





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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#### COVER

Cantharellus enelensis Voitk, Thorn, Lebeuf, J.I. Kim, secret site, Avalon Peninsula, August 10, 2013. Aquarelle sketch: Glynn Bishop. More biscopelial chanterelles inside, as well as a review of the chanterelle species of our province.

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# Message from the Editor

Welcome to our chanterelle issue, fit reading for St John's Eve.

I bet before reading this issue, most of you did not know we had several species of chanterelles in this province. Unless you heard it from Greg Thorn at the Foray, of course. Foray after foray... In 2007, when I published my little mushroom book, I thought our chanterelle was *Cantharellus cibarius*, just as you could read in most mushroom books for the rest of the continent.

That is how far we have come in a decade. Now you can read about our three chanterelle species, and realize that none of them is *C. cibarius*. Not only does *C. cibarius* not grow here, it does not grow anywhere in North America.

This sort of knowledge of our mycota has come about from our foray activity, the collections you made during our forays, meticulously kept and documented in our fungarium, ready for further scientific study. It takes years to build up data and material, before we can generate new knowledge from them, but once it starts coming, it flows. When he was here, Tom Volk maintained that Mycology is one of the few sciences where amateurs can make major contributions. Our experience has proven his theory many times over.

We may not have seen it or felt it, but our past activity has shifted the ground under our feet 180°. Putting together a book on mushrooms in this province in the early 2000s meant essentially collecting something from our woods, and trying to interpret it in relation to descriptions and pictures from elsewhere. A mushroom book written to-day can be based on interpreting something picked from our woods in relation to knowledge we have acquired in the intervening years about our own fungi.

This is a major shift. To be sure, our knowledge is incomplete. We still have large groups of mushrooms

that remain a mystery to us, whose interpretation still rests on an ability to make the best match with descriptions of mycota from elsewhere. But one by one, we are whittling down these groups, chipping blocks off them and making them ours. The major contributor to our new knowledge is the foray.

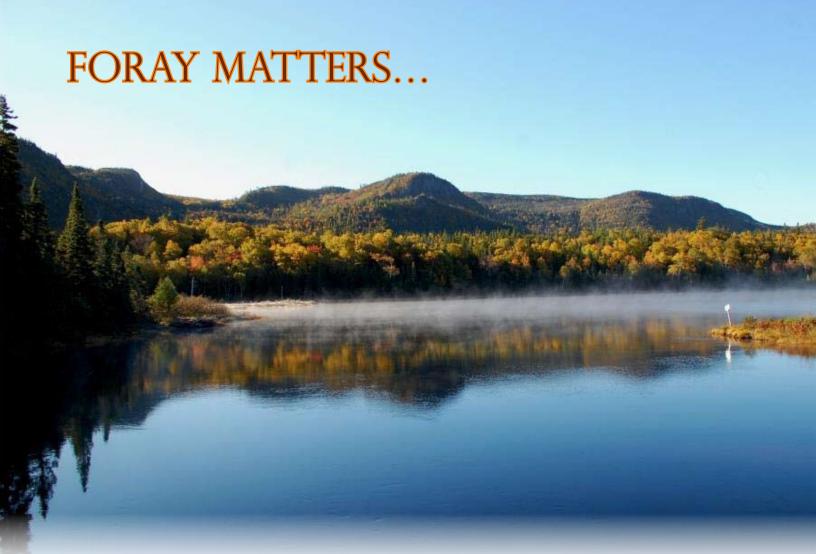
Those of you, who mull over such things, may have noticed that with the chanterelle, we have brought ourselves up to date about the status of all three of our highly regarded edible species of commercial significance: morels, pine mushrooms and chanterelles. Of these big three, only chanterelles exist here in quantities big enough to support at least a some commercial interest. Morels and pine mushrooms may be locally relatively abundant in a few small locations, but the total amount, compared to our total population, would probably not feed us all, never mind exportation. The NL chanterelle just might support limited export. We are very rich, if we are satisfied to supply our own needs. If we wish to export these resources in exchange for money, we will probably impoverish ourselves over time.

## From now on, our common chanterelle is <u>Cantharellus enelensis</u>, or <u>the NL chanterelle</u>.

After announcing the Foray in the last issue, registrations are flowing in nicely. We were later than usual in announcing it and the Foray is earlier than usual, making the registration period very short. If interested, but not registered yet, please do so as soon as you can. Avoids disappointment and helps the organizers.

