very small piece of tissue in this way, one can be reasonably sure that only one strain of dikaryotic mycelium is being removed and isolated. In practice we find that both isolation of a dikaryon and plate-to-plate transfer of dikaryotic mycelium once isolated, can be most easily accomplished using a sterile #11 scalpel. Small agar squares can be cut from the edge of the mycelial thallus and transferred to fresh Petri dishes. The dikaryotic mycelium thus isolated from the spore-germination plate will grow outward in all directions from the point of inoculation on the new plate and should cover most of the surface of the medium within 8-12 days. One can then go ahead and make further transfers to new plates with a fair degree of certainty that one is working with a single strain of dikaryotic mycelium.

It is probably advisable to isolate several different strains of dikaryotic mycelium onto separate plates by taking tissue from

different sections of the spore-germination plate. Different strains isolated from a single spore-germination plate should be identified by labels and compared for vigor of growth and vigor of fruiting ability, so that, through observation and trial-and-error, the strain showing maximum vigor in both respects can eventually be identified and used exclusively thereafter. Isolating the most vigorous strain takes time and careful observation; however, this need not interfere with continuing on to the second and third steps of the process, since any dikaryotic mycelium that has been properly isolated from other strains should exhibit fruiting ability. After several strains have been put through several fruiting stages it should be apparent which strain is most vigorous. Our observations indicate that the most vigorous fruiting strains have a distinctly "ropy" morphology when growing in the mycelial stage. This stands to reason, since this ropy appearance is due to the formation of rhizoids, thick strands of hyphae, which are similar in structure to the rhizoids formed prior to and during the fruiting stage. Those rhizoids function in the transport of water and nutrients to the developing mushrooms (see Chang & Hayes, 1978, Chapter 8).

If one has fresh mushroom specimens, it is possible to employ another method of isolating dikaryotic mycelium without utilizing spores. This is the method of subcutaneous isolation (Enos, 1970). The operation should be performed with clean hands and implements. A pair of latex gloves sterilized by spraying with Lysol should be worn. Hold the fresh mushrooms by the stipe in one hand, and with the other hand swab the cap surface lightly with a sterile cotton swab dampened with tincture of iodine. Have ready a clean #11 scalpel and an alcohol lamp to sterilize it. Grasp the cap of the

mushroom, top up, between the thumb and fingers until it splits open to reveal the interior whitish flesh. Flame the scalpel and remove a small piece of this subcutaneous flesh and transfer it to a sterilized nutrient plate. Several inoculations can be made from the interior flesh of a single cap. Since the flesh of the mushroom has been woven together out of dikaryotic mycelium, it will grow out across the plate in the same manner as mycelium isolated from a spore-germination plate. This procedure eliminates the step of having to isolate different dikaryotic strains, since mycelium isolated in this manner consists of only one strain.

STEP II - GROWING STOCK INOCULA

Once one or more strains of dikaryotic mycelia have been successfully isolated, it is necessary to build up a stock of mycelial cultures grown on sterile agar media. The inocula from this stock will be used to inoculate the mycelium onto sterilized rye or other grain. Before proceeding to this step, however, it is advisable to have a good supply of inocula grown out of sterile agar media, so that one will have plenty of sterile inocula even if a few cultures should succumb to contamination. The information in this section therefore describes procedures for preparation, sterilization, and inoculation of solid nutrient media.

Most laboratory work with higher fungi, yeasts, molds, bacteria and so on involves growing the organism on a solid agar medium to which appropriate nutrients have been added. Agar is a pectin-like substance extracted from certain kinds of sea-kelp, which, when dissolved in boiling water and allowed to cool, solidifies to a gelatinous consistency. Agar is a standard item in all microbiological work, and is available from almost any scientific supply company. It is also stocked by many health-food stores and Oriental food stores as a dietary supplement. Fungi Perfecti (P.O. Box 7634, Olympia, WA 98507) offers a wide variety of mushroom-growing supplies and will send you a very helpful catalog for $2.50.

Potato Dextrose Agar (PDA) and Malt Extract Agar (MEA) are standard nutrient media suitable for cultivating the mycelia of most higher fungi, including Stropharia cubensis. Both types are commonly available in a premixed form from most scientific supply

companies. The premixed type need only be dissolved in boiling distilled water. Usually about 15-20 g of pre-mixed agar medium per 1000 ml of water is used.

The appropriate proportions and mixing instructions are usually printed on the container of dried agar preparation. With very little trouble, one can also manufacture one's own PDA or MEA. Recipes for PDA, MEA, and a variation of MEA called MYP for Malt-Yeast-Peptone are given below. We have found MYP to be excellent for long term maintenance of vigorous mycelium.

- P.D.A.
- 250 g potatoes
- 15 g agar
- 10 g dextrose
- 1.5 g nutritional yeast (or yeast extract)

Shred the unpeeled potatoes into a colander and then rinse them for thirty seconds with cold tap water. Combine the rinsed potatoes with one liter of water and gently boil for thirty minutes. Filter the resulting potato broth through muslin or cheesecloth and discard the potatoes. To the liter of potato broth add the agar, dextrose, and yeast which you have previously weighed out and mixed together in a baggie. While stirring gently add in the mixed powdered ingredients. Gently boil for ten minutes or until the solution is clear. Take care not to allow the solution to boil over. Add enough water to return the total volume of the solution to one liter. Pour the solution while still hot into Petri plates, baby food jars, or slant culture tubes (Fig. 11). Use just enough to cover the bottom of a plate or baby-food jar to a depth of about ¼ inch full. For convenience, the plates may first be placed in

the bottom of the cooker before the medium is poured; then pour the medium, put the covers on the plates, then build a second stack on top of that; then pour, cover, and stack again, until a stack similar to Fig. 12 has been built. The solution may be allowed to cool or sterilized immediately. Sterilization procedures will be described shortly.

A recipe for Malt Extract Agar (MEA) follows.

To 1 liter of gently boiling water add a previously weighed and mixed powder containing:

20 g malt or malt extract (may be powder or syrup)

25 g agar

0.1 g potassium dibasic (K2HPO)

0.1 g calcium carbonate (CaCO3) (powdered oyster shell may be used)

The liquid malt extract sold in the syrup sections of most grocery stores is quite suitable for this medium. After the nutrients have been completely dissolved in the water, the hot solution is poured into plates in the same manner as the PDA.

MYP or Malt-Yeast-Peptone medium is a variation on MEA very useful for long term maintenance of desirable cultures. To 1 liter of gently boiling water add a previously weighed and mixed powder containing:

- 7 g malt extract (powder or syrup)
- 1 g peptone or soytone

- 0.5 g yeast extract
- 15 g agar

Soytone and Peptone are commercial brands of a protein hydrolysate and can be purchased from scientific or microbiological supply houses.

In the case of all three of these recipes, if some of the nutrient solution is left over after pouring the plates, the flask may be sealed and stored in the refrigerator indefinitely, or sterilized with the plates and stored on the shelf. When one wishes to make more plates, the medium can be reliquified over heat and reused.

The three types of media described above are quite easy to prepare and will be suitable for growing stock inocula. It is a good idea to mix up and have on hand at least two types of media, and to use them alternately in preparing batches of plates. In this way the fungus will not become accustomed to one type of medium and thus will be forced to use different parts of its genome in adapting to the different media. This will prevent the mycelium from succumbing to any "senescence factor" or tendency to age physiologically and thus to lose vigor after a period of time.

These three types of media are completely adequate for growing out one's stock inocula. From a purely practical standpoint, we have found them to be easily and readily prepared from a relatively few common ingredients. Unless one wishes to get involved in complex nutritional studies, it is unnecessary to bother with other recipes. Other types of media may be used, however, and those who do wish to get more deeply into this step of the process are urged to consult Neal, et. al. (1968).

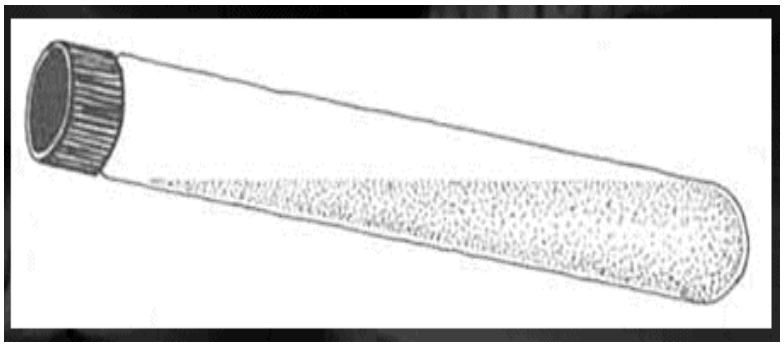
Once one has prepared an agar medium and poured it into the Petri plates, baby food jars, slant culture tubes, or other suitable receptacles, it is necessary to sterilize the medium in the receptacles in order to kill the spores of bacteria, yeasts, and other molds which get into the medium from the air. This can be done via the following procedure: If a laboratory autoclave is not available, a standard home cooking or canning pressure cooker can be used. We use and recommend the All American 941½ pressure cooker, available from its manufacturer, The American Aluminum Foundry Co., P.O. Box 246, Manitowoc, Wisconsin 54220 (see Fig. 27). Place a small amount of water (approx. 1 liter) in the bottom of the cooker (tap water will do) so that the surface is covered. Place the receptacles containing the medium into the pressure cooker. Be sure to stack them carefully (see Fig. 12); a small enameled tray is useful for this. Note: If using pre-sterilized plastic plates, pour the medium into the plates after sterilizing; do not autoclave plastic plates.

It does not matter whether the medium is still hot and liquid, or whether it has been allowed to cool and solidify, since the heat of the sterilization process will reliquify the medium anyway. If baby food jars or culture tubes are used, be certain that the lids are left loose, not screwed down tight, when they are being sterilized. Seal the lid of the pressure cooker, but leave the stopcock open. Bring the cooker to a boil over high heat on a stove. When the water has begun to boil vigorously, a good head of steam will begin to vent through the stopcock; it should be closed at this point, and the pressure allowed to build up to between 15-20 lbs. Then reduce the heat just enough to maintain pressure at this level for 45 minutes to 1 hour. The standard sterilization time for solid media at these

temperatures (250 degrees F.) and pressures (15-20 lbs.) is 15 minutes, but experience has shown that this is often insufficient to insure complete sterilization. Allowing a visible head of steam to build up in the pressure cooker before closing the stopcock is also important, for if it is closed prematurely, the pressure will rise but the water will be unable to vaporize, and dry heat requires much longer to accomplish sterilization.

After the medium has been sterilized at the correct pressure for 45-60 minutes, turn off the heat or carefully remove the cooker (remember that the medium is liquid at this point and can slosh around) and allow the cooker to cool to room temperature before opening the stopcock; otherwise, the sudden release of pressure will cause the medium to boil over.

When the cooker has cooled to room temperature or slightly above, wrap the column of the stopcock with an inch wide piece of paper toweling, then dampen it with an aerosol Lysol spray and then open the stopcock and allow any excess steam to escape. Remove the lid and carefully remove the receptacles containing the medium. Place the receptacles inside a pre-sterilized inoculating hood (see Fig. 10) or on a clean, smooth tabletop which has been wiped down with Lysol or similar strong disinfectant. As the receptacles cool further, the medium will solidify.



slant culture tubes are being used, they should be placed on an angle while the medium is still liquid, to provide maximum surface area for mycelial growth.

