

A Publication of the
Boston Mycological Club
Since 1897

Volume 73, No. 1.
April 2018

The Bulletin



MARSHALL DEUTSCH • GARY LINCOFF • STUCK LIKE GLUE
SUPER CUP FUNGUS FORAY • HELP FUNGI • MYCOBUTTONS
KOMBUCHA? • LOOKING FOR FUNGI • TWO EVOLUTIONS

*A publication of the
Boston Mycological
Club prepared
diligently, at times
relentlessly, by your
faithful Editorial
Board*

Zaac Chaves
Editor-in-chief

Susan Goldhor
Editorial advisor

Lawrence Millman
Editorial advisor

CONTENT
WANTED
Generously
submit your
contributions to:
BulletinBMC
@gmail.com



This has been a difficult issue to compose due to the passing of two enormously important people in our community. Marshall Deutsch, who edited *The Bulletin* for more than a decade, died after ninety-six very full years. And then Gary Lincoff, an influential amateur mycologist who had a profound effect on my own learning, died at the far too early age of seventy-five following a stroke. Their passings are a tremendous loss to us all, yet we are grateful for the incredible amount they gave us throughout their lives.

When reprinting Marshall's obituary we were astonished to learn all of the non-mycological things he did. I think you will be too. It is enormously touching to hear reflections from some of regarding Gary's passing. We are continuing to invite reflections and stories of Gary and Marshall into the next issue. Please don't hesitate to share more thoughts and stories that come up.

And yet, despite this all, our publication still burgeons with articles and studies, now in your hands. It is inspiring.

We encourage submissions from any and all mycophiles and we make a concerted effort to publish from first time contributors.

The cover image is *Lachnelulla resinaria* var. *resinaria* photographed by Joe Warfel during the Super Cup Fungus Walk. You can read more about this remarkable creature in James K. Mitchell's article on page sixteen and more about the Super Cup Fungus Foray in Lawrence Millman's article on page twenty-four.

© All Rights Reserved.

Credits

Printed locally by South Shore Printing of Scituate, MA.

All uncredited images depicted are sourced from BMC archives and artists/photographers who made an explicit request to remain anonymous. To source any material please reach out to original authors if specified. Otherwise items may not be used unless explicitly stated so in caption.

Project Gutenberg (PG) sourced images include the following caption:

This eBook is for the use of anyone anywhere in the United States and most other parts of the world at no cost and with almost no restrictions whatsoever. You may copy it, give it away or re-use it under the terms of the Project Gutenberg License included with this eBook or online at www.gutenberg.org. If you are not located in the United States, you'll have to check the laws of the country where you are located before using this ebook.

The Bulletin

APRIL 2018

- 4 Letters to the Editor
- 6 Marshall Emanuel Deutsch
Obituary Aug 17, 1921 - Dec 23, 2017
- 8 Gary Lincoff
Obituary Oct 3, 1942 - Mar 16, 2018
- 14 *Coltricia montagnei*
Who's in a Name
By John Dawson
- 16 Stuck Like Glue: Fungi That Live on Conifer Resin
By James K. Mitchell
- 22 Help Our Fungal Friends
By Trish Twining, w/ editorial rev by Russ Cohen
- 24 Super Cup Fungus Foray
By Lawrence Millman
- 26 Looking for Fungi in All the Wrong Places
By David Babik
- 30 Corticioid Facts
By Lawrence Millman
- 32 Kombucha: Do You Know What You're Drinking?
By Susan Goldhor
- 38 Mycobuttonology
By Marie Elwyn
- 40 A Tale of Two Evolutions
David Hibbett Lectures the BMC
By David Babik
- 46 *Upcoming Events*



Letters To the Editor

Dear Zaac,

Many thanks. This is a great issue, several bars above the usual across the country, and even a notch or two above your own august publication. Did you guys get a new air purifier for the Editorial Suites, or something? Whatever it is, keep it up!

Cheers!

Andrus Voitk

PS If it's really the air purifier, where did you buy it and what make?

Hi Andrus,

Thank you kindly for your compliments. It's likely our authorship will be delighted by your note and our editors are grateful that you shared. Also thank you for your work producing *Omphalina* - a truly spectacular and important series.

I will see what we can do to catalog our appliances in a later issue.

Gratefully,

Zaac

Dear Bulletin,

This summer while on a section hike of the Pacific Crest Trail in Northern California I had an interesting encounter with some wildlife that may (or may not) have something to do with fungi. I had stopped to a break next to a log when I noticed a bird sitting perched just a foot away from me. It was a Golden Crowned Kinglet, and he appeared to be in terrible shape. The little thing could barely maintain his perch, he kept tilting like a drunk would. The bird had incredibly labored breathing, he appeared to be in his death-throes.

I sat quietly next to the bird for a while, unable to offer any assistance I tried to maintain respectful fellowship to his passing.

I have attached some photos I took, the very first photo shows the bird was perched above a polypore fungus growing on the end of this log. Sorry it is not of better quality, I was concentrating on the Kinglet, not the mushroom. I do not know the species, but these particular mushrooms seemed very common on fallen conifers and stumps in the area. The remarkable thing about the fungus was that it was sweating out an incredible amount of liquid on what was a very hot and dust dry day. I actually formed a wet spot on the ground underneath, when the rest of the forest was tinder dry.

Eventually I headed a considerable distance downhill from the bird in search of a spring to replenish my own depleted water supply. When I returned a half hour later I expected to find the bird had expired. To my surprise I found the bird somewhat recovered, his breathing had improved, he could perch upright. After another ten minutes or so he seemed to fully recover his senses and ultimately flew off.

Then it occurred to me, perhaps the bird have been inebriated. The Kinglet did seem to be in a drunken stupor. Did the Kinglet come to drink of the liquid of the mushroom and the excreted fluid contained a narcotic? Could this be more than a random interaction, could attracting woodland animals be a way for the fungi to spread its spores? Is this mushroom the neighborhood drug dealer, and the Golden-crowned Kinglet its willing junkie?

I don't have any answers, but I would be interested to hear if anyone has seen anything like this before.

Scott Stimpson



Dear Editor.

I have been in contact with Marcia Jacob, famous for her holiday fruitcakes, and for all the volunteer work she has done for your club. She is one of the nicest people I have ever met and, if you think it is appropriate, can you recognize her retirement in *The Bulletin*, which she's been stuffing into envelopes and mailing for so many years. People do love to hold books in their hands. And trees can be regrown. Without them we would have no mushrooms. All we need are wise people to keep nature in balance; it is our duty and our holy obligation. Greg

Greg Doyle at South Shore Printing actually produces our Bulletin, and we are grateful for the time and effort he puts into each issue. As he notes, the Bulletin leaves his presses and continues on its way to you, thanks to Marcia Jacob, and I for one cannot thank her enough. Thanks, Greg, for sending your gratitude Marcia's way! Zaac



Marshall Deutsch, who served more than a decade editing *The Bulletin*, is picture with his wife Judy Deutsch in Santa Fe a couple years ago.
Photograph kindly mailed by Judy Deutsch

Marshall Emanuel Deutsch

Aug 17, 1921 - Dec 23, 2017

Text from <https://www.danielsfuneral.com/notices/Marshall-Deutsch>

Dr. Marshall Emanuel Deutsch, 96, died on December 23. He was born in New York City, and recently moved to Corrales, NM, after 51 years in Sudbury, MA, and earlier times in New Jersey, Detroit, Michigan, and New York.

A graduate of DeWitt Clinton High School and the City College of New York, he served in the Army Air Forces in World War II (for which he was awarded an Air Medal) and received his Ph.D. in physiological studies from New York University in 1951.

Marshall had a varied career, but considered himself primarily an inventor of medical diagnostic tests, and held 60 patents, including two patents that introduced a simplified automatic system of assay, later applied to home pregnancy tests and referred to in hundreds of subsequent patents by others.

An extremely witty person to the end, Marshall was a solver of difficult puzzles including *The Nation's* puns and anagrams puzzles and *The New York Times* diagramless ones, a folk dancer for more than seventy years, a linguist, a lover of Mozart operas, and, for more than twelve years, a columnist for and editor of the Boston Mycological Society's *Bulletin*. He was a traveler to twenty-five countries (in part to work for the US Agency for International Development and the UN Capital Development Fund), the author of many scientific and non-scientific articles and letters, and especially proud of his letters in the *Journal of the American Medical Association*.

Marshall produced and presented more than 200 radio shows on nutrition and science that were broadcast over WBAI and KPFA, and wrote articles on nutrition for *The Realist*. In 1955, he founded the Morristown, NJ Unitarian fellowship, which still flourishes.

An American Association for the Advancement of Science Life Member, he also was a member of the International Network of Cholesterol Skeptics, which researched the impact of cholesterol and debunked the myth that it was bad—a myth finally losing credence.

He is survived by his beloved wife of 70 years Reverend Judith Deutsch and their three adult children. A memorial service for Marshall will be held on Saturday, April 28 at 1 PM at the First Parish Church in Sudbury, MA. Marshall was a member of both congregations.





Gary Lincoff

Oct 3, 1942 - Mar 16, 2018

On March 16, Gary Lincoff died. He was giving talks and active up until Monday, when he had a massive stroke, went into a coma and died. He was seventy-five years old, with the curiosity and energy of a much, much younger person – say, about eleven ~ but with a lot more knowledge and wisdom. The last time I'd seen him and asked him about coming to Boston, he told me he was pretty tied up. But he subsequently asked Larry Millman why the BMC never invited him, which led me to hope we might lure him here next year. Now, next year will never come. I wish I'd asked him years ago.

Gary was interested in everything. After meeting him for the first time, my husband invited him to a talk he was giving on nuclear disarmament. Gary trudged uptown on a cold rainy day and attended the talk. And he could make everything interesting. I recently announced publicly that if Gary gave a talk about blackboard erasers, I'd go, and I meant it.

Gary's knowledge was vast and he was a mesmerizing speaker, able to educate and/or entertain, according to the occasion. Actually, Gary never educated without entertaining and he never entertained without educating. The best mushroom ID book is Gary's Audubon Guide. If you don't own this book, consider buying a copy. But here's a very different side of Gary's quest for knowledge; a short piece he wrote on his trips (I use this word advisedly) to Siberia to meet shamans and learn more about *Amanita muscaria*. Just go to: http://nemf1.homestead.com/files/various/muscaria/fly_agaric_text.html and please read it to the end.

