OMPHALINA

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Newsletter of FORAY NEWFOUNDLAND AND LABRADOR

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FORAY NEWFOUNDLAND AND LABRADOR

is an amateur, volunteer-run, community, not-for-profit organization with a mission to organize enjoyable and informative amateur mushroom forays in Newfoundland and Labrador and disseminate the knowledge gained.

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OMPHALINA *is the lackadaisical newsletter of Foray Newfoundland & Labrador. There is no schedule of publications, no promise to appear again. Its primary purpose is to serve as a conduit of information to registrants of the upcoming foray and secondarily as a communications tool with members.*

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Please address comments, complaints and contributions to Andrus Voitk, self-appointed Editor:

foray AT *nlmushrooms* DOT *ca*,

… who eagerly invites contributions to, dealing with any aspect even remotely related to mushrooms. Authors are guaranteed instant fame—fortune to follow. Authors retain copyright to published material, and submission indicates permission to publish, subject to the usual editorial decisions. Issues are freely available to the public on the FNL website. Because content is protected by authors' copyright, editors of other publications wishing to use any material, should ask first.

COVER

The "Labrador *Alpova*", 8 August, 2008 on the upper Overfalls Trail, Forteau, Labrador. This is under study as a probable new species, hitherto unknown to science. "From Labrador" can be expressed in Latin as "labradorensis", which might just be a fitting name for it, should that turn out to be the case. See article, p. 7.

Another successful foray is over, and a Report should be available in due course. These forays, Reports and especially OMPHALINA articles about new knowledge about our mushrooms would not be possible without generous partners, who share our interest in the mycota of Newfoundland and Labrador. This issue of OMPHALINA, the cover picture and the lead article are dedicated to our partners in thanks for smoothing our path of mutual interest. Our partners are listed on the inside of the back cover.

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CONTENT

Message from the Editor

Well, here we are, back safely from the world's driest foray ever. When the Database Team volunteers to do dishes, it is an ominous sign. Still, we had a good time, again proving that nothing can daunt us! From the point of enjoyment, the foray was a success. Despite the lack of mushroom bounty, it was equally rewarding from a scientific perspective. You will learn of some of our discoveries from the Report, whereas some other parts will become evident considerably later. So it is with the subject of the cover picture and lead article, only now coming to the fore, after its first discovery in 2005. We love the $1,000 story and have told it often. Were it not for our partners, this issue would largely be empty. And, of course, our foragers, finding the unknown species (yes, again this year). And our identifiers, recognizing them as objects worthy of further pursuit.

In addition to a review of our truffles (including a potential new species), we have two similar lichens from Mac Pitcher and a run-down on puffballs from Jim Cornish. The *Morganella pyriformis* picture is as gorgeous as you can find, a true "Ahh" getter, as was shown when the winning pictures of the Photo Contest were shown. Then a quiet sort of story that ends up giving an unexpected bit of insight into how fungi might evolve. From Michael Beug we have the NAMA 2010 toxicology report, followed by an account of a young man who lost his parents to mushroom poisoning and how this influenced the course of his life.

In the end a second look at some fascinating evidence for multipotentiality as the mechanism for parallel evolution. This is not the sort of stuff we might have thought would engender correspondence, but the first brief dissertation garnered three letters, including the one printed that led to this update. A good topic generates articles of its own, so there is no worry about filling an issue!

And a new column just to wish you, probably last of the season for most of us,

Happy mushrooming!

andrus

Foray matters...

Expenses

If any of you have made any expenses related to the foray and have not claimed them or submitted an account, please do so at your earliest opportunity (while we still have money to pay you!). Send them to our Treasurer, Geoff Thurlow < geoffthurlow AT gmail DOT com>.

Photos

If you would like to share your photos with us, send them to Marian Wissink <marian AT mun DOT ca>, Editor of our Report. Jim Cornish has kindly stepped into the webmaster slot, when Nathan's changed circumstances prevented his continuing. Once Jim gets the situation in hand, we'll surely ask you to send them to him as well, so that all can enjoy more than the Report can fit in.

GPS & radio

Please check your bags to see if you forgot to return either of these after use. We are missing one round yellow GPS unit and two two-way radios. These safety devices cost us about $100 each, so it is not a loss that our budget can withstand too well.

Report

The arrangement with many of our partners includes an undertaking to publish a Report before the end of the calendar year. Because December is usually devoted to other pursuits, that means that we should aim for November. Therefore, any contributions should get to Marian at the end of October or first week of November at the latest. Please send any story, impression, observation, etc. to Marian before that time. She would be very grateful for help.

Comments

As always, we tried some new things in hopes of improving the foray experience for us all. Some worked, some definitely did not. However, we do not know how you perceived things. If you have any suggestions for improvements, or observations of things that made life difficult, please let us know. The foray is for us all, and the organizers are willing to change things, but are not aware of everything. Whether you are a veteran or this was your first foray, your observations will help your Board to organize a better foray. Send your comments to any Board member that you feel comfortable talking to, or directly to our esteemed President, Michael Burzynski <info AT nlmushrooms DOT ca>.

The one thousand dollar question

Andrus Voitk

—Do we have truffles in Labrador?

It may not sound like much, but that is a $1,000 question.

