

False Morels-



Gyromitra caroliniana everywhere!
Courtesy W. May.

Age-old Questions of Edibility: a primer by Michael Beug

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Gyromitras... sorting through the names

While writing *Ascomycete Fungi of North America* with coauthors Alan and Arleen

Bessette, we spent considerable time trying to sort out species concepts. For the *Gyromitra*-like fungi, we wondered whether there was any difference between *Gyromitra gigas*, *Gyromitra montana*, and *Gyromitra korfii*. The three had been placed in synonymy by some mycologists, but was that the correct decision? Should *Discina perlata* be called *Discina ancilis* or is it really a *Gyromitra*? (For a review, see Beug's series of papers on the Ascomycetes in the last two issues of FUNGI vol. 6, nos. 4 and 5.) After all, *Discina ancilis* (= *Discina perlata*) looks extremely similar to *Gyromitra melaleucooides*. Alternatively, should *Gyromitra melaleucooides* really be in *Discina*? What about *Pseudorhizina californica* and *Pseudorhizina sphaerospora*? They look like a *Gyromitra* with a *Helvella* stalk. Where do they belong? Finally, what should be said about edibility of these species?

Our nomenclatural questions were resolved, at least for now, by Methven, et al. (2013). Their DNA work shows *Discina* nested in with *Gyromitra*

and they propose five subgenera for the genus *Gyromitra*. The subgenera are *Gyromitra*, *Discina*, *Caroliniana*, *Pseudorhizina*, and *Melaleucooides*. In North America, the subgenus *Gyromitra* contains *Gyromitra esculenta* (Pers.) Fr., *Gyromitra infula* (Schaeff.) Quél. and *Gyromitra ambigua* (P. Karst.) Harmaja; *Discina* contains *Gyromitra ancilis* (Pers.) Kreisel, *Gyromitra olympiana* (Kanouse) Harmaja, *Gyromitra leucoxantha* (Bres.) Harmaja, *Gyromitra montana* Harmaja and *Gyromitra korfii* (Raitv.) Harmaja; *Caroliniana* contains *Gyromitra caroliniana* (Bosc) Fr. and *Gyromitra brunnea* Underw.; *Pseudorhizina* contains *Gyromitra sphaerospora* (Peck) Sacc. and *Gyromitra californica* (W. Phillips) Sacc.; and *Melaleucooides* contains the distant basal species *Gyromitra*



Gyromitra montana. Courtesy S. Trudell.

melaleucooides (Seaver) Pfister.

Now we could settle on an answer. Based on the work of Methven et al. (2013), all species formerly in *Discina* should be in *Gyromitra* and the accepted name for what we had learned as *Discina perlata* should be *Gyromitra ancilis*. The genus *Pseudorhizina* also disappears and its two North American species move to *Gyromitra*. We are left with a very interesting situation. The genus *Gyromitra* resides in the family

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Discinaceae. No species are left in *Discina*. Does the family name need to change? Stay tuned.

False morels, red morels, beefsteak morels... which Gyromitras can I eat?

Gyromitra esculenta is a poisonous mushroom with toxins that decompose upon heating. I want to make a brief appeal not to try to detoxify and consume *Gyromitra esculenta*. While there are no reports of deaths from consumption of *Gyromitra esculenta* in North America, there have been numerous deaths from this species in Europe. In North America, hospitalizations, even cases

of liver damage from *Gyromitra esculenta* consumption are not unusual. *Gyromitra infula* and *Gyromitra ambigua*, the other two North American members of *Gyromitra* subgenus *Gyromitra* have caused poisonings in Europe, though there are no reports in the NAMA database involving either of these species. The toxin in *Gyromitra esculenta* is gyromitrin (N-methyl-N-formylhydrazine acetaldehyde) which quickly loses the

acetaldehyde group in the stomach, or on heating, and then more slowly loses the formyl group, finally forming monomethylhydrazine.

Monomethylhydrazine is a well-studied carcinogenic toxin that has been used as liquid rocket fuel. To my knowledge, the toxins in *Gyromitra infula* and *Gyromitra ambigua* have never been studied, but they are thought to be hydrazines, probably gyromitrin.

While the NAMA database has

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Gyromitra ancilis (*Discina perlata*) Courtesy B. Bunyard.



Gyromitra esculenta. Courtesy M Beug.

numerous reports each year of *Gyromitra esculenta* poisoning, there have only been six reports in thirty years for poisoning by *Gyromitra montana*. My recent examination of the six cases revealed not a single case where *Gyromitra montana* was positively identified. In at least one instance, I was able to determine that the culprit was actually *Gyromitra esculenta* by meeting a woman a year later who had seen the victim in the woods collecting what he had called "snow mushrooms." She had recognized the mushrooms as *Gyromitra esculenta* and had warned the man not to eat them. He ignored her and wound up in