# **OMPHALINA**



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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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Foray Newfoundland & Labrador 21 Pond Road Rocky Harbour NL A0K 4N0 Canada OMPHALINA, newsletter of Foray Newfoundland & Labrador, has no fixed schedule of publication, and 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.

Issues of Omphalina are archived in:

Library and Archives Canada's Electronic Collection http://epe.lac-bac.gc.ca/100/201/300/omphalina/index. html, and

Centre for Newfoundland Studies, Queen Elizabeth II Library (printed copy also archived) http://collections.mun.ca/cdm/search/collection/omphalina/

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Please address comments, complaints, and contributions to the Editor, Sara Jenkins at omphalina.ed@gmail.com

Accepting Contributions

We eagerly invite contributions to Omphalina, dealing with any aspect even remotely related to NL mushrooms. Authors are guaranteed instant fame fortune to follow. \_Issues are freely available to the public on the FNL website.

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# **O**MPHALINA

ISSN 1925-1858 Vol X, No. 1 May 2019

# CONTENT

Editor's note	4
Foray Matters 2019	
President's Message	5
Bowring Park Mycoblitz	6
Registration Form	8
One Mystery Solved: Hebeloma avallaneum Kauffman Andrus Voitk	10
Sub Cortina (interview with Chris Deduke)	
Sara Jenkins	12
Invisible (Almost) Winter Mushrooms	
Henry Mann	4
Powdery Mildews of the Avalon Peninsula	
H. Van T. Cotter	16
The Bishop's sketchbook	20
How to discriminate one old growth forest from another	
Yolanda Wiersma and Troy McMullin	21
At Last! Wild mushrooms at the St. John's Farmer's Market	
Shawn Dawson	24
The Diversity of Form and Color in Myxomycetes	
photos by Ania Ronikier	26
Partner Organizations	27

**Cover image:** Dianema sp., one of many unique myxomycota. As a focal point of the 2019 Foray, the diversity in form and color of myxomycetes is highlighted throughout this issue. Image: A. Ronikier.

Message from the S'ditor



WOW. After some delay, the Foray issue is finally here, and what better to get excited about than a romp around the woods in search of slime molds! With such a short time window to admire them before transport and dehydration render them unrecognizeable, there's something extra beautiful in their ephemeral forms that present a new challenge for us this year. And I'm particularly excited that we'll have these adventures again on the Avalon Peninsula—and perhaps more so, selfishly, because I don't have to drive nearly as far as in other years. There are just a few short weeks for our dedicated membership to secure spots before the general public, so I don't need to remind you to sign up soon.

As in 2018, this year's Foray will focus on the unique forests of the Avalon, whose high rainfall rates encourage rich fungal communities. More details about the Foray will be forthcoming in our next issue, due out in two short months. Michael Burzynski's introduction on the following page provides a good overview of what's in store, and Helen Spencer's mycoblitz information highlights new challenges and rewards for urban collecting.

This issue also includes some insight into what are perhaps lesser appreciated by those of us that got into mushroomhunting for edibles, such as admiring the microscopic world of powdery mildews, a new index for considering the fungal communities of forest ecosystems, and a mindful search for tiny winter treasure, among other things. All contributers are gratefully acknowledged for their time and efforts.

As I haven't yet the knowledge base to wax poetic about all matters mycological, perhaps the best use of this space is for all of us to take a moment to thank Andrus Voitk for his dedication to Omphalina over the past decade. Without his unflagging enthusiasm for the subject matter, his support of your new editor, and his almost inhuman attention to details, this—nor future issues—would not be here. Thank you Andrus.



# Foray 2019 Finds Time for Slime and Urban Fungi

The Foray returns to the Avalon Peninsula this year, but at mid-month (**September 13, 14, and 15**) instead of at the end of the month, when we sampled there last year. We do this in order to inventory the same part of the province at different times during the growing season, and since the weather is so different each year, we trust that there will be different growing conditions from one year to the next, and different fungi in fruit when we are there.

Two new things will happen during this Foray: we will be joined by a researcher who specializes in an oftenoverlooked group—the unfortunately named slime moulds (myxomycetes), and we will be sampling several urban sites in the City of St. John's where many species of introduced trees and shrubs are growing in a human-altered landscape. Both of these bring the possibility of adding new fungi and lichens to our cumulative species list. During past forays we have usually had to discard slime moulds because most years primarily only Tony Wright was were willing to try to identify them. This year we will purposefully search for them, collect them, and culture them. Even if they are not mature enough to key out, DNA analysis will identify what they are. Last year, during the *Suillus* Foray, the team of Rytas Vilgalys, Van Cotter, and Nhu Nguyen collected scores of DNA samples of many different species for their work with their chosen boletes. This year we hope to be as thorough with the slime moulds. Unfortunately they are small (bring reading glasses, if you use them), and, true to their name, they are often slimy and *VERY* fragile. A small plastic collecting box, like the tackle boxes used by fishermen, is the best tool for collecting fragile specimens. If you can bring one, it will be a great help during field trips.

Since the end of last year's foray, more and more information is coming in about the material that identifiers brought back with them, or which was sent to other experts. We will keep you updated with new identifications as we receive them.

