OMPHALINA

ISSN 1925-1858

Newsletter of FORAY NEWFOUNDLAND AND LABRADOR

Vol. IV, No 7
Aug. 12, 2013

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.

Webpage: www.nlmushrooms.c

ADDRESS
Foray Newfoundland & Labrador
21 Pond Rd.
Rocky Harbour NL
A0K 4N0
CANADA
E-mail: info AT nlmushrooms DOT ca

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

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, where a copy is also printed and archived <http://collections.mun.ca/cdm4/description.php?phpReturn=typeListing.php&id=162>.

COVER

Cystoderma amianthinum, Humber Village environs, October 16, 2004. Centrefolds are usually reserved for perfect specimens, but covers are allowed, from time to time, to show life as it really is, warts, wounds, scars, holes and all. The purpose of each individual may seem to be to perpetuate the species, but the big picture suggests that we are all here as fodder for somebody else's perpetuating efforts. Further, obviously mankind does not own the patent on mycophagy. Now, read the lead article to meet the two genera and five species found in Newfoundland and Labrador related to this wrinkled old cover beauty. And find out the meaning of wrinkles.

OMPHALINA
ISSN 1925-1858
Vol. IV, No 7
Aug. 12, 2013

CONTENT

Message from the Editor

Here we are, a few weeks to the foray, where we go forth and identify. To help, this issue starts off with a review of the *Cystoderma* and *Cystodermella* species in our province by one of our faculty, Irja Saar.

Our mission is to organize "enjoyable forays," so we hope that you enjoy the forays and have fun. But while having fun, we can also make a significant contribution to knowledge of the fungi in our province. We have developed a respectable species list backed by a very robust collection of mushrooms. Many of our visitors have often wondered, why we collect so many samples "of the same thing", why we spend so much time and energy doing what seems to be repetitive work. No doubt many of our Database Team members have also wondered why they need to document the umpteenth sample of the same very common mushroom.

The lead article provides an answer. Had we kept but one collection of a straw-colured *Cystoderma*, thinking it was *C. amianthinum*, we should never know that we have two very similar species, *C. amianthinum* and *C. jasonis*. Further, had we kept but one orange-brown *Cystodermella*, we should have never known that three such species grow in our province. Foray conditions do not always allow exact identification—sometimes specialized expertise and technical resources are required for accurate separation of individual species in species complexes.

By archiving several collections of a group, we are more likely to collect all species in a species complex. A study such as the lead article can then define the species for us, and, if we are lucky, even find a way that we can distinguish between them in the future. Several collections of the same species also provide a good idea of their relative frequency, and distribution in the province. In other words, if we wish to learn from our collections, not just store them, having many representatives yields much more information. From a scientific point of view, our collection is a very valuable resource, documenting part of our natural history heritage.

The lead article is a tribute to the effort of our Database Team, and should be dedicated to its members over the years. Without their efforts, this sort of work could not be done, and we would still not know which species of *Cystoderma* and *Cystodermella* grow in Newfoundland and Labrador. Enjoy the collecting, enjoy the databasing, enjoy the new knowledge gained from your efforts!

We have gathered so much information over the past decade, that now you can expect to get more articles like this, outlining the species that grow in our province. Future ones will come without a long editorial comment. Honest. Well…

See you at the foray!

andrus

FORAY MATTERS...

The 2013 foray will be held on Fogo Island, Sep 6-8, one of the four corners of the world, and one of the top ten places to visit in the world. Information on our website <**www.nlmushrooms.ca**>.

1. **TRAVEL. We suggest everybody who does not come earlier, aim for the 2:45 ferry from Farewell to Fogo on Fri.** This will likely involve about 20 cars. The ferry can handle this amount, but possibly not 20 cars *in addition to* normal traffic. Some *may* end up waiting for the 5:00 PM ferry. To make sure everybody has a chance to get to the Sign-in desk and find their community and house in daylight, then get some food before the program, the Reception and supper begin at 7:00 PM at the Inn. For the majority, who have arrived earlier, there is so much to see on Fogo Island, that the opportunity to relax and poke around should be delightfully pleasant.

   Ferry times are fixed, dictating travel times. Please note the time it takes to drive to Farewell, and the need to be there at least an hour before ferry departure to get on. Like our foray, it is a first-come-first-served system with no reservations.

2. **SIGN-IN** on site begins at The Fogo Island Inn, Joe Batt's Arm, at 3:00 PM, Fri Sep. 6, 2013. If you arrive earlier, please wait, look around, enjoy yourself, as the registrars are unable to get there sooner.

3. **INFORMATION.** For specific details about the foray and Fogo Island, see the Foray issue of Omphalina (vol 4, Nr 3), entirely devoted to these topics. It can be downloaded from our website. All the information is not in that issue, so please read all the information on our website.

4. **PROGRAM**. For a rough outline, please see issue 4 of Omphalina.

5. **CRAFT TABLE**. Remember to bring along any mushroom related art or craft you might like to show or sell.

6. **IF YOU MISSED OUT THIS YEAR.** We hope to return to Fogo Island next year, so that there will be an opportunity to get there, if you missed it this time. Our suggestion is to take out or renew your membership (See Membership on our website), so that you will get advance notice, and register as soon as you get it next year. If we run into an oversubscription situation again, we hope to give preference to members not registered this year, provided they get their registrations in early next year.

7. **TRAIL SIGN UP**. To save crowding and confusion at the Foray, please review the trail descriptions on the next two pages, and send in your selection in order of preference to our Trail Director, Jamie Graham <jdgraham40 AT gmail DOT com>. He will assign you to your best choice available on a first-come-first-served basis, until all trails are evenly filled.

8. **NOTICE OF MEETING**. The Annual General Meeting will take place at the Barr'd Islands Town Hall, 2:00PM, 2013. The Agenda will be in your Program. The Minutes of the 2012 Meeting are posted on our website. Please read them, as you will be asked to approve them.

PRESELECT YOUR TRAIL

To avoid crowding around the sign-up sheet, we offer an opportunity to preselect your trails. Please use the map and trail description (next page) to preselect your trail. Mail your selections, in your order of preference, 1-7, to our Trail Director, Jamie Graham <jdgraham40 AT gmail DOT com>, with your name(s). DEADLINE August 29, 2013. As you see, there are 6 available places on each trail. Jamie will assign these to you in order of receipt and preference. Those who have not preselected, will get to sign up at the foray, choosing from available places.

Come for breakfast Saturday morning, ready to go out on the trail directly after. Because some houses are a distance away, we shall not have time to go "home" before setting out. Car pool: we'll need 3 cars per trail, as the mycologist and DBT member return at noon.