The caller was a senior manager at the Wildlife Division of our provincial Department of Environment and Conservation. He had read that according to the stomach content analysis of flying squirrels, most of their diet is made up of truffles. Although there are no flying squirrels on the Island, they do exist in Labrador, and the caller wondered what ours ate. The date was March 2006, a few months after we had completed the Report of our 2005 foray activity, including our first foray in Labrador. Therefore, I was able to answer.

—Yes.

Not many words, but a $1,000 answer.

—I haven't heard that we have something as exotic as truffles in Labrador.

—There are various kinds of truffles, both the expensive edible ones and others, both real and false truffles. At our foray we collected a false truffle.

—How can you be sure?

—I'll send you a picture by e-mail. The specimen was identified by a mycologist and rests in our herbarium. We keep a database to answer such queries. Our species list is published, available to all from our website. When we have a reasonable number, we'll investigate them further.

—So this is quite a production, then? A validated and verifiable list.

—Yes. Collections are professionally identified by international experts invited for this purpose, then photographed by a professional biology photographer from the University of New Brunswick. Data is entered by a team of our own university students, who get to come to the foray without charge in return for their work. Voucher specimens to back up the list are dried in specially constructed driers and archived in our fungarium at Gros Morne National Park.

"The Labrador Alpova*", a false truffle collected in Labrador in 2005. Not much to look at, but brought us a $1,000 partner, increased many-fold since those early days. And perhaps a new species, as discussed in the next article. Photo: Roger Smith.*

—This is very valuable for any organization interested in the biodiversity of our province.

—Yes, and unfortunately expensive. So, I was wondering…

—Yes?

—Well, seems this was of use to you just now. If you think the Foray generates useful data, would your Division be willing to become a partner in this effort?

—How much are we talking about?

—Well, how about figuring that this year we excuse 5 database team students from paying registration fees? Say, the fees were approximately $200 a head. That comes to $1,000. What do you think?

—Yes, I think that would be a reasonable expense for our Division.

—And a damn site cheaper than getting this information through a contract.

—Send me an invoice, partner.

Most truffles are round mushrooms growing beneath the soil surface (hypogeous). The famous and prized edible truffles grow around the Mediterranean and on the west coast of continental North America. They are ascomycetes, producing spores in elongated sacs resembling bean pods, just like the cup fungi with whom they belong. False truffle is a term reserved for truffles that are not ascomycetes. The pictures are used to give a quick look at two genera of truffles in our province, *Elaphomyces* & *Endogone*; false truffles from the genera *Alpova* and *Rhizopogon*, both bolete relatives, will be dealt with in the next article.

Despite their macroscopic, microscopic and evolutionary differences, truffles make a logical grouping, because most are alike in behaviour. They live

Cordyceps (above) *is an interesting genus of small club-like mushrooms, most of which are parasites on insects. Some species are prized in Eastern medicine placing them among the most expensive of mushrooms.* C. ophioglossoides *(upper left) is species that grows as a parasite on truffles of the genus* Elaphomyces *(upper right, cut in half, and intact on lower picture). When you see the* Cordyceps*, careful digging will lead you to the truffle. Often they form a ring around the base of a conifer, because the mycorrhizal* Elaphomyces *is distributed around the roots.* Elaphomyces *is a true truffle, but not the prized edible. Photos by Roger Smith, collections from Notre Dame Provincial Park, September, 2008.*

underground. They have mycorrhizal relationships with green plants: they feed the plants minerals and water, and in return get some sugars that plants form via photosynthesis, thanks to chlorophyll. They use an animal vector to spread spores. Remaining underground, they do not have access to the wind for spore dispersal, like many mushrooms with a stem. Instead, they emit strong odours, attracting animals to eat them and spread the spores around in their feces. The odour explains why one way to find truffles is to look for swarms of truffle flies, attracted to the odour, and why pigs and dogs are used to hunt them. The same odour is why we like them as well.

"Truffleness" is another example of parallel evolution. Organisms from quite different evolutionary lines have independently discovered a similar way to make a living: go underground, partner up with a plant for food, produce spores inside your body, emit a smell to attract consumers who eat you and then disperse your spores to start the cycle anew.

Identification of truffles to species can be difficult, made more so because many are being reclassified. As with many mushrooms, European names have been applied to many, which may be species unique to this continent.

Endogone pisiformis. *Photo: Roger Smith. September, 2009.* Sphagnum *in Thomas Howe Demonstration Forest, near Gander. This miniscule truffle does not fruit underground, but atop* Sphagnum. *Apparently neither saprobe nor parasite, it is thought to form mycorrhizal relationships with plant roots. Which plants are involved is somewhat unclear, but despite living on top of* Sphagnum, *apparently the mutualistic relationship is not with it. Endogones are neither ascomycetes nor basidiomycetes, but belong to the small phylum, Glomeromycota.*

Preliminary report from the bolete underground:

the false truffles of Newfoundland and Labrador

Jeremy Hayward, Tom Horton and Andrus Voitk

False truffles are basidiomycetes (mostly mushrooms with cap and stem) that have lost their "normal" shape an gone underground (become hypogeous). Normally, the cap bears and protects the sporulating surface (gills or pores/tubes), and the stem holds it above ground and moss, so that dropping spores can be borne away by passing air currents. Going underground, this mechanism is no longer needed. Truffles become irregular round balls with the sporulating surface on the inside. However, the mycorrhizal habits of the "parent" species are maintained: truffles are mycorrhizal organisms, tree or other plant partners.

