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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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COVER

Pregnant female caribou (*Rangifer tarandus*) in February. The antlers of females are small and one or both may fall off in the winter. She will lead her herd to its calving grounds to deliver in three months. Females make up and lead the herd. Males, one per herd, are for show—the original trophy male.

In the winter they paw the snow to reach lichens, which form their main diet. They then root around with their nose. A nose covered with snow is a usual winter picture of feeding caribou. When it swells and gets red, they get to lead Santa's sleigh.

Background: reindeer lichen (*Cladonia arbuscula*), blurred to avoid competing with the cameo.

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CONTENT

Message from the Editor

Merry Christmas and happy new year to you all! The best of the spirit of these holidays to you, whether you observe them or not.

One of our long term goals was to review the reindeer lichens (caribou moss), and what more suitable time than the Christmas issue? It is a real gift to have it done by one of the world's experts on the group, aided by one of our own lichen enthusiasts. This review is especially appropriate for us, because one, *Cladonia terrae-novae*, is named after Newfoundland.

Even people who have no interest in nature should be familiar with species that are named in honour of their own land. We had hoped that *Cladonia labradorica* would also be reviewed here, but learned that although it resembles the reindeer lichens to an untrained eye like ours, and may be eaten by equally untrained caribou, taxonomically it is not part of this group, so the Big Land will have to wait for another opportunity. Both species were described by Teuvo Ahti, so we can expect knowledgeable and fatherly treatment.

The remaining issue continues in the festive spirit. We offer you a choice of three colourful goblets to toast the new year, and our own native candles to light your evenings during the holidays and through the dark season. Of course, there are a few delicacies to add glamour to receiving family and friends, and then we have Henry Mann close with a rousing chorus of "Oh, Christmas tree."

Two additions to our website inside one set of covers: we have had several requests for a running index over the years, especially of species described in Omphalina. We finally got an index together, listed by species, topic and author. This can be found on our website. Another ongoing discussion has been with contributors about the need for guidelines for authors. A preliminary tentative set has also been put together. Both are inside a single pair of handsome covers from our first few issues. The guidelines will be updated as required, the index after each volume.

*

We thank Michael Burzynski for the picture on the back cover. Yes, it is true: both the date and site of our 2014 foray are under review. The photo may be a hint of a change that may or may not be in store. It also creates a certain symmetry: caribou—look for it—on the front and back cover. We expect a firm announcement of foray date and time in the next issue.

*

Finally, are you still at a loss for a few Christmas presents? If the intended recipient is curious, young, or interested in nature, you won't do better than Jens Petersen's The kingdom of Fungi, reviewed in Omphalina 4(6):10. Not an ad or a plug (we do not know the author), just a good tip.

*

And thus we put to bed our fourth volume.

Happy mushrooming 2014!

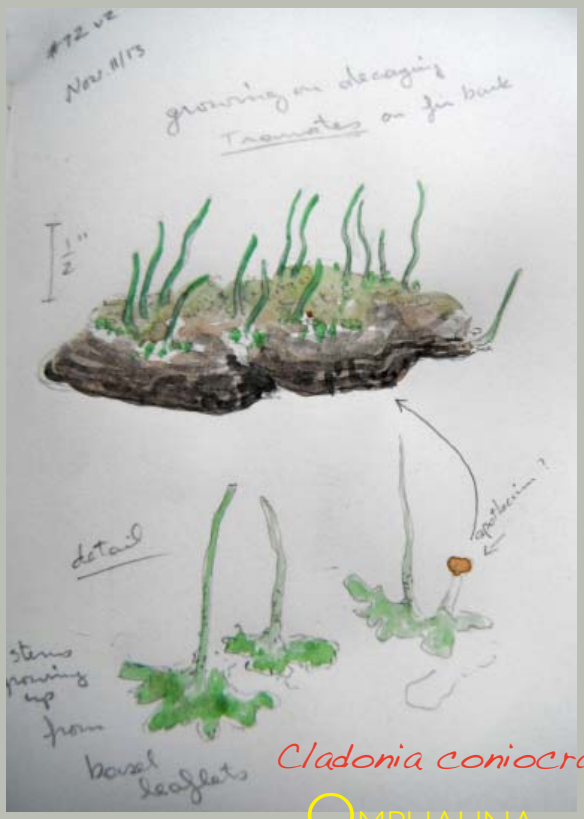
andrus

Merry Christmas and Happy New year!

The Bishop's Sketchbook

Cladonia maxima–also eaten by caribou in Newfoundland.