See you at the foray!





#### Barachois blitz

Each year we have tried to census one of our protected areas, as part of the foray. This year we chose Barachois Pond Provincial Park, which is about 1 hour's drive from Grenfell. Among the special attractions of Barachois Park are white pine, making pine associate mycorrhizal mushrooms a possible find, and the tundra-like habitat atop the barren areas of Erin Mountain. Erin Mountain is 340 m asl, with a spectacular view over the region, way out to the St Lawrence Gulf to the west and the pristine forested hills to the east. Photos the following two pages.

The title banner shows a view from bridge by Tina Leonard. For those, who can get there Friday, **meet by the Park Administration Building about 11:45 AM**. At 12 noon, sharp, we shall divide into teams to explore the Park for an all-taxa (mycologic only, please) census. The blitz

is short and intense. To allow time for sorting, identification, databasing, photography, etc., and still have time for the reception and presentations, most of us need to leave the Park before 3:00 PM. The group going up to Erin Mountain may take a bit longer.

Please bring your own water and lunch to eat on the trail.

Our website <nlmushrooms.ca> has a downloadable **Registration Form**, instructions on **how to get there**, available **hotel accommodation**, and other important **information**. Further notices or information about the Foray will appear there, and on this page in future issues.

Michael Burzynski





View of the Park from Erin Mountain, above, and view of the landscape at the top, below. The latter is not above the tree line, but is so barren, unprotected and soilless that only subalpine vegetation thrives.







# The chantered les Newfoundland & Labrador

Greg Thorn, Jee In Kim, Renée Lebeuf, Andrus Voitk

The genus Cantharellus looks very distinctive, but many of its species are quite similar. Therefore, it is no wonder that at first all yellow chanterelles in North America were thought to be Cantharellus cibarius, the much-loved chanterelle of Europe. Only within the last few decades have we become aware that chanterelles on this continent differ from their European relatives. On the Pacific coast of North America the export of chanterelles is a multimillion dollar business. The trickle-down effect has been increased research, explaining why initially the majority of new North American chanterelle species have been described from there. We have since learned that chanterlelles, much like some other genera (e.g. morels), seem to be very parochial species, evolving into new genetic entities as they move into new surroundings.

Our first study of local chanterelles led us to the discovery that the common species in Newfoundland and Labrador was genetically very close to Cantharellus roseocanus, first described from the Pacific coast;<sup>2</sup> so close in fact, that initially we thought they were the same.3 As for C. cibarius, current knowledge suggests that it is strictly a European species, not found in North America at all.4

Continued study of genus Cantharellus has allowed us to identify three species that grow in this province. The one we thought might be C. roseocanus turned out to be a novel species, Cantharellus enelensis, named after our province (en-el-ensis = N-L-ensis = NL-dweller), where it is very common, but extending in lesser numbers as far west as Michigan and Illinois. Two other species have also been found here, C. camphoratus, described 40 years ago from Nova Scotia,<sup>5</sup> and the European *C. amethysteus*. If true, this would be the first European species known in North America. The whole story has just been reported in an article in Botany.6 The story, parts of which you have heard at our forays over the years, is now presented in the following pages, beginning with a description of our three species.