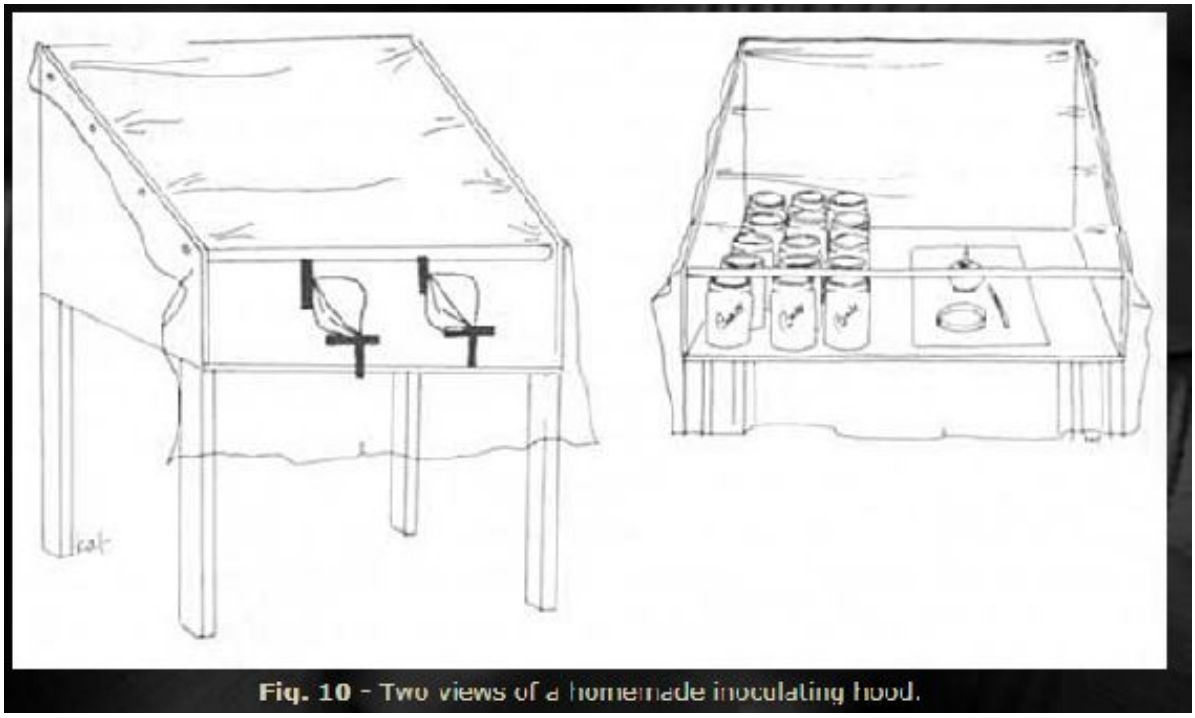


Fig. 10 - Two views of a homemade inoculating hood.

Note: PLASTIC PLATES CANNOT BE AUTOCLAVED! If using pre-sterilized plastic Petri plates, the medium should be sterilized in a flask sealed with tinfoil. The flask should be about ½ full, so it is best to sterilize two 1000 ml flasks with 500 ml each of medium. The procedure for pouring plastic plates is described below.

If pre-sterilized plastic plates are being used, one proceeds as follows: Allow the sterilized flasks to cool in the inoculating hood until they are warm to the touch - but can be handled easily. The medium is still liquid at this point, and is ready to be poured. Working with the usual sterile precautions (see below), one requires an alcohol flame and a stack of 20-40 plastic Petri plates. These commonly come packaged in rolls of twenty. Begin with a stack of about five plates. Carefully peel back the tinfoil from the lip of the flask of medium, and flame the flask lip briefly in the alcohol flame. Then, holding the flask in one hand, with the other carefully lift the lid from the bottom plate in the stack, keeping the other plates balanced on top of it. Hold the lip of the flask close to the edge of the Petri plate. Pour just enough medium to cover the bottom of the plate to a depth of about ¼ inch. Carefully replace the cover and then repeat the process with the next lowest plate and so on up the stack. After the plates have been poured, they should be stacked (carefully!) in columns of 10 or 20 in order to minimize condensation on the lids while cooling.

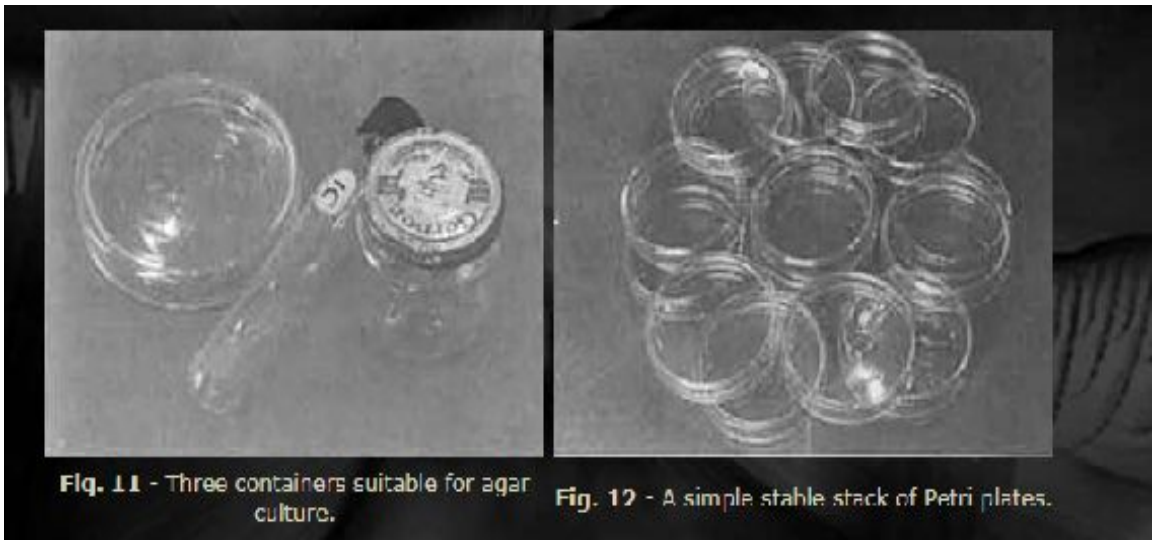


Fig. 11 - Three containers suitable for agar culture.

Fig. 12 - A simple stable stack of Petri plates.

When the receptacles have cooled completely to room temperature, and the medium is fully solidified, they are ready to be inoculated. If

possible, inoculation should be carried out inside an inoculation hood such as that shown in Fig. 10. Commercial hoods are available, or a homemade hood can be constructed out of wood and all joints sealed with silicon caulking compound. Pre-sterilize the hood before introducing the culture receptacles by spraying all inside surfaces thoroughly with Lysol aerosol, or a mixture of 25% Clorox-distilled water solution, or both. If a hood is not available, inoculation can be carried out in the open air in a room in which the air is relatively still, i.e., a room without any drafts. The air of the room should be sprayed beforehand with 25% Clorox solution and the surface on which inoculation is to be done wiped down with a strong Lysol solution. All sterile procedures should always be done wearing latex gloves which have been sterilized by spraying with Lysol (Figs. 13 & 14). Never use aerosol Lysol spray in the presence of any flame. After spraying Lysol in the inoculating hood, wait a few minutes before introducing the alcohol lamp into the hood. Remember that spray lysol is highly flammable.

When the receptacles have cooled completely to room temperature, and the medium is fully solidified, they are ready to be inoculated. If possible, inoculation should be carried out inside an inoculation hood such as that shown in Fig. 10. Commercial hoods are available, or a homemade hood can be constructed out of wood and all joints sealed with silicon caulking compound. Pre-sterilize the hood before introducing the culture receptacles by spraying all inside surfaces thoroughly with Lysol aerosol, or a mixture of 25% Clorox-distilled water solution, or both. If a hood is not available, inoculation can be carried out in the open air in a room in which the air is relatively still, i.e., a room without any drafts. The air of the room should be

sprayed beforehand with 25% Clorox solution and the surface on which inoculation is to be done wiped down with a strong Lysol solution. All sterile procedures should always be done wearing latex gloves which have been sterilized by spraying with Lysol (Figs. 13 & 14). Never use aerosol Lysol spray in the presence of any flame. After spraying Lysol in the inoculating hood, wait a few minutes before introducing the alcohol lamp into the hood. REMEMBER THAT SPRAY LYSOL IS HIGHLY FLAMMABLE.

Fig. 13 - Materials for plate-to-plate inoculation.

Fig. 14 - Disinfecting rubber gloves with Lysol.

Inoculation should be done using a disposable scalpel or an inoculating loop which has been opened to form a hook (Fig. 8), and can be carried out in essentially the same manner as was described for isolating dikaryotic mycelium from a spore germination plate. Select a completely sterile, vigorously growing culture from one's stock of dikaryotic mycelium isolated from spores. The mycelium of a vigorous culture should be pure white and ropey in appearance, and preferably less than 10 days old (cf. Fig. 13). Wash one's hands and

arms thoroughly in soap and water before beginning work, then wipe down with alcohol. Wear thin latex gloves sprayed with Lysol or Clorox-water solution as added protection (Figs. 13 & 14); talcum powder can be sprinkled inside first to make them easy to slip on. Wear a short-sleeved or sleeveless shirt for the process to avoid introducing contaminants from one's clothes. Pass the scalpel or hooked inoculating loop through the flame of an alcohol lamp until the working tip has been heated to redness (Fig. 15). Allow it to cool for a moment or quench it in a Petri dish of sterilized agar sacrificed to this purpose. Open the culture just enough to insert the end of the loop, and snag a small piece of mycelial tissue or small plug of agar and transfer this rapidly to the freshly sterilized medium, again opening the lid just enough to insert the inoculum (Fig. 16). Withdraw the loop and replace the lid on the newly inoculated culture. If a scalpel is used instead of a loop, inoculation can be accomplished by cutting a small square (1 sq. mm) of mycelia-grown agar from the culture plate, and transferring this to the new plate. If using tubes or baby food jars, the lids should be left fairly loose to allow for aeration. Repeat this process for as many times as one has receptacles to inoculate. It is not necessary to use a new culture for each inoculation; a single culture is sufficient to inoculate dozens of fresh plates. After a batch has been inoculated, however, the culture used as the source of inocula should be discarded.

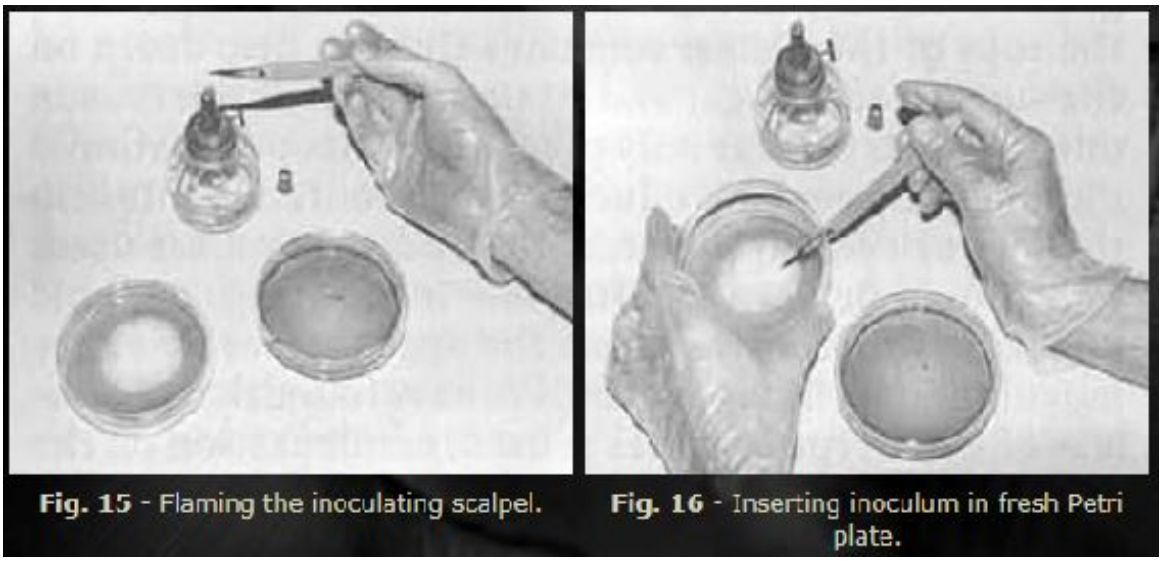


Fig. 15 - Flaming the inoculating scalpel.

Fig. 16 - Inserting inoculum in fresh Petri plate.