Reindeer lichen
Cladonia arbuscula



Cladonia coniocraea

Teuvo Ahti
John McCarthy

Reindeer lichens of Newfoundland and Labrador

Photo: Red Wine caribou herd, Urve Manuel

Caribou and their Scandinavian and Russian relatives, the reindeer, feed on lichens, particularly in wintertime. They do not eat all kinds of lichens, and most lichens are actually too small or sparse to feed these big mammals. In Newfoundland and Labrador, caribou frequent areas with sufficient lichens on the ground to paw them in winter for food. Only reindeer lichens ("caribou mosses"; *Cladonia*) are normally abundant enough in these feeding craters, particularly *Cladonia mitis* and *Cladonia rangiferina*, although many other species such as the true Iceland lichen (*Cetraria islandica*) and the crinkled snow lichen (*Flavocetraria nivalis*) are consumed in smaller amounts.[1,2] Terrestrial lichen species most frequently identified in Newfoundland caribou rumen samples include *C. rangiferina*, *C. mitis*, *C. arbuscula*, *C. stellaris* and *Cetraria islandica*.[3] In addition to ground lichens, caribou also eat some arboreal lichens growing on trees, primarily blackish species of *Bryoria* (horsehair lichens) and the greenish *Alectoria sarmentosa* (witch's hair or the so-called "maldow").[3]

The taxonomy and nomenclature of reindeer lichens have experienced a number of changes in recent decades, and the status of all species is still not fully clear. Newfoundland has played a considerable role in the development of this taxonomy, since one of us (TA) made his first caribou lichen survey here in 1956,[1,4] and followed this up with a world monograph of this group.[5] He and others have published numerous additions and corrections to the 1961 monograph. TA did not do field studies in Labrador, but his Finnish countryman and teacher, Ilmari Hustich, has published an overview of the very extensive lichen woodlands of central Labrador-Ungava.[6] For a few decades, the reindeer lichens were recognized as a distinct genus, *Cladina*, but recent molecular studies have shown that it should be included in the large genus *Cladonia*.[7,8] A fresh treatment of most of the Newfoundland and Labrador species is found in Nordic Lichen Flora.[9]

Thousands of collections of Newfoundland and Labrador lichens, including *Cladonia* species, exist in major herbaria, especially in Ottawa, Munich, Helsinki, New York, and St. John's. Some *Cladonia* species are widespread and easy to identify, while others have a limited distribution or can be difficult to identify. We recognize eight species of reindeer lichens in the province, which we describe below. Our report is meant to augment Mac Pitcher's poster on reindeer lichens of the province.[10] Common names are taken from Brodo et al.[11] or Hinds and Hinds,[12] but some new ones are introduced.

Refer to the glossary when reading about individual species, and refresh your memory of general terminology published by Michele Piercy-Normore.[13] A key is provided at the end.

GLOSSARY

Apothecia (s. apothecium): Fungal reproductive structures, containing the spore forming tissue.
Arcuate: Curved like a bow.
Cortex: Outmost layer of a thallus consisting of tightly compressed hyphal cells.
Divaricate: Branching or spreading widely from a point.
K: A solution of 10% potassium hydroxide (KOH) in water; gives a yellow reaction depending on the presence of certain secondary metabolites in reindeer lichens.
Medulla: Inner layer of a thallus, made up of relatively loosely interwoven fungal hyphae.
PD: Paraphenylenediamine. Usually used as several crystals dissolved in strong ethanol; gives a yellow through orange to red colour reaction with various metabolites.
Podetia (s. podetium): upright simple or branched stipes (stalks) formed from apothecial tissue. Usually capped by coloured apothecia.
Pycnidial: refers to pycnidia (s. pycnidium), small, immersed, flask-shaped structures that contain special spores (conidia) functioning in sexual or vegetative reproduction.
Scyphose: Cupped.
Squamulose: A lichen growth form characterized by aggregations of crowded squamules or small, scale-like thallus lacking a lower cortex or rhizines (root-like hyphae that anchor the lower surface of foliose lichens to a substratum).
Stereome: Tough cartilaginous cylinder forming the supporting tissue for Cladonia species.
UV: Ultraviolet light. Some lichen compounds respond vividly to ultraviolet light by producing various colours. With reindeer lichens the UV+ reaction is always due to the presence of perlatolic acid.
Verruculose: With wart-like growths on the surface.

Editor's thanks

Although John McCarthy made a special effort to capture as many of these species as he could this past summer, when this article was put together, the authors were still short some species. Many thanks to Urve Manuel, Stephen Sharnoff, Roger Smith, Soili Stenroos and Einar Timdal for their contributions, all graciously given at no cost to Omphalina. *The work of some of these artists/photographers can be enjoyed (possibly even bought) at these websites, the last two well-known to all with an interest in lichens:*

Urve Manuel: <http://astonesthrowglass.wordpress.com/>

Stephen Sharnoff: <http://www.sharnoffphotos.com/lichens/lichens_home_index.html>

Einar Timdal: <http://nhm2.uio.no/botanisk/lav/Photo_Gallery/>.

Photo: Roger Smith

***Cladonia arbuscula* – Reindeer lichen**

Internationally, this is a somewhat problematic species (known as *C. sylvatica* in the early literature). In Newfoundland, the problem is whether it is distinct from *C. mitis* (see discussion under *C. mitis*). Traditionally, after the 1930s, the two species have been differentiated by a color test: if a drop of *para*-phenylenediamine applied to the lichen produces an orange-red reaction (is positive, or PD+), it is *C. arbuscula*, and if not (PD–), it is *C. mitis. Cladonia arbuscula* tastes bitter when chewed, whereas *C. mitis* tastes mild (mitis = mild), but this difference is not always obvious. The author of *C. mitis*, the German lichenologist Heinrich Sandstede, was a baker and could no doubt recognize the taste more accurately!

