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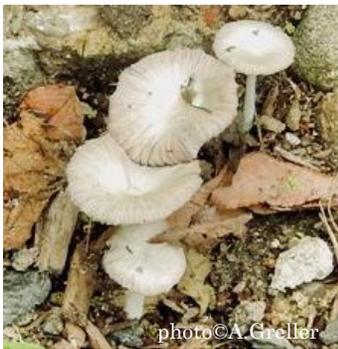
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VOLUME 29 NUMBER 2, SUMMER 2021

FINDINGS AFIELD

Identifying the genus of an unknown mushroom can be the most difficult and frustrating part of the process of identification. This was certainly so in this case, where the data pointed in several disparate directions.



Bolbitius glatfelteri

My initial puzzlement came with the receipt of photos emailed by the collector, Andy Greller, who consistently finds species new to our Long Island checklist. (See photo below.) It was unfamiliar to me, and did not immediately suggest a genus, or rather, suggested several.

The cream colored, striate to furrowed, delicate cap suggested a member of the Coprinaceae, while the free gills and their cinnamon hue beckoned in the direction of *Pluteus*. As this was possibly a new addition to our Long Island



(Continued on page 3)

Tracing the Roots of Mushroom Cultivation

by Dr. Kelly Ivors (kivors@nature.berkeley.edu)

Reprinted from *Mycena News*, newsletter of the San Francisco Mycological Society, text & photos courtesy of the author.

The consumption of mushrooms by man predates recorded history.* Historical data indicates mushroom cultivation and consumption occurred in ancient civilizations of China, Rome, Greece, Egypt and Central America. In fact, Asian civilizations have been cultivating edible mushrooms for almost 1400 years, since the first mushroom, *Auricularia auricula* (wood ear), was cultivated in China around 600 A.D. Soon to follow were *Flammulina velutipes* (enokitake) around 800-900 A.D., *Lentinula edodes* (shiitake) around 1000-1100, *Agaricus bisporus* (button) around 1600, *Volvariella volvacea* (paddy straw) around 1700, *Tremella fuciformis* (white jelly) around 1800, and *Pleurotus ostreatus* (oyster) around 1900. Of the leading mushrooms today that were cultivated before 1900, *Agaricus* is the only one that was not first grown in China.



Button mushrooms growing in limestone caves at Moonlight Mushrooms farm, PA. (Photo Dr. K. Ivors)

Wu San Kwung is known both by legend and historical account as the originator of shiitake mushroom cultivation. He was born during the Sung Dynasty (960-1127) in the Chekiang Providence of China. Legend states that Wu San Kwung stayed deep in the forests of the high mountains where

he hunted and collected wild mushrooms for food. One day he discovered that certain broken trees, which had fallen to the ground, produced mushrooms. Later he used a knife to cut the logs and noticed "the more cuts, the more mushrooms. No cut, no mushrooms." Occasionally after cutting, no mushrooms appeared for years. When this happened, he became angry and beat the logs vigorously. Sev-

(Continued on page 4)

PRESIDENT'S MESSAGE

This season did not get off to a good start but that has now changed. Since July 15th there has been an abundance of *Boletus atkinsonii* which some call *edulis* in error. I have never seen so many ever! We picked about ten pounds and after cleaning and getting rid of bugs had less than 5 pounds. This yielded 6 1/2 ounces of dried Boletes. Then on to *Boletus ornatipes* which is now called *Retiboletus*. This is just such a beautiful mushroom to find and usually only the stipe is buggy. We found some in our neighborhood and in our back yard; there were even some in Heckscher S.P. They retain their wonderful color when dried. My favorite, *Lactarius hygrophoroides* was also found in large numbers. Other edibles include *Russula crustosa*, *flavida*, *variata* and *Craterellus fallax*. These are just what Joel and I found on our own

walks. Can you imagine what other members came up with? My tip is to look for large oaks to see what you can discover.

Some of our forays go forth even when the temperature is over 85 degrees. I am sure that many people, including myself, cannot tolerate this heat. If you still want to take part, make sure you bring water and pace yourself.