It's an understatement to say Gary will be greatly missed.

Susan Goldhor

On the first of the many times I stayed with Gary, he put me in the coldest room in his W. 95th Street apartment, saying that it was appropriate for an Arctic aficionado like me. Given my interest in the Arctic, he also created a menu of items we weren't having for dinner that night, starting with the Appetizer, seal tartare, and ending with whale blubber ice cream. I will miss him more than mere words can say.

Lawrence Millman

I was Gary's Facebook friend for years ~ I not only enjoyed seeing the photos of his urban and far-flung global forays and reading the descriptions of what discoveries were made, but I really enjoyed his many posts quoting Thoreau. I met him in real life at NEMF 2016 ~ one of the few lecturers who remembered to aim the remote in the right direction without constant prompting from me. I greatly admired and respected his intelligent analysis of the mushrooms, and his remarkable sense of humor that flavored everything he said.

Gary loved the mushrooms ~ all of them, even the most toxic, and his enthusiasm and passion were wonderfully infectious. I'm really sorry there won't be any more books by him for us to read.

Marsha Browne

BMC Identification Committee Member

Gary sat at our table during the banquet at NEMF in Fitchburg. He told us a story of how John Cage almost wiped out the who's who of the 1960s NY art scene by not budging on serving a basketful of Jack O'Lanterns, *Omphalotus illudens*, (which he insisted were chanterelles) but luckily Gary switched them out with the real thing & none were the wiser & all were the "liver."

Debbie Shore, Scott Shaffer, Maureen Byrnes

Even though I had a collection of costlier and glossier mushroom books I considered Gary's Audubon Society Field Guide to North American Mushrooms my Bible on the subject and told Gary so in August 1993. He asked me if I had my copy with me. I did and told him he had autographed it years ago. When I handed it to him he added, "If this is really your Bible, I hope you pray a lot!"

Jura Strimaitis



Gary Lincoff and Russ Cohen September 1995
by Irene Lincoff

I would say without elaboration – “What happens in Telluride stays in Telluride.” I don’t have colorful recollections about shrooming with Gary. Trying and failing to make complicated scheduling arrangements was usual.

Once Joan and I were snowed in NYC staying with Gary and Irene at their apartment near Zabar’s – no one in NYC owns a shovel – fell on ice hailing a cab to go to opera – broke my wrist.

Al Ferry

The occasion was a weekend course on mushroom hunting, taught by Gary, sponsored by the Appalachian Mountain Club, and hosted at the AMC's Mohican Outdoor Center.

I had not as yet met Gary, but as I was a big fan of his mushroom field guide (the one in the National Audubon Society Series, with the maroon leatherette cover, and still one of my favorite mushroom books), I was really looking forward to this course.

Gary had brought his wife Irene and their son Noah to spend the entire weekend together while he taught the course.

As it happened, however, northwestern NJ was in the midst of a really dry season, and mushrooms were quite scarce, and what we found were mainly in the stream bottoms, where a bit of moisture was seeping out from the banks.

Also - there was hardly any enrollment in the class (perhaps because of the dry conditions): just me, and one young couple, who left to do something else partway through the weekend, thereby bestowing me with a 1:1 audience with Gary for the remainder of the weekend.

One of few mushroom species we were successful in finding was the Blusher, *Amanita rubescens*. Gary offered to cook some up for me. Needless to say, I knew I could rely on his I.D. expertise. Nevertheless, I was unable to override my longstanding wariness about *Amanitas*, and I politely declined his offer. (I have yet to ever eat an *Amanita*.)

I did, however, ask Gary to sign my copy of his Audubon mushroom book, which I am grateful he did.

And while Gary was willing to continue the class for the entire weekend with me as his only student, I released him from that obligation, allowing him to enjoy his family time over the remainder of the weekend.

One final item to share: on this, and several subsequent occasions, upon knowing my interest in edible wild plants, Gary disclosed that, while (just about) everyone associated him with wild mushrooms, he was equally (if not more) passionate about picking and eating wild berries and other wild fruit, and said that he and Irene would really enjoy their summer fruit-picking expeditions.

Thanks for the opportunity to share these remembrances.

Russ Cohen

Gary was the Pied Piper of amateur mycology.

Andrea Ignatoff



Gary Lincoff Leading a Foray

By Ildar Sagdejev (Specious) (Own work) [GFDL (<http://www.gnu.org/copyleft/fdl.html>) or CC BY-SA 4.0-3.0-2.5-2.0-1.0 (<https://creativecommons.org/licenses/by-sa/4.0-3.0-2.5-2.0-1.0>)], via Wikimedia Commons

In the Spring of 2011 I was on a morning foray with Gary when I found a particularly tiny mushroom unlike any I had yet known. The mushroom appeared as a tiny orange speck. It was nestled within an acorn cap. Gary diagnosed this for me as *Arachnopeziza aurelia* and I remember him being particularly excited. I can still feel his profound enthusiasm filling me with encouragement. He always had a way of inspiring people like this. I can still hear his vivid exclamation “How did you see that?!”

I am so grateful to have known Gary and expect my encounters with this species to be with many mixed emotions. I learned many mushrooms through Gary and I better knew him through these organisms.

Zaac Chaves

We all think of mushrooms as an ephemeral piece of nature that can come and go in the blink of an eye.

Sometimes we forget that we are not so different from the fungi we seek.

Gary, you will be missed but live on in our memories.

Thus shall ye think of all this fleeting world:
A star at dawn, a bubble in a stream;
A flash of lightning in a summer cloud,
A flickering lamp, a phantom, and a dream.

The Buddha

David Babik

When I'd visit Gary in New York City, he'd often remark on my inability to find my way around the Big Apple. With lousy navigational skills, he'd ask me how I could spend so much time in the Arctic and not disappear forever. I told him that the landscape in the Arctic is visible, whereas the landscape in New York is obscured by skyscrapers.

But those skyscrapers are our landscape, he'd exclaim, pointing to one, then another of them enthusiastically.

Lawrence Millman

Aquip he said, Which do you love more, the mushroom or the tree?

Thank you Gary.
Marie Elwyn

At the NEMF in Fitchburg we suffered such a severe drought I remember Gary saying "Sticks! Sticks! Everybody go out there and get sticks! At least we'll have crusts and asco's to look at."

Do you know how hard it is to organize ID tables with four foot logs and huge branches on them?

I will always remember the times I spent with Gary at NAMA, NEMF and in Colorado at Telluride having wine and just talking about life. He was such a wonderful, genuine and intelligent man who was always teaching. Instead of telling you the species name, he would often ask you questions to guide you to decipher it yourself. The myco-world will truly not be the same without him.

Gary Gilbert

Coltricia montagnei

Who's in a Name

By John Dawson

C*oltricia montagnei* (Fries) Murrill is an uncommon but distinctive terrestrial polypore, whose pores, as described in Bessettes' and Fischer's *Mushrooms of Northeastern North America* are "angular and radially elongated near the stalk", but form "conspicuously concentric gill-like plates toward the margin". It fruits under hardwoods from July to October. The epithet *montagnei* honors Jean Pierre François Camille Montagne, a French military surgeon who, after retiring from the French army at age 48, devoted the rest of his life to the study of cryptogamic botany (mosses, algae, lichens, and fungi).

Montagne was born at Vaudoy en Seine et Marne on February 15, 1784. When he was just eight years old his father, an obstetric surgeon, died of typhus, and at age 14 young Jean Pierre enlisted in the marines. He participated in Napoleon's Egyptian campaign, and after the fall of Alexandria in 1802 he returned to France and began medical studies in Paris. It was there that his interest in botany was awakened, through contact with professors from the natural history museum.

In 1804 Montagne entered the military health service, serving first at a military hospital in Boulogne-sur-Mer and later in Italy, where he attained the rank of surgeon major. In 1815 he became leader of the health service within the Royal Army, but was captured by the Germans and imprisoned for a year. He then returned to Paris, and rejoined the army three years later. He served for a time with a regiment at Saint-Omer, where he met a doctor who was engaged in the study of cryptogams. Thereafter Montagne pursued field studies in botany in parallel with his military duties.

Montagne was subsequently deployed to Spain, and was awarded the légion d'honneur for his service there in the battle of Pampelune. He then traveled around France, ending up as director of the military hospital in Sedan, where he worked from 1830 until his retirement in 1832.

During his military service Montagne came into contact with many naturalists with whom he later corresponded on botanical matters. As a result of his broad knowledge of languages, his collecting, and his publications in scientific journals (especially the *Annales des science naturelle*) he became widely known both within and outside of France, and was elected a member of the French Academy of Sciences in 1853.

With his British contemporary Miles Joseph Berkeley (profiled in the second installment of this series), Montagne is regarded as a pioneer in the study of fungi from what were then considered "exotic"

locales, such as Algeria, Brazil, Chile, and North America. He is also regarded as a precursor of the field of plant pathology, on the basis of his discovery of the potato blight fungus *Phytophthora infestans* and his studies of fungal pathogens of nut trees. He contributed to various important botanical works, including *Flora Chilena*, *Exploration scientifique de l'Algérie*, and *Charles d'Orbigny's Dictionnaire d'Histoire Naturelle*, and in 1856 published a compilation *Sylloge Plantarum Cryptogamarum* of the descriptions he had given of 100 new genera and 1700 new species of cryptogams.

Montagne suffered a crippling stroke in 1860 and died of another on December 5, 1866.

Final note: Formerly, *Coltricia montagnei* was known as *Coltricia montagnei* var. *greenei*, *Cyclomyces greenei*, and Green's polypore – all involving a second eponym for someone named Green(e). In Ron Myers's myco-etymological dictionary it is speculated that the individual in question may have been the early American botanist Benjamin Daniel Greene, about whom interested readers may consult the quaintly amusing obituary by Asa Gray that appeared on p. 449 of the *American Journal of Science and Arts*, ser. 2, vol. xxxv (1863).

Sources: Information in this article is taken from the entry on Montagne in the German reference work *Die Geschichte der Mykologie* [The History of Mycology] by Heinrich Dörfelt and Heine Heklau, and from the online source <http://botanique.univ-lille2.fr/fr/l-herbier-de-la-faculte/l-herbier-historique/montagne-camille-jean-pierre-francois.html> (in French).