Let the freshly inoculated medium stand at room temperature for 3-5 days. During this time the pure white, thread-like mycelium will spread radially across the surface of the medium, covering it completely within 7-20 days. Growth of the inoculum should be apparent by the fourth day after inoculation. Also apparent by about this time will be any contaminants that have gotten into the cultures during inoculation in spite of precautions. They usually appear as small white dots with blue-green centers, and grow much more rapidly than the mycelium. These are usually other molds, such as Penicillium and Aspergillus, Neurospora or various yeasts. Most are easy to distinguish from the mushroom mycelium, since the mycelium is pure white, occasionally with a slight tinge of blue, while the contaminants may be green, blue-green, black, yellow, dirty-gray, and so on, and otherwise do not resemble the mycelium. Any contaminated cultures should be discarded as soon as one is certain that contamination is present. It is normal to lose a few cultures to contamination, and one should not be discouraged by it. It is practically impossible, under non-laboratory conditions, to eliminate all contamination; but as one gains practice in making inoculations,

speed and technique should gradually improve so that contamination can be held to a minimum. It would be a good idea to consult an introductory microbiology text for information relating to fast and efficient inoculating techniques.

After the plates have been inoculated, they may be stored while growing out in a sealed styrofoam box or cake box which has been sterilized by washing out with strong Clorox solution, then sprayed on all inside surfaces with Lysol. This will help to prevent contamination during growth. In very humid climates, water will condense on the tops of the plates; sometimes this can drip down on the surface of the agar and contaminate it. For this reason one should try to use only plates in which condensation is minimal, to avoid introducing unseen contaminants into the jars or rye; or, if plates with condensation are used, one should be very careful, while inoculating, to avoid knocking drops of water onto the agar surface when removing and replacing the cover. We have found that regardless of what type of plates are used, condensation on the cover can be eliminated by stacking the plates in taller (and more precarious) stacks of fifteen or more during the cooling down of the media.

STEP III - GROWING ON STERILIZED RYE

When a number of mycelial cultures have been successfully grown on solid agar medium, one is faced with a choice: It is possible to stop at this point, and concentrate on perfecting techniques for mycelial growth on agar. The mycelium itself contains psilocybin and can be ingested for hallucinogenic effects. The amount of psilocybin present in the mycelium is determined by the richness of the medium on which it is grown. Thus for an individual wishing only to obtain psilocybin from mycelium, there is a wide-open area for investigation; viz., to discover a suitable nutrient medium that gives a maximum yield of psilocybin per unit surface area of agar. If laboratory facilities are available, psilocybin can also be obtained from mycelium grown in liquid medium in shaken or submerged flask cultures. Since the necessary equipment for this is unavailable to most people, this approach is not discussed further here. Interested readers are urged to consult Catalfomo & Tyler, 1964.

The other choice at this stage involves moving on to the third step in the procedure, whereby mushrooms can be obtained by inducing the mycelium to fruit. In order for vigorous fruiting to take place, the mycelium must first be grown out onto sterilized rye, wheat, barley or other similar grain, so that a mass of mycelium weighing from 50-100 grams is obtained. The growing of mushroom mycelium on sterilized grain is a standard procedure in commercial mushroom culture that is used to produce "spawn" for inoculation into beds of horse-manure compost. The procedures described in this section are in fact adapted, with appropriate modifications, from a process originally

developed by San Antonio (1971) for growing fruits of the common edible mushroom Agaricus bisporus under laboratory conditions. The steps involved in growing the mycelium onto rye-grain medium are described below.

While the mycelium will grow and fruit suitably on many types of grain, including rye, wheat, barley, triticale, oats, brown rice, sorghum, millet and even buckwheat, our experience is that rye works as good as any and is less expensive than most. Therefore we have primarily worked with rye in this stage. One must be certain, however, that the rye used is packaged for human consumption, and not grown as feed; feed rye has usually been treated with a fungicide.

At this stage, it is useful to construct a styrofoam box with a window in the lid such as illustrated in Figs. 17-20. These boxes can be obtained from pet stores and tropical fish dealers and can be used as a convenient modular system for incubating jars in a high-humidity, constant temperature environment. Jars may also be kept in an aquarium or a terrarium of suitable size. Such a case may be outfitted with a Grow-lux light and a timer set to a 13-hour light cycle to provide a nearly perfect growth environment. If one is working in an environment where temperature fluctuations are minimal and conditions are clean, the jars can simply be incubated on a shelf or table without any special containers.

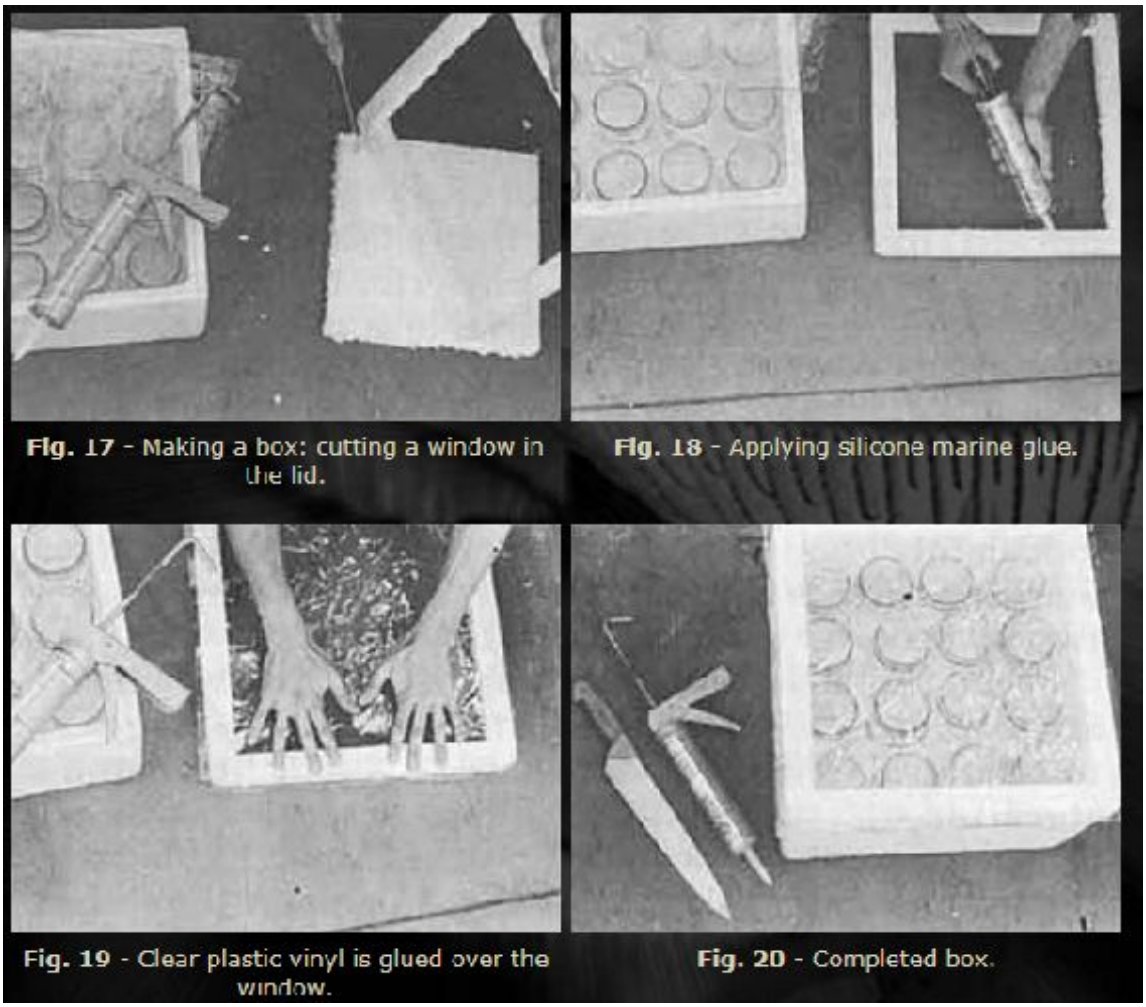


Fig. 17 - Making a box: cutting a window in the lid.

Fig. 18 - Applying silicone marine glue.

Fig. 19 - Clear plastic vinyl is glued over the window.

Fig. 20 - Completed box.

To prepare the rye medium, begin with a clean, wide-mouth quart Mason jar with a dome and ring lid. Add the following ingredients to the jar in these proportions:

160 ml rye berries (dry weight approx 150 g)

130 ml water (tap or distilled)

½ tsp. of calcium carbonate ($CaCO_3$)

The calcium carbonate, which is optional, need not be of great purity; powdered oyster shell, powdered limestone, or powdered chalk is suitable.

When the ingredients have been added to each jar in the proper proportions, the lids should be screwed loosely onto the jars, with the rubber seal of the inner lids inverted so that the jars will not seal during sterilization (Fig. 26).

Now the jars containing the rye can be sterilized. Add water to the pressure cooker; never use less than 1 to 1½ liters. Place the jars in the cooker, making sure that the lids are loose (Fig. 28). If one's pressure cooker is large enough to permit, jars can be stacked in two tiers without difficulty (Figs. 29 & 30). Seal the lid of the pressure cooker, but leave the stopcock open as before, until a head of steam begins to vent from the stopcock. Then close the stopcock, and bring to 15-20 lbs. pressure. Reduce heat when this pressure is reached so that pressure is maintained but does not increase. This is about medium heat on an electric stove. Sterilize at this pressure for one hour. Remove from the heat and allow the pressure to return to zero before opening the stopcock. Remember to wrap the stopcock column with a strip of Lysol-soaked paper toweling. Open the stopcock and allow excess steam to escape; then remove the lid from the pressure cooker. Remove one of the jars, tighten the lid down finger-tight, and carefully examine the jar for cracks and immediately discard any flawed jars (Fig. 31); then shake the remaining jars vigorously (Fig. 31). One can inscribe the jars with the date of inoculation or other suitable code-number (Fig. 32) in order to keep track of the schedule of shaking the jars. One will note on removing the jar that the rye has absorbed the water and swelled to several times its previous volume. After shaking, leave the lids tightened until the jars have cooled. Place the jars into the pre-sterilized inoculating hood (if available) or onto the clean, disinfected

working surface (Fig. 10). Then let the jars cool for at least two hours or to room temperature.

When the jars have cooled completely to room temperature, and are no longer warm to the touch, they are ready to be inoculated. This step is best accomplished using a sterilized #11 scalpel (Fig. 33). These scalpels can be obtained from any medical supply house. Flame the blades of the scalpel over an alcohol lamp (Fig. 33). Insert the scalpel into an agar mycelial culture grown in a Petri plate or baby food jar, and cut a grid into the surface, so that small squares of agar of about 1-1.5 cm square are formed (Fig. 34). One can get about 9-20 small squares of agar from a single four-inch Petri dish in this way (Fig. 35). Cultures grown in slant tubes are obviously unsuitable for this step, because of difficulty in removing squares of agar from the tubes. At each transfer re-sterilize the scalpel blade by flaming, insert into the agar culture, and spear and remove one of the squares of mycelium-covered agar (Fig. 36) and transfer rapidly to one of the Mason jars, lifting the lid of the jar just enough to insert the inoculum (Figs. 37 & 38). Firmly tighten the lid and shake the jar vigorously to spread the inoculation points. Repeat this inoculation step for each jar.

An alternative method of inoculation was suggested to us by a friend, as possibly effective in increasing the sterility of the procedure and thus cutting down contamination. This method is a standard approach to fungal inoculations in mycological work, and so far seems promising, although we have not investigated it thoroughly enough to know if it is the answer to contamination problems.

Fig. 21 - A set of jars to be filled and sterilized.

Fig. 22 - Materials for making the rye medium.

Fig. 23 - Adding weighed rye to the jar.

Fig. 24 - Two grams of powdered oyster shell ($CaCO_3$) are added.

Fig. 25 - 150 milliliters of water are added.

Fig. 26 - Mason jar lid with rubber edge up.

Fig. 27 - The All American 941½ pressure cooker.

Fig. 28 - Loading the pressure cooker.