We had a lot of fun last year, and I hope to see you this year at Burry Heights Camp this September!

# Michael Burzynski

President, Foray Newfoundland and Labrador

Bowring Park Nycoblitz

# by Helen Spencer

For many Newfoundland Foray participants the mycoblitz on Friday afternoon is the fun start to a busy week-end. We always meet at a lovely location, often a provincial park, and spread out to gather as many different fungi as possible, bringing them back to the Foray host site for sorting and identification. For those new to Forays, it's very exciting to be suddenly immersed in the world of fungus and mycologists at the mycoblitz.

This year, for the first time, the mycoblitz will be at an urban location, Bowring Park (305 Waterford Bridge Road) in St John's. We hope that by exploring an established urban park we will find species of fungus that we haven't yet found on any of our forays. There are many trees and shrubs that are not native to Newfoundland in urban environments, and hopefully some of their associated fungi have found their way there too.

A history of Bowring Park, including a list of some of the trees that have been planted over the last century, can be found at http://www. bowringpark.com/usr/documents/history\_ of bowringpark.pdf. A brief review tells us that these 50 acres of land were obtained from the Newfoundland Government in 1847 and initially developed into farmland. Later it was bought by the Bowring Brothers and donated to the city to be turned into a park which officially opened in 1914. The park has formal gardens, tree plantings, several kilometers of trails that wind through woods, gardens, lawns, beside rivers and ponds. The old Newfoundland Railway passes through the park and there are sports fields as well as a conservatory and an old slate quarry. In short, it's a fun place to explore, and the variety of habitats should produce high biodiversity overall, and locations where we ought to find lots of lovely mushrooms.



## Join the Mycoblitz

Details will follow in our next issue with meeting time and location.



Download the map of the park here: http://www.bowringpark.com/usr/documents/bowringpark\_map.pdf



OMPHALINA Vol X, No. I



# **Registration & Acknowledgement** of Foray Participant's Responsibility, Express Assumption of Risk, and Release of Liability

Salmonier Line, September 13, 14 & 15, 2019

Space is limited, so registrations are accepted on a **first-come firstserved basis**. A registration is only recorded when full payment and a signed Acknowledgement have been received. Please submit a completed Registration and Acknowledgement form for **each participant**. Print and sign both pages of this registration form and send, with your payment, to

# Geoff Thurlow, 16 Hammond Drive, Corner Brook, NL, A2H 2W2, CANADA

We can accept payment by cheque (made out to "Foray NL"), cash, or e-transfer (add recipient: info@nlmushrooms.ca; use password ForayNL).

# Registration

Name:	
Street:	
City:	_Province/State:Code:Country:
Tel: (	e-mail:

# Participation fees (in Canadian dollars)

Adult (includes registration fee, accommodations for two nights, meals (reception, two breakfasts, Sa	turday bag lunch, Saturday supper,
Sunday lunch), workshops (except materials), lectures, trails, and other activities)	\$265.00
Youth 13 to 17 pay 50% (Children 12 or younger participate for free)	\$130.00
Database Team: Students - no fee; Non-student team veterans 50%*	\$130.00
Your membership in Foray NL is included in the participation fee. Membership lasts	until the following year's foray.

# Workshop Fees

**Watercolour Workshop with Glynn Bishop.** Limited spaces allotted on a first-come first-served basis. If the session is full, your fee will be refunded; fee is \$42.00 (paints \$26 and book \$16); no fee if you bring your own........ + \_\_\_\_\_

Dyeing with Mushrooms with Lisa VanNostrand. Fee is \$10 for materials...... + \_\_\_\_\_

Other workshops are available for registration on-site in September. A small fee may be associated with some workshops and can be paid at the Foray.

Book Purchase: I wish to buy\_\_\_\_NL mushroom field guides @ \$20.00 each...... + \_\_\_\_\_ This is a special members' price. We do not sell the book at the foray.

Special needs/wishes:

Dietary or other needs

*Please Note:* We often take photographs of Foray participants during events to use on our websites and in our newsletter, Omphalina. As a registered member attending Foray NL, we presume that you agree with our use of a photograph containing your image. If you do NOT wish a photograph of you to be used in this way, please contact us at info@nlmushrooms.ca.

\* We request that database team members who have organizational support please pay the full participation fee, if possible—Foray NL has very limited sources of funds. Contact M. Burzynski if you have questions: info@nlmushrooms.ca I understand that during my participation in the events that together make up the Annual Fall Mushroom Foray, henceforth known as "the Foray" of MUSHROOM FORAY NEWFOUNDLAND & LABRADOR, INC., henceforth known as "FNL", I may be exposed to a variety of hazards and risks, foreseen or unforeseen, which are inherent in the Foray and cannot be eliminated without destroying the unique character of the Foray. These events include, but are not limited to: accommodations, identification outings, scientific presentations and investigations, meals, including as a food course mushrooms selected by participants, leaders, including FNL Organizers and Faculty, and travel to and from the outings and meals. The inherent risks include, but are not limited to: the dangers of serious personal injury, property damage, and death, henceforth known as "I&D", from exposure to the hazards of travel; moving in the wilderness, including uneven or insecure terrain, actions of fellow participants, wild animals or third parties, including hunters; mushrooms that may be poisonous, toxic, or cause unforeseen allergic or other adverse reactions in individuals, both independently and in conjunction with other substances, including wine or other alcoholic spirits. FNL Organizers and Faculty have not tried to deny or minimize my understanding of these risks. I know that I&D can occur by natural causes or activities of other persons, FNL Organizers and Faculty, animals, trip members, trip leaders and assistants or third parties, either as a result of negligence or because of other reasons. I understand that risks of such I&D are involved in adventure travel such as the Foray and I appreciate that I may have to exercise extra care for my own person or others around me in the face of such hazards. I further understand that the Foray may not have, or be readily accessible to, rescue, medical facilities, or expertise necessary to deal with the I&D to which I may be exposed.