Jean Pierre François Camille Montagne

Wellcome Library no. 6992i Photo number: V0004078, CC BY-SA 2.0, https://commons.wikimedia.org/wiki/File:3AJean-Fran%C3%A7ois-Camille_Montagne_-_Lithograph_by_C._Fuhr%2C_1866%2C_Wellcome_V0004078.jpg via Wikimedia Commons





Stuck Like Glue: Fungi That Live on

Conifer Resin

By James K. Mitchell

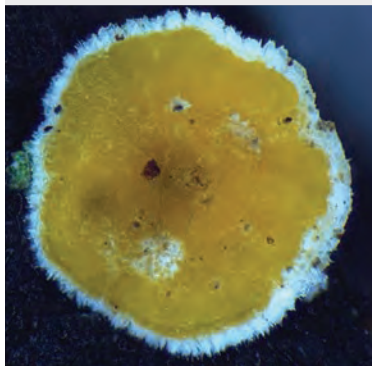
Conifers produce resins not only to discourage herbivory, but also to seal off damaged areas to prevent pathogens from entering the plant. When fresh, this resin is extremely sticky, flowing slowly and trapping most things that touch it. As it dries, it begins to polymerize, forming a hard, external crust; the interior becomes thicker or crystallizes and remains very sticky. It is reasonable to anticipate that this substrate is extremely inhospitable for most organisms, including fungi. Colonization of young resin could result in engulfment and death, and colonization of older resin is complicated due to its hard surface. In both cases, the resin acids and terpenes are not particularly nutritious and are likely toxic - challenges which should be ample deterrents to fungal establishment.

However, upon closer inspection, one can see that this is not the case. A few species of fairly colorful cup-fungi, such as *Lachnellula resinarum* (white and yellow), *Claussenomyces kirschsteinianus* (blue), *Ciliolarina spp.* (whitish), and *Sarea resinae* (orange), are small but relatively conspicuous. One might also see a few small green lichens growing, and with the aid of a lens or microscope, some less colorful ascomycetes. *Claussenomyces olivaceus* (dark olive cups), *Sarea difformis* (black cups), a number of calicioid fungi and lichens (black or brown pins), and various mytilinioid fungi (black clamshells) are also frequently found, as well as fuzzy patches of various brown or black molds. For most of the surface area, though, not much activity is evident to the naked eye, or even the eye aided by a stereomicroscope. To see further, we use a and requires the use of a compound microscope.

Continued on page 18

See Front Cover for a Photograph of *Lachnellula resinarum var. resinarum*

Some Typical Local Resiniculous Fungi

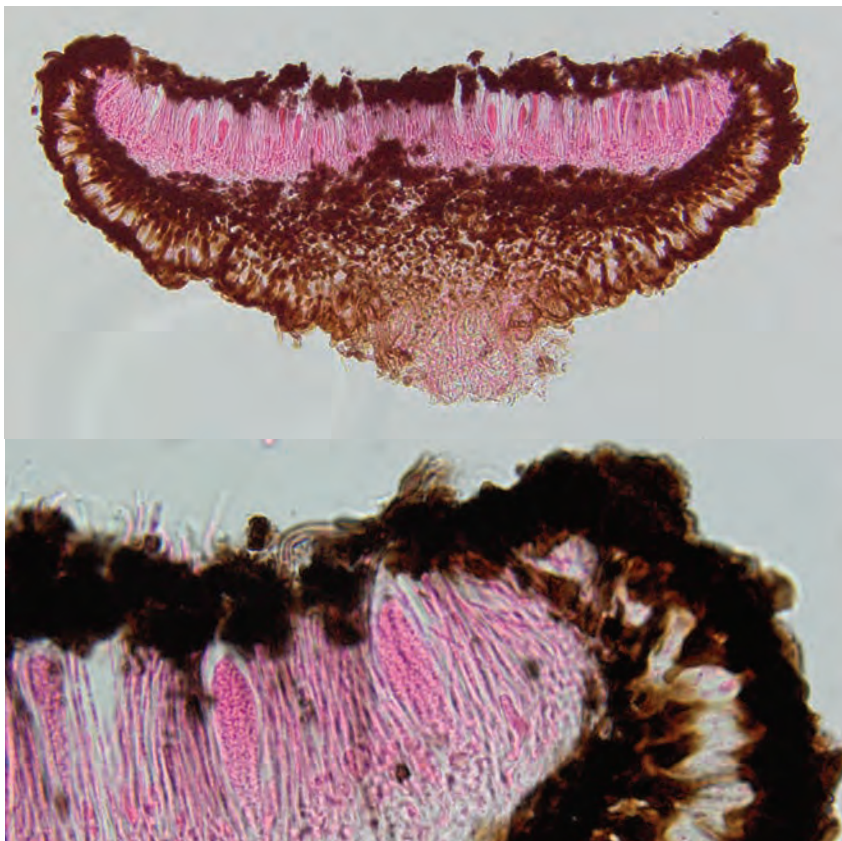


Lachnellula resinaria
photographed by Luis Quijada



The small black cups in the lower right are young apothecia of *Claussenomyces olivaceus*, and the two larger black clamshell fungi in the upper left are unidentified mytilinioid fungi.

A 15 μm thick section of *Sarea difformis* mounted in a solution of eosin and glycerol. Instead of just the asci, it can be seen here that the Eosin stains the entire hymenium.



An asci closeup *Sarea* specimen. The asci are clearly polysporous (contain many spores).

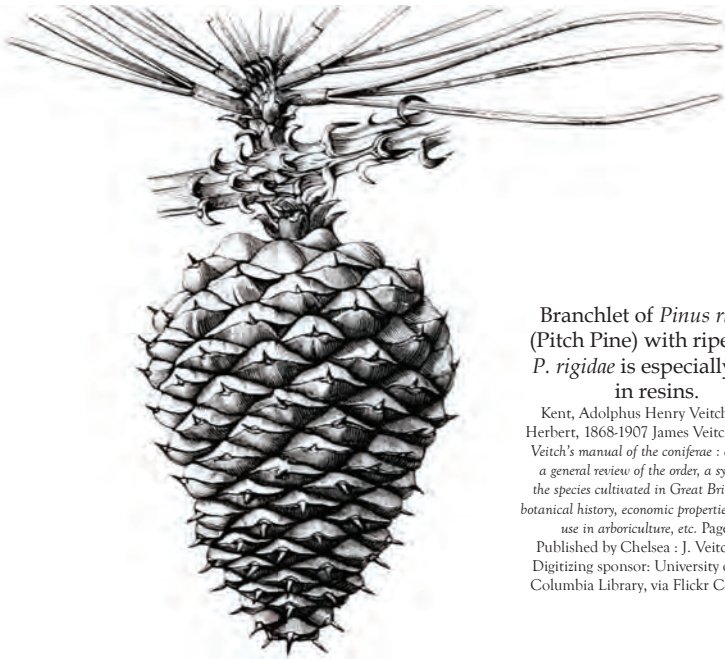
For closer observation, a patch of resin is selected and frozen on the stage of a freezing microtome; once frozen, it is sliced very thinly and placed on a microscope slide. Even having seen the fungi growing on the surface, what we see under the microscope is still somewhat surprising: the entire surface of the resin is clearly colonized by fungal hyphae penetrating hundreds of microns into the crust, and sometimes even into the liquid resin below. Despite what we may have anticipated, fungi are flourishing on this substrate, and appear to preferentially seek it out. But how is this possible, and why? Unfortunately, these questions are probably not easy to answer in a broad sense. Adaptation to this resinous substrate is probably an example of convergent evolution, since the fungi mentioned above are mostly not very closely related. It might be easier to explore these questions for just one or two related fungi rather than the handful of aforementioned examples.

Let us focus now on the two fungi in the genus *Sarea*, both of which are only ever found on resin (the other aforementioned species are mostly in genera that are not solely resinicolous).¹ *Sarea* is also in a unique position of being *Incertae Sedis* – ‘of unknown placement’ – within the subphylum Pezizomycotina², which may be indicative of a completely new evolutionary lineage specialized to live on resin. These two species are also present on a wide variety of trees in both the pine and cypress families distributed across the northern hemisphere, suggesting a general adaptation to this habitat. Finally, a fair amount of research has documented these species in their taxonomy, distribution and habitat. All of these facts seem to support this genus as a prime candidate for study. It may come as no great surprise that this is the genus I am currently most actively investigating.

Before studying their ecology or biochemistry in depth, I am attempting to better understand these two species by searching for them in the field on various host trees in different environments, and studying them with both morphological and molecular methods. I have collected from a variety of locations primarily within New England and California, including the Boston Harbor Islands (USNPS), Appleton Farm Grass Rides (TTOR), the Eagle Hill Institute, Estabrook Woods (HU), Arnold Arboretum (AA), Harvard Forest (HF), Chickering Bog and Ell

1 Hawksworth, D. L. and Sherwood, Martha A. A reassessment of three widespread resinicolous discomycetes. *Can. J. Bot.* 59: 357-372 (1981).

2 Garrido-Benavent, I. Contribución al conocimiento del género *Sarea* Fr. (Ascomycota, Incertae Sedis) en la península Ibérica. *Errotari* 12: 42-51 (2015).



Branchlet of *Pinus rigidae* (Pitch Pine) with ripe cone. *P. rigidae* is especially high in resins.

Kent, Adolphus Henry Veitch, James Herbert, 1868-1907 James Veitch & Sons, *Veitch's manual of the coniferae: containing a general review of the order, a synopsis of the species cultivated in Great Britain, their botanical history, economic properties, place and use in arboriculture, etc.* Page 56.

Published by Chelsea : J. Veitch; 1900.
Digitizing sponsor: University of British Columbia Library, via Flickr Commons.

Pond Natural Areas (TNC), Unicoi and Sweetwater Creek State Parks (GSPHS), Eldorado, Tahoe, Plumas, and Klamath National Forests (NFS), and Redwoods National and State Parks (NSP and CDPR). Additionally, I have collected from 22 different host species belonging to seven genera to date. The specimens of *Sarea resinae* and *Sarea difformis* – easily distinguishable from each other – are virtually indistinguishable within each species. There are some small variations in color (pale orange to more reddish) and presence of a small stipe in specimens of *S. resinae* and variations in size in specimens of both species. However, it is unclear whether these disparities are significant, or which features might be, since specimens look very similar under the microscope. In contrast, my molecular work thus far has yielded some encouraging and more immediately interesting results.