Cladonia arbuscula is more robust, with denser and more ”combed” (unilaterally deflexed) top branching. Ahti mapped this lichen’s distribution in Newfoundland,[1] and found that *C. arbuscula* is more abundant in coastal conditions and bogs, whereas *C. mitis* is dominant at higher elevations and generally more prevalent throughout the island’s interior; it is also more frequent in the extensive lichen woodlands of Labrador. Based on molecular analyses, Piercey-Normore et al. confirmed that *C. mitis* is monophyletic, but nested within the variable *C. arbuscula.*[8]

In recent lichen lists, the eastern North American *C. arbuscula* is often referred to as subsp. *squarrosa.* This is because the type specimen of *C. arbuscula* (from Thuringia, Germany) deviates chemically from the majority of *C. arbuscula* by containing psoromic acid, and is therefore largely regarded as a distinct subspecies. In the absence of molecular evidence, Ahti & Stenroos suggested that for the time being, the type strain should be regarded as a local chemotype of subsp. *arbuscula* rather than as a distinctly named taxon.[9] Thus, subsp. *arbuscula* has a wide distribution in the world. (If subsp. *squarrosa* is recognized as distinct, its correct—earlier—name at subspecies level is actually subsp. *beringiana*, synonymized with molecular evidence by Piercey-Normore et al.[8])

Photo: Einar Timdal

***Cladonia ciliata* – Thin reindeer lichen**

This is the rarest species of reindeer lichen in Newfoundland (known earlier as *C. tenuis*). In eastern North America it is only found on treeless heaths on the south coast of the Avalon Peninsula, e.g., around St. Bride's (see Ahti's map, Fig. 3c).[14] It is clearly oceanic in distribution, being also present on coasts of Europe and the North Pacific (e.g., British Columbia).

It is very slender and green, with strongly deflexed brown tips. The species has two color forms: the yellowish-green forma *flavicans* is the only one present in Newfoundland. The forma *ciliata*, which is ashy gray (the pigment usnic acid absent), has been reported, but these records are now considered to represent *C. oricola*.

Upper photo shows *C. rangiferina* on the left and *C. ciliata* on the right. Right photo shows *C. ciliata* in greater detail. Photos taken in Norway.

Photo: Einar Timdal

Photo: Stephen Sharnoff

Photo: Stephen Sharnoff

Photo: Stephen Sharnoff

***Cladonia mitis* – Green reindeer lichen**

Currently this species is often treated as a subspecies of *C. arbuscula* (see discussion of *C. arbuscula*), usually as ssp. *mitis*, but investigation of the taxonomy of the *Cladonia arbuscula* group is still going on. Despite reports that the chemical distinction between *C. mitis* and *C. arbuscula* does not always hold,[15] and that *C. mitis* is nested (as a monophyletic subclade) within *C. arbuscula*,[8] Ahti is convinced, based on 60 years of observation, that these taxa are distinct and can be separated with relative ease.

The earliest subspecific epithet for the species is subsp. *subsylvatica,* never used since its description from Brigus, Newfoundland, by Stirton.[16] The mild-tasting, slender and hardly "combed" *C. mitis* is extremely common in Labrador and interior parts of the island of Newfoundland (and throughout boreal and arctic Canada). It is a more important forage lichen for caribou than the bitter-tasting *C. arbuscula* sensu stricto—although the taste difference may not be important for caribou.

Photos from continental North America.

Photo: Soili Stenroos

***Cladonia oricola* – Coast reindeer lichen**

This is the newest member of the reindeer lichen group in Newfoundland, recently described by Ahti and Stenroos.[17] The type specimen is from the Hawke Hills on the Witless Bay Line, Avalon Peninsula. On first meeting it in 1956, TA suspected that it might be a different entity, and is glad to note that it has been found to have purple jelly in its pycnidia; otherwise the secondary chemistry and color of dying base resembled that of the somewhat similar-looking *C. rangiferina.* It is more slender and pale-coloured than *C. rangiferina* and strictly coastal in distribution. Its range is still unknown, but it is abundant throughout much of the Avalon Peninsula. Elsewhere it seems to be restricted to the Maritimes and New England, and is very abundant on the southeast coast of Nova Scotia.

Type specimen from Hawke Hills on the Avalon Peninsula, right; upper photo from Trepassey, NL.

Photo: Soili Stenroos

Photo: John McCarthy

Photo: Roger Smith

***Cladonia rangiferina* – Gray reindeer lichen**

This is the only reindeer lichen species which was recognized by Linnaeus (or, he actually included all the others under this same species, in part as varieties). It is usually easily recognized by its grey to bluish color (embrowned at tips), although the branching system is similar to *C. arbuscula* and *C. mitis*, its common associates in vegetation. *Cladonia stygia* and *C. oricola* have the same color, but are much less common and abundant. From the Gaff Topsails, in Central Newfoundland, Ahti described *C. conspicua*, also found in Europe, a similar species with hardly any brown color at the tips, and branching resembling that of *C. stellaris*.[18] However, for now we have decided to view it as an occasional variant of *C. rangiferina* and not as a distinct taxon. Upper photo beside *C. terrae-novae* on the right.