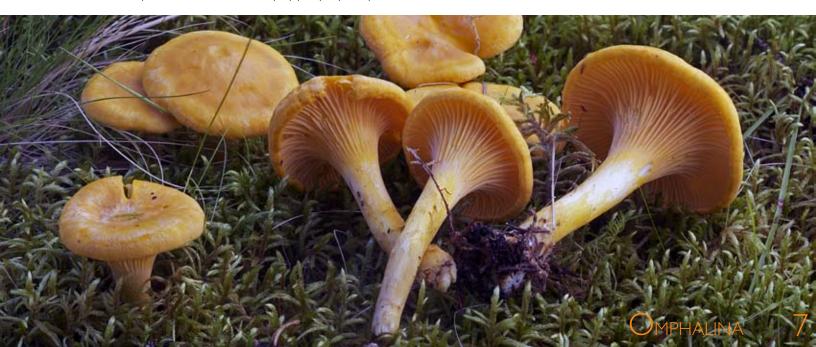


#### Cantharellus enelensis—the NL chanterelle

Macroscopic Pileus: 2–17 cm diameter, convex to flat to funnel shaped in age, and margin becoming wavy; finely pruinose with a whitish bloom, rarely pinkish; opaque, not hygrophanous; orange yellow; stains brown slowly and dries darker in exsiccata. Hymenium: narrow folds, close to moderately spaced, up to 5 mm deep; frequent forking, cross veining increasing with age, deeply decurrent; deep yellow to orange yellow, pinkish tinge in youth. Stipe: 0.4–1.2 x 3–7cm; even or tapered downwards; velvety; solid; orange-yellow, lighter yellow toward base, slowly stains brownish. Context: white with yellow borders; fruity smell mindful of apricots; taste mild to peppery. Sporeprint:

orangey yellow.

**Ecology** <u>Habit</u>: Single mushrooms forming fairy rings or groups, sometimes massive colonies, under mature *Picea glauca*, less often *Abies balsamea*, in well drained, sandy soil, growing among moss or fruticose lichen, more at the forest edge than deep in the forest. Rarely cespitose or fused. <u>Season</u>: end of July to end of September in 2–3 fruitings, peaking in August. Sporocarps may last beyond one month and seem to be very resistant to mold, slugs and insect larvae. <u>Distribution</u>: Very common throughout the coniferous boreal forest of Labrador and the Island, seemingly commoner and more abundant near the sea-shore.





#### Cantharellus camphoratus

MACROSCOPIC Pileus: 2–10 cm diameter, convex to flat to funnel shaped in age, with wavy margin; finely pebbly with small brownish scales; opaque, not hygrophanous; yellow; stains brown and dries darker in exsiccata. Hymenium: moderately to widely spaced folds, under 3 mm deep, up to 1 mm wide with blunt, round edges; wrinkled, sinuous, cross-veined and anastomosing, more so with age, deeply decurrent; light yellow, may have flesh coloured bloom. Stipe: 0.3–1.2 × 2–5 cm; tapered downwards; very finely velvety; solid; light yellow, white toward base, stains brownish. Context: white with yellow walls; smell of

apricots (we have not noted a camphor smell); taste mild to peppery. <u>Sporeprint</u>: whitish yellow.

**Ecology** <u>Habit</u>: Small fairy rings or groups, in sandy soil on small amount of duff, exposed or on low moss. Seemingly mycorrhizal with *Abies balsamea* and other conifers. Cespitose or fused growth not uncommon. Season: beginning of August, commoner in September. Lasts several weeks, quite resistant to mold, slugs and insect larvae. <u>Distribution</u>: Uncommon. To date documented in several small groups from many regions on the West Coast and Northern Peninsula of Newfoundland. Uncommon; massive colonies not known. Full extend in the province unknown.





#### Cantharellus amethysteus

MACROSCOPIC Pileus: 2–7 cm diameter, convex to flat to funnel shaped in age, wavy margin almost from the outset; opaque, not hygrophanous; yellow with lilac bloom (not often seen), forming small lilac scales with maturity; stains brown quickly and dries darker in exsiccata. Hymenium: nearly smooth to moderately wrinkled with short, shallow, round-edged folds seldom over 1 mm deep; forking with marked anastomoses, especially in age, deeply decurrent; light yellow. Stipe: 0.4–1.2 x 3–7cm; even or tapered downwards; smooth, solid; yellow, white toward base, stains brown quickly; fruitbodies often fused at the base, forming either multi-headed individuals or fusing entirely to form very robust stipes. Cap and hymenium often undeveloped in exposed fruit

bodies, resulting in a peg shape with an almost smooth hymenium, reminiscent of *Clavariadelphus truncatus*. Context: white with yellow walls; smell very pleasantly fruity, with hints of apricot; taste mild to peppery. Sporeprint: light yellow.

**Ecology** <u>Habit</u>: Scattered individually or in small to moderate groups, usually among leaf duff in moist, bare soil, with most of the sporocarp exposed above the ground. Seemingly mycorrhizal with *Betula payrifera*, possibly also *Alnus incana* ssp. *rugosa*. Lasts several weeks. <u>Season</u>: middle of August, commoner in September. Not as resistant to slugs and insect larvae, as the other species. <u>Distribution</u>: Uncommon. So far known from three areas on the West Coast, in birch forest. Massive colonies not known. Full extent in province unknown.