During our forays we have found false truffles from two genera in the Boletales, bolete relatives: *Alpova* and *Rhizopogon*. The *Alpovas* are relatives of the gilled bolete genus, *Paxillus*, and usually are mycorrhizal with deciduous trees. See the article on *Paxillus involutus*, p. 16 of the last issue, for more on this genus. *Rhizopogon* is related to the genus *Suillus*, an entirely different subdivision of the Boletales; these form mycorrhizal relationships with conifers.

Rhizopogon and *Alpova* look very much alike on the outside, but are easy to differentiate on cross section. Externally, the rhizopogons in the upper two pictures on the next page are almost indistinguishable from the *Alpova* on the cover, or the lower picture, next page. However, note the difference in cross sections. The context of *Rhizopogon*, seen on the two upper pictures, has well defined palisades of maze-like air chambers, the walls of which are white on cross section. The appearance is that of a sponge with very convoluted cells or spaces. This is entirely different from the cross section of *Alpova*, lower picture, which is essentially solid, alternating between a darkening gelatinous material and a firmer ivory-coloured stroma, giving it a marbled appearance.

While the genera are easy to distinguish, individual species within the genera are much more difficult to separate on the basis of macroscopic morphology (their looks) alone. In an effort to dissect out the species, the first two authors examined the DNA of our specimens, with some interesting results.

Two *Rhizopogon* species have been found, both from Central Newfoundland. The upper picture shows *Rhizopogon evadens*, collected from Notre Dame Provincial Park, and below it is *Rhizopogon pseudoroseolus*, collected from the red pine stand east of Gambo. A favourite food of squirrels, one specimen was found in the branches of a pine tree, where a squirrel had put it to dry for later use.

The difference between these species is more difficult to determine macroscopically. The skin (peridium) of both starts off a light colour and darkens with age. Both turn dark on rubbing, *R. evadens* a darker red and *R. pseudoroseolus* somewhat more pinkish. On cross section the skin of *R. evadens* is brown, while that of *R. pseudoroseolus* is a definite rose colour. The content (gleba) is white until late, when it turns dark olive. It may stain pink, then brown (without an intermediary yellow stage) on injury. Again, pink staining of the context seems to be more common with *R. pseudoroseolus* than *R. evadens*. Finally, the context of *R. evadens* seems somewhat more compact, while *R. pseudoroseolus* looks to

have more air cells. These differences are subtle, even if compared side by side, the pink skin on cross section perhaps being the easiest to discern. Usually, microscopic examination is required to tell them apart with certainty.

The name *R. pseudoroseolus* suggests the existence of a species called *R. roseolus*. Indeed, this is true. Macroscopically the two have different size and shape of spores, and only *R. pseudoroseolus* shows a very strong reaction with $FeEO_4$.

All three *Alpova* collections were found in Labrador (Labrador Straits, 2, and Konrad Brook, 1)—5 and 500 km apart from each other. All proved to be the same species, close to *Alpova diplophloeus*, but sufficiently removed from it genetically to suggest a distinct genetic species. Whether this actually is a new species, or a strain of the related species, is being determined; in the interim we refer to our truffle as "The Labrador *Alpova*". Although apparently this species has not been described before, the gene sequence has been recovered once before from a soil sample from Alaska, suggesting that it is a northern species of wide distribution on this continent.

Thus, we have a possible new truffle. Wait for more news about this.


Photo: Roger Smith


Photo: Roger Smith

Freckled Pelt Lichens

Peltigera aphthosa & *Peltigera leucophlebia*

Mac Pitcher

The Freckled Pelts are easily recognized species in the genus *Peltigera*, which is commonly referred to as the Dog Lichens (for tomentose or woolly species) or Pelt Lichens (for the smooth and shiny ones). Although we have at least a dozen *Peltigera* species, most are either gray, brown or dark-coloured. Only two are bright green, and of these the Freckled Pelt (upper photo) can be recognized by smooth edges and the lack of veins on its white-margined, black-centered under-surface. The similar, but less common Veined or Ruffled Freckled Pelt, *Peltigera leucophlebia* (lower photo—by Maria Voitk), has ruffled edges and distinct whitish to brownish veins on its undersurface.

The Freckled Pelt lichens are uncommon but regular species in boreal forests and heathlands throughout Newfoundland and Labrador, usually on the ground, and can be found overgrowing feather mosses, often at the bases of trees, and occasionally on the lower boles of some trees, usually Balsam Fir.

They are interesting triple organisms. The primary photosynthetic partner (photobiont) of the fungus is a green alga, *Coccomyxa*. However, it also uses a cyanobacterium as a secondary photobiont. This cyanobacterium, of genus *Nostoc*, is found in small pockets, visible on the upper surface of the thallus as darkened “freckles”, hence the common name.

This and other cyanobacteria laden lichens, collectively referred to as cyanolichens, comprise approximately 10% of all lichens. They are able to capture and store nitrogen from the atmosphere, and as they die and decompose this nitrogen is then released into the soil as an important plant nutrient. This ability to “fix” nitrogen is not without adverse consequences though, since cyanolichens, because of their nitrogenase enzymes, have a much higher susceptibility to atmospheric pollution than do the green alga lichens. As a result, cyanolichens are in peril in many parts of the world.

