

THE MYCOPHILE

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www.namyco.org

The Mushrooms, My Friend, Are Blowing in the Wind...

Nov. 25, 2013 — Plants use a variety of methods to spread their seeds, including gravity, forceful ejection, and wind, water, and animal dispersion. But what of the mushrooms, whose spores also need to be strewn far and wide to ensure their propagation?

Biologists have long thought that the spores produced by a mushroom's cap simply drop into the wind and blow away. The problem with that notion, said Emilie Dressaire, a professor of experimental fluid mechanics at Trinity College in Hartford, Conn., is that spores can be dispersed even when the air is still. So how do the mushrooms do it? Dressaire, along with Marcus Roper of the University of California, Los Angeles (UCLA), believe they have found the answer: they make their own wind.

Dressaire presented the findings in a talk at the 66th Annual Meeting of the American Physical Society's (APS) Division of Fluid Dynamics (DFD), held Nov. 24-26, 2013, in Pittsburgh, Pa.

Using high-speed videography and mathematical modeling of spore dispersal in commercially grown oyster and Shiitake mushrooms, Dressaire, Roper, and their students found that the fungi created their wind by releasing water vapor. The vapor cools the air locally, and this creates convective cells that move the air around in the mushroom's vicinity.

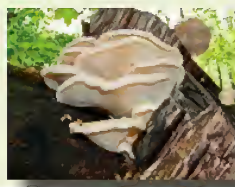
Dressaire said these air movements are strong enough to lift the spores clear of the mushroom. As a result, she continued, "mushrooms are able to disperse their spores even in the most inhospitable surroundings."

The team believes this evaporative cooling process might be used to some degree by all mushroom-producing fungi, including those that cause disease in plants, animals, and humans.

"Most people, even scientists, think of mushrooms simply as machines for producing spores," Roper said. "The more spores each machine produces, the more likely it to successfully colonize new habitats." But the new work suggests that there is much more going on.

"Our research shows that these 'machines' are much more complex than that: they control their local environments, and create winds where there were none in nature," Dressaire said. "That's pretty amazing, but fungi are ingenious engineers."

Source: *Science Daily*, December 16, 2013 <http://www.sciencedaily.com/releases/2013/11/131125121154.htm>
based on report in the *American Physical Society's Division of Fluid Dynamics* (2013, November 25)



FORAYS & OTHER EVENTS

This section of **THE MYCOPHILE** is reserved for publicizing the annual forays of NAMA affiliated clubs and other events you may be interested in learning about. If you would like us to list your club's next big event, contact us with details you would like displayed here and send to the editor dianna.smith@comcast.net. See also <http://namyco.org/events/index.html>.

January 18-20, 2014 (Martin Luther King Jr. Weekend): Sonoma County Mycological Association is hosting their annual SOMA Camp. It will be packed with forays, specimen tables, slide shows, top-notch speakers and workshops on cooking, cultivation, dyeing and polypore paper-making and photography. For adults staying in the onsite cabins the cost is \$325. Participants under 13 years of age pay \$200. The cost for adults staying offsite is \$200, with children under 13 at \$165. For more information see www.somamushrooms.org.

January 24-26, 2014: The fifth biannual *All California Club Foray (ACCF)* will be held in January 2014 in Albion, California. Chief mycologist, Dr. Terry Henkel, and grad students from Humboldt State University will assist with taxonomy. This event includes catered meals, comfy lodging, and mushroom hunts in the bountiful Jackson Demonstration State Forest near Mendocino. This foray is open to any current member of a California mushroom club and NAMA members. Cost is \$175 per person and includes two nights lodging and all meals from Friday evening through Sunday breakfast. Pre-registration is required. Registration and detailed information can be found at: http://bayareamushrooms.org/forays/accf_2014.html

May 9-11: The Oregon Mycological Society (OMS) will be hosting its Spring Mycology Camp at Suttle Lake, Oregon. For more information see www.wildmushrooms.org.

August 7-10: 2014 NEMF Samuel Ristich Foray at Bowdoin College, Maine. Dr. Seanna Annis, mycologist and plant pathologist at the University of Maine at Orono, will be the host mycologist. Presenters will include Renée Lebeuf, Raymond Archambeault, Greg Marley and Michaeline Mulvey. See www.nemf.org/foraynext.htm.

September 4-7: COMA's annual Clark Rogerson Foray will be held at Berkshire Hills Emmanuel Camp in Copake, NY and is easily accessible from NYC, the Hudson Valley, Connecticut and Western Massachusetts. See www.comafungi.org/special-events for information on registration.

October 9-12: NAMA's 2014 FORAY at Camp Arnold (<http://www.tsacamparnold.org/>) in Eatonville, Washington.

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2013 ANNUAL PHOTOGRAPHY CONTEST

in the Documentary Category

First Place: Walt Sturgeon's *Hygrocybe appalachiensis*

Second Place: Kathy Yerich's *Psathyrella epimyces*

Third Place: Daniel Winkler's *Ophiocordyceps* sp.

Honorable Mention: Todd Elliott's *Pseudotulostoma volvata*

Todd Elliott's *Amanita lanivolva*

Walt Sturgeon's *Pseudoclitocybe cyathyformis*

Dianna Smith's *Coltricia perennis*



Walt Sturgeon: *Hygrocybe appalachiensis*



Kathy Yerich: *Psathyrella epimyces*



Daniel Winkler: *Ophiocordyceps* sp.



Todd Elliott: *Pseudotulostoma volvata*



Walt Sturgeon: *Pseudoclitocybe cyathyformis*



Todd Elliott: *Amanita lanivolva*



Dianna Smith: *Coltricia perennis*

Paul Stamets Receives 2013 NAMA Award for Contributions to Amateur Mycology

NAMA's Award for Contributions to Amateur Mycology is given annually to recognize a person who has contributed extraordinarily to the advancement of amateur mycology. Its recipients have often extensively conducted workshops, led forays, written or lectured widely about mushrooms and identifying mushrooms, all on a national or international level. The recipient is awarded a plaque and lifetime NAMA membership.

Paul Stamets, once just another student at Evergreen State College, came under the influence and guidance of Dr. Michael Beug, and eventually became, as they say, a force of nature. No less than Dr. Alexander H. Smith was astonished by young Paul's technique for photographing spores using the Electron Scanning Microscope.

Paul's early interest in magic mushrooms led him to produce an excellent taxonomic work on the psilocybin mushrooms of the world. Paul expanded his interest in mushroom cultivation to include techniques for growing both gourmet and medicinal mushrooms. Dr. Don Hemmes was amazed at the quality of Paul's workshops on mushroom cultivation. Working closely with Dr. Andrew Weil, Paul has pioneered the research and development of medicinal mushrooms in the US, and Paul's influence at medicinal mushroom conferences here and abroad is truly international. In fact, Paul is currently an FDA inspector working with turkey tails and breast cancer.

With his six books on mushroom cultivation, use, and identification, and especially with his recent publication, "Mycelium Running," Paul has reached out to a vast audience of people largely naïve about mushrooms, but eager to learn about using mushrooms in myco-remediation techniques, pioneered by Paul, to help clean up lands and waters polluted by oil spills; and there are ongoing projects today in the US and the Amazon that are informed by Paul's methods.

Not only has Paul contributed extraordinarily to the advancement of amateur mycology, but he serves as a potent role model for amateur mycologists that we, too, can achieve well beyond our imagined potential in the exciting fields of mushroom taxonomy, cultivation, medicinal mushrooms, and myco-remediation. In addition, there is a long list of Paul's help to mushroom clubs, including NAMA, and we are deeply grateful that so accomplished an amateur mycologist, so prominently recognized now in circles few of us travel in, and has maintained a close mycelial network with NAMA and with the North American mycological community at large.



