THE KEYSTONE CAP

Newsletter of the Eastern Penn Mushroomers

www.epennmushroomers.org

Summer 2023

IN THIS ISSUE

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President's Message by Tom Warman

Well, here we are in summer already. Generally, a time when I am feeling pretty good and loving life. But, as a mushroomer, this past spring was not that way. Please, allow me to explain.

In April, I attended all four club forays and collected a sum total of ZERO mushrooms. At each foray, my take was limited to old branches with turkey-tail or various lichens—all last year's of course. No puffballs, no chanterelles, and, certainly, no morels. Yet, I kept going back for more. Why?

Despite, my poor results – which I blame entirely on our unseasonably dry spring and not my skill – I realized that the company of my fellow mushroomers and what I learned from them at each foray more than made up for my paltry pickings.

Please make an effort to join in our upcoming forays. Regardless of what you find, I am sure that, like me, you will go home with much more than fungi.

Until next time,
Tom

Fungi Carbon Storage and Fossil Fuel Emissions submitted by Niles Lavin

I recently read an article on www.sciencedaily.com titled: *Fungi Stores a Third of Carbon from Fossil Fuel Emissions and Could be Essential to Reaching Net Zero, New Study Reveals*. I was astonished by the amount of credit fungi is *finally* getting in regards to its bioremediation properties. Most of us are familiar with fungi's ability to clean up oil spills, filter water, and eat plastic. Yet even these remedies have neither gotten credit in the mainstream science communities nor been implemented on massive scales to curb the pollution problem. The article makes many key points, the following are a few:

Mycorrhizal fungi are responsible for holding up to 36 per cent of yearly global fossil fuel emissions below ground - more than China emits each year.

The fungi make up a vast underground network all over the planet underneath grasslands and forests, as well as roads, gardens, and houses on every continent on Earth.

Fungi are not only crucial to storing carbon and keeping the planet cooler, but are also essential to global biodiversity.

Researchers are now calling for fungi to be considered more heavily in

conservation and biodiversity policies, and are investigating whether we can increase how much carbon the soil underneath us can hold.

Professor Katie Field, Professor of Plant-Soil Processes at the University of Sheffield and co-author of the study, said: "Mycorrhizal fungi represent a blind spot in carbon modelling, conservation, and restoration - the numbers we've uncovered are jaw-dropping, and when we're thinking about solutions for climate we should also be thinking about what we can harness that exists already."

<www.sciencedaily.com/releases/2023/06/230605181230.htm>.

Peer Reviewed Article: https://www.cell.com/current-biology/fulltext/S0960-9822(23)00167-7?_returnURL=https%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS0960982223001677%3Fshowall%3Dtrue

The Mushroom Identification Trilogy: A Video Review

submitted by Tom Warman

I recently revisited this timeless video on mushroom ID released in 2005 by the inimitable Taylor Lockwood, and what a treat it was. Lockwood, with his signature leather bush hat and soothing, conversational delivery, introduces us in an entertaining way to the fascinating world of proper mushroom identification.

Accompanied by superb specimen photography and backed by a somewhat kooky tribal drum-themed soundtrack, Lockwood breaks down the video into three sections (hence the "Trilogy" in the title): "Introduction" – basics of mushroom morphology; and description "Into the Details" – greater clarity and depth of terminology, and; "Into the Woods" – characteristics of sample species from major genera, all richly illustrated by lovely photos. The first two sections fairly flew by, but I found myself reaching for the fast-forward button by the middle of the third. Regardless, Lockwood never lets details get in the way of sharing his enthusiasm for mushrooms. Oh yeah, did I mention that the accompanying photo samples are superb?

Although Lockwood likely aimed this video at emerging enthusiasts, his well-written dialogue and somewhat comical editing will make it enjoyable for all levels of fungal ID experience. Unfortunately, the video appears to be out of print (Lockwood's website, www.kingdomoffungi.com is off line), so your best bet is to borrow a copy from a fellow mushroomer. All in all, worth scrounging around for.

My rating: 4.5 out of 5 stars

A Primer on Fungal Taxonomy by John Dawson

Given the recent flux in the scientific names of fungi, newcomers to mushrooming may understandably wonder how such names are determined. The purpose of scientific names is to reflect evolutionary

SAVE THE DATES

Mark your calendars so you don't miss these FUNgi activities.

EPM 2023 Summer Forays
Saturday, July 7, 2023
Saturday, July 15, 2023
Saturday, August 19, 2023
Saturday, September 2, 2023

Helen Miknis Foray
Friday, August 4 – Sunday, August 6, 2023

Watch your email inbox for notification of additional events.