	Fogo Head, Battery & Brimstone Head	Lion's Den Valley (± Loop)	Waterman's Brook	Payne's Trail	Turpin's Trail West (± East)	Oliver's Cove (± Cape Cove)	Stag Harbour
Terrain	rocky, bog, coastal barrens, meadow,	inland barrens, woods, meadows	coniferous forest, barrens at end	barrens, heath, bog, woods	grassy then bog/ woods/ barrens	meadow, barrens, woods	woods, small marsh
Difficulty (1-5; 1 = easy)	5	4	4	3	3	3	2
Productivity (1-5; 1 = low)	2	4	5	5	3	3	5
Points of interest	excellent view	Marconi Wireless Interpretation Centre	waterfall at the end		1st ground radar station in North America	traditional gardens	view of Indian Island
Length (Km)	5 + 1	5	6 + return	2 - 8	7	2 + 7 + return	2
Community	Fogo	Fogo	Fogo	Payne's Cove	just before Tilting	Tilting	Stag Harbour
Start	Battery parking lot & Lions Club parking lot	Parson's Hill Rd to Marconi Site	logging road to boardwalk	road	Sandy Cove toilet building then NE	ball park	west side road to South Point
GPS N49°	43'29.6"; 42'55.6"	43'10.1"	42'34.2"	38'19.2"; 38'59.5"	42'27.5" ; 42'28.6"	42'05.3"	34'31.6" ; 34'38.8"
W54°	16'53.1"; 17'42.2"	15'42.6"	16'30.6"	18'38."; 18'41.6"	04'58.2" ; 04'53.3"	03'36.2"	16'48.8" ; 17'38.7"
End	road, town	return or loop by the shore	waterfall, or return earlier	Harlick's Pond (or Deep Bay)	return or east to Lane House Museum	loop or Cape Cove trail and return	ferry wharf road
Special interest	**General**	**Photography**	**Cortinarius**	**Lichens**	**Lichens**	**General**	**Rusts**
Leader	Michael Burzynski	Judy May	Jeri Graham	Tina Newbury	Marian Wissink	Jamie Graham	Geoff Thurlow
FOGO leader	Peter Decker	Tim Charles	Murray Mac-Donald or Adam Grevatt	Allan Dwyer	Fraser Carpenter	Richard Penton	Jason Penton
Mycologist	**Irja Saar***	**Faye Murrin**	**Renée Lebeuf***	**Andrus Voitk***	**Esteri Ohenoja***	**Greg Thorn***	**Cathie Aime***
DBT	April Muirhead*	Christian Wright*	Claudia Hanel*	Chris Deduke	Rosie Myers*	Aare Voitk*	Kenny Tuach*
Special interest leader	Irja Saar	**Roger Smith***	**André Paul***	Chris Deduke*	**Michele Piercey-Normore**	Greg Thorn	**Cathie Aime**
FOGO participant	Mona Brown	tba	Adam Grevatt	tba	tba	tba	Helen Broaders
Participants 1							
2							
3							
4							
5							
6							

*Return WITH COLLECTIONS TO DATE at 12:00 noon to begin ID process

Cystoderma & *Cystodermella* of Newfoundland and Labrador

Irja Saar, Andrus Voitk

In 1889 Fayod created a new genus, *Cystoderma*, transferring several species from the genus *Lepiota*.[1] In 2002 Harmaja reviewed this genus and split it into *Cystoderma* for species with amyloid spores and *Cystodermella* for those with inamyloid spores.[2] Amyloid spores turn greyish to blackish blue with iodine solution (eg Melzer's reagent, Lugol's solution or IKI) and inamyloid spores do not change colour. Subsequent genetic studies have supported this division, although a few *Cystoderma* species have been found with inamyloid spores.[3] The current concept of these two genera, taking into account recent understandings of phylogeny, has been summarized by the Saar.[3] The macromorphologic difference between these genera is small[4] and both have some morphologically similar species, opening the way for identification error. This study was done to determine the diversity of species in these genera in Newfoundland and Labrador.

Material and methods

A total of 49 collections were examined by IS with light microscopy, and a selected number sequenced using ITS and LSU markers, as described previously.[5] Source of material: 4 collections by Kuulo Kalamees while at Foray Newfoundland & Labrador in 2003, 35 collections from the fungarium of FNL from forays in 2004-2012, and 10 collections made by AV in the same time span. Examined collections have been deposited in the fungarium of the Estonian University of Life Sciences, TAAM, or the University of Tartu, TU.

Results

Five species from two genera were identified: *Cystoderma amianthinum* (39 collections), *Cystoderma jasonis* (3 collections); and *Cystodermella granulosa* (3 collections), *Cystodermella* cinnabarina (3 collections), and Cystodermella *adnatifolia* (1 collection). *Cystoderma amianthinum* made up almost 80% of the collections (Figure 1). Genetically, our collections fit with the same species from Europe (Figure 2). No genetic difference was noted between *Cystoderma amianthinum* var. *amianthinum* and *Cystoderma amianthinum* var. *rugosoreticulatum.*

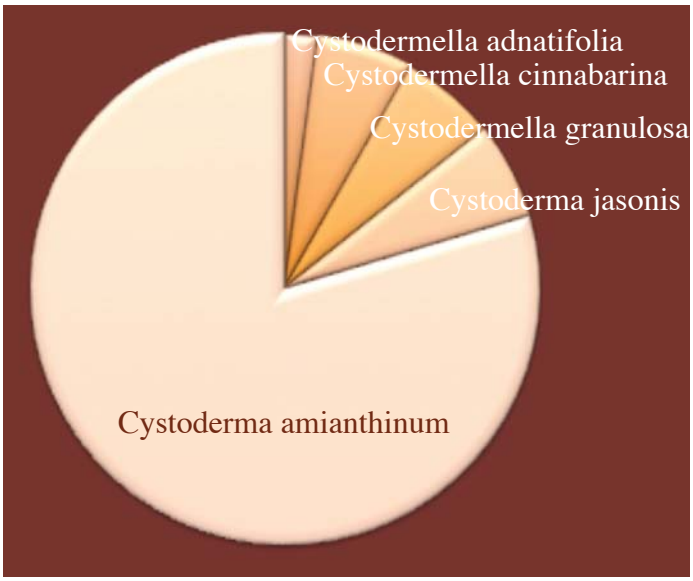


Figure 1. Number of collections over 10 years from three sources. Cystoderma amiathinum *is almost four times as common as the others combined. Likely the frequency of* C. amianthinum *is underestimated, and that of the others overestimated.*