Paul has discovered and coauthored four new species of mushrooms, and pioneered countless techniques in the field of edible and medicinal mushroom cultivation. He received the 1998 "Bioneers Award" from The Collective Heritage Institute, and the 1999 "Founder of a New Northwest Award" from the Pacific Rim Association of Resource Conservation and Development Councils. In 2008, Paul received the National Geographic Adventure Magazine's Green-Novator and the Argosy Foundation's E-chievement Awards. He was also named one of Utne Reader's "50 Visionaries Who Are Changing

Your World" in their November–December 2008 issue. In February 2010, Paul received the President's Award from the Society for Ecological Restoration: Northwest Chapter, in recognition of his contributions to Ecological Restoration. In June 2012, Paul received an honorary Doctor of Science degree from The National College of Natural Medicine, in Portland, Oregon. For more information on Paul Stamets see <http://www.fungi.com/about-paul-stamets.html>.

John Dawson, 2013 Harry and Elsie Knighton Service Award Recipient

*The Harry and Elsie Knighton Service Award was established by the NAMA Board of Trustees to recognize and encourage persons who have distinguished themselves in service to their local clubs. The annual award consists of a plaque; publicity for the winner and club in *The Mycophile*; a one-year NAMA membership; and registration, housing and foray fees for the next NAMA Foray.*



John Dawson has been President of the Eastern Penn Mushroomers Club for the last ten years. John stepped in as President after the deaths of Helen Miknis and Suzanne Whittaker, both of whom were driving forces in establishing EPM. He helped the club through these times with grace and sensitivity. He stepped down this year but is still serving as meeting chairman in charge of special events and winter meetings.

John wrote a President's Message for each newsletter. Each of those messages carried significant information and helped keep the club informed, knowledgeable, and more in tune with the larger picture of the world of mycology. He also writes a "Who's in a Name" series which teaches people about mycologists and others who have fungi named after them. This series of over 30 names has brought attention to EPM.

He has also been helpful to the community at large; as a frequent speaker at state and county parks, and helping with the bioblitz at King's Gap Environmental Center when the ranger in charge became ill. He also managed to convince other members of the club to help. John has also helped local medical personnel to identify suspect fungi in possible poisoning situations. He has represented our club at sports shows and special outdoor events, constantly bringing it into the public eye.

John attends most EPM forays and is very active in identification and helping others learn to identify fungi. He is very interested in many of the smaller species. Other members often collect small things just to give him a challenge. After one foray this year, John took home some deer dung and cultured it, and managed to find three more species. He loves to take photographs of fungi and has supplied many photos for the club website. He is a frequent contributor to Mushroom Observer and NAMA photo contests.

John has served the club tirelessly in many ways. He and his wife have often hosted the club at their home for the annual 'Tasting' event. He has presented many interesting programs at winter meetings. He arranged for the club to have access to a local preserve, where cabins could be rented for a foray, and is already planning another trip for members to the same location.

He has been active in NEMF and encourages all members to attend the larger forays presented by NEMF and NAMA. He served as Registrar for the recent NEMF foray in Pennsylvania.

In the November-December issue of *THE MYCOPHILE* we inadvertently neglected to mention all of the invited mycologists who presented programs at the 2013 NAMA Foray in Arkansas. In addition to Dr. Clark Ovrebo, Patrick Leacock, Ron Petersen, Arleen Bessette, Alan Bessette, John Plischke III, Michael Kuo, Marisol Sanchez-Garcia, Walt Sturgeon, Tom Volk, Nathan Wilson, Britt Bunyard, Dimitris Floudas, Daniel Winkler, Steven Russell, Dr. Jean Lodge and Andrew Methven, there was also David Lewis. Our apologies for this unintentional oversight.

Message from NAMA President, David Rust

After the foray in Arkansas, one of our members who could not attend asked me if I was still pleased about being NAMA President. I responded unequivocally, "I would say 'still pleased about being president' understates my joy about the outcome of this foray. I am really, really, looking forward to the next two years."

At the NAMA Board of Trustees meeting, several key issues were addressed. I'd like to list a few here. A longer summary of the meeting can be found on the next page.

Because the cost of travel is so high, and to give NAMA more flexibility in conducting business, trustees voted to have the option to conduct online board meetings in the future. We also chose to re-draw Region boundaries, which have not changed since they were explicitly created in a state by state list in the original Articles of Incorporation in 1967. Both of these initiatives should make NAMA a more efficient organization.

I'm also excited about our push to bring as many as four additional students to NAMA forays. Encouraging young mycologists will create bonds far into the future.

The Awards Committee's choice of Paul Stamets for the 2013 NAMA Award for Contributions to Amateur Mycology is brilliant. Stamets is without doubt the most visible mycologist in the world. The Stamets YouTube Channel has 37 videos. Paul founded (and owns or manages) Fungi Perfecti, LLC; Agarikon Press; The Life Box Company; and Mycopesticide, LLC. He has been awarded 7 patents and has received numerous awards through the years. Paul has supported NAMA in many ways in the past decade. Thank you, Paul, and congratulations!

NAMA is participating in the USA Science and Engineering Festival in Washington, DC in April 2014. The Festival is a STEM event, meant to boost kid's interest in Science, Technology, Engineering and Mathematics. This is an opportunity for us to put together our collective creativity and expertise to put on a show. We are planning an exhibit that can be replicated at many events and fairs in the future. I'd like to thank The Mycological Association of Washington (DC) for agreeing to staff the booth and take the lead on this venture.

If you are not a life member, please take a moment to renew your membership dues either by check to Ann Bornstein or online at: <http://namyco.org/join/application.html>. The same low dues are still in place.

The trustees decided to conduct an audit of our financial records. We would like to find a NAMA member who lives close to Herb Pohl in New Jersey and conduct an impartial audit.

NAMA is going to begin a fundraising program. If you could help NAMA put together a cohesive, thoughtful, and strategic approach, please contact me.

If you can volunteer, please contact David Rust, 510.468.5014 or david.rust@sbcglobal.net.



Trustees meeting participants at the NAMA Arkansas Foray and a burro on the left, who insisted it be in the picture!
(Photo by David Rust)

President's Report on Annual Trustee Meeting

The NAMA Board of Trustees met on October 23, 2013, prior to the foray in Arkansas. We addressed a number of issues and set a process to fix several more. Following is a summary of the meeting's accomplishments and actions:

- Congratulations to Linnea Gillman, who was re-elected as Secretary.
- The Board of Trustees can now meet and vote in an online forum, which means we can hold meetings without physically bringing everyone together. I envision at least one additional meeting per year, using an online technology website such as "Go To Meeting". This change should save future travel and lodging expenses for all board members.
- The Executive Committee duties are more clearly spelled out and a limitation on the dollar amount that the President can authorize without bringing a request to the full committee.
- Three At Large positions appointed by the President can now serve up to three year consecutive terms.
- The Toxicology Committee (Michael Beug requested this change) now consists entirely of approximately 150 volunteer emergency identifiers as listed on the NAMA website.
- We agreed to participate in a Science & Engineering Festival in Washington, DC, next April, 2014. Connie Durnan will chair an ad hoc committee to organize our participation.
- NAMA will pay up to \$500 for foray fees and travel costs for up to 4 additional students to attend forays (Michael Beug request).
- A small stipend will be awarded to foray mycologists upon receipt and publication of an article in our peer-reviewed journal *McIlvainea* (another Michael Beug request).
- Updated the Executive Secretary's job description to reflect her actual duties.
- NAMA's Regional boundaries have not changed since 1967 and we are bound by the concise description as stated in our Articles of Incorporation, filed with the State of Ohio. Instead of a state by state listing, we changed the description of the boundaries of Regions to more simple language: The NAMA Board of Trustees shall designate geographic regions of the United States, Canada and Mexico, consisting of affiliated organizations and members. These regions may change from time to time based on association needs and membership levels. This will give the Board a chance to redraw the boundaries and create new regions as needed.
- Election of Regional Trustees has been expanded to a more democratic level, and all members in a region will have a vote. An ad hoc committee is working on region and election changes.
- We added language suggested by former NAMA president Ike Forester to bring the Policy Manual into compliance with IRS 990 questions. The new policies cover such areas as: conflict of interest, whistle blower, restricting business transactions to prohibit loans to officers, and better document retention policies.
- The board voted to conduct an audit of the past two years' financial records (the first one in recent history).
- Hold an all-day planning session at next year's foray (board trustees). This session will help NAMA re-shape our vision and mission for the future.
- Liability insurance was discussed, but the quotes we received were high. More investigation is necessary.
- Voted on the 2013-2014 budget prepared by Treasurer Herb Pohl. Note: because of the new board meeting format, future budgets will be proposed and approved before the beginning of the fiscal year.
- Authorized the NAMA President to start a fundraising program. More on this as it develops.
- We talked about the NAMA archive, which has been dormant since 2007. (I visited the archive at the New York Botanical Garden in the Bronx in September.) We will develop guidelines for what to add and how to add it with archivist David Rose.
- We closed with a short discussion about the NAMA Foray Guide. We asked the foray committee to meet and recommend a more comprehensive update before the next board meeting. Items to consider include language of the Memorandum of Understanding with host clubs, pre-approval and oversight of the foray budget, and voucher collection committee responsibilities.

