Symbiosis©

The newsletter of the Prairie States Mushroom Club

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From the President, Dean Abel

I think 2018 is going to be a good mushroom year. In this issue Sarah DeLong-Duhon and Rosanne Healy explain the club's commitment to the citizen science project Mycoflora. Although PSMC was founded 30 years ago as a project to survey the morel population in Iowa, we have only occasionally submitted unusual finds to the Ada Hayden Herbarium at Iowa State University.

Under the direction of Dr. Lois Tiffany, Rosanne surveyed several Iowa state parks and deposited many voucher specimens with the herbarium. Records of these and other fungi are available on the Herbarium website. The Mycoflora project promises to add to our understanding of fungal diversity beyond what we have been able to document so far.

On another front I believe the mushroom club must take on an additional task: the health and safety of mushroom collectors in our Midwest woods. It seems that every six months a new tick-borne pathogen is discovered. In this issue Bobbie Ney describes her battle with Lyme disease and the indifference of the medical community which has too often proven ignorant about the disease. I have a friend in Kansas who acquired two tick-borne diseases – Rocky Mountain Spotted Fever and ehrlichiosis – at the same time. He spent a week in the hospital in critical condition and even months later he still suffers from his bout with the infections.

My point is that we must encourage – even demand – that participants in club forays take every possible precaution to prevent infection from these pests. Eager mushroomers, adults and children, must be warned that the danger in the woods is not poisonous mushrooms or poison ivy or bears. The danger is in believing that it won't happen to them. People die every year from these diseases. This is the new reality in which we live.

I personally have three goals this year. First, I hope to find a morel this spring. Second, I hope to get some identification results out of two new books I gifted myself: ***Agaricus of North America*** (Richard Kerrigan) and ***Ascomycete Fungi of North America*** (Beug et al.). These books were not cheap and I hope I made a sound investment.

Third, I recall a conversation with Bob Embree, mycologist at the University of Iowa. I complained, "I keep finding the same things I already know over and over" and Bob replied with a smile, "And the same things you don't know over and over." So this year I am going to learn the Mycenas. The Herbarium lists 15 Iowa species of which I know only three for sure. ***North American Species of Mycena*** by Alexander Smith (1947) lists 232 species so I ought to be able to figure out a few for my life list.

I suggest that everyone pick a favorite genus of mushrooms and concentrate on learning those. I start off every year with this good intention but it's so easy to be distracted by all the other fungi that I lose sight of my goal. In any case, it's springtime again and I hope to see you all in the woods.

Dr. Lois Tiffany

From the Editor

Dave Layton

Change – This Issue's Theme

In his President's message, Dean Abel discusses three articles, one about changes in understanding the dangers of ticks and two others about PSMC's changing role in citizen science by Sarah DeLong-Duhon and Dr. Rosanne Healy. That role has come full circle with the Mycoflora Project. Dean notes how PSMC began with Dr. Lois Tiffany engaging Iowa citizens in her 1980s Morel Study. Sarah, a student, leads our Iowa Mycoflora project. Now Rosanne, who was Lois' student, is our project advisor.

Also in this issue is Sarah's wonderful article, *A Change in Perspective*. Plus, Mike Krebill knows one of the authors of a hot-off-the-press regional field guide to mushrooms. In his review of the book, Mike explains why he feels Timber Press's approach has the potential to change the way field guides are written in North America. And what would the spring issue of *Symbiosis* be without new insights on a favorite topic – morels? Mike accepted my challenge to see what he could discover from interviews and researching for *Morels: Changes Noted in the Last Decade*.

Spring is always my favorite time with the excitement of the woods coming to life. This year the additional excitement of the Mycoflora Project is causing me to care more about mushrooms than whether they're best in soup, omelets or spaghetti sauce. Fungi are often the barometers of larger environmental changes and this project may cause a major change in our understanding of what's really out there, and what's happening.

A Change in Perspective

by Sarah Delong-Duhon

1 Stereum at Indian Creek

Ever since I was a little kid, I've been enamored with nature. I spent all my time outside, wandering around in the forest on my mom's property in Alabama, and in my Dad's jungle of a yard in Florida, a remnant of my grandmother's insatiable love for gardening. I never knew just how alike we were until I began work at the Kirkwood greenhouse, and finally realized how happy plants made me. After two semesters working part-time in that tropical jungle so similar to Nanan's garden, this newfound love drove me to learn more about the wildlife that has surrounded me my entire life. I'd always studied the animals, but never the small and the unmoving, the modest green workers who toil away in the sun and the dirt.