My Favourite Mushrooms: *Puffballs*

Jim Cornish

Watching puffballs explode in a cloud of smoke underfoot is a vivid memory of late summer visits to my aunt's small sheep farm on Newfoundland's west coast. Today, puffballs are one of my favourite mushrooms, not because of my childhood antics, but because of their rather unique biology and their frequent use in mystic rituals, particularly in some native North American and pagan European cultures.

Puffballs

The term "puffball" is not a scientific classification. Rather, it is a helpful way of grouping some 150 species of mushrooms from multiple genera that all share a unique way of releasing spores. The puffballs found in this province belong to the family Lycoperdaceae, of which, in order of prevalence, we have the genera *Lycoperdon*, *Bovista* and *Calvatia*. Like so many mushrooms, these are also being shuffled around from one genus to the next, as new information, particularly of their genetic relationships, comes to light. Thus, for example, *Lycoperdon pyriforme* is now *Morganella pyriformis* and *Calvatia utriformis* is now *Lycoperdon utriforme*.

The genus *Lycoperdon*, sometimes called the "true puffballs, has over 50 species and is probably the most widespread of all the puffballs. Lycoperdon is a combination of two Greek words, "lyco" meaning wolf and "perdon" meaning to break wind, giving them another common name, wolf-farts. Newfoundlanders have long called them harse farts, probably

Lycoperdon perlatum Pers.: Pers., the common puffball, is our most common woodland puffball. It fruits on the ground from September to November. Its fruiting body can be 6cm high and 5cm wide and tapers to form a wide sterile stalk. It is covered in detachable white conical spines with shorter spines and granules between them. White at first, *L. perlatum* turns buff or yellow-brown color with age. In mature specimens the fragile spines fall off, leaving a distinctive spotted scar pattern that may be helpful when identifying older specimens.

Morganella pyriformis (Schaeffer:Persoon) Kreisel & D. Krüger is commonly called the pear-shaped (pyriform) puffball. The fruiting body is a little smaller than its common cousin, typically tan to red-brown in colour and covered in small warts. It may have a short wide stalk that is attached to its substrate by strands of sterile mycelia.

owing to the fact there are no wolves here.

We also have a few hardskinned and blackspored puffball species of the genus *Scleroderma*. Although puffballs by shape, they are related to the boletes genetically.

Puffballs are saprophytes. They grow on leaf litter and rotting wood. They usually appear between late summer and early fall and grow alone, scattered, or in tight clusters and rings.

Puffballs are easily recognizable. Their fruiting bodies (basidiocarps) are typically ball-shaped and are attached to the substrate by either long strands of root-like mycelia or by short sterile stalks. In the early stages of growth, the inside (gleba) is white, filled with elastic, thread-like tissues that are covered with immature spores. This mass is enclosed by a single or double paper-like protective layer (peridium). As puffballs age, the fleshy tissues disintegrate, leaving behind millions of yellowish-brown or brown spores ripe for release.

The method puffballs use to jettison their spores for dispersal explains the word “puff” in their common name. Depending on the species, a single hole (ostiole) or a series of slits rupture the top of the peridium. Raindrops, or anything else striking the mushroom, buckle the peridium forcing the spores out through the rupture in a puff of “smoke.” The spores are then dispersed by air currents and running water. Some, like *Bovista*, separate the spore-sac or endoperidium from the skin (exoperidium), to tumble about in the wind and release its spores. Because it can survive under a blanket of snow, it is not unusual to see a smoking *Bovista* being blown about by a stiff spring breeze.

Puffballs are edible, but great care should be taken when collecting them.

1. **They should be cut in half to ensure they do not hide developing cap and gills, an indication that you are likely holding the button stage of the deadly *Amanita.***
2. If the cut section is black, you likely have a toxic *Scleroderma*, another bauble not fit for the pan.
3. Puffballs must be picked and eaten when young, while they are still white inside. If the spore mass

1. has begun to turn yellow, green or brown, they are unfit.

Mysticism and Medication

Like many other species of mushrooms, puffballs played an important role in mystic practices in some cultures. Puffball necklaces were worn as good luck charms and were burned as incense to ward off ghosts. Emptied of their spores, the fruiting bodies were filled with pebbles to make spiritualistic rattles used by shaman. Tepees were sometimes covered with figures of puffballs to ward off evil spirits. In the Pacific Northwest cultures of British Columbia and Washington, puffballs were regarded as ghost's make-up, ground ghosts and corpses. In Great Britain their original name, the devil's snuff-box, shows the disdain heaped on fungi by that mycophobic culture.

Puffballs also had medicinal uses. The Blackfoot drank a concoction that included puffball spores to stop internal bleeding. The Arikara (the semi-nomadic people of the Great Plains of North America) added spores to the pulverized root of red baneberry to make a poultice to treat inflammation and to soothe burns and itching. Dried, mature puffballs were used as a remedy for earaches and to heal broken eardrums and bone fractures.

Bovista plumbea Pers.: Pers., commonly called the tumbling puffball, detaches the spore sac from the skin when mature and depends on being blown or kicked around to disperse its spores. The basidiocarp ruptures along several lines allowing the spores to spill out. Slightly smaller (2-4 cm across) and lead-coloured (plumbea) when mature, it lacks spines. Photos: A. Voitk.

