OMPHALINA

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Newsletter of FORAY NEWFOUNDLAND AND LABRADOR

Vol. VII, No 4
June 2, 2016

FORAY NEWFOUNDLAND AND LABRADOR

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

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

Issues of OMPHALINA *are archived in:*

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

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

COVER

Lyophyllum shimeji (Kawam.) Hongo, undisclosed supersecret site in central NL, 25 Sep., 2012. Photo: Michael Burzynski, who is immune to torture and will not reveal the site. Maybe not immune to bribery, though…

Thought to be a species of the Far East, recently *L. shimeji* has been discovered in Scandinavia, and now here in NL. See inside for the first report of it from North America.

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CONTENT

Message from the Editor

Great news for those of you who enjoy tasting different textures and flavours of wild mushrooms: *Lyophyllum shimeji*, the prized gourmet fungus of Japan, second only to matsutake, is native to our province.

Does it really taste that good? I thought it was the best mushroom I tasted in 2015, and that was when I thought it was *L. decastes*. Thanks to Ellen Larsson, we now know what it is, that it grows in NL, and also what other *Lyophyllum* species grow here (and which species, common elsewhere, are not found here—at least not found so far).

Of course, not all questions are answered, and many others are raised. The companion article deals with *Hypsizygus*, a closely related tasty edible. Again, more questions are raised or left unanswered than are resolved. If you enjoy pursuing riddles, Mycology provides you with endless material to mine.

As always, Foray matters first. Read the Foray Matters and How to Get There. Unless you fly in, getting there is much more involved than past forays, and takes a bit of planning. Keep an eye on our website for additional information, as well as subsequent issues. BTW, no matter what advice you are given about flies not being around that time of year, do bring fly dope. The black flies and mosquitoes of Labrador are legendary, so show them some respect! If they have packed it in for the season, fine. But if not, be ready. Fly dope does not weigh much. Can be bought locally.

Now, for some good news! One person you will not see at our foray this year is Michele Piercey-Normore. OK, that is not the good news. The good news is that the reason she will have to give the foray a miss, is that our own Michele was named Dean of the new School of Science and the Environment at Grenfell Campus of MUN. That's right. Michele will be moving to Corner Brook. No doubt her association with FNL helped her land the job. She begins Aug. 1, making it difficult or her to take the time off this year. But she will be back!

Photo: Roger Smith

Michele came to our foray in 2012 as an invited lichenologist, and has been returning since. She is a member of the FNL board, has done the lichen identification each year and written the "Lichen Report" for our Foray Report issue of Omphalina. But we will not be left without lichen expertise. Troy McMullin, recently appointed Research scientist at the Canadian Museum of Nature, will be there along with Chris Deduke, Michele's former doctoral student (now Doctor Chris), doctoring the Database.

See you in Goose!

andrus

FORAY MATTERS…

Photo: Maria Voitk

Foray 2016 at Happy Valley-Goose Bay!

Unknown to us, some internal miscommunications prevented information about Foray 2016 from appearing on our website. This has now been corrected, and Registrations Forms and other information is there. As it becomes available, additional matters will also be posted on the site. Please check there from time to time, as well as this page in upcoming issues.

Driving to Goose Bay from the Island is an adventure, and has logistical implications for us as well. People have written in, asking whether it is possible to get a ride with somebody driving up. Others have asked whether it might be possible to organize small caravans to drive together—more fun and definitely prudent, especially over the six hour stretch from Port Hope-Simpson to Happy Valley-Goose Bay, where there is no settlement, gas, food, lodging or cell phone service.

Board member Erin McKee stepped up to volunteer as your trip advisor. If you have questions about airlines, local needs, and are not clear or need advice, please write her. If you are driving, please let her know. If you are willing to take equipment or people, please let her know how much room you have for which commodity. Also, if you wish to travel in small convoys, please let her know. She will then put you in touch with each other, and let you sort out whether or how you can help one another. And if you have any questions at all about any kind of travel, she will try to answer them.

<emckeemail AT gmail DOT com>

Veterans of our Foray, please bring your whistles and hats! The first one is free, but we should like to recoup the cost if you lost, wore out or forgot yours and need another. You need to wear them when in the woods to keep our insurance in effect, so we provide them free to all, but a "donation" is appreciated, if this is your second or third, or…

See you in Goose!

Michael Burzynski

HOW TO GET THERE

Photo: Maria Voitk

Erin McKee

By Air

Certainly the easiest way to get to Goose Bay is by plane. Air Canada, Air Labrador, and Provincial Airlines all offer regular service to Goose Bay. Check them all, because your travel service may not have all in its system and some may have specials at the time.

http://www.aircanada.ca

http://www.airlabrador.com/

https://www.provincialairlines.ca/

Direct flights are available from Deer Lake, Gander, and St. John's (Island of Newfoundland); Blanc-Sablon (Quebec); Nain, Churchill Falls, Postville, Rigolet, and Wabush (Labrador), as well as Halifax (Nova Scotia).

Connecting flights can be made via Deer Lake, Gander, St. John's, and Halifax.

Road

Drive the Trans-Labrador Highway (TLH) (https://en.wikipedia.org/wiki/Trans-Labrador_Highway) to turn your Foray experience into a true adventure!

Book your **ferry**, check departure times, arrive 1 hr before scheduled departure <http://www.labradormarine.com/>. Check back for delays due to weather before setting out.

If you plan to rent a car, check about Labrador travel—not all rental agencies rent or insure cars for Labrador.

Connecting Quebec with the Island of Newfoundland (via ferry at Blanc-Sablon), the TLH provides overland access to Goose Bay (driving times approximate):

From Newfoundland: 15 hours from Deer Lake, including the ferry crossing at St. Barbe, NL, to Blanc Sablon, Quebec. Book your ferry

From the southern coast of Labrador: 10 hrs from Blanc-Sablon, Quebec.

From the southwest: 18 hours from Saguenay, Quebec

The TLH is paved only in certain places. Anticipate long-distance, gravel-road driving. Those adventuring along the TLH from the west, through Quebec, would be prudent to bring extra gasoline, motor oil, and windshield washer fluid, as well as emergency flares, two spare tires mounted on rims, and equipment to change a flat tire. Please also carry a first aid kit, bug spray, sunscreen, camping gear, extra clothing and layers, food, and drinking water.

There is no cell phone service along much of the TLH. The province has satellite phones available on loan (no charge) to users of the Trans-Labrador Highway, which can be picked up at several locations along the route. http://www.tw.gov.nl.ca/publications/Satellite_Phones_on_TLH.pdf

Gas is available en route at Manic 5 and Relais Gabrielle (Quebec – Route 389), then in Labrador City, Churchill Falls, Goose Bay (Route 500) and Port Hope Simpson (Route 510). There are rest stops, accommodations, and food available at these locations also.

To check highway driving conditions before you go, call: (709) 896-7840 or 896-7888.