Internal Transcribed Spacer (ITS) sequences from Europe and Japan housed in publicly accessible sequence databases^{3,4} reveal fairly significant differences between *Sareas* in these two locations. This is perhaps not surprising due to the geographic separation of Europe and Japan:

Continued on page 20

3 Clark, Karen et al. 2016. GenBank. *Nucleic Acids Res.* 44: D67-D72. (Database Issue)

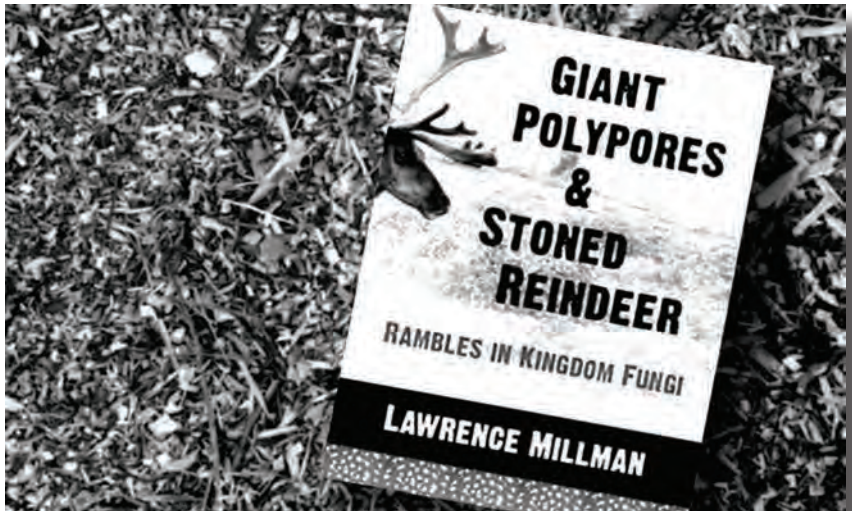
4 Takeya, Masaru et al. 2011. NIAS Genebank databases for genetic resources and plant disease information. *Nucleic Acids Res.* 39: D1108-D1113. (Database Issue)

and there is likely to have been speciation since the two populations could not mix unless they were transferred by humans. However, what is more surprising is that for each of these locations, there are significant differences (~4%) among the sequences of different specimens from fairly close locations. My own data exhibits the same pattern: my sequences are different by about 4% or more from specimens from Japan and most of the specimens from Europe, and there are a few clusters of my own sequences that are about 4% different from each other. This is significant because the ITS gene is considered the barcode gene for fungi. This means that this sequence is generally used to differentiate between species, with a 3% difference considered the standard cutoff point for species differentiation. Therefore, there are strong indications that multiple Asian, European, and American species of these fungi exist, rather than just two as previously thought. Furthermore, when the clusters of similar sequences are compared, another pattern starts to emerge: genetically similar specimens appear to grow on the same type of tree. For example, two 'species' from Japan are found on trees in the genus *Chamaecyparis* (Cypress), but specimens from *Tsuga* (Hemlock), *Larix* (Larch), and *Pinus* (Pine) seem to belong to other 'species'; one of the 'species' from New England has so far only been found on *Picea* (Spruce), whereas others have only been found on *Pinus*. At this stage sampling is too sparse to tell if this is truly a pattern. However, it does point to exciting possibilities in the future.

The possibility of the existence of many previously-unrecognized species is exciting. If these species have all truly adapted to species of different genera of conifers, they may also have different ecophysologies. Even multiple species adapted to the same genus or species of tree may have significantly different biochemistry and ecology. Hypothetically, one could try to grow them artificially on various types of resin and record growth rates to see if they differ. Chemical tests might also be devised to distinguish the species. Furthermore, it might even be possible to match the evolution of various conifers with that of these different species of fungus.

Of course, a significant amount of work still remains. At this time, I am focusing on acquiring additional specimens to sequence - both locally and internationally from a variety of host trees - to verify my preliminary hypotheses. If you or any of your friends happen upon either of these species, and you are in a place where you do not need a permit to collect, I would be more than happy to accept any contributions of specimens for my research.





Giant Polypores and Stoned Reindeer

Giant Polypores and Stoned Reindeer has gone into a second edition! To get your signed copy of this remarkable book of fungal musings, either get one at the Duff Sale or send a check for \$22 (postpaid) to:

Lawrence Millman, P.O. Box 381582, Cambridge, MA 02238

STINKHORNS STILL IN STOCK. DON'T WAIT.



[HTTP://STINKHORNMEDICINALS.
TUMBLR.COM/](http://stinkhornmedicinals.tumblr.com/)

Help Our Fungal Friends

By Trish Twining, with editorial review by Russ Cohen

I don't know about you, but I am out in the woods *well* before any respectable edible mushroom would consider fruiting, except perhaps those morels I dream about. To keep those early walks engaging last year, I became interested in foraging more broadly for wild edibles to include in my hunt. Thank you, Russ Cohen, for inspiring me with your talk at the Boston Mycological Club (BMC) potluck a few years ago. His topic was *Wild Plants I Have Known...and Eaten*, which is also the title of his book. Enjoy Russ Cohen's talk on Garlic mustard on YouTube™.

Garlic mustard, or *Alliaria petiolate*¹ is a significant invasive in New England, as well as most of the United States, and is considered a "top ten" destructive invasive in many States. A native plant of Europe, garlic mustard is self-fertile and is very difficult to eradicate once it is established in an area. It spreads rapidly and unfortunately, displaces native or other desired plants in a relatively short period of time. Each plant can produce thousands of seeds which can be spread by wildlife, humans, water, or other means.

For BMC Members, the important thing to know about garlic mustard is that not only is it a major invasive, but is an *enemy* of our fungal friends! Garlic mustard is allelopathic and destroys the connections between native tree seedlings and mycorrhizal fungi². This prevents competition from native tree species and perhaps other plants.

So, it's got to go, and *you* can help. Garlic mustard is easy to identify. It is a biennial, meaning it flowers in its second growing season. It loves to establish itself in any disturbed soil, and is remarkably capable at expanding its range from that initial stronghold. While you are walking, pull it, pull it, pull it!³

In its first year, garlic mustard is quite unobtrusive. We have all seen these heart shaped leaves, with rounded teeth, and when crushed give off a strong garlicky smell:

But in year two, it flowers and fruits. Garlic mustard can germinate at low temperatures, and does so the year before it flowers, so it already has a rosette of leaves and a well developed root system at the beginning of the next growing system. This gives it a head start over native species. In year two, it grows one to two feet tall and flowers are white. It often

1 See <https://gobotany.newenglandwild.org/species/alliaria/petiolata/>

2 Stinson K. A, Campbell S. A., Powell J. R. Callaway R. M. 2006)

3 Make sure to remove the roots and avoid disturbing the soil too much.

lines the edges of those trails we peruse looking for mushrooms.

BMC's Russ Cohen, our local expert on foraging⁴ suggests that the tastiest parts of the plant are the early stems of the second year plant, which can be eaten raw but lends itself to stir fry or added to soups. Older plants, or the first-year leaves, can be used as a base for pesto (you might want to blanch them for several minutes to tone down their pungency), and for the truly dedicated the seeds can be collected and used to make mustard, or grate the root for a horseradish substitute.

4 <http://users.rcn.com/eatwild/bio.htm>



Garlic Mustard

Hall, Charles Albert. *Plant-life*, with 74 full-page illus., 24 being from photos, by the author and 50 in colour from drawings. Published by London, A. & C. Black in 1915. Page 332 . Digitizing sponsor: MSN, via Flickr Commons.

Annual Garlic Mustard Pull

Help us eradicate garlic mustard from the woods at Wolbach Farm, Sudbury, MA. Learn about invasives while getting your hands dirty. Garlic mustard is particularly noxious because it disrupts soil microbial processes and displaces native plants.

Those wanting to attend ought contact Sudbury Valley Trustees to register(it's free). Tools are provided: www.svtweb.org

**Wednesday,
May 2
5pm to 7pm**

Super Cup Fungus Foray

By Lawrence Millman

On February 4, Super Bowl Sunday, I decided to inaugurate a mycological alternative to watching a bunch of adult men repeatedly smash into each other without being accused of assault. The event in question was the First Annual Super Cup Fungus Sunday. Admittedly, a cup fungus is not nearly as large as a football stadium, but what it lacks in size, it more than makes up for in character.

The Super Cup Fungus Foray was sponsored by the Thoreau Farm in Concord and organized by the Farm's inimitable director, Margaret Carroll-Bergman. Its location was Estabrook Woods in Concord. In addition to a number of locals, the foragers included such mycophiles as Chris Neefus, James Mitchell, *Bulletin* editor Zaac Chaves, Joe Warfel, and yours truly.

Slipping and sliding over ice, we began finding crusts and poly-pores right away. Later we found the rather uncommon *Camarops petersii* (Dog's Nose Fungus) on an old oak stump, and on a poplar log we discovered *Holwaya mucida* (sorry, it doesn't have a common name) together with its anamorph, *Crinula calciiformis*.

Investigating his favorite substrate, pine resin, James Mitchell found several small ascos — *Sarea resinae*, *Sarea difformis*, and *Lachnelulla resinaria* var. *resinaria* — in a single clump of resin. The last of these (see cover photo) was less than 0.5mm's in diameter, but it still qualifies as a super cup fungus.

Those readers who think all fleshy fungi head south for the winter are in for a surprise. On our foray, we found four *Mycena* species, two *Marasmius* species, a *Galerina*, and a *Collybia*. Several of these specimens looked a bit the worse for wear, but others seemed to have fruited during a recent thaw.

Let me conclude by saying that, while the New England Patriots lost the Super Bowl, our group won the Super Cup Fungus Foray. For we not only identified fifty-nine different fungi during our foray, but we also had a super time.