2 White pine stand, Indian Creek

I went out hiking on my own, something I'd not the courage to do before, because I had the bug and I wanted to learn more. It didn't take me long to come to another revelation about wild nature – plants weren't the only things out here that I'd never noticed before. Fungi of all shapes and sizes populated the undergrowth, and even the manicured lawns around town; they were everywhere. If there was plant detritus, there was sure to be mushrooms. I heard some of them were even tasty – kinds that you'd pay outrageous prices for at the

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A Change...

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supermarket were growing out here, as free as can be. Oysters, morels, dryad's saddles, honey mushrooms, wood ear… but first, one had to be sure of identification, and that's no easy matter. From my time at the greenhouse, just being exposed to the plants made memorizing their names a simple matter, so I was already primed – all I needed to do was some research.

3 Clathrus columnatus, Florida 2008

I've always been big into photography. Thanks to my dad, who has been at it way longer than me, I've had access to digital cameras since my childhood. I took pictures of everything that looked interesting: flowers, strange rocks, animals, beautiful sunsets. Once, I found a stinkhorn fungus growing in the yard, and I don't know how I did it, but I correctly identified it as *Clathrus columnatus*, a name that's stuck with me since. It would be a very long time before I thought about mushrooms again. I would see them in yards, on trips to beautiful wooded places, growing out of flowerpots. I would take pictures of them, but I never stopped to wonder what they were. Now, when I look back on those photos, I only wish that I could step through it like a portal and tell my younger self, "Look closer. Buy an identification key, learn how to make spore prints, dig up that stinkhorn egg so you can see how it works – you won't regret it."

4 Armillaria bootlaces, Macbride Recreation Area

Instead, I wandered around in nature for 24 years, loving it for the fresh sweet air and the green cast shadows, for the lovely dappled light on the ground – but never for the rich, impossibly deep biodiversity within. Now I know how to recognize the black bootlaces of honey fungus, the deep teal blue of *Chlorociboria*, the strong wine red of spring Trillium flowers, and appreciate them all for much more than their beauty. The forest looks so different to me now than it used to. Now I can begin to point out the participants that make the ecosystem what it is. I see it for its microbiomes – the lonely stand of white pine, the trickling streambed, the underside of a rotting log, or the south facing slope of an elm copse. I love that I can guess what might be living there and why, but I am also thrilled by the realization that I still know hardly anything, because there is so much left to learn.

According to PSMC Treasurer Roger Heidt, these squirrels have to help with mushroom carving before he feeds them. Yah I know what you're thinking, *and we trust this guy with our money?*

Mushroom Ramble

Saturday, May 5th, 9 a.m. - Noon

Marty Augustine of the Prairie State Mushroom Club will lead participants on a search for fungus at Wickiup Hill, 10260 Morris Hills Rd, Toddville, IA. We will have a program on mushroom identification initially. Then we will head to the woods to see what we can find. Of course, at this time of year many folk's thoughts will be on the tasty morel mushrooms – though we will see many other kinds of fungi as well. We will learn a bit more about local mushrooms and what was located at the end of the program – who knows, maybe someone will even share their favorite spots? Bring a container to collect mushrooms and dress for conditions that may include ticks, mosquitoes or poison ivy. Cost: $2.50/adult, $1.00 for children 16 and under or $5.00 per family. No charge for Mushroom club members.

https://www.ijsc-online.org/deer-tick-vs-brown-dog-tick/

Lyme: A Life Changing Disease

by Bobbie Ney, Iowa City, IA
forwarded to Dean Abel

Editor's Note: You'll realize that Bobbie's ordeal is far from over, and it's being exacerbated by ignorance and greed in the insurance industry and medical field. Something has to change and that change starts with the kind of awareness that Bobbie demonstrates here. We'll stay in touch with her and report as her odyssey progresses. - DL

I am a healthy 69-year-old woman who exercises every day. I walk three to four miles for five days of the week and swim 20 laps two days a week. I eat healthy, mainly a vegetarian diet, except when I go out to dinner or get together with friends. Then I may eat meat and too many sweets. I have tent camped, backpacked and hiked across the US and in Canada since I was 30 years old. I have picked hundreds of ticks off my dog and myself and have not used any spray to prevent mosquito or tick bites. My previous dog, Honey, tested positive for Lyme disease around 2008 (at age six) but didn't have any symptoms until she was 10 years old. Honey eventually died from complications with seizures that can be a symptom of Lyme disease. I was tested for Lyme around 2008 but the test was not positive.