Now the begging: Joel has too much research to do and cannot still be the editor. As I have said before, I would like to give up being president soon. I also would like to give up the treasurer and membership secretary roles. I will gladly train someone to do this. Please take time to add something to our club. It would be a shame for it to go under after all these years.

If it cools, I hope to see you along the trails.

EDITOR'S NOTE

If you have been a member of our club for 17 years or more, you may remember some of this issue's articles, which are being reprinted for the benefit of newer members, who hopefully will find them of interest and useful.

Moreover, this move is necessitated by your editor having the unofficial responsibility of preparing our clubs extensive collections for voucher deposition to the NYBG herbarium, a process requiring identification, drying, labeling and spreadsheet preparation, which, although a labor willingly assumed, is quite time consuming. This reduces the opportunity to continue to produce original material for this newsletter.

Therefore, I once again am asking both for one of you to step up to assume the position of editor, and for others to submit fresh material for this newsletter. (I thank Jim Lampert for his contribution to this issue.)

Although it is possible for the club to continue its activities without a newsletter, as some mushroom clubs manage to do, it will be a poorer experience without it. LIMC has published a newsletter, in one form or another, since the club's inception in 1973, and it would be good to see this tradition continue into the foreseeable future. Please think about doing your part.



MATERIAL FOR THE FALL EDITION SHOULD REACH THE EDITOR BY SEPT 1ST.

(Submissions may be forwarded by email in any format or typed.)

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FINDINGS AFIELD*(Cont'd from page 1)*

checklist, I reached out to Andy, who was gracious enough to return to Alley Pond Park, Queens and collect a good number of the fruit bodies for me. (Yes, Queens is geographically part of Long Island, and therefore within our purview.) They turned out to be quite fragile overall, with a viscid cap.

I was then able to conduct a microscopic examination of the spores and some of the cell structures, which initially only heightened the mystery. The spores were yellow-brown, thick-walled and with a germ pore—consistent with *Agrocybe*! This threw me for a loop, but now that I know better, perhaps it should not of.

Spores, *Bolbitius glatfelteri*

So, it was back to the drawing-board, which means using the key provided in “How to Identify Mushrooms to Genus” by Largent & Baroni, and requires determining the character of the pileipellis (skin of the cap) as well as the sporal type—which in this case was as described above. This led unambiguously to the Bolbitiaceae, at which point the light dawned. The Bolbitiaceae is a family of 17 genera which encompasses *Conocybe*, *Agrocybe*, *Paneolus*, *Pholiotina*, and of course, *Bolbitius*, and only the latter bore all the characteristics of Andy’s collection. Once the genus was established, there was only the small matter of finding a key to *Bolbitius*,

This was not an easy matter, as none of the current popular guides, nor indeed any of the older guides in my possession could identify this species. However, in N.A. Flora, Vol.10, Part 3, 1917, which may be accessed online, Murrill describes this species

as *Mycena Glatfelteri*, although it was correctly characterized by Peck as *Bolbitius Glatfelteri*, in Bull. Torrrey Club, 30: 97, 1903. (Strangely enough, Index Fungorum regards this as a synonym.) The habitat was “rotted manure” in Missouri.

The Murrill key lists only 2 species of Bol-

*Cheilocystidea, B. glatfelteri*

bitius that are white, and distinguishes between “*Mycena sordida*” and “*Mycena glattfelteri*” by several characters, including spore size, which is greater in *M. glattfelteri*, measuring 12-16 X 8-10 μm, consistent with our specimens. A more complete recent description online (*Diversity of species of the genus Bolbitius (Bolbitiaceae, Agaricales) collected on dung from Punjab, India. Amandeep, K et al, Mycosphere 2013*) reports the presence of cheilocystidia “polymorphic, cylindrical, clavate, inflated clavate, ventricose, fusoid or subglobose”. As may be seen in the microphoto of our specimen, they are polymorphic indeed.

Inasmuch as Mycoportal lists only a dozen collections of this species worldwide, it is safe to assume that it is extremely rare, as its dimensions (cap 3-4 cm. wide) make it unlikely to be overlooked by collectors. All but one collection are in the early 20th century, one by the eponymous N.M. Glatfelter himself dated June 5, 1914. The sole recent collection is from Quebec (by Renee Lebeuf, a well-known collector) dated May 31, 2015.