Holwaya mucida
by Zaac Chaves

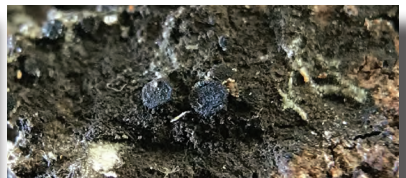
See Front Cover for a Photograph of *Lachnelulla resinaria* var. *resinaria*



Super Cup Fungus Foray
by Zaac Chaves



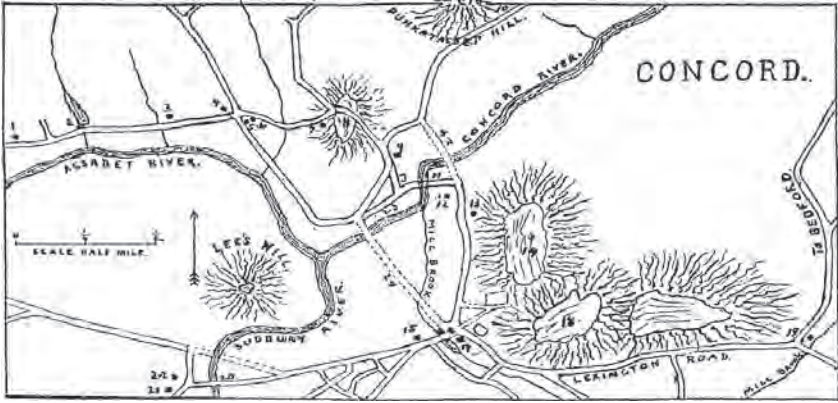
Crinula calciiformis - *H. mucida*'s anamorph
by Zaac Chaves



Sarea difformis - black cups
by Zaac Chaves



Sarea resinae - yellow cups
by Zaac Chaves



Coburn, Frank Warren. *The Battle of April 19, 1775*. F. L. Coburn & Co., Printers, Boston. Image Titled: Concord Village And Vicinity. Page 79. Released Aug 20, 2015. Via Project Gutenberg.

Looking for Fungi in All the Wrong Places

By David Babik

When strolling through the woods in the height of mushroom season, deciding where to look can be a real challenge. Do you look up hoping for some oyster mushrooms or perhaps a lion's mane? If you do, you will definitely miss the black trumpets at your feet that require intense concentration to spot. Maybe you are one of those folks who prefer to lie on your stomach inspecting the underside of logs and fallen twigs. In any case, the challenge of deciding where to direct your focus can result in very slow progress. 2014 was a great year for black trumpets. At the Northeastern Mycological Foray (NEMF) in Maine, we were hunting trumpets on Bradford Mountain and decided to set a program to track our route. We walked for over ninety minutes and managed to cover one tenth of a mile. We found *lots* of trumpets. I don't think we were in much risk of getting lost since at the end of the foray, we could still see the bus we rode in on.

However, things are not always so straight forward. That is why everyone should use some type of App to guard against getting lost. The Boston Mycological Club (BMC) held a foray in Estabrook Woods in Concord one year on November 2nd. It was the last walk on the schedule and fortunately, it was an unusually warm day with temperatures approaching 70 degrees. My friend, Bill, and I set out into that beautiful afternoon with hopes of scoring some giant hens. We did just about everything they advise against. We had no coats, no water, no first-aid supplies, no flashlight or matches and naturally no food. We had baskets, knives and cell phones (with sketchy signals at best). It was a great

afternoon and we were finding all kinds of interesting fungi. In no time we were off trail and exploring along brooks and hilltops. We were not worried about getting lost since it was a clear sunny day and we could track our location by the sun's position. Being the veteran outdoors men that we were, it seemed like a piece of cake.

Around 2:30 we started thinking about heading back. The sky had clouded over and it was getting noticeably cooler with a North wind beginning to pick up. Using the last traces of sunlight to guide us we started our return trip. Even though the trail wasn't where we thought it should be, we eventually found a trail marker and started to follow it. After about an hour of following a trail with red markers we came to a road at the edge of the woods. There was a family walking their dog along the road and we asked them for directions to the parking lot where our car was (and the ID table to the foray). We really needed to get back since we had lots of good stuff for the table. We had a sinking feeling when they told us that the lot we described was about two miles away in the direction we had come from. Nevertheless, we still had some daylight left and could definitely walk two miles in a straight line before it was dark. So, off we went, walking much faster now (although I still had to stop for a photo of some huge *Pholiota* growing out of an old tree). Tired and cold, we finally saw the trail head leading out of the woods. The only problem was that the sign designated a different conservation area in the town of Carlisle, not Concord. We were in a whole different town! That's when we began to realize that the woods consisted of several adjacent conservation lands with different trail markings for each section.

Now panic was setting in as we accosted a guy with a little boy and a dog. We pleaded for some help in finding our way. It turns out that he knew the woods well and could direct us back. Unfortunately, he informed us we were a good two miles from where we wanted to be. That's when we started begging him to drive us there. Not really fond of giving a lift to two strangers with big sticks and knives he told us that because of the car seats he just couldn't help us out. It was one of those "every man for himself" moments when I suggested that he leave Bill behind and just take me. Bill had to acknowledge that if I could get back to the car we would be much better off than we were at that particular moment. Finally, we twisted his arm into agreeing to my plan. The drive to where my car was parked only took about ten minutes. As I drove home, I wondered if Bill would survive in the dark woods that night. Just kidding; I did drive right over and pick him up and we both promised that we would never get ourselves into a mess like that again.

Continued on page 28

That week we began our research of potential Apps that would keep us from getting lost in the woods. We finally settled on one called *Map My Walk*. It was a free application that would show a map of the area you were in with a red line that designated the path you had taken. It was simple and easy to use. In fact, I have turned it on when I was exploring conservation land in other states and it produced maps showing where the trails connected. I never head out mushrooming without turning it on.

We learned a valuable lesson and discovered the hard way how easy it is to lose your bearings when focusing on finding fungi. I would suggest that anyone reading this find an application that they like and always use it when wandering the trails in search of mushrooms. *Map My Walk* is one of many free programs available. Another, even more advanced option, is the App that Chris Neefus of the BMC has created, called *MushroomLog*. It not only can keep you from getting lost but it can also mark the location of any mushrooms you come across for future reference. It is available for iPhones only, for a nominal cost. You can find more info at www.MushroomLog.net.



MushroomLog Description

By Christopher Neefus



MushroomLog is a feature-rich iPhone App designed to keep track of when and where you find wild mushrooms. You can log single observations, like when you spot a chicken-of-the-woods during a drive along a back road, or you can use it to track where you go and what you find on a mushroom walk with your local mycological club. In addition to mapping the location of each observation, it lets you record the common name and scientific name of the mushroom, what the mushroom was growing on, the habitat where you found it, how plentiful they were, and how confident you are in your identification. You can save pictures of each mushroom. The App builds a database of your foray locations, where you walked on each foray, each mushroom observation you made, and the pictures you took. Later, you can retrieve and map the track and observations from your walks or search your observation database by species, location, a range of dates. Getting Started tutorials and a complete User Manual are available on the MushroomLog support site.

\$4.99(on iTunes)

Version: 1.3(4)

Size: 26.9 MB

Rated 4+

Mushroom Apocalypse: A Book of Fungal Fiction

Whimsical, satiric, and sometimes even outrageous, *Mushroom Apocalypse* is Lawrence Millman's 16th book and the first ever book of mycological short stories. In its pages, you'll encounter (among other characters) a pair of foodies who contemplate eating a mushroom cloud, the Dalai Lama as a magic mushroom aficionado, and a Russian czar named Ivan who's a terrible mushroom identifier.

The book can be obtained at the Duff Sale or by sending \$16 check/cash (postpaid!) to Lawrence Millman, P.O. Box 381582, Cambridge, MA 02238. Be sure to ask for an inscription!



Cover Image *Mushroom Apocalypse*
by Lawrence Millman

Our Website

<http://www.bostonmycologicalclub.org/>

This is an incredible resource created with the generous patience and extraordinarily talents of Scott Shaffer. Among past lectures and other resources you can use your account to readily view digital back issues of *The Bulletin*.

Corticoid Facts

By Lawrence Millman

Corticoid fungi are an assemblage of species from at least ten different orders. Some mycologists regard the Corticiaceae as a “dustbin taxon” for fungi that don’t seem to fit in anywhere else. Commonly called crusts, these fungi often inspire this sort of derision, but knowledge makes the heart grow fonder....

88.7% of all crusts grow under logs. This means that they wear parkas (i.e., those logs themselves), and thus they do just fine in cold weather, which is why they tend to reign supreme in Christmas Mushroom Counts!

Most crusts have either effused or resupinate fruiting bodies. An exception: cyphelloids. This is not a sexual disease, but a term that describes the cup or disc-like morphology of a *Henningsomyces*, a *Rectipilus*, or a *Merismodes*.

Another exception: the Stereaceae. They’re often pileate and likewise have a dimitic hyphal system, whereas most other crusts have a monomitic one.

Hymenophore terms: appressed (difficult to remove); byssoid (cottony); hydroid (prominent teeth); irpicoid (irregular or flattened teeth); grandinoid (gifted with granules); tuberculate/verrucose (gifted with warts); fimbriate (fringed with rhizomorphs); rimose (cracked); and meruloid (having netlike folds).

Most crusts are white rotters. The few brown rotters include *Plicatura*, *Coniophora*, and *Leucogyrophana* species. You can often tell how eagerly a crust rots its substrate by how difficult it is to remove from that substrate.

91.9% of all crusts are saprobes. As with other fungal decomposers, our planet depends on their ability to recycle the compounds in plant materials.

A small percentage of crusts are mycorrhizal, including *Byssocorticium*, *Piloderma*, *Tomentella*, *Amphinema*, *Athelia* (maybe), and *Trechispora* (maybe) species. A diagnostic feature: most mycorrhizal crusts are byssoid.

Piloderma species sometimes can be identified by the yellowish mats of hyphae they produce near the log of their choice.

A few crusts are parasites, including *Chondrostereum purpureum*, *Serpula* (Wet Rot), and *Coniophora* (Dry Rot) species. The most infamous of these, *Serpula*, degrades injured wood in a forest – might it consider the wood in a house injured, too?

Some crusts only grow on the bark of living trees. Examples: *Aleurodiscus*, *Corticium*, and *Dendrothele* species.