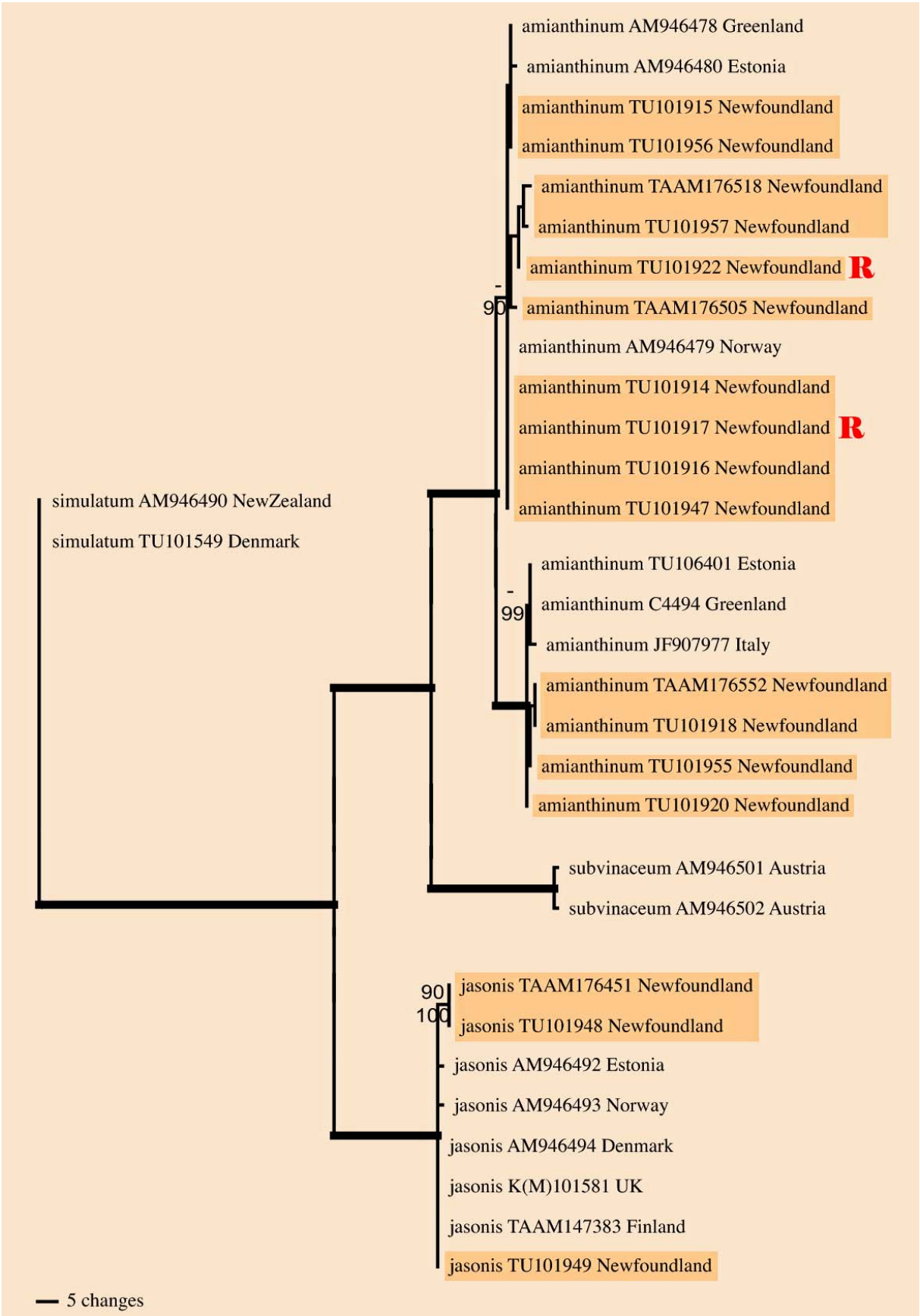


Figure 2. Phylogeny of ITS data for Cystoderma *(left) inferred by Maximum parsimony analysis. Thick branch indicates bootstrap value ≥ 95%, and posterior probabilities ≥99%. Newfoundland and Labrador collections highlighted. Red* **R** *indicates the two collections of* Cystoderma amianthinum *identified as var.* rugosoreticulatum*, the others are var.* amianthinum*. Note that they are intermingled—neither variety forms a cluster separate from the other, suggesting the distinction has no genetic basis. Note the significant genetic distance between the morphologically similar* Cystoderma amianthinum *and* C. jasonis.

*Interpret this trees. Can you spot something interesting here? It has been a while, so you may wish to refresh your memory of clade trees (*Omphalina*, vol 3, Nrs 1 & 5). Then turn to page 18 for an interpretation by our resident phylogenist.*