Photo: John McCarthy

Photo: John McCarthy

***Cladonia stellaris* – Star-tipped reindeer lichen**

This is the best-known reindeer lichen (earlier known as *C. alpestris*) that forms dense, broad, semiglobose, greenish-yellow heads. Because of its beauty, it is collected commercially for export in Scandinavia and Finland. It is used for ornamental wreaths in cemeteries in Germany and other countries, and for architectural tree models. It is common in Newfoundland, especially in old lichen woodlands, but thrives less in coastal environments. It may be the dominant ground cover organism across extensive areas of Labrador. Its postfire regeneration is much slower than that of the other species, and it does not stand regular, annual grazing by caribou. In those situations it is often replaced by other species of reindeer lichens. Some authors have recognized a segregate of *C. stellaris* containing psoromic acid (PD+ golden yellow at branch tips) as a distinct species, *C. aberrans*. Although only based on secondary chemistry, the variant has a distinct range, mainly on coasts of the North Pacific (common in Alaska), and is also rarely found in Labrador. However, because there is no molecular support for this variant, we regard it as a chemotype without taxonomic name.

Photo: John McCarthy

Photo: John McCarthy

Photo: John McCarthy

***Cladonia stygia* – Black-footed reindeer lichen**

This species was not recognized until the 1980s.[19] It is rather similar to *C. rangiferina* but the dead basal parts turn coal black (first inside) and in general the color is darker (best seen in mixed colonies). The jelly in its pycnidia is bright purple—a rarely seen microscopic diagnostic character. It is fairly common in the province, growing mainly in bogs, often as the dominant reindeer lichen, but can also occur on drier ground.

Photo: John McCarthy

***Cladonia terrae-novae* – Newfoundland reindeer lichen**

This species was ”discovered” in Newfoundland, the type specimen being from Long Pond on the Burin Peninsula Highway west of Swift Current.[1,5,20] Terrae-novae refers to Newfoundland, of course. This species is recognized by its semiglobose podetia, reminiscent of those of *C. stellaris,* but they are not as regular and appear as if curly in configuration. In moist conditions, it is more green than whitish. This is a common coastal species (inland occurrences in open bogs) in Newfoundland (map, fig. 4D)[14] up to the Great Northern Peninsula and extends southwards to New Jersey, being endemic to eastern North America. A special feature of the species is that it is occasionally ash-grey, lacking the yellowish pigment usnic acid. This is clearly a genetic color form, which has been named forma *cinerascens* and in small patches may be the dominant ground cover in some bogs.

Photo: John McCarthy

Key to Reindeer Lichens and Similar Species in Newfoundland and Labrador

1. Podetia with a cortex; surface compact, usually somewhat shiny; very young stages squamulose.... 2

1. Podetia without a cortex; surface minutely fibrose, hardly shiny; never squamulose 4

2. Podetia straw-yellow, with spiny branchlets, branches usually in whorls of 2 to 4, sometimes mainly dichotomous, never scyphose; top branchlets only slightly brown 3

2. Podetia greenish-yellow, with thin, at tips arcuate branchlets, tips often scyphose; top branchlets conspicuously brown ..... (***C. amaurocraea***)

3. Podetia mainly dichotomously branched, very slender but in dense tufts; medulla UV+ white (squamatic acid); mainly in bogs of Avalon Peninsula. ..... (***C. unicalis subsp. biuncialis***)

3. Podetia mainly in whorls of 2 to 4, surrounding a hole, slender to robust; medulla usually UV- (squamatic acid absent, rarely present); common ....(***C. uncialis subsp. uncialis***)

4. Podetia appearing inflated, moderately branched, 3-11 mm thick, sometimes scyphose; coastal, alpine or open bogs .....(***C. boryi***)

4. Podetia slender, not inflated (though hollow), richly branched, 0.5-2 mm thick, never scyphose but tips slender 5

5. Podetia yellowish-gray, forming broad, rounded, densely branched cushions; distinct main stem absent; extreme apical tips with whorls of four (rarely three, five or six) divaricate branchlets around an open hole; PD- (rarely yellow at very tips, when psoromic acid present), UV- white (perlatolic acid); widespread .....***C. stellaris***

5. Podetia yellowish or ashy grey, slender, less branched, distinct main stem present at least towards the base; PD+ orange-red or PD-, UV- or UV+ 6

6. Podetia yellowish-gray, upper parts densely branched but main stem distinguishable in lower part; surface of podetia clearly rough or bumpy; podetial axils often closed; tips divaricate or often unilaterally bent; PD-, K+ yellow (atranorin); mainly coastal .....***C. terrae-novae***

6. Podetia yellowish to ashy gray, slender, main stem obvious throughout 7

7. Basal (necrotic) parts of stereome (inner medulla) blackened (melanotic), otherwise ashy or pale gray to dark brown; pycnidial jelly red; mainly in bogs ....***C. stygia***

7. Podetia not strongly blackened but pale at base . 8

8. Podetia ashy or pale gray, never yellowish (usnic acid present) 9

8. Podetia yellowish-gray (usnic acid present) 11

9. Podetia ashy (silvery, whitish) gray, slender, tips mainly 4-tomous, often bent in one direction; PD+ orange-red (fumarprotocetraric acid), K+ yellow (atranorin), UV- 10