FUNGI IN THE NEWS

Much Ado About Mushrooms!
https://chicago.suntimes.com/2023/6/21/23724296/mushrooms-nutrition-eat-well-dietary-recommendations
This article reviews the myriad varieties of fungi and their benefits to human health, emphasizing the antimicrobial, anti-inflammatory, cardiovascular-protective, anticancer properties.

Making Mushroom Paper
https://fungi.com/blogs/articles/making-mushroom-paper
A history and overview of making paper from mushrooms.

How a fungus sidesteps a plant's defense mechanism
https://phys.org/news/2023-06-fungus-sidesteps-defense-mechanism.html
This article takes a deeper dive in parasitic mushrooms and their biological process with plant hosts.

relationships among organisms, and as the science of mycology has advanced, the basis for judging how closely different fungi are related to one another has changed. At first, kinship judgments were based on morphological similarities, such as the nature of the spore-bearing surface (hymenium) of the fruiting bodies (pores, gills, teeth, etc.), the shape and size of the fruiting bodies, the color of the spores en masse, etc. Later, judgements were revised on the basis of microscopic characters (such as whether the spores were borne on club-shaped structures called basidia, in sacs called asci, or neither) or reactions to chemical reagents. Now the taxonomic hierarchy (kingdoms, phyla, classes, orders families, genera, and species) is again being revised, this time on biochemical grounds (shared segments of DNA). Whether that means the names will eventually stabilize remains to be seen. In any case, *how* different two individuals must be in order to be regarded as separate species will always be a subjective matter, because organisms form an evolutionary contiuum. It is we humans who try to split them up, and there will always be differences of opinion among specialists.

The scientific names of all living organisms follow the taxonomic scheme devised by the Swedish botanist Carl Linnaeus in his book *Species Plantarum*, published in 1753. They are Latin binomials (in italic type) consisting of a capitalized *generic name* (such as *Amanita*) and a lower-case *specific epithet* (such as *campestris*), followed by a standardized abbreviation (in roman type) of the name of the *authority* for that binomial (the person who first applied that name to the organism in a published scientific description of it and who deposited a *type specimen* on which the description was based in an herbarium). For fungi, the criteria for what constiutes a valid description and name for a species is specified by the *International Code of Nomenclature for Algae, Fungi and Plants,* a document that is revised at each International Botanical Congress, usually held every fours years. The starting point for the names of gastromycetes (e.g., puffballs), rusts and smuts are those given to species thereof by the South African botantist Christiaan Persoon in his 1801 book, *Synopsis Methodica* Fungorum; for all other fungi it is the names applied to species thereof by the Swede Elias Fries in his 1821 book *Systema* Mycologicum. Of course, only a limited number of species were described in this book, many of the names Persoon and Fries used have since been changed, and in some cases Persoon and Fries adopted names for species that had already been applied to them by others. To give credit where credit is due, and to make it possible to trace back in the literature to earlier studies of a given fungus, the code of nomenclature specifies how names of authories are to be cited and in what circumstances a scientific name must be altered.

The details are somewhat complicated, because of the need to allow flexibility within the code to accommodate both advances in scientific knowledge and legitimate differerences of opinion among specialists. First of all, no binomial in use before the appearance of Persoon's and Fries's books is considered valid *unless* it was adopted by Persoon or Fries, and in cases in which they retained a binomial that was originally applied to a species by someone else, provision is made to make clear the original source for the name. For example, the puffball *Lycoperdon perlatum* was first described by Persoon and has borne that name ever since, so its full scientific name is *Lycoperdon perlatum* Persoon. Likewise, the chanterelle *Cantharellus cibarius* was first named by Fries and has not been renamed, so its full scientific name is *Cantharellus cibarius* Fries. On the other hand, *Cyathus striatus* was named by William Hudson before 1801, and *Agaricus campestris* was named by Linnaeus before 1821. Those names were adopted in the books by Persoon and Fries, respectively, so they remained valid afterward. But to give credit to Hudson and Linnaeus, the *authorities* for those names are properly cited either as Hudson ex Persoon and Linneaus ex Fries, or, more succinctly, as Hudson: Persoon and Linneaus: Fries. As a further example, for fungi other than gastromycetes the citation Persoon ex Fries occurs frequently, to indicate a species first named by Persoon prior to 1821 whose name was retained by Fries.

But what if different investigators happen to apply the *same* binomial to *different* fungi? Or what if *different* names are given to the *same* fungus at different times or by different investigators, as is often the case? The former are called *homonyms* and are treated according to the rule of priority: Only the fungus to which the name was first applied can remain so designated; all others must be renamed. The latter are called *synonyms*, and are more problematic. It is not the purpose of the code to adjudicate among them, but only to prescribe how to indicate their provenance.

