OMPHALINA

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Jun. 14, 2015

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

Polyozellus multiplex, Mount Desert, Seal Harbour, Maine, USA, August, 1897. Phound by Mrs Elizabeth W. Woodward, fotografed by Mr Wright. Who was this lady, who at age 56 walked the woods, observed and discovered natural history phenomena, hired (?) a photographer to record this find, knew and corresponded with the leading mycologists in her area, sent them photos and specimens? Unfortunately, we don't know much of her. What we do know, you can read inside. Of Mr White we only know that he was a photographer. Other than that, we do not even know his first name.

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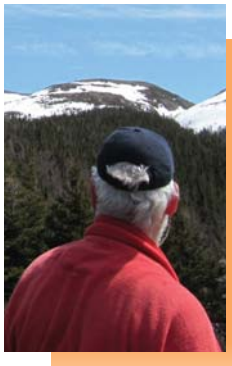
CONTENT



Message from the Editor

Midsummer approacheth, the hard winter is phorgotten, and all nature prepares for autumn phruiting. Take a breather before the main mushroom season and join us for a look inside herbaria: two detective stories and one chase, to give you an glimpse into the sort of problems encountered on the taxonomic side of mushroom science.

Taxonomy is an attempt by mankind to classify nature into manageable and defined units, so that we can speak intelligibly about them with each other. It is inherently hopeless, because we impose an artificial system on nature, who has no need for our rules or our system. But if we wish to communicate with each other, we must eschew the luxury allowed nature to thwart our system; we have to respect it.

Over a quarter millennium, many taxa have been proposed, and many of them have undergone several interpretations. There are a myriad of names for what may be the same thing. Adding new names in this setting often adds more confusion. At the same time, we do need to have names for things to talk about them. A great responsibility goes with proposing nomenclatural novelties—first we should do all we can not to trample the work of investigators who went before us.

The coin of herbaria are type species, those collections that bear the name of the species and its description. All scientists refer to these collections to study a species. Herbaria become the stewards of stability in the biosciences; the collections entrusted to their safekeeping are priceless. But, just like our rules, herbaria, because they are built, filled and managed by us, mere mortals, may run into problems—and we need to solve them.

Cultures that understand the value of herbaria take pride in them. Governments fund them and benefactors support them. People are proud to house them in edifices like the one shown on p. 4. In this regard, it is tragic that the culture of our province is mired in a considerably more primitive age. The outward aesthetics of our provincial museum are second to none. Alas, an empty shell! Inside, this Provincial Museum is without a curator for Natural History!!! We do not have space to house collections or the staff to look after them. The Foray's collection can not be curated at the Rooms. Imagine—so far this invaluable resource is handled out of the basements of a few individuals!

Regular readers of Omphalina know how much work has come out of this collection. Clearly, these three articles, discussing various aspects of solving taxonomical problems, are but by-products of other research, based on the Foray collection. Although we have an institution with a mandate to curate the natural history artefacts of the province, this institution is not able to manage a valuable collection of specimens—photographed, databased and professionally identified. Furthermore…

… Oops … our apologies, dear reader, somewhere we slipped off track. It happens more frequently with our new medications. Just ignore this last bit. If your own heart pills are topped up, enjoy this potboiler of suspenseful cliffhanging thrillers.

See you at the Foray!

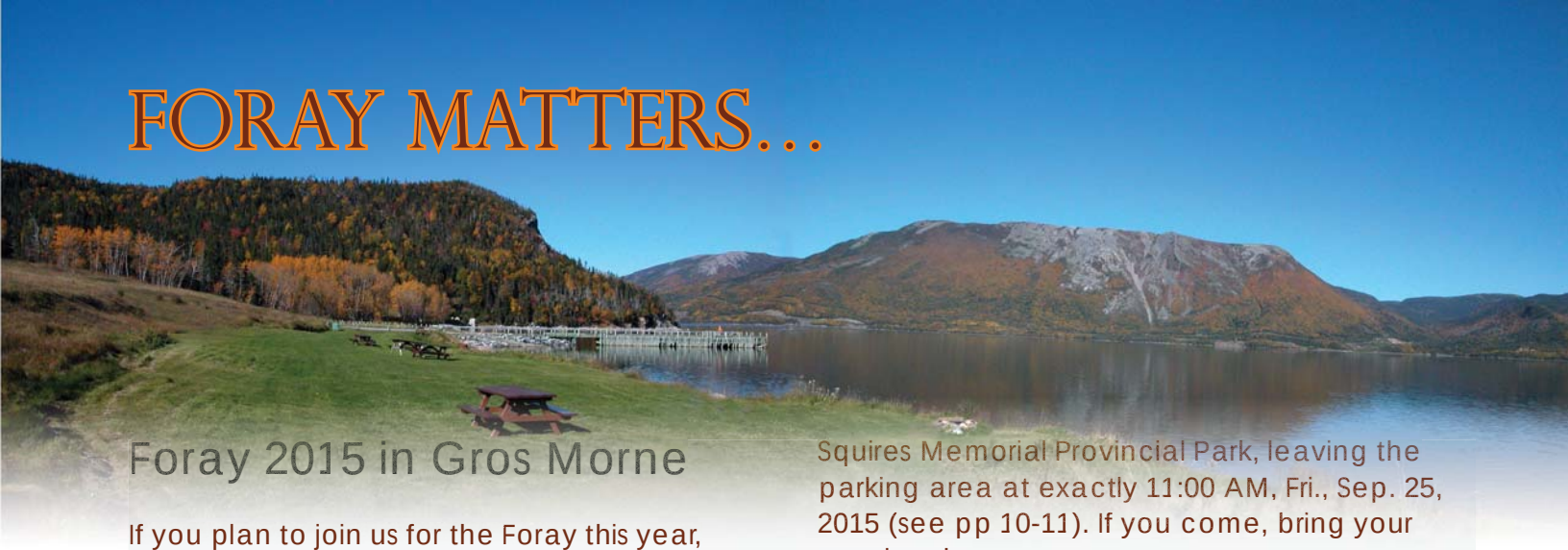
andrus

PS:

We have received a few comments that there is too much content to absorb. As you may have noticed, both the frequency and content has been reduced recently. Comments? Enough trimming? More?

a

FORAY MATTERS…



Foray 2015 in Gros Morne

If you plan to join us for the Foray this year, please try to register as soon as you can. We have not been able to take all comers these past 6 years, and it looks the same again. Registrations are being filled apace, and in the words of our Registrar, "…when the music stops there's going to be some disappointed regulars."