I want to thank everyone who participated. We had good discussions and covered a lot of ground. Thanks to Becky Rader, Executive Secretary, for distributing committee reports and agendas prior to the meeting.

David Rust, NAMA President

Count Your Mushrooms

by Moselio Schaechter

From SMALL THINGS CONSIDERED, (<http://schaechter.asmblog.org/schaechter/fungi/>) November 06, 2013

Maybe you have to be a mushroom enthusiast or a fungal ecologist to give this a thought, but counting the number of mushrooms in a tract of forest will not tell you the size of the fungal biomass therein. The mushrooms you see are only the fruit bodies. The whole fungal organism consists of an extensive growth and accumulation of invisible hyphae, the mycelium. Measuring fungi by counting mushrooms is like weighing an orchard by counting the apples on apple trees, only here not all “trees” produce fruit. To the consternation of wild mushroom collectors, the copious amounts of mycelial filaments existing in the soil and decaying wood may or may not produce mushrooms. What determines which mycelia will fruit, and how prolifically? In earlier times, this conundrum seemed difficult to unravel, but now, with high throughput sequencing available, this has become amenable to investigation.

A group of Norwegian and Finnish researchers carried out an intensive study to correlate the number of fruit bodies emerging from decaying tree logs with the abundance of the mycelia in the wood. The general conclusion was that for most fungal species, the more mycelial mass at a site, the greater the number of visible fruit bodies. This may not seem surprising, but the details, based on careful measurements, matter. For example, fewer fruit bodies were produced by those species whose fruiting is more energetically costly, such as the ones that display a cap sticking out from the surface of a tree (called pileated in the trade) as compared to those whose fruit bodies lie flat along the surface (known as resupinate). The quantities of both mycelial DNA and visible fruit bodies increased linearly with the increasing decay of the wood until the decay became quite advanced. From that point on, the amount of mycelial DNA continued to increase, whereas the fruit body count decreased. In other words the mycelium goes on developing as the tree decays but this does not result in the concomitant formation of fruit bodies. These fungi find growing easier than differentiating under these conditions.

These measurements involved a great deal of work. The investigators used 100 large (20-42 cm in diameter and some 20 meters in length) Norway spruce logs whose stage of decomposition was duly evaluated. The work involved qPCR, high throughput sequencing, and tons of statistics. They found 198 species from the DNA data and 137 from the fruit body count. The mean number of species per log was ca. 16 and 9, respectively. Almost all the species encountered were bracket fungi. (Calling them mushrooms is a matter of usage. Some people don't. I do.) All of the more abundant ones were woody or leathery in consistency, thus inedible. I presume that was a source of disappointment to the investigators, being that edible mushrooms such as shiitake and maitake do grow on trees. The pie chart shows that a few mushroom species dominated while most species were represented by relatively few finds. In their words: “... species that are able to obtain a dominating position in the mycelial community possess a high fruiting rate, produce abundant fruit bodies, and have a high prevalence both as fruit bodies and as DNA, suggesting a positive feedback-loop.”

Until the advent of readily available DNA techniques, the study of fungal communities depended largely on identifying and enumerating fruit bodies. Now that the quantity of subterranean or tree-dwelling mycelia can be readily determined, a truer picture of fungal abundance emerges, thus revealing actual ecological relationships. For example, based on what the eye tells you, inclusion of some fungal species in red lists of threatened organisms may turn out to have been pessimistic. Some species are just stingy in fruiting. Their mycelia may be doing quite well and not be endangered.

Being able to measure the actual mass of the organisms can expand our knowledge of the presence and activities of fungi in the environment. As the authors say: “An interesting avenue for future research would be to examine what makes some species wait even decades until they form fruit bodies, and what triggers fruit body production.” Even those mushroom hunters who return from the woods with a nearly empty basket can take heart; the mycelium is lying awaiting.

Reference

Ovaskainen O, Schigel D, Ali-Kovero H, Auvinen P, Paulin L, Nordén B, & Nordén J (2013). Combining high-throughput sequencing with fruit body surveys reveals contrasting life-history strategies in fungi. The ISME journal, 1709, 1696-709 PMID: 23575372



Fig. 2. Left: The mushroom species most commonly found in this study, *Fomitopsis pinicola*. Source. Right: The second most common mushroom species in this study, *Heterobasidion* sp. Shown here is a representative of this genus, *H. annosum*. (See Reference)

It is THAT time of year again, mycophiles! DUES ARE DUE for 2014!

Download the membership form from our website and send it to **Ann Bornstein at 61 Devon Court, Watsonville, CA, 95076-1160** with your check. Or easily renew online using PayPal at www.namyco.org/join/index.html.

By sending publications electronically, we have been able to lower our membership fees, and pass the savings to you. But, because the cost of printing and mailing out hard copies is higher than the membership fee collected, we urge you to sign up for the lower cost full-color digital version. You save money and so do we!

- \$24 members of affiliated clubs (electronic)
- \$30 members of affiliated clubs (hard copy)
- \$29 individual/family membership (electronic)
- \$35 individual/family membership (hard copy)
- \$35 individual/household membership outside North America (electronic)
- \$45 individual/household membership outside North America (hard copy)
- \$15 student membership
- \$60 sustaining membership
- \$500 life membership

Start with a few clicks at the NAMA website: <http://namyco.org/join/index.html>

Toxic Polypores - Polyporic Acid in Fungi

By Michael Beug, PhD

Chair NAMA Toxicology Committee

(Note from editor: I thought it was worth while republishing this article given the fact that an increasing number of people are experimenting with various polypores to produce salves and teas for their potential health benefits.)

I and it turns out many other people who give talks about fungi, have long considered polypores to be non-toxic. But for the most part, who would want to eat them? Very few are fleshy and tasty. However, since much of the interest surrounding the medicinal use of mushrooms involves polypores, I began to worry about individuals self-medicating with polypores they find in the wild. It started with a conversation with a friend I encountered while walking through her woods in early January. I had just found a polypore unlike anything I had ever seen and was heading home with a discretely sampled part of it. Our conversation turned to medicinal mushrooms and she told me of mushrooms collected for her husband by a wild crafter when he was battling cancer. I did not think much about it then; I had a mushroom to identify.

At home, I cut out three little pieces of the polypore and placed them in a spot plate. A drop of KOH turned the first piece dark red. The second piece got a drop of Melzer's reagent – no reaction. Since I study *Ramaria* species, I tried a drop of FeSO₄, an important reagent for that genus, and the third piece with FeSO₄ turned dark green. I could find nothing in the books I had on hand about a dark green reaction of polypores with FeSO₄, but a dark red reaction to KOH brought to mind a 2001 paper from *Mycologia* about *Hapalopilus*. They mention a cherry red reaction for the European *Hapalopilus rutilans* (Pers.) Murr. and their DNA work demonstrated that the European species is the same as the American species that we call *Hapalopilus nidulans* (Fr.) Karst. (Ko, et al, 2001). They also mention that *Hapalopilus nidulans* contains up to 40% by dry weight polyporic acid and that that compound is responsible for the reaction with KOH. More importantly, polyporic acid (a dihydroquinone derivative) causes damage to kidneys and central nervous system function. Three people were poisoned in Germany in two separate incidents, one in 1986 and one in 1987. Had I found *Hapalopilus nidulans*? I did the microscopy, the hyphae were right; the spores looked like they fit. But I was worried that my mushroom was far more hairy than the description seemed to indicate for *Hapalopilus nidulans*. I couldn't find a good picture.