Lycoperdon utriforme Bull., commonly known as the mosaic puffball (a reference to the polygonal-shaped segments that develops on the outer surface of the fruiting body as it matures), is common in sub-alpine meadows and tundra, so it is most frequently found in Labrador. Photo: M. Burzynski.

The juniper mushroom

Andrus Voitk

Ever since meeting the genus *Hemimycena* at our foray in 2003, I have been on the lookout for its members. I often crawled on the ground, scouring needle, leaf, grass and any other litter, where these little mushrooms were reputed to hold sway, adding their degenerating skills to ensure a smooth and even flow to the carbon cycle. My efforts have been amply rewarded by filthy, muddy and worn out knees on my pants, as well as scuffed shoes, but no hemimycenas. Sadly, I had resigned to a hemimycenaless fate.

In 2006 I had reason to look for a selcouth mushroom known to grow on living juniper. I had not examined junipers closely before, deterred by their user unfriendly nature: they squat on the ground, and spread branches thick with very sharp needles to prick the exploring hand. Getting into such a bush is a painful bother, requiring copious blood transfusions. The very first juniper I came upon yielded up a cherished prize. No, not the selcouth one growing on juniper, but hidden under all those prickly branches, busily decomposing old juniper needles, was an army of the delightful *Hemimycena lactea* (Figure 1).

Now curious, I explored a juniper bush near our home, over 500 km from the first find. Surprise: this one also hid an army of *H. lactea* (Figure 2)! My curiosity was piqued. In Europe this mushroom is known to fruit indiscriminately on decaying wood and duff of various conifers (cedar, cypress, fir, juniper, pine and spruce). In nearly three years of diligent searching I have not found it on duff of our other conifers. Could *H. lactea* in Newfoundland be limited exclusively to duff of *Juniperus communis*? If it were this exclusive, then our mushroom, isolated from its continental progenitors for centuries in remote and insular Newfoundland, must have undergone some genetic mutation. Although it may still resemble its European counterpart, we may harbour a newly evolved species.

To pursue the juniper association, we went to Killdevil Camp, where junipers are plentiful. Seven of ten bushes had *H. lactea* fruiting under them (Fig-

Figure 1. Hemimycena lactea, *decomposing dead juniper needles. Butter Pot Provincial Park, September 12, 2006.*

Figure 2. Hemimycena lactea, *decomposing dead needles under the juniper near our house.*

Figure 3. Hemimycena lactea, *decomposing dead needles under juniper at Killdevil Camp.*

Figure 4. Hemimycena lactea, *decomposing dead balsam fir needles.*

ure 3). The juniper association seemed real. However, something set the three junipers without *H. lactea* apart from the others. All were unhealthy, with few needles, unable to provide shelter beneath them. Did our mushroom prefer juniper, or merely require shelter? Perhaps this small mushroom needed protection from wind to avoid drying, and fruiting this late in the season required protection against the night frost. Whereas our prostrate juniper provides this service naturally, branches of most other conifers are too high off the ground to offer it shelter.

To answer this, we explored a place where thick balsam firs had their branches right down to the ground. Eureka! The fifth tree had some *H. lactea* under it (Figure 4). It seemed that our *H. lactea* was no different from its European relatives in substrate preference but did require a protected habitat to fruit. The reason I had not seen it on other conifer duff was because I had not pried low balsam fir branches off the ground and crawled beneath them.

This is a pastoral sort of story, not very exciting, unless you were there, perhaps. It is not recounted here to allow your heart rate to settle after all the other exciting articles, but rather to illustrate how organisms might evolve. If a mushroom found itself in an environment where it was clearly advantageous to be able to digest juniper duff, those members with a better enzyme system specific to the digestion of juniper would have an edge over their peers. Their progeny would prosper, whereas that of their brethren, secreting a medley of enzymes to digest everything, but nothing that well, might die off. Over centuries a species different from the immigrant forefather would evolve. Of course, if junipers then died out, a juniper specialist would starve to death, whereas a generalist would now have the edge. Perhaps this knowledge kept our hemimycenas from changing.

2010 NAMA Toxicology Committee Report

Summary from McIlvainea Volume 21, online at www.namyco.org

Michael Beug, Toxicology Chair

During 2010, 76 incidents of mushroom poisoning involving 93 people were reported through the NAMA website and/or through our nationwide team of toxicology identifiers. One previously ill elderly person's death was hastened by having consumed *Amanita phalloides*. Six other individuals survived poisoning by potentially deadly *Amanita* species (two cases involved *Amanita phalloides*, two cases involved *Amanita ocreata* and one case involved *Amanita bisporigera* or a look-alike). One possible amatoxin case involved a *Psilocybe* seeker who apparently consumed *Galerina* by mistake and may have suffered some liver damage. Another amatoxin case involved a small *Lepiota* species that looked a lot like *L. rubrotincta*. This case plus the reported death of a dog from *Lepiota subincarnata* (syn. *Lepiota josserandii*) should remind people once again not to eat small species in the genus *Lepiota*.

Of the 84 people not involved in confirmed or suspected amatoxin cases, 58 consumed known poisonous mushrooms or mushrooms where the identification was unknown and 26 consumed or mushrooms that are edible to most people. The most serious of the non-amatoxin cases involved a woman who consumed an *Amanita smithiana*, after having been told that it was Matsutake. She suffered kidney problems but was successfully treated and did not require dialysis.