Please note that for those able to make it, we begin the foray with a **mycoblitz** of Sir Richard Squires Memorial Provincial Park, leaving the parking area at exactly 11:00 AM, Fri., Sep. 25, 2015 (see pp 10-11). If you come, bring your own lunch.

Participation fee covers room and board from Fri supper to Sun lunch. Bedding is provided, but bring your own towels, soap and shampoo. Alternately, these may be purchased from Killdevil for $3.50.

Michael Burzynski
President

Faculty, 2015. As always, faculty bios will be in the Program Booklet. Here we introduce those faculty, who join us for the first time.

Andy Methven is an emeritus professor of mycology and lichenology in the Department of Biological Sciences at Eastern Illinois University. Among his research interests are systematics and ecology of fleshy fungi, mycogeography, the application of molecular techniques to fungal systematics, and the identification and distribution of lichens in the Midwest. His current research program is examining the distribution of the mushroom genus *Lactarius* in the Northern Hemisphere, and the application of molecular techniques to phylogenetic studies in the mushroom genera *Clavariadelphus, Lentaria* and *Macrotyphula*.

Andy Miller is the mycologist at the Illinois Natural History Survey at the University of Illinois Urbana-Champaign. He specializes in the identification of fungi using morphology and molecular DNA sequencing methods. Having traveled throughout the world, he is especially interested in fungal biodiversity and the discovery of new species. His lab is currently studying the relationships of a wide variety of fungi ranging from false morels and earth tongues to pyrenomycetes and loculoascomycetes.

Detective in the herbarium

Andrus Voitk

The William and Lynda Steere Herbarium. Photo: Ivo Vermeulen. Permission to use courtesy of the New York Botanical Garden

Type specimens are the holy grail of bioscience. These are the collections or other records (occasionally only fragments, cultures, seeds, spores, DNA, or illustrations) of a species described for the first time and given a scientific name. These are the collections to which scientists turn ever after to study the species, and these are the final arbiters to determine whether other collections are the same or a different species. Often the original description (**protologue**) is quite laconic, applicable to a wide variety of similar species, and often over time these original descriptions have been reinterpreted, with characters added that were not included in the protologue, possibly even undetectable with the technology of the time. In contrast, the type collection does not change and can not be reinterpreted; well preserved, many characters will remain and none can be added.

Stable taxonomy depends on robust type collections. In addition to insufficient or incomplete material, collections may deteriorate with time. Bacteria, moulds and insects can do damage to specimens, as can excessive heat during drying, and various other environmental or stochastic events. The era of DNA study has revealed that older specimens often do not yield sufficient DNA that can be amplified for use in analysis. DNA study has also brought to the fore another problem with fungarium material: mixed collections.

What are mixed collections? Most forays have display tables where participants can view the collected species neatly arranged on trays, each with a tag bearing its name. It is quite common to consolidate such collections, so that all collections of *Laccaria laccata*, for example, are placed on the one tray with that name. Students of *Laccaria* will tell you that closer examination of such material may reveal that the *L. laccata* tray has specimens of *L. bicolor*, *L. proxima*, *L. nobilis*, *L. longipes*, and other similar species on it. Similar situations have been found with some type collections: inadvertently some similar species have been included in the collection.[1] Obviously, this creates a problem.

Where such a possibility exists, scientists studying **holotype** collections (original material identified by the protologue as that on which it is based) must first determine whether the collection is mixed. If new species are discovered, comparison to known species must be made with known type material and not with similar species inadvertently included in the type collection. If a mixed collection is found, the "true" species needs to be identified from the rest of the collection. Those portions can then be declared a **lectotype**, although the original holotype collection must remain intact. "Physical type material is sacrosanct—even if demonstrably in conflict with the protologue—and cannot be 'cleaned up'" (Tom May, Secretary of the Nomenclature Committee for Fungi, personal communication, 2015).

In the course of studying the holotype collection of *Polyozellus multiplex* (Underw.) Murrill, I encountered such a potential problem. In 1899 Lucien Marcus

Underwood described a new species, *Cantharellus multiplex*.[2] The specimen on which this description rests was sent to him by Mrs Elizabeth W. Woodworth, and now rests as the holotype for the species in the Steere Herbarium of the New York Botanical Garden. The herbarium sheet is kept in a folder, and has glued to it four folded paper packets, numbered 0080296, 0080297, 0080298, and 0080300. Figure 1 shows the sheet and the contents of the respective packets.

My task was simple: examine the holotype and harvest tissue for DNA analysis from it. The difficult part was to determine what is the holotype. The presence of four distinct and numbered packets raised the possibility of a mixed collection, where each packet might represent a different organism. Only one can correctly be designated as holotype. There was no record on the herbarium sheet to explain how or why its contents ended up in four separate packets.

Herbarial practice is to keep notes and other documents related to the collection with the collection, and each time it is examined, the new examiner is expected to leave an annotation of the pertinent findings, opinions or conclusions, again to be kept with the specimen. In addition to the fungal material in packet 0080300, it contained an undated written description, a small black and white photograph and two letters (Jan. 19, 1899, and Feb. 6, 1899) to Prof. Underwood, all sent by Mrs Elizabeth W. Woodworth, the lady who collected the specimen. Two packets were annotated by H. E. Bigelow in 1973 that in his opinion the contents were *Polyozellus multiplex* (Underw.) Murrill.

Mrs Woodworth found some unusual, leafy, black mushrooms in 1897 and 1898. She first sent a

***Figure 1**. The holotype collection of* Cantharellus multiplex *Underwood, from the Steere Herbarium of the New York Botanical Garden. The herbarium sheet with the four packets is on the right, and the fungal contents of each of the packets on the right. Packet numbers indicate the source for each. Bars scaled for 5 cm.*

***Figure 2**. Lucien Marcus Underwood. From humble and impecunious beginnings, he rose to the forefront of academic prominence by dint of his own hard work, both physical and mental. A gifted orator and author, at home as much in the arts as the sciences, he was known for his generosity, friendliness and objectivity. At the age of 54, the peak of his powers not yet tapped, financial losses propelled him into such profound despondency that he committed suicide, even attempting to take his family with him.*

Photograph in the public domain, from Wikimedia, source: Bulletin of the Torrey Botanical Club, Vol. 35, Jan. 1908, photographer unidentified.