9. Podetia ashy-grey, densely branched, tips mainly 3-tomous, curly; stem obvious only in lower portion; PD-, K-, UV+ white (perlatolic acid); rare, in bogs ... .***C. terrae-novae f. cinerascens***

10. Podetia slender, very pale gray, but upper portion somewhat brownish, with long (often > 1 cm) internodes; tips clearly deflexed; tapering into thin, pointed tips; surface somewhat compact, verruculose not softly fibrose; pycnidial jelly red; south coast ....***C. oricola***

10. Podetia slender to robust, silvery, bluish, pale or brownish grey, with shorter internodes; tips deflexed or erect; extreme tips not much tapering; surface of extreme tips softly fibrose; pycnidial jelly colorless; widespread and common .....***C. rangiferina***

11. Podetia very thin, predominantly dichotomous; apical branchlets strongly deflexed, conspicuously brown; PD+ brick-red; south coast of Avalon Peninsula .....***C. ciliata***

11. Podetia more robust, 3- to 4-tomous; PD+ red or PD- 12

12. Podetia with a rather robust main stem; head rather densely branched, branchlets bent in one direction (as if combed); tips clearly embrowned; P+ orange-red (rarely P-); very common, but more abundant on the coast than in the interior ....***C. arbuscula***

12. Podetia smaller and more slender, paper yellowish; tips less brown, less dense, less bent; PD- (usually rangiformic acid), rarely P+ orange-red; common in interior, scarce along coast .....***C. mitis***

References

1. Ahti T: Studies on the caribou lichen stands of Newfoundland. Annales Botanici Societatis Zoologicae Botanicae Fennicae 'Vanamo' 30(4): 1-44. 1959.
2. Bergerud AT: Relative abundance of food in winter for Newfoundland caribou. Oikos 25(3): 379-387. 1974.
3. Bergerud AT: Food habits of Newfoundland caribou. Journal of Wildlife Management 36(3): 913-923. 1972.
4. Ahti T: Newfoundland lichen stands and the wintering range of caribou. Newfoundland Department of Mines and Resources, St. John's, Nfld., 88 pp (mimeographed). 1957.
5. Ahti T: Taxonomic studies on reindeer lichens (*Cladonia*, subgenus *Cladina*). Annales Botanici Societatis Zoologicae Botanicae Fennicae 'Vanamo' 32(1): 1-160. 1961.
6. Hustich I: The lichen woodlands in Labrador and their importance as winter pastures for domesticated reindeer. Acta Geographica 12(1): 1-48. 1951.
7. Stenroos S, Hyvönen J, Myllys L, Thell A, Ahti T: Phylogeny of the genus *Cladonia* s. lat. (Cladoniaceae, Ascomycetes) inferred from molecular, morphological, and chemical data. Cladistics 18: 237-278. 2002.
8. Piercey-Normore MD, Ahti T, Goward T: Phylogenetic and haplotype analysis of four segregates within *Cladonia arbuscula* s.l. Botany 88: 397-408. 2010.
9. Ahti T, Stenroos S: Cladoniaceae. In Nordic Lichen Flora, Volume 5 Cladoniaceae. Eds: Ahti T, Stenroos S, Moberg R. Nordic Lichen Society. 2013.
10. Pitcher M: Caribou forage lichens of Newfoundland and Labrador. The Osprey 43(1): 3. 2012.
11. Brodo IM, Sharnoff, SD, Sharnoff S: Lichens of North America. Yale University Press, New Haven and London. 2001.
12. Hinds JW, Hinds PL: The Macrolichens of New England. The New York Botanical Garden, Bronx, NY. 2007.
13. Piercy-Normore M: Quick guide to lichen collection and identification. Omphalina 3(12):8-10. 2012.
14. Ahti T: Lichens. In Biogeography and Ecology of the Island of Newfoundland. South, RG, ed. Dr. W. Junk Publishers, The Hague. pp. 319-360. 1983.
15. Ruoss E: Chemotaxonomische und morphologische Untersuchungen an den Rentierflechten *Cladonia arbuscula* und *C. mitis*. Botanica Helvetica 97: 239-263. 1987.
16. Stirton J: On lichens (1) from Newfoundland, collected by Mr A. Gray, with a list of the species; (2) from New Zealand; (3) from the south of Scotland. Transactions and Proceedings of the Botanical Society of Edinburgh 14: 355-362. 1883.
17. Ahti T, Stenroos S: *Cladonia oricola*, a new coastal species of reindeer lichen in eastern North America. Abhandlungen aus dem Westfälischen Museum für Naturkunde 70(3/4): 405-410. 2008.
18. Ahti T: New species of reindeer lichens (*Cladina*). Annales Botanici Fennici 23: 221-227. 1986.
19. Ahti T, Hyvönen J: *Cladina stygia*, a common, overlooked species of reindeer lichen. Annales Botanici Fennici 22: 223-229. 1985.
20. Ahti T: Four species of Cladinae new to North America. Archivum Societatis Zoologicae Botanicae Fennicae 'Vanamo' 14(2): 129-134. 1960.