In consideration for my acceptance as a participant on the Foray and the services and amenities to be provided by FNL Organizers and Faculty in connection with the Foray, I confirm that:

- I have read these and any other terms, rules, information and conditions applicable to the Foray, made available to me directly or on the FNL website;
- 2. I will pay any costs and fees for the Foray;
- 3. I choose to participate in the Foray of my free will, being fully aware of the risks involved; and
- 4. I acknowledge my participation is at the discretion of the leaders.

The Foray officially begins and ends at the times and location(s) designated by FNL Organizers and Faculty. The Foray does not include carpooling, transportation, or transit to and from the Foray (including ferry) or trails during the Foray, and I am personally responsible for all risks associated with this travel. This is meant to include transportation provided by FNL Organizers and Faculty or participants during the Foray, including transport or carpooling to trails during the Foray and between the accommodations and the Foray trails.

If I decide to leave early and not to complete the Foray as planned, I assume all risks inherent in my decision to leave and waive all liability against FNL Organizers and Faculty arising from that decision. Likewise, if the leaders have concluded the Foray, and I decide to go forward without the leaders, I assume all risks inherent in my decision to go forward and waive all liability against leaders including FNL Organizers and Faculty arising from that decision.

This Agreement is intended to be as broad and inclusive as is permitted by law. If any provision or any part of any provision of this Agreement is held to be invalid or legally unenforceable for any reason, the remainder of this Agreement shall not be affected thereby and shall remain valid and fully enforceable.

To the fullest extent allowed by law, I agree to WAIVE, DISCHARGE CLAIMS, AND RELEASE FROM LIABIL-ITY FNL, its officers, directors, employees, agents, faculty and leaders, from any and all liability on account of, or in any way resulting from I&D, even if caused by negligence of FNL, its officers, directors, employees, agents, faculty and leaders, or any other parties in any way connected with FNL or the Foray. I further agree to HOLD HARMLESS FNL, its officers, directors, employees, agents, faculty and leaders from any claims, damages, injuries or losses caused by my own negligence while a participant in the event. I understand and intend that this Assumption of Risk and Release of Liability is binding upon my heirs, executors, administrators and assigns, and includes any minors accompanying me on the outing.

I have read this document in its entirety and I freely and voluntarily assume all risks of such I&D and notwithstanding such risks, I agree to participate in the Foray. Signed:

Date: \_\_\_\_\_

*If you are a minor (under age 18), your parent or legal guardian must sign this Agreement on your behalf.* 

I hereby agree and consent to the foregoing Acknowledgment on behalf of the minor named here:

Relationship: \_\_\_\_\_ Signed: \_\_\_\_\_ Date: \_\_\_\_\_

)ne Mystery Solved:

Hebeloma avellaneum Kauffman



### **Andrus Voitk**

The title was the subject line of an e-mail that arrived on April Fool's Day from Henry Beker. You'll remember Henry, the leading world authority on the genus *Hebeloma* (from the Greek *hebe*, 'youth' and *loma*, 'hem or fringe', referring to the veil that is only present in the earliest stages of fruit development), who was part of our faculty in 2017—*the year of no* Hebelomata. When he was invited, he was warned that the timing was unfavourable, but he and the charming Linda Davies did not let our hebelomopenia bother their good spirits or civilized manner. Henry is famous for two other memorable deeds:

- At the aforementioned foray he bought me a beer, even though I protested that as my guest I should do the buying, and
- He studied all of our hebelomas, resulting in an entire issue of Omphalina dedicated to the genus<sup>1</sup>—surely a first for any amateur club's newsletter.

Henry wrote that his pursuit of the genus in North America has led him to find an identity for one of the unknown species we had collected in 2005 in Pinware Park on the Labrador Straits. In the 2016 Omphalina it was presented as an unknown species (see top image). The DNA of the type of *Hebeloma avellaneum* Kauffman matched that of our collection. The Michigan agaricologist Calvin H. Kauffman (1869–1931) collected his specimen on the opposite coast of the continent, in Washington's Olympic National Park. The description appeared posthumously. The species has been reported very rarely since, and none have been sequenced until the work of Henry and his team. The redescription of the species with other northern hebelomata is published in a recent article.<sup>2</sup> You can paste the DOI link from the references into your browser and read it or download a pdf copy.