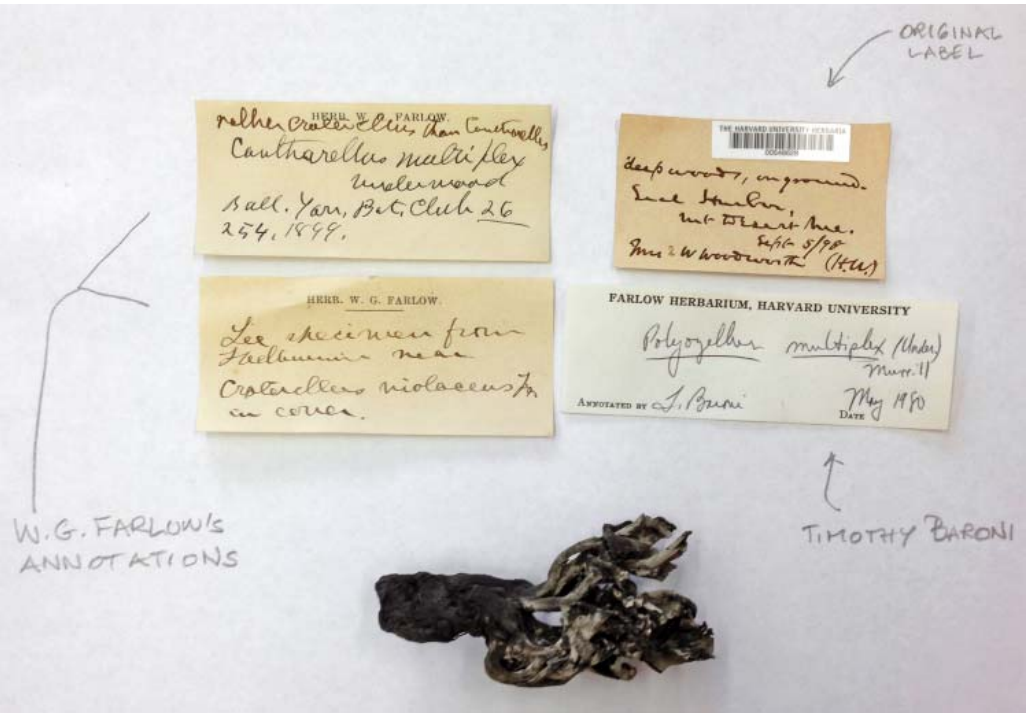


***Figure 3**. Mrs Woodworth's second collection of 1898, unnamed, in the Farlow Herbarium of Harvard University. Hollis Webster's initials on the original label. Farlow's annotations on the left and Baroni's bringing it to* Polyozellus multiplex *in 1980, below the original.*

Photo: Don Pfister

photograph and description to Prof. Charles H. Peck, who replied that he did not know the mushroom. Then she sent a specimen to Mr Hollis Webster, who also was not certain of its identity. Finally, she sent a specimen to Lucien Marcus Underwood, Professor of Botany at Columbia University and Chairman of the Board of Scientific Directors of the New York Botanical Garden (Figure 2). Underwood recognized it as a new species and described it.

Mrs Woodworth's letters to Prof. Underwood were read for clues to why the contents were in four packets. On January 19, 1899, she states, "I have found it for two years in the same place—two plants each year." She states that in 1897 she did not preserve any specimens. This leaves at most two collections in 1898, and we need to find out whether the holotype collection has material from one or both of them. Her letter goes on to say, "This year I sent a plant to Mr Webster of the Boston Mycological Club. He had never seen it, but thought [it] a *Thelephora*."

Mr Hollis Webster was a founding member and long time Secretary of the Boston Mycological Club. At the time the BMC had its own herbarium, so a specimen could end up there. The BMC herbarium was transferred to the University of Massachussetts Amherst College herbarium with Howard Bigelow, and later donated to the Steere Herbarium of NYBG by Roy Halling. No other collection of *Polyozellus multiplex* from 1898 exists in the Steere, and in the holotype no packet is marked "ex BMC".

Is it possible that this specimen ended up elsewhere? Hollis Webster often consulted Prof. W. G. Farlow, and it is a reasonable assumption that a consultation about a striking unidentified species would result in its placement in the Farlow Herbarium of Harvard University. Indeed, pursuing this possibility in the Farlow Herbarium turned up a collection of *Polyozellus multiplex*, collected September 5, 1898, from Mt. Desert, ME, by Mrs E. W. Woodworth, and initialled HW (Hollis Webster) and subsequently annotated by Farlow (Figure 3).

Mrs Woodworth only found two sporocarps in 1898. One, collected in September, was sent to Mr Hollis Webster, and is now in the Farlow Herbarium. Therefore, the material sent to Prof. Underwood, must be the single remaining fruit body, collected in August. All the four packets of the holotype collection, each clearly marked as collected in August, 1898, must come from a single collection, consisting of a single sporocarp. The detailed letters of Mrs Woodworth allow us to reach this conclusion with confidence.

How did this single fruit body end up in four separate packets? The history is not recorded in the available material, but some speculation can produce a plausible explanation. Underwood's protologue states it is based on "specimens"—note the plural—sent to him by Mrs Woodworth. The appearance of the fruit body in the holotype packets suggests that it had been dried in a plant press, not uncommon at the time. Sporocarps of this species can be quite large: my biggest single *Polyozellus* sporocarp is divided among six separate packets. Using a plant press instead of an air dryer may make them more compact, but

to make pressing bulky specimens easier, it would seem reasonable to split the fruit body. This would account for packets 0080296 and 0080300, both of which contain relatively intact specimens. These exsiccates are very friable, and quite likely in the process several fragments broke loose. It might be reasonable that these were saved and placed in a separate packet, thus explaining packet 0080298, the one with the larger fragments. The fourth packet, 0080297, with the smallest fragments, clearly states "*Polyozellus multiplex*, Mt. Desert, Maine, Piece broken off. See herbarium sheet for rest." Packets 0080297 and 0080300 were annotated by H. E. Bigelow. This makes it most likely that 0080297 contains fragments that resulted from events surrounding Bigelow's examination of 0080300 in 1973, whether during packing, unpacking, shipping or examination.