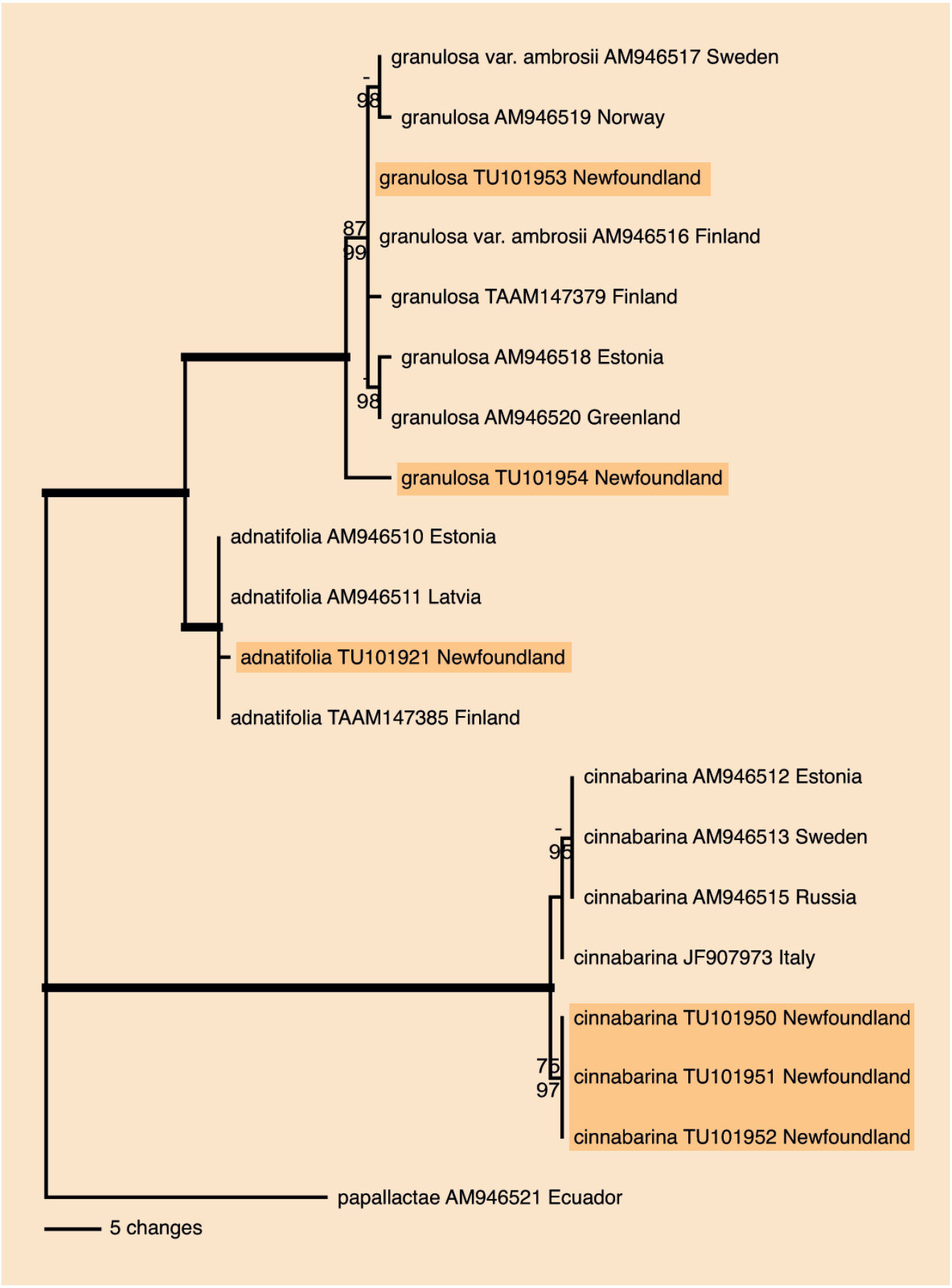


Figure 3. Phylogeny of ITS data for Cystodermella *inferred by Maximum parsimony analysis. Thick branch indicates bootstrap value ≥ 95%, and posterior probabilities ≥99%. Bootstrap support (≥70%) and posterior probabilities (≥95%) are also shown above and below branches (bs/pp), respectively. Collections from Newfoundland and Labrador highlighted.*

Figure 3. Cystoderma amianthinum *var. amianthinm (above) and rugosoreticulatum (below). Neither taxon clustered separately. Cap wrinkling is likely an environmental effect, suggesting that these varietal distinctions should be abandoned.*

Cystoderma amianthinum (Figure 3, cover and title banner)

Cap: 10-45 mm diameter; convex becoming nearly flat, evenly covered with a fine granular layer; some remnants of the universal veil hang from the cap edge; buff, varying from yellowish buff to cinnamon buff. **Gills**: notched, close, smooth, multiple lamellulae, white. **Stem**: 3-8 mm diameter, 30-80 mm long, length rarely significantly greater than twice expanded cap diameter; cylindrical or wider toward foot; concolourous or somewhat darker as cap, covered with granular-floccose coating from foot to ring zone, covering lost with age; smooth above ring zone; ring zone fugacious, floccose-scaly; foot base often covered with cottony mycelium, white or concolorous with stem. **Flesh**: white to cream, soft; unpleasant musty-earthy odour. **Spores**: 5-6 × 3-4 µm (5.5 x 3.2), Q=1.3-2.3 (1.7), ellipsoid to oblong, weakly amyloid.

NOTE: For spores the arithmetical average appears in brackets after the range. Measurements and observations are taken from our material, not from what is reported. In the case of species rarely encountered, our experience is not large, and the measurements may require revision with greater experience.

Figure 4. Cystoderma jasonis. *Small size and long stem/cap diameter ratio evident, but flesh and gills not impressively yellowish. Photo: Maria Voitk.*

Cystoderma jasonis (Figure 4)

Cap: 7.5-35 mm diameter; convex becoming nearly flat, at times bell-shaped or conical, evenly covered with a fine granular layer; remnants of the universal veil hang from the cap edge; tan, varying from brownish yellow to yellowish brown, granules usually darker than background. **Gills**: notched, close, smooth, multiple lamellulae, yellowish buff, rarely whitish. **Stem**: 2.5-7 mm diameter, 30-85 mm long, almost three times the diameter of the cap; cylindrical or wider toward base; concolourous or darker than cap, covered with granular-floccose coating from foot to ring zone, covering lost with age; smooth above ring zone; ring zone fugacious, floccose-scaly; base often covered with cottony mycelium, white or concolorous with stem. **Flesh**: yellowish buff near the cap surface, pale ochre below, soft; unpleasant musty-earthy odour. **Spores**: 6-8 × 3-4 µm (6.6 x 3.4), Q=1.5-2.6 (1.9), oblong to fusiform, amyloid. **Arthroconidia** (asexual spores) reported under the cap cuticle from European material, were not observed in our specimens.

Cystodermella adnatifolia (Figure 5)

Cap: 25-80 mm diameter; convex becoming applanate, evenly covered with a moderately fine granular layer; white cottony remnants of the universal veil hang from the cap edge; orange buff to brownish orange. **Gills**: notched, close, smooth, multiple lamellulae, white. **Stem**: 3-9 mm diameter, 30-90 mm long, length not much more than expanded cap diameter; even or wider toward foot; covered with streaky white cottony fibrils, mixed with scattered granules concolorous with cap below ring zone; smooth above ring zone; fugacious, floccose-scaly ring zone; covering lost with age; foot base often covered with white cottony mycelium. **Flesh**: white, soft; unspecific mushroom odour. **Spores**: 4-5 × 2.5-3.5 µm (4.5 x 2.8), Q=1.4-1.8 (1.6), ellipsoid to oblong, inamyloid.

Figure 5. Cystodermella adnatifolia. *Larger size and squatter stature evident, as is the red colour of the cap, especially in younger specimens. Photo: Maria Voitk.*

Figure 6. Cystodermella cinnabarina. *Stem/cap diameter ratio applies with mature specimens with flattened caps. Two shades of cinnabar red. Colour indistinguishable from* Cystodermella adnatifolia, *but* Cystodermella cinnabarina *can be verified microscopically by cystidia on gills and stem. Photos: Roger Smith.*

Cystodermella cinnabarina (Figure 6)

Cap: 25-80 mm diameter; convex becoming applanate, evenly covered with a moderately fine granular layer; white cottony remnants of the universal veil hang from the cap edge; brownish orange to brownish red. **Gills**: notched, close, smooth, multiple lamellulae, white. **Stem**: 3-9 mm diameter, 30-90 mm long, length not much more than expanded cap diameter; even or wider toward foot; covered with streaky white cottony fibrils, mixed with occasional reddish granules from foot to ring zone; smooth above ring area; fugacious, floccose-scaly ring zone; covering lost with age; foot base often covered with white cottony mycelium. **Flesh**: white, soft; unspecific mushroom odour. **Spores**: 3.5-4.5 (-5) x 2-3 µm (4 x 2.7), Q=1.2-1.9 (1.5), ellipsoid to oblong, inamyloid. **Cystidia:** present on the edge and on the side of the gills (cheilo-, pleurocystidia) and on the surface of the stem (caulocystidia); slightly swollen or flask-shaped below, tapering to a long, narrow neck with a spear-shaped apex covered with crystals (dissolving in KOH or Melzer's solution), 30-50 × 4-10 × 3-4 µm.