Is it worth spending foray time and resources on vouchering specimens, and making them available to scientist for study? It is, if you are curious to learn what species really grow in your own neighbourhood. Learning that this is an uncommon transcontinental species provides some insight into the distribution of fungi on this continent.

Many thanks, Henry, for your work and for this update.



### References

- 1. Omphalina 7(5):6–33, 2016.
- Cripps CL, Eberhardt U, Schütz N, Beker HJ, Evenson VS, Horak E, 2016, The genus Hebeloma in the Rocky Mountain alpine zone. *MycoKeys* 46:1–54; doi.org/10.3897/mycokeys.46.32823

*(left)* Calvin H. Kauffman (1869–1931). His *H. avellaneum* was collected on Nov. 8, 1925.

*(below)* The original *Hebeloma avellaneum* Kauffman specimen is archived in the University of Michigan Herbarium. Information and photos pertaining to this samples are available through Mycoportal at: <u>http://mycoportal.org/</u><u>portal/collections/individual/index.php?occid=346697&clid=0</u>



image usage: http://creativecommons.org/licenses/by-nc/3.0/

### with Chris Deduke

## Sara E. Jenkins

The update on Hebeloma sp. provides an easy opportunity to slide right into the next segment, which focuses on the activities of the individuals that collect and maintain the data and collections of Foray NL. We're talking about how a simple mushroom translates into *information* for researchers. President Michael Burzynski already grabbed the moniker "behind the scenes" for the Foray report, so we adopted a slightly more myco-centric title for this segment. Prepare yourselves, dear readers, because I LOVE TALKING ABOUT DATA.

When the annual Foray is complete, a catalogue of information pertaining to the specimens collected by Foray participants and faculty takes on a new life of its own, as these data—including the physical collection itself—are made available to the scientific community for research. That adorable jelly fungus you carefully carted out of the field and left to be identified while you ran off to join the supper line, might become the cornerstone in a global DNA analysis of its species, or maybe even play an integral role in improving crop yields in the face of climate change.

So how does your mushroom or lichen (or slime mold!) get there?

For this first issue, I spoke with Chris Deduke, whom you may know as the Foray data collection guru, working with a dedicated group of data volunteers to ensure information collected about each specimen is documented consistently during the Foray. In his professional capacity, Chris is the Assistant Collection Manager for lichens at the Canadian Museum of Nature's Natural Heritage Campus in Gatineau, Quebec (www.nature.ca).

# [Editor] Chris, tell us a little bit about what you do for the Foray.

[CD] I'm the unofficial data manager and a member of the board of directors. My database role oversees the recording and standardizing of information about the Foray collection, including the species identification and identifier (thank you Foray Faculty!), the collector, location, and photograph ID number. With the help of several volunteers, this information is entered in



**Chris Deduke**, Data Manager at Foray NL. He also loves to talk about data.

spreadsheets throughout the Foray, and the ID cards are then packed away with the dehydrated samples for archiving at their final destination at Grenfell Campus, Memorial University of Newfoundland (SWGC) in Corner Brook. We work hard to get the information entered during the Foray itself because we are all motivated by a sense of camaraderie, and because the faculty and collectors are still there to provide clarifications if needed.

# [Editor] I know what my handwriting looks like on the ID cards—it's a dumpster fire at best. How do you ensure consistency in data collection?

[CD] We set up a series of codes in our spreadsheets to facilitate consistent, high quality data entry. Codes are generated for collector and identifier names, trail locations, etc. We use the information from trail sign-up sheets to confirm collector names. Each of the volunteers works on their own version of the Foray spreadsheet, and then I merge that into a master version. After the Foray, the master list is sent to Tony Wright and Andrus Voitk to correct any taxonomy or spelling errors for fungi; I review the lichen list myself. After the final round of data clean-up to check spelling in the other data fields, the compiled and corrected list goes to Michael Burzynski for upload onto the Mycology Collections Data Portal (MycoPortal:http://mycoportal.org/) website.

# [Editor] At that point, the data are public and anyone can access information from the Forays?

[CD] Yes, although some specific location information is hidden for sensitive species, such as species of concern or high demand edibles. To my knowledge, we have uploaded most of the historical Foray data to MycoPortal with the exception of the years 2004, 2005, 2008. The most recent 2018 data has been uploaded for fungi. Find more information about FNL and Mycoportal in *Omphalina* Vol. 7, No. 7, p. 12-14.

# [Editor] What happens to that information if taxonomic information for a particular species changes?

[CD] MycoPortal is a network of connected digitized herbaria/fungaria operating within the Symbiota framework (http://symbiota.org). This collection of web tools organizes how the data is accessed. As a result, unlike a static spreadsheet, the search function under Mycoportal can use taxonomic synonyms. This means that you can pull up records from both old and the most current name. Species synonymy is checked against what is known as a taxonomic thesaurus, or database of names (nomenclator), one of which is the Index Fungorum (www.indexfungorum. org). This site is developed and is maintained by the Royal Botanic Gardens at Kew, UK and is updated every three months, so content is generally current. These sites curate the list of names in order to prevent taxonomic confusion and organize over 100,000 fungal names.