In July, 2017, I began having the followings symptoms: dizziness, fatigue, visual focusing issues, jitteriness, "brain fog", and more trouble than usual retrieving words. I also had essential tremors for at least six years, which have become more pronounced since July. I have been able to continue my routine of exercising, playing bridge and other games and have been able to cover up the symptoms so other people wouldn't identify a problem. I went to my general practitioner in mid-July and my doctor recommended that I take a medication for vertigo. She said that the medication would not cure the symptoms and that I could not drive for four hours after taking it. I decided that there was no purpose in taking the medicine.

Two weeks later I called the doctor because the symptoms still persisted, and she referred me to a physical therapist. I went to PT for six weeks. After five weeks, I made an appointment with the PA at my doctor's office since my doctor was out of the country. I requested a blood test to also include a Lyme's test. The PA refused to give me the Lyme test saying that, if I had Lyme disease, there was not a treatment for it. The blood test showed a deficiency in vitamin B^{12} which can cause the same symptoms that I exhibited. I took a vitamin B^{12}, but the symptoms persisted. On my next visit, I insisted that I wanted a Lyme test. I also asked to be referred to a neurologist. In November, I saw a neurologist and had a MRI and CT scan of my neck.

The blood work for Lyme did not come back until after I received my test results of the MRI and CT scan. The neurologist called and said that my MRI showed hyperintensities (lesions produced by demyelination and axonal loss that are often seen in auto immune diseases that have effects on the brain) which have been found in persons with Lyme disease and migraines. Shortly after this, my Lyme test showed that I was positive in eight out of 10 of the IgG which are the antibodies that are produced as a later response to Lyme disease. IgM are antibodies that are produced immediately after exposure. I did not have any of the IgM.

The neurologist referred me to an infectious disease doctor which was scheduled for December. He did a spinal tap to see if the disease was in my nervous system to determine whether to give me IV or oral antibiotics. The tap was normal so I started three weeks of antibiotics on Dec.

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Lyme: A Life Changing Disease

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26. I asked this doctor what I should do if the symptoms persist after the medication has ended. He said that would indicate that my symptoms are not from Lyme disease. Most medical doctors use CDC guidelines which are 20 years old and prescribe three weeks of antibiotics for all stages of the disease. There is a major controversy about treatment and diagnosis of Lyme disease. You will discover this if you start researching the subject on the web.

Many people with chronic Lyme disease will go to Lyme-literate doctors when the prescribed three weeks of antibiotics do not solve their symptoms. These clinics are usually headed by a medical doctor but use a holistic approach. They do not take insurance and can be quite costly for the client. They will frequently use a combination of antibiotics and herbal medicine.

There is currently a class action lawsuit against the Infectious Disease Society of America and various insurance companies and doctors. The website for the lawsuit is: www.courthousenews.com/wpcontent/uploads/2017/11/LymeDisease.pdf. The lawsuit gives some history about Lyme disease and treatment, *e.g.* "while many patients who contract Lyme disease can be cured with short-term antibiotic treatment, a large number of patients, up to 40%, do not respond to short-term antibiotic treatment. These patients with chronic Lyme disease require long-term antibiotic treatment for many months until the symptoms are resolved."