Figure 7. Cystodermella granulosa. *Top in situ photo showing "classical" brown colour. Bottom photo shows pallor with age. Granule size and pattern on cap remain similar in both. Bottom photo: Roger Smith.*

Cystodermella granulosa (Figure 7)

Cap: 25-80 mm diameter; convex becoming applanate, evenly covered with a moderately coarse granular layer, in two of our three collections arranged in a more concentric pattern than our other species; white cottony remnants of the universal veil hang from the cap edge; with different brown tinges, usually not having red or orange, may fade in age. **Gills**: notched, close, smooth, multiple lamellulae, white. **Stem**: 3-9 mm diameter, 30-90 mm long, length not much more than expanded cap diameter; even or wider toward foot; covered with streaky white cottony fibrils, mixed with occasional brownish granules from foot to ring zone; smooth above ring zone; fugacious, floccose-scaly ring zone; covering lost with age; foot base often covered with white cottony mycelium. **Flesh**: white, soft; unspecific mushroom odour. **Spores**: 3.5-5 × 2-3.5 µm (4.2 x 2.7), Q=1.4-1.8 (1.5), oblong, inamyloid.

Discussion

Collections from various locations of the province over a decade produced five species of the *Cystoderma*/*Cystodermella* complex. This study does not exclude the possibility of finding other species in our province, particularly in arctic-alpine or other specialized habitats. It is not known whether these mushrooms are saprobes or have an association with a moss or some other photobiont.

Differentiating between the genera *Cystoderma* and *Cystodermella* macroscopically can be difficult. Our two *Cystoderma* species are smaller, mostly straw coloured, and have smaller granules; *Cystodermella* species are larger, have coarser granules and are either brown or reddish-orange-brown. A relatively young, well hydrated, actively growing *Cystoderma amianthinum*, as shown in the title banner, may also seem reddish-brown and bigger, with prominent granules. However, with some care, and some familiarity, you should be able to differentiate the genera with reasonable accuracy. The spore reaction to iodine should help differentiate the difficult cases most of the time, although on occasion *Cystoderma amianthinum* may be very weakly amyloid.

If you think you have the genera sorted out, you will encounter the difficulty of separating the species. Table 1 features some helpful macro- and microscopic features. Slightly smaller stature, proportionately longer stem to cap diameter ratio, and yellowish buff gills and flesh differentiate *Cystoderma jasonis* macroscopically from the otherwise very similar *C. amianthinum*.

Table 1. Differentiating characters of Newfoundland and Labrador *Cystoderma* and *Cystodermella* apecies						
		Cystoderma		*Cystodermella*		
		amianthinum	***jasonis***	***adnatifolia***	***cinnabarina***	***granulosa***
cap	**diameter mm**	10-45	7.5-35	25-80	25-80	25-80
	stem/cap ratio	1-2	2->3	about 1	about 1	about 1
granules	**colour**	straw to light cinnamon	straw to light cinnamon	brownish orange to red	brownish orange to red	cinnamon to brown, pales with age
	size	fine	fine	medium coarse	medium coarse	medium coarse
	pattern	evenly distributed	evenly distributed	evenly distributed	evenly distributed	at times concentric
gills	**colour**	white to buff	buff to yellow	white	white	white
flesh	**colour**	white to cream	cream to yellow	white	white	white
	smell	unpleasant	unpleasant	mushroomy	mushroomy	mushroomy
spore	**size µm**	5-6 x 3-3.5	6-8 x 3-4	4-5 x 2.5-3.5	3.5-5 x 2-3	3.5-5 x 2-3.5
	Iodine reaction	weak amyloid	amyloid	inamyloid	inamyloid	inamyloid
cap arthrospores		absent	not found	absent	absent	absent
cystidia		none	none	none	gill edges, sides, stem	none

Unfortunately, these characters may overlap, and are not always present. Spore size and shape is also reported to differ, but again there is sufficient overlap to make them only relatively helpful. *C. jasonis* is reported to form asexual spores under the cap skin; this are not a consistent feature and was not seen in our specimens. In view of such morphologic similarity, it is interesting to note that *C. jasonis* is phylogenetically quite distant from *C. amianthinum*, compared to other morphologically more dissimilar species (Figure 2).

Differentiating between the three *Cystodermella* species is no easier task. *C. granulosa* is primarily brownish, but may pale with age to straw coloured. The granules of the other species are evenly distributed, but those of *C. granulosa* showed a concentric pattern in two of our three collections. *C. adnatifolia* and *C. cinnabarina* are the same reddish/brownish orange, and can only be differentiated microscopically: *C. cinnabarina* has cystidia (special projecting cells) on the gill sides and edges, and the stem, while *C. adnatifolia* does not. Difficulty identifying these species macroscopically is compounded by their relative scarcity. Encountering them only a few times in a decade, one is more likely to mistake subtle differences as variations within one species, or vice versa.

There was no genetic support for the wrinkled and smooth varieties of *Cystoderma amianthinum*. Seeing many collections, it seems that wrinkling is more a factor of sporocarp age and hydration, with a spectrum observed from smooth to wrinkled. It is often seen to a variable degree in different members of a presumably monoclonic collection. Smooth clusters become wrinkled with time. Similar wrinkling is common in some other species of the complex, not found here, as well. These observations suggest that wrinkling is an environmental characteristic common to many species under the right conditions, and not a taxonomic separator. Continued separation of these two varieties as valid taxa does not seem warranted.

References

1. Fayod V: Prodrome d'une histoire naturelle des Agaricinés. Annales des Sciences Naturelles. Botanique, Série VII 9:181–411. 1889.
2. Harmaja H: *Amylolepiota*, *Clavicybe* and *Cystodermella*, new genera of the Agaricales. Karstenia 42 (2):39–48. 2002.
3. Saar I, Põldmaa K, Kõljalg U: The phylogeny and taxonomy of genera *Cystoderma* and *Cystodermella* (Agaricales) based on nuclear ITS and LSU sequences. Mycological Progress 8 (1):59–73. 2009.
4. Saar I: *Cystoderma* Fayod. *Cystodermella* Harmaja. In: Knudsen H, Vesterholt J (Eds.). Funga Nordica. Agaricoid, boletoid, clavarioid, cyphelloid and gastroid genera. 2nd edition. Nordsvamp, Copenhagen:617-620. 2012.
5. Vauras J, Saar I, Voitk A: Comparison of European *Tricholomopsis osiliensis* with putative *Tricholomopsis sulfureoides* of Newfoundland. Omphalina 3(5):9-11. 2012.