# [Editor] How does the work you put in at the Foray complement your job at the Museum?

[CD] My responsibilities for the lichen collection include acquiring new material for the Museum's collection (CANL), mounting and labeling it, and archiving both the data (digitally) and the physical specimens. The collection is maintained as physical record of known biodiversity and researchers can access it to request specimens for further study. We also work to digitize previously acquired specimens, and conduct tours and outreach activities for the Museum with the public. Lichen samples that have not been identified during the Foray itself may go back to Gatineau with me for further identification work at the Museum.

## [Editor] How did you get involved with the Foray?

[CD] I studied with Michele Piercey-Normore at the University of Manitoba for my PhD (currently, Professor and Dean of the School of Science and Environment,

OMPHALINA Vol X, No. I

Grenfell College, Memorial University of Newfoundland). She was one of the—possibly, *the*—first lichenologist to join the Foray. She recommended that I attend the 2014 Foray on Fogo Island as a database volunteer, and I was hooked.

# [Editor] One last question: how did you develop your interest in lichens?

[CD] I find lichens fascinating. I arrived at lichenology from an interest and background in philosophy (my undergraduate degree)—specifically environmental philosophy. Philosophically, we are still having trouble articulating what exactly they are. They don't fit a traditional definition of an organism and are discovering new participants in these symbiotic associations.

# "PHILOSOPHICALLY, WE ARE STILL HAVING TROUBLE ARTICULATING WHAT LICHENS ARE."

Historically they've been viewed a bit like fungal misfits or misclassified as plants or bryophytes (moss); they aren't technically organisms but are primarily considered fungi. Although lichenization is a fungal lifestyle—a nutritional strategy—lichenology generally operates as a separate field from traditional mycology. As heterotrophic organisms, all fungi are defined relationally: parasite (host+fungi); mycorrhizal (host+fungi); saprotroph (carbon source+fungi); lichen (fungi+photobiont). However, the symbiotic nature, unique structures and corresponding descriptive vocabulary have pushed lichenology into its own discipline.

Lichens exhibit a diversity of growth forms, substrates, habitats and ancestries. Lichenization has evolved multiple times and in two different phyla (Ascomycota and Basidiomycota). Why? Is there a single answer to that question, or many? Lichens interest me because there are so many unknowns. You'd need lifetimes (!) of study to unravel all of the questions we still have.

# [Editor] Thanks Chris!

Readers, head over to MycoPortal if you want to further explore the Foray NL data collection. To download the entire Foray NL archive, select the FNL collection and search "Canada". Going for a hike and want to know what species you might find? Sort the data by locality. Looking for a new species to photograph? Sort by species. Dig in. Happy hunting.



Figure 1: Sarea resinae, highly magnified.

# Henry Mann

Winter is normally regarded as the off-season for outdoor mushrooming, however there is still much to be observed in our woodlands. Wherever one looks, fruiting bodies of wood decay fungi are conspicuous on branches and trunks. Locating and identifying conks, bracket fungi, crust fungi, jelly fungi and others has become one of my hobbies when snowshoeing the trails<sup>1</sup>.

Andrus Voitk's recent article on winter resin fungi in *Omphalina*<sup>2</sup> peaked my interest. Do these really occur in the Pasadena Ski and Nature Park where I do much of my winter wandering, or are they just too uncommon to be readily noticed? Surely, something as strange as mushrooms (cup fungi) growing on conifer resin must be unusual, if not rare. Having personally listened to Andrus extolling these recent finds several times, this seemed to be a matter requiring some exploration. So on a spring (almost) day in March, I examined some resin-exuding trees along the PSNP trails. The first spruce tree had considerable old caked resin and appeared to be a likely candidate, but seemingly had no sign of the diagnostic orange cups. Just to be sure, I made a nose-close check and—"Voila!"—amazingly, a tiny orange speck appeared, then a few others scattered here and there. Little black cups of about the same size were also noted, each considerably less than one millimeter across.

Now, with a "search image" in mind, other trees with old resin almost always exhibited the orange species, Sarea resinae, (Figure 1) and sometimes also the black species, S. difformis, (Figure 2). Despite previously unnoticed and unseen, these miniscule species showed up almost everywhere in a "nose-to-bark" encounter. Obviously a hand lens is helpful to be sure one is not just "seeing" a fleck of debris and mentally extrapolating that into an imaginary cup fungus! Figure 3 illustrates how these "almost" invisible mushrooms can become visible with close examination of resinous trees and patient scanning of the caked "dry" resin.

As true winter mushrooms, these tiny fungi are reported to appear during winter thaws and can be found at least until June, but then seem to disappear during the warm summer months. Look for them especially in early spring!

Photographing these little critters is also not easy and with their resinous substrate, can be a sticky matter at best! All three images in Figures 3 were taken with the macro setting of an Olympus TG4 camera.

### **Cited Sources**

1. Mann, H. 2019. Winter Mushrooms, Notable Nature along the Pasadena Ski and Nature Park Trails XII. www.pasadenaskipark.org/ nature\_program.html

2. Voitk, A., 2018. Sarea of NL. *Omphalina* 9(7): 12-16.



Figure 2: Sarea difformis, highly magnified.