Our collection will be donated to the NYBG herbarium with Andrew Greller as the observer. *Bolbitius glatfelteri* will be a proud addition to the Long Island checklist. 

A Non-poisonous species of *Amanita* sect. *Phalloidiae*

Until recently, all species of *Amanita* sect. *Phalloidiae* were thought to be deadly poisonous, inflicting fatalities globally, based on phallotoxins and amatoxins that were not the products of secondary metabolism, but were coded for in their gene sequence. So it was completely surprising when it was revealed in 2019 that a local species of this section was being consumed in tropical Africa, including Madagascar, with no ill effects. This species has now been named *Amanita bweyeyensis*, and even more surprisingly, molecular analysis showed the

presence of the gene sequence for phallotoxin. But chemical analysis revealed an absence of any toxins, meaning that these genes were not being expressed, perhaps due to environmental and climatic conditions, so that the authors believe it should be considered to have the potential to be deadly poisonous. (*Two new species of Amanita sect. Phalloidiae from Africa, one of which is devoid of amatoxins & phallotoxins, A. Fraiture et al, Mycokeys 53:93-125 (2019)*)

Mushroom Cultivation (Cont'd from page 1)

eral days after the beating, mushrooms flushed from the log. This story is perhaps the possible origin of the practice of cutting and beating logs for shiitake production.

However, it wasn't until the 17th century in France that commercial mushroom growing began. By coincidence, farmers observed crops of *Agaricus* growing in melon beds fertilized with horse manure, and later confirmed that horse dung was closely associated with growth of the button mushroom. In 1630, the first attempt at indoor *Agaricus* cultivation occurred near Paris in Chambry, France in caves (limestone quarries) where they produced "champignons de Paris". Some accounts report that King Louis XIV (1643-1715) was among the original European mushroom growers. It wasn't until the 19th century that modern cultivation techniques were formed and then passed onto gardeners in England. *Agaricus* cultivation in caves spread quickly throughout Europe, reaching Belgium, Holland and Scotland.



Mushroom mine in Scotland (late 19th /early 20th century).

In the late 19th century (1880), mushroom production made its way across the Atlantic to the United States, where curious home gardeners near New York city and Long Island tried their luck at growing this new and unknown crop in caves and cellars. In 1891, William Falconer published the first book on mushroom cultivation entitled "Mushrooms: How to Grow Them; A Practical Treatise on Mushroom Culture for Profit and Pleasure" (available at <http://cdl.library.cornell.edu/cgi-bin/chla/chla.cgi?notisid=AAM1556>). Falconer suggested that mushroom growing was perfect for florists; since they grew flowers on benches, mushroom beds could be placed under bench tops and the 2 crops could be grown at once. Mushroom cultivation was also recommended to housewives as a source of additional income. In 1896, William Swayne of Kennett Square, PA built the first mushroom "house" used exclusively for com-

mercial mushroom production. Houses were used to control precise environmental conditions required for cultivation.

Growers had to depend on spawn imported from England, which by the time it reached the U.S. was of poor quality. In 1903, two scientists at the US Department of Agriculture were successful at producing pure-culture spawn of *Agaricus bisporus*. The first manufacturer of spawn was the American Spawn Company of St. Paul, Minnesota, headed by the French mycologist Louis Lambert. He began the production of brick spawn, advertised as "Lambert's Pure Culture Spawn", which later received a silver medal at the Universal Exposition in St. Louis in 1904. Ten years after this development, at least 4 - 5 million pounds of *Agaricus* were grown annually in the U.S. Strains of this species were naturally brown in color; it wasn't until the mid 1900s that snow-white strains of the button mushroom were first observed and isolated from growing beds. At current, white button mushrooms dominate the industry, mainly for aesthetic reasons, as well as having a longer shelf-life.