Photo: John McCarthy

Photo: Einar Timdal

Photo: John McCarthy

Photo: Stephen Sharnoff

Four Cladonia *spp. from the key, similar to reindeer lichens. Top down:* Cladonia amaurocraea, C. uncialis *ssp*. biuncialis, C uncialis *ssp*.. uncialis, *and* C. boryi.

Andrus Voitk

WHICH SPECIES of *MITRULA* DO WE HAVE in NEWFOUNDLAND?

Mitrula is a small genus of beautiful aero-aquatic (feet in the water, head in the air—most of the time) fungi, decomposers of organic matter in fresh water. In appearance they resemble candles, with white tapers on which the sporulating tissue (hymenium) sits like a bright yellow flame, with occasional orange and pink hues. In his 1977 review of the genus, Scott Redhead concluded that there were four species, two in Europe, *M. paludosa* and *M. borealis*, and three in North America, *M. elegans, M. lunulatospora* and *M. borealis*.[1] Two species have since been added in Europe and one in China, but in North America we still have only three names to fit onto our finds.

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

Title banner: Rocky Harbour bog, June 11, 2010. (Find: Henry Mann).

Range

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

Fruiting season

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

Macroscopic morphology

Macroscopically ours all looked similar (Figures 2-5), with no characters suggesting that we should expect more than one species. *M. borealis* and *M. lunulatospora* are smaller than *M. elegans*, and ours look

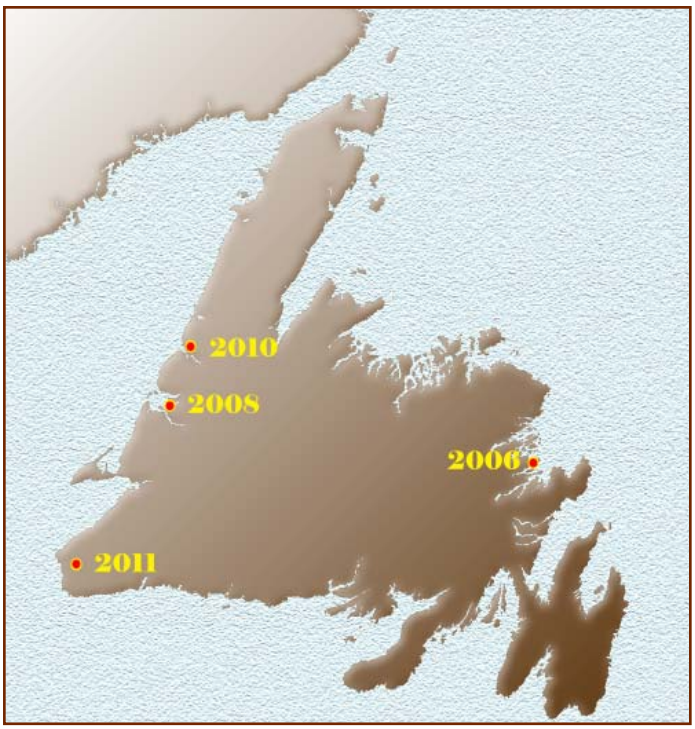


Figure 1 (above). Location and year of my four collections.

Figure 2 (below). Fen near Salvage, June 17, 2006.

Figure 3. Fen leading to Gillams bog, June 7, 2008.

Figure 4. Rocky Harbour bog, June 11, 2010. (Find: Henry Mann)

small, so size suggested that they might fit better with *M. borealis* or *M. lunulatospora* than *M. elegans*, no? Unfortunately, size was not documented accurately in the field, so that this is a guess, not a reliable character.

Microscopic morphology

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

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

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

DNA

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

each other. More work for the future…

Comment

Here the microscope made a clear decision, when other characters waffled from one species to the other. Small wonder, then, that often when you show a mushroom to a mycologist and ask what it is, she, giving it nary a glance, immediately puts a piece under the microscope to seek the answer. Some seemingly similar species are defined by their microscopic differences. They may differ macroscopically as well, but if they are encountered infrequently, we may not have a sufficient understanding of which characters are useful in separating them. Of distribution, fruiting time, habitat, substrate, size, and colour, only fruiting time seemed to be useful for identifying our species.

We may well have the other two species here also, because four collections are not an exhaustive survey. Therefore, please go out in our bogs and fens to look for these little candles. Should you find some, please take pictures, collect and dry them and let me know. Oh, and measure them.

Summary

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

References

1. Redhead S: The genus *Mitrula* in North America. Canadian Journal of Botany, 55:307-325. 1977.
2. Wang Z, Binder M, Hibbett DS: Life history and systematics of the aquatic discomycete *Mitrula* (Heliotales, Ascomycota) based on cultural, morphological, and molecular studies. American Journal of Botany 92:1565-1574. 2005.

Figure 5, below: Fen by Doyle's, June 12, 2011.