Consumption of raw mushrooms was the downfall of several people. Two consumed Morels raw, one consumed a raw *Leccinum*, another a raw *Russula* and one person ate a raw *Pleurotus*. Nearly all of the *Chlorophyllum* cases involved munching raw mushrooms. Even consuming raw *Chlorophyllum rachodes* or *C. brunneum* is likely to cause distress. *Chlorophyllum molybdites* poisoning is much worse if they are eaten raw – even though *C. molybdites* makes most people ill even if cooked. All mushrooms, even the sliced ones you see on salad bars, should be cooked before consumption. Mushroom cell walls are made of chitin which we cannot digest well without the aid of cooking. Many mushrooms also contain compounds that damage red blood cells (hemolysins) unless denatured by cooking. Because freezing only slows down but does not stop bacterial decay, mushrooms should be cooked prior to preserving in the freezer.

One person began to feel ill from drying Matsutake – it is important the mushroom dryers be operated in well ventilated areas because the spores given off in the process can cause problems for some people. There was also the first formal report I have received of someone having GI distress after eating Matsutake. For every edible mushroom, there appears to be some people who are sensitive and will get an upset stomach from eating it. Severe anaphylactic shock is rare, but there appears to be a case this past year involving *Laetiporus sulphureus* where the reaction was very severe. Several years ago there had been a death from shock after consumption of *Laetiporus conifericola*.

Consumption of hallucinogenic mushrooms can present serious problems when the altered state produces violent behavior and the police are called. A young man had taken hallucinogenic mushrooms and then sat down to watch "Alice in Wonderland." When pepper spray and control holds failed on the out-of-control subject, police repeatedly used a Taser. Even then it took seven Taser shots before the person collapsed and quit breathing. The young man died, with the death attributed to *Psilocybe* mushrooms even though Tasers have caused numerous deaths, unlike *Psilocybe* mushrooms which do not cause fatalities.

A tragic outcome in 2006 was presented in a poster session at the North American Congress of Clinical Toxicologists conference in Denver, October 10/7/2010 (French LK, Burton BT, "Liberty and Death," Oregon Poison Center, Portland, OR, USA):

> A healthy 20-year-old-male reportedly ingested as much as 4 g of hallucinogenic mushrooms one evening (typical single ingestion is 1/8 g) prior to entering a sleeping woman's apartment. Upon awakening she demanded he leave and a struggle ensued. Police were summoned to the

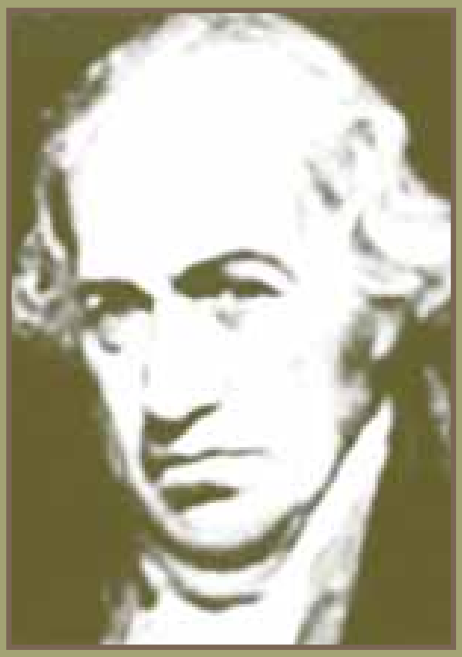
home but the man became increasingly violent and failed to comply with their commands. He did not submit to multiple Taser discharges. Instead, he managed to pull out or break the wires and continue to struggle and attempted to grab the officer's pistol. After fleeing outdoors, additional attempts to subdue the man included nine beanbag rounds and additional Taser applications, all without effect. After attempted entry into a police vehicle containing a loaded rifle, the man was shot and killed.

In another case a very young man suffered long-term depression and 3 months memory loss after consuming what was almost undoubtedly *Amanita pantherina*. He also became violent and exhibited strength beyond his years.

One frequent user of hallucinogenic mushrooms contacted Marilyn Shaw about loss of muscular control, inability to focus, balance, or stand followed by extreme fatigue lasting up to three days. This has happened to him on several occasions after consuming *Psilocybe azurescens*. He reported that other individuals had observed a similar effect from *Psilocybe cyanescens* and other *Psilocybe* species that grow in association with wood chips and river estuaries. Marilyn contacted both Paul Stamets and Dr. Andrew Weil and confirmed that there appears to be a neurological problem associated with these wood-associated *Psilocybe* species.

A young man made a "medicinal" tea from the black knot fungus on cherry trees plus some *Daldinia concentrica* when he had been unable to find any Chaga. He suffered gastric distress for days. One of his ideas was that the GI distress was symptomatic of liver problems and milk thistle would protect his liver. However, milk thistle extracts are not absorbed in the GI tract (which is why injectable Silibinin is used in the experimental protocol to treat patients who are suffering amatoxin poisoning from certain toxic *Amanita*, *Lepiota*, *Galerina* and *Conocybe* species). Tim Geho pointed out to him that at some doses Chaga has caused muscle paralysis and that he should be careful.