#### CANTHARELLUS CIBARIUS



#### CANTHARELLUS ENELENSIS THE NL CHANTERELLE



#### CANTHARELLUS CAMPHORATUS



#### **CANTHARELLUS AMETHYSTEUS**



Photomicrographs of spores (above) of our three species, compared to the European Cantharellus cibarius (top). Same magnification and scale. White line on top indicates  $10 \mu m$ . The

overall spore shapes of *C. enelensis* and C. camphoratus resemble that of the European *C. cibarius*. Spores of C. amethysteus are longer and thinner, often pinched in at the middle

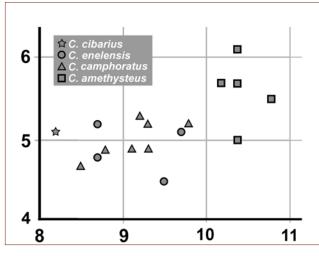
> and slightly bent, with different sized

dumbbell halves.

These pictures, sampling only one sporocarp of each species, suggest relatively clear differences in spore size and shape between the species. However, spore size varies so much that several sporocarps need to be examined

to get a reasonable range and average. Graph to the left shows average spore sizes for sequence-identified collections, measured by one observer (RLB) to reduce interobserver error. Cantharellus cibarius had the shortest spores, but we only had two collections, and many European texts describe somewhat bigger spores for this species.

The top three are unlikely to be differentiated by spore measurement. Only Cantharellus amethysteus has clearly longer spores, with somewhat odd shapes, but even here the range is wide, so that many spores need to be measured. The average Q (length divided by width, an indicator of shape) was 2.3, usually over 2.0, but on occasion as low as 1.5-1.6.

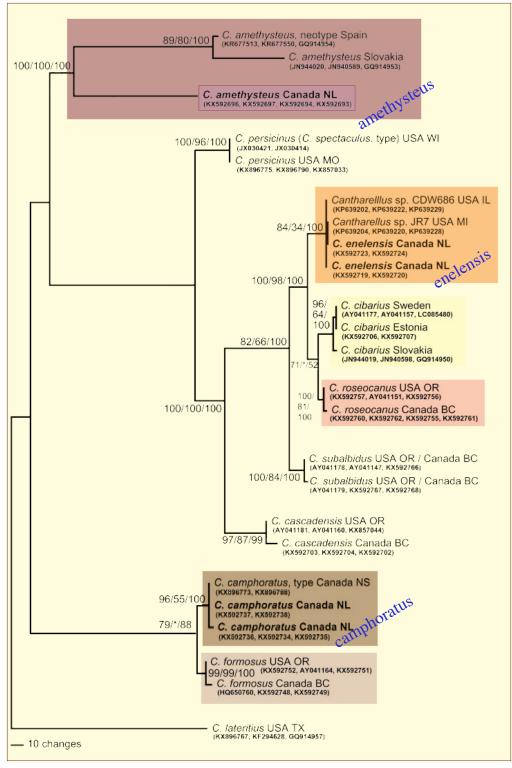


Pruned phylogenetic tree rooted in *Cantharellus lateritius*, showing our three species among their kin.

In the middle is *C. enelensis*, on a sister branch to the branch from which arise the European *C. cibarius* and the Pacific coast *C. roseocanus*. All three resemble each other both macro- and microscopically. The lowest branch holds *C. camphoratus* as a sister to *C. formosus*, state mushroom of Oregon.

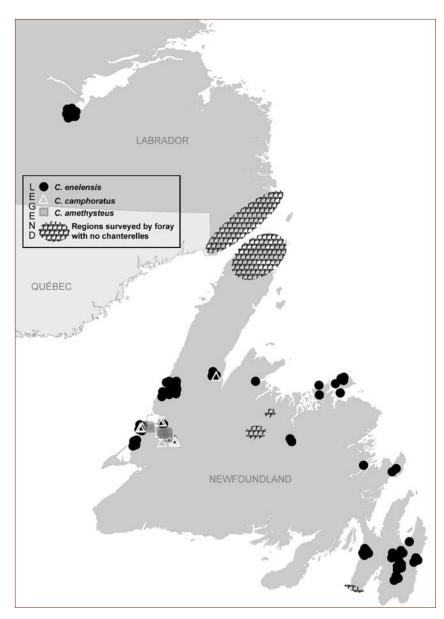
The upper panel shows C. amethysteus. Note that ours seems to sit on a separate branch from *C. amethysteus* of Europe. Initially we considered them as separate species, but the base pair differences between the European and Newfoundland collections were neither great enough nor consistent enough to garner sufficient statistical support to be considered separate species. For this reason we reported them as the same (conspecific).