Additional information, including advisories, highway cameras, and construction delays can be found on the province's Department of Transportation and Works website:

http://www.tw.gov.nl.ca/highway.html

http://www.roads.gov.nl.ca/construction/default.stm#Labrador (for construction information)

Additionally, the Town of Happy Valley-Goose Bay provides a great resource on the TLH online: http://www.happyvalley-goosebay.com/newcomers/files/pg/trans_labrador_highway_guide_may_2012.pdf

Please address questions about travel to me, Erin McKee <*emckeemail* AT *gmail* DOT *com*>. I shall be glad to answer or help in any way.

See maps, next page. Print them out from here or download & print maps from our website <www.nlmushrooms.ca>.

See you in September!

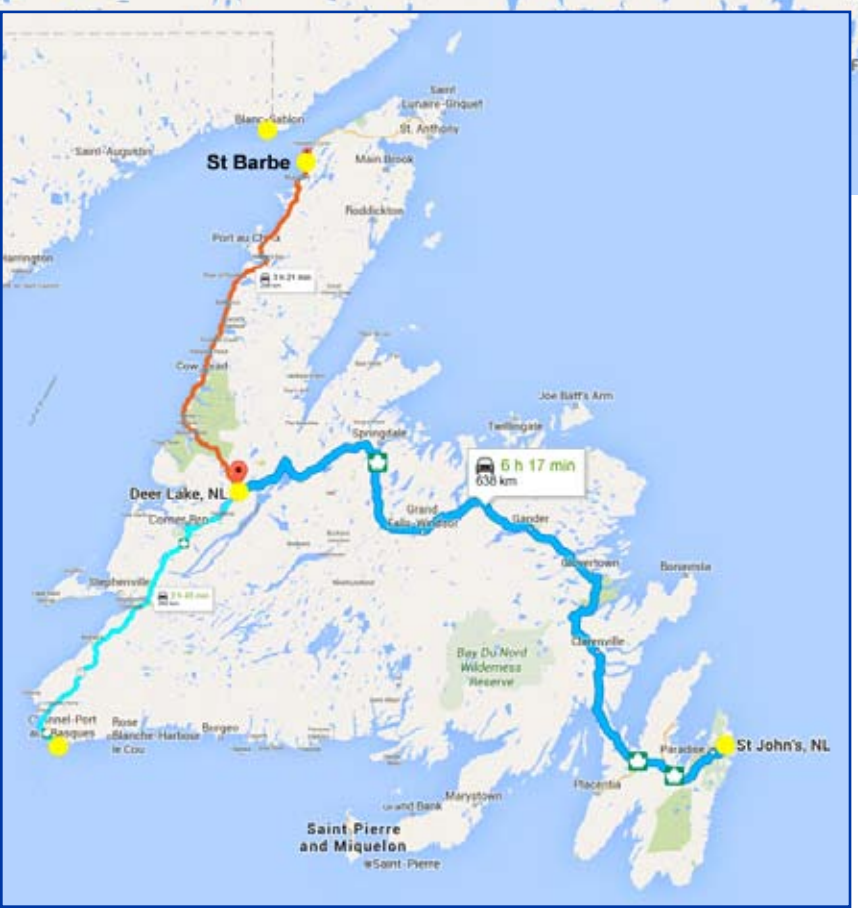
Happy Valley-Goose Bay, NL

Mostly gravel road from Red Bay to Happy Valley-Goose Bay
No settlement, gas, food, lodging or cell phone service between Port Hope-Simpson & Happy Valley-Goose Bay

Blanc Sablon to
- Forteau ..... 15 min
- Red Bay ..... 1 hr 15 min
- Mary's Harbour .....2 hrs 30 min
- Port Hope-Simpson ... .3 hrs
- Happy Valley-Goose Bay ...8 hrs 45 min

Mary's Harbour to
- Happy Valley-Goose Bay ...6 hrs 30min

Port Hope-Simpson to
- Happy Valley-Goose Bay ...5 hrs 45 min



Route from the west via QC not shown. Please do your own research and due diligence on the net.

NF: TCH from east (St John's) or west (Port au Basques) to Deer Lake. From Deer Lake north on Hwy 430 to St Barbe. Ferry from St Barbe to Blanc Sablon, QC.

Labrador: Blanc Sablon to Mary's Harbour, then to Port Hope-Simpson. Consider overnighting anywhere along that stretch. Facilities are very adequate. Reservations advised. Between Port Hope-Simpson and Happy Valley-Goose Bay there is no opportunity to overnight, short of camping.

The Forest of Labrador

Michael Burzynski

I grew up in England, and came to Canada at the age of 10 when my parents decided that things were getting far too crowded in Britain. Our family ended up in a town called Gagnon in northern Québec, where my father, an electrical engineer, was in charge of the electrical systems of a huge iron ore mine. It was a completely different landscape from what I was used to—stark and beautiful and very strange. Gagnon (which no longer exists) was about 150 km southeast of Labrador City, and the landscape is very similar to parts of Labrador, so I find the rock barrens, clear lakes, spruce forest, and sands of the Goose Bay area surprisingly familiar.

Jacques Cartier dismissed Labrador as a landscape of "stones and rocks, frightful and rough". There is little soil—the great ice sheets that covered and shaped eastern North America scraped the plants, animals, and soil from the surface of Labrador during numerous ice advances. When the ice melted, it left sheets of ground rock—sand—that rivers shift slowly towards the sea. The sand fills valley floors, and slows running water, throwing rivers into a slow writhing movement that, over decades, creates meanders, oxbow lakes, shifting sand bars, dune fields, and wide sand flats.

Above and title banner: Large meanders are typical features of rivers running through expanses of loose rock rubble, gravel, and sand.

Previous page, lower: Low-lying sites are occupied by bogs and other wetlands, dryer ridges are covered with forest. Trees tend to be far apart, and the understory is a dense cover of whitish *Cladonia* lichens.

Below: Black spruce clone, typically surrounded by a thick mat of fruticose lichens, like *Cladonia*.

This is a subarctic environment. There is dense forest in the Goose Bay area, but the boreal forest is near its northern limit, retreating into the protection of valleys farther north—surrounded by vast areas of treeless tundra. The diversity of the forest is much lower than in southern Canada. The major tree species of Labrador are black spruce, white spruce, balsam fir, white birch, balsam poplar, showy mountain ash, American mountain ash, choke cherry, trembling aspen, and eastern larch. Trees tend to grow relatively far apart, and the lower branches of the

black spruce often root where they touch the ground, sprouting clones of the original tree so that each tree eventually becomes a small, dense copse of genetically identical trees. The soil is thin, with lots of exposed rock and wet hollows. About 450 km north of Goose Bay, forest peters out completely in the valleys around Okak, and the only species that make it that far are black spruce, white spruce, balsam

Above: Black spruce clone killed by fire, bare mineral soil showing.

Below: Burned forest starting to recover.

fir, larch, showy mountain ash, and balsam poplar. The small diversity of tree species to some extent restricts the number of potential mycorrhizal partners for fungi.

