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The Bulletin

A Publication of the Boston Mycological Club Since 1897

MUSHROOM LOG • A TRIP TO HELL • LEAVES AND SHADOWS NAME GAME • RAPS • AMANITA SCULPTURE • WATERCOLORS CROSS-KINGDOM DATING • LIMERICKS • 2016-7 XMAS COUNT A publication of the Soston Mycological Olub prepared diligently, at times relentlessly, by your faithful Editorial Soard

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

Spring has arrived, and our hopes are grand. Your excitement showed spectacularly when forty-seven of you braved our February walk lead by Larry and Zaac at Middlesex Fells. More accurately, this was a crawl as after two hours we had only traveled a few hundred feet with an astonishing range of specimens. While we marveled over *Hypoxylon fragiforme* (red in KOH) and *H. fuscum* (greenish in KOH) we also felt concerned regarding the dry soil beneath the logs which we overturned, a lasting reminder of drought.

And you have continued to keep us impressed and, candidly, a little perplexed with the unique contributions in this issue, ranging from a rap, to the debut of an App, on to a three-hundred, and even a forty-three cubic foot mushroom sculpture. We have endeavored to fit this varied content in this *Bulletin* to the best of our abilities and hope you will enjoy the range of pictures, poetry, art pieces, and articles. Keep up your enthusiastic pursuit of fungi in all of their myriad forms. Every issue will be housed permanently in the Harvard Herbaria archives.

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

The cover image depicts *Nectria episphaeria* on *Diatrype sp.* photographed during the Christmas Mushroom Count by Joe Warfel. You can read more in the article on page thirty-four. There are more photos there to of this commonly encountered albeit rarely noticed species.

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Letters To the Editor

Hello Susan,

Just read your Retelling The Chaga Saga in the most recent Bulletin.

Toward the bottom of the first page is the following sentence: "In New England, Chaga is only found above 1,000 feet of altitude, but further north, where latitude translates into altitude it occurs even at sea level."

I also recently read in *Mushroom: The Journal Of Wild Mushrooming* a recipe by Monica Hill: *Chaga Maple Syrup Balls*. With all this chaga on my mind I decided to go find and whack some chaga off one or two coastal Bristol County birch trees and infuse the chaga into some maple syrup sap and whip up some balls.

After a morning's hunt chaga was brought to bag. Yes, chaga exists in southern New England and can be found well below 1,000 feet of altitude. See attached photo.

Happy New Year! Hopefully 2017 will be be moister than 2016 was.



E. Castro Hi E. Castro,

I'm impressed that you decided to get Chaga and just found and bagged some! Good work! I'm not sure where I read the statement about altitude. I wish I were a better note taker. But, 1,000 feet is not much. I'm in our NH home right now and I checked the altitude – 610 feet. If I walk up to the top of the hill our house is on, I get to about 900 feet.

So, are you sure you didn't walk uphill?

Meanwhile, I'll try to find the source for that statement. And I'll tell Leon Shernoff to omit it or add a footnote when he reprints the article in *Mushroom: the Journal Of Wild Mushrooming.* Happy New Year! and thanks for writing, *S*usan

Free Digital Mushroom Book

Our Canadian neighbors are offering another free online myco-benefit. The City of Toronto is issuing a series of publications on local natural history, and Mushrooms of Toronto has recently been published and is available for free download at: http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=766a036318061410VgnVCM10000071d60f89RCRD

The first few times I attempted to open this download Adobe refused to cooperate but it finally acquiesced, and the booklet is well worth my (pretty minimal) effort! I urge you to click on this url as well, and see what a really motivated municipality can do. Plus, mushrooms are cosmopolitan creatures and their mushrooms are our mushrooms.



Susan Goldhor

Great resource. I am impressed that you found this gem. -Zaac

Gibson, William Hamilton, Our Edible Toadstools and Mushrooms and How to Distinguish Them, Harper & Brothers Publishers. New York. Published May 1885, released August 2014, via Project Gutenberg.

Fungal Limericks

by Maury Pore

panita

There once was a gal named Lavinia Who espied on a log a *Scutellinia* Its eyelashes — a mess! It lacked any dress! So she went off in search of a *Wynnea*.

In the South lived a fellow named Sam Who couldn't tell a Bolete from a yam. He cooked up the latter All slathered in batter, And said, "This ain't no porcini, goldamn!"

There once was a woman named Rita, Who found a quite fresh *Amanita* She thought it looked sweet And thus good to eat. (She wished that she'd had a fajita)

The 2016 Christmas Mushroom

Counts

by Lawrence Millman

hristmas is a time for receiving gifts, some of which come from Santa Claus, others from looking at or rolling over logs. The latter are, of course, fungal gifts. How about a *Hirsutella* on a moth larva or a *Mollisia melaleuca*? Eat your heart out, Santa: you're incapable of delivering these latter gifts to your clients!

As usual, the 2016 Christmas Mushroom Count took place at Wachusett Wildlife Sanctuary in Princeton, Massachusetts. Although the Sanctuary rested, Scott Schafer, Joe Warfel, Joe Choiniere, Greg Giannone, *Bulletin* editor Zaac Chavez, and yours truly eagerly set out on the foray in the late morning.

Right away, on Goodnow Road, we found the blackened corpses of a *Bondarzewia* and a *Meripulus sumstinei*. As birders include dead birds on their bird counts, so we included these species. But there's a difference. A dead bird can longer reproduce, while a dead fungus still has spores lodged in its fertile surface, and these spores might, just might, combine to form a mycelium.

Once we ventured into the interior, we found a variety of fungi. For example, the aforementioned *Hirsutella*, an *Ophiocordyceps* anamorph. There were the usual crusts and polypores. And then there were the jellies (*Exidia*, *Tremella*, and *Dacrymyces* species), none of which finds winter a problem. They desiccate...and then, with somewhat milder temperatures, rehydrate.