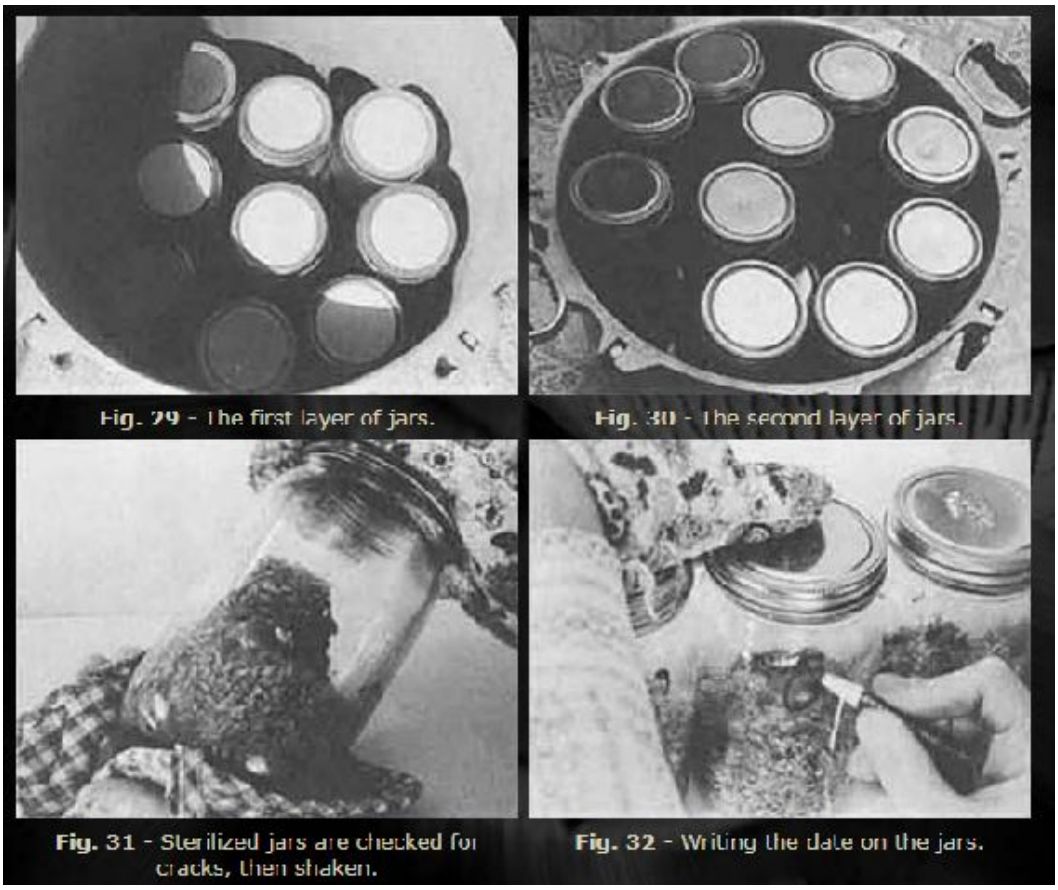


Fig. 29 - The first layer of jars.

Fig. 30 - The second layer of jars.

Fig. 31 - Sterilized jars are checked for cracks, then shaken.

Fig. 32 - Writing the date on the jars.

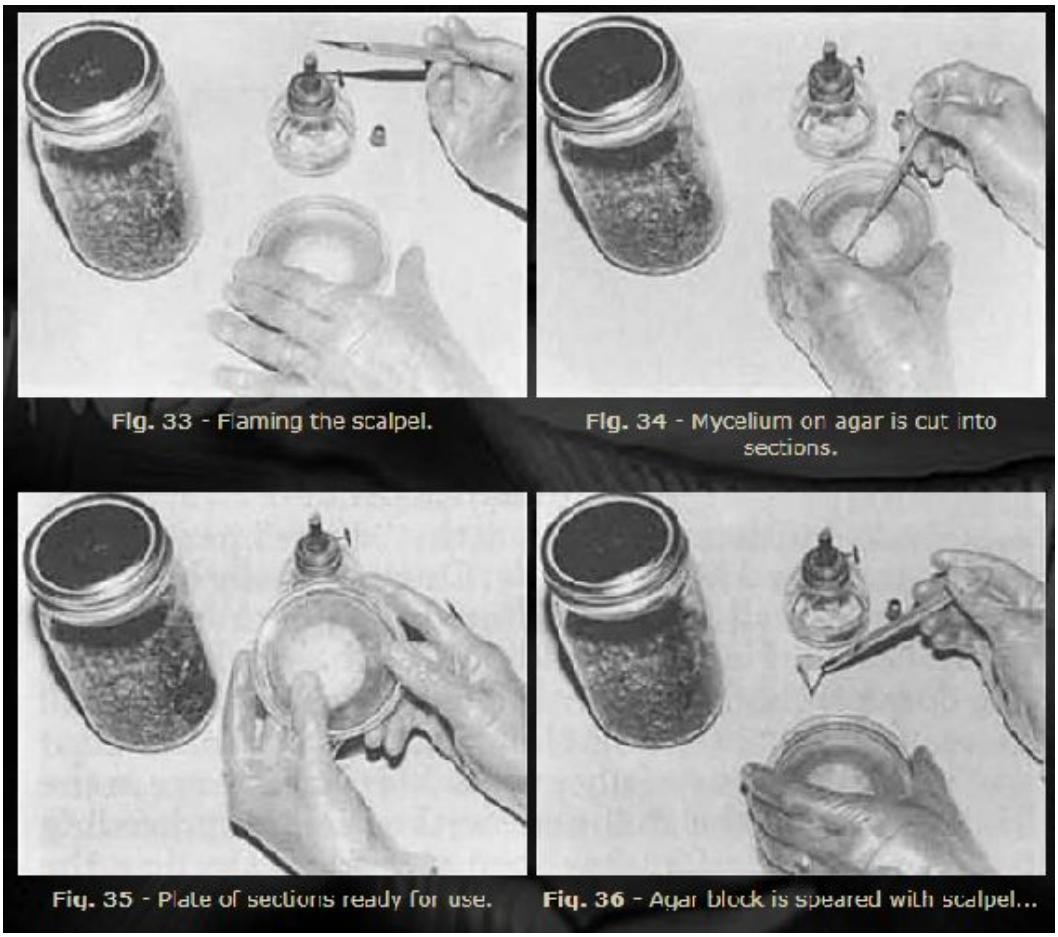


Fig. 33 - Flaming the scalpel.

Fig. 34 - Mycelium on agar is cut into sections.

Fig. 35 - Plate of sections ready for use.

Fig. 36 - Agar block is speared with scalpel...

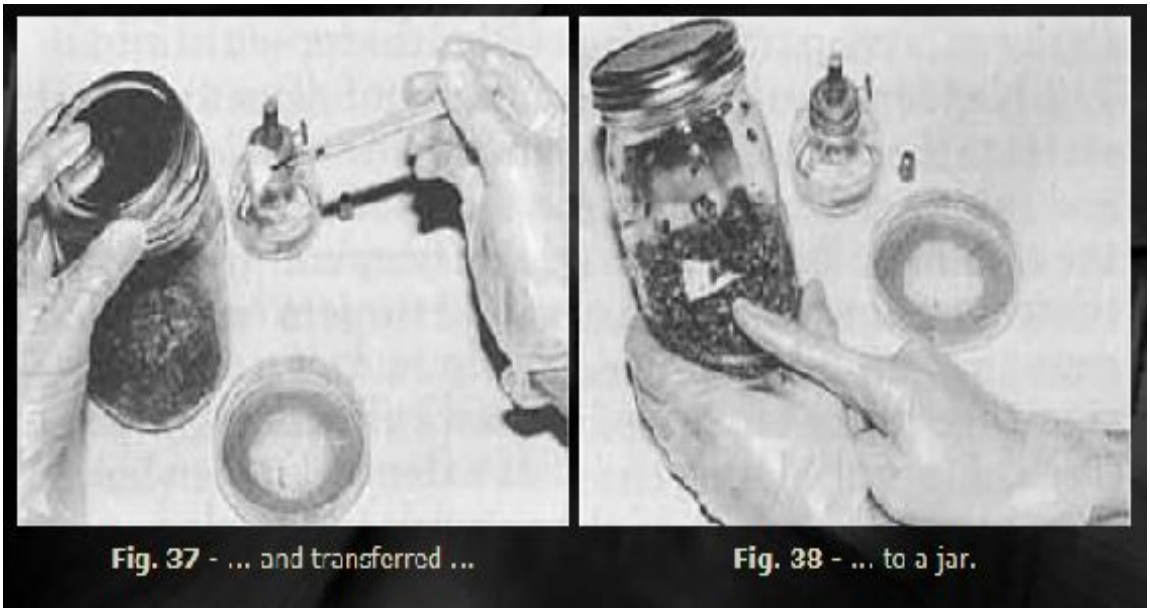


Fig. 37 - ... and transferred ...

Fig. 38 - ... to a jar.

Fig. 39 - Jars at 4, 6, and 10 days after inoculation.

In order to use this method, one must bore an approximately ½-in. diameter hole in the "dome" part of the dome-and-band Mason jar lids. One can easily have this done for a small fee at a machine shop which has a drill press. NOTE: Have the holes bored with the white side of the dome facing up! Seal the hole in the lid with a small piece of masking tape that has been folded back on itself at one end so it can be easily grasped. Sterilize the rye in the Mason jars in the manner described in the preceding pages. After the jars have been sterilized, sterilize the following items for 45 minutes in the pressure cooker: one 50 ml Pyrex pipette (wrapped in tinfoil); the glass part of a standard household blender; one 250 ml Erlenmeyer flask containing 100 ml of water (seal the top with tinfoil). The blender should be covered with tinfoil on top; do not sterilize the plastic top of the blender! The metal propeller and rubber gasket of the blender need not be removed, as they will not be harmed by high

temperatures. After these items have been sterilized and the jars have cooled enough to inoculate, proceed as follows: Select one or two vigorous, uncontaminated mycelial cultures from your stock of inocula. Using the flat of a flamed kitchen knife, cut around the edges of the agar disk in the plate, and empty the disk or disks into the blender. Add 100 ml of sterilized water, place the top on the blender and homogenize at high speed for 20 to 30 seconds. Suck up the homogenate in the sterile pipette. Grasp the free end of the masking tape covering the hole in the lid of the jar. Place the tip of the pipette in the hole and allow 5 to 10 ml of homogenate to fall into the jar. Reseal the hole by re-sticking the tape. Repeat for each jar.

After the rye has been inoculated, a period of waiting and careful observation follows. The jars should be maintained at a roughly constant temperature of 70-80 degrees F., and 95% relative humidity. Since the lids remain on the jars the humidity will tend to be high and need not be worried about. Maintaining the relatively high and constant temperature, however, is important to promote early and rapid mycelial growth. The mycelium gives off heat as it grows and a styrofoam box of the sort used by tropical fish wholesalers is ideal for holding this heat and thus self-incubating the jars. During the first three days after inoculation, the mycelium will grow off the agar inoculum and onto the rye. By the eighth to fourteenth day, depending on the temperature, the mycelium will have grown radially outward from the inoculum in all directions to form a mat of growth slightly smaller than a fifty-cent piece.

When mycelial growth has reached this stage, firmly tighten the lid and again shake the culture vigorously, to break up the mycelium

and redistribute the inoculum throughout the rye. During the shaking process you will run across obviously contaminated jars; simply remove them and set them aside for washing out later. After shaking, allow the culture to stand for 3-4 days. At the end of this time mycelial growth from many different points in the rye should be apparent (Fig. 39). Shake the jars in this manner on the fourth, sixth, eighth, and, if necessary, on the tenth days after inoculation. Complete permeation of the rye should be observed anywhere from the eighth to the fourteenth day. At this time, the rye should be completely permeated by the snow-white mycelium, which may occasionally be lightly tinged with blue. If growth of any other color is observed, or if the rye is only partially permeated, then the culture is contaminated and should be discarded.

It should be noted that the time required for the mycelium to completely permeate the rye can vary widely according to individual circumstances. In some cases, permeation can take place in under eight days; in others, up to three weeks may be required. Our observations indicate that temperature of incubation of the jars is the single most critical factor governing permeation time. The mycelium of Stropharia cubensis has a growth optimum at about 80 degrees F. (Ames, 1958). We have found that cultures incubated at 80 degrees completed permeation in 11 to 13 days, while cultures incubated at 70 degrees required up to twice as long to complete permeation. A temperature of 68-70 degrees F. was, however, optimal for fruiting cultures after the casing step was carried out (see below). The degree of wetness of the rye medium also influenced permeation time, being slowed when the rye was too dry. We have found the best combination of rye and water to be approximately 160 ml rye to

130 ml water. We found these two factors, temperature and moisture, to affect permeation time significantly, while little discernable effect could be attributed to pH or the presence or absence of light. Even under optimum conditions, however, it is still necessary to shake the jars periodically to spread the inoculum through the medium and facilitate aeration. For the same reason one may also wish to loosen the lids of the jars (just a crack!) after the last shake.