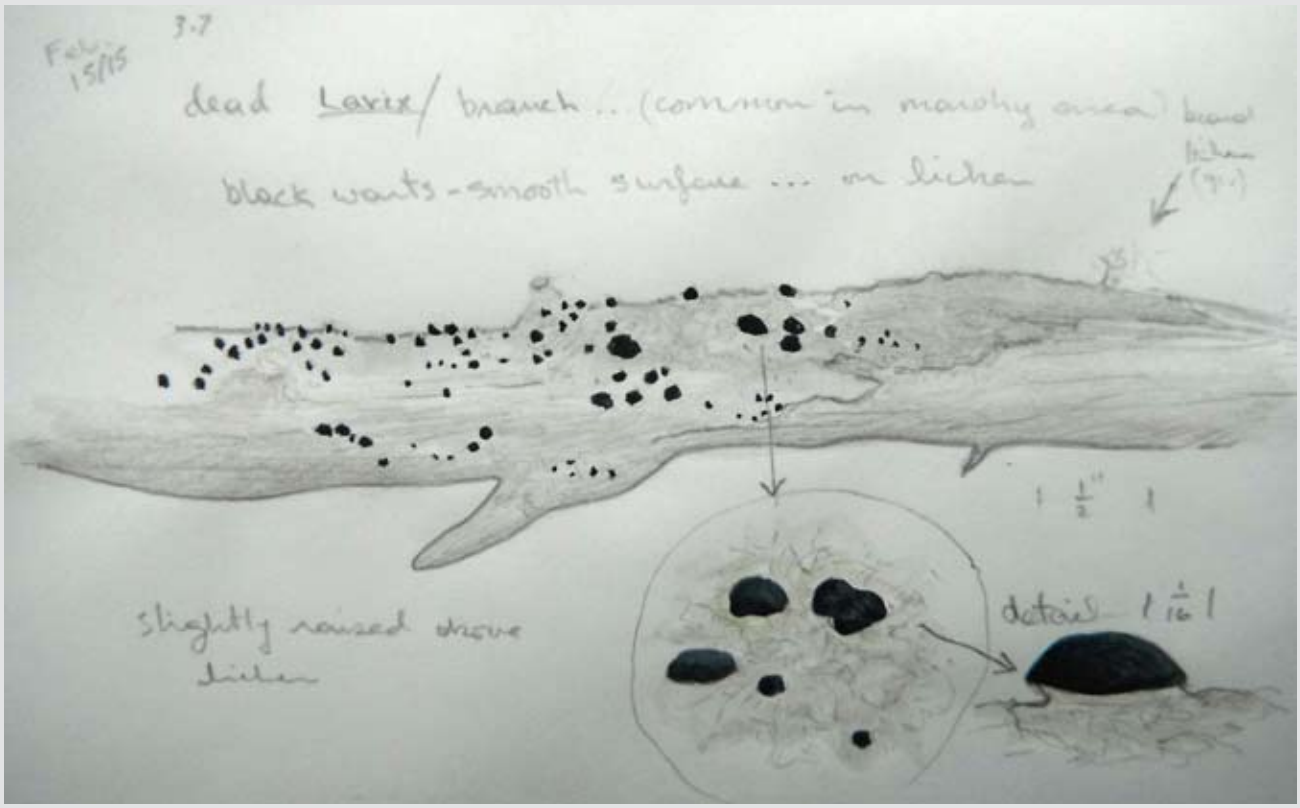
As in most parts of the boreal forest, fire is crucial the forest ecosystem. Wildfires sweep through the forest, burning off the loose organic material that accumulates on the soil surface, killing shrubs and smaller trees, racing through the canopy of larger trees, and exposing bare mineral soil that allows tree seeds to take root. Many species have adaptations that allow them to recover quickly from fire—cherry, poplar, and aspen sprout rapidly from surviving roots; black spruce bears cones that release seeds only after being heated by fire; tiny wind-borne seeds of aspen and poplar can travel for kilometres on the wind; cherry and mountain ash rely on air transport by birds.

Labrador is huge and beautiful, and—as I am sure we will find during the foray—diverse. I can assure you that no-one will repeat Jean-Jacques Audubon's parting words: "Seldom in my life have I left a country with as little regret as I do this".

The Bishop's Sketchbook

Amandinea punctata

Found on dead larch in a site contaminated by a steel mill decades back. The species thrives on pollution. Identified from watercolour sketch by Teuvo Ahti.



Lyophyllum shimeji in NL

A VERY WORTHWHILE EDIBLE

Ellen Larsson, Andrus Voitk

If you like to eat wild mushrooms, *Lyophyllum decastes* is one species really worth knowing. Its common name, fried chicken mushroom, indicates what people have thought of its taste. Its very close relative, *L. shimeji*, known in Japan as hon-shimeji, is prized only second to matsutake in taste, and commands a price to reflect this exalted gourmet status. Although not rare, you won't find these species very often, but when you do, it will not be alone; there is usually enough to feed a small group, and on occasion you can find enough to last a season. This year one of us (AV) was lucky enough to be invited to collect a large fruiting of what he thought was *L. decastes* around an alderbush on the lawn of one of his neighbours (title banner and Figure 1). To him, this turned out to be the mycoculinary highlight of 2015, easily surpassing such big competitors as chanterelle, king bolete, morel, and pine mushroom. While he may like chanterelles equally well, they are so common by comparison, that the novelty factor made *Lyophyllum* the clear winner.

Lyophyllum decastes is one species in a complex of species, covering the Northern Hemisphere. The complex was thought to contain three very similar species: *L. decastes*, *L. fumosum* and *L. shimeji*. Recent phylogenetic studies have shown that each of these forms a species complex of its own, made up of 1–3 cryptic species.[1] As you might have guessed, neither macro- nor microscopic appearance can distinguish these cryptic species from each other too well. Henrik Sundberg, with some Japanese and Swedish colleagues, discovered what seemed to be the prized Japanese gourmet mushroom *Lyophyllum shimeji* in Sweden. With the help of one of us (EL) he uncovered these cryptic species within each species group. Although all are good species, for the moment the additional cryptic species remain unnamed. There have been a myriad of names for these mushrooms, and it is going to be a major effort to sort out which old name might reasonably apply to which species, which name can be dropped as a synonym of an earlier description, and which species is undescribed, requiring a new name.

This is yet another demonstration of how easy it is to define phylogenetic species clades with current molecular analysis technology, but how difficult it is to know what name to apply to them. Unfortunately, no parallel major advances have taken place in taxonomy,

Figure 1. **Lyophyllum shimeji**. *Close-up in the title banner. Even though some distance away, it formed a complete ring around the alder, making it very difficult to imagine that it is not associated with the tree, either directly or indirectly through a mediator. This is the same prized gourmet species that grows in Scandinavia and Japan.*

so proper identification still involves meticulous review of past protologues and type material. This is often made difficult by the lack of good material, paucity of original descriptions, preponderance of competing descriptions (i.e. real or potential synonyms) and several changing interpretations that have evolved over the years. Linking taxa to type specimens or some other from of typification is our major mechanism for stabilizing the system. Unless taxonomy becomes valued—i.e. funded—it will always lag behind phylogeny, setting the stage for continued confusion and instability.