The above paragraph is speculation, an attempt to explain how the holotype collection came to be spread among four separate packets. Whether this is how things happened or not, is not important. It is important to know that the detailed documentation supplied by Mrs Woodworth supports only a single sporocarp's being sent to Prof. Underwood, making everything in the holotype collection a bona fide part of the holotype specimen. Nothing in the documentation supports the presence of additional collections.

A comment is warranted about the photograph in the holotype collection (cover photo). The same photo appeared in Underwood's protologue. Mrs Woodworth states that it was taken by a Mr White of one of the specimens that she found in 1897. She also states that she did not preserve specimens from 1897. Thus, this photograph is illustrative of the species from the type locality, but not of the actual specimen described in Underwood's protologue, now preserved as the holotype collection.

Discovery of evolutionary relationships has brought about disruption in ranking based on morphologic similarity. Herbaria, depositories for scientific collections, provide the anchor that stabilizes taxonomy in this period of turmoil. Ironically, the same DNA work has also shown that many type specimens, thought to be reliable, consist of mixed collections in need of resolution. This does not invalidate the worth of type collections, but merely serves to underscore the importance of adhering to best herbarial practises. Part of these best practises is not to mix collections. Another part is the keeping of meticulous records. The detailed accounts of Mrs Woodworth and the archiving of an interesting specimen by Hollis Webster allowed us to determine a question of reliability of this holotype collection.

***Figure 5**. Atsushi Yasuda in 1914, six years before receiving a black leafy mushroom from Z. Tasiro. Because I have no photo of Hollis Webster, Atsushi Yasuda represents both young scientists, who recognized on first encounter that* Polyozellus multiplex *belongs with the thelephoras. We have no record why, and can only assume that it may have been on the basis of the microscopic appearance of the spores.*

Lloyd named the species Phyllocarbon yasudai *in honour of Prof. Yasuda. More knowledgeable linguists subsequently corrected it to "yasudae," possibly treating "Yasuda" as a feminine proper noun because it ends with a. I submit that while Lloyd did not get the mushroom right, he did get the gender treatment of the name right, taking its latinzed nominative as "Yasudaus," masculine, since the professor was a man. The genitive, "of Yasudaus," is "Yasudai." Classical scholars welcome to weigh in.*

An interesting footnote to this story reveals the uncanny perceptiveness of some people encountering this mushroom for the first time. Credit is due the 36-year old English and Latin teacher, Mr Hollis Webster, for suspecting that the specimen might be a *Thelephora*. Whether this was Webster's own conclusion or one formed together with Farlow, we do not know. Farlow's annotation that he thought the species fit better with *Craterellus* than *Cantharellus*, both quite a distance away from

Thelephora, suggests—but does nor prove—that Webster's response may have reflected Webster's own opinion, made before consultation.

Webster was not alone in thinking this species was a Thelephora. In 1920 Prof. Atsushi Yasuda of Tohoku University in Sendai, Japan, (Figure 5) received the same species, collected from Mt Kirishima by Z. Tasiro. He also thought it was likely a *Thelephora*. Unsure, he sent a portion to the American mycologist, Curtis Gates Lloyd, who thought it was a hitherto unknown pyrenomycete (an ascomycete), and named it *Phyllocarbon yasudai*.[3] This is why, if you ever look up *Polyozellus multiplex* in any taxonomical work, you will see that name listed as a synonym.

It took 54 years after Webster and 33 after Yasuda, before Imazeki, on the basis of spore shape and the presence of thelephoric acid, placed *Polyozellus* among the Thelephorales, where it is to-day.[4]

Acknowledgments

I thank the Steere Herbarium of the New York Botanical Garden for permission to examine the holotype, photograph the exsiccata, reproduce the photograph in the collection, and also Barbara Thiers for help to use the photograph of the Herbarium in the title banner; Gros Morne National Park Herbarium for requesting the loan on my behalf; and the Farlow Herbarium of Harvard University for permission to photograph the second collection. I also thank Don Pfister for photographing that collection, for providing additional information, and for reviewing the MS; Jason Karakehian for providing information from the BMC archives and elsewhere, and for reviewing the MS; Diane Woodworth Liebert for providing information about Mrs Elizabeth W. Woodworth; and Ellen Bloch for providing additional data from the Steere Herbarium. I also thank Tom May for a discussion on holotype collections, Atsushi Yasuda (unrelated) and Tohoku University Archives for the photo of Atsushi Yasuda, and The Smithstonian Institute for the privilege of examining Lloyd's *Phyllocarbon yasudai*. I thank Susan Goldhor for organizing some of the help I had, and Greg Hartford for permission to use his photo of Seal Harbor at the close.

References

1. Saar I, Voitk A. 2015. Type studies of two *Tricholomopsis* species described by CH Peck. DOI 10.1007/s11557-015-1068-5. 2015.
2. Underwood LM. A new *Cantharellus* from Maine. *Cantharellus multiplex.* Bull. Torr. Bot. Club, 26:254-255. 1899.
3. Lloyd CG. Mycological notes. Mycological writings, 6:1029-1101.1921.
4. Imazeki R. *Polyozellus multiplex* and the family Phylacteriaceae. Mycologia, 45:555-561.1953.

Little Long Pond, near Seal Harbor, Mount Desert Island, Maine. From a coniferous forest like that in the background, Mrs Elizabeth W. Woodward collected the first Polyozellus multiplex. *Photo: Greg A. Hartford, AcadiaMagic.com*

The Bishop's Sketchbook

Tricholomopsis sulphureoides update

Irja Saar, Andrus Voitk

Readers with better memories will recall that in 2011 we published a review of the genus *Tricholomopsis* in the province, where we mentioned that our *T. sulphureoides* resembled that of the recently described *T. osiliensis* from Europe.[1] Molecular studies of the two species found that they were conspecific.[2]

At the time we also got a small piece of tissue from the original collection identified by Peck as the type on which he based the description of what is now known as *T. sulphureoides (Figure 1)*. Much to our surprise, this piece turned out to be genetically conspecific with *T. decora*, a much commoner and scalier species than *T. sulphureoides*. This brought up a question: did Peck by error describe a particularly smooth collection of *T. decora* as a new species, or is his type collection mixed with several species?