The genus *Fomitopsis* in Newfoundland & Labrador

Andrus Voitk

Fomitopsis **is a cosmopolitan genus of brown rot polypores that form hard, woody conks, mostly limited to temporal-boreal forests. There are from under ten to over thirty species in the genus, depending on the exact definition used. During ten years of forays, we have identified three species in Newfoundland and Labrador:** ***Fomitopsis pinicola*****, F. ochracea, and F. rosea. All prefer conifers, causing cubical brown rot, although all have been reported on hardwood.**

Fomitopsis pinicola

This is probably our commonest large conk, and usually easily recognized. Large specimens can reach over 30 cm at their attachment. The top is gray to black and only moderately zonate Characteristically, it has a shiny red band at the edge. One of its identifying features is that the coating of this band melts like wax when exposed to a flame. The undersurface is light ochre to yellow, often staining darker yellow on handling. The pores are small and round, about 5-6/mm. The cut surface has a characteristic "*Fomitopsis* look" of woody whorls in the upper body and successive pore layers in the lower. It has a distinctive "sour" smell. During active growth the pore surface, and at times the entire conk, may exhibit dramatic guttation. Its commonest host is balsam fir, but can be found on spruce, birch and we have seen it once on poplar. Of the three, this one seems to have the shortest sporulation time, and mature spores are difficult to find in many collected specimens. Despite a relatively easy-to-recognize description here and in most books, it is quite variable in appearance and can pose a puzzle, before it is finally identified. The smell, red laccate band, appearance on cross section, and presence of brown rot should usually make the determination.

Fomitopsis pinicola. *Left: summer and winter views of one of our favourite big conks on a dead birch. After it reached over 30 cm diameter, somebody broke it off, so we do not know how big it would have grown.*
Right, upper: immature nubbin guttating in stage of active growth. Right, lower: detail of the pore surface—small round regular pores bordered by a sterile edge.

Fomitopsis ochracea

Marginally smaller than *F. pinicola*, it can also grow quite big, making size an unhelpful differentiating character. The top is similarly black to gray and only moderately zonate. There is no red band. If there is some coloured tissue near the edge, it does not melt, but chars when exposed to a flame. The edge may be ochre in colour, giving it the name, but it may also be quite drab and gray. The undersurface is light ochre to yellow, often staining darker yellow on handling. The pores are small and round, about 4-6/mm. The cut surface has the characteristic *Fomitopsis* whorls in the upper body and successive pore layers in the lower.

Fomitopsis ochracea. *On birch, previous page and on balsam fir, above. Often the conks on birch are lighter and more ochraceous on top and those on conifers darker, than F. pinicola.*

It has a distinctive "sour" smell. During active growth the pore surface, and at times the entire conk, may exhibit dramatic guttation. Its commonest hosts are balsam fir and spruce, but proportionately it is more common on birch than *F. pinicola*. The original find was on poplar in Alberta. It, also, is quite variable in appearance and can present a definite puzzle for the unwary identifier. Absence of a red laccate band should usually make the determination. If still puzzled, looking at the spores with a microscope should help. The spores of *F. ochracea* are subglobose (almost round—about like a blown up balloon), while those of *F. pinicola* are more elliptical (a little longer and a narrower)—see table.

Fomitopsis rosea

This is an uncommon large conk, with two collections from ten years of forays and two in my personal collection in the same time. It is easily recognized because of its pink pore surface and pink flesh. Large specimens can reach over 30 cm at their attachment. The top is gray to black, with brownish tones and not very zonate. There is no red band at the edge. The undersurface is pink, often staining darker, almost red, on handling. The pores are small and round, about 5-7/mm. The cut surface is pink with the *Fomitopsis* look of whorls in the upper body and successive pore layers in the lower. During active growth the pore surface, and at times the entire conk, may exhibit dramatic guttation. Its commonest host is spruce or balsam fir, but has been reported on hardwood in Scandinavia. Being pink, it should be easy to recognize, but there is another pink *Fomitopsis*, *F. cajanderi*, with which this one can be confused. So far we have not seen the latter in our province. The spores of *F. rosea* are cylindric, and those of *F. cajanderi* even longer and narrower.

	Fomitopsis pinicola	*Fomitopsis ochracea*	*Fomitopsis rosea*
Occurrence	very frequent	moderately common	quite uncommon
Host tree	conifer:birch = 80:20	conifer:birch = 60:40	conifer
Confluence	occasionally confluent	may be confluent	usually separate conks
Size	3-30 cm wide, or more	3-20 cm wide	2-15 cm
Top	gray to black, mildly zonate	gray to black, mildly zonate	gray to black, mildly zonate
Band	red laccate band, may be orange or deep yellow; melts with flame	may have dull ochre band; chars with flame	gray, no coloured band
Undersurface	off-white to yellow; stains yellow	ocher to yellow; stains yellow	pink; stains darker
Pores/mm	5-6	4-6	5-7
Context	yellowish tan	yellowish tan	pink
Spores	elliptic; 5-8 x 3-4.5; Q=1.8	subglobose; 5.0-6.5 x 3.5-6.0; Q=1.3	cylindric; 5.5-7.5 x 2.5-3.0; Q-2.3

F. pinicola and *F. ochracea*

Early studies of the *Fomitopsis pinicola* complex showed that North America had two intersterile strains (did not mate), seemingly indistinguishable morphologically. They were only partly compatible sexually with the morphologically similar European strain, homogeneous on its continent. The exact relationship and phylogenetic placement of these strains has not been dissected out, but it is interesting to speculate that the two North American "strains" might actually have been our *F. pinicola* and *F. ochracea*. The latter species, although reasonably common, at least here, was described only in 2008. Until then, presumably it was considered as an extreme variation of *F. pinicola*.