Because some NL mushrooms, identified as *L. decastes*, resembled the Swedish *L. shimeji*, EL examined the NL collections. A total of 22 collections of *Lyophyllum* were reviewed, identified originally as: *L. decastes* (15), *L semitale* (4), *L. fumosum* (2), and *L fuliginosum* (1). Examination showed two to belong to different genera, and the remaining 20 were divided as follows: *L. shimeji* (11), *L. decastes* (5), *L. semitale* (4). Identifications were made by Ellen, who sequenced two collections from each of the two larger groups for confirmation.

Because the present project was limited to the *L. decastes* complex, we shall not deal with *L. semitale* here. However, before dismissing it, for the curious we should explain that *L. semitale* belongs to a group of smaller *Lyophyllum* species that darken or blacken on contact, exposure or injury. In 1982 Clémençon published type studies on 18 such species, to which he added 4 new ones. The following year Clémençon and Smith described 26 new taxa of darkening *Lyophyllum* in North America. With so many taxa, it is possible that our *L. semitale* may hide other taxa; the group is ready for phylogenetic review.

Review of the *Lyophyllum decastes* complex led to the following conclusions:

1. There are only two native species of this complex in NL (at least so far).
2. *L. fumosum* and its close relatives do not seem to be native here (at least so far).
3. Our commonest species of the complex seems to be *L. shimeji*.

Figure 2, adapted from the study by Larsson and Sundberg,[1] shows the place of the two NL species in this ranking. In taxonomic terms, both species in the panel marked *L. decastes* cannot be that species. Because the species was first described from Europe,

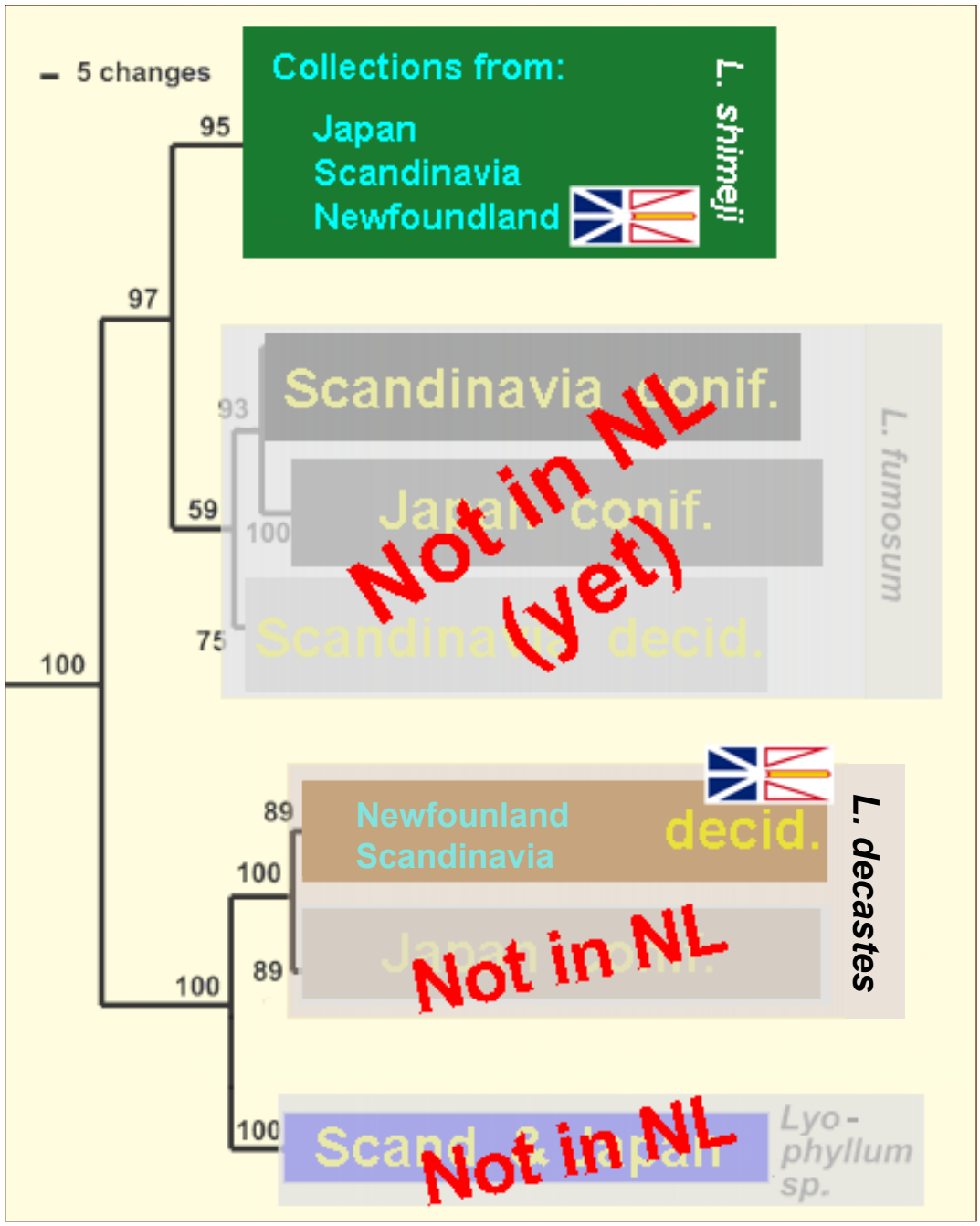


Figure 2. Phylogeny of the* Lyophyllum decastes *complex *(adapted from Larsson & Sundberg[1]).*

Species not found in NL are grayed out and marked in red. ***So far*** *we have only identified two species of the complex here (flagged), primarily differentiated by growth on rich (loamy) or poor (sandy) soil. We can think of no reason* L. fumosum *does not grow in NL, although not finding one in 13 years must mean something.*

This is the first report of L. shimeji *in North America, confirmed by nuclear studies. Growing in poor soil, it is likely a circumpolar species, and search in other northerly regions may recover it elsewhere. Quite likely it has been collected, but identified as* L. decastes.

Future studies may reveal the species to harbour cryptic species within it, like L. decastes, *but current evidence suggests this is the correct identification for our species.*

most likely the European species is the "true" *L. decastes*. Since ours seems to be the same, it is reasonable to apply that name to our mushroom.

The panel marked *L. shimeji* warrants a little comment. In an earlier study, Sundberg and Larsson found that like the other *Lyophyllum* species, *L. shimeji* also harboured two cryptic species.[2] This was supported by studies suggesting *L. shimeji* contains two strains that do not interbreed. However, as Figure 2 shows, the most recent analysis did not identify two genetic clades, and our specimens nestled nicely with those from Japan and Sweden. Thus, for the moment at least, the commonest species of the *L. decastes* complex in NL is the highly praised *L. shimeji*. This species also lends itself well to drying, with a taste a bit mindful of *Boletus edulis* on reconstitution.

Our two species are difficult to tell apart. The initial impression in Sweden was that *L. shimeji* grew with conifers in poor soil, but since then it has been found with deciduous trees as well. The tasty specimen referred to in the introduction and shown on in Figure 1 to grow with alder, turned out to be *L. shimeji*. No wonder AV liked it as much as he did!