Laetiporus mollis:
Photo by Michael Beug

I posted a note to the toxicology identifiers alerting them to *Hapalopilus nidulans* and attaching my image. I soon received genuine pictures of *Hapalopilus nidulans* and it was clear that I had a different mushroom. I mailed my material off to polypore expert Dr. Jim Ginns and he identified it as *Laetiporus mollis* (Pers.) Quel. But did the color reaction I had observed indicate polyporic acid? It turns out that North American material turns a beautiful lilac to violet with KOH while the same species in Europe turns cherry red. Maybe my mushroom has polyporic acid, I don't know. There are other polypores known to contain polyporic acid. They include *Porostereum friesii* (Lév.) Horst. & Ryv. = *Lopharia papyraceae* (Jungh.) Reid and *Phanerochaete filamentosa* (Berk. & M.A. Curtis.) Burds. = *Rhizochaete filamentosa* (Berk. & M.A. Curtis) Gresl. Ko et al (2001) demonstrated that the ability to produce this acid has evolved three or four times in polypores and we do not yet know all of the potentially toxic species. Polyporic acid is the active ingredient in at least one Chinese herbal medicine (Gui Zhi Fu Ling) which is made from some species of *Poria*. However, the polyporic acid in the Chinese herbal medicine is a different (though still very toxic) compound! I certainly would not use any polypore that turns red or violet in KOH as a medicinal mushroom. I place too high a value on having functioning kidneys and am not desirous of

damaging my brain. But I was worried that my mushroom, which I had nicknamed the rainbow sherbet polypore, was far more hairy than the description seemed to indicate for *Hapalopilus nidulans*.

Among the people who collect mushrooms for natural dyes, *Hapalopilus nidulans* is very highly valued for the lovely purple colors that it produces. I wonder if *Porostereum friesii* and *Phanerochaete filamentosa* may also prove of value to the dye crowd? Just do not try them for medicinal effects. They are most certainly all three toxic. Don't try consuming certain dye lichens either, you might die as a result. Dorothy Smullen uncovered the fact that two *Sticta* species contain polyporic acid. Also *Letharia vulpina*, which was used historically in Europe and in western North America to poison wolves, contains the yellow pigment vulpinic acid, which is a member of the polyporic acid family of compounds. It turns out that fungi produce a wide range of derivatives of polyporic acid to act both as antibacterials and as fungicides directed against other fungi.

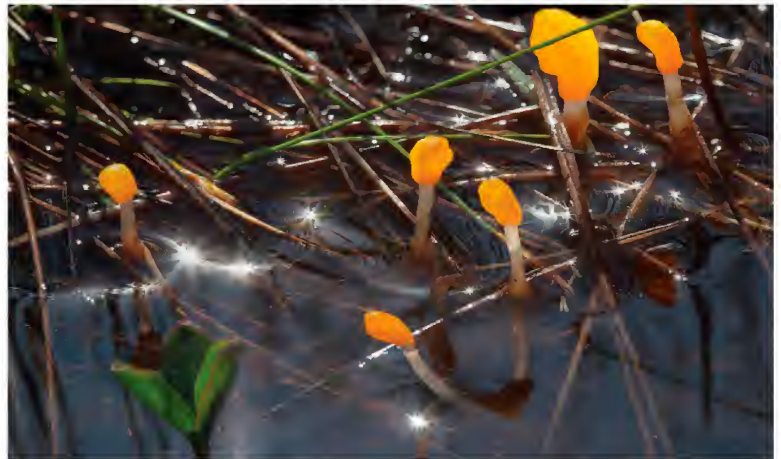
Abstracted from *McIlvainea* 21, 2012.

Reference

Ko, K.S., H.S. Jung and Leif Ryvardeen. 2001. Phylogenetic relationships of *Hapalopilus* and related genera inferred from mitochondrial and small subunit ribosomal DNA sequences. *Mycologia* 93(2): 270-276.

WHICH SPECIES OF MITRULA DO WE HAVE In NEWFOUNDLAND?

by Andrus Voitk



Rocky Harbour bog, June 11, 2010

(From *Omphalina*, 0-IV-11, December 17, 2008, newsletter of Foray Newfoundland)

Mitrula is a small genus of beautiful aero-aquatic (feet in the water, head in the air—most of the time) fungi, decomposers of organic matter in fresh water. In appearance they resemble candles, with white tapers on which the sporulating tissue (hymenium) sits like a bright yellow flame, with occasional orange and pink hues. In his 1977 review of the genus, Scott Redhead concluded that there were four species, two in Europe, *M. paludosa* and *M. borealis*, and three in North America, *M. elegans*, *M. lunulatospora* and *M. borealis*. Two species have since been added in Europe and one in China, but in North America we still have only three names to fit onto our finds.

Between 2006 and 2011 I have collected these mushrooms four times from different areas of the Island (Figure 1). Collection dates were June 7-17, a spring mushroom, explaining why we have not encountered it at our fall forays. Its distribution is probably much greater in our province, and the reason Labrador, or other areas of the Island are not represented is likely that I have not collected in those areas at that time. Join me in a short journey to identify these finds. With only three species, it should be easy, no?

Range

Mitrula borealis is the more northern species, known from northern USA and Canada. *M. elegans* and *M. lunulatospora* are found in southern Canada and northern and middle USA, apparently with equal frequency. Because of our more northern location, *M. borealis* seems like the expected species in our province, no?

Fruiting season

The fruiting time for *M. borealis* is recorded as July-September, whereas that of *M. elegans* and *M. lunulatospora* in its northern range is April-September. Ours all fruited in early or mid-June. Fruiting time suggests our species is not *M. borealis*, no?

Macroscopic morphology

Macroscopically ours all looked similar (Figures 2-5), with no characters suggesting that we should expect more than one species. *M. borealis* and *M. lunulatospora* are smaller than *M. elegans*, and ours look small, so size suggested that they might fit better with *M. borealis* or *M. lunulatospora* than *M. elegans*, no? Unfortunately, size was not documented accurately in the field, so that this is a guess, not a reliable character.

Microscopic morphology



Figure 2. Fen near Salvage, June 17, 2006

answer:

1. All spores were straight, thus excluding *M. lunulatospora*.
2. Spore width was within a tight range for all our collections, with very little variation, i.e. all are the same species.
3. Spore width fell entirely within the range of *M. elegans*.

DNA



Figure 3. Fen leading to Gillams bog, June

Is a difference in spore width enough to separate otherwise similar mushrooms into different species? In this case, DNA analysis by Wang and colleagues suggests it is.² Informed a monophyletic group apart from *M. elegans*. At the same time, the *M. elegans* story may not be all in yet. In Wang's study it seemed to form a polyphyletic group with some closer to the European *M. paludosa* than to each other. More work for the future...

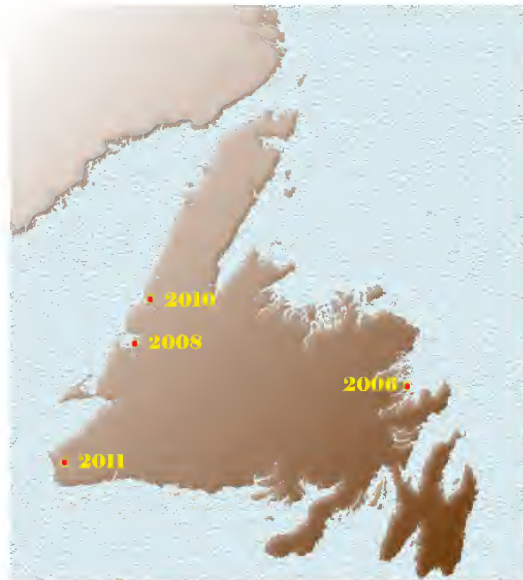


Figure 1. Location and year of my four collections

Let us ask the microscope to arbitrate. Here we have some luck. *M. lunulatospora* has distinct cucumiform spores (“lunulatospora” refers to the crescent moon and “cucumiform” to cucumber). The other two North American species have straight spores, but of distinctly different width. Those of *M. elegans* are 1.5-3µm wide, and those of *M. borealis* are 2.5-5µm. With such clear differences, spore shape and width should tell the story.