There was a small hint: the type collection contains 17 intact fruit bodies and some fragments. We have never seen a single collection of *T. sulphureoides* with over eight fruit bodies, making the likelihood high that the type collection comes from more than one source. Fresh mushrooms differ in appearance, but these differences are not as obvious after drying. Microscopically, there are differences in their spores, but there is sufficient overlap to prevent firm conclusions. Analyzing the DNA from a wider sampling of the type collection should answer this question. Our findings to answer this question have recently been published.[3] Here we update you on these findings, as they apply to *T. sulphureoides* in NL; the original article discusses a similar phenomenon with another Peck type collection.

The DNA from another four fruit bodies of the holotype collection (Figure 1) matched that of *T. sulphureoides* collected here and *T. osiliensis* from Europe, forming a clade quite distinct from that of *T. decora* and other known species. From this we can draw the following conclusions:

1. *T. sulphureoides*, as described by Peck, is a good species.
2. *T. osiliensis* is a later synonym for *T. sulphureoides*.
3. The type collection is mixed (i.e. not all material is representative of the designated species).

What happens when a type collection is mixed? The designated collection on which the description of a species is based, is called the **holotype.** It is the name-

bearing collection to which all scientists turn to learn the characters of the species. It becomes the final arbiter to decide whether any future specimens belong to the same species or not. The holotype collection cannot be altered in any way. When it is learned that a holotype collection is mixed, an effort is made to identify some material from that collection that represents the described species. This material is then declared as the **lectotype**. The lectotype now becomes the name-bearing material on which the type is described, and to which all future scientists refer to learn the characters of the species.

This was the situation with this collection, and the four fruit bodies identified in Figure 1 were designated the lectotype for *T. sulphureoides*.

If you read our earlier reports on this species, you may have noticed that we spelled it *T. sulfureoides*. "Sulfureoides," with an F was the spelling of Peck at his original description, taken from the American English usage of spelling the element sulphur with an F. However, no matter their origin, scientific names are latinized, and the correct spelling of sulphur in Latin is with PH. The Rules of Nomenclature suggest following correct Latin usage, but do not invalidate a name because of a spelling error; it is called an "**orthographic variant**," and either it or the "correct" spelling is accepted. After some discussion, we decided it would be preferable to follow the Latin spelling for a latinized word. As you see, rules are in place for correcting both small and large errors in the interests of stable taxonomy.

***Figure 1**. Photo of the **holotype** collection of the current* Tricholomopsis sulphureoides. *The yellow oval identifies the fragment sampled initially, which turned out to be* T. decora. *The cyan triangles mark the approximate places of sampling of four additional fruit bodies. All turned out to be* T. sulphureoides. *These four fruit bodies are now designated as the **lectotype** for the species. The exact identity of the other specimens in the holotype collection is undetermined.*

Acknowledgments

We thank the New York State Museum, Albany, NY, for permission to reproduce Peck's original watercolour of *T. sulphureoides* in the title banner, and publish the photo of the collection in Figure 1. We thank Ed Lickey (faculty of 2006 and 2010) for taking the photo of Figure 1 and for collection the specimen for initial analysis, and thank Lorinda Leonardi for help with identifying the sampled specimens.

References

1. Voitk A: *Tricholomopsis* of Newfoundland and Labrador. Omphalina, 2(7): 6–9, <www.nlmushrooms.ca>. 2011.
2. Vauras J, Saar I, Voitk A: Comparison of European *Tricholomopsis osiliensis* with putative *Tricholomopsis sulfuroides* of Newfoundland. Omphalina, 3(5): 9–11 <www.nlmushrooms.ca>. 2012.
3. Saar I, Voitk A: Type studies of two *Tricholomopsis* species described by CH Peck. Mycological Progress, 14:46, DOI 10.1007/s11557-015-1068-5 2015.

The empty skillet

ZE'EV'S WILD MUSHROOM & CHEVRE TART

Robin McGrath

This tart can be made with any fresh wild mushrooms, but the version pictured here used frozen sautéed chanterelles because the freezer was full of them. They were brought to room temperature, as was the cheese, before the cooking began. You can cut corners by using a frozen pie shell, baked in the oven according to the directions on the package, or make one from scratch. Don't forget to prick the surface of the dough or use baking beads or beans or something to keep the crust from puffing up. Either way, this is a quick, easy and delicious recipe. Amounts are approximate—use what is available.

INGREDIENTS

1 pie shell, blind baked
250 grams wild mushrooms
1 medium onion
1 large or 2 small shallots
2 large leeks
2 cloves garlic
2 tbs. butter
180 to 250 grams chevre
Pepper
Newfoundland savoury

PROCEDURE

Slice the onion, the shallot, and the white of the leeks, and sauté gently with the fresh mushrooms and crushed, diced garlic. If using previously frozen mushrooms, add them when the onions are soft. Season with pepper, savoury and other herbs to taste. Simmer off excess liquid if need be, or lift the alliums and mushrooms with a slotted spoon and place into the bottom of the cooked pastry shell. Crumple the chevre over the top and put the tart under a broiler until the cheese starts to turn golden brown. Allow the tart to cool for a few minutes before serving it. This makes a good lunch with a side salad and it is an excellent starter for a dinner party.

THE HUNT FOR *MORCHELLA NORVEGIENSIS*

Andrus & Maria Voitk

In the February, 2014, issue of Omphalina, Kerry O'Donnell reported that we had three morel species in the province,[1] followed by preliminary descriptions of these species. One, *Morchella importuna*, was well known, but the other two were hitherto undescribed species, which we code named Mel-36 and Mel-19; Mel is Kerry's short form for black morels from the ***M****orchella* ***el****ata* clade, and the number indicates the order in which he had encountered them from the world over. These two similar species differed dramatically in distribution: Mel-36 was parochial, known from only the west coast of this province and the St Lawrence side of New Brunswick, whereas Mel-19 was widely distributed.

We set out to report these new species formally. One of the responsibilities when describing a new species is to make sure that nobody has described it before. The current system of naming living organisms has been in use for over 250 years, so it is quite possible that what you believe to be a new species may have been described before by someone, somewhere. Old descriptions can be obscure, necessitating a very meticulous search. In the case of the regional Mel-36, prior description seemed unlikely. On the other hand, it seemed more than naïve to think that the cosmopolitan Mel-19, a species collected from all over the Northern Hemisphere, and seemingly particularly common in Scandinavia, the hotbed of taxonomic activity (Figure 1), had escaped notice for over two centuries, until we stumbled on it in Newfoundland and Labrador!