With the advancement of air conditioning and improvement of environmentally controlled mushroom houses (1930), cave cultivation almost disappeared. Today, only a handful of growers operate underground around the world, including the 'Moonlight Mushroom' farm in southwestern Pennsylvania, which consists of a 150-mile labyrinth of tunnels 300 feet underground. Although *Agaricus bisporus* currently accounts for approximately 90% of the total mushroom production in the US, additional technological breakthroughs have encouraged the commercial cultivation of other types, including *Lentinula*, *Flammulina*, *Pleurotus*, *Hypsizygus*, *Hericium*, *Morchella*, and *Grifola*. Today, Pennsylvania leads the country in total annual production (>50%), with California a strong second. More than 20 other states now add significantly to total production. This means that mushrooms, which have limited shelf life and shipping range, are available everywhere!

References

- Chang, S.T. and Miles, P.G. 1987. Historical record of the early cultivation of *Lentinus* in China. *Mush. J. Tropics* 7:31-37.
- Del Sordo, S.G. First fifty years: A chronological history of the mushroom industry

* (Editor's note: In fact, DNA analysis of Neanderthal dental tartar established that they consumed mushrooms, among them *Coprinopsis cinerea* and *Schizophyllum commune*, the split-gill, which is still consumed in tropical regions.)



PEGGY'S CULINARY CORNER

COCONUT SULPHUR SHELF MUSHROOM SOUP

- 1 Tbs. olive oil
- 1/4 c. diced shallots or mild onion
- 3 cloves garlic, minced
- 2 1/2 c. 3/4" cubed sulphur shelf mushroom
- 2 1/2 c. 3/4" cubed potato
- 1 can chicken or vegetable broth
- 1 can coconut milk (unsweetened)
- 1 c. spinach julienned
- 1/4 c. chopped cilantro
- lime wedges



1. Heat the oil over medium heat and add the shallots/onions, cooking until translucent. Add the garlic and cook 1 minute longer.
2. Add the cubed mushroom, and cook until the liquids are evaporated.
3. Add the cubed potato, chicken/vegetable broth, and cook for 6 minutes, or until the potato is tender.
4. Add the coconut milk, 3/4 the spinach and half the cilantro. If the broth is too thick, add up to 1/2 c. water. Cook 2 more minute. Remove the soup from the heat.
5. Serve the soup with lime wedges, along with rest of chopped cilantro and spinach. Salt to taste.

Serves 2 as main dish or 4 sides.

(Note: The above recipe has been adapted from the 3foragers blogspot)

HARJIT BHATT'S CHICKEN KORMA

Marinade:

- 8 oz. plain yogurt
- 2 tsp. curry powder
- 1 tsp. ground coriander
- 1 tsp. mince fresh ginger
- 4 cloves garlic, minced
- 1/2 tsp. cayenne pepper
- 1/2 tsp. lemon juice

Ingredients

- 3 cups chopped sulfur shelf mushrooms
- 2 Tbsp. vegetable oil
- 1 medium onion, chopped
- 1 large tomato, chopped (or can of same)
- 2 bay leaves



Mix marinade. Add sulfur shelf mushrooms coat, cover and let stand at room temp for 1/2 hour (can prepare ahead and refrigerate also). Warm oil in large skillet or wok. Cook onion until brown. Add tomato and bay leaves, cook 5 minutes. Add sulfur shelf mushrooms and marinade, mix well. Cover and simmer for 15 - 20 minutes or until mushrooms are cooked. Remove bay leaves. Serve over hot rice. 4 + servings.

(From the website of Missouri Mycological Society)

Easy Chicken Mushroom for Two

- 1/4 lb. bacon cut into 1/2 " pieces
- 1 Shallot chopped
- 2 gloves garlic minced
- 3 cups very fresh Chicken Mushroom cut into fork size pieces
- Sprigs of fresh thyme or oregano
- Broth (Chicken or Vegetable)
- 1/4 cup of cream
- Salt and pepper.
- Grated Romano cheese



Cook bacon in a skillet until crisp. Remove to paper towel to drain.

Lower heat and add shallot and garlic and sauté until just soft. Add Mushrooms and stir so that nothing browns. Add broth to keep juicy as needed. When mushrooms have turned a nice orange, add thyme or oregano. Then add cream and salt and pepper to taste. Mix in bacon pieces and serve over noodles, pasta, rice etc. Udon noodles recommended.