The website also provides some background information about the treatment of the disease:

> *Initially, the Insurance Defendants coverage for Lyme disease provided to patients covered long-term antibiotic treatment, and even paid for extended hospital stays to treat patients who did not respond to short-term antibiotic treatment. This allowed doctors to properly assess and treat patients with chronic Lyme disease and prevented the suffering and death of many thousands of Lyme disease patients. In the 1990s, the Insurance Defendants decided that treatment of Lyme disease was too expensive and "red-flagged" Lyme disease. The health insurance industry made a concerted effort to deny coverage for treatment of Lyme disease. The Insurance Defendants enlisted the help of doctors who were researching, not treating, Lyme disease. The Insurance Defendants paid these IDSA panelists large fees and together they developed arbitrary guidelines for testing for Lyme disease.*

Tulane University, Northeastern University, and the Global Lyme Alliance are some of the places doing recent research on treatment and diagnosis of chronic Lyme disease. Both Northeastern and Tulane indicate that short term treatment may not kill the bacteria.
Websites of some research articles are:

- Tulane Study,
- cos.northeastern.edu/news/kim-lewis-new-treatments-lyme-disease-grant,
- globallymealliance.org/press-releases/gla-expands-research-program-announcement-inaugural-postdoctoral-fellowships.

Other interesting web sites that give information on Lyme disease include the following:

- Canadian Lyme Disease Foundation (canlyme.com/lyme-basics/symptoms),
- International Lyme and Associated Diseases Society (www.ilads.org/lyme/treatment-guideline.php),
- Global Lyme Alliance (globallymealliance.org),
- National Institute for Health and Care Excellence (NICE) which is in the UK (www.nice.org.uk). NICE is developing a treatment protocol for Lyme disease which is to be released in April 2018.

North American Mycoflora Project

by Sarah Delong-Duhon

Mycoflora Project logo

Editor's note: *The PSMC Board has agreed to invest $300 toward participation in the Mycoflora Project – enough to process 30 specimens if we ship at least 100 at once. Sarah has also written a direct grant to the Mycoflora project to process 30 more specimens. She has also applied for a PHIL Student Success grant that would cover 50 more specimens. Dr. Rosanne Healy and PSMC Board members provided support and guidance for her Mycoflora application. We are excited about the possibility of receiving this funding and thank Sarah for her hard work and talent!* - DL

The concept for the North American Mycoflora Project started in 2012 when a meeting of science-minded fungi enthusiasts was held at Yale University and a goal was proposed: "to produce a modern, comprehensive mycoflora of macrofungi for North America".

Since the development of cheaper and simpler methods of DNA extraction and analysis, it has become painfully clear how little we know about the natural world. Even the most studied organisms in the world are having their taxonomies questioned, and it appears to me, as a pretty new mushroom enthusiast, that mycology is one of the most under-researched fields there is. It is especially concerning that Iowa does not appear to be the target of any similar mycoflora studies, even though it's exceptionally rich with fungal biodiversity – as anyone who has taken an interest in Iowa's fungi probably knows.

The Mycoflora Project has created an organized list of easy to follow protocols that make it simple to participate as a citizen scientist, while collecting valuable data and material on a local level that everyone who is interested can access and use.

Protocol for contributing:

1. Photo documentation of the fungus.
2. A corresponding observation made on MushroomObserver or iNaturalist (both very easy to use).
3. Information such as date and location, substrate, smell, bruising, or other interesting qualities.
4. Collecting the specimen, and later collecting a small amount of tissue to place in a provided tube.
5. Sending the tube to one of two facilities that will perform DNA extraction and analysis on it.
6. Using your sequence data to compare with other specimens!

The only limiting factors for the project would be manpower and expertise (provided by participating club members), and funds to pay for sequencing ($10 per specimen if 100 specimens are processed at once). At this time we're waiting to find out about applications I made.

Observations can be documented with either MushroomObserver or iNaturalist, but the best feature of iNaturalist is that it is available as an app on your phone, and is by far the easiest way to get GPS data. Anyone using the iNaturalist app will need to set up an account. To get an accurate reading, while you are in the process of making an observation with the app, make sure to hit the location info box and select "get current location" at least once, so the app is forced to make a new query and doesn't rely on data from 5 minutes ago. iNaturalist is also useful in that it offers suggestions to you as you begin to type a name into the identification box, making it quicker to find the genus or species you are looking for. It also offers suggestions based on analyzing the color and other features from the photo(s) you took, but please take these suggestions with a grain of salt as they lean heavily towards the most common and most distinctive fungi, such as Chicken of the Woods (*Laetiporus sulfureus*) and Turkey Tail (*Trametes versicolor*).