Three orange cups

Andrus Voitk

	Peak fruiting month	Sub-strate	Colour	Inside cup	Rim	Outside cup	Flesh	Stem	Spores
Aleuria aurantia photo this page	Sept	bare, disturbed, sandy ground	bright orange, blue-green staining	shiny, smooth	distinct, very finely granular	orange, very finely granular	brittle, thin, orange	none	oblong 16-24 x 9-11 μm
Caloscypha fulgens photo top next page	June	spruce duff	yellowish to deep orange	matte, wrinkled	wavy, often eaten	orange, granular, turns blue-green	brittle, thicker, light coloured	none	round 5-7.5 μm diameter
Geopyxis carbonaria photo bottom next page	May	burned conifer duff	bright orange, or tan to reddish brown	shiny, smooth	white, with obvious frilly fringe	same colour as inside, minutely granular	brittle, orange	distinct substan-tial stem (insert)	oblong 12-19 x 6-10 μm

Here are three cup fungi, all well over 1 cm in average diameter when mature—big enough for an abstemious New Year's toast. They may look similar on first glance, but the chart and pictures, show you that they differ in many ways. No longer should you confuse them. You do not need a microscope to tell them apart, or too many words to demonstrate their differences.


Photo: Aare Voitk


Photo: Henry Mann

The empty skillet

CREAMED CHANTERELLE SOUP

Robin McGrath

Most soups rely for their quality on the stock from which they are made. Bouillon from cubes or a packet may do in a pinch, but for really good soup, make the stock from scratch. If you are concerned about your waistline, you can substitute milk for the cream in this recipe but you may wish to thicken it with a little cornstarch. If you like a thicker soup, you can grate a potato into the stock when you add it to the onions. Fresh Newfoundland chanterelles, picked in Goose Bay, Labrador, were used. Most fresh or frozen sautéed wild mushrooms can be substituted for a different taste. Experiment! Freshly grated nutmeg is always an improvement on ready-ground nutmeg.

INGREDIENTS

500 grams of fresh Newfoundland chanterelles
1 litre of meat or vegetable stock
2 medium onions
250 ml or more of cream
Salt and pepper
Fresh grated nutmeg
Chopped parsley or chives
2 tbs. butter or olive oil

PROCEDURE

Sauté your fresh Goose Bay chanterelles briefly at a high heat in a little olive oil or butter. Set aside. Chop the onion and sauté in butter at a medium heat until translucent, but not browned. Add stock and simmer until the onions are well cooked, about fifteen minutes. Add the mushrooms, setting a few aside to add with the garnish. Simmer until mushrooms are tender, then remove from heat and cool a little. Puree with a wand, blender or food-processor. Add cream, salt and pepper to taste, and a liberal grating of fresh nutmeg, along with any reserved whole mushrooms. Before serving, heat gently but do not boil. Garnish with parsley or chives.

Dr. Elizabeth Penashue, who says, “The only mushrooms an Innu will eat come on a take-out pizza,” tries wild mushroom soup. “Tastes good,” she said after a hesitant sip. “Tastes like caribou, maybe the stomach part.”

MUSHROOM POTSTICKERS

Robin McGrath

There were so many chanterelles in Labrador in the summer of 2013, that it was necessary to go beyond the usual soup and risotto offerings to get the full benefit of them. Vegetarians can make these dumplings entirely from mushrooms, but it is necessary to add a raw egg or some corn starch to make the filling stick together. Either way, these potstickers are a novel and delicious start to a meal.

INGREDIENTS

1 lb chanterelles or other wild mushrooms
1 lb ground pork
1 cup chopped water chestnuts
1 shallot, chopped fine
4 tsp soy sauce
2 tsp chopped fresh ginger
2 large cloves of chopped garlic
Salt and pepper
1 egg white
4 pack frozen won ton skins

PROCEDURE

Chop the mushrooms up—do not puree—and mix with the ground meat, water chestnuts, shallot (or chopped green onions), then add the soy sauce, ginger, garlic, salt, and pepper, and work briefly by hand. Thaw the won ton skins just enough to separate them and form the dumplings by putting one teaspoon of the filling into a skin, wetting the edges with egg white and pressing into a triangle. The skins dry out very quickly so cover the thawing leaves with plastic wrap as you work. Cook the dumplings by boiling them in a large pot of salted water for three minutes. They may be added to a soup of chicken broth or served hot with soy sauce or a dip (e.g. mix soy sauce, hot chili sauce and rice vinegar).

If you have bamboo steamers, you can form open face dumplings by trimming the won ton skins into circles, putting a heaping tablespoon of filling into the centre of each one and pressing the sides up around the mushroom mixture. A single pea or a splinter of carrot in the centre of each dumpling adds colour. They should be steamed for about five minutes. These dumplings can be frozen after cooking and reheated later in boiling water or a steamer.

THE MAIL BAG

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

I don't know, but…

Recently I received a plea from our exasperated Editor that went something like this, "Please, could you explain this balsam fir phenomenon to our readership! I have been getting photos of Figure 1 and questions on this fir thing that has nothing to do with mushrooms!"

When asked to explain something on the spur of the moment, my automatic response is "I don't know". Well, "I don't know" doesn't mean "I don't know anything", it means "I don't know everything", that is, I don't know the definitive, all-encompassing answer, the final word on the matter," which is often what is expected, even of a lowly naturalist. But when pressed, I can cobble together some sort of patch-work explanation. So here is what I "think" about these white, little nubby buds (buddies?).

Your correspondent's Figure 1 (photo: Joan Scott) shows a dead twig of a balsam fir from an end branch where the male cones are produced. Figure 2 shows twigs from a recently fallen still alive tree showing the cup-like bud remnants of this past spring's pollen cones. In Figure 3 a few withered cones are still attached. The remains of these pollen cone bud bases can often be seen on dead fallen branches on the forest floor (Figure 4).