Figure 3: (A) Resinous spruce trunk at 30 cm from camera lens. Not much to see; (B) At 15 cm from camera lens. Orange cups begin to "appear"; (C) Cups are clear with camera lens about 1 cm from resin surface.



# **Powdery Mildews of the Avalon Península** And their Beautiful Microscopic Features

# H. Van T. Cotter

When many of us are foraging for mushrooms we hope to find such fungi as chanterelles and sweet tooths. These fungi are beneficial to their tree associates through their mutualistic ectomycorrhizal relationships. However, there is another side to fungal-plant relationships, one characterized by fungi that cause detrimental plant diseases. One such group of fungi is the powdery mildews.

We recorded five powdery mildew fungi, a type of Ascomycete, at the 2018 NL Foray, four of which were new to the cumulative list of fungi collected at NL Forays.

OMPHALINA Vol X, No. I

This group of fungi give you good reason to break out the microscope. The appearance of powdery mildews changes dramatically as one increases magnification. With the naked eye, we see a white powdery covering on the plant. Add a hand lens and in the autumn we can see tiny yellowish immature and black mature spheres called ascocarps (fruiting bodies; from the Greek *askós* for 'bag' and *karpós* for 'fruit') scocarps) amongst the white fungal growth. Finally, add a compound microscope and, "viola!", the beautifully ornate fruiting bodies are revealed—some look like satellites, others like alien creatures, and still others are covered with Velcro-like hooks (why might that be?), ...

If a gardener, you are most likely familiar with powdery mildews from infections on some of the vegetable and flowers in your garden. The bulk of the biomass of these fungi is on the surface of plant leaves (or other plant parts) with nutrient absorbing structures inserted into the outer cells of the leaves. This is highly unusual as virtually all other plant pathogenic fungi grow hidden vegetatively within the leaf or other plant part, and only reveal themselves to sporulate and reproduce.

As many powdery mildews are host specific, identifying the plant host is a key requirement in identifying the powdery mildew fungus.

# "EVEN MYCOPHILES DON'T WANT WINE THAT TASTES LIKE OLD MUSHROOMS."

From a crop production standpoint, particularly troublesome powdery mildews occur on apples, cucurbits, grapevines, and cereal grains such as barley and wheat. In the case of grapevines, powdery mildew fungus *Necator uncinula* will infect both leaves and fruit; infected fruit lends an undesirable, off flavor to wines, sometimes described as "fishy or mushroomy". This provides one key reason to control powdery mildew on grapevines. During my career as an industrial mycologist, while working in Germany we discovered and developed a new fungicide active ingredient, Metrafenone, which effectively controls powdery mildew. Even mycophiles don't want wine that tastes like old mushrooms.

Powdery mildews have two reproductive strategies. The first is to produce abundant chains of conidia (asexual spores) covering infected leaves with a white powdery coating—thus their name. These spores are fragile and short-lived, serving to distribute the fungus in space and thus the disease during the growing season. Under favorable conditions on a susceptible host, this asexual, clonal reproduction can cause severe powdery mildew epidemics. At this stage, features available to identify powdery mildews are limited to the plant host infected and a few microscopic features of the conidial reproduction.



Figure 1: Alnus Powdery Mildew. La Manche Provincial Park, along parking lot edge of mixed forest. 27 Sep 18.



**Figure 2:** Chasmothecium of *Erysiphe penicillata* squashed to release multiple asci with 8 ascospores each. Appendages with dichotomous branched tips on chasmothecia.



Figure 3: Prunus virginiana Powdery Mildew. La Manche Provincial Park. 27 Sep 18.



**Figure 4:** Chasmothecia of *Podosphaera clandestina* squashed to release single ascus within each chasmothecium. Each ascus has 8 ascospores. Appendages with dichotomous branched tips on chasmothecia.



Figure 5: Symphotrichum novae-angliae Powdery Mildew. La Manche Provincial Park, Edge of Freshwater Swamp. 27 Sep 18



**Figure 6:** Chasmothecia of *Golovinomyces asterum* squashed to release multiple asci with ascospores. Simple appendages on chasmothecia.

However, the second reproductive strategy which kicks in during the late part of the growing season provides a suite of beautiful microscope features which facilitate identification (Figures 2, 4, 6, 8, 10). Thus, the September timing of the 2018 NL Foray was perfect for collecting and identifying powdery mildew fungi. This second reproductive strategy is sexual and consists of producing small black round ascocarps called chasmothecia on the surface of the leaf. Chasmothecia open along a line of preformed weakness to expose the spores, hence the name ("chasmo" from the Latin chasma or Greek khasma for 'a hollow or crack', and "thecia" from the Greek theke 'case' or 'sheath'). This sexual reproduction provides the means for the powdery mildew fungus to overwinter. On perennial plants, powdery mildew fungi can also overwinter in infected buds.

We collected and vouchered the following powdery mildews at the 2018 NL Foray on the Avalon Peninsula:

Alnus powdery mildew caused by Erysiphe penicillata (Wallr.) Link (Figures 1 & 2). This fungus' annual strategy, and that of the next two powdery mildews described below, is to form the ascospores in the autumn which then are the overwintering stage.