The majority of projects created for the Mycoflora Project thus far have been sponsored by mycological associations where appropriate, and it's a great that the Prairie States Mushroom Club will sponsor a project for the state of Iowa, as this will be the first one! The club already holds forays for discovering interesting fungi, so encouraging members to participate in the Mycoflora Project will be an easy matter. It's not only possible but also likely that we could discover new or previously undescribed species in the state of Iowa, and make our mark on the current understanding of fungal biodiversity in our region.

Getting The Most Out of Your Mycoflora Project

by Rosanne Healy

Here are some possible results of your MycoFlora project - assuming your sequences are clean (they won't all be.)

1) You will end up with lots of interesting sequences of what you collect, though be prepared that not all will work.
2) Some sequences will match with something uploaded to *GenBank that has a name associated with it (though the name may or may not be accurate). If the named sequence came from a lab that is working on that group of fungi, you can probably trust that it is accurate. For example, if you get an *Inocybe* sequence back with a name that came out of the Matheny Lab in Tennessee, you can trust it. I am looking into compiling a list of labs and what they are working on. Sometimes there is little information associated with a particular sequence. However, there is usually a paper associated with it that can in some cases be downloaded. If you can download it, you can see where it came from, and who identified it, which will help you to decide whether the name can be trusted. For example, if the sequence came from a collection geographically close to yours (say yours is from Iowa, and the sequence is from something collected in Wisconsin), chances are good that you have the same thing if the sequence similarity is high (97-100% similar with high coverage). If a particular "hit" is less than 97% similar, or was collected in a far away place (like China), chances are that your collection is not the same species, but may be closely related. Although most things are not found everywhere, some species certainly appear to have a wide distribution. In most cases, though, you should expect Iowa species to be most highly similar to things collected in the temperate eastern U.S.
3) You will certainly end up with things that are not close to anything else (less than 97% similar). This can be interpreted in several ways:
   a) It is from a described species that is not on GenBank because nobody has sequenced it before, so you need to try to key it out.
   b) If it doesn't key out, it doesn't mean it wasn't described, it may mean it hasn't been included in a key. This is where things can get tricky, and it may save a lot of time to turn to an expert in the group, who will likely be happy to help if you have sequences and a photo (again - a good reason to compile a list of labs with what they are working on).
   c) The lab that you are working with can help you determine if it is a new species. In this case, I encourage you to get involved in the naming and describing of the species.

In many cases, you will end up generating sequences that will be welcomed by labs (sometimes at great distances from Iowa) that are working out a particular group of fungi (*Amanita* for example). This is where the intersection between the mushroom clubs and the fungal systematics researchers becomes critical. For previously described species, you will be helping to document distribution and seasonal fruiting. In some cases, you may rediscover something that was described long ago, but forgotten. There are a great many things that were described 50 or more years ago, and we only know of them from the description, perhaps because they were rare, or because the description was not terribly useful. It takes an enormous amount of time to track down the molecular identity of species that were described more than 50 years ago, because old specimens (which most mushroom **holotypes are) are very difficult to impossible to sequence. In those cases, a good solution is to go back to where the type was collected and try to find a fresh collection, photograph, sequence, and in collaboration with an expert who can verify it, designate the fresh collection as an ***epitype to stand in for the holotype that is too old and crumbly, if not completely missing, to be useful for clearly showing what that particular described species is. After the epitype sequence is generated, it becomes a critical anchor point in ****phylogenetic analyses that infer relationships. These inferences are how new species are ferreted out. One of the bottlenecks for describing new species is figuring out what the previously described things are first, in order to compare to make certain that what you think is a new species really is a new species. Therefore, recollecting and sequencing things that were previously described, but for which we have a poor concept, would be an enormous contribution to fungal diversity studies. And finally, you are very likely to find

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Getting The Most Out...

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some things that have not been previously described. These will be things that were overlooked in the past, things that were buried under an overly broad concept like *Armillaria mellea* and *Cantharellus cibarius*, or things that were previously thought to have a much larger distribution than they actually have, like *Boletus edulis* and *Russula emetica*.