Fortunately much of the detective work had just been done in the course of a major taxonomic review of *Morchella* in Europe and North America.[2] From the coauthors of this work we learned that *Morchella norvegiensis*, described from Norway in 1990,[3] could be a potential match for our Mel-19. (*M. norvegiensis* is described as growing on burned ground, but the fire was over a decade earlier.) The authors of the review had attempted to analyze DNA from the **holotype** (the original name-bearing collection on which its description was based), but unfortunately the specimen did not yield material from all five sites required to determine phylogenetic species among morels. Sequences from sites that could be surveyed fit that of Mel-19, as well as three other macroscopically similar species. Only multilocus analysis would be able to determine which of the four species it matched.

Because analysis of the holotype could not provide the answer, another method had to be used. An acceptable solution would be to collect fresh morels in the

Figure 1. *Distribution of Mel-19. A: World distribution indicated by blue squares.* ***B****: Distribution in the Scandinavian region. Blue squares indicate confirmed Mel-19. Green circle is probable Mel-19. Red star shows type locality of* Morchella norvegiensis. *Note that no known collection of Mel-19 has been confirmed for Norway.*

type location (the site where the original specimen was collected). If these matched Mel-19, most likely it was *M. norvegiensis*. Our plan was to select a specimen that yielded the required DNA and designate it the **lectotype** (the new name-bearing collection to which future researchers could turn), which we planned to deposit in the Herbarium of the University of Oslo (O) alongside the original.

According to the records at O, *Morchella norvegiensis* was collected in the third week of May, a time that coincides with our wedding anniversary. What better way to celebrate our 50th wedding anniversary, than hunt the elusive *M. norvegiensis*?

Decision made, we set about to look for help. Veterans of our forays will recall that in 2011 the Norwegian polypore expert, Leif Ryvarden was part of our faculty, followed by Norwegians Gro Gulden and Jon-Otto Aarnæs in 2012. We wrote them of our plan, asked if they could help locate the exact type location, and join us in the search. Jon-Otto organized things on the Norwegian end, and offered to be our chauffeur, pick us up and drive us around during the hunt. Gro invited us to stay at her summerhouse for the hunt, less than an hour's drive from the type location. Sir Leif, unable to join the hunt, offered to meet us on arrival in Oslo and treat us to dinner, so that we would not have to face the Norwegian forests on an empty stomach. To top all this off, Jon-Otto told us that Roy Kristiansen, the author (the scientist who first described it), of *M. norvegiensis* still lived in the area and would guide us through his haunts in our search for his species.

The next few pages show photos of our adventures: many unusual fungi, which do not grow here, some also rare for Norway, even some morels. However, we did not find any morels in the type location, which had changed significantly over time. According to Roy, *M. norvegiensis* had not been seen there for the past 30 years. He also felt that identification of *M. norvegiensis* from outside its type locality is unreliable, given the proliferation of recent genetic species with similar morphology. Result: no fresh DNA-yielding sample of confirmed *M. norvegiensis* for DNA analysis and inadequate DNA from the holotype. What to do now?

As a general rule, it is better if known species are formally described and named, their type collections and DNA available to other scientists. Although we cannot entirely exclude the possibility that Mel-19 is *M. norvegiensis*, we also lack proof that they are conspecific. At least one of the authors feels that morphologically they are different species. Our best option is to describe *Mel*-19 as a new species, stating that current technology cannot resolve the question. Should future technological advances make our name a synonym, the species and its supporting data and material will have been available to scientists in the interim. Thus, although we did not settle the issue definitively, we can document that an effort was made, point out what needs to be done in the future, and describe the species according to best available information at the time. A worthwhile result, because it gives us a clear direction.

In the event that Mel-19 were shown to be conspecific with *M. norvegiensis* in the future, our original argument would again be pertinent: how likely is it that such a widespread and relatively common morel had not been described until 1990? Therefore it behooves us to see which "classical" names might fit with Mel-19. Two possibilities arise, *M. elata* Fr. and *M. conica* Pers. To date, *M. elata* has not been matched to a phylogenetically distinct species. In his **protologue** (the original species description) Fries described it as an uncommon species found in coniferous woods,

especially in moist, burnt places (In silvis abiegnis, præcipue locis humidis adustis).[4] We stress the "præcipue," (especially or primarily). We have never found Mel-19 in burned woods; in our experience it is not a fire morel. For this reason we feel that *M. elata* does not fit Mel-19.

In the original description, *M. conica* was published by Persoon as an alternate name for *M. continua*, and therefore illegitimate by current nomenclatural rules.[2] By the way, the Rules state that they are to be applied retroactively, so that what may have been acceptable practice at one time is no longer such, if the Rules forbid it later. What the species represents is somewhat difficult to ascertain, because it has variously been interpreted as a yellow morel (*M. esculenta* clade) and a black morel (*M. elata* clade). Current interpretation and usage, particularly in Scandinavia, has considered it as a species of the *M. elata* clade, and some collections determined to be Mel-19 were identified in the field as *M. conica*. Because Mel-19 has been identified from the Netherlands, type region for *M. conica*, somebody used to thinking of *M. conica* as a black morel might make a proposal to conserve the name and apply it to Mel-19 in favour of its new name. The Rules of Nomenclature allow for such proposals in order to conserve a classical name in current usage, which might otherwise disappear. In view of the illegitimate status of the epithet at the species level, and the unclear nature of the species concept it represents, such a proposal seems dubious to us.

Thus, we are left with giving Mel-19 a new name, even though we suspect that the species has been known before. How is this possible? Well, the brief look at *M. conica* might hint at a possible explanation. The awareness of the diversity of species in the genus is a late phenomenon, primarily triggered by the availability of DNA analysis. Morphologically these species are so alike that in many cases interspecies differences were likely not appreciated. Hence, a description of what was taken to be a single species probably encompassed several. As such, it may no longer be valid for any of the newly defined species. The result will be that each new species will need its own unique name, and the "classical" names, which likely embraced several species, may no longer match any single species.