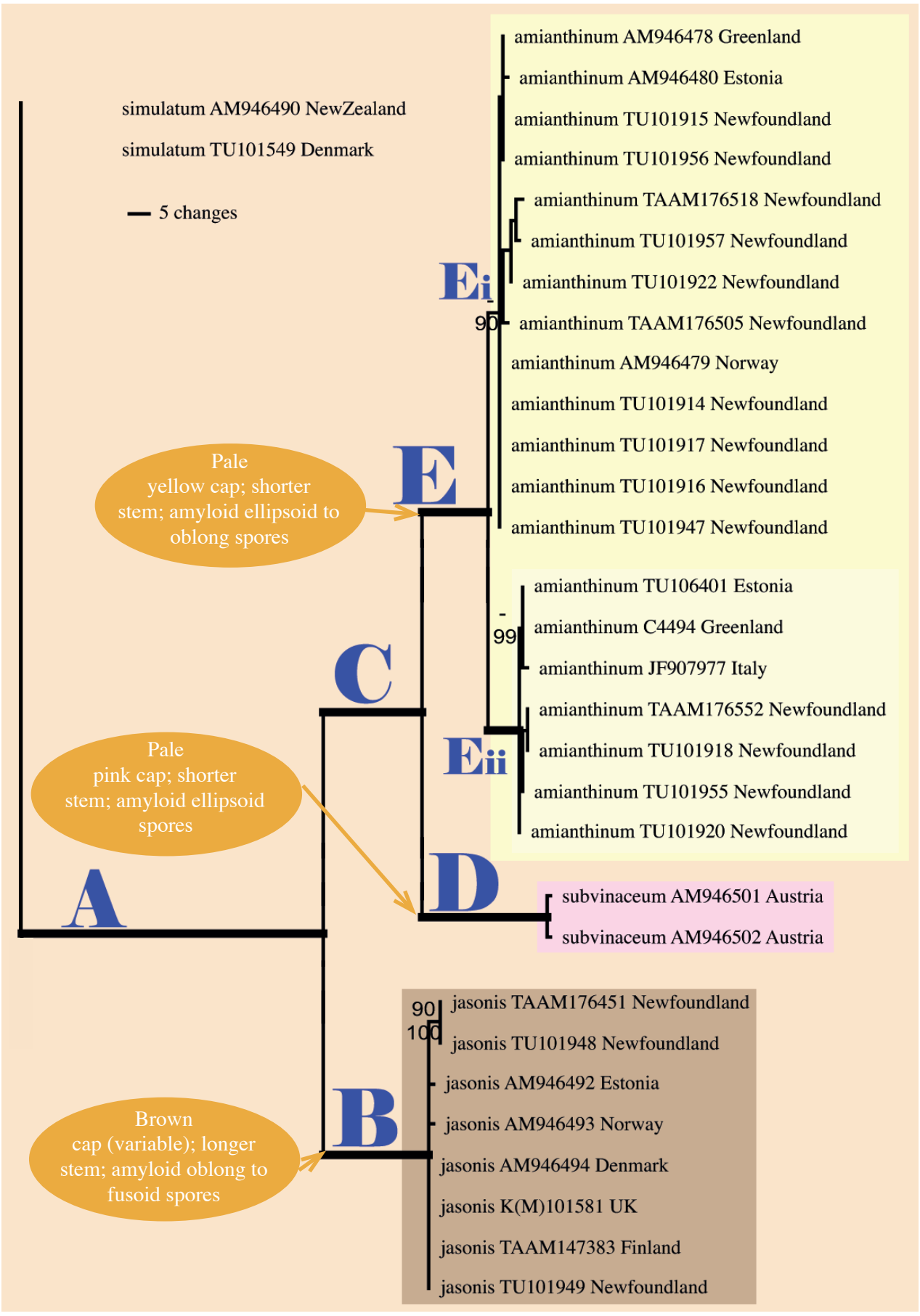
As we have reported earlier, in our foray collection 8 of 12 voucher photos identified as *F. pinicola*, collected before we were aware of the second taxon, are actually *F. ochracea*. Spurred by this discovery, we did a small poll of a few other fungaria. Renée Lebeuf found two collections of *F. pinicola* in the fungarium of Le Cercle des Mycologues de Montréal, and both looked like *F. pinicola*. However, since the circulation of the existence of *F. ochracea*, the Québec group has reported it from Québec on their Flickr website. Dave Malloch found five collections of *F. pinicola* in the New Brunswick Museum, and reported that all five seemed to be identified correctly. Tony Wright, turning down an invitation to coauthorship, examined the collection of *F. pinicola* at the Royal Ontario Museum.* Of 57 collections identified as *F. pinicola*, 51 specimens had the requisite red laccate band. One, collected by L. O. Overholts in 1931 from *Populus grandidentata*, looked like *F. ochracea*, and the other five Tony classified as "doubtful".

The above quick surveys are not presented as hard scientific fact, but they do give food for thought. *F.* ochracea was first reported from Alberta and confirmed in NL. Our earlier discussion led David Boertmann to submit the photo at the bottom of this page of what looks like *F. ochracea* from Stanley Park in Vancouver. This suggests the species is transcontinental, at least in the northern boreal forest. These finds, and the discovery of at least one specimen identified as *F. pinicola* that looked like *F. ochracea* in ROM (possibly five more), suggests that it is quite possible that this species could be the second of two intersterile North American "strains" of *F. pinicola* described before *F. ochracea* was recognized as a separate species. Further, because both North American strains mated only partly with the European strain of *F. pinicola*, it is quite possible that what we identify as *F. pinicola* in North America, might also turn out to be a genetically distinct (and undescribed) species. Clearly, even this very common species complex hides some secrets it might yield to the curious investigator.

There is a right and a wrong way to respond to an Editor's request to take on a project. "This sounds really interesting, but unfortunately I have no time", albeit polite, does not cut it. Tony provides the benchmark for correct mode of response: 1) unblinking acceptance, 2) quick execution, 3) comprehensive report, 4) appropriate concluding statement: "Thank you for this assignment."

Interpreting a phylogenetic tree

Michele Piercey-Normore



Clade A arises from the root, a species removed from the group under study. It splits into two, clades B and C. Clade B is a strongly supported clade, and forms a "good" (clustered or monophyletic) species, *C. jasonis*, with samples collected from North America and Europe. It is the earliest or most primitive of the species in this tree. Clade C splits into two sister clades, clades D and E. Clade D is another highly supported species, *C. subvinaceum**, which is a sister species to *C. amianthinum*.

Species of *Cystoderma amianthinum* form a good species (ie. monophyletic species) in an earlier analysis by Saar et al.,[1] but only three specimens were used in their study. The tree in this article, shows 20 specimens of *C. amianthinum,* collected from Newfoundland and Labrador, Greenland, Estonia, Norway, and Italy. When larger numbers of specimens of a species are studied, some may cluster together into a smaller clade within the main species clade, as seen here. Even though *Cystoderma amianthinum* seems to separate into two groups (Ei and Eii) within clade E in the tree, only one of those groups (Eii) has high statistical support. The thick branch for clade Eii indicates that it has greater than 95% bootstrap and 99% posterior probability values. The statistical support in the other group (Ei) is much less. In other words, phylogenetically clade Eii exists as a separate entity within the larger clade E, but evidence to support the separate existence of clade Ei is not strong with the markers and genes analyzed.