When one or more jars of rye have been completely permeated by mycelium, the third step in the procedure is completed and one is ready to move on to the fourth step, casing. Before discussing this step, however, it is perhaps advisable to insert a word of caution with respect to the third step. This step, getting the mycelium to grow out and permeate the rye, seems to be the most difficult and discouraging step in the whole procedure. The peculiar headaches that one is faced with in this step can be summed up in one word: contamination. For some reason, contamination seems to be a much more serious problem at this stage than at the stage of growing on agar, probably because whole-grain rye is much more difficult to sterilize completely than is agar. Anyone attempting this step, in fact, is almost sure to receive a real education in the number of fungal and bacterial "weeds" that exist to plague the amateur mycologist. Our experience has been that two contaminants in particular are quite persistent and seemingly impossible to eliminate entirely. One is a crusty, rapidly-growing blue-green mold with a medicinal odor, probably a Penicillium or Aspergillus. The other is an unidentified bacteria that exudes a yellowish slime onto the side of the jar and that smells strongly of rotten apples. Spores of both of these

organisms must be so commonly present in nature that they manage to contaminate some of the cultures despite the most careful inoculation procedures. The mold shows up rapidly and can be quickly spotted. Any culture seen to have this contaminant can be considered a loss. The bacteria takes longer to become obvious but with practice one can learn to spot it within a few days after inoculation. A sure give-away for presence of this contamination is to loosen the lid slightly and sniff at the crack: a strong yeasty or ferment-like odor indicates the presence of contamination. Uncontaminated cultures give off only a slight smell of cooked rye. Cultures contaminated with this organism are also almost impossible to salvage. The bacterium is anaerobic, that is, it can grow in the absence of oxygen. Our experience is that it seems indifferent to the presence or absence of oxygen, and grows in either situation. The mushroom mycelium is quite aerobic, in fact proper aeration is essential for its growth; therefore proper aeration can afford the fungus something of a competitive advantage against this organism.

Other contaminants will occasionally be seen, although not with the regularity of the two already mentioned. These may include black, olive green or sulphur-colored molds, and sometimes a dirty-grey, rapidly growing mold that is probably a Rhizopus.

Three factors seem central to achieving a very low (5%) rate of contamination:

It is very important to let a good head of steam build up in the pressure cooker. If you are using the All American 941½ cooker, then it should vent clearly visible jets of steam for three to five minutes before the valve is closed and pressure allowed to build.

1500 ml of water should be covering the bottom of the 941 Vi at all times during the cooking of jars.

Lysol, while easily available, has serious drawbacks. It is highly flammable and if used in the presence of the alcohol lamp or any other open flame can explode. CAUTION: Mushroom growers have been severely burned in accidents involving Lysol. Staphene is the commercial name of a strong water-based disinfectant that can be obtained from a scientific or medical supply house or ordered from the manufacturer, Vestal Labs, St. Louis, MO. Staphene cannot explode but should be treated with respect and handled with rubber gloves, as it is very toxic.

Petri dishes of inoculum should be used when the expanding circle of growing mycelium still retains at least a ¼ in. margin of undisturbed agar on all sides. Contaminants enter the dishes at the edges and most locate there. If inoculum is taken from "young" growth areas, very few even slightly contaminated dishes of inoculum enter the process of inoculating large batches of jars.

Jar Shifting: Once jars are cased it is important to check them for any possible contamination that may take hold in the casing soil itself. If a system of shelves is used, then each day the jars in the back of each row should be transferred to the front of the row. During the transfer, examine the jar for signs of contamination and excessive dryness or wetness. And mites. Done regularly, this process results in examination of all the jars every few days. Contamination can thus be caught in its early stages before it has a chance to spread. It is especially important to eliminate colonies of blue and green bacteria that are powdery.

Contaminants of any kind are not good and it is advisable to discard immediately any culture seen to be contaminated. Although the mycelium can co-exist with some of the slower-growing fungal contaminants, it is still best to discard any contaminated cultures in order to avoid spreading the plague. The cleaning of jars should be done as far away from the inoculation area as possible and should be done by someone who is not involved in making sterile inoculations. Jars that have been contaminated should be washed in a strong solution of Clorox and water before being reused. The best way to deal with contamination is to not allow it to become established in the first place, by being extremely meticulous about one's sterilization and inoculation procedures. Always make sure that the jars are sterilized with wet heat, not dry, by allowing a head of steam to build up in the pressure cooker before closing the stopcock. An inoculating hood, even if it is as simple as a cardboard box with clear plastic in one side, becomes almost indispensable at this stage. Always use sterile, uncontaminated agar cultures as the source of inoculation. Make sure that the working surface, and the inside of the inoculating hood, are thoroughly disinfected before inoculation.

The general working environment should also be kept as clean and dust-free as possible. One may wish to use an electrostatic air cleaner for this but it is not essential. Also make sure that hands and arms are clean before inoculating, and wear latex rubber gloves if possible. Spray your gloved hands with spray Lysol before reaching into the hood. Careful! Remember spray Lysol is flammable. Use a sterilized scalpel for making inoculations, and be certain that it is absolutely clean for each batch to be inoculated. It does not hurt to

swab it with alcohol beforehand. Be certain to flame the implement thoroughly in an alcohol flame before making each transfer. Practice making transfers as rapidly as possible, so that neither the receptacle containing the inoculum, nor the Mason jar are kept open longer than necessary. Finally, be absolutely ruthless in discarding contaminated cultures. Nothing less than complete permeation of the rye by the snow-white mycelium should be considered acceptable. If these procedures are followed rigorously, some cultures will undoubtedly still succumb to contamination, but the number can be held to a minimum.

STEP IV - CASING AND RECASING

When one or more jars have been completely permeated by mycelium, one can move on to the fourth step in the process that leads directly to the production of mushrooms. In commercial mushroom culture, this step is called casing. In the method outlined here, casing consists of removing the dome and band lid of the jar, and covering the surface of the permeated rye with about ½ to ¾ in. (½ cup for quart jars) of sterilized soil (Fig. 40 & 41). The soil should be premoistened to field capacity before being applied. The fastest way to do this is to spread the soil on a clean sheet of plastic and spray it lightly with the spray nozzle of a garden hose. Mix thoroughly. Field capacity can be gauged by the following rule of thumb: spray the casing soil just enough so that the soil is moistened throughout, but no water passes through the soil into the mycelium. In other words, moisten thoroughly, but do not saturate the soil. If the soil is to be sterilized, it should be moistened first. After sterilization, it can be conveniently stored in a double layer of plastic garbage bags, after it has cooled. Small amounts of casing soil may be dampened by putting two or three liters of casing soil in a large mixing bowl and moistening it with a pump sprayer. A large wooden spoon is perfect for folding the wet layers of soil into the dry. Alternate spraying the soil and stirring the dampness throughout the mix. When the casing soil has uniformly darkened in color and retains a shape when squeezed, it is ready to use. Once in the jar the soil should be shaken level and wetted a bit more with a fine mist sprayer (Fig. 42 & 43). A fine-mist spray must be used to avoid sealing the surface of the casing soil.

After applying and moistening the casing soil, discard the lids and maintain the cultures in a high humidity environment. A large styrofoam cooler with a window cut into the lid and covered with clear or translucent polyethylene is excellent for this (Fig. 17-20), so is a glass aquarium. If maintaining the jars in aquaria or styrofoam boxes, it is important to pay attention to proper aeration. Experience has shown that the daily transpiration/evaporation cycle is important if one is to have vigorous fruiting, healthy cultures. Maintaining the proper moisture balance and evaporation rate in the casing soil is actually a complex interplay among temperature, aeration, and evaporation. If either temperature or aeration is excessive, the soil will dry out. On the other hand, it should not become waterlogged, and a minimal amount of air movement should be present to facilitate a slow, even rate of evaporation from the casing soil. For this reason we recommend incubating the boxes with the lids partially or wholly removed after fruiting has begun. The temperature should be kept above 70 degrees F. Spray the cultures daily with a fine-mist spray just enough to make up for moisture lost through evaporation (Fig. 44). Each cased jar requires 2-3 good squirts of water per day to maintain continuous fruiting. Do not exceed field capacity. A good test for proper moisture content is that the surface of the soil should feel moist and spongy to the touch. Boxes of newly cased jars should be stored in chronological order.

Watering becomes a critical matter at this stage. If the correct water level is maintained in the casing soil, the first flush of mushrooms will be normal. But if jars are allowed to become too dry, then aborted fruiting or formation of many small mushrooms unable to grow to full maturity will occur. With proper watering and proper aeration,

perfectly normal first flushes can be grown. What is a proper amount of moisture? The general tendency seems to be for beginning cultivators to keep jars too dry. Remember always to use premoistened casing soil. Make sure the distribution of the moisture is uniform. Once jars have been cased with pre-dampened soil, they ordinarily only need water once a day. The exceptions occur during and after periods of intense fruiting when slightly more water is required, or during spells of dry, hot weather. Strong drafts, especially warm drafts from floor heaters, can dry jars out very quickly. If one keeps jars on shelves that are open to the surrounding room part of the day, then it is especially important to keep the heaters from blowing directly on jars. Shelves can be enclosed in transparent polyurethane film in order to maintain high humidity and minimize contamination.

The other extreme to avoid is overwatering. The casing layer should be kept damp but not soaked. Any visible water accumulating between the rye covered mycelium and the walls of the jar indicates overwatering and a potential for contamination. Often if left unattended such jars become yellowish, indicating a more advanced stage of contamination. Such jars should be placed on a shelf together - separate from the other jars - and all water should be withheld until excess water in the jars recedes completely. Often, upon recasing, such jars seem to regain their equilibrium, and fruiting, though delayed, is normal.

Fig. 40 - Open jar and soil ready for casing.

Fig. 41 - ½ cup casing soil is applied.

Fig. 42 - Casing soil is shaken to even it ...

Fig. 43 - ... then sprayed, using a fine mist.

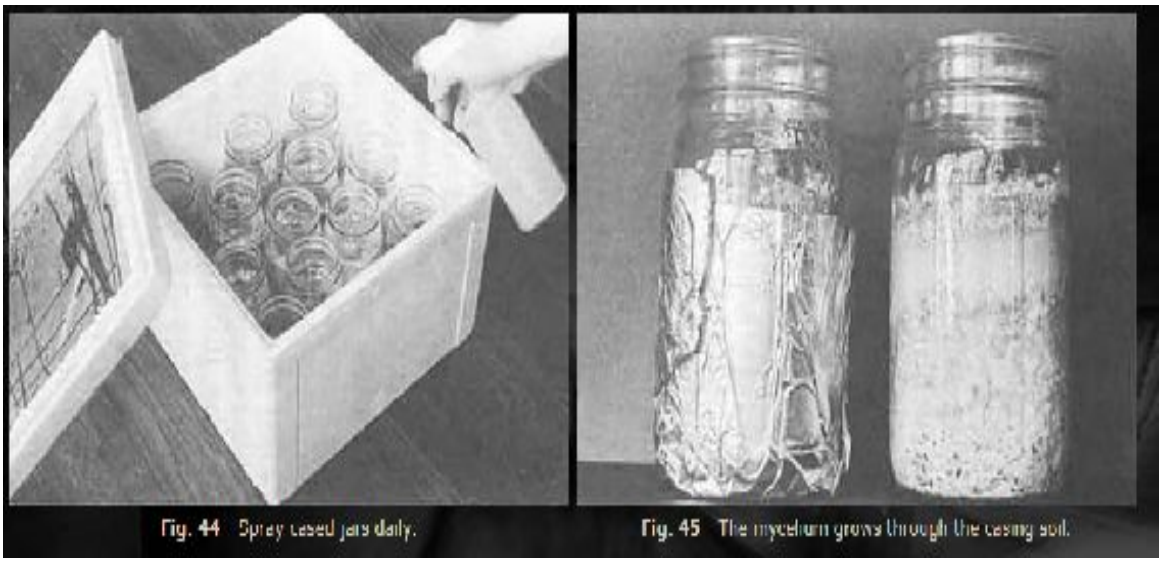


Fig. 44 Spray cased jars daily.