Sampling for DNA

If I know that I will be sampling anything for DNA, I bring a cooler of ice with me (leave it in the car, and put my samples on it after each stop. I put samples in separate containers with lids, or separate wax paper containers. I try to clean off the soil as much as possible for each sample before putting it in the container, and if necessary, hold it in place with a leaf or tissue paper, so that it doesn't get sand and soil on the gills or other parts that I might sample from. I keep these things on ice because I don't want anything else to grow on it, and mushy things are hard to sample as well as make poor voucher specimens. The same day, I sample for DNA. If I have too many specimens for one day, I sample from the most fragile things first (Amanita, Coprinoid, Mycena, boletes), and save the more robust things in a refrigerator until the next day. For sampling, I have at the ready a candle, matches, sterile alcohol swabs (you can get these from a pharmacy), razor blades, and tweezers. I use an alcohol swab to clean off and disinfect my tweezers and razor blade, then run them through a flame, keeping all parts that will be involved in the sampling from touching anything else. I use one end of the razor blade to open a fleshy part of the fungus, like the stem or the cap (if it is big enough), and then use tweezers to grab tissue from beneath the surface, being careful not to swipe any soil or other contaminants in the process. Put the tissue directly into the lysing buffer solution. Some samples will not have any fleshy parts to sample in this way. In that case, I sample from the gills (even though the site asks you to put the stem in and not the gills). I find that gills are often cleaner than stem tissue. In this case, make sure you get multiple fruit bodies from the same location so that there is at least one specimen that is not marred in this way. However, be careful that they really are all the same species. Do watch for bugs because these can bring other fungal contaminants with them. Don't sample from infested specimens. In fact, if you see infested things, just leave them in the field. To recap: the best places to sample are from within fleshy stems (boletes, *Cortinarius, Russula, Hygrophorus*), within big fleshy caps, or clean gills if caps and stems are too thin. It really helps to be able to look at your material under a dissecting microscope while doing this. You will be amazed at how dirty some clean-looking things are! Dirt will inhibit PCR reactions. This is why you want to avoid it. If you have a really interesting thing that is dirty, you can clean it in water before sampling from it.

* GenBank: The NCBI genetic sequence database, an annotated collection of all publicly available DNA sequences. https://www.ncbi.nlm.nih.gov

** Holotype: the single collection designated by an author as the type representative of a species (or lesser taxon such as varieties, forms, etc.). Every species has a type, and every genus has a type species. The type specimen of the genus is the holotype of the type species for the genus. The designated type of a species can be found in the original description of a species.

*** Epitype: a specimen or illustration selected to serve as an interpretative type when the holotype, lectotype, or previously designated neotype, or all original material associated with a validly published name, is demonstrably ambiguous and cannot be critically identified

**** Phylogenetics: The study of the evolutionary history and relationships among individuals or groups of organisms

A Lyrics Change

Here's a poem from new PSMC member Moira O'Keefe sung to *The First Noel*
Also check out Moira's custom Morel T-shirt available at https://HappyHunting.threadless.com/

The First Morel

The first Morel, I finally did see, on a path in the woods, beneath an elm tree
It was just as they said...the elm was quite dead,
on a south facing hill, a stipe but no gills
Morel, Morel, Morel, Morel,
Morchel-la-la and mycorrhi-zael

The first Morel on the first day of May,
down on my knees, with my knife I did slay
no haste did I lack, as I tossed it in my sack,
I love them the same, gold, grey or black ,
Morel, Morel, Morel, Morel,
Morchel-la-la and mycorrhi-zael

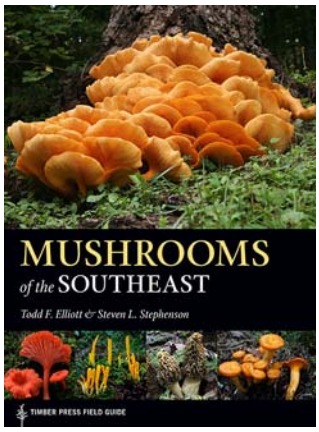
From the corner of my eyes, starting to rise,
18 or more, strewn across the forest floor
Morel, Morel, nothing quite like the rush,
Few things compare to when you find a big flush,
Morel, Morel, Morel, Morel,
Morchel-la-la and mycorrhi-zael

After a rain, it is hard to explain,
why you didn't go to work and missed the train
And then I heard a knock,
followed by the alarm clock,
asleep as I lay, until Mother's Day