The major difference between the two is the richness or poorness of the soil in which they grow. We shall describe *L. shimeji* for you here, but because they are morphologically—both macro- and microscopically—so similar, that description may well be applied to

either of our two species.

One word of caution. After this recommendation, you will be tempted to rush out to get your own taste of this delicacy. Please remember that like most things, if you know the mushroom it is unmistakable, but if you do not know it, it is not nearly as easy as knowledgeable authors are tempted to say. There is always a bit of uneasiness and hesitation in identifying from a description something you don't really know. Do not experiment by eating something on the basis of descriptions or pictures alone. That said, the description will show you that there are a few characters, which together are not found in too many other mushrooms that fruit here.

Figure 3. **Lyophyllum decastes** ***(above) and*** **L. shimeji** ***(below).*** *The colour difference is not meaningful, as both species can vary from warm tones to grayish tones. Similarly, the marbled or tiled cap in the lower specimen is not a meaningful differentiator. Such a pattern can be observed in some specimens of this and many related species and genera—see the following article about* Hypsizygus *on p. 14.*

Description (see title banner, Figures 1 & 3) Cap 5–15 cm diameter, convex, eventually becoming plane, smooth with innate radially streaked fibrils, dry to moist but not slimy, opaque and not hygrophanous, margin inturned for a while, often with fine fibrillar material, brown, varying from dark to light, with yellowish and/or grayish shades. Gills close, three lamellae, unforked, edge smooth, usually slightly decurrent, but notched, making a distinct junction with the stem, occasionally the notching may get straightened out, white, becoming yellowish with age. Stem 0.8–2 cm wide, 5–10 cm tall, cylindrical or thickened at base, no ring or ring zone, white, unstaining. Flesh white, firm, unstaining, non-specific smell and taste. Sporeprint: white. Ecology Unclear: said to be saprobic, with reports it may be mycorrhizal. We have only found it in lawns or meadows, but not alone in the middle of the meadow, rather by trees or near the periphery of the lawn-forest border. This suggests some relationship to trees. The collection shown here grew as a ring around alder, highly suggestive of a mycorrhizal relationship. As mentioned, *L. decastes* tends to be found on relatively rich (loamy) soil, whereas *L. shimeji* grows in poor (sandy) soil. Fasciculate-connate, but not cespitose (i.e. clustered tightly together, clusters arising from a single site, but not from a unified stem base). Season September–October.

Distribution Known from northern Eurasia, North America and Australasia (*L. decastes*). In NL we have collected both species from the west coast and *L. shimeji* from the sandy central NL. We expect the distribution of both to be much wider.

With all the grassland in and around Goose Bay, there should be a good chance of collecting both *L. decastes* and *L. shimeji* at our fall Foray. Look for them!

References

1. Larsson E, Sundberg HL *Lyophyllum shimeji*, a species associated with lichen pine forest in northern Fennoscandia. Mycoscience, 52:289-295. 2011.
2. Sundberg H, Larsson E: *Lyophyllum shimeji*—talltuvskivling, en ny svamp för Sverige. Svensk Mykologisk Tidskrift, 31(2):11-19. 2010.

Photo: Bill Bryden

ERRATUM:

Hypsizygus marmoreus in the woodpile

Andrus Voitk

Since the review of "all" our oyster mushrooms and allies,[1] we added an old *Pleurotus populinus* to the group.[2] Now Bill Bryden from Central Newfoundland sent in photos and specimens of a "new oyster" species for the province, *Hypsizygus marmoreus*, that he found growing in copious amounts in his woodpile. Examination of Bill's specimen confirmed that it fit the accepted description of *H. marmoreus*. Hitherto, the only species of *Hypsizygus* in the province had been identified (by me) as *H. ulmarius*. Bill's new find was used as an opportunity to review our vouchers of the species, which led me to conclude that my earlier identification was erroneous. I now believe that we have one species only, but not the one I reported.

Thus, I report an ERRATUM in my first article.[1]

The safest name to apply to our species, pending type studies, seems to be *Hypsizygus marmoreus* (Peck) Bigelow, in favour of the earlier reported *H. ulmarius* (Bull.: Fr.) Redhead, (or the European *H. tessulatus* ((Bull.: Fr.)) Gillet.)

I shall (re)describe the species here and follow that with a peek into its convoluted taxonomy. This way the majority, who, no doubt, are not interested in its edibility or how to identify it, can now skip these boring first three illustrated pages and go directly to the much more alluring next three of text, discussing its taxonomy.

Description

Cap convex, 5–20 cm in diameter, margins downturned, white to tan in colour, often, but not always with a characteristic "marbled" appearance.

Gills close, somewhat decurrent, usually with a notch producing a clear demarcation between gill and stem; much variation, including decurrent forms; white, turning cream yellow with age.

Stem 4–18 mm diameter, often eccentric, curved, swollen at base, smooth, white. May be very long relative to cap diameter, or equal to it.

ILLUSTRATIONS

Title banner and Figure 1A, next page. Hypsizygus marmoreus *in the woodpile. Note cespitose growth (several stems from same place), long central stem and relatively small cap (under 5 cm diam.), notched gills. Insert shows the only specimen in the group with the characteristic tiling or marbling of cap. Paper with white spore print seen R lower corner.*

Figure 1B, next page. Hypsizygus marmoreus *on fallen poplar. Much wider cap (14 cm diam.), with characteristic marbling pattern. Gills were notched, and stem shorter than cap diameter.*

Figure 1C, next page. Hypsizygus marmoreus, *foray voucher specimen. Cap 13 cm diam., white, staining yellowish, no marbling. Note completely decurrent gills.*

The macroscopic appearance shows wide variation. If all you collected looked like ***B****, you could easily name them "marmoratus" for the marbled cap. Then, if you suddenly found one like* ***A****, who could blame you for thinking it a new species and calling it "elongatipes" (longleg)? And if you found one with gills like* ***C****, who could blame you if you thought it a* Pleurotus*? Yes, they can be misidentified. The microscopic appearance is similar for all. Specifically, spores are subglobose, 4.3–5.8 x 3.9–4.8 µm;* Q_{av}*=1.1.*

Figure 1. Hypsizygus marmoreus. *See caption, previous page*.

HABITUS & ECOLOGY Grows in connate to cespitose clusters of two to several on living (usually in places injury) or fallen hardwood. In NL all but one find has been on red maple (*Acer rubrum*); the exception was on balsam poplar (*Populus balsamifera*); Bill's best guess from the bark of the involved billets is that this find grew on red maple.