Perhaps the most unusual species was found by Greg Giannone, who, upon investigating a *Diatrype stigma*, noticed several small red dots. Those dots were *Nectria episphaeria*, which is small even for chronically small Nectrias. Joe Warfel's photograph of it graces this *Bulletin*'s cover. Look for it on *Hypoxylons*, too. But look hard because specimens typically are no more than half a millimeter in diameter. I suspect that Joe Warfel's photo-graphs of *N. episphaeria* are the best ever taken of this diminutive species!

By 4:30pm, it had grown dark, so we retired to the Sanctuary's camp room and studied our specimens. Later I made a tally – 71 different species. This is more species than we would have inventoried this past summer, admittedly a drought-ridden time. And we would have gotten still more, except that many logs were frozen to the ground and thus incapable of delivering their gifts...

ble of delivering their girts...

See a photograph of the corresponding ID session on the last page.



Nectria episphaeria on *Diatrype sp.* Up Close photographed by Joseph Warfel



Hirsutella, an Ophiocordyceps anamorph photographed by Joseph Warfel



Fungi are classified as *crytogams*, translating to hidden marriage, referring to the fact that they do not produce seeds. Rabenhorst, L., Grunow, A., Dr. L. Rabenhorst's Kryptogamen-Flora von Deutschland, Oesterreich und der Schweiz. Page 197. Published 1892. Digitizing sponsor: MBLWHOI Library, via Flickr Commons.

Hookup Apps for Cross-Kingdom

Dating by Susan Goldhor hen I was a student, biology was divided by an impermeable wall into zoology and botany, and my education took place solely in departments of zoology. Even though we were encouraged (actually, pretty much forced) to take the broadest possible view of our field, so that I took classes in physiology, biochemistry, genetics, embryology, evolution, ecology and behavior; looking at organisms ranging from minute pond dwellers to primates (what I thought of as a "soup to nuts" view), there were two areas that were tacitly off limits. One was anything about Homo sapiens, which was regarded as the province of the ivory towered Arts section of the University, while we labored in the fields of Science; and the other was Botany which covered fungi as well as plants. By the time I left grad school, Zoology and Botany had been melded into Biology. But nothing ever made me want to learn about plants (to say nothing of fungi). Not the fact that I had good friends who were botanists; not the fact that plants alone were capable of turning sunlight and carbon dioxide into sugars, and that all animals depended upon those carbohydrates for nutrition (even carnivores depend on plant sugars; they just get them second-hand), not the fact that I loved trees and forests; not gardening or cooking or getting interested in agriculture; none of this led me to believe that plants were worthy of my scientific interest. But recently, I've come to believe that plants are not only as interesting as animals, but that plants exhibit behaviors as complicated as that of animals.

So what changed? To a great extent the science has moved on. But what really changed for me was my fifteen years of writing columns for this small journal; *The Bulletin*. Fungi got me interested in plants. Plants move, communicate with each other, share their bounty with their less fortunate neighbors, recognize family, friends and foes, and develop long-lasting relationships with each other but also with organisms in other kingdoms; most notably with fungi. These relationships look a lot like marriages (at least, to me). Since humans like to raise barriers to same-species marriages between individuals of different colors, belief sets or national origins (amazingly, the last barrier to fall for humans is marriage between individuals in two different kingdoms pretty much blew my mind.

I should make a full and open disclosure here that not all scientists think of these relationships as marriages. Whether that's a function of prejudice or superior knowledge is a question of how you view it. Or, it could just be that the word *marriage* carries a heavy emotional load for many, who insist on a narrower, more tribal view. If we said that plants and fungi form long-lasting, physically intimate relationships for mutual benefit and support, no one would demur. Think of it as you like. I do note that anthropomorphism seems to be increasingly acceptable to scientists – perhaps as a result of recognizing all that shared DNA. The learned journals have recently published papers entitled (for example), "Indifferent, affectionate, or deceitful: lifestyles and secretomes of fungi," "Symbiosis and the social network of higher plants," "Dating in the dark: How roots respond to fungal signals," and so on. To say nothing of the increasing number of botanists talking about plant neurophysiology....

I hasten to add that I do not categorize all fungal-plant relationships as marriages. Fungal pathogens and their plant prey may be intimately linked, as are criminals and victims, but this does not constitute a

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marriage. Similarly, those fungi that rot dead plant material do not have long-lasting mutually beneficial relationships with their source of carbohydrates, although the relationships that they do have are varied and fascinating and of tremendous ecological importance to us humans. But, I do regard most mycorrhizal relationships as mutually beneficial, and akin to marriages — or, at least, long-term affairs.

A *mycorrhiza*, the word put together from *myco* (fungus) and *rhiza* (root) is actually a microscopic organ, formed from the joined tissues of the plant root and the fungal hypha. The hypha is the threadlike part of the fungal body as it grows underground (or through dead wood or any moist substrate), seeking water and nutrients. Although mushroom

hunters think of the mushroom as the fungus, the true fungus is the hyphal mass that we call a mycelium. Think of the mold on fruit or bread left too long in the fridge – that's a mycelium. As for mushrooms, Hope Jahren, in her wonderful (and highly recommended - read it!) book, Lab Girl, wrote, "you may think a mushroom is a fungus. This is exactly like believing that a penis is a man." But much as I admire Hope, she's wrong about this. It's actually exactly like believing that a penis plus testicles is a man. The mushroom is the occasional fruiting body of the underground fungal mycelium. It's a little weird to think that fungal herbaria are full of just reproductive organs and nothing else, but so it is.



Cover Image Lab Girl

There are two major categories of mycorrhizal fungi: endomycorrhizal and ectomycorrhizal. I'm only going to talk about the ectos here. First, they are the major partners of our forest trees, and second, only ectos (although not all ectos) produce mushrooms. (Also, only ectos actually exist as individual identifiable species. But that's a story for another time.)