Morel, Morel, Morel, Morel,
Morchel-la-la and mycorrhizal

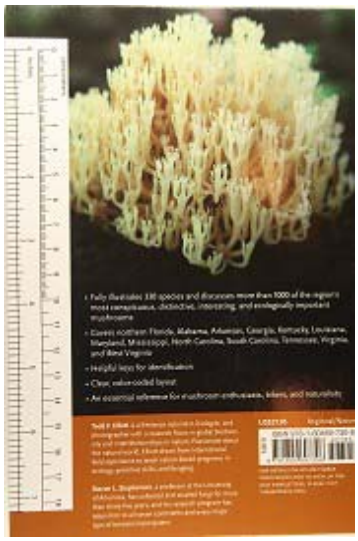
Welcome Changes in a Mushroom Field Guide

by Mike Krebill



I'm looking at a copy of **Mushrooms of the Southeast**, by Todd Elliott and Steven L. Stephenson, Timber Press, Portland, OR, 2018. It is the latest in a series of well-designed regional guides. What makes this book especially useful starts with the covers.

- While technically a paperback, the "flexibound" covers appear more durable and flexible than most, bridging the gap between a typical paperback and a hardback cover.



- The ruler on the back cover is clear, with inch markings that go right to the edge, so that one can easily measure diameters of mushroom caps and stems. In addition the ruler contains a centimeter scale, with the first 10 cm marked off in millimeters. The metric portion is essential, as dimensions of specimens in the book are exclusively metric.

- The back cover lets you know that 330 species are fully illustrated, and that more than 1000 of the region's most conspicuous species are described.

- The states in the region covered are listed. This is a major selling point. A few years ago, Timber Press did this with regional guides to foraging; it makes a profound difference to a book buyer, as a buyer wants to know "Does this include the specimens I'm likely to see in my state?" Several regions of the US are represented in the series: the Northeast and

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Welcome Changes...

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Eastern Canada, the Rocky Mountain Region, the Pacific Northwest, and now the Southeast. So far, Timber Press hasn't produced a field guide to Midwestern mushrooms, so if any of you are interested, now is the time to inquire. The fact that Kuo and Methven have claimed the title **Mushrooms of the Midwest**, and Marrone and Yerich have written **Mushrooms of the Upper Midwest,** won't deter Timber Press's plan to complete the series.

- A cover-related nicety is the use of the facing pages inside the front and the back cover. The Peterson Field Guide Series, published by Houghton Mifflin, was the first to use this approach as far back as 1937, but it is certainly appropriate and welcome here. These make reference a snap. **Inside the front** is a nicely drawn picture key to the mushroom groups used in the book: gilled mushrooms, tooth fungi, boletes and relatives, polypores and relatives, etc. **Inside the back** are illustrations of the detailed parts of a mushroom. These show a cross-section of an amanita egg, the growth-stages of a gilled mushroom from egg or button stage to a mature mushroom, so that a person can see where the partial veil or ring comes from and understand how the cap may wind up with patches from the universal veil. Other helpful illustrations show cap shapes, cap surfaces, cap margins, gill attachments, gill spacing, stalk shapes, renditions of veils on stalks, and stalk surfaces. Clearly, yet simply drawn, they assist the book user in identifying specimens.

Each mushroom group in the guide has its own color-tabbed section. Where there are keys, the keys avoid technical language. However, every species page goes into detail on characteristics so that the identity of your specimen can be confirmed or denied. The microscopic sizes and shapes of spores, and tests of chemical indicators are included. The species account page also contains information on habitat/biological role, distribution, and comments. The comments section is where edibility is discussed.

The color photos, most of which were taken by Todd Elliott, are outstanding. Since it is important to see the underside of a mushroom and its stem as well as the top of the cap, Todd includes several specimens together in the photo, with some tipped over. Photos have a razor-sharp focus, and the mushrooms are close enough to see clearly. The major distinguishing features are apparent.

Congratulations to Todd, Steven, and their publishing team at Timber Press. This is a well thought out reference, a useful book worth owning for anyone interested in the mushrooms of the Southeast US.

Morels: Changes Noted in the Last Decade

by Mike Krebill

Back in 1964, Bob Dylan wrote and sang "The Times They Are A Changin'." It was a different time, an era with its own problems to be sure, yet similar concerns persist today. Dylan's lyrics encouraged us to be aware of what was going on around us. Are we astute enough to pick up on the changes? Let's narrow our focus to a topic that may interest us as the season approaches – morels.