Interpretation of such differences is an art—in a different context, the same finding may have a different meaning. In the case of sympatric collections, where genetic mixture may be assumed, such a difference would be considered a mere genetic hiccough of no import. But living an ocean apart, with little opportunity for genetic mixing, such small differences are much more likely to be real, indications of real evolutionary changes in response to different habitats. To date there are no



other European chanterelle species known in North America, and the likelihood that the central European *C. amethysteus* is the first, setting foot in Newfoundland, may seem a bit of a stretch. The populations are very disjunct, there are no similar occurrences in the genus, the two habitats differ significantly, and so does their macromorphology.

How could this be determined with some certainty? Two ways. You could analyze sequences from different DNA loci, which may show the differences more clearly. Alternately, you can wait a few thousand years for evolution to run its course, at which time it should all be clear either way. The second way is cheaper.



Distribution of chanterelles in our province. Not surprisingly for mycorrhizal mushrooms, chanterelles were not found on surveys of non-forested barrens and ericaceous heaths. More surprising was not finding them in two of our few red pine forests (smaller hatched areas in central NL), particularly because elsewhere they are known as pine partners.

So far, *C. amethysteus* is only known from three sites in the Bay of Islands region. *C. camphoratus* is known from five sites in the Bay of Islands regions as well as from the lower part of Main River.

Cantharellus enelensis, the NL chanterelle, is found throughout the forested areas of the Island. In Labrador, one of the biggest and most productive places is on the Canadian Forces Base in Goose Bay. We did not find any chanterelles in northern Labrador, at Konrad Brook, although the valleys were abundantly forested with black and white spruce on sandy soil. Elsewhere on the continent it has been documented as far as Michigan and Illinois, but given the amount of collecting and study, the numbers seem low; the species may not do as well in regions with greater diversity of chanterelle species.

#### Comments

As many species in the order Cantharellales, basidia of our species had 4–6 sterigmata, four being the commonest for all three. The uncommonly wide variation in spore size may be a factor of basidial sterigma number. Observations with other genera (e.g. Lichenomphalia, where sterigma count may vary from one to four in a single species) show that the more sterigmata, the smaller the spores. Thus, variable sterigmal numbers may contribute to the wide amplitude in spore size.

A word about aberrant sporocarp shapes: shallow ridges, and peg-like, cespitose or fused fruit bodies. These features seem very common with *C. amethysteus*, reasonably common with *C. formosus*, and uncommon with *C. enelensis*. It seemed that these features were related to environmental factors. In our

admittedly limited experience, C. amethysteus grows in the most exposed situation, usually on bare earth or thin layer of leaf litter, with no moss, lichen or grass to "protect" the developing hymenium. Possibly in these situations, periods of heat or wind during early growing may arrest cap development. Peg shaped fruiting bodies with a flat hymenium or multicephalic and fused sporocarps were very common in such habitats. One population, found in a more protected environment of moss, had more specimens with more "normal" hymenium. C. camphoratus seems to prefer low moss or thin duff, so that it is not as exposed as C. amethysteus. Not surprisingly, aberrant shapes are less common among C. camphoratus. Aberrant shapes are least common with the NL chanterelle, which seems to seek out regions with high moss or fruticose lichens. However, we have seen regions where C. enelensis also exhibits these irregular shapes (e.g. Burnt Hill in Norris Point); in these locations the fruit bodies are also above any protective layer.

Like most chanterelles, ours all have an unmistakable smell reminiscent of apricots. *C. enelensis* is the most pungent and obvious. *C. amethysteus* smells more delicate, fruity, complex and sweet, and *C. camphoratus* has the least fruity smell of the three. These differences are subtle, and probably not evident unless comparing specimens of same age and freshness side-to-side. At first, the lack of a camphor smell fooled us into rejecting *C. camphoratus* as a possible identification for this mushroom, something we only corrected thanks to knowledgeable reviewers of our scientific report.