10-20 spores of one mushroom from each collection were measured under oil immersion (1,000 x magnification) using a calibrated microscope. Microscopy gave a clear

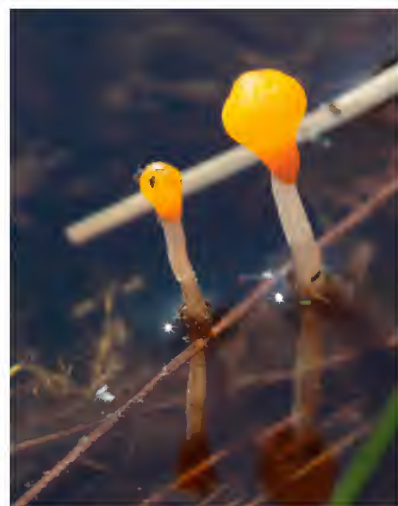


Figure 4. Fen by Doyle's, June 12, 2011

Comment

Here the microscope made a clear decision, when other characters waffled from one species to the other. Small wonder, then, that often when you show a mushroom to a mycologist and ask what it is, she, giving it nary a glance, immediately puts a piece under the microscope to seek the answer. Some seemingly similar species are defined by their microscopic differences. They may differ macroscopically as well, but if they are encountered infrequently, we may not have a sufficient understanding of which characters are useful in separating them. Of distribution, fruiting time, habitat, substrate, size, and color, only fruiting time seemed to be useful for identifying our species. We may well have the other two species here also, because four collections are not an exhaustive survey. Therefore, please go out in our bogs and fens to look for these little candles. Should you find some, please take pictures, collect and dry them and let me know. Oh, and measure them.

Summary

The common species of *Mitrula* in Newfoundland is likely *M. elegans*, which fruits in the first half of June.

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NOTE: This may be true for the Canadian province of Newfoundland and Labrador, but not necessarily for other regions. Areas with more biodiversity may have other species as well. After all, there are three described for North America. As for Newfoundland and Labrador, the number of known species of *Mitrula* doubled within a few hours of distributing the journal with this article. Gene Herzberg wrote in about two encounters he had with the genus in our province. The first, encountered in June, had been examined by Faye Murrin and identified as *M. elegans*. The second was seen in August, well beyond the fruiting time of *M. elegans*. The only species to fruit in August is *M. borealis*. Since the fruiting time was the most reliable identifying factor for the four collections described, the likelihood is high that this was, indeed, *M. borealis* that Gene encountered, even though it was not collected or examined. It pays to write, and it pays to solicit reader input. The likelihood is high that this was, indeed, *M. borealis* that Gene encountered, even though it was not collected or examined. It pays to write, and it pays to solicit reader input.



Collector of tiny fungi from the NAMA Foray in Arkansas, 2013

Wild Harvested Mushrooms Committee

Food Code Recommendations

By David Rust

Monitoring the sale of fresh wild mushrooms has confounded the Food & Drug Administration for over two decades. The FDA preferred inspection of each individual mushroom, something along the lines of the little labels on your pears in the produce section. They also wanted to have each mushroom identified and certified by an “expert” but couldn’t agree how to define who might qualify. They had a plan to develop training programs for mushroom identifiers, with detailed course objectives about illness (symptoms, cause and prognosis), identification, harvesting and handling best practices, and regulatory requirements.

NAMA got involved through Michaeline Mulvey, member of the Maine Mycological Association, who participated on a Wild Harvested Mushrooms Committee for the Conference For Food Protection (CFP). The CFP has helped the FDA develop policy and rules for its Food Code, which regulates food retail and safety. The committee no longer includes Michaeline Mulvey, because the committee is structured to disband at intervals. The current roster consists of public health regulators, representatives of the grocery industry, someone from the restaurant industry, and FDA staff.

Longtime NAMA member Bill Bakaitis, founder and long-time guiding member to the Mid-Hudson Mycological Association, was also consulted over the years by a member of the Mushrooms Committee — Rich Vergili, representing the Culinary Institute of America. Bill has records of exchanges with Rich on many proposals which were eventually cast aside as unworkable. Proposal issues ranged from changing Latin names and common names, what “species” to list as edible, cryptic species, bio-accumulation of toxins, allergic reactions, criterion for what constitutes an ‘expert’, bad science, inspection of individual mushrooms. The problems were legion.

“I found problems with every stage of this protocol,” says Bakaitis, “serious enough to pose issues of liability for the credentialing agencies and trainers. I can understand how the collectors and restaurateurs would like to have cover for their economic enterprise, but given the uncontrollable factors involved, mistakes will happen, lawsuits will be filed, and lawyers will have a field day picking apart the testimony of experts. This is the conclusion of a person trained in the philosophy of science, who has worked with poison control cases for 25-30 years.”

When you eat wild mushrooms in a restaurant, or purchase them at a grocery or farmer’s market, you trust that the mushrooms were properly identified and that no poisonous mushrooms have made their way into the food distribution system. After years of debate, the Wild Harvested Mushrooms Committee could not come up with a way to manage wild mushrooms in restaurants and retail food establishments. There are just too many unknowns.

Many in the mushroom community think the proposed FDA Food Code rules governing the sale of wild harvested mushrooms are a solution looking for a problem. Ask yourself this question: have you ever heard of anyone getting poisoned by a mushroom from a restaurant, in a grocery produce section, or a farmer’s market? If rumors and Internet myths are ruled out, really, how many poisonings are there from retail sources? As we see from time to time, the food industry is a ticking time bomb of E. coli, listeria, and salmonella. Mistakes happen — we just don’t want mistakes with mushrooms.

I participated in what may be the final meeting of the Wild Harvested Mushrooms Committee on December 2, 2013. Here is what I learned. The revised 2013 FDA Food Code calls for those food establishments who purchase fresh wild mushrooms from individuals to keep a log of the scientific and common name, the name and contact information of the person who identified the mushroom and the mushroom seller, and a statement as to

the identifier, specifically related to mushroom identification.

The Wild Harvested Mushrooms Committee will recommend retaining the logs for 90 days, in case a question is raised by someone who became ill from eating at that food establishment. The committee was quite concerned about delayed onset poisonings and accumulated toxins.

The recommended guidelines also call for “development of qualifications and training curriculum that could be used for further training of mushroom identifiers.” NAMA could get involved, after a discussion about whether the idea meets our mission and goals, by designing a program for specific local fungi and regulations therein. Our clubs train identifiers now; this isn’t a big stretch. Additionally, we will recommend training for chefs for handling and cooking of cultivated and wild mushrooms.

On behalf of NAMA, I submitted proposed changes to the annex section of the food code, mostly intended to make the scientific background information in support of the proposed change more accurate. I am working with the Wild Harvested Mushrooms Committee co-chairs to incorporate these comments into issues which will be submitted at the upcoming biennial conference in May in Orlando, Florida.

When a group of NAMA members was polled about proposed changes to the FDA Food Code, these ideas surfaced about what was not addressed in the proposed 2013 policy:

1. The biggest danger to food safety is toxic look-alike mushrooms entering the food distribution system.
2. Care of mushrooms once they are made available for sale is key. Mushrooms in retail groceries are often a mixed bag because they are ephemeral and need to be inspected by the seller to remove rotting fruit bodies.
3. Establishing or enforcing code based entirely on mushrooms that grow locally is a bad precedent. Wild collected mushrooms are shipped globally within a day or two.
4. Mushrooms must be well cooked, with the exception of truffles. There is a new raw food craze; eating raw shiitake mushrooms can cause dermatitis. Mushroom cell walls are chitin, which must be cooked to be digested properly. Even raw button mushrooms are known to have a low level of hydrazines, a potential cancer-causing toxin.
5. As we discussed, some mushrooms have a cumulative toxic effect, and can take months to show symptoms. But, it is unlikely these mushrooms would be sold commercially.
6. People may have allergic reactions to popular edible mushrooms which appear after eating the same mushroom several meals in a row; or reactions can happen out of the blue.
7. Some mushrooms have been known to cause skin reactions from repeated handling, but it is unlikely that these mushrooms would be sold commercially.