Prunus virginiana powdery mildew caused by Podosphaera clandestina (Wallr.) Lév. (Figures 3 & 4).

Symphotrichum novae-angliae powdery mildew caused by Golovinomyces asterum (Schweinitz) U. Braun (Figures 5 and 6).

**Chelone glabra powdery mildew caused by Neoerysiphe chelones (Schweinitz) U. Braun** (Figures 7 & 8). The asci of this fungus and N. galeopsidis do not mature in the fall but rather, overwinter as immature asci. They then produce and release ascospores in the spring.

Lycopus uniflorus powdery mildew caused by Neoerysiphe galeopsidis (DC.) U. Braun (Figures 9 & 10).



Figure 7: Chelone glabra Powdery Mildew. Cape St. Mary's, wet area in tuckamore. 26 Sep 18.



Figure 9: Lycopus uniflorus Powdery Mildew. La Manche Provincial Park. 27 Sep 18



**Figure 8:** Immature asci of *Neoerysiphe chelones* released by squashing chasmothecia. Multiple asci per chasmothecium. Simple appendages on chasmothecia



**Figure 10:** Immature asci of *Neoerysiphe galeopsidis* released by squashing chasmothecia. Multiple asci per chasmothecium. Simple appendages on chasmothecia.

# Image credits

Leaf images (Figures 1, 3, 5, 7, 9) were taken by Roger Smith.

Microscopic images (Figures 2, 4, 6, 8, 10) are by the author and were taken using a 40x objective on a compound microscope. Each micrometer unit is equal to 2.5 micrometres.



# How to discriminate one old-growth forest from another

# Yolanda Wiersma and Troy McMullin

In life, we often have to weigh our options when making a big purchase, whether for something we need, like a truck for our construction business, or a new item to support our hobby, like a fancy camera or set of cross-country skis. To the non-expert, a set of trucks, cameras, or skis might all look about the same, and the non-discriminating shopper might wonder why there can be huge price disparities in items that seem to do pretty much the same thing (drive, take pictures, slide on snow). However, on looking closely there are differences in the features (valued by the connoisseur of said consumer goods) that warrant differences in the price<sup>1</sup>.

A similar thing can be said when making decisions about conservation. There is only so much land out there, and there are competing interests for its use, including resource exploitation, residential development, recreation and conservation. Conservation managers have to identify and prioritize for protection those areas which contain the most valuable features, from an ecological standpoint. In forest ecosystems, old-growth forests are generally prized as they are rare, and are presumed to house high measures of unique biodiversity. However, just as one shopping for a new truck might need to look under the hood, or the photographer might critically examine the spec sheet on a camera, we contend that simply prioritizing forests because they contain old trees might be an oversimplification.

In a recent "Concepts and Questions" article in the Ecological Society of America journal *Frontiers in Ecology and the Environment*, we outlined a proposal for a different way of thinking about how we value forests from a conservation perspective. Rather than thinking about how old a forest is, we propose that it is more important to ask how long a given area has been continuously forested. A

<sup>1</sup>Author note: While we are aware that economists distinguish between the concepts of "price" and "value", we are not going to delve into the nuances of Economics 101 here. Suffice it to say, that if you value skiing fast you will shell out \$800 for that pair of carbonlite skis. Or that if you value taking great photos, you will pay to have the features on the \$500 SLR over the \$50 point-and-shoot.



Figure 1: old growth forests of Salt Spring Island, BC

forest may be old, but if has previously been a cutover, a farm or some other kind of non-forest habitat, it may not be as rich in biodiversity that tends to only occur in oldgrowth forests as a forest with similarly-aged trees that has been forested for hundreds or thousands of years.

The idea of valuing forests by measuring biodiversity and continuity is not an original one; lichenologists in Europe have long noted that ancient woodlands (areas that have been continually forested, although in some cases, lightly managed through harvest practices such as pollarding and coppicing) harbour suites of taxa that are not found in old forests that have emerged in an area that was previously non-forested. One taxonomic group that is especially correlated to forest age and continuity is lichens—in particular, the small microlichens known as the calicioids (the "stubbles"). These lichens occupy unique microhabitats (snags, knot holes, overturned tree roots, bark crevices) that only form after an area has remained in a forested state for hundreds of years. In ancient woodlands in Britain, lists of lichens have been used to quantify an Index of Ecological Continuity (IEC). The more of these specialized lichens that are found in a given patch of forest, the higher the IEC, and thus the more conservation value we can ascribe to that forest. Other organisms have been proposed as indicators of forest continuity, including insects that inhabit polypore fungi or certain bryophytes. However, lichens are particularly sensitive to environmental conditions and they do not move or change throughout the year making them practical indicators of overall biodiversity and ecological continuity.