The biggest surprise was provided by *Cantharellus amethysteus*. Our first collections had no hint of violet, so that we recognized it as different, but not as a violet species. Only after we found that its DNA was close to *C. amethysteus*, did we begin to look for violet colour. It took three seasons to find some mushrooms with violet scales on the cap, not a very commonly seen character of our mushroom! Up to now the DNA of lilac chanterelles identified as *C. amethysteus* in North America has formed a separate cluster, recently described as a new species, *C. lewisii.*<sup>4</sup> We suspect that ours will turn out a spearate but close species to the European one in time. See the caption to the phylogenetic tree for a discussion of the possible status of our violet species.

A few years back, FNL passed a motion at its Annual General Meeting to ask our provincial government to name what we have called **The NL chanterelle**, as our provincial mushroom. Now that we know it is a unique species, new to science, named after our province—known as such all over the world—this suggestion seems even more appropriate. We have approached the current government with this request.

#### Acknowledgments

Science does not happen in a vacuum. Please see the original publication for the list of the host of people and organizations (including FNL), who helped realize this study. For our special chanterelle issue we also owe thanks to Glynn Bishop and Michel Savard for providing added levels of enjoyment to the subject.

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This story is making the news in major publications all over the world. It started off as 547<sup>th</sup> page news in Botany, then catapulted up to a small corner at the bottom of page 8 in the Western Star (illustrated), daily newspaper of the good burghers in and around Corner Brook, centre of the region from which most of our specimens came (and where this year's foray is headquartered), and, finally, zoomed to its deserved prominence in Omphalina, with a cover photo, special art and bilingual poetry, and treatment as the proper front page news that it really is.



fort is still being made, but a Newfoundland chanterelle has finally been recognized as unique by the scientific world. According to "Botany," a scientific journal published by NRC Research Press, the species of chanterelle found only on the island, and different from other more common species found on the island, has officially been given the scientific name, Cantharellus enelensis. The word enelensis is made up of the phonetic pronunciation of N-L, specifying Newfoundland, and the word "ensis," which means "from."

## Key to our species

		CANTHARELLUS			
		enelensis	camphoratus	amethysteus	cibarius (European)
growth		single	single, cespitose or fused	often cespitose or fused	single
height		20–170 mm	10–85	30-85mm	
overall shape		"typical chanterelle",' very rarely like a peg	"typical chanterelle", occasionally like a peg	often like a peg, many fused multi-headed ones	"typical chanterelle"
colour		orange-yellow	yellow	yellow	yellow
сар	shape	round, smooth, wavy with age	round, becoming wavy	scalloped edge, crinkly from youth	round, becoming wavy
	bloom	off-white to weak orange- pink	whitish	whitish to weak lilac	whitish
	skin texture	whole, thin	brownish scales	lilac to brown scales	whole, thin
	diam. (mm)	20–160	15–85	10-70	20–100
hymenium	fold shape	folds sharp and deep like gills; straight	shallower; wrinkled	shallow to flat or absent; wrinkled; much anastomosis	like gills; straight
	colour	orange with pinkish cast	pale to lemon yellow	pale to lemon yellow	pale to lemon yellow
	forking	common	very common	very common, if	common
spores, fresh specimen	shape	pip to very short sausage	pip to very short sausage	developed small, curved sausage, pinched in at the waist	pip
	proportion	twice as long as wide (Q=2.0)	less than twice as long as wide (Q=1.6)	more than twice as long as wide (Q=2.3)	less than twice as long as wide (Q= 1.6)
	size (μm)	6.7-10.6 x 4.3-5.8	8.7–9.6 x 5.3–6.3	9.6–12.5 x 3.9–5.8	6.7–8.7 x 3.9–5.8
tree partner		white spruce, less often balsam fir	balsam fir, less often spruce	birch; possibly alder; possibly even balsam fir	conifer

Table with the differentiating characteristics of our three species, compared to *C. cibarius*, the European mushroom with which they were confused initially.

The pictures show "classical" features (pinkish cast to C.

enelensis, brown scales on *C*. camphoratus, lilac scales on *C*. amethysteus). These are rarely seen in NL, so please check the descriptions and other pictures for a closer representation of what you might find in Newfoundland and Labrador.

If you suspect that you have a species other than the **NL chanterelle**, this table should enable you to identify your find. If you are collecting for food and are still not sure, do not despair: all are edible and equally delicious!