Consider, for example, the Brick Cap. Fries called it *Agaricus sublateritius*. The French mycologist Quélet later split up the genus *Agaricus* and placed the Brick Cap in the new genus *Hypholoma*. Later still, the mycologist Karsten split up Quélet's genus and put the Brick Cap in the new genus *Naematoloma*. Authors who accept Quélet's name call the species *Hypholoma sublateritium* (Fries) Quélet, while those who follow Karsten instead call it *Naematoloma sublateritium* (Fries) Karsten. In either case, the name enclosed within parentheses indicates that Fries was the person responsible for the specific epithet, while the name outside the parentheses is that of the person who later placed it in a

different genus. The name that results is then called a *new combination*: a different generic name attached to the same specific epithet. The specific epithet itself remains valid and is not changed *unless* the reclassification would result in a homonym. In that case the specific epithet must be changed as well, resulting either in a *new name* or reversion to a name given earlier (if the reclassification was due to two species formerly considered different now being deemed to be the same).

There are few restrictions on the generic names and specific epithets themselves, except that they be Latinized. Some names are descriptive, some indicate where a species was first described, and some honor noted mycologists or collectors. It is my understanding that so long as the authority for a scientific name is given, it is not incorrect to use it, even though other authorities may deprecate it (i.e., regard it as obsolete). In particular, either of two online databases may be consulted to find the currently accepted name for a species (according to those who maintain the databases): Index Fungorum or Mycobank. But occasionally those databases themselves disagree.

The foregoing discussion of the rules of nomenclature does not exhaust all the problems the code addresses. For example, some fungi have both a sexual form (teleomorph) and an asexual form (anamorph), which may be so different that they are initially regarded as different species and named accordingly. If their underlying specific identity is eventually discovered, the most recent revision of the code specifies that, unless the name of the anamorph is too firmly entrenched in the literature, it is the name of the teleomorph that is subsequently to be applied to both. And then there are those dual organisms we call lichens.

But enough. What has already been said is plenty for readers of this primer to digest.

Fungi Mating Types submitted by Niles Lavin

DNA sequencing has shed some light on the mating habits of fungi. When we refer to the higher organisms, sex is simply male or female. With fungi this is not the case. Depending on the group, most fungi have so many mating types they are referred to by numbers, letters, or simply "+" & "-". It is a very complicated process wherein the *alleles* (sometimes called *idiomorphs*, as in *ascomycetes*) of the mycelium must find one another and mate.

There are many new studies being done on this subject the world over. Some species of fungi can have 10,000-35,000 mating types! Researchers are still stumped as to why such an enormous amount of mating types is necessary. One of the articles includes reference to a peer reviewed journal study of the mating diversity of *Trichaptum* mushrooms. From that article: "Why any organism would need so much sexual variation remains an open question, but study author and University of Oslo geneticist David Peris suspects it has to do with the mushrooms' sessile lifestyle: having to be different at two different gene regions makes it less likely for spores released from the same mushroom to successfully combine, thus lowering the odds of inbreeding."

Also, having so many variants to choose from makes it more likely any given neighbors will be sexually compatible—up to a 98 percent chance, says Peris—which could help the species survive in the long run. "When conditions are changing, you want to generate this genetic variation," says Peris, as it can act as fodder for adaptation.

The full article and more on this subject can be found here: https://www.the-scientist.com/news-opinion/this-fungus-has-more-than-17-000-sexes-69930
https://www.nature.com/articles/6800035
https://en.wikipedia.org/wiki/Mating_type

Helen Miknis Memorial Foray

The event will take place at the Mont Alto campus of Penn State University the weekend of **August 4th to the 6th**. The lush Michaux and Tuscarora state forests provide a variety of habitats in the state parks and game lands that are lined up along Pennsylvania's share of South Mountain and the Tuscarora Ridge. Paula DeSanto and Dave Wasilewski will act as lead identifiers at the foray.

The event will begin at noon on Friday with an early bird foray in the afternoon. A full day foray and several half day forays will be scheduled for Saturday. Friday and Saturday evenings are devoted to identification of finds with our workplace and display space in the public areas of the dormitory where we stay. Review of the collection will take place Sunday morning.

Accommodations will be in the Penn Gate II dormitory. The dormitory is a favorite and quite comfortable, with four-person, two-bedroom suites including microwaves, mini-refrigerators, and a bath area shared between the two bedrooms, with easy access even at late hours to the work area for the foray in the public areas of the dormitory.

Meals, beginning with dinner on Friday and ending with breakfast on Sunday, will be in the nearby Mill Creek Café on the campus, where mushrooms (commercial) are always on the menu. The staff is delighted to have us back and the food is the best on-campus food we've had at a foray.