Fig. 45 The mycelium grows through the casing soil.

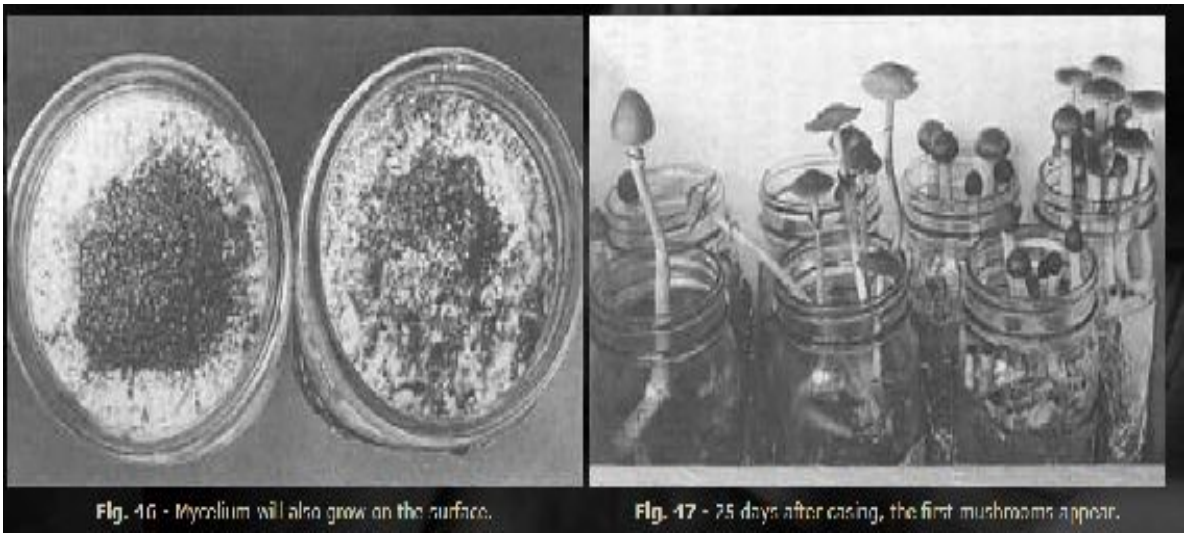


Fig. 46 - Mycelium will also grow on the surface.

Fig. 47 - 25 days after casing, the first mushrooms appear.

During the next two to three weeks, the mycelium will begin to grow up into the casing soil, penetrating it to just beneath the surface (Fig. 45). The mycelium may occasionally break out onto the top of the soil and begin to spread across its surface, and part of the purpose of spraying daily is to keep this surface growth "knocked down" with the spray (Fig. 46). Excessive surface growth, in which the mycelium completely overgrows the casing soil and forms a thick spongy crust on the surface, is an indication that the mycelium is starved for air and that ventilation should immediately be increased. If you are

under-watering your jars, this surface mycelium will turn blue with thirst. As the mycelium grows into the casing soil, it will begin to form a network of ropy strands visible at the interface of the soil and the glass. This network gradually gains more and more intersecting nodes, and by the 14th to 20th day after casing, these nodes have differentiated into tiny white dots distributed through the casing soil along the perimeter of the jar. These dots are the young mushroom primordia; gradually they enlarge and incorporate more mycelia, slowing taking on the appearance of tiny mushrooms with squat, fat stems and dark, brownish heads. This is the "pin" stage in the development of the mushroom and the primordia at this stage are about 1-2 mm in length. These pins continue to enlarge and some will begin to thrust above the surface of the casing soil, both at the sides and in the center of the jar. Once the young mushrooms have penetrated the surface of the casing soil, another five to ten days is required for them to reach full maturity. At maturity the mushrooms may be 2 to 9 inches tall and have caps ranging from 1 to 3 inches in diameter (Fig. 47 & 48). We have also found that these mushrooms do respond favorably to light, and that a daily 13-hour fluorescent or Grow-lux cycle results in mushrooms with larger caps and shorter stems than those grown without any special lighting. Probably it is not advisable, however, to place the cultures in direct sunlight for prolonged periods. While many mushrooms will grow to full size, approximately an equal number will grow to about half-size or less and then cease to grow; these "aborts" can still be plucked, dried, and used, although they are not as aesthetically appealing as the fully matured specimens. With practice one can learn to spot aborts early and remove them from the cultures. Aborted mushrooms left in

the cultures are susceptible to attack by bacteria which quickly render them both ugly and unusable.

Excessive numbers of aborts are another indication of inadequate aeration. If the jars are being incubated in styrofoam boxes or aquaria, there is a possibility of accumulating carbon dioxide in the air space above the casing soil. This will inhibit fruiting and/or prevent fruits from reaching maturity. If this happens, increase aeration by leaving the lids off the box, or by using a small fan to enhance air movement over the surface of the jar. Be careful not to over aereate, however; too fast a rate of evaporation will cause the casing soil to dry out.

Occasionally mushroom primordia will form down toward the bottom of the jar and grow to maturity but will not break the surface of the casing soil. It is possible to inhibit this effect somewhat by wrapping jars with tinfoil to the top of the casing soil (Fig. 45). This effect, formation and development of primordia toward the bottom of the jar, is normally seen during the earliest mushroom "flush." After the first flush, the jars are recased for each subsequent flush (see below). We find that recasing will largely eliminate this problem for all flushes but the first one.

A variety of types of casing soils have been found to effectively promote fruiting. We have found the following mixture to be one of the best:

- 7.5 liters peat moss
- 3.5 liters fine vermiculite
- 4 liters washed fine sand
- 2 liters calcium carbonate (finely crushed oyster shell)

Powdered oyster shell is sold as a feed supplement by many feed companies. The calcium carbonate is an optional ingredient and can be left out without significantly affecting fruiting. It should be added if available, however, to buffer the soil and keep it from becoming too acidic. This factor may contribute to the growth of contaminants on the surface of the casing soil, and the calcium carbonate can inhibit or prevent this. For the same reason, one may also wish to water occasionally using a saturated solution of calcium carbonate. We have also found that a mixture of one part mica-peat (50/50 vermiculite-peat-moss mixture) to one part potting soil will work.

Sterilization of casing soil is usually recommended but we found it unnecessary when relatively sterile commercially bagged materials were used. If you wish you may sterilize casing soil before use at 15-20 lbs. pressure for 30 minutes. It should be wetted first to field capacity. Casing soil can be stored indefinitely in a tightly sealed large glass jar, or in a polyethylene garbage bag. If a glass jar is used, it can be sterilized with the casing soil in it. Remember to loosen the lid prior to sterilizing. After the first flush of mushrooms, the soil and mycelium-covered block of grain will shrink somewhat, leaving a space between the mycelium and the walls of the jar. Whenever this condition is noticed, it is time to recase. Recasing will greatly extend the life and fruiting capacity of your jars. It is a simple procedure which involves using a clean fork (one per jar, as this way contaminants are not spread from jar to jar) to scrape off all of the old casing soil and aborted mushrooms growing down along the sides of the jar. Then, using fresh casing soil prewetted as before, recover the mycelial block and use the fork to work the fresh casing soil down the sides of the jar around the block as well as covering

the top. It will take your jars about two weeks to recover from this treatment but then they will do their best fruiting, producing clusters of large carpophores and behaving as if this recasing procedure had made them more resistant to contamination.

Instead of applying the casing soil to the mycelia-covered rye in the jars as described in the preceding pages, it is possible to adopt a somewhat different approach to the making of cased cultures. The steps involved in this method are described briefly below. The basic idea for this method was suggested to us by a friend, Paul Kroeger, and his contribution is gratefully acknowledged. In order to use this method, one begins by growing the mycelium out on the rye in the Mason jars in exactly the manner described above for the cased jar method. One may use plastic trays, glass baking pans, or one may manufacture a styrofoam box with a window of clear plastic in the lid as described above (Fig. 17-20). Sterilize the inside surface of the tray or box thoroughly by wiping down with a 25% Clorox solution followed by a Lysol spray. Cover the bottom of the container with a ¾-1 inch-deep layer of perlite or a 1:1 mixture of vermiculite and casing soil. Grow the mycelium on the rye medium in the Mason jars until it is fully permeated and ready to case. Instead of casing at this stage, however, shake the jars again. The mycelial block will be tightly woven together and may require a little extra effort in order to be shaken loose. After shaking, empty the contents of several jars into the container so as to form a layer of rye "spawn" about 1-1½ inch deep.

The number of jars required to do this will vary depending on the size of the container, but usually between five and ten jars are

sufficient. Cover the rye layer with a second layer of moistened casing soil, to a depth of 1-1½ in. One has now created a 3-layered "sandwich" arrangement in the container: Perlite or vermiculite-casing soil forms the bottom layer and provides drainage; the second, rye and mycelium layer provides the nutritive substrate for the mycelium; the topmost, casing layer prevents the mycelium from becoming desicated or attacked by contaminants as well as functioning to induce the mycelium to fruit. Once the layers have been made, maintain the container in a humid environment and as close to 70 degrees F. as possible. If using styrofoam boxes, keep the lid on for the first two weeks following casing. Since the soil is moist and the mycelium produces water in its respiration, humidity will be high in the box (in fact, condensation on the transparent lid can usually be seen) and therefore one should not spray, or should spray only lightly and infrequently, during this stage.

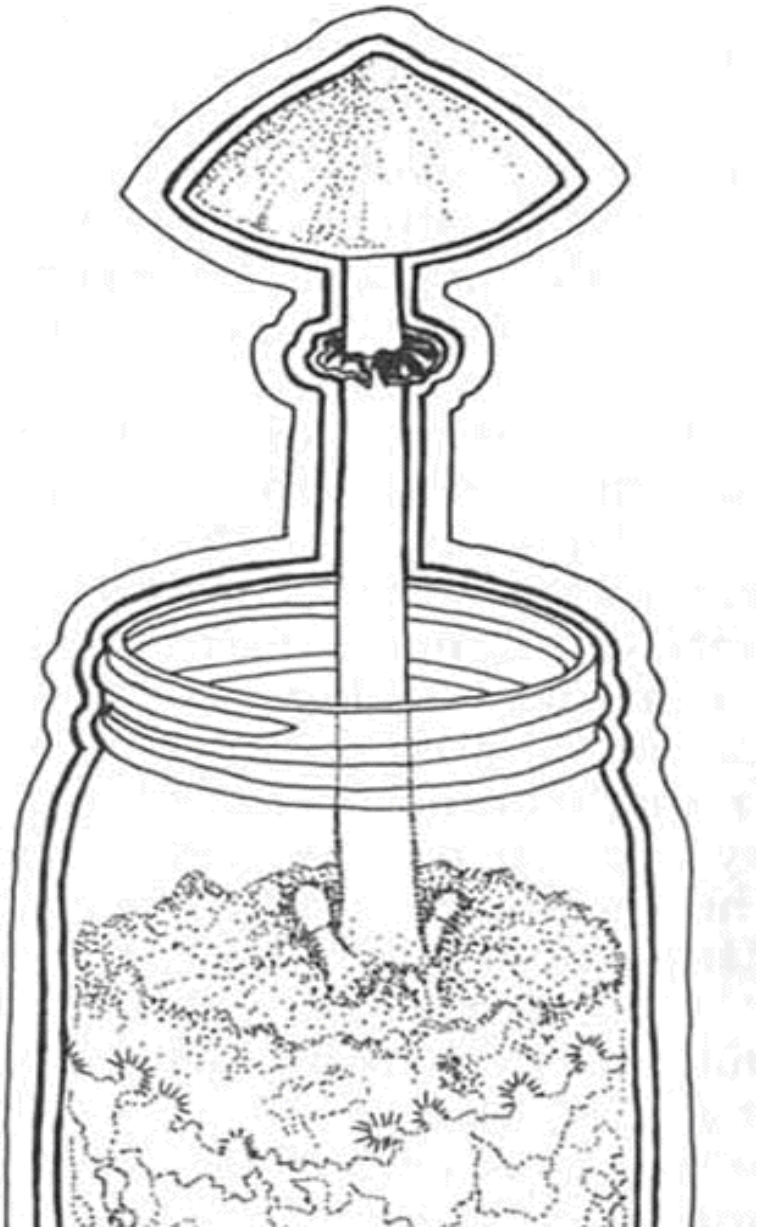
Two weeks after casing, or approximately one week prior to the commencement of fruiting, the lids should be removed to prevent carbon dioxide accumulation in the containers. Daily watering with a fine mist can be started after the lids have been removed. The mycelium will continue to grow into the casing soil. Fruiting, at both the sides and center of the container, will commence 21-30 days after casing. The box or tray culture will fruit abundantly, producing many clusters of perfect large carpophores in various stages of maturity across the entire surface of the casing soil. As these clusters are plucked, the holes created in the casing soil should be plugged with fresh casing soil. Recasing as described for the jars is not necessary with this method. The container cultures will usually succumb to contamination (usually a green mold which shows up on

the surface of the casing soil) more quickly than the jars. Containers fruit for 30 to 40 days as opposed to 60 to 80 days for jars, but the flushes produced during this time are so abundant that the overall total yield for trays and jars is comparable (approximately 10 grams dry weight of mushroom for every 100 grams dry weight of rye).