However, even though the general features are the same, how then do we explain the nice whitish plump bud clusters as in Figure 1 compared to the ragged cup-like bases of the spent male cone buds? Balsam fir is a very aromatic tree with bark bladders and broken twigs exuding a sticky clear resinous substance that is difficult to remove from skin, hair and clothing. The resin (Canada balsam) is not water soluble, and when exposed to the air, the volatile solvent will evaporate leaving a solid residue which turns whitish as seen at the tip of a female cone candle in Figure 5. Figure 6 shows a twig with young immature pollen cone buds which has died prior to pollen cones emerging and maturing. Some whitish resin residue is visible, but not as heavily covering the buds as in Figure1.

So the explanation seems to be that sometimes male cone buds fail to open, twigs die and the buds become coated in resin. Why? I don't know. Maybe a fungus? Something has caused twig death and may stimulate resin secretion. Resin is thought to protect the tree from herbivores and pathogens. Perhaps this is a response to contain or eliminate a pathogenic fungus?

I should be ecstatic to hear an alternate explanation, but at the moment this is all I can muster. I threw in the hint of possible fungal involvement hoping to persuade the Editor to allow this fumbling discourse into print.

I don't know!

O, Tannenbaum!

Henry Mann

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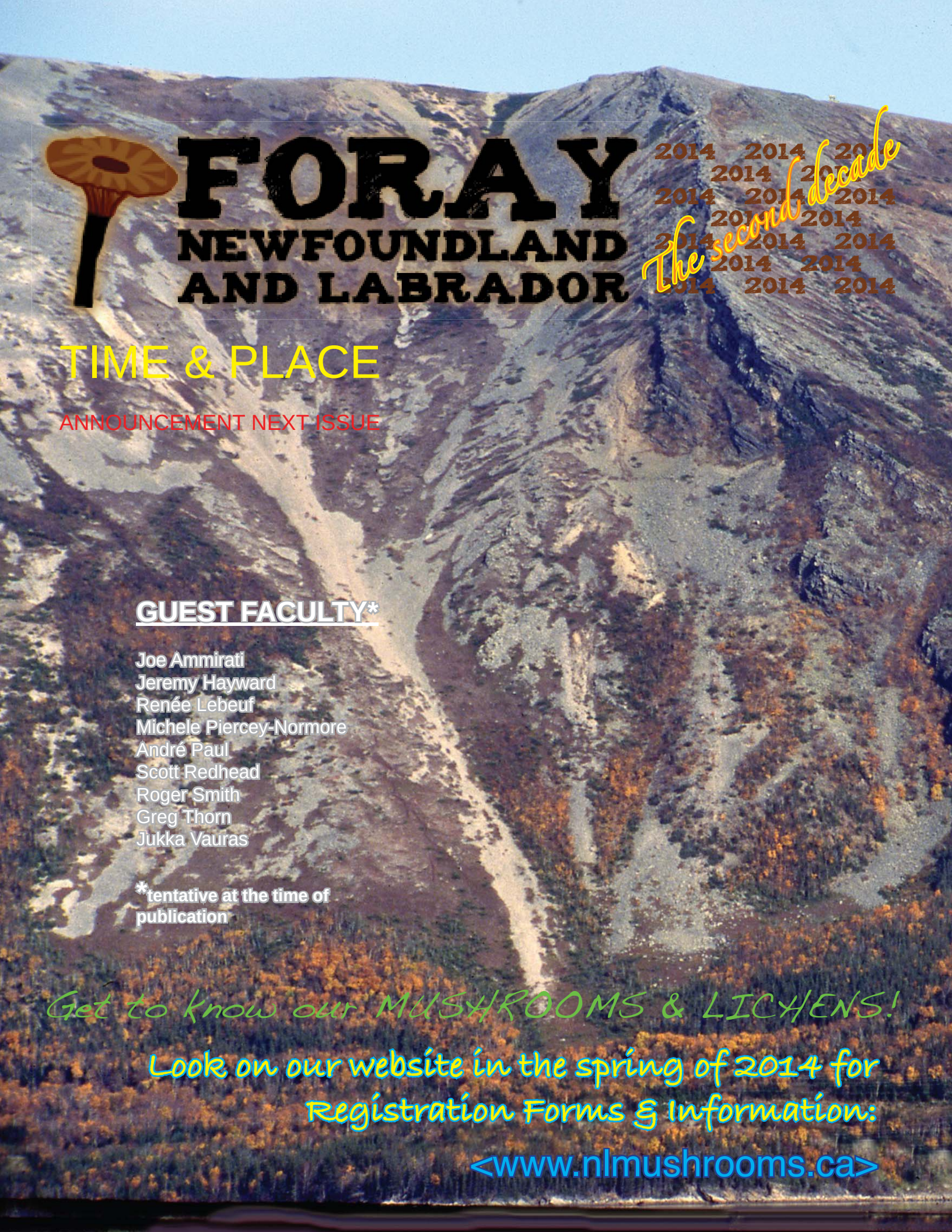

FORAY NEWFOUNDLAND AND LABRADOR

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