The lichens that have been used in Europe are not limited to the calicioids and can include more readilyidentifiable macrolichens. In Nova Scotia, the coral lichen (Sphaerophorus globosus, which was also observed by members of the last Foray on the Avalon Peninsula) is a potential indicator species that can discriminate older, second growth from continuous old-growth forest. Here in Newfoundland and Labrador, more work is needed to identify a suite of old-growth lichen indicators. For example, we still lack knowledge about the stubbles; a recent week-long survey by one of us (with Foray board member André Arsenault) resulted in the discovery of 34 calicioids, increasing the known diversity in the province by 22! No doubt there are more in places we have not yet looked. Nor have we related the suites of lichens collected from various parts of the province (and there have been many collections made, both through the Foray NL efforts, and by collectors such as Tuevo Ahti, John McCarthy and others) to the age/continuity of the forests from which they



were collected. Careful inventories of areas known from other sources (e.g., forest maps, local knowledge) to have been forested for comparatively long lengths of time will be needed, and these inventories should then be compared to similar forests with recent disturbance. Such work could likely form the basis for a few graduate student projects and Foray events in the future.

A strong understanding of the types of lichens that indicate a high degree of forest continuity would be useful for advancing conservation in the province. The provincial government developed a Natural Areas System Plan over two decades ago, which has yet to be made public and implemented. The Wilderness and Ecological Areas Advisory Council (WERAC) also exists to take recommendations for new protected areas, and knowledge about which forests have the highest value amongst the vast tracts throughout this province will help to prioritize the most important ones for conservation. *Note:* A read-only version of the article "Out with the OLDgrowth, in with ecological continNEWity: new perspectives on forest conservation" in *Frontiers in Ecology and the Environment* is available <u>here</u>.

If you'd like a PDF that you can print and share, please contact Yolanda at **ywiersma@mun.ca** 

To read about the calicioids, see McMullin RT and Arsenault A. 2016. The calicioids of Newfoundland, Canada. *Opuscula Philolichenum* 15: 92-104. Either of us would be happy to send a PDF.











Market Market Market

## Shawn Dawson

I've been selling plants, vegetables and wild harvested plants at the St John's Farmer's Market, food festivals, and restaurants for five years. I've also been selling wild mushrooms to restaurants for 5 years. Yet I've never been able to sell wild mushrooms at the Farmer's Market until this past fall—when I and Mark Wilson became certified to sell mushrooms at local markets. I now sell wild mushrooms, while Mark cultivates and sells oyster mushrooms (*Pleurotus ostreatus*).

People seem to be genuinely pleased to be able to purchase local wild mushrooms at the market. They make mushrooms a part of their weekly grocery list when visiting the St John's Farmer's Market. They seem to particularly enjoy the fact that \$5 at the Farmer's Market gets you enough mushrooms to try a special recipe at home, rather than spending much more for prepared wild mushrooms at a restaurant. A lot of people are curious to try wild mushrooms, but don't have the knowledge, confidence or time to pick them themselves.

Throughout the fall, I sell a wide variety of edible species that are wild harvested, mainly on the Avalon Peninsula. In early fall, golden chanterelles are widely available to harvest. Later into the fall we harvest a lot of sweet teeth, hedgehogs, winter chanterelles and *Catathelasmas* (we call them big cats), and we even managed to find some matsutake! The work doesn't stop in winter, however, as we are busy harvesting chaga (the polypore *Inonotus obliquus*) in central Newfoundland and bringing it to market on Saturdays.

My friend Scott and I usually spend the beginning of each week collecting for the local restaurants, and the later part of the week collecting mushrooms to prepare for Saturday's market. In mushroom season I'm very busy; I usually spend between eight and twelve hours every day, five days a week, foraging for mushrooms and other wild foods, followed by many evening hours cleaning and delivering the harvests. Saturday is market day, which is fun and sociable, but also exhausting! Sundays are rest days....I wish! But no—most Sundays during the season, I give guided foraging tours at Murray's Garden Centre. *Editor's Note:* You can find out more about Shawn's business and tours on his <u>Barking Kettle Facebook</u> page or follow Murray's Garden Center to be notified about his tours. Many of you may already know Shawn from his participation on the last NL Foray, and we hope to have him here every issue with one of his creative cooking or preservation recipes to share with you.



### This year the Foray is hoping to have a mushroom inspired arts and craft table!

Interested Foray participants are invited to bring along a few mushroom-related crafts to sell. The Foray will provide the tables, does not charge any commission on sales, and will not take responsibility for any theft or damage. Artisans interested in selling their creations will need to register and provide an estimate of how much table space they require, as space is limited. Please direct Foray Market registrations and other inquiries to Rachelle Dove (**rachelledove709@gmail.com**) with subject line "Mushroom Crafts".

OMPHALINA Vol X, No. I

# The Diversity of Form and Colour in Myxomycetes

### Hemitrichia serpula. All images courtesy of Ania Ronikier.

Globally, myxomycota exhibit a wide array of diversity in both form and colour. This image collection highlights just a few. The two species at right exhibit the multi-hued effect of structural interference on light reflected by the highly corrugated, multilayered surface of the peridium<sup>1</sup>. Irridescence in butterfly wings is similarly produced by overlapping scales.

<sup>1</sup>Inchaussandague et al., 2010. Structural color in Myxomycetes. *Opt. Express* 18(15): 16055-63.



Trichia decipiens







Dur Partner Organizations



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