Here are some questions to ponder:

- Has the collecting season become earlier, perhaps due to global warming?
- Do invasive plants, like garlic mustard, have any impact on the abundance of morels?
- Due to the continuing loss of elms from Dutch elm disease, have you sensed that the number of morels declined in the last decade?
- In the last 10 years, have humans had a discernible impact on morel populations? If so, how?
- With the advent of the emerald ash borer, are morels now more likely to be found around dying ash trees?
- Have you found a technique in the last decade for putting more morels in your basket that seems reliable?

I sent the questions to PSMC member Marty Augustine, and here is his emailed response. Do you agree with him?

(cont. on pg. 11)

Morels: Changes Noted...

(cont. from pg. 10)

Some thoughts off the top of my head…

When I was a kid, May 1 was questionable for morel collecting. I could normally find enough 1" tall grays to make a single meal. As you know a few years back we were collecting morels the last week of March. Over all I believe global warming has advanced the morel season one or two weeks in the last 50 years.

I have only noticed that garlic mustard makes it harder to find the morels … the morels don't seem to mind growing in a high garlic mustard area.

Due to the fact that elm trees are still reproducing the Dutch elm disease doesn't seem to be wiping out all elms. Finding an area that is well populated with saplings as well as more mature elms is more difficult. That makes a favorite sustainable morel spot harder to come by. The invasive nature of maple trees is as much a problem in this situation as Dutch elm disease is. It seems to me the maple tree saplings grow faster and therefore canopy the elms before they can get established.

The only true human impact I can see is the trampling of woodland vegetation. Picking grays before they can mature and produce spores may be a problem but that doesn't hurt the mycelium. Plenty of morels seem to make it to maturity for sporulation to populate new areas.

I really don't know enough about morels and ash trees to comment on their possible symbiotic relationship. The best way to put more morels in your basket is to buy 300 acres of timber and guard it against invaders. The next best is probably do what you did… retire. That gives you much more time to be out wondering in the woods picking mushrooms. I can't wait until I can do that!

– Marty Augustine

Last week, I attended the Spring Workshop of the Iowa Association of Naturalists. We met in a break room and two naturalists expressed their views on morel numbers declining. One told me that she lived on an 80-acre farm. They practiced sustainable harvesting of morels, which to her meant always leaving some morels unpicked, and using onion sacks to allow the spores to fall out. They could count on harvesting 4 pounds every year. Then, they made the decision to run cattle and that was the end of the morels. She assumed it was due to compaction, but many people believe cattle may feed on morels, too. The other person believes that the decline in morel numbers that he has seen is due to more people hunting them. And then, they take a photo with their cell phone and post it to social media and hundreds of people go looking for morels. It used to be that you'd never see morels being sold at Farmers Markets. Last year, Walmart bought, then sold morels brought to them by local hunters.

A person in Southeast Iowa told me just last week about encountering a mother lode in 2017, a year after a windstorm blew down a swath of cottonwood trees on their property. He and relatives collected 100 pounds of morels in April and May.

I spent 30 years teaching in Michigan, and have seen the unbelievable loss of ash trees due to the emerald ash borer. We sometimes found a few morels around the larger ash trees, but have not seen the same kind of correlation that occurs when an elm tree starts dying and morels pop up around it.

A friend cleared a path for his golf cart through his woods so that he and his wife may hunt morels that way. When I asked about changes they have witnessed in the last decade of collecting, he said they took my advice several years ago, and switched from a plastic bag to an onion sack for carrying the morels. Now they find a goodly crop of morels along the cart path.

A couple more items worth sharing…. over a decade of observations by a professor of environmental science in Pakistan laid the groundwork for a nicely written article titled The Disappearing Morel Mushrooms of Pakistan. (https://www.thethirdpole.net/2016/03/15/the-disappearing-morel-mushrooms-of-pakistan/) It shows the impact of global warming and deforestation on morel populations, and how this has affected the livelihood of citizens. It is a fascinating read.

Morel sightings map for 2018:
https://www.thegreatmorel.com/sightings/

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http://iowamushroom.org

THINK SPRING!!!