Mycelial hyphae are much thinner than plant root hairs and far longer; so an ectomycorrhizal hypha can explore much greater areas of soil, searching for water or nutrients. Many can extrude acids to break

down mineral particles and free up phosphorus, and some can extrude enzymes to break down organic matter. Some can even kill small invertebrates and digest them, absorb the nutrients freed up by these digestions and share them with their plant partners. They can do all sorts of things but there's one thing they cannot do: they cannot manufacture sugars. Only green plants can carry out photosynthesis, which has given our planet the twin gifts of carbohydrates and oxygen, thus making it possible for the rest of us to evolve. So when a fungal hypha meets an appropriate plant partner, it gloms onto a tiny rootlet to form a mycorrhiza, and initiates a partnership where it supplies the plant with nitrogen, phosphorus, water and micronutrients of various kinds, in exchange for sugars. There are other things going on between the plant and its fungal partners. The fungi form a communication network between plants. Both the fungal and the plant partner may provide protection to the other from a variety of enemies. Like human relationships, these are complex and constantly changing. But the first thing they have to do is to meet, and most of us (unless you met your future spouse in grade school) can attest to the difficulty of that first step. After all, we don't just want to meet anybody; we want to meet a potential partner.

This is just as true underground as above: not every fungal species affiliates with every tree species. We foragers know this without having to analyze DNA because we know that certain species of mushrooms are found only around certain species of trees, and no others. We know that Suillus species will be found in pine woods and Leccinum scabrum near birch. On the other hand, there are times when I think that Russula species are under everything – especially in dry years when nothing else seems to be fruiting (although this may be my imagination). In fact, Russulas are fairly promiscuous: Lactarius being another genus that tends to hook up pretty widely. We know that oaks host a variety of mushrooms but that there's no point searching a grove of maples, ash or sycamores, since they have mycorrhizal partners that are endos but not ectos. So it's not simply that fungal hyphae happen to encounter tree roots; as in any singles bar, the trees are telling the fungi where to search; the fungi are searching while advertising their presence, and each is signaling as to whether it's a desirable partner. Think of it as Tinder[™] for trees. (Maybe we could call it *Timber*[™].) We're just starting to understand how these two kingdoms talk to each other, so we don't know each species' signals, but we have learned some general social media type messages. For example, one such fungal signal (but not for all fungi) is the volatile organic compound sesquiterpene which causes the plant to respond by

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putting out extra lateral roots. And we've also learned that fungi that are highly selective about their trees utilize different hookup mechanisms than those that are promiscuous. Just like people.

And here we must insert a little fact about these *marriages*. There are a few (very very few) fungal species that are faithful to one tree host type. There are no tree species that have a monogamous relationship with any fungus. Take the alder family. Their fungal associates are all specific to alder, but alders don't limit themselves to just one of these faithful partners. And, contrary to what you might think, these fungal partners of alder are evolutionarily diverse. Similarly, the entire genus of *Suillus* is specific to pines and their relations, but those trees have a lot of partners other than *Suillus*.

Since at least a few fungi are more faithful to their plant hosts than vice versa, it's interesting to ask how they do it and what the benefits are. At least some *Suillus* species, and also a closely related genus, *Rhizopogon*, have spores that are long lasting in soil (*Rhizopogon* spores have been shown to survive forest fires, when very little else does) and are stimulated to germinate by diffusible compounds released by pine roots and only by pine roots. However, when these fungal specialists are not in spore form but are mycelial, growing around and searching, they will occasionally try to initiate mycorrhization with the wrong tree. For example, *Suillus grevillei*, which specializes in larches, has been observed



Suillus luteus shang hai zi ran bo wu guan bian zhuă, chang jiang san jiao zhou ji lin jin di qu bao zi zhi wu zhi. Page 127. Published 1980s. Digitizing sponsor: Institute of Botany, CAS and Internet Archive, via Flickr Commons.

trying to mycorrhize with a pine or Douglas fir only to be repelled by quickly manufactured phenolics in the chosen root. What a slap on the hypha! Trees know which partners they want. As to the benefits of specialization, when Suillus species connect with the appropriate tree, the roots they mycorrhize enlarge, leading us to believe that these specialized fungal partners are getting more sugar than the generalists. Whether this

is a bad bargain for the tree or whether *Suillus* pays for those extra sugars with extra goodies from its own foraging, is unknown. But even if it's a bad bargain, since *Suillus* tends to colonize just a small proportion of the tree's root tips, the tree is free to seek more generous partners on the rest of its root system, thus enjoying, penalty-free, what so many humans can only dream of.

Suillus may enlarge its host's roots but all ectomycorrhizal fungi change the structure of the roots they colonize. The fungus forms a sheath that reduces the rate of cell division and suppresses the development of root hairs. Essentially, this eliminates the plants's ability to forage and means that all its nutrients must come through the fungal partner. ("Don't you worry about a thing, sweetie — I'll take care of you.")

In thinking about these aspects of Botanical Big Love, it's helpful to picture the root structure of a big tree. Just in physical terms it would be difficult for one fungal mycelium to associate with all of those rootlets. But in physiological terms, there's another reason for plants to want multiple fungal partners, and this is that different fungi offer different benefits. Since these experiments are really difficult to carry out, we don't know all of the benefits that each fungal species offers, but we do know a few. For example, Laccaria bicolor has a snake-like venom with which it kills springtails; those minute and ubiquitous insects. After digesting them, it shares the nitrogen (plants need N-P-K just like it says on fertilizer packages) with its tree partners. Who wouldn't want this partner? Suillus forms enormous mycelia; we don't know for sure, but maybe it's a good forager for phosphorus and water. On the other hand, Russulas form hardly any mycelia. Are they freeloaders? Or are they good at protecting their hosts from predators and/or diseases? If it's the latter, it's understandable that almost everyone is willing to spare them some rootlets.