When your cultures are well established in the mature fruiting phase, it is a good idea to shift your awareness toward a new class of potential pests and carriers of contamination. These are insects, specifically flies and mites. The best way of controlling flies is by keeping your cultures in a screened room that flies are unable to penetrate. Even in the most tightly sealed environments flies do occasionally occur. It is therefore a good idea to use a slow acting insect killer of the vaporizing type, such as the "No-Pest Strip" in the growing area. Usually this is all the fly protection that is necessary. Mites are a more persistent and difficult pest to control. Massive reliance on applied insecticides is the commercial mushroom growers' approach to mite control. But we believe that application of insecticides to Stropharia cubensis should be undertaken only as a last resort.

The real key to mite control is early detection. Therefore, examine your jars very carefully. Mites are most visibly active in the middle and late afternoon, and are usually first spotted wandering around on the smooth rim of the jar. They are tiny specks, distinguished from tiny bits of casing material only by their motion. Jars with mites should be immediately isolated, or preferably removed entirely from the growing area. Once mites are detected, the grower must go to a state of high alert and check the jars every day to see if the plague is

spreading. Removal of infested jars is the best course. The next best course is to spray only the infested jars with a ½-strength solution of Malathion. Malathion, though anathema to the anti-insecticide purist, is one of the least toxic and most rapidly degraded of commercial insecticides. It should not, however, be used on cultures within 6 days of fruiting. Under no conditions should the miticide Keldane be applied to cultures. Keldane is FATAL to Stropharia cubensis.



STEP V - HARVESTING, PRESERVING, AND DOSAGE

As the mushroom matures to full size, the cap will enlarge and become more globular in shape. The gills will at first be covered by a flap of tissue, called the veil, that connects the margin of the cap with the stipe. As the cap enlarges, this veil will detach from the cap margin to form an annulus, or ring of ruptured veil tissue, on the stem. The mushroom can be harvested as soon as the veil rupture has occurred. If a spore print is to be collected, however, the mushroom should be allowed to flatten out to an umbrella shape before harvesting.

Freshly harvested mushrooms can be eaten fresh, or can be dried and sealed in plastic bags for preservation. It is a simple matter to construct a small drying cabinet out of masonite or plywood. This consists essentially of a wooden box with a hinged door on the front and two or more screens or wire shelves which can slide in and out. A 150- to 200-watt electric light bulb can be mounted in the bottom as a heat source. We have found this type of drying cabinet completely suitable and trouble-free. It produces an even heat at about 120 degrees F. and will dry even large, thick-stemmed mushrooms completely within 48 hours; smaller mushrooms dry in 24 hours using this cabinet. They may be dried in a gas oven at low heat (140 F. or less) for 6-10 hours (Fig. 49 & 50). They may also be dried under a heat lamp, on a screen over a heating vent, or in a small electric food dehydrator. Mushrooms are fully dried when hard to the touch, like crackers, with no spongy feel at all (Fig. 51).

Mushrooms that have been dried at too high a heat will turn brown and be very bitter to the taste. Such mushrooms are substantially less psychoactive. To preserve maximum potency, dried mushrooms should be sealed in five gram increments in plastic bags from which the air has been withdrawn (Figs. 52-54), and this in turn placed in a tightly sealed glass vessel or other moisture-proof container, and frozen. We have found the polypropylene boiling bags used in food storage and preparation to be excellent for preserving dried mushrooms. Rolls of bagging material and the electric sealers used for sealing are sold commercially in department stores under the brand name "Seal-A-Meal" and "Seal & Save." Dried mushrooms left in the open air quickly lose their potency. Fresh mushrooms should not be frozen without drying first, as freezing them in this condition will turn them into a black, gooey mess. Fresh mushrooms can, however, be preserved in a plastic bag in the vegetable pan of the refrigerator for about a week to ten days. Fresh mushrooms older than this should either be eaten or dried to prevent spoilage.

The dried mushrooms contain from 0.2 to 0.4 percent psilocybin (Schultes, et al., 1973) by weight. Some strains of Stropharia cubensis have been reported to contain as much as 0.5% psilocybin (Wasson & Heim, 1959, p. 260). Psilocin is present only in trace amounts. A dose of about 10-12 milligrams of psilocybin, or about 5 g dry weight of mushrooms, or 50 g wet weight, is sufficient to manifest the full spectrum of hallucinogenic effects in a 160 lb. adult. These effects include visual and auditory hallucinations, extreme hilarity, distortions of time and space perception, and a sense of emotional detachment from the environment. Less marked effects can be detected at doses as low as 2 mg, which is about 1-2 dried

mushrooms. Fresh mushrooms seem to be somewhat stronger than dried ones. Psilocybin is one of the least toxic of all hallucinogens. A full, effective dose is 12 mg while mescaline, by comparison, has a minimum effective dose of 200 mg for an average-size adult, and a toxicity 2.5 times that of psilocybin (Aboul-Enein, 1974).

The state of mind induced by a full dose of mushrooms is one of euphoria and calm lucidity, with no loss of coherency or clarity of thought. The hallucinations seen with the eyes closed are colorful, hard-edged, and highly articulated, and may range from abstract geometrical forms to visions of fantastic landscapes and architectural vistas. These hallucinations are most intense when the mushroom is taken in the setting preferred by the Mazatecans: inside at night in complete darkness. On the other hand, if one is in a natural setting and directs the focus of the senses outward to the environment, one discovers that one's senses seem keyed to their highest pitch of receptivity, and finds oneself hearing, smelling and seeing things with a clarity and sensitivity seldom, if ever, experienced before. Although it should be clear to anyone who has read this far that cultivating these mushrooms is an endeavor requiring time, patience, care and humility, and one fraught with its own peculiar problems, once one has partaken of these wonderful gifts of nature and experiences the exalted consciousness that they can bring about, we think that they will agree with us that the effort involved provides its own ample reward.

Fig. 48 - Grasp the stalks firmly when harvesting.

Fig. 49 - Remove the soil from the bottoms of the stems.

Fig. 50 - Mushrooms ready for oven-drying.

Fig. 51 - The dried mushrooms are weighed.

Fig. 52 - They are placed in plastic bags.

Fig. 53 Bags are heat sealed with a bag sealer.

AFTERWORD

Approximately sixty days after you began the isolation of spores, the first harvest will be possible from your rye-filled jars. Mushroom growing is like alchemy in that there is a division of the work into practical effort and visionary reward. The organic psilocybin within the mushroom is quality controlled by the very stable and ancient genes of the Stropharia. You, as the propagator and spiritual friend of the mushroom, can form a deep relationship with the mycelial ally and again and again make far journeys into its visionary realms if you observe a few simple rules. Tolerance to psilocybin is easily acquired if trips are taken more often than once a week. If one does acquire a tolerance, it can be gone around by either upping the dose or by laying off for a couple of weeks to allow your body to recover its equilibrium. We recommend the latter course even though the toxicity of psilocybin is so low that raising the dose is a valid alternate course.

Now our little handbook closes. Advice from this point on can only come in generalities. Take the mushrooms that you have grown, take them in the darkness as the Indians of Mexico who have used them for centuries do. Smoke a lot of your favorite hash to synergize the behind-the-eyelids hallucinations and prolong them. Psilocybin is light shedding illumination on a landscape both within and without the mind and body of human beings and previously invisible to them. The exploration of this vast region by persons whose mental equipage is that of the modern West has only begun. Only a moment has passed since our culture has rediscovered, through the work of Wasson and others, the ancient and unplumbed relationship between the vision-causing mushrooms and our own strangely gifted

species. You are a pioneer in a world whose future is undetermined and whose living organisms are full of singularities and surreal transforming promise.

7 MIND-BENDING FACTS ABOUT MAGIC MUSHROOMS

From ancient shamans (and Santa Claus?) to modern neuroscientists, humans have a long fascination with 'magic' fungi.

Fungi have flourished on Earth for quite a while, possibly more than 2 billion years. They've evolved some impressive tricks during that time, including many that are either fascinating or frightening to humans and sometimes a bit of both.

Some ancient fungi grew nearly 30 feet (9 meters) tall before trees existed, for example, and today a honey fungus in Oregon may be the largest organism on the planet, spanning an area of about 400 acres (162 hectares). Certain kinds of fungi can glow in the dark, and a few turn insects into zombies. Some species are lethal to humans, while others provide us with valuable superfoods.

And then there are magic mushrooms, also known as "shrooms." These fungi are famed for their psychedelic effects on people who ingest them, an ancient practice dating back to prehistoric "mushroom cults" and shamans who may have inspired Santa Claus. Yet even after centuries of experience, we are only now demystifying many of the magical and medicinalpowers these mushrooms possess.

This article is not necessarily meant to advocate casual use of magic mushrooms, which are widely illegal and potentially dangerous. Even when they provide the health benefits described below, they're typically used in a controlled clinical setting, often with counseling or

other guidance from medical professionals. That said, however, they are also natural wonders of our planet that we would be foolish to ignore.

So, for a closer look at these mystical members of Mother Nature's medicine cabinet, here are a few interesting facts you may not know about magic mushrooms:

There are 2 basic types, but about 200 different species.

Psychedelic fungi fall into two general categories, each characterized by a distinct mix of mind-altering ingredients that make their mushrooms "magic."

The largest, most common group produces hallucinogens called psilocybin and psilocin, and features more than 180 species from every continent except Antarctica. These diverse fungi hail from roughly a dozen genera, but are often lumped together as "psilocybin mushrooms." Most belong to the genus Psilocybe, including well-known species like P. cubensis ("gold top") and P. semilanceata ("liberty cap").

Psilocybin fungi might be so diverse, according to a study in Evolution Letters, because they didn't inherit the genes behind psilocybin from a common ancestor, but passed them directly among distant species in a phenomenon called "horizontal gene transfer." Psilocybin could have originally evolved as a defense mechanism, the study's authors suggest, deterring fungi-eating pests by "altering the insects' 'mind.'"

The other group is smaller, but has a rich history of religious use. It consists of one iconic species Amanita muscaria ("fly agaric") plus a few less famous relatives like A. pantherina ("panther cap"). Instead of psilocybin or psilocin, its main hallucinogens are chemicals known as muscimol and ibotenic acid.

These "muscimol mushrooms" are related to some notoriously toxic fungi, namely Amanita phalloides ("death cap") and A. ocreata

("destroying angel"). They're generally less poisonous than those killer cousins, but given the high stakes of a mushroom mix-up, non-experts are advised to steer clear of Amanita altogether.

"This is serious stuff, folks," warns food writer and forager Hank Shaw. "Mistake this mushroom for another amanita and you can die."

Magic mushrooms may have given us Santa Claus.