Certain crusts – for instance, many *Peniophora* species – are harmless endophytes. Only when the wood dies does their mycelia spring into action.

Newly fallen wood seldom boasts crusts.

Cytidia salicina, which grows mostly on willows, is a gelatinous(!) crust.

A few crusts are plant rotters. *Laetisaria fuciformis* is the cause of “red thread” disease in turf grass (location: major league ballparks), while *Butlerella eustacei* causes “fish-eye rot,” a post harvest disease of stored apples.

Some crust species, like *Corticium*, produce sclerotia as asexual propagules. Investigate the Small Wonder in the latest issue of *Fungi* to learn more!

Being (mostly) under logs and almost flush against the ground, crusts use insects as one of their primary vectors of spore dispersal.

Who says crusts can't be colorful? *Terana caerulea* is a royal blue, *Byssocorticium alkovirens* is green-blue, and *Phlebia radiata* is peachy-orange.

And who says crusts can't be dramatic? The teeth of a *Hericium* or *Radulomyces copelandii* would be considered fangs if they existed on an animal.

So let's celebrate “dustbin diving!”

Guidebooks/References

- Bernicchia, A, Gordjon, S.P. *Corticaceae s.l.* Editizioni Candusso (in English)
Breitenbach, J., Kranzlin, F. *Fungi of Switzerland, Volume 2: Non-Gilled Fungi*
Hjortstam, K., Ryvarden, L. *The Corticiaceae of North Europe* (available online)
Ginns, J. “Genera of the North American *Corticaceae*,” *Mycologia* 1998, 90(1)
Burt, E.E., *The Thelephoraceae of North America* (excellent for its field details).

Kombucha: Do You Know What You're Drinking?

By Susan Goldhor

The *Business* section of a recent *New York Times* had a feature article on how the rust belt is trying to woo hi-tech businesses away from San Francisco and into low rent places like Flint and Detroit. The officials from the left coast were driven around in a deluxe bus and offered treats like “vegan doughnuts and coal-infused kombucha.” Coal-infused kombucha? Does drinking it give you black stomach disease? Is this for real? But it brought home to me, as nothing else has, just how trendy kombucha is.



Kombucha Colony of Yeast and Bacteria Growing In Black Tea

By Kosovokelly - Own work, CC BY-SA 4.0, <https://commons.wikimedia.org/w/index.php?curid=38024901> via Wikimedia Commons

Kombucha tea is a mystical brew, with an ancient pedigree, a wide geographic distribution and an even wider list of putative benefits. As one review stated,

It has been claimed that kombucha teas cure asthma, cataracts, diabetes, diarrhea, gout, herpes, insomnia and rheumatism. They are purported to shrink the prostate and expand the libido, reverse gray hair, remove wrinkles, relieve hemorrhoids, lower hypertension, prevent cancer, and promote general well-being. They are believed to stimulate the immune system, and have become popular among people who are HIV positive or have full-blown AIDS.

Wow! Unfortunately, there are no studies to back up any of these benefits. There are, however, some studies that show harm to consumers from kombucha tea¹.

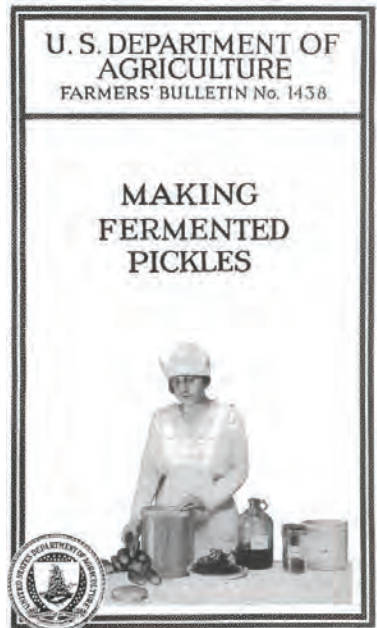
If kale is today's trendy vegetable, fermentation is today's trendy food processing method. There's even a name for its aficionados: *fermentos*. Fermentation covers a wide spectrum of products, from sauerkraut and salami to sourdough; kimchi and camembert to kombucha².

Increasing numbers of bread bakers are cultivating and maintaining sourdough cultures. In fact, many regard their cultures as pets; feeding them daily and looking for caretakers when they go on vacation. Whether or not this level of attention is necessary is another question, but we all need to care for others and, in the case of sourdoughs, it's billions and trillions of others. Some of those are fungi (yeasts for the most part) and many of them are bacteria, including *Lactobacillus sanfranciscensis*, which is notable for living only in sourdough bread cultures³.

When you make sourdough

- 1 more about this later.
- 2 Not forgetting beer and other alcoholic beverages; especially now when we're learning that the big lure turning hunter-gatherers to agriculturalists was not eating their crops but fermenting them into alcohol, while Johnny Appleseed's success had little to do with delicious crisp apples and everything to do with brewed cider.
- 3 Not however only in San Francisco; it's actually pretty cosmopolitan.

Continued on page 34



LeFevre, Edwin. USDA Farmers' Bulletin No. 1438: Making Fermented Pickles. USDA. 1924. via Project Gutenberg.

bread, the yeasts cause the dough to rise, but the bacteria give the bread its flavors. When you create a sourdough culture, you could (coward!) buy or beg a starter, but the classic way is just to knead flour and water together by hand (preferably not after using one of the hand sterilizers so popular today), covering it with a cloth and just letting it go. If all goes well, the microorganisms that invade it (no one knows just where they all come from), will get along with each other and form a stable community, bubbling away contentedly and ready to make delicious bread.

When I went online to learn how to ferment kombucha in my kitchen, I realized that this process (unlike home bread making) has become a little more commercialized. Most sites recommend purchasing your *symbiotic community of bacteria and yeasts* (SCOBY) and starter, rather than trying to create the kombucha ecosystem on your own, and then just brewing and sugaring the tea and taking it from there. Once you've made your initial purchase however, you're set forever, barring accidents, since you can just reuse your SCOBY (which will even produce offspring!) and use some of your finished product as starter for the next batch. Unlike the owners of sourdough SCOBYs (why should the kombucha folks get all the nifty acronyms?), kombucha brewers are cautioned to use lead-free glass vessels and to sterilize everything carefully. Thinking about the two processes, it's easy to understand why one is open to passing microbes and the other should be highly controlled. First, when you make bread, it's clear when the process is complete and your bread has risen adequately. But the key difference is that bread is baked at a temperature of about 500 °F. If there are any weird alcohols or acids they'll be blown off and, most importantly, no microorganism can possibly survive. A loaf of home baked bread is its own autoclave.

If you purchase your SCOBY and starter from an honest and competent supplier, and you follow directions, you can have a lot of fun trying different flavors, and you can probably drink your kombucha with impunity. It's unlikely to cure AIDS or cancer but, since the placebo effect is the most powerful known to modern medicine, who knows? The important thing is that you won't get sick (or sicker). Alas, if you try to create your own, or borrow from a friend who's created his own, or buy from a questionable supplier or don't follow directions you can get sick. For example, if you over-ferment your tea, you may end up with acidosis. For mycologists, one of the most interesting medical threats from kombucha is that some cultures produce usnic acid; a liver toxin. When I read this my mycological ears perked up because usnic acid is a product of some lichens. In fact, this has led to some kombucha cultures being

called lichenous; however, the photobiont component of lichens has not been found. So the big problem of kombucha is that it is not its own autoclave and any contaminant is likely to either stay or multiply during fermentation.

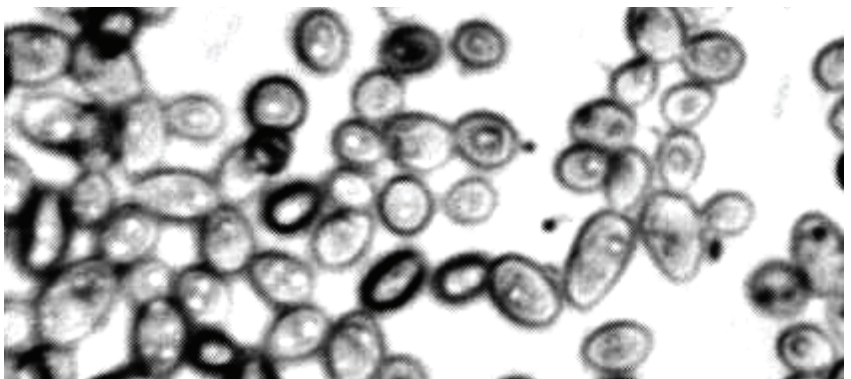
Drinking Kombucha can be harmful for people with preexisting ailments. Due to its microbial sourcing and possible non-sterile packaging, kombucha is not recommended for people with poor immune function, women who are pregnant or nursing, or children under 4 years old. Further, it may compromise immune responses or affect stomach acidity in susceptible people.⁴

The most damning statements come from a 2003 review by Ernst, which characterized kombucha an “extreme example” of an unconventional remedy because of the great disparity between implausible, wide-ranging health claims lacking evidentiary support, and the potential for harm kombucha has. The author concluded that the number of proposed, unsubstantiated, therapeutic benefits did not outweigh the known risks, that kombucha should not be recommended for therapeutic use, and (most presciently) that kombucha only appears to benefit those who profit from it.

Little did he know back then in the dark ages when kombucha commercialization was limited to some home brewers who were making enough to supply the local stores. By 2014 kombucha sales were approaching \$400 million/year, and an LA-based company called GT’s Kombucha™ (GT started as a teenager in 1995, brewing kombucha in his parents’ kitchen) claimed the major share. But watch out, GT! Less

4 *Wikipedia*

Continued on page 36



Kombucha Culture 400X Sample Taken from
Tea Recently Purchased “Scoby” Was Floating In.