What's sauce for the goose is sauce for the gander. Trees aren't the only partner covering a lot of underground territory and looking for multiple hookups. Bruns et al. write, "both plants and fungi have large parts of their thalli that are not associated directly with their partner and are free to simultaneously associate with other unrelated hosts. This arrangement means that individual fungi can be simultaneously associated with several plants and that individual plants can be simultaneously associated with multiple fungi. In addition, both plants and fungi disperse independently (i.e., horizontally). These latter features mean that the fates of the mutualistic partners are not tightly linked; each is free to try to optimize the interaction in a selfish way. This is predicted to lead to

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Cross-Kingdom; Continued from page 13 low specificity, and possibly cheating."

There are two fascinating phenomena that emerge directly from the complex interactive nets formed by the fungal-plant hookups in the forest. One (a future article) is what has been cleverly and accurately termed the *wood-wide web*; a way to exchange messages and carbon between trees (and between trees and other plants), using the fungal network as carriers. The www acts as a social safety net, with the bigger trees contributing sugar to the smaller ones, down in the understory with insufficient light for photosynthesis. And the other phenomenon, more relevant to our study of intimate relationships (and, with the fungus literally penetrating the root, inserting itself between cells and —finally — wrapping itself around the root, this relationship is really intimate) is that of cheating.

Anyone who's read novels about human relationships (it's tedious, but almost all novelists seem limited to describing their own species) will recognize that adultery is at the root of a great many romances, classic and otherwise. At some level, we can probably consider these plots mycorrhizal. But who can forget Anna Karenina throwing herself in front of a train, or Madame Bovary dying hideously of arsenic? (An article in *The New Yorker* claims Flaubert "is said to have vomited at the



Laccaria bicolor by walt sturgeon (Mycowalt) 2016 used under a CC BY-SA 3.0 license via Mushroom Observer

dinner table two nights in a row after writing this scene" and my memory of Emma's death is in line with that. I've never wanted to reread this book.) Just for being unfaithful! To boring husbands! Surely tree-fungal relationships are more civilized than this. Well . . . sometimes.

First of all, what constitutes cheating in a mycorrhizal relationship? We already know that it's extremely rare for a fungal partner to limit itself to a single species of tree, and it's unheard of for trees to limit themselves to a single fungal species. Promiscuity here is the rule; it's healthier. When we talk about marriages, we're talking about individual mycorrhizas and even those are not permanent although ectomycorrhizas may last more than a year - a long time in the evanescent world of hyphae and root hairs. (Endomycorrhizas have a lifetime of days.) Each mycorrhiza is a tiny partnership, exchanging nutrients, water, protective compounds and signals. A tree in the forest may have thousands of mycorrhized rootlets formed with multiple species of fungi. (The Canadian mycologist, David Malloch, has pointed out the contrast between the relatively small number of trees species in our northeastern woodlands and the thousands of species of ectomycorrhizal fungi underground, affiliated with those trees.) And sometimes, life being what it is, one fungal partner will try to cheat. Cheating in mycorrhizal terms means not sticking to the terms of one's bargain. For example, keeping all the phosphorus (or nitrogen, or whatever) for one's self instead of giving a fair proportion to one's partner. (And remember that the fungal partner is wrapping up the plant root in such a way that it can't forage for itself.) Evolution is always pushing partners towards cheating. Mutualistic symbionts are always edging towards parasitism. However, this evolutionary trend has a safety valve – if it didn't, partnerships and communities would collapse. The safety valve is that if one partner has the ability to cheat, the other partner has to have the ability to impose sanctions on the cheater. Think about international agreements. Think spy-counterspy. If the fungal partner in one mycorrhiza doesn't hand over whatever it's supposed to deliver, the tree cuts off sugars to that fungus. Yes! The tree knows what's happening in every mycorrhiza! It can impose sanctions, which is another way of saying that the tree divorces that fungus - without alimony! Sometimes, since plants can be violent, the divorce can be lethal for the cheater. In at least one case that was investigated, the tree had been giving the fungus defensive chemicals as well as sugars. When these were withdrawn, the tender, nutritious, and now defenseless hypha was gobbled up by soil invertebrates. Sometimes I feel that the mycorrhizal net is just waiting for its Flaubert.

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It's a revelation to me – a zoologist – that plants can choose their partners, carry out complex relationships with a great number of partners, make ongoing adjustments to what each receives, and divorce those partners who fail to deliver. As to the fungal half of these partnerships, I guess I'm less surprised. After all, fungi are genetically closer to animals than they are to plants. I've been looking at the multiplicity of amazing fungal behaviors for years. But the fungi have just recently opened my eyes to the plants, and now that they're open, I see wonders. This is an exciting time to be a biologist, all kingdoms included, and the most exciting bits are the places where the kingdoms meet and marry. Or at least hook up.

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Cover Image Wedding in the Forest Kamson, Yalakov David, Hatunah BeYaar / Wedding in the Forest. Published 1925-30. Digital images created by the Gruss Lipper Digital Laboratory at the Center for Jewish History, via Flickr Commons.

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Mushroom (Name) Hunt

by David Babik

In the age of DNA upheaval, it is becoming increasingly difficult to stay on top of the current scientific names of many fungi, leading many people to use more common names. This word connect game will help you to familiarize yourself with some of the current binomial nomenclature. Connect the common name to the scientific name.

The Gypsy	Clitocybe nuda
Platterful Mushroom	Inonotus obliquus
Velvet Foot Paxillus	Sparassis spathulata
Hen of the Woods	Phyllotopsis nidulans
Cauliflower	Craterellus fallax
Bay Bolete	Artomyces pyxidata
Artist's Conk	Exsudoporus frostii
Chaga	Megacollybia rodmani
Yellow Foot Bolete	Cortinarius caperata
Black Trumpet	Grifola frondosa
Oak Maze Gill	Imleria badia
Crown-tipped Coral	Harrya chromapes
Orange Mock Oyster	Daedalea quercina
Blewit	Tapinella atrotomentosa
Brick Tops	Ganoderma applanatum
Candy Apple Bolete	Hypholoma lateritium

Answers On Page 25

Watercolor Paintings Of Fungi By Louise G. De Long

From the Archives of the BMC

by Jason Karakehian

For this brief installment of *From the Archive* I will continue to focus on late 19th and early 20th century depictions of fungi in our collections, but I will switch from photography to watercolor. One such collection of watercolors is here attributed to Louise G. De Long (1843-1928), née Williams, a Connecticut native (BMC [roster], ca. 1900¹; Federal Census, 1910; Massachusetts Vital Records [a]; Butler, 1916). In 1864, she married Henry C. De Long (1838-1916) of Medford, MA, a Universalist minister (Butler, 1916).