In addition to the reports involving humans, there were reports from 13 dog owners about dogs ill after the dogs ate mushrooms or were suspected of having eaten mushrooms. Four of the cases involved the death of the dog. Three of the dog deaths were due to amatoxins and in one case the mushroom involved was uncertain and death was so rapid that it might not have been a mushroom at all. There was also an inquiry from the owner of a goat herd wondering if several deaths in her herd might be attributed to mushrooms. However, the symptoms fit neither known mushroom toxins nor known toxic weeds. The only mushrooms the owner reported in her field were lots of puffballs.



DANIEL GABRIEL FAHRENHEIT

Andrus Voitk

Everyone above a certain age in Canada is aware of the name Fahrenheit, because that was the name of the degrees in which we measured temperature when we were young. Back then, only the civilized world used Celsius. More logical and fitting with the metric system, Celsius has now been adopted virtually throughout the world, while Fahrenheit hangs on as a curious anachronism in Belize and a smattering of other remote little places.

Daniel Gabriel Fahrenheit, was born in 1686 into a wealthy Gdańsk merchant family as the eldest of five surviving children. Instead of pursuing higher education, as one might expect, given his background, a stochastic event propelled him to Amsterdam at the age of 15 for a crash course on how to become a merchant. Fahrenheit put in the required time, but was more fascinated by the world around him, and after much exploring, turned toward instrument making instead. This allowed him to experiment with physics and chemistry, subjects that had beguiled him.

Making thermometers, he saw the need for a stable and reproducible temperature scale. His zero was the freezing point of the then known coldest liquid (salt water) and the temperature of a horse was defined as 100—the horse was felt to have a more stable temperature than man, whose temperature in that scale measured 96. Water froze at 32 and boiled at 212. In the course of this, Fahrenheit noted the effect of atmospheric pressure on freezing and boiling points of liquids, and from this devised instruments to measure altitude and atmospheric pressure. He learned glass blowing to make his thermometers, barometers and altimeters. He also studied the expansion of fluids with heat, and devised the mercury thermometer as an improvement over alcohol, because of the greater stability and reproducibility of mercury's response to heat.

In the course of his life he was in contact with the leading scientists of his day and did considerable travelling to visit colleagues. While in England Fahrenheit was elected a Fellow of the Royal Society. At the time the lack of formal education was not an impediment for practicing scientists to be thus honoured. He also lectured in Chemistry in Amsterdam, were he lived most of his life. He is buried in Den Haag, where he died at age 50, very much an active investigator to the end. During his life he elucidated several physical-chemical principles and applied them to his ends. The degreeless man behind the degrees was able to pursue his dreams to satisfy both his curiosity and his need for a financial footing.

Fahrenheit was not a mycologist, but gains entry into a mycological journal through his parents. Who knows what would have become of Daniel Gabriel, had he not lost both his parents to mushroom poisoning when he was 15?

Parallel evolution revisited

Andrus Voitk

Nice to read your lines on parallel evolution [Omphalina II(5):4]. There is so much more in nature than we ever believe—both in biodiversity and evolution, and our memories and eyes are always too small. I remember a paper from the 70-ies by the German geneticist Karl Esser. He had a ***Polyporus*** species in culture and he could get it to frutify in culture as well, producing normal fruitbodies. However, when he used the single-spore mycelia of each mating type and let them grow for some time, he found in one of the plates a normal ***Polyporus*** (though with bisterigmate basidia without clamps), in another a resupinate poroid species (with the same microscopy), in the third a clavaroid thing, in the fourth a sponge, and other distorted forms.

Nils Hallenberg

Nils was good enough to send me the referrence[1] and Henry Mann got the book for me through the MUN library system. If you are interested in this sort of thing and if you speak and read fluent Swiss, the Proceedings are a delight to read. You can dip in here and there, read what the most famous mycological taxonomists of their time thought and how they addressed each other, respectfully or brusquely, as suited the occasion and their character. You can spend a week dipping into this book here and there—every bit as good as an anthology of good poetry. Honest.

Esser had carried out several culture experiments with ***Polyporus ciliatus***. He showed that under laboratory conditions, strains of this fungus produced fruiting bodies of various shapes. When genetic material of two individuals joined into one (sexual reproduction), the "normal" mushroom was produced, but when fruiting bodies were produced from mycelia with genetic material of only one individual ("vegetative growth"), many different morphologic forms appeared, influenced by laboratory conditions (environment/habitat). In other words, the genetic material had within itself latent totipotentiality, allowing it to produce the shape that seemed best suited for the conditions.

This suggests that in parallel evolution similar shapes (e.g. gills, or club shape, or pores) are not reinvented ***de novo***, but rather the potential is carried in the genes and given expression, when circumstances favour it.

Reference

1. Esser K, Hoffmann P: Genetic basis for speciation in higher Basidiomycetes with special reference to the Genus Polyporus. in Clémençon H, Ed.: The species concept in Hymenomycetes. Proceedings of a Herbette symposium held at the University of Lausanne, Switzerland, August 16-20, 1976. J Kramer, Hirschberg, Germany; published as vol 61 of Bibliotheca mycologica, pp189-214. 1977.]