By John Alan Elson (3dham.com) [GFDL (<http://www.gnu.org/copyleft/fdl.html>) or CC BY-SA 4.0-3.0-2.5-2.0-1.0 (<https://creativecommons.org/licenses/by-sa/4.0-3.0-2.5-2.0-1.0>)], via Wikimedia Commons via *Wikimedia Commons*

than a year and a half ago, Pepsico smelled money and jumped into the market by purchasing KeVita™, a California company producing kombucha and probiotics. Looking into her crystal ball, and knowing the inner workings of capitalism red in tooth and claw, this writer predicts the following events:

With cries of surprise and horror, it will be discovered that many sources of kombucha are over the allowed alcohol limit, for general sale, of 0.5%. This has already happened once; a new kombucha maker in Maine applied for a permit to sell his product and a Cornell professor started sampling brands for alcohol content. Not only were many over 1%; two nationally sold brands had alcohol contents of 4 to 6%; about that of beer. Kombucha was swiftly removed from many points of sale, and pressure started to be applied for the product to be analyzed and pasteurized (to blow off the alcohol). Alas, kombucha aficionados don't want their product to be pasteurized, which will destroy all those microbes. How this will play out is difficult even for me to predict but my guess is that small players in farmers markets and health food stores will probably be okay, but any brand raising its nose above the water will find itself embroiled in costly legal battles with Pepsico, all of whose products will be uniform, pasteurized and (probably) alcohol-free. Of course, home brewers will be *literally* home free.

Poking around the internet, I think my favorite kombucha fermento is the mother of five who touts herbal kombucha that she makes. It's non-sterile and she suggests that you can let it ferment for as long as you like – no worry. She also says that her kids go crazy for it. No wonder; they're probably all slightly drunk.

The tendency of some kombucha companies not to leave well enough alone will also muddy the waters by making medical claims and/or causing harm to consumers. Example: A Tennessee-based company with the attractive name Tealixir™ is brewing kombucha with herbal infusions. My favorite is Dr. Marigold™, which contains echinacea, ginkgo, St. John's Wort, and much, much more. There are two options here. One is that the company is smart enough to add such minute amounts of these ingredients that they will have no effects on consumers. The other is that they are actually including sufficient amounts of these herbal infusions to have potentially damaging effects. Because, if an herb is capable of actually doing you good by interacting with your metabolism, it is very likely capable of doing you harm by interacting with your metabolism – to say nothing of your medications, anesthesia, etc.. In particular, numerous herbs have anticoagulant effects and may

have potentially toxic interactions with anticoagulants such as Warfarin (aka Coumadin®). Laurie Leonard, M.D. and mycophile has listed a few popular herbs, where adverse effects have been reported:

Ginger: prolongs bleeding time.

Licorice: may cause hypertension, sodium and water retention; may have MAO inhibitor activity; can change anesthetic requirements.

Astragalus root: may offset immunosuppressive effects of corticosteroids and cyclosporine; may have toxic diuretic effect on kidneys and cause hypotension.

Red clover blossoms and Pau D'arco bark each may have toxic anticoagulant/antiplatelet effect.

And yet. . . don't they sound innocent?

Why do we assume that kombucha, an undefined community of bacteria and fungi, to which the maker may have added almost anything, and whose level of fermentation may or may not have been carefully monitored, is beneficial? My voice clamoring (unheard) in the desert is for kombucha makers to get together and set some ground rules. Otherwise, it's going to be Pepsico as the winner. And I think we'd all hate to see that.

Of course, you may be making your own. More power to you. But don't assume that because it's all *natural* it's all good. Don't add a bunch of herbs. Don't over-ferment. Try to work out a recipe that you follow consistently. Do consult with experts. Keep notes. In short, act like you're taking a lab course. And, just as we advise with new species of mushrooms, don't give it to the very young, the very old, the very frail or those with compromised immune systems.

Caveat emptor; caveat fermentor. And good luck!



Ernst E (2003). "Kombucha: a systematic review of the clinical evidence". *Forschende Komplementärmedizin und klassische Naturheilkunde*. 10 (2): 85-87. doi:10.1159/000071667. PMID 12808367.

<https://list.uvm.edu/cgi-bin/wa?A3=ind0108D&L=MEDLIB-L&E=0&P=289515&B=-&T=text%2Fplain;%20charset=iso-8859-1>

This letter from a medical library manager is interesting and informative about "natural" medicines.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC64772/>

this natural medicine comprehensive data base is, unfortunately only available for purchase. But, at the end of the review, you can get abstracts of the references.

And, for those wishing to learn more about sourdoughs, there are many sources, but one excellent read is in Michael Pollan's *Cooked*. A major section of this terrific book is devoted to fermentation (called "Earth") but the sourdough description is in the section entitled "Air". Actually, I defy you to open this book at any point and not want to read it all.

Mycobuttonology

By Marie Elwyn

I became a serious button collector a.k.a buttonologist, in 2004 when I fell face first into what I thought at the time was the most fascinating hobby out there! And so for the next ten years I found a community of friends from around the country and the world who loved to share the knowledge they had found in a hobby that swept America starting in 1947, when the *National Button Society* was formed.

I learned about history and artistry, fashion and whimsy, railroads, world wars, fables and children's stories, as the hobby is all encompassing. In the days when buttons became more than a necessity, it was fashion to wear a new set of buttons that portrayed, say, the newest opera or political rivalry or as the seasons changed, so did the buttons. What I gravitated to was more of the natural world, no surprise there. Peach pit buttons are hobo art, opening more doors into American history.

After years of collecting I became satiated with my learning and my treasure hunting. My learning curve had slowed down to a snails pace. Little did I know the mycelium was running! As the world of mycology entered my horizon, the Victorian fascination with the natural world became more evident on the buttons. Last Spring I did a program named *Buttons That Bug Me*, for our Massachusetts State Button meeting. I think you might have figured out what was on all my buttons. Beautiful insects made from all kinds of different materials are easily found on buttons dating back centuries.

Finding fungi on buttons made in the late 1800s or earlier is difficult, so most of my collection are what we call studio buttons, made by artists for the button collectors. Finding identifiable mushrooms is even harder, and whimsical seems to win out. However, I am a mushroom hunter and the foray at the button shows is a fun hunt! I hope you enjoy looking at some of my foraged buttons!





Veiled Stink-horn with Fly
Carved Shell
On Shell
AKA Pearl
Victorian Era
Beauty.



The Rare Purple
Fuzzy Cap and
Sparkle Amanita



Bolete with a
Pine Needle
Border

A Tale of Two Evolutions

David Hibbett Lectures the BMC

By David Babik

The Boston Mycological Club (BMC) was recently treated to an in-depth lecture from Professor David Hibbett of Clark University on the evolution of fungi and a history of leading pioneers of mycology. I need to mention, right up front that I am not a scientist and do not suggest that this brief article can capture all the aspects of David's lecture. I am, however going to try to hit on several things that stuck with me.

David describes himself as fungal systematist or one who studies stories of fungal evolution.

David helped us to grasp just why it is close to impossible to stay abreast of current fungal nomenclature. Exponential growth on the field of phylogenetics stemming from developments in molecular biology have forced us to re-evaluate how fungi have been classified. We can no longer rely solely on similar visual characteristics to guide our groupings. Morphology is still very important and useful for species identification. However, the field of phylogenetics now draws our attention to genetic similarities as well as visual cues.

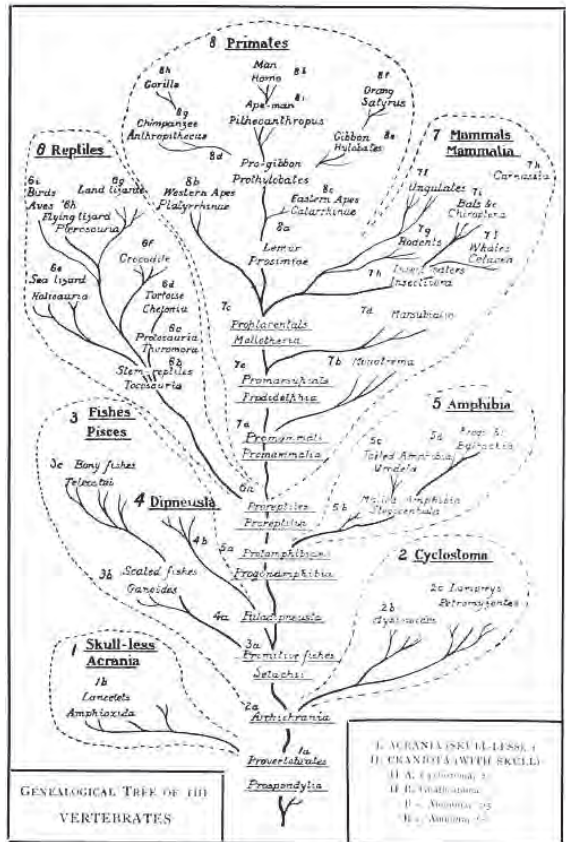


The Ladder of Intellect (Stone, Fire, Plant, Animal, Human, Heaven, Angel, God)

Lullus, Raimundus. Ramon Lull's Ladder of Ascent and Descent of the Mind. first printed in 1305. 1512, <http://www.uni-mainz.de/press/25888.php>. This work is in the public domain in its country of origin and other countries and areas where the copyright term is the author's life plus 100 years or less. via Wikipedia.

Although the taxonomic changes are often frustrating, David views them as a good thing, because they indicate progress. We are finally breaking away from ideas based on the early Greeks' notions of a *Scala Naturae*, a linear or "ladder" view of the natural world, ranging from inanimate objects to plants to animals to man to God. Darwin showed that there was one common ancestor to all things in a branching "tree of life." However, even after Darwin, the *Scala Naturae* view contributed to "ladder thinking," in which evolution was interpreted a process of extant (currently living) species changing into other extant forms. The idea of a linear *Scala Naturae* is not consistent with Darwin's evolutionary theories, yet traces remained with all living things being placed in a hierarchy of "lower" to "higher" forms of life. This thinking led to many flaws in assessing nature. David showed us two images of earthstar fungi that looked very similar. In the past, it would be assumed that they had been the product of the same evolutionary line. However, genetic studies revealed that the two had developed the same form independently of each other. Many examples of convergent evolution have been discovered using genetic data.

Aside from talking about fungal evolution, David's lecture also explained his own evolution as a mycologist. Tracing his mycological lineage back through time to the early leaders in the field. He couldn't

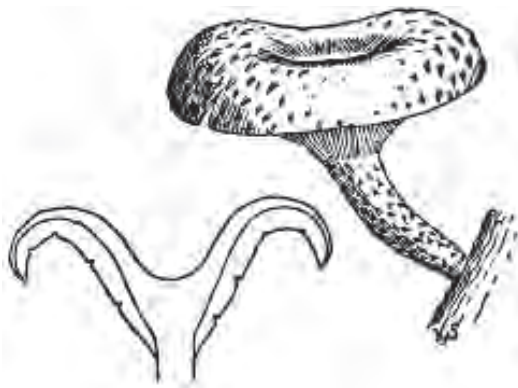


Genealogical Tree of the Vertebrates
 Haeckel, Ernst. *Last Words on Evolution*. A. Owen & Co., London. 1906. via Project Gutenberg.