The collection consists of an oblong sketchbook, bound in marbled boards with a cloth tape spine that measures 22 cm x 14 cm, and a small set of loose paintings. The watercolor paintings in the sketchbook are pasted onto each page, though many of the paintings have become detached. Sundry markings are made throughout the sketchbook, but a note on the reverse side of the front cover board "paintings by Mrs. De Long" provides the only information concerning ownership. "Mrs. De Long" is written on the back of each of the loose paintings. Some of the paintings in the sketchbook bear the name "Miss Ayres," presumably Helen F. Ayres (1837-1907), an artist and Louise's neighbor in Medford (BMC [roster], ca. 1900²; Federal Census, 1880; Massachusetts Vital Records [b]). The paintings are mostly of agarics, with some boletes, polypores and ascomycetes. Many of the paintings of agarics are marked poisonous or edible. Only a few bear specific locations such as Lynn [MA], or Kittery Point [ME]. The few dates given indicate that the paintings were executed around 1897-1898. The paintings were likely made from freshly collected material, judging from the specific dates and localities affixed to some of them, as well as the fact that both artists were BMC members and would have regularly encountered wild-collected specimens.

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1 Listed in the roster as: De Long, Mrs. H. C. 141 High St., Medford.

2 Listed in the roster as: Ayres, Miss H. F. 119 High St., Medford.

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Lepiota naucina Louise G. De Long. Lepiota naucina. 99. Watercolor. Image courtesy of the Boston Mycological Club archive.

Archives; De Long; Continued from page 18

Club. Boston, Massachusetts. [Archive copy].

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Psalliota silracola ? Louise G. De Long. Psalliota silracola. 161. Watercolor. Image courtesy of the Boston Mycological Club archive. Facsimile edition. Boston, MA: New England Historic Genealogical Society, Boston, Massachusetts. Retrieved from Ancestry.com.

Massachusetts Vital and Town Records [b]. Provo, UT: Holbrook

Research Institute (Jay and Delene Holbrook). Retrieved from Ancestry.com.







Louise G. De Long. Amanita frostiana, A. spissus, A. formosa, undetermined Amanita. 131. Lynn. Sept. 17, 1897. Watercolor. Image courtesy of the Boston Mycological Club archive.



Amanila mappa A. vernus Louise G. De Long. Amanila mappa, A. vernus. 102. Watercolor. Image courtesy of the Boston Mycological Club archive.

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Mushroom Apocalypse by Lawrence Millman

Reviewed By Susan Goldhor

2017, Mutinus Press, \$13.95.

Finally his 16th book? Or his 17th? I've lost track. As someone who's read pretty much all of them, I've followed Larry's career arc, from ethnography/travel to mycology, with amazing detours along the way, and enjoyed it all. The enjoyment comes partly from the subject matter (travel, adventure, experiences with different cultures and – most recently – mycology) but also partly from the fact that Larry is a really good writer. (One of his classics, *Last Places*, is on *Outside Magazine*'s list of the all time 100 Best Travel Books. That's serious praise.)

And now comes a paperback. slim Mushroom Apocalypse: A Book of Fungal Fiction (\$13.95), the cover showing a very mushroomy (gilled, partial veil remnant) mushroom cloud with a very New Yorker-ish sophisticated couple dining al fresco in front of it. And the cover tells it all. This is a very sophisticated, literary mushroom book. If you're a mycophile, you'll enjoy this book. But if you're a literary mycophile, you'll love it. Because you'll get all the references. Some of the pieces just test your myco-expertise. Summit Fever, although it parodies the entire genre of mountain climbing stories, is really one where it just helps to



Cover Image Mushroom Apocalypse by Lawrence Millman

Bulletin

recognize the fungal family. *The Odyssey* is hysterically funny, even if your memory of Homer's epic is almost non-existent. But the Jeeves pieces gain enormously from having read Wodehouse, and (of course) you'll recognize the Conradian origin of "The Horror, the Horror". Because (and here I'm giving away one of Larry's secrets), Larry is a self-taught mycologist; but actually has a doctorate in literature. And he's a voracious reader. As an (almost) equally voracious reader, I've loved tracing his plots back to arcane Edwardian works that no one else has read, and then accusing him (publicly, in letters to the editor of *Fungi*) of various literary crimes.

Having said that, however, I'm going to recant. I think you'll enjoy this book whether you've read the canon or not. Sure, it's fun to know about Stephen Daedalus when Larry has James Joyce say that a daedaloid fungus is his favorite, but it's not necessary. Most of these little essays are entertaining without literary leanings – provided you lean towards the fungi. Some of them have nothing to do with literature and everything to do with mycology and mycologists, a sterling example being the description of the program for the first annual Whacked Out Mycology Convergence in East Dementia, Connecticut. But having retracted my literary warning, I now feel obliged to put out another one. There are no sacred cows in Larry's world. Everyone and everything is fair game – even God, DNA analysis, and sexual confusion. So if you have a sacred cow, you can expect it to be milked – publicly. But not meanly.

Order a Copy Directly From the Author

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 (postpaid!) by sending a check (or cash) for \$16 to Lawrence Millman, P.O. Box 381582, Cambridge, MA 02238. Be sure to ask for an inscription!