(Original recipe by Peggy.)

Poetry: Mushroom Study

By: Mrs. Morton A. Gibbs; San Francisco, California
(Reprinted from Glenn Freeman's "Introductory Mushroom Microscopy")



First, you name its habitat:
Woods or pastures, hill or flat –
Under just what trees it grows,
(If a preference it shows?)
Is it single, cespitose,
Or gregarious and close?
Next, its pileus, or cap,
All these features you must map –
Color, texture, size and shape,
Nothing must your eye escape.
Is its margin involutes?
And in age does it upshoot?
Is it glabrous (smooth) or not.
Viscid (sticky) or somewhat?
Does its color change when bruised

To pink or black or lovely blues?
Then the lamellae you take,
(Saying "gills" is a mistake)
Color, shape, and size of them.
Grown to, or quite free from stem?
(But this stem you must call "stipe")
Tell unerringly its type.
(What you never, never do
When picking, is to cut it through)
You must have the whole of it
Or descriptions will not fit.
Is it bulbous, is it thin,
Hollow, or with stuff within?
Has it scales or annulus
(that's the ring, contrarious,
for it makes you want to swear
it so often isn't there)
Next a spore-print must be made,
Note each slightest tinge or shade.
Lilac may as white be classed,
Cream, as ochre-spored, alas!
This requires a microscope,
Or with spores you cannot cope.
Size and shape again you note,
Tho' they're tiny as a mote.
Last, you take your books, a lot –
One may give it - one may not.
Now you know the nomenclature,
You can hunt without ill-nature.
So you search with greatest care,
Offering up a fervent prayer.
BUT, 0 HELL! You tear your hair!
YOU CANNOT FIND IT ANYWHERE!!!



From our Members & the Public..



Boletus atkinsonii, 7-15, still fruiting in good numbers.



The toxic *Chlorophyllum molybdites*, 7-7, often mistaken for *Macrolepiota procera*.



Laetiporus cincinnatus, the "white" Chicken Mushroom.

Agaricus subrufescens (Almond Agaricus)
by James Lampert



Following up from my previous successful growing of Blewit mushrooms last year I wanted to try growing something different. I purchased *Agaricus subrufescens* (Almond Agaricus) spore syringe from a commercial

dealer. I want to mention that the Almond Agaricus is a tropical type of mushroom and the mycelium will not survive the winter months unlike the Blewits which I'm hoping for a return appearance this year.

I prepared 3 areas in my herb garden beds with homemade compost. The compost was made from kitchen and garden scraps throughout the year and enriched with manure (dried) gifted from my neighbors horse.

The *Agaricus* spores were inoculated into a 5lb. bag of a sterilized substrate consisting of rye berries, straw and worm casings. The mycelium took about a month to fully colonize the substrate which was left in a dark area of my basement and kept at a temperature of 75 deg. Fahrenheit with the use of a seedling heating mat.

Once fully colonized I broke up the substrate and buried it into the compost. I watered it every day unless it rained and to my delight I was eating garden mushrooms within a month.

The Almond Agaricus mushrooms closely resemble portabella mushrooms and have a better flavor in my opinion. I will be looking forward to more of these tasty treats popping up throughout the summer months.

(Editor's Note: A. subrufescens is a native species "an uncommon resident of Eastern forests" and "not close to other N.A. species" according to Agaricus expert Richard Kerrigan; also found in Europe, South America and Hawaii.)



cont'd from P.6

From our Members & the Public..



photo©B.Pritvchenko
Michigan Market, May 29



Retiboletus ornatipes
by Peggy



Our webmaster Dale with haul of Chanterelles.



Psathyrella sp., eaten by pet dog with no ill effects.



photo©R. Eklund
Gyromitra korfii 6-4

WELCOME NEW MEMBERS

Monika & Roman Perez

William & Gail O'Hern

Joel Albinowski

Laurie Sponza

Jeffrey Millman

James Marrin



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"Mushroomers wish not only to appreciate the fields and woods, but also to pluck part of those fields and woods, bringing them home to sauté."
Gary Alan Fine, Morel Tales, The Culture of Mushrooming, 1998



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