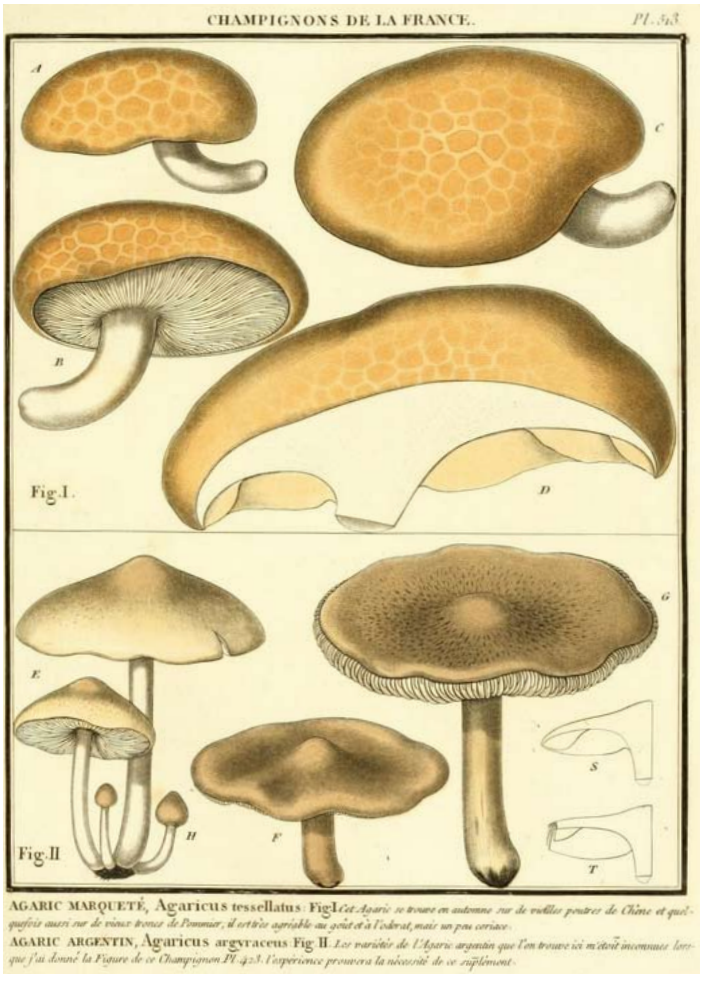
MICROSCOPIY Clamp connections in all tissues, no pleurocystidia, a few siderophilic granules at the base of the four-spored basidia, and globose to sublgobose smooth spores, measuring 4.3–5.8 × 3.9–4.8 µm.

As the illustrations show, the macroscopic appearance varies markedly. Size as well as its proportion to the stem is highly variable; the "characteristic" speckled marbling is often totally absent*; colour varies from white to tan; gills, usually notched, can be decurrent, making confusion with *Pleurotus* easy. The variability in appearance of the four collections I have seen makes me think that determining the species macroscopically invites misidentification. Of all the characters, I suspect that the spore size should be the most reliable to distinguish it from *H. ulmarius*. In the past, I only looked at the shape of the spores to confirm that it was not *Pleurotus dryinus*, without measuring their size. Review of these collections now reveal that all have similarly sized spores, 4.3–5.8 × 3.9–4.8 µm, making me believe that probably *H. marmoreus* is the only species in this province. It is not common: before Bill's find, I have recorded it only three times, and in 13 years the Foray has collected it once.

Edibility

This or a closely related species is much treasured

* If you study related species, you will notice that marbling is a variable character for them as well. And if you study even more distantly related species, you may suspect that marbling is a genetic trait with variable expression through a wide lineage. For example, see the photo of *Lyophyllum* aff. *shimeji* on p. 9. *Lyophyllum* and *Hypsizygus* are related genera.



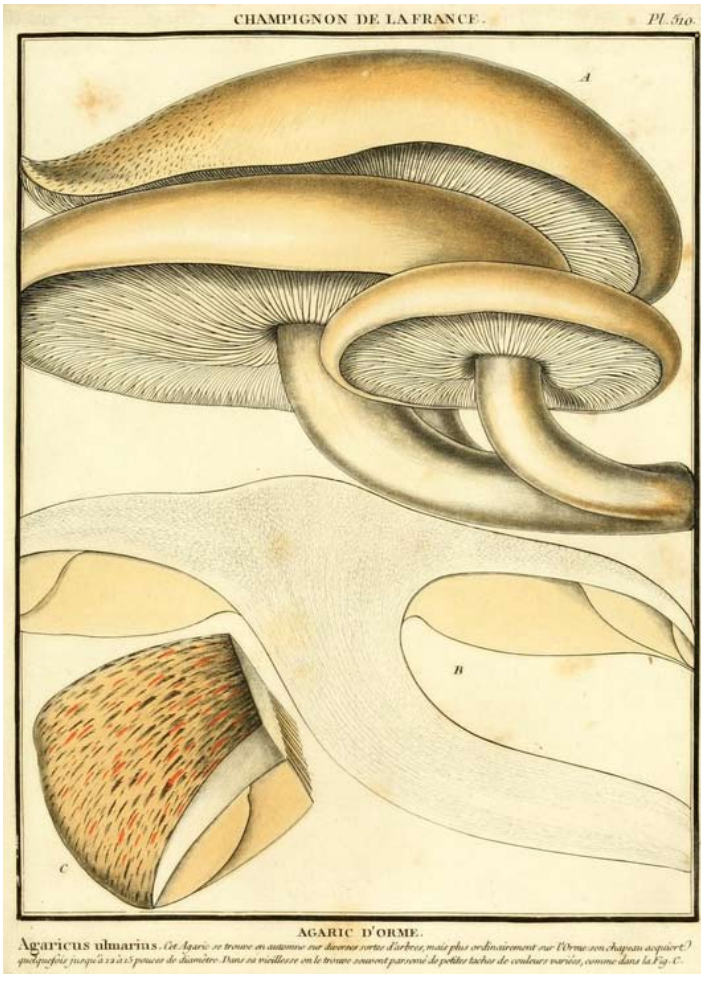


Figure 2. *Bulliard's original 1791 illustrations for* Hypsizygus tessulatus *(upper picture, Left) and* H. ulmarius, *(Right).. See caption, previous page. The suggestion is that the former has an exxentric stem and a tessellate (tiled) cap, while the latter has a central stem and an unpatterned cap with adpressed fibrils. Both have notched gills, not decurrent. If both are good species, they probably share these characters to some degree.*

in Japan, where it is grown commercially, with a brown-capped variety sold as buna-shimeji, and a white-capped one as bunapi-shimeji. Because they grow relatively well, both colours of this gourmet mushroom are often available even in our supermarkets. As food, they are considered to have a strong umami taste. Umami is a taste best known for its ability to enrich existing tastes, giving food a "deeper" taste. In addition to its food value, *Hypsizygus tesselatus* is valued for certain medicinal properties, particularly anticancer effects. As many similar cases, there is reasonable basic science evidence to support the claim, but so far convincing clinical evidence is lacking.

Not every ulmarius is created equal

Despite having only a handful of species, the taxonomy of the genus *Hypsizygus* has been confusing. The three species, *Hypsizygus marmoreus* (Peck) Bigelow, *H. ulmarius* (Bull.: Fr.) Redhead, and *H. tessulatus* (Bull.: Fr.) Gillet, are very similar—if they are separate species at all. Errors in identification are easy, even for seasoned mycologists. Species concepts have been built on interpretation of very terse original descriptions. It is difficult to know which characters have differentiating value, which are common to all, and which have been misapplied.