Neotropical Polypores: Part 3 by Leif Ryvarden

Reviewed By Lawrence Millman

Leif Ryvarden 2016, Fungiflora: Oslo, Norway Price: \$35 Editor's address: leif.ryvarden@ibv.uio.no

The percipient reader might remember the laudatory review I gave to Neotropical Polypores Part 2 in an earlier Bulletin. Now Leif Rvvarden (or Sir Leif, as he's called in his native Norway) has published Neotropical Polypores Part 3, and it's no less worthy than the preceding volume. From the beginning, when it documents the quite rare genus Obba, specifically the species Obba rivulosa, the book is a splendid addition to polypore literature. Mercifully, it remains true to broadly defined genera like Oligoporus, Perenniporia, Polyporus, Trichaptum, Trametes, and Tyromyces rather than, as is the case with many other current mycological tomes, toss those genera into a taxonomic dumpster. Like the previous volumes, there are no photographs, but no matter – the descriptions of basidiocarps, microscopic data, habitats, and remarks at the end are usually sufficient for identification purposes. Many of the species, like Tyromyces subgiganteus and Trechispora mollusca, can be found in eastern North America; many others you'll encounter only if you're somewhere like Costa Rica, Cuba, or Brazil. So why not head down to the neotropics and experience a throng of exotic polypores? Recommended for polypore aficionados as well as all serious mycological libraries. (#



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Answers To Mushroom Name Hunt From Page 17

The Gypsy Platterful Mushroom Velvet Foot Paxillus Hen of the Woods Cauliflower Bay Bolete Artist's Conk Chaga Yellow Foot Bolete Black Trumpet Oak Maze Gill Crown-tipped Coral Orange Mock Oyster Blewit Brick Tops Candy Apple Bolete

Cortinarius caperata Megacollybia rodmani Tapinella atrotomentosa Grifola frondosa Sparassis spathulata Imleria badia Ganoderma applanatum Inonotus obliguus Harrya chromapes Craterellus fallax Daedalea quercina Artomyces pyxidata Phyllotopsis nidulans Clitocybe nuda Hypholoma lateritium Exsudoporus frostii

Why I Wrote MushroomLog

by Chris Neefus

Wherein our esteemed member explains the origin of the mushroom app every right-thinking iPhone owner should download.

've always prided myself on having a good sense of direction. Maybe it's hereditary - my father was a navigator in the US Army Air Force during WWII. But in the woods, even the best of us can lose track of where we are. Daniel Boone once claimed "I have never been lost, but I will admit to being confused for several weeks." Since most of us have other things we need to do, a couple of weeks of confusion might be less than desirable. There are a number of good navigation apps for smart phones that can help you find your way back to your car, and most of them will let you save waypoints for locations that you would like to be able to return to later. During my first season of mushroom walks with the BMC, I used an iPhone app called SpyGlass. It would let me save the locations of mushrooms I found so I could find them again. But Spy-Glass wasn't designed for mushroom walks. It didn't save the dates for my entries. I had to include the date and name of the mushroom in the description of each saved location. By the end of the season, there were so many location entries, it was nearly impossible to find the one I was looking for. I also used my phone to take pictures of many of the mushrooms I found, and I tried to be conscientious about making entries in my field notebook. The challenge was connecting the images, notebook entries and locations.

I work at a university where winter break lasts most of the month of January. During the beginning of the break, I was looking through my field notes and pictures, and started imagining what an ideal iPhone app would look like for organizing field notes, map locations and images. I had developed a lot of computer software previously, but hadn't written any iPhone apps. Still, I figured "why not just create the app myself?" So, I spent the rest of winter break learning the iPhone operating system, iOS, Apple's new programming language, Swift, and their newest development platform, *xcode*. After writing a dozen or so practice apps I started working on MushroomLog. Now, a year later, it does everything I originally envisioned. It can track where you walk, it lets you record names, dates, field notes and images of each mushroom you find and organizes them by location, walk, and date. Later you can recall the map and a list of mushrooms for a particular walk, or you can search all of your mushroom observations by name, month, year, and a number of other criteria. So, you can easily look up and map where you found

black trumpets last year. Lots of features have been added to the app based on feedback from some very dedicated testers. For example, you can upload an observation's details and images to the MushroomObserver website, where a community of amateur and professional mycologist will help you with your identification. You can send the track and all the observations from a walk to another MushroomLog via eMail, Air-Drop or iCloud Drive. The app has a built-in database of 3000 scientific names and 2000 common names, which makes it really easy to fill in names for each of your mushroom observations. You can do quick name lookups in the database and add additional mushroom names or make changes to existing ones. In February, MushroomLog was approved by the Apple App Store.

If you would like to learn more about MushroomLog, you can look at the support website:

http://MushroomLog.net

If you decide you'd like to use it, it's on the Apple App Store at https://itunes.apple.com/app/id1115792620

BMC members can contact me (chris.neefus@unh.edu) for a Promo Code that will let them download it for free. Whether you're a BMC member or not, you can also contact me if you'd like to be part of the beta test group for future releases.



Mushroom Log. Left: A map of February Fells BMC wall in which a route is superimposed with pin points at each observation. Middle: A concurrent list of observations with photos(where taken) and names(where named). Right: An observation can hold many photos, notes, and a name which will auto-populate or can be typed manually. Streen shots and graphics provided by Zaac Chaves, who is truly impressed by Chris' fine work.

Cort Neferious: 🛛 Mushroom Flep

by Joshua Hutchins

I'm so nefarious looking for Cortinarius in various areas, appearing wherever the rain carries us. I know your curious, acting garishly when flashing blue Lactarius, I'd bet you think that that's hilarious. See I'm serious, Xylarias, Daldinias....Laetiporus ridge- you find 'em where the forest is. Polyporus umbellatus - the same as Grifola frondosas - you find those where the most oldest Oaks is. Some are saprotrophic and some are mycorrhizal and there's some facts about medicinal mushrooms that might surprise you - like cancer fighting properties and Psilocybes -

been used to open the mind since the time of Socrates. And quite possibly much older than Philosophy, inoculated on earth - brought by the Annunaki. Don't soak it in sake unless your sure of the species...Ganoderma tsugae is the Hemlock Reishi. Nectria on some tree leaves....It's not easy to key a red Russula – there's like a billion and three of these?! Is this chaga, or a canker from a tree disease? This styles hotter than the stars in the Pleiades....hotter than our own sun - ten trillion. four hundred million and thirty three degrees... But like a bird in the trees - I'm out on a limb - It's all about Mycology.