These are many of the same complex issues that Bill Bakaitis brought up, back a decade or more ago. I’ll stay involved with this issue and let you know what develops.

!!!HELP!!! **IS THERE AN ACCOUNTANT IN THE HOUSE?**

In an effort to bring our financial records up to date, the NAMA trustees voted to authorize an accountant to review them. We are hoping a NAMA member, who is also an accountant, will volunteer to take on the task. Our NAMA Treasurer, Herb Pohl of New Jersey, is in need of a qualified independent source, preferably who also lives in the tri-state area to check out our accounts. Please contact him at herbpohl@embarqmail.com.

Odd Mushroom Out at the Berkeley Bowl

By David Rust

In October, 2013, the Berkeley Bowl, a renowned grocery and produce store in Berkeley, California, was selling matsutake: #1 (veil fully intact) for \$16.95/pound and #2 (gills exposed/gills showing age) for \$10.95/pound. I was looking over the #1 bin and picked up a hefty mushroom with a large, firm, tapered stalk, veil still closed on one side. Right away, I could clearly see that this was not in fact the matsutake *Tricholoma magnivelare*. It was either a *Catathalesma imperiale* or *Catathelasma ventricosum*. The gills were very small against the size of the cap, running down the stem, and the mushroom did not smell like a matsie. Again, my mushroom had a firm, tapering stem, with no visible ring.



I had three choices: 1) throw it back in the bin, buyer beware, 2) tell someone that this was in fact not a matsutake and ask them to pull it (secretly I wanted to buy it, bring it home and cook it), or 3) raise a stink and argue long enough to get it pulled. Guess how this went? Uh, huh. #3 it was.

The first employee said, "I don't know anything about the mushrooms. It's in the matsutake bin. Therefore, it's a matsutake." Wrong answer. "I'll get the guy who knows mushrooms."

The mushroom guy said, "That's what the buyer said so we're selling it as a matsutake." Wrong again. He complained a bit, but I held firm. "I'll get my manager," he offered.

The MANAGER said, "That's what the buyer said so we're selling it as a matsutake." DING!!!! Wrong again.

Remaining calm, but persistent, I said, "this is not a matsutake for the following reasons: smell, tapering stem, gills running down the stem. I know they grow in the same habitat. I've picked these in Oregon myself. (Note the escalation in my argument in the back and forth [see MANAGER above].) This is a *Catathalesma imperiale*, common name "the cat". Some people eat these, but it's not a matsutake and you shouldn't be selling it as one.

Manager response: "The buyer sold us matsutake and we're selling this as a matsutake."

I responded, "This is not a matsutake. It is *Catathalesma imperiale*. You should not be selling a species that you don't know, because it could be harmful. It looks a lot like a matsutake for these reasons, texture of cap, larger cap than stem, closed veil, but look on this side, you can see the gills running down the stem, how small they are, the tapering stem, absence of unique matsutake odor, although it could take on the smell of a matsie being in the same bin with them for days (I couldn't discern any matsutake odor, but then my nose is sort of 'feh' these days.)

Manager response: (see above)

I said, “The sign above the mushrooms that says ‘all wild and cultivated mushrooms should be thoroughly cooked. For more information, see the Bay Area Mycological Society, www.bayareamushrooms.org. That’s me, David Rust, co-founder of the Bay Area Mycological Society.”

Manager response: “You should call them.”

I said, “No, that’s me. I’m saying I know how to identify this mushroom and it is not a matsutake, and you should not be selling it as a matsutake.”

Manager response: “The buyer said this is a matsutake and we’re selling it as a matsutake.”

OMG!!!!!! Rinse and repeat.

I said, “You don’t know this species of mushroom and you should not be selling it as a matsutake. You don’t know if this species could make someone sick. I know this mushroom, and that it is an edible species that some people eat and enjoy, but it is not a matsutake.”

(It went on like this for a little while longer. I have already handed him the mushroom at the point I said it did not have a matsutake smell. Point to me. He didn’t smell any matsutake odor.)

Manager response: “I’ll show this to the buyer tomorrow. My name is Julio.”

I said, “I know. I’ve shopped here for 30 years, and I’ve talked with you before. My name is David Rust, the co-founder of the Bay Area Mycological Society. (Note, did not add, “and I am the President of the North American Mycological Association.”)

I followed up with him in a week or so. He had given the mushroom to the buyer, who said he would go back and talk with his people. And?????

Bottom line: people in the retail grocery business are at the mercy of the folks who sell them wild mushrooms. They have to trust that no mistakes are made, and that all matsutakes (and other mushrooms) they purchase and offer for sale are in fact what the buyer certifies. No oversight. No fact checks. I know this was a harmless error, but what if it had been an unopened *Amanita smithiana*, which can cause renal failure or an *Amanita ocreata*, which can cause death. Hey, they look a lot like a matsutake, don’t they?



Sorting incoming fungi at the Arkansas Foray Photo by Jerry Sheine

Reflections on Recent North American Mushroom Poisonings

By Michael W. Beug, PhD, Chair NAMA Toxicology Committee

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Amatoxin Cases

As of November 2013, there have only been eight reports this year of humans consuming deadly species of *Amanita*, and we have not heard of any deaths. However, in 2012 newspaper reports and/or Poison Case Registry Reports alerted us to 35 individuals poisoned by deadly species of *Amanita* with one death in each of two Canadian cases and three deaths in one incident at a California senior care facility. After hospitalization, thirty of the individuals (all from the U.S.) were enrolled for Dr. Todd Mitchell's experimental treatment protocol – all thirty individuals in the experimental protocol survived, including one person who consumed a very, very large meal of *Amanita phalloides* (see McIlvainea Volume 22 online at www.namyc.org for the complete 2012 NAMA Toxicology Committee report).

In Canada, not only is the experimental protocol not available, but also in one death underlying health issues in the affected individual (colitis) meant that the doctors failed to recognize the case as mushroom poisoning, treated the individual for his diarrhea and cramps and sent him home. Two days later, he reported to the hospital with fulminant hepatic failure. He died 8 days after his mushroom meal. The poison center was never notified and best treatment practices for amatoxin poisoning were not employed. The mushrooms were identified post mortem as *Amanita virosa*.

In the other Canadian case, mushroom poisoning was again initially not recognized. The patient, an alcoholic, was initially treated as a cardiac patient, but there was a rapid progression to multi-organ failure and death. A relative later found and discarded the remains of a cooked mushroom dish that was in the victim's refrigerator. While no attempt was ever made to identify the mushrooms, the symptoms were consistent with amatoxin poisonings.

All three deaths in the United States resulted from a single case in California where a caregiver at a residential care facility made a soup from mushrooms collected on the grounds. One elderly tenant had refused the dinner and was not ill, alerting investigators to the soup as the cause of the illnesses. The mushrooms were never positively identified, but descriptions by the caregiver implicate either *Amanita phalloides* or *Amanita ocreata*. Three of the five elderly residents who consumed the soup succumbed from the effects of amatoxins. The first death occurred three days after the meal. Two additional deaths occurred before Dr. Todd Mitchell was contacted and treatment following the experimental protocol was initiated for the two surviving elderly women. A woman in her 90s recovered from the poisoning symptoms with use of aggressive rehydration alone but then died 20 days later due to other causes. Press accounts attributed her death to mushroom poisoning. A second woman survived after treatment including Legalon SIL (Todd Mitchell, personal communication). The caregiver also consumed the soup and survived, though her treatment is unknown.

For 2013 so far, there have been two cases in upstate New York involving ingestion of amatoxins. The hospital physicians followed the experimental protocol of Dr. Mitchell and Legalon – SIL was employed as a part of the treatment. There was complete recovery. The experimental protocol was also successfully employed in one case in Victoria, BC and three cases in Seattle. All survived using hydration and SIL alone, including one whose INR (a measure of blood clotting time) peaked at >6 (Todd Mitchell, personal communication). In October 2013, a Portland, Oregon case involved ingestion of *Amanita phalloides*. There is no information available as to severity of the poisoning or treatment, with the poison center citing patient confidentiality laws. However, we do know that there was complete recovery.