# The Bishop's Sketchbook

















#### **CANTHARELLUS ENELENSIS**

Chanterelle de Terreneuve NL Chanterelle

Papillon, nuage, champignon. Chenille, orage, moisissure. Passages du sublime.

\*

Butterfly, cloud, mushroom.
Caterpillar, thunderstorm, mold.
Splendid impermanence.





In a previous issue of OMPHALINA (vol. VIII, no. 1), we described how three boxes of unidentified lichen specimens came to the Agnes Marion Ayre Herbarium in St. John's, NL, who collected them, and why we were asked to identify the specimens fifty years later. Here we describe three psychrophilic (cold-loving) lichens commonly found in Northern North America. All three were found at the 2016 HV Foray. P-M collection photo L, in situ R.



#### Nephroma arcticum (L.) Torss.

Commonly known as arctic kidney lichen, N. arcticum is a large, relatively fast growing foliose lichen with a circumpolar arctic-boreal distribution, found on humus soils and bryophyte covered rocks in northern forests.1 Thallus lobes can be very broad (up to 30mm wide), flattened or irregularly wrinkled without soredia or isidia. Transplant experiments have shown its ability to acclimate to environmental change.2 Size and colour varies with altitude: at higher altitudes, it is smaller and yellowish-green,

while at lower altitudes it is larger and bright green. It is a tripartite lichen (made of 3 parts): fungal component, green algae (Coccomyxa sp.) and cyanobacteria (Nostoc sp.). The cyanobacteria are contained within cephalodia below the green algal layer, creating broad, flat grey bumps on the upper surface of the thallus. The lack of carbon-based secondary compounds in the cephalodia makes them appropriate food for slugs, and in turn, the green algae are protected against grazing.3



## Umbilicaria hyperborea var. hyperborea (Ach.) Hoffm.

*Umbilicaria hyperborea* is an umbilicate foliose lichen, attached to the substrate only at a central point. Its somewhat unorganized appearance and habitat preference bring about its common name, blistered rock tripe. It is often found on exposed horizontal siliceous rock surfaces, such as boulders or cliff outcrops. The thallus is medium

to dark brown with a slightly uneven to strongly verrucose upper surface. Apothecia are common, representing a key identifier due to the unique structure of complex ridges on slightly raised disks, growing either individually or adnate (several fused together). A cold-loving species, it has a fairly northern distribution throughout Europe, Asia and North America, or higher altitudes in warmer latitudes, like Mexico and Australia.



#### Tuckermannopsis americana (Sprengel) Hale

The genus *Tuckermannopsis* was introduced by Gyelink (1933) who distinguished it from *Nephromopsis* by the absence of pseudocyphellae on the lower surface. The upper surface of *Tuckermannopsis* americana is dark in colour, either brown, blackish, or olive-green. The lobes are short, with margins bearing long, slender cilia averaging 3-6 mm in length. When the thallus is broken, the white medulla can be seen, and glows whiteish-blue under ultraviolet light. It is commonly found growing on trees, especially conifers, in open lowland forests in Northern North America.

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## THE MAIL BAG

OR WHY THE CARRIER PIGEONS ASSIGNED TO SERVE THE LAVISH CORPORATE AND EDITORIAL OFFICES OF OMPHALINA GET HERNIAS





In your last issue you showed a photo of a small morel near your house. Here are just a few beside our house.





In your last issue you showed a photo of a small morel near your house. Here are just a few near our house.

Geoff Thurlow

Michael Burzynski

Ed note: Possibly related to the long, cold winter, heavy snow, or delayed spring, this was the most morel-depauperate spring on record around our place, and elsewhere I looked. But not for everybody. Clearly, something is fishy with the above letters. First, the similarity of the message is inescapable, suggesting collusion. The large size and generous quantities, described as "just a few", suggest obvious gloating. Finally, it hit me: both come from officers of FNL, the Treasurer with Morchella importuna on the left, and the President with Morchella laurentiana on the right. Obviously, the executive class have access to some morel graft. At least one also has access to some Barsac, a fine bifungal product in its own right. The lesson: sit on the Board, and you get all the mushrooms you want, even in the worst years. Think about it. The Annual General Meeting takes place at the Foray. Come there, stand for office, and next year you, too, could be reaping the benefit of executive morel turpitude. It seems to pay to serve. Why not get in on it?

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