OK, if you have read this far, you no doubt want to know what these new names are. Sorry. To be validly published, names must not be published beforehand, so you will have to wait for the definitive scientific description. At that time, we shall update you. The loyal reader of Omphalina, of course, will know that at one time we gave our readers an opportunity to vote for a name for both Mel-36 and Mel-19. You will be pleased to learn that the authors of these species were democratically minded people, who gladly accepted the name with the most votes in each case. Stay tuned.

Acknowledgments

We owe great thanks to Gro Gulden and Jon-Otto Aarnæs for facilitating this search at the expense of their time and cost to make it a memorable event. We thank Roy Kristiansen, who monitored the type location beforehand. Thanks are due Roy, as well as Klaus Høiland and Terje Spolén Nilsen for guiding us in their respective regions. And, of course, to Sir Leif Ryvarden for providing the initial nourishment that allowed us to brave the Norwegian forests (Figure 2). Finally, we thank Pierre-Arthur Moreau for the image of the type collection herbarium sheet of *Morchella norvegiensis* used in the title banner. The good will of these friends caused the interpersonal rewards of this adventure to outweighed its mycological worth, by far.

References

1. O'Donnell K: A preliminary assessment of of the true morels (Morchella) in Newfoundland and Labrador. Omphalina 5(2):3-6. 2014
2. Richard F, Sauvé M, Bellanger J-M, Clowez P, Hansen K, O'Donnell K, Urban A, Courtecuisse R, Moreau P-A: True morels (*Morchella*, Pezizales) of Europe and North America: evolutionary relationships inferred from multilocus data and a unified taxonomy. Mycologia; doi:10.3852/14-166 . 2015.
3. Kristiansen R: Nye arter for vitenskapen, originalbeskrevt fra Østfold. Agarica 10–11:6–12. 1990.
4. Fries EM: *Morchella*. Systema mycologicum 2:8. 1822.

***Figure 2**. Priming the nutritional reserves on arrival to Oslo, before tackling the wild Norwegian mushrooms. Clockwise from the Left lower corner: Maria Voitk, Andrus Voitk, Sir Leif Ryvarden (host), Jon-Otto Aarnæs (chauffeur—note that his beer is non-alcoholic).*

Clandestine photo by servitrix Elise Kåks using cell phone of anonymous colleague.

The collectors

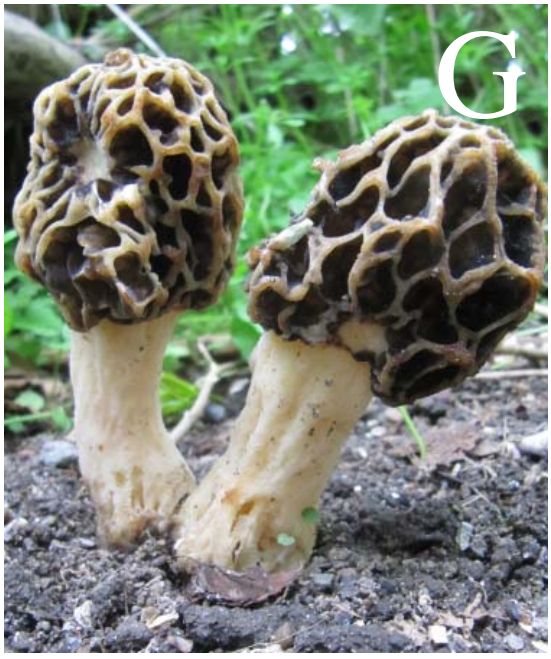
Top: Standing almost on the exact spot where the first ***Morchella norvegiensis*** was collected in 1983 are our intrepid hunters: Maria Voitk, Gro Gulden, Andrus Voitk, **Roy Kristiansen** (guide for the day and the man who first discovered the species and described it in 1990), and Jon-Otto Aarnæs. The soil is calcareous from human activity because the site had been used to dump high calcium factory tailings and store materials. It is on the banks of the Glomma River, seen to the right of Jon-Otto's head; this has overflowed and eroded the bank at snowmelt.

Middle: Admiring a collection of ***Sarcosoma globosum*** after an absence of decades from Norway, in the calcareous Follum Forest, led by **Terje Spolén Nilsen**, guide of the day, at the left. The area had rings comprising over 100 specimens. The Follum Forest region yielded the highest diversity, 22 species—not bad for this time of year.

Bottom: Under the arc of a majestic horse chestnut (*Aesculus hippocastanum*) in full dramatic bloom in the King's gardens, near Oslo, joined by mycologist **Klaus Høiland** (second from the left), our guide on this Pentecost Sunday. A calcareous area, where morels could be expected, but not this time. The King's garden, of course, is much more than a garden, containing forests, paths, fields, cattle, horses, and other accoutrements needed by kings, including many chestnuts in full bloom, many species of pine, and, yes, gardens. Detail of the dramatis personæ was sacrificed to capture the full arc. Sorry, Klaus.

The collected

***A-C**: Undetermined* M. elata *clade morels found in Follum; may or may not be* M. norvegiensis. ***A** by Gro Gulden.* ***D-E**:* Morchella importuna*; we suspect both are the same species, but **E** appeared later, during rain, accounting for colour difference (our opinion, not fact). Yes, we ate most, but kept a few, should you wish to sequence them.* ***F**:* M. esculenta *found, photographed and determined by Terje Spolén Nilsen after our visit.* ***G**: M. esculenta clade morel, suspected by Roy Kristiansen to be M. vulgaris, or close to that taxon.*



A: Gyromitra longipes, *photo: Jon-Otto Aarnæs. Not known from North America, this species has only been recorded in Norway once before.* ***B:*** G. gigas. *True to its name, it is gigantic. This specimen, at 22 cm cap diameter, is at least three times as big as the biggest I have seen here, suggesting the two continents may have different species. Ours grow in birchwoods. European books claim theirs grow in coniferous woods, but note that it is surrounded by last year's fallen birch leaves. Three mushrooms grew within a circle of five large birch trees in the middle of a coniferous forest.* G. esculenta, also found, is *not shown.*

A: Anemone nemoralis, *a smaller relative of our rare* Anemone canadensis, *covered the ground everywhere in the woods. Among the anemones was an interesting parasitic cup fungus,* Dumontinia tuberosa ***(B)***.