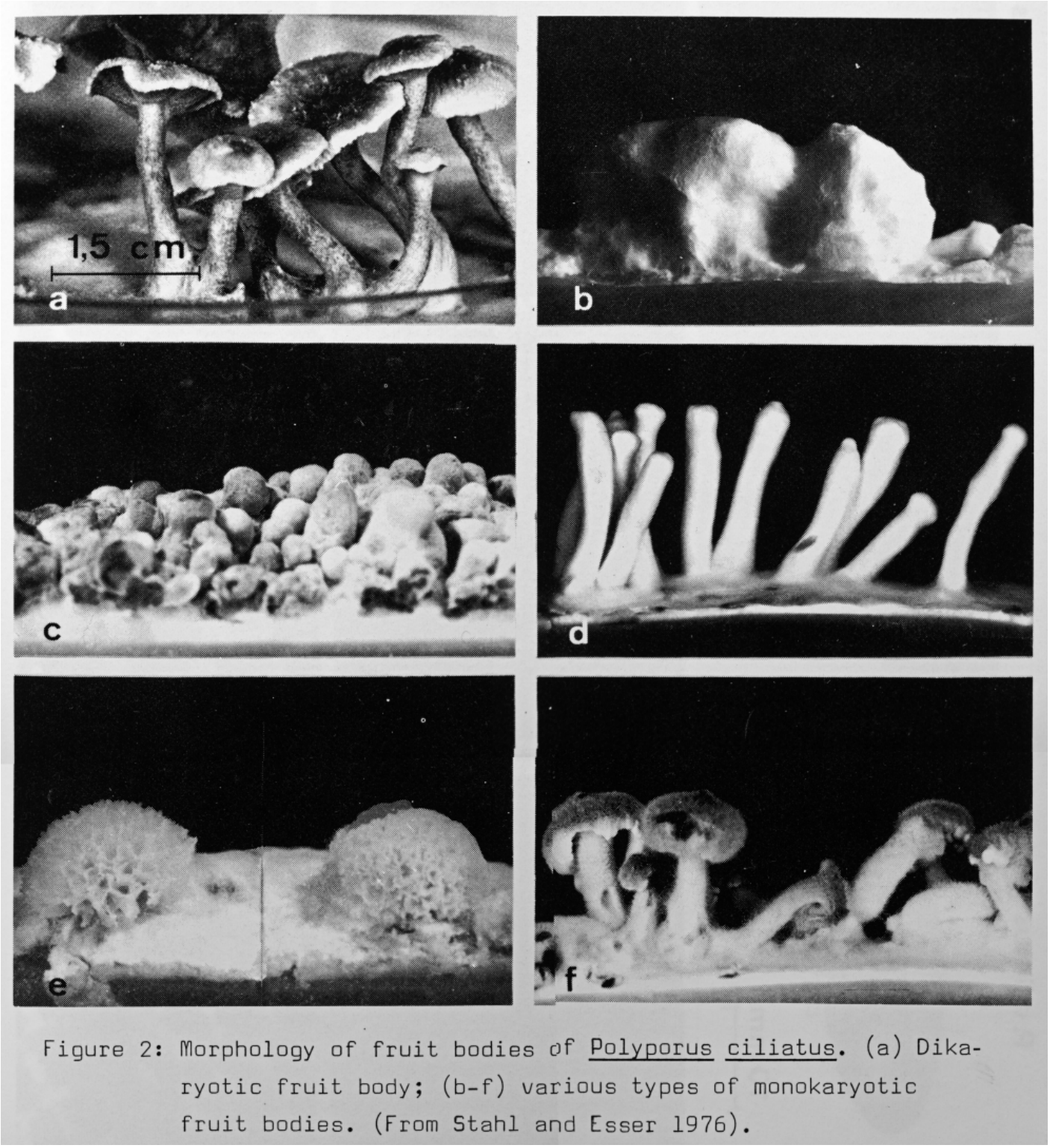


Figure 2: Morphology of fruit bodies of Polyporus ciliatus. (a) Dikaryotic fruit body; (b-f) various types of monokaryotic fruit bodies. (From Stahl and Esser 1976).

Esser's photographs from the cited work, above, showing the various shapes that the same species could produce under varied laboratory conditions. Reproduced with the kind permission, sought and granted in writing, of A. R. Gantner Verlag, Ruggell, Lichtenstein.

Esser worked with *Polyporus ciliatus*, a European species named for its cilia or hairs, produced at the edge of the cap. He also found that these cilia appeared under certain laboratory conditions, and not others. Similarly, the unciliated *Polyporus brumalis* would produce cilia under differing laboratory conditions. Thus, both have the potential for cilia formation when advantageous, and one got the name only because it did so with regularity. Pretty amazing! We do not have *P. ciliatus* in North America, but the small *P. varius*, illustrated on the previous page, comes close in general looks, if not in ciliation.

the mail bag

or why the passenger pigeons assigned to serve the lavish Corporate and Editorial offices of OMPHALINA get hernias

ERRATA

Dear Editor,

Another great issue in Aug... Noted one slip: p. 7, penultimate line, McLean should read McNeil.

Ed note. Very sorry for slip. Apologies sent to Raymond McNeil, whose name was correct in the reference section, at least. Correction made in file posted on our website, but unfortunately issues already mailed have the error. If you dislike such slips (I do), trash yours and download a corrected Vol II, Issue 7.

Dear Editor,

An unusual find, the dye-maker's puffball, *Pisolithus arhizus*. Not likely to be in your area, but who knows? Publish the picture and somebody may find one and let you know.
Photo: DarrenJacobs

Greg Thorn

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