In 1791 Pierre Bulliard described *Agaricus tessulatus* and *A. ulmarius* (Figure 2).[3] Rolf Singer transferred both to *Hypsizygus* in 1947, but thought that the American and the European *H. ulmarius* represented different species. In North America Charles Peck described *Agaricus marmoreus* in 1872 and *Pleurotus elongatipes* in 1908. Howard Bigelow transferred both to *Hypsizygus* in 1976.

Before the days of molecular studies Scott Redhead studied these species morphologically, and concluded that:

1. the *H. ulmarius* reported from Europe and that reported from North America were the same species,
2. Boulliard's *H. ulmarius* and *H. tessulatus* were the same species,
3. Peck's *H. marmoreus* and *H. elongatipes*, were the same species, *H. marmoreus*,
4. *H. marmoreus* was a separate species, distinct from *H. ulmarius*, and
5. on the basis of an illustration of sporocarp and spores, *H. marmoreus* probably also occurs in Japan.[3]

Thus, in 1984 Redhead reduced a field of five potential species to two. More studies led him to report two years later that

1. *H. tessulatus* was distinct from *H. ulmarius* after all, and
2. *H. tessulatus*, *H. marmoreus* and *H. elongatipes* were the same species.

Therefore, in 1986 according to Redhead there were still two species in the complex, but now they were known as *H. tessulatus* and *H. ulmarius*. The most significant difference between the two was a difference in spore size: the spores of *H. ulmarius* were larger than those of *H. tessulatus*. This became the accepted practice, except that for some reason the species in the Far East continued to be known as *H. marmoreus*.

The advent of nuclear sequencing has not produced the expected clarity in this case. In fact, phylogenetic analysis of the genus is contradictory. Many investigators have reported *Hypsizygus tessulatus* and *H. marmoreus* as separate species, both distinct from *H. ulmarius*. Others have concluded that two, and recently, all three, are conspecific. An underlying problem is that all these studies depend on the

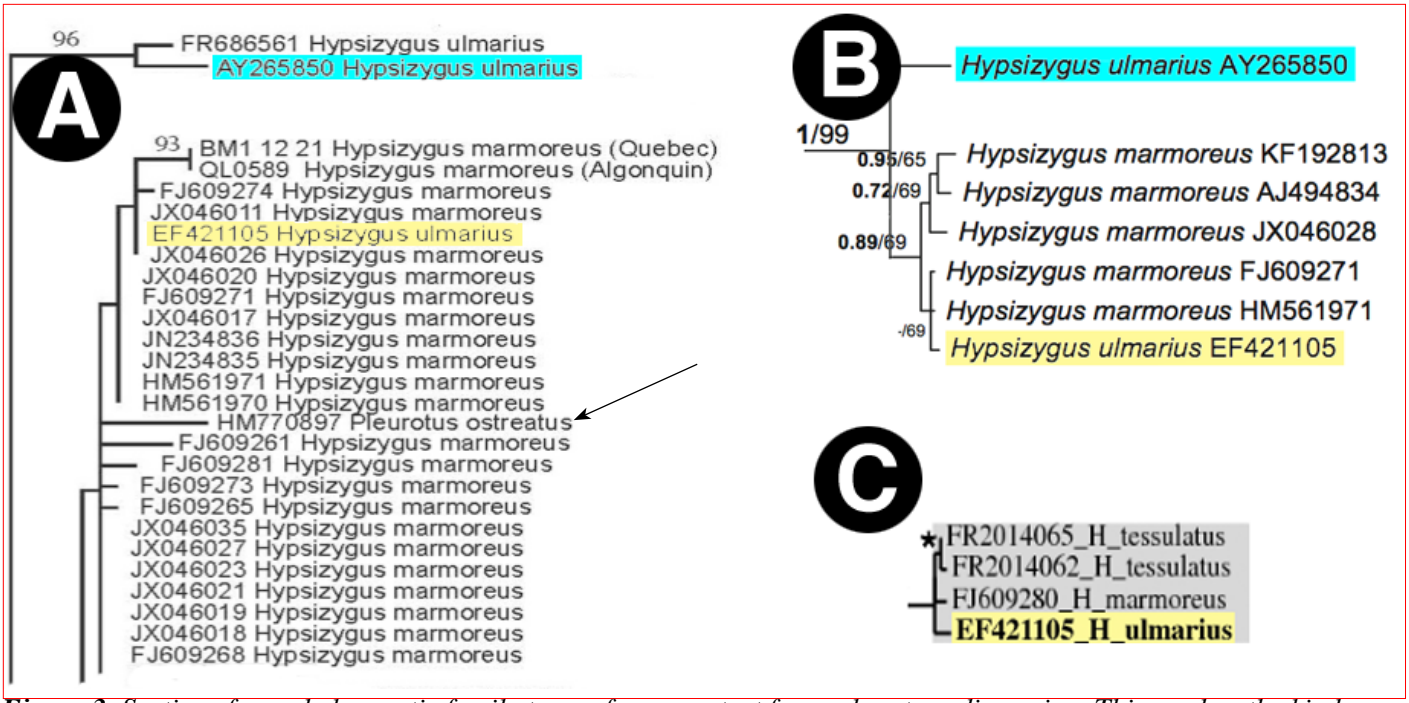


Figure 3. *Sections from phylogenetic family trees of genus* Hypsizygus, *selected from recent publications and slightly modified for illustrative purposes. Please see the text for explanatory discussion. This use has the kind permission of the respective authors, listed in References: A = 4, B = 5, C = 6.*

accuracy of identification of material deposited in GenBank. Experience with other complexes suggests this is not a safe assumption. The following illustration demonstrates the problem.

Figure 3 shows selected parts of three published phylogenetic trees—with minor modifications—constructed with DNA sequences from GenBank. I have highlighted sequences from two collections in GenBank used by many investigators, one in green and the other in yellow. Both are identified as *Hypsizygus ulmarius*, but as trees **A** and **B** show, they do not cluster together. The green one always clusters apart as a separate species, and if it has others, as in tree **A**, they are also identified as *H. ulmarius*. The yellow "H. ulmarius" always clusters within the *H. marmoreus* group. In other words, despite the same identification, the green and yellow are different species. Their associations suggest that most likely the green one is *H. ulmarius*, and the yellow one is a misidentified *H. marmoreus*. Majority consensus taxonomy is not always right, but this seems the likeliest here.

If you set out to make a tree and take **both** these sequences (as in **A** or **B**), they will separate out as different species, and other samples they cluster with will give you an idea of what species they are most likely to be. However, if you want to use **only one** *Hypsizygus ulmarius* as a representative of its species in your tree, it becomes very important that you get the correctly identified specimen. Unfortunately, there is no way that you can tell beforehand whether a deposited sequence really represents the species whose name it bears. Trees **A** and **B** clearly show that there are at least two species of *Hypsizyugus*, most likely *H. ulmarius* and *H. marmoreus*. However, because the yellow collection bears a mistaken name, finding it together with *H. marmoreus*, as in tree **C**, may lead you to suspect that there is only one species, and that *H. ulmarius* and *H. marmoreus* are conspecific. Not so.