The story of Santa Claus is pretty odd when you think about it, from magic elves and flying reindeer to Santa's chimney use and his iconic red-and-white suit. According to one theory, many of these quirks come from muscimol mushrooms or, more specifically, from Siberian shamans who distributed them centuries ago.

A. muscaria has long been valued in Siberia, where human consumption dates back to at least the 1600s. While some of that was likely recreational, Siberian shamans ingested the fungi "to commune with the spirit world," as anthropologist John Rush told LiveScience. The shamans also gave out shrooms as gifts in late December, he noted, often entering homes via the roof due to deep snow.

"[T]hese practicing shamans or priests connected to the older traditions would collect Amanita muscaria, dry them and then give them as gifts on the winter solstice," Rush explained. "Because snow is usually blocking doors, there was an opening in the roof through which people entered and exited, thus the chimney story."

Those shamans also had a tradition of dressing up like A. muscaria, Rush added, wearing red suits with white spots. Their vision quests could be shared with spirit animals like reindeer, LiveScience points out, which live in Siberia and are known to eat hallucinogenic fungi. And there are other links, too, like Santa's Arctic home or his placement of gifts under trees (akin to how A. muscaria grows at the base of pines). Yet the Santa story is a blend of many influences

over centuries, and mushrooms are only a speculative albeit intriguing source of Santa's magic.

Humans and magic mushrooms go back millennia.

No one knows exactly when humanity discovered magic mushrooms, but there is evidence to suggest they were used in religious rituals thousands of years ago. Psilocybin mushrooms were important to some Mesoamerican cultures at the time of Spanish conquest, for example, a tradition that was likely already ancient by then.

"A genuine mushroom cult in Mesoamerican cultures seems to have existed," biologist Harri Nyberg wrote in a 1992 study, "and its beginnings can be traced to remote antiquity." This is partly due to artwork like the "remarkable 'mushroom stones' of the ancient Mayas and mural frescoes found in central Mexico," Nyberg noted, some of which date back more than 2,000 years. The hallucinogenic fungus Psilocybe mexicana, which is native to Central America, was previously known by the Aztec word teonanacatl often translated as "divine mushroom."

Psilocybe mexicana mushroom, magic mushroom

In the Sahara desert, rock art from 7,000 to 9,000 years ago may feature even earlier portrayals of psychedelic fungi. The scenes include human dancers holding mushroom-like objects, in some cases with two parallel lines connecting the objects to the dancers' heads. This is not definitive evidence, but some researchers see it as the earliest hints of people using mind-altering mushrooms.

There's also a fringe theory, the "stoned ape hypothesis," that suggests magic mushrooms sparked the boom in brain size and culture of early humans. Many experts dismiss this idea as simplistic and speculative, noting its lack of evidence for tracing human consciousness so neatly back to a single catalyst. Yet the idea has also drawn more interest lately, and even some of its doubters see value in the way it highlighted psilocybin's ability to alter consciousness and the brain itself.

Psilocybin seems to briefly reorganize the brain.

Psilocybin binds to a receptor in the brain for serotonin, and that's thought to cause many of its sensory distortions. Yet along with hallucinations and mood changes, people who take psilocybin often describe an abstract, dreamlike sense of "expanded consciousness." And in recent years, technology like functional magnetic resonance imaging (fMRI) has shed light on what this looks like inside the brain.

In one study, for example, researchers scanned the brains of 15 volunteers after giving them psilocybin. Activity spiked in the brain network linked to emotional thinking, with simultaneous activity in different areas like the hippocampus and anterior cingulate cortex. (This pattern resembles fMRI scans of people who are dreaming, the researchers noted.) At the same time, activity became less organized in the brain network linked with high-level thinking and the sense of self.

Another fMRI study found a "dramatic change" in brain organization, linking psilocybin with a temporary flurry of neural connections that don't normally exist. "We find that the psychedelic state is associated with a less constrained and more intercommunicative mode of brain function," the authors wrote, "which is consistent with descriptions of the nature of consciousness in the psychedelic state."

Additionally, a team of researchers from the University of South Florida discovered that psilocybin can also bind itself to receptors that stimulate healing. Therefore, it's believed psilocybin repairs and

grows brain cells, which could prove beneficial to those who suffer from depression or other mental health problems.

Psilocybin may cause lasting personality change.

While brain activity generally returns to normal after psilocybin wears off, research suggests some effects can last longer. One study, published in the Journal of Psychopharmacology, measured how psilocybin affects five domains of personality neuroticism, extroversion, openness, agreeableness and conscientiousness. It found "significant increases in Openness following a high-dose psilocybin session."

Openness is a psychological term for someone's attitude toward new experiences, and is associated with traits like imagination, creativity and aesthetic appreciation. Not only did openness generally rise during a psilocybin session, but in nearly 60% of study participants, it "remained significantly higher than baseline more than 1 year after the session," the researchers wrote.

That was surprising, they added, since personality doesn't usually change much after the age of 30, especially not like this. "Normally, if anything, openness tends to decrease as people get older," the lead author of the study said in a statement.

The volunteers were all deemed psychologically healthy before the experiments began, the researchers reported, and their psilocybin sessions were closely monitored. Some of the participants did report strong fear or anxiety during the sessions, and while that reaction was temporary, the researchers said it shows the potential risks of trying hallucinogens without expert supervision.

Psilocybin can temporarily 'dissolve' your ego.

Some people report losing their sense of self while on magic mushrooms. This "dissolving" of the ego is typically short-lived, but may be related to some longer-lasting effects of psychedelics, like the openness mentioned above. And according to a 2017 study published in the journal Neuroscience of Consciousness, temporary ego loss could be beneficial in the right context.

"This 'ego dissolution' results in a moment of expanded awareness, a feeling in which the mind is put more directly and intensely in touch with the world," said co-author Philip Gerrans, a philosophy professor at the University of Adelaide, in a statement. "Through this experience it may be possible to re-engineer the mechanisms of self, which in turn could change people's outlook or worldview. The profound sense of connection produced by this experience has the potential to be beneficial for people suffering from anxiety, depression and some forms of addiction."

As co-author Chris Letheby added, psychedelics offer a wide perspective that can endure even after the drugs wear off. "People who go through psychedelic experiences no longer take it for granted that the way they've been viewing things is the only way," he said. "Psychedelics can assist in enlightening people about the processes behind their subjectivity. Ego dissolution offers vivid experiential proof not only that can things be different, but that there is an opportunity to seek change."

Even consuming "microdoses" of magic mushrooms can spark a person's creativity, according to a 2018 study published in the journal Psychopharmacology. Participants who ate tiny doses contrived more ideas on how to solve a task and "were more fluent, flexible and original in the possibilities they came up with," researchers found.

Magic mushrooms can improve mental health.

Although magic mushrooms are widely outlawed, and commonly dismissed as dangerous "party drugs," a growing body of research casts them in a much less nefarious light. Not only are they safer than many people believe, but they show tantalizing potential to help with a variety of mental health problems. For one thing, psychedelics in general have "negligible habit-forming potential," as neuroscientist Nick Jikomes writes for a Harvard science blog. Some psychedelics can even help treat addiction to habit-forming drugs like cocaine and nicotine. Magic mushrooms are also increasingly seen as a possible psychiatric wonder drug. Research has shown promising effects on depression, for example, such as a 2017 study that found psilocybin "may effectively reset the activity of key brain circuits known to play a role in depression." The compound seems to boost emotional responsiveness in the brain, another recent study found, suggesting it could relieve depression without the "emotional blunting" often associated with traditional antidepressants known as selective serotonin reuptake inhibitors (SSRIs).

Psilocybin has brought transformative relief from anxiety, too, including in people with life-threatening cancer. In one study, moderate doses of psilocybin combined with psychotherapy helped cancer patients overcome anxiety and depression related to their diagnosis, leading to a long-term rise in quality of life and optimism. Six months after a single dose (which only lasted four to six hours), about 80% of participants still showed significantly reduced anxiety and depression, and 83% still reported higher life satisfaction. Two-

thirds even described their psilocybin session as one of the five most meaningful experiences in their lives. Amid this upswell of research, the old caricatures of magic mushrooms seem to be quickly changing. The U.S. cities of Denver and Oakland both decriminalized psilocybin in 2019, for instance, and similar efforts are now underway elsewhere, including some at the state level. Psilocybin was also recently designated a "breakthrough therapy" for depression by the U.S. Food and Drug Administration, and in late 2019, a major study found "no serious adverse effects" in 89 healthy volunteers, and no negative effects on cognitive or emotional functioning.

Meanwhile, thanks to growing interest and resources for psilocybin research, we may be on the cusp of learning even more. In 2019, Johns Hopkins University announced the launch of its $17 million Center for Psychedelic and Consciousness Research, the first such research center in the U.S. and the largest of its kind in the world. "The center's establishment reflects a new era of research in therapeutics and the mind through studying this unique and remarkable class of pharmacological compounds," said director Roland Griffiths, a professor of behavioral biology at Johns Hopkins. Based on what scientists have found so far, there's clearly a need for more research on psilocybin, a field that has long been limited by legal restrictions. But it's also worth repeating a key caveat about psychedelic therapy: The participants in these studies are carefully dosed and monitored by experts, and their sessions are often complemented by counseling to help them process the experience. Psychedelics can be scary at times, especially if you aren't familiar

with their effects, which can vary widely based on factors like mood, temperament, psychological condition and setting.

HOW TO PROTECT YOUR MUSHROOM GROW FROM MUSHROOM FLIES

Mushroom flies are a type of pest that is capable of attacking your mushroom grow and doing some damage. They thrive off of mycelium and compost. They are hardy in nature, however, several options exist that offer mushroom cultivators peace of mind. Methods such as pasteurisation and a variety of solutions can be employed to prevent and remove the threat of mushrooms flies.

WHAT ARE MUSHROOM FLIES?

These tiny and dark coloured creatures that live very short lives. They measure between 2-8 millimetres in length and sometimes act as pollinators for plant pollen and mushroom spores. Mushroom flies are known to be weak flyers, often choosing to walk over plants and soil. They originate from various different families, which include Sciaridae, Diadocidiidae, Ditomyiidae, Keroplatidae, Bolitophilidae and Mycetophilidae.

Mushrooms flies are hardy creatures and capable of surviving cold temperatures. Female mushrooms flies can lay around 50 and up to 300 eggs into compost. These eggs then become larva, which develop into pupa and then finally reach the adult stage.

HOW DO FLIES HURT YOUR MUSHROOM GROW KIT?

If your magic mushroom grow has been hit by a mushroom fly infestation, several problems may arise. Mushroom flies and their larva will begin to feast off the compost that nourishes your mushrooms, as well as the mycelium networks underneath them. In doing so, mushroom flies may compromise optimal yields.

HOW TO FIGHT MUSHROOMS FLIES IN A NATURAL WAY

If you are unfortunate enough to realise that your mushroom grow is under attack from mushroom flies, there are several methods you can select to make sure you eliminate them successfully to avoid any damage to your grow. Using chemicals are an option to deter and defeat them, however far more natural and organic options do exist. If you have the space and resources, one option would be to introduce some new pets into your home in the form of natural predators. Venus fly traps might be a good option for some. They will settle into the humid climate of the grow space and munch away a fair amount of the invading species.

CONCLUSION

Despite evidence to the contrary, mushrooms have often been believed to have no medicinal value. As a Schedule 1 drug, it is often believed or perceived to be nothing more than a typical hallucinogenic party drug. However, researchers at New York University and John Hopkins have recently conducted one of the largest sets of studies to study the therapeutic effects of psilocybin mushrooms on cancer patients. To the astonishment and surprise of many, 80 per cent of cancer patients showed significant reductions in psychological stress, anxiety, and depression for up to seven months or longer after only one magic mushroom experience. In addition to the remarkable healing benefits, no other significant side effects have been documented. In other words, there was no clear downside.

Books by the same Author:

Search: “Andrew McDeere”

at Amazon

Kind reader,

Thank you very much, I hope you enjoyed the book.

Can I ask you a big favor?

I would be grateful if you would please take a few minutes to leave me a gold star on Amazon.

Thank you again for your support.

Andrew McDeere