Continued on page 42

quite go all the way back to Linnaeus and Fries but he did make it as far back as Atkinson. Linnaeus was one of the early pioneers, and was known as the “Father of Taxonomy” who developed the binomial nomenclature that we still use today. He theorized the concept of a nested hierarchy of ranks. Later Elias Magnus Fries, who introduced the concept of creating spore prints and based classification of fungi on the methods of spore production. George Francis Atkinson, (1854-1918) a stage coach driver from South Dakota, who at the age of 31 became a professor at Cornell, wrote one of the first texts on mycology. His book inspired C.H. Kaufmann at the University of Michigan, to do an in-depth study of fungi in Michigan. Kaufmann’s work helped spark the careers of over 200 mycologists. The most famous of these was Alexander H. Smith. Smith’s work greatly advanced the field of mycology and also led to many famous students that draw their lineage to him, one of these was Orson Miller, whose guide book is still in widely in use today. In a many-branched tree of mycologists, David finally led us to his place in this evolutionary chart of fungal thought.

The lecture wrapped up with discussion of some of the diverse forms that fungi have taken. One of these was something called *Nia vibrissa* a marine mushroom that grows on timbers of sunken ships. He also talked about mushrooms going underground as false truffles and certain cyphelloid species that grow on mangrove roots (a possible stepping stone to marine fungi). Finally, David treated us to a discussion of his personal favorite mushroom *Lentinus tigrinus* originally named by Bulliard as a species of *Agaricus*, and later transferred to *Lentinus* by Fries. The lecture covered many interwoven topics and helped us to get a grasp on the evolving nature of mycological studies. David finished by extending an invitation to BMC member to drop by his lab with specimens they need help identifying. He suggested to always call first to make sure someone will be around to help out with your research.



Lentinus tigrinus

McIlvaine, Charles; Macadam, Robert K., Toadstools, mushrooms, fungi, edible and poisonous; one thousand American fungi, The Bowen-Merrill Company, Published 1900, Page 230. Released: 2016 via Project Gutenberg.



Hibbett Lab Exclusive BMC Offer

If you have a cool but mysterious fungus that you would like to ID, but can't make it to the Monday night ID sessions in Cambridge, please consider bringing it to the Hibbett lab at Clark University. We can't promise to put names on everything you bring in, but we are always happy to look at interesting finds from current BMCers. If you would like to consult, please get in touch by e-mail (David Hibbett: dhibbett@clarku.edu) and we can try to find a time to meet.

Bioluminescent Mushroom Stamps Now Available

Big News For Philatelists: for those of us bored with stamps showing flags or evergreens, our PO will issue a set of ten stamps showing bioluminescent organisms and one of these is Taylor Lockwood's gorgeous photo of *Mycena lucentipes*. The other nine are not mycological but they are gorgeous. (And don't forget that Taylor is going to be with us on September 23rd and 24th, for a foray, a talk, and a lot of hints about mushroom photography!)



2018 *Mycena lucentipes* Stamp

Lockwood, Taylor. *Mycena lucentipes*. Bioluminescent Life Stamps. US Postal Service. 2018



Eagle Hill Courses

Eagle Hill Classes have been posted early this year and some are reproduced below. If any look appealing to you and you are willing to take good notes bring information back to the BMC we encourage you to apply for the BMC The Eagle Hill's Scholarship.

May 27 to June 2 **Introduction to Bryophytes and Lichens**
Fred Olday

June 3 to June 9 **Sterile Crustose Lichens Unveiled**
James Lendemer

June 24 to June 30 **Lichens and Lichen Ecology**
David Richardson and Mark Seaward

July 29 to Aug 4 **Mushroom Identification for New Mycophiles**
Greg Marley and Michaeline Mulvey

July 29 to Aug 4 **Tracks/Sign of Insects & Other Invertebrates**
Charley Eiseman

August 19 to August 25 **Mushroom Microscopy**
David Porter and Michaeline Mulvey

Sept 28 to Sept 30 **Fall Maine Mushrooms**
David Porter and Michaeline Mulvey

Oct 12 to Oct 14 **Crustose and Foliose Lichens**
Fred Olday

Free App From Chris for BMC Members

BMC members who email Chris (Chris.Neefus@unh.edu) will be given a code for a free download for iPhone (or iPad) only; not Androids.

Since 1897

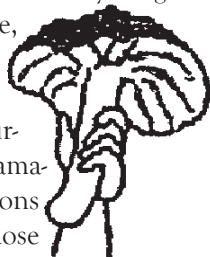
The front of every issue of *The Bulletin* reads “since 1897” and there has been some confusion over what this refers to. It’s not the club. The first Bulletin was published on a single-page type-written document in 1897. To achieve this marvel of technology and organization took the 1895-founded BMC two years.

The Next BMC Bulletin Wants Your Work

Please submit any and all contributions before July 1.

CALL FOR SUBMISSIONS

Calling for submissions regarding the pursuits of amateur mycologists: we can receive these in any form from those who write, draw, and capture digital images. We need the utmost generosity of all your expressions to accurately reflect our passion. Remember, *The Bulletin's* most explicit purpose is to broadcast the grandest expressions of the amateur: those vital mycological pursuits whose motivations are far more various, and often profound, than those who pursue for money.



Generously submit all contributions to BulletinBMC@gmail.com

Help Friends of the BMC

When we plan our weekly forays throughout the year, we need to get permission from the owners of the areas we are visiting. Some of the local conservation groups have been very welcoming to our group and deserve our support. Two in particular have helped us substantially, even suggesting places to explore (Like the old growth forest in Cummington that was the site of this year's bus trip). The Trustees of Reservations and Sudbury Valley Trustees are both excellent organizations that you should support if at all possible.

If you are able, we encourage you to join these groups or at least make a donation. It's a lot of work to keep trails clean and free of fallen trees and invasive plants. They make our trips to the woods much more enjoyable.

Sudbury Valley Trustees: www.svtweb.org The Trustees of Reservations: www.thetrustees.org.

Membership for 2018

We invite any interested person to apply for membership. One of the ten best holiday gifts (refer to minutes from the BMC Hygiene Committee, May 11, 1896). Join the BMC online using PayPal or by mailing a completed Membership Application to

Brett Maguire (BMC Membership Secretary)

676 Pleasant St. Apt 3

Worcester, MA 01602

Annual Dues

\$20.00 - Individual member

\$25.00 - Family membership (all at one address)

\$10.00 - Junior member (individual under age 21)

Applications received after November 1st will include membership into the coming year.



How Magic Mushrooms Got from Mexico to Cambridge

A very unusual informal short talk (with slides) by Oakes Plimpton, who actually accompanied Gordon Wasson on his storied 1957 trip to Mexico where he (Wasson) cajoled a Curandera into sharing her “magic mushrooms.” This is your chance to talk to someone who was in on the birth of psilocybin in North America.

We’ll also have in attendance Diana Xochitl Munn, Director of Public Programs, Harvard Museums of Science & Culture, whose interest in that expedition is both personal and scholarly.



Dreams And Nightmares Of Urban Restoration Ecology

Most brownfields and landfills get a coat of grass (if they get anything). Steven Handel, the premier restorer of such sites as Fresh Kills Landfill, creates viable complex ecosystems with plants, fungi and animals. His experience is wide-ranging; his honors are many and we guarantee a unique and fascinating talk.

UPCOMING EVENTS

- Sun,**
April 15
2pm
BMC Annual Meeting *How Magic Mushrooms Got from Mexico To Cambridge* Talk by Oakes Plimpton (Wasson's 1957 accomplice)
- Sat,**
April 21
10am-1pm
Shiitake Mushroom Growing Workshop
By Chris Neefus in Topfield, MA
This course is full. Congrats to all who registered.
- Sun,**
May 6
5pm
BMC Annual Culinary Potluck
Dreams And Nightmares Of Urban Restoration
Ecology talk by Steven N. Handel
At the Cambridge VFW
- July 27-30**
2018 NEMF Foray in Geneseo, NY
Hosts CNYMS, MYMS, NJMA, and SVMA.
<http://www.nemf.org/>
- Aug 6-12**
Mon-Sun
New Moon Mycology Summit
White Pine Community Farm, Wingdale, NY
<http://www.newmoonmycologysummit.org/>
- Sat-Sun,**
Aug 18-19
10am-1pm
Introduction to Mushrooms
By Gary Gilbert
Cox Room (white farmhouse building) 82 Eastern Ave, Essex. A \$5.00 donation is requested.
- Sept 6-14**
Insider's Alaska with Lawrence Millman
Weeklong Intensive Mushroom Foray in Alaska
Email for more info: l.millman@comcast.net
- Sat, Sept 15**
The Gary Lincoff Memorial Foray
Hosted by WPMC in McCandless Township PA
<http://wpamushroomclub.org/lincoff-foray/>
- Sun-Mon,**
Sept 23-24
Taylor Lockwood will be in Attendance for Sunday's Foray. Presentation on Monday.
- Sept 28-30**
Newfoundland and Labrador Foray
www.nlmushrooms.ca/foray_information/foray_2018.html
- Mon,**
Oct 1st
Medicinal Mushrooms A Very Critical Evaluation By Denis Benjamin, author of the landmark book on the health effects of mushrooms, *Mushrooms: Poisons and Panaceas.*

Join our efforts in sharing all regional mycology related events with BulletinBMC@gmail.com

Mystery Fungus



Dear Mycophiles, This *Mystery Fungus* is commonly found in these parts and inhabits wood. Hints: It is dramatically inedible and associated with bears. The first person who correctly identifies it will receive a free copy of my book *Mushroom Apocalypse*. Send your answers to: BulletinBMC@gmail.com Lawrence Millman

Photograph by Lawrence Millman



Dacrymyces palmatus

by Joe Warfel

This photo came from the Super Cup Fungus Foray.

Read more on page twenty-four.