There are several flexible options available to fit anyone's needs, including attendance only (no accommodations, and with or without meals), Saturday attendance (with or without meals), or the full deal (all activities, accommodations, and meals)

The deadline for registration is July 9, 2023.

The registration form to attend the event can be downloaded from the EPM website, which is linked below.

https://epennmushroomers.org/miknisforay/

Summer Forays Schedule

7/1/2023 – Idle Road – Lambs Gap, Marysville

GPS: (40.308009, -77.021598)

Directions: From I-83: Take PA-581 W, US-11 S and PA-581 W to PA-944 W/Wertzville Rd in Hampden Township. Take exit 61 from I-81 N - Follow PA-944 W/Wertzville Rd and Lambs Gap Rd to Idle Rd in RyeTownship (2.9 mi) - Turn left onto PA-944 W/Wertzville Rd (1.2 mi) - Turn right onto Lambs Gap Rd (1.6 mi) - Turn left onto Idle Rd (0.1 mi)

Address: State Game Lands Number 170 111 Idle Rd, Marysville, PA 17053

7/15/2023 – Conroad Weiser SP - Rowland Picnic Area

GPS: (40.53676708019065, -76.7739009813534)

Directions: from Harrisburg: Follow US-22 W and PA-225 N to Mountain House Rd in Jackson Township (25.3 mi) Take Deitrich Rd to Game Lands Rd/White Oak Rd (3.1 mi)

Address: Rowland Picnic Area Jackson Township, PA 17032

8/4-8/6/2023 – Helen Miknis Memorial Foray

Address: Mont Alto, PA

More details featured in the newsletter.

8/19/2023 Middle Creek Wildlife Management Area

GPS: (40.29686165926188, -76.2516951631499)

Directions: From Harrisburg: Follow I-81 N and US-22 E to PA-343 S in Bethel Township (28.3 mi) Continue on PA-343 S. Take E Kercher Ave, Prescott Dr and PA-897 S to Museum Rd in Clay Township (19.1 mi)

Address: 100 Museum Road Stevens, PA 17578

9/2/2023 Gifford Pinchot State Park

GPS: (40.08394338307239, -76.89080117088102)

Directions: From Harrisburg: Take I-83 S and PA-177 S to Alpine Rd in Warrington Township (15.9 mi)
Follow Alpine Rd to Conley Rd (0.5 mi)

Address: Gifford Pinchot State Park 2200 Rosstown Rd, Lewisberry, PA 17339

Lion's Mane Mushroom "Crab cakes" Recipe

When I think of summer, feasting on delicious crab cakes at the beach is definitely a memory that comes to mind. Did you know that Lion's Mane (*Hericium erinaceus*) has a similar taste to crabs? *Hericium erinaceus* is also very easy to grow at home (kits can be purcashed from many growers online), and can frequently be found at your local farmers markets!

8 oz Lion's Mane mushroom
1 egg
½ cup panko breadcrumbs
¼ cup onion (finely diced)
1 tblsp mayo
1 tsp worcestershire sauce
¾ tsp old bay seasoning
1 tsp dijon mustard
1 tblsp parsley (finely chopped)
¼ tsp salt
¼ tsp black pepper
2-3 tblsp oil (to fry cakes)
2 optimal garnsh: lemon wedges

Hand shred Lion's Mane Mushroom into small pieces resembling texture of flakey crab.
In large bowl, combine egg, mayonnaise, onion, Worcestershire sauce, old bay seasoning, Dijon mustard, parsley (finely chopped), salt and pepper. Mix until fully incorporated.
Mix in Lion's Mane Mushroom until fully incorporated. Mix in Panko breadcrumbs until fully incorporated.
Form mixture into 3-4 equal size round flat patties (about ½ to ¾ inch thick).
Heat oil in sauté pan on medium/high heat.
Cook patties for approximately 2-3 minutes per side. Should be golden brown and cooked throughout.
Add optional garnish, squeeze of lemon and enjoy!

EPM Annual Photo Contest

Snap some pics of your fungal finds and share them on Groups.io and you will automatically be entered into EPM's annual photo contests. In the past, the contest was limited to the fall but now will begin in the spring and last through the fall.

There will be two catergories with three winners in each category. First place winners will receive fifty dollars, second place twenty-five, and third place a free one-year membership. The first category will be judged on photos that are aesthetically pleasing and the second category will be judged on photos that best describe the mushroom. In the latter mentioned category more than one photo can be posted with features that help identify the mushrooms from the photos.

The only rule is the photos must be posted on Groups.io and taken this year. The contest starts now, and winners will be posted in the winter newsletter.