In one other 2013 case, we again have limited information. Hospital physicians treated the amatoxin ingestion with penicillin and N-acetyl-cysteine, an approved protocol that does not require the physicians to get hospital board approval for an experimental treatment. While there was a successful outcome, neither penicillin nor

N-acetyl-cysteine have been shown to have a positive effect and success in this case is properly attributed to aggressive rehydration therapy.

My take-away lesson from extensive conversations with Dr. Mitchell and many other physicians is that in cases of moderate ingestion of amatoxins, aggressive rehydration therapy alone will lead to complete recovery. At the next stage of severity, injectable silimarin (i.e. Legalon-SLI®) is called for. Here it is important to note that milk thistle extract, available at most pharmacies and taken orally, is ineffective since it is not absorbed and thus not able to protect the liver function. Finally, in the most severe cases where liver functions are severely affected, blood clotting is severely depressed, and kidneys are threatened, percutaneous cholecystostomy should be considered in addition to other therapies. Hopefully, by using these practices as outlined in the "Prevention and Treatment of Amatoxin Induced Hepatic Failure with Intravenous Silibinin (Legalon® SIL): A Nationwide Open Clinical Trial", deaths from amatoxin ingestion will become a rare event and severely ill patients will be spared the trauma and life-long expense of a liver transplant

In dogs, there were six deaths from apparent amatoxins in 2012 and five reported cases involving dog deaths so far this year. While *Amanita* species are most often involved, one 2012 case and one 2013 case involved a dog death as the result of ingestion of *Galerina marginata* (= *Galerina autumnalis*).

Readers should be aware that some of the small *Lepiota* species (e.g. *Lepiota subincarnata* = *Lepiota josserandii*) can be lethal to both dogs and humans. Human cases of *Galerina marginata* ingestion are usually linked to confusing this brown-spores species with the somewhat larger white-spored mushrooms in the *Armillaria mellea* complex. On several occasions, *Galerina marginata* has been mistaken for purple-black spored *Psilocybe* species, some of which are very similar in size, coloration and habitat to *Galerina marginata*.

Poisoning Incidents not Involving Amatoxins

While I have made no attempt yet to summarize the poisoning cases of 2013, in 2012 there were reports dealing with 75 people (70 incidents) suffering non-life-threatening conditions after consuming mushrooms. Thanks to the work of Marilyn Shaw, the numbers reflect detailed reporting for the region covered by the Rocky Mountain Poison and Drug Center (Colorado, Hawaii, Idaho, Montana, and Nevada). We also have detailed reporting from Michigan thanks to the cooperation of Susan Smolinske at the Children's Hospital of Michigan Poison Center. Her volunteer intern, Hanady Nasser-Beydoun, prepared a spreadsheet for us of all symptomatic mushroom poisoning cases that their center had handled. For the rest of the country, we know that reporting is very incomplete, so our numbers really cannot be used to indicate whether poisoning incidents are increasing or decreasing with time or whether poisoning incidents are more common in one region than another.

Notably for 2012 and again in 2013 we have received a significant number of reports of adverse reactions to hallucinogens. In both years *Psilocybe* ingestion has resulted in cases where the patient became combative. *Chlorophyllum molybdites* accounted for 12, possibly 13, of the reports of adverse reactions to mushrooms in 2013, but has not been reported in cases yet for 2013. Often the victim had only consumed one bite raw. Cooking seems to decrease the severity of the symptoms, but even cooked *C. molybdites* can cause significant gastric upset. One husband (an MD) treated his wife at home using Gatorade® after finding the hospital to be of little or no help. Two other individuals self-medicated with Gatorade® to replace electrolytes lost from excessive vomiting and diarrhea after consuming *C. molybdites*.

Adverse reactions to morels accounted for 10 of the 2012 reports and a couple of the 2013 cases. One case involved raw morels, the other cases involved cooked morels. One case involved alcohol with the meal. Whether that individual can eat morels without alcohol was not established. For some people, it is unwise to consume alcohol with a meal of morels, though a significant majority of individuals can enjoy a beer or wine with a morel meal.

It is becoming increasingly clear that some people can develop sensitivity to morels and suffer gastric distress after a morel meal when they had previously eaten morels for years without incident. We have even received the first report of life threatening anaphylactic shock from morels. The affected individual had previously eaten morels for years without adverse effect.

Five individuals in three separate incidents were sickened by puffballs, both *Calvatia* species and *Lycoperdon* species. Puffballs are normally only a problem if they are no longer pure white inside. However, in these cases, victims said that they had consumed mushrooms that had not yet started to mature and darken inside. While there have been no puffball poisonings reports so far for 2013, we have had several reports of short-term, but violent, human poisonings from mistakenly consuming species of *Scleroderma*. In one case, a *Scleroderma* species was mistaken for a truffle and in at least one other case it was mistaken for a puffball. Here it is important to remember that while a young *Scleroderma* specimen may be white inside, it will be very firm and not soft like a marshmallow. The inside of all edible puffballs will both look and feel like a marshmallow. For suspected truffles, it is important to realize that even an edible species will be of no interest for the table unless the smell is delightful. If the suspected truffle does not have a delightful odor (usually cheesy-garlic, but sometimes pineapple, earthy-licorice or other strong, pleasant odors) it is not worth eating.

In 2013 we have so far also seen many dog poisonings because of *Scleroderma* ingestion. For dogs (and pigs at least), consumption of *Sclerodermas* can be lethal. Also biting into a mature puffball can lead to lycoperdonosis, a pneumonia-like lung infection.

Five 2012 cases and a few 2013 cases involved purchased mushrooms. Cases can involve individual sensitivity to a specific normally edible species (notably *Pleurotus ostreatus*, *Lentinula edodes* (shiitake), and *Agaricus bisporus* (crimini)). In 2013 there have been several more reports of flagellate dermatitis caused by consumption of raw or undercooked shiitake.

One 2012 case was troubling since it involved sale of the poisonous species, *Omphalotus illudens*, by an unreliable wild crafter. The chef at the restaurant where the mushrooms had been purchased sampled the dish before placing it on the menu, so only he became ill. A brand new (12/16/2013) poisoning report is particularly disturbing since it involved a bag of purchased porcini mushrooms that caused such severe gastro-intestinal distress that the victim generally did not care whether she lived or died. Examination of the remaining material in the bag revealed a piece of mushroom with gills. We will never know what caused the woman's distress - was she allergic to king boletes (porcini), or was there a toxic gilled mushroom in the bag, or did the harvester mistakenly pick and sell *Boletus huronensis* or another toxic bolete somewhat similar to a king bolete? Clearly there should have been nothing with gills in the bag."

New and old lessons

Lesson #1: What you see after a poisoning is not necessarily what was actually eaten.

In 2012 and again in 2013 there was a mysterious case involving kidney failure. Kidney failure due to mushroom ingestion is exceptionally rare, having been reported in the past only for *Amanita smithiana* in the Pacific Northwest and one case due to *Cortinarius orellanosus* in Michigan. We know nothing about the cause of kidney failure in the 2012 case, but the 2013 case has been extensively investigated and will be reported on in full in McIlvainea volume 23 in 2014. The patient believed that any white-gilled mushroom was safe to eat and had collected a wide range of white-gilled mushrooms including several *Russula* species, *Leucoagaricus*, and deadly *Amanita* species. I learned several lessons from this story. One lesson is that identification of mushrooms from photos only tells you what was not eaten. So was any *Amanita* consumed – you will have to wait to learn that answer. The critical thing to know now is that the patient suffered rhabdomyolysis-induced kidney failure. The mystery was even more intriguing because while kidney failure due to mushroom ingestion is very rare, rhabdomyolysis had never been reported in North America due to a mushroom ingestion. Vomiting and diarrhea caused electrolyte loss. The patient was on statins, which as a result of electrolyte loss, triggered rhabdomyolysis which in turned triggered kidney failure. Drugs other than statins (e.g. colchicine) can have the same effect. Any severe GI distress, not just mushroom ingestion can cause this cascade of events.