We hear so often that GenBank identifcations are unreliable. True. Is GenBank useless? Is GenBank at fault? Not at all!

I am the culprit.

Or people like me.

I am the person who failed to identify a species correctly, sometimes because I did not know enough, sometimes because it was not possible with the technology I had at hand, and sometimes because I skipped a step or made some unwarranted assumptions during the identification process. For example, suppose that I had sequenced my first *Hypsizygus* collection back in 2008. At that time I thought it was *H. tessulatus*, and would have entered its DNA under that name. Shortly after collecting it, I read Redhead's 1986 work that very often what is identified as *H. tessulatus* in North America is really

H. ulmarius; two of the differences are that the latter grows singly or in pairs and has a smooth cap, whereas the former grows in cespitose clusters and has a marbled cap. Because mine grew as a pair, and had a non-speckled cap, I changed my mind and reidentified mine as *H. ulmarius*. Had I decided to sequence it then, I may have deposited the same DNA under the name *H. ulmarius*. After more thought and study, now I believe that spore size is the most reliable determinator, and hence for the time being the best identification for my find is *H. marmoreus*. Were I to sequence it now, its DNA—the very same DNA from the very same mushroom as in both previous cases—would now be entered as that of *H. marmoreus*. Thus, had I sequenced my specimen and deposited its DNA in GenBank, it could have borne one of three different names, depending on my species concept at the time!

You think that is bad? Did you notice in the middle of all the *H. marmorei* in tree **A** there is an oyster mushroom, *Pleurotus ostreatus* (arrow)? A *Pleurotus* among *Hypsizygus*? Impossible! Au contraire. For a while I had mistaken our *Pleurotus dryinus* for *Hypsizygus*. The opposite could be equally possible. Then I discovered that the decurrent gills were a reliable differentiator. Flick back two pages and look again at the specimen with the decurrent gills. Without a speckled cap, it resembles a *Pleurotus* more than a *Hypsizygus*, and surely could have been signed off as one, were it not that Gro Gulden, the identifier, examined it microscopically. For those who have done battle in these trenches, it is not difficult to see how an occasional oyster falls into the marbles.

Thus, if identifications in GenBank are unreliable, they are so because of people like me. GenBank provides a great service by making DNA sequences of organisms available to all scientists. Free access to such material is invaluable, but scientists need to guard against inaccurate identifications by people like me: caveat emptor. Global or continental studies are more likely to miss the devil, who is in the details. Small studies of specific groups like this, utilizing type specimens, are more likely to pin down exactly which *Hypsizygus* is hiding in your woodpile.

While we await such results, what name would be the "safest" to use for our mushroom? Many characters seem very variable, and we know that often morphologic characters do not have genetic significance. The one character, if present, that has proven to be more reliable genetically, is a difference in spore shape or size. Therefore, if *H. ulmarius* has larger spores than the other(s), as Redhead reported, then our species is not *H. ulmarius*.

Is there one remaining species, as Redhead suggested, or are there more? Redhead's report was the best that could be done with morphology. In the molecular era, we know that many morphologically similar species show phylogenetic divergence on different continents. Some people have reported differeces between European *H. tessulatus* and *H. marmoratus* from elsewhere, but the problem remains that we cannot be certain what species were really used. Type material needs to be sequenced for valid comparisons. Meanwhile, we know from past experience that in any complex, what Peck described is also the most likely species to grow here, so we should be safe in using the Peck name. Should studies show synonymy with the older species (*H. tessulatus*), the change will not be difficult.

For your information, Bill Bryden has sterile cultures of this mushroom, so if you wish to grow your own or want to study its DNA, please let me know and I can pass on your request.

Now, honestly, is this Byzantine tract of words not a whole lot better than any discussion of identification or edibility, with lots of nice, big pictures?

Acknowledgments

I thank Bill Bryden for sending in his specimen and thank the authors of trees A, B and C for permission to modify, cut and use them, and particularly thank Jean-Marc Bellanger for helpful discussions of the subject.

References

1. Voitk A: The oysters of NL. Omphalina 4(6):12-15. 2013.
2. Voitk A: *Pleurotus populinus* Omphalina 6(5):15. 2015.
3. Bulliard JBF: Herbier de la France, t 11, fasc 127-132, pls 505 & 508. Diderot, Debure Behie, Paris, 1791.
4. Tudor D: Fungal pigment formation in wood substrate. PhD thesis. University of Toronto. 2013.
5. Sesli E, Vizzini A, Contu M: *Lyophyllum turcicum* (Agaricomycetes: Lyophyllaceae), a new species from Turkey. Turkish Journal of Botany, 39:512-519. 2015.
6. Bellanger J-M, Moreau P-A, Corriol G, Bidaud A, Chalange R, Dudova Z, Richard F: Plunging hands into the mushroom jar: a phylogenetic framework for Lyophyllaceae (Agaricales, Basidiomycota). Genetica, 143:169-194. 2015.

THE MAIL BAG

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

Your conclusion that a king bolete under a birch must be *Boletus betulicola*, as you claimed in OMPHALINA 7(2):12–13, 2016, is only one possible explanation. The phylogenetic support for this species seemed sketchy at best, so you may still be dealing with *B. edulis*. Finding it under birch does not prove it is a birch partner. The circled birches on the attached photo are surrounded by a lush growth of spruce seedlings, while the others on the same lawn are not. Your habitat photo of *B. betulicola* does not show enough detail to see if your tree had some small spruce under it that you did not notice. Might the mushrooms be spruce seedling partners?

Harvey W.

Dear Harvey,

WHAT!!! Me not notice??? How dare you? Sorry, just kidding. Nice photo and good point.

Actually, I did notice: the birch in the article did have a few 2-3 cm spruce seedlings under it, hidden in the grass. If you really squint hard, you can probably make one out just to the right of the close-up *Boletus* photo at the end of the article (p. 13). Such a small number of such tiny seedlings made me discount them as serious contenders for partners to such a large fruiting of such large mushrooms, but you could be right.

There is a lot that goes on under the ground that we do not know. Why do only some of the above birch have spruce under them, and not others? Ignoring the one surrounded by rocks, they all seem to be equally accessible to a lawn mower. Is there a birch-spruce two-way relationship mediated by a mycorrhizal fungus that is associated only with some trees?

Ed.

Your notes on the *Boletus edulis* complex (OMPHALINA 7(2):12–13, 2016) were very interesting! (Also the *Morchella* article.) It would be nice to see Bakker's study redone with new material. We do believe in *B. betulicola*, but who knows if it is heterogeneous?

Best regards,

Teuvo Ahti

Thank you for your kind note, Teuvo. Yes, a repeat study of the *B. edulis* complex would be very welcome. Your use of the word "believe" was very accurate. We can debate all we want, but we'll only **know** this if we investigate. Restudy the group, and also analyze root tips for mycorrhizal partners. Then we shall know who's in bed with whom. Until then it makes for entertaining speculation. So much work, so little time!

Ed

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