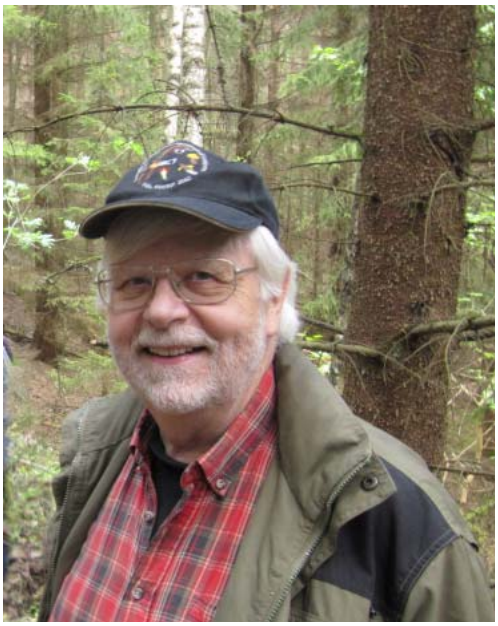
As shown, this fungus has a deep root, which connects to the rhizomes of the anemone, whom the cup fungus taps for food without offering anything in return. We demonstrated what seemed to be a connection between mycelia and Anemone *rhizomes, but did not demonstrate the sclerotium or tuber, which gives the species the name "tuberosa." Although often reported, is it possible that we were either too late or too early to see it? Presumably, its function is to store extra food that tides the fungus over the winter and allows for early spring fruitbody formation. If so, there may be a time after fruitbodies have matured, when it is used up, before it forms again. Maybe?*

The authors, somewhat battleworn after half a century of shared adventures—a mere blink of an eye, compared to the half a billion year old rocks behind them. To the right, hosts Gro Gulden, above, and Jon-Otto Aarnæs, below.

We close this contemplation on the passage of time with a photo of the beautiful *Hepatica nobilis* among cones of *Picea abies* on which grow *Mycena plumipes* (formerly *M. strobilicola*)—all part of a cycle. Both tree and flower fertilize its seed (the tiny grains on the mushroom caps are spruce pollen) to grow new flowers and trees as the old ones wear out. When the seed is dispersed, its husks are decomposed by fungi to release the building blocks used to make them, so that new organisms can be formed.

We found pyrenomycetes, imperfect fungi, some small ascomycetes, and four macrofungi, decomposing conifer cones. In addition to *Mycena plumipes*, also decomposing spruce cones was *Strobilurus esculentus*. On pine cones grew its beautiful relative, *S. stephanocystis*, and on both we found *Auriscalpium vulgare*.

A full species list available from the editor, probably in exchange for a modest keg of aged Grande Champagne Cognac.



Gyromitra toxicity

Michael Beug

Ed Note: The mail page has been given over to the most significant comment in response to our last issue (all others were highly laudatory—thank you). The following is a condensed version. The full text can be read in NAMA's Mycophile, vol 55, nr 3, available for free download from: <http://www.namyco.org/mycophile.php>. While there, check out NAMA's new web page

The article about *Gyromitra* in the last Omphalina[1] prompted me to review *Gyromitra* toxins.

Gyromitra esculenta contains about 9-11 gyromitrins that produce monomethylhydrazine (MMH), which is both cytotoxic and carcinogenic. The difference between a harmless dose and a lethal dose is small, so that a person might eat a large meal of *G. esculenta* for several days with no ill effect, and then die from a subsequent meal. MMH levels in *G. esculenta* vary with collection site, altitude, duration of preservation, and type of preservation.[2]

Of even greater concern is the carcinogenicity. In studies with mice, even a single small dose of MMH caused lung, preputial gland and liver tumors.[3-5] Thus, even one meal of *G. esculenta* might start tumors.

Ascomycete astudies have shown that MMH levels are highest in *G. esculenta* and *Cudonia circinans*. *Helvella macropus, H. crispa, H. lacunosa, H. elastica, H. acetabulum, Leotia lubrica, Spathularia flavida, Otidea onotica* and *Neobulgaria pura* had 5-10% of the MMH of *G. esculenta.* No MMH was found in *Morchella esculenta, Disciotis venosa* or *G. ancilis*. I have not been able to learn how much MMH might be in *G. gigas.*

The North American Mycological Association (NAMA) database for North American poisonings by species in the genus of *Gyromitra* has numerous serious examples from consumption of *Gyromitra esculenta.* While there have been no deaths reported for this species in North America, cases hospitalization with severe liver damage occur nearly every year. When you add the fact that these mushrooms are also very potent carcinogens, it is very clear that consumption of *Gyromitra esculenta* is a very dangerous practice. Since both *Gyromitra infula* and *Gyromitra ambigua* are in the *Esculenta* subclade of *Gyromitra*, these species should be avoided as well.

No poisonings from other *Gyromitra* species are recorded. The few reported cases of poisoning by the *G. gigas* complex could all be attributed to: 1) misidentification, 2) undercooking, or 3) individual sensitivity. An examination of the numerous reported poisonings by morels and verpas turned up the same three factors. Also, morels (and many other species) can accumulate arsenic and lead, in some cases causing serious poisoning.

Consumption of *Gyromitra esculenta* is very dangerous. Should you choose to cook and eat other *Gyromitra* species, consider doing the cooking outdoors. Personally, I prefer not to take chances and do not eat *Gyromitra* species.

References

1. Miller AN, Matlak A, Raudabaugh D, Pärtel K, Tamm H, Methven AS, Voitk A: The genus *Gyromitra* in NL. Omphalina 4(3): 4-15. 2015.
2. Andary C, Privat G, Bourrier M-J: Variations of Monomethylhydrazine Content in *Gyromitra esculenta. Mycologia* 77(2): 259-264. 1985.
3. Toth, B: Hydrazine, methylhydrazine and methylhydrazine sulfate carcinogenesis in Swiss mice. Failure of ammonium hydroxide to interfere in the development of tumors. Int. J. Cancer 9: 109-118. 1972.
4. Toth B, Nagel D: Tumors induced in mice by N-methyl-N-formylhydrazine of false morel, *Gyromitra esculenta*. J. Cancer Res. Clin. Oncol. 93: 109-121.1978.
5. Toth B, Nagel D, Patil K: Carcinogenesis by a single dose of N-methyl-N-formylhydrazine. J. Toxicol. Environ. Health 6: 577-584. 1980.

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