Lesson #2: Atropine

One dog death was attributed to consumption of *Amanita muscaria*. The dog was given two doses of atropine as part of the treatment. However, atropine is strongly contraindicated with poisonings involving mushrooms in the *Amanita muscaria* group, the *Amanita pantherina* group and *Amanita aprica* where muscimol and ibotenic acid, not muscarine is primary the toxin (Beug and Shaw, 2009).

Lesson #3: *The Internet*

The problem of untrained individuals using the internet (or for that manner a book or other source) to identify mushrooms on their own came to light when a woman wrote that her dog was poisoned by what she had confirmed was *Amanita pantherina* and that the symptoms matched poisoning by ibotenic acid and muscimol. However, the reported symptoms actually matched lycoperdonosis. This was confirmed when a picture of the mushroom was sent in. It was an old *Lycoperdon*. The correspondent confirmed that when the dog bit into the mushroom, a cloud of dark green spores arose. The symptoms had been caused by inhalation of that cloud of spores.

Lesson #4: *Medicinal Mushroom Caution*

We have had a couple of reports in recent years about individuals becoming ill from medicinal mushroom teas. One clear problem is gathering any black growth on a tree, assuming that it is Chaga. So far, at least two individuals have suffered significant discomfort from their medicinal tea. In at least one case, they appear to have gathered *Apiosporina morbosa*.

I also wish to remind readers of the 2012 *McIlvainea* article on polyporic acid (Beug, 2012 and included on pages 10-11 in this issue of *The Mycophile*.). Not all polypores are safe to boil and consume as a tea. You also might want to be very careful about purchasing Chinese medicinal mushrooms. In late October 2013, I was in the field collecting with David Arora and he told me about visiting mushroom markets in Kunming, China and seeing toxic species of *Amanita*, etc. for sale. When he queried the vendors, he learned that purchasers would include these in mushroom blends, presumably assuming that no one will get a dangerous dose if mixed with enough non-poisonous material!

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Amanita phalloides

Mushroom: A Global History

Cynthia D. Bertelsen

2013

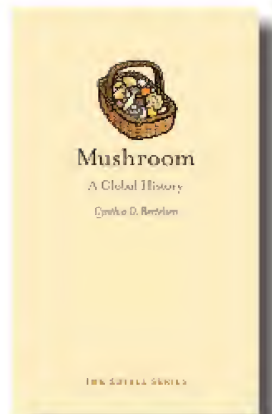
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The author begins her acknowledgements (p. 151) with

Mushrooms remain a complex and mysterious subject even now, after months and months of research, ponderings, and hair pulling. This book only touches the outer epidermis of the subject, so to speak.

I would have preferred that editors had chosen an author who did not pepper page after page with clichés and who knew something about mushrooms to start with or who had gained some understanding from her months of research. This little 160 page 5” x 8” book did not earn a place in my library, nor will I be donating it to the public library. For the first time in my life, I threw the book away. For reasons that I detail below, I do not recommend this book.

As a history, the story is garbled, with the author seemingly randomly and repeatedly moving forward and backward through time, randomly and repeatedly moving from east to west, north to south. The book is heavily peppered with quotations from a wide range of sources, but returning again and again to a mycophobic theme.

The section “Mushroom Anatomy” beginning on page 16 is as garbled as her history theme. She starts to describe what mushrooms look like, interjects a short paragraph about the water content and chitin content of mushrooms (information repeated at other random places in the book). She mentions that cod appear to be able to digest chitin, then in the next paragraph describes the genus *Amanita* in a way that implies that all mushrooms have a volva and then mentions clamp connections (but no other microscopic features) as something that can only be seen under a microscope. Near the middle of the “Mushroom Anatomy” section (page 19), this seemingly random paragraph appears

Certain cultures believe that brightly colored mushrooms are poisonous, and those which are more sombre in tone are not; this is proved a fallacy when one considers that species from the *Amanita* family, such as the destroying angel, are almost sheer white. Some mushrooms glow in the dark, their bioluminescence due to fungal luciferins, chemicals inherent to their biology that result in a phenomenon called ‘foxfire’.

(The war journalist George Weller (1907-2002) once wrote to his wife, in a letter penned late at night, ‘Darling, I am writing to you by the light of five mushrooms.’)

Never mind that ‘foxfire’ is the glow of *Armillaria mellea* mycelium and that there are lots of rules for identifying mushrooms that don’t work (indeed she tells the reader other rules that don’t work here and there but never deals with the issue consistently). She has interjected this information between a faulty description of mushroom caps that leads to an abbreviated paragraph about how colour is unreliable for identification and is followed by a discussion of mushroom stems, then mushroom sizes, then mushroom diversity.

The section titled “Classification, a Convuluted Morass” (pp. 20-25) is itself a confusing morass. She tells us in the first paragraph that “‘Keys’, or guidebooks, provide useful tools for identification” and you think that you are about to learn about keys and guidebooks. Instead, she inserts an ethereal quote by one of the first female mycologists Mary Elizabeth Banning (1822-1903) and jumps back to Aristotle, Pliny the Elder, Discorides and the evolution of western taxonomy. She closes the classification section not by mentioning Chinese and other classification systems but with a paragraph (p. 25) that starts by informing us that David Arora has helped us know that “the highland Maya of Chi

apas developed a workable classification system for mushrooms.”

Misinformation is abundant. Illustrations seem to be randomly selected, sometimes even incorrectly labeled. On page 10, a watercolor of “*Agaricus* species” is unlike any *Agaricus* I have ever seen. On page 90, the 25 tiny images in the figure “Psilocybin or ‘magic mushrooms’” includes 5 images of *Amanita muscaria*, an image of turkey tail polypores, at least three non-hallucinogenic *Mycena* species, two innocuous *Pholiota* species and other miscellaneous large and small mushrooms. There was not a single image that I could confidently identify as a mushroom that is likely to contain psilocybin. On page 133, the nine small images above the title “Poisonous mushrooms, beautiful but deadly” does not contain any of the deadly species, and probably only two of the nine images represent toxic species (*Amanita muscaria* and an image that is possibly an *Inocybe* species).

There are eleven historical recipes and eight modern recipes in the last chapter (pp. 135-146). I would not buy the book just for the recipes. I wish that I could say that the book has any other redeeming features. I certainly did not find them.

Michael W. Beug

The 2014 Patrice Benson Memorial NAMA Foray

Eatonville, Washington

October 9-12, 2014



Patrice Benson wanted nothing more than for everyone to enjoy themselves. And in her memory, PSMS invites you to Washington in 2014 to hunt in magnificent old growth forests, to learn from an amazing line up of speakers and workshops, and above all else -- to enjoy yourselves.

In October, NAMA will convene at Camp Arnold in Eatonville, Washington, which lies close to great mushrooming habitat in national forest lands of the Cascades Mountains and Mt. Rainier National Park.

For more information about Camp Arnold, please visit <http://www.tsacamparnold.org/>.

If you have any questions, please contact us at nama2014@psms.org

Stay tuned for more details!

Pacita Roberts and Teddy Basladynski

Puget Sound Mycological Society members and organizers of the 2014 NAMA Foray



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Newseletter of the North American Mycological Association
THE MYCOPHILE



Gymnopilus luteofolius, New York City, October 5, 2013

Unexpected things turn up in New York City, such as this beauty found in wood chips on a recent New York Mycological Society walk in the Bronx: *Gymnopilus luteofolius*. Unlike more familiar species of *Gymnopilus*, this one sports a scaly cap and fibrillose margin. The colors, too, set it apart: purple, vinaceous and lavender tones on cap and reds, pinks and browns on the stipe. As it matures, bright orange spores become caught in the arachnoid partial veil, the remnants leaving bright rings around margin and stipe--to dramatic effect! And it is reported to be mildly hallucinogenic.

Photo and description are by Tom Bigelow of the New York Mycological Society.