The decision whether to recognize such a clustering group as a separate species or not, is a matter of judgment. Although Saar has observed these two genetic clusters within *Cystoderma amianthinum* previously,[2] she has not found any macroscopic, microscopic or lifestyle differences between the two groups. Hence, she has elected not to separate out this potential cryptic or "nested" species. This may be the beginning of speciation, the loss of a former "species", or simply ongoing variation produced from the pressures of natural selection.

Is there any morphological support for these genetic lineages? The more primitive species, *C. jasonis*, has a stem almost three times longer than the cap diameter, brown cap, and oblong-fusoid spores. Evolutionary change over time along its sister lineage (clade C) gave rise to two more closely related species, *C. amianthinum* and *C. subvinaceum*. These sister species produce mushrooms with the stem length less than two times cap diameter, with more yellow (*C. amianthinum*) or pink (*C. subvinaceum*) cap colour, and spores shaped more ellipsoid-oblong (*C. amianthinum*) or ellipsoid (*C. subvinaceum*). These distinctions hold in a general way, but have sufficient variability to create overlaps that make identification challenging.

What did we learn?

- The number of specimens within a species in a tree may change the interpretation of a "species".
- Not every genetic spilt needs to be named as a new species.
- Good species have morphological or other changes to agree with the genetic changes.
- Strong support for a group of samples with no apparent morphological difference may indicate a cryptic species.

References

1. Saar I, Põldmaa K, Kõljalg U: The phylogeny and taxonomy of genera *Cystoderma* and *Cystodermella* (Agaricales) based on nuclear ITS and LSU sequences. Mycological progress 8:59-73. 2009.
2. Saar I: The phylogeny and taxonomy of genera *Cystoderma* and *Cystodermella* (Agaricales, Fungi). Tartu University Press, Tartu, Estonia. 2012.

*C. subvinaceum *has been reported from Québec, but has not been identified from Newfoundland and Labrador, to date.*

The Bishop's Sketchbook

Poison control notes — *Russula peckii*

—Hello?

—Hi. This is Rebecca from Poison Control with a parent on the line whose toddler ate a small amount of red mushroom on their lawn. The child is fine. What should I do?

—Ask the parents to take a picture of the mushroom from side, top and bottom, and send it to me. Here's my e-mail.

Hello. I think these are a variety of Russula. Mother

Yes, that is a Russula. *None of its species here are lethal, although some can be quite toxic, emptying out your gastrointestinal tract above and below with gusto. Those can make you quite sick and can pose a significant risk of fluid loss, especially at the extremes of age. Therefore, if your son gets ill, please take him to Emergency—he may need intravenous fluids for 24 hrs. However, odds are that he'll be fine.*

Meanwhile, please do the following two things to help assess the risk of toxicity:

1. Look at the gill edges with a loupe or magnifying glass. If they are very finely serrated or saw-toothed (like a miniature hacksaw), then this is almost certainly Russula peckii *(**Nice red cap, red flush on stem, stem longer than cap diameter, serrated gills, mild taste**) a very good edible. Your son has nothing to fear.*

2. Taste a small bit of the white flesh of the mushroom. Yes, I know, but don't worry. It is perfectly safe, even it it turns out to be a toxic one. Bite on it a bit and let the mushroom sit on your tongue for about 60-120 seconds (sometimes it takes that long for a taste to come through). Then spit it out. No more need be done, even if it is toxic, although you may wish to rinse. If the taste is sharp, acid or hot, the mushroom is probably toxic. In that case, depending on how much your son ate, he may become ill. If you think it is a lot (more than 1-2 whole mushrooms), perhaps pumping out the stomach or drinking activated charcoal may still play a role, if it is less than 1-2 hrs from the ingestion. If it is only a matter of a few bites, wait and see is wiser.

BTW, the above taste test works for Russula *species, but not for all mushrooms. Please do not get confused and think this is how you can tell poisonous mushrooms generally. It is not, and tragedies can result.*

Hello,

Thanks for the speedy reply. Yes it does have the serrated gill edges. The taste test results reminded me very much of a standard white supermarket mushroom. We will of course be watching but I think things will be fine. He barley ate 1 square centimeter of the mushroom. It was not bad actually, though I don't think we'll be eating any more. ;)

I replied quickly because the young are more vulnerable (as are geezers my age), and time may be important in some cases, where tragedy can be averted or alleviated by speedy action.

Anyway, I'm very glad that things are fine. The amount eaten was so small that even with a toxic mushroom, likely he would not have suffered too much. And finding out that it was an edible is a relief.

Thanks to everybody involved for all your help. I think we were very lucky, I've noticed in my hasty research that though no Russula tends to be deadly the scientific names reflect many unpleasant body functions.

THE MAIL BAG

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

I was interested in the "play" about lady's slippers and ash & maple in the last issue. Our latest Oak Ridges Trail Association Quarterly carried a story on the same theme, flower, endomycorrhiza, maple & ash. This time, it was about garlic mustard, and how it inhibits maple and ash growth by repelling mycorrhiza, and thereby slowly altering the character of our hardwood forest here in Ontario <http://www.oakridgestrail.org/Summer2013TT.pdf> (see p 5).

Regards, ER.

Ed comment: *We are overjoyed to learn that somebody, somewhere reads the stuff we publish! Gives us courage to go on for another day. Garlic mustard, Alliaria petiolata, has also found its way to our fair province. We thank John Maunder for the pictures of this mycorrhiza-repellent.*

OUR PARTNER ORGANIZATIONS

- People of Newfoundland and Labrador, through
  - Department of Environment and Conservation
    - Parks and Natural Areas Division
    - Wildlife Division
  - Department of Natural Resources
    - Center for Forest Science and Innovation
- People of Canada, through
  - Parks Canada
    - Terra Nova National Park
    - Gros Morne National Park
- Model Forest of Newfoundland and Labrador
- Memorial University of Newfoundland
  - St. John's Campus
  - Grenfell Campus
- Tuckamore Lodge
- Quidi Vidi Brewing Company
- Rodrigues Winery
- Shorefast Foundation

FORAY NEWFOUNDLAND AND LABRADOR

2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013

The second decade

FULLY SUBSCRIBED!

FOGO ISLAND

Headquarters: *Joe Batt's Arm*

September 6-8, 2013

GUEST FACULTY

Cathie Aime
Renée Lebeuf
Esteri Ohenoja
Michele Piercey-Normore
André Paul
Irja Saar
Roger Smith
Greg Thorn

Meet the MUSHROOMS & LICHENS of Fogo Island!