Bower, F. O.; Wardlaw, C. W., Botany of the living plant, London, Macmillan and Co., Itd. Published May 1947, Page 460. Digitizing Sponsor: MBLWHOI Library, via Project Gutenberg.

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WHAT TIME IS IT? GLEBA TIME



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Mushrooms of the Northeast by T. Marrone and W. Sturgeon Reviewed By David Babik

ith the many new and unique books being released this year, it would be easy to miss this new field guide, with an unexciting title. However, if you do miss this one, you may regret it.

Teresa Marrone, a noted wild foods author with over 30 years of foraging experience and Walt Sturgeon, a known mycologist (and friend of the BMC) with over four decades of mushrooming under his belt, have worked together to produce a beautiful and useful pocket field guide. The focus is field identification, so microscopic characteristics are not addressed in the descriptions. This is mainly a book to carry with you when out in the woods.



Cover Mushrooms of the Northeast by Teresa Marrone an Walt Sturgeon

Mushrooms of the Northeast is illustrated with hundreds of clear color photos, mainly taken by the authors themselves. Close up inserts help to highlight important identifying aspects of particular species. Part of what is really useful about this book is that it provides the most current nomenclature along with an intense focus on the best ways to differentiate between similar looking mushrooms. The in-depth text will prove enlightening to more advanced mushroomers, yet the clear language keeps it accessible to beginners too.

The main body of the guide is set up into sections, starting with the most common edible and poisonous mushrooms to help budding mushroom hunters learn the basic species. Other sections cover "cap & stems" fungi with gills and those with pores, shelf fungi, spherical, cupshaped and miscellaneous others. This allows a reader to quickly search for help when out in the field. The book finishes off with an up-to-date list of useful books and websites, as well as a glossary of mycological terminology. At a 4"x 6" size and a shelf price of only \$16.95, this is a book that will easily become your first choice to place in your mushroom basket or coat pocket when you head out into the woods.

A Trip To Hell

A Mycological Short Story

by Lawrence Millman

s a graduate student in mycology, I needed some way to support myself, so – with all other possibilities exhausted– I took a parttime job as an outhouse technician. The habitat seemed so similar to grad school that I figured I would have no difficulty segueing from one to the other, then back again.

One morning the phone rang, and an anxious-sounding woman told me that her husband had visited their outhouse three days earlier and still hadn't returned. Could I perhaps find him?

Ordinarily, outhouse technicians don't perform extractions, but I felt so sorry for the woman that I agreed to do the job. She took me to the privy behind her house, and I peered into the deepest, darkest hole I'd ever seen. My flashlight didn't even reveal the bottom. What kind of outhouse is this? I asked myself, getting out my rope.

Down, down, down I rappelled. Suddenly I lost my grip on my flashlight, and in trying to grab it, I lost my grip on the rope. I found myself falling head over heels through space for what seemed like an endless period of time. At last I landed not as I expected, on a heaping pile of shit, but in a hot, sulfur-smelling place with rows of extremely pallid people seated at barcoding tables.

Right away I realized the truth: that these barcoders were dead.

A gaunt, winged individual with a caudal appendage and a tag on his chest that said "Hi, I'm Beelzebub" approached me and declared, "Welcome to Hell, my friend. Kindly sit down and start sequencing fungi."

"Sorry, but I don't understand..."

"You've arrived in the section of Hell reserved for academic mycologists. You never went into the field when you were alive, and you won't be going into the field now that you're dead. All you'll do here — morning, noon, and night — is sequence fungi. Sequence them forever more. And no gene editing, please."

One of the mycologists remarked to Beelzebub, "I've been working on *Stereopsis* for twenty-five years now, and its placement is still ambiguous."

Continued on page 35

Leaves And Shadows

By James M. McAuley



Leaves and shadows Hiding what I'm looking for Hiding all that's good for me Kingdom Fungi I explore.

McCook, Henry C., Ant communities and how they are governed; a study in natural civics. Page 114. Published 1909. Digitizing sponsor: MBLWHOI Library, via Flickr Commons.

Leaves and shadows Watch me step by step As I walk along the forest floor Searching for...

Leaves and shadows Sorting through the light and dark As I walk through the park Peering, tearing 'round root and rock.

Leaves and shadows Leaving me to see what I want to see Seeing what you want me to see Leaves hiding me.

Leaves and shadows Sharing all your shapes and forms With me Baring all you are after storms For me Changing you, Changing me.

Leaves and shadows Beneath leaves and shadows You leave me Shadowing you.





Seven Foot Sculpture of an Amanita by Jason Livingston and Carly Nix Photograph by Carly Nix



A Trip To Hell; Continued from page 32

"It will always be ambiguous," sneered Beelzebub.

"My consensus trees have refused to be in consensus since the moment I sat down in this awful place," another mycologist said.

"C'est la vie," sneered Beelzebub again.

Another mycologist seemed to be stuck inside a cladogram. He kept shaking it with his arms, but to no avail. He could not get out.

Explained Beelzebub: "That guy got up from his barcoding table and went into what passes for the field in these nether parts, so we had no choice but to imprison him."

Needless to say, I was growing less and less comfortable, especially after I saw one of the sequencers being blasted repeatedly by a BLAST (Basic Local Alignment Search Tool), so I said to Beelzebub, "Well, it's been fun, old chap, but I've really got to be going.".

"You're not going anywhere," he sneered yet again. "Sit down at one of the empty barcoding tables and start sequencing euagarics now!"

I decided to play my trump card. "But can't you see that I'm alive? Alive, I repeat, as opposed to being dead, like these barcoders?" I declared.

At this sudden revelation, Beelzebub looked at first astonished, then both angry and disappointed. When he calmed down, he said, "Well, I

suppose I'll have to fly you up to where you came from. Here, hop on my back..."

The thought of being a passenger on such a diabolic individual did not appeal to me, but I didn't really have a choice. Our journey back to the world of the living occurred, it seemed to me, in a single protracted moment.

You won't be surprised to learn that, upon emerging from the outhouse, I decided not to become a mycologist. Instead, I became test pilot so I could be in the sky and thus be as far as possible from outhouses, not to mention barcoding tables.



Bower, F. O.; Wardlaw, C. W., Botany of the living plant, London, Macmillan and Co., ltd. Published May 1947, Page 460. Digitizing Sponsor: MBLWHOI Library, via Project Gutenberg.

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BMC Eagle Hill Scholarships Available

Eagle Hill Classes have been posted early this year and 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 Hils Scholarship. See Alan LaRue's article on page nine for a proud example.

June 4	Introduction to Bryophytes and Lichens
to June 10	Fred Olday
July 2	Lichens and Lichen Ecology
to July 8	David Richardson and Mark Seaward
July 16	Boletes and Other Fungi of New England
to July 22	Alan and Arleen Bessette
July 23	Lichens, Biofilms, and Stone
to July 29	Judy Jacob and Michaela Schmull
July 30	Foraging Edible and Medicinal Mushrooms
to Aug 5	Greg Marley and Michaeline Mulvey
Aug 6	Saxicolous Lichens
to Aug 12	Alan Fryday

Our Website

http://www.bostonmycologicalclub.org/

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

Walk Leaders Wanted

The BMC is looking for foray leaders to lead our Sunday Forays. We have streamlined the process, and it is easier than ever. Walk leaders welcome members, distribute maps, and help break down the ID table after the session. This is an excellent job for a new member to learn more about mushrooms and meet other members- no ID experience required. Please contact Bill Carroll for additional discussion at BMCForayCoord@gmail.com. Thanks everyone!

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

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.

Membership for 2017

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) 111 Williams St. Apt. 2 Boston, MA 02130

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.

The Fourth Annual White Mountain Fungal Foray

This year's White Mountain Fungal Foray will again take place at the World Fellowship Center in Conway, New Hampshire. The dates will be September 1-3. That's Labor Day Weekend, so forget your labors and head up to the White Mountains to look for fungi. Lawrence Millman will be the chief mycologist and coordinator again. This year he will be joined by Tom Bigelow, Dianna Smith, master chef Luke Smithson, and Bulletin editor Zaac Chaves. For more information or to register, call World Fellowship at 1-603-447-2280.

Save The Dates For NEMF 2017

The New York Mycological Society, Connecticut-Westchester Mycological Association, Mid-Hudson Mycological Association and Long Island Mycological Club are hosting the 2017 NEMF Samuel Ristich Foray at the Stratton Mountain Resort in southern Vermont July 27-30, 2017.

Gary Lincoff, Faculty Chair is assembling a group of local experts in the principal genera that we are likely to encounter during the foray as well as some genera we may not encounter. There will be a microscopy lab available during the entire foray for participants to hone their microscope skills or to assay their collections.

Frank Marra, Walks Chair, has put together over a dozen interesting collecting venues for us to explore. No site is more than a half-hour's drive from the Resort on Stratton Mountain. The NYMS has visited this area every year since its rebirth in 1962, so there is a deep experience in these woods. We will even have access to the top of Stratton Mountain via a lift line!

Our accommodations will be located in three lodges located in a resort village located about halfway up Stratton. All lectures, exhibitions, vendors, evening programs, socials and lunch & dinner meals will be found in one building, the Base Lodge, from where the lift goes up Stratton.

Black Bear, Lift Line & Long Trail Lodges will provide double occupancy accommodations and a continental breakfast. Black Bear and Long Trail Lodges are air conditioned, While Lift Line Lodge is not air conditioned, our experience in Vermont is that early summer may bring hot days but the elevation provides cool relief at night. The accommodations in Lift Line will provide an economical sleeping option.

UPCOMING EVENTS

Sun, Apr 30 3:00 pm	122nd Annual BMC Meeting And Lecture MUSHROOMS AND CLIMATE CHANGE by Jennifer Talbot, Assistant Professor of Micro- bial Mycology at Boston University. Herbaria Seminar Room
July-October Most Weekends	The BMC's Weekend Walks This list is being finalized. To help out send and email to: BMCForayCoord@gmail.com
July-October Most Mondays 7-9pm	BMC Monday Night ID Sessions Harvard Herbaria Seminar Room. Look for email announcements. We will have open access to the BMC's Library while we endeavor to place more accurate names on our recent specimens.
July 27-30	NEMF Foray in Stratton, VT Hosted by the NYMS, COMA, and MHMA. Contact: http://www.nemf.org/
Sept 1-3 Labor Day	Fourth Annual White Mountain Fungal Foray World Fellowship Center in Conway, NH. Contact: http://worldfellowship.org/
Sept 1-4 Labor Day	COMA Annual Clark Rogerson Foray Hemlocks Center, Hebron, CT. Contact: http://www.comafungi.org/special-events/clark-rogerson-foray/
Sept 7-10	NAMA Annual Foray Hosted by NAMA and Britt Bunyard in Wisconsin; contact: http://www.namyco.org/nama_2017_northwoods_foray.php

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

Mystery Fungus



Dear Mycophiles, The 'mystery fungus' in the last issue of *The Bulletin* was the stalked puffball *Calvatia elata*, aka *C. bovista*. This issue's 'mystery fungus' (above) is an ascomycete that is probably not found in the Northeast, but is somewhat prolific south of here. Fruiting bodies grow on deciduous wood and are 1-3 mm. Whoever correctly identifies this fungus will receive a free copy of one of my books. Send your answers to: BulletinBMC@gmail.com Lawrence Millman Photograph by Lawrence Millman



Calvatia elata, aka C. bovista Photograph by Joe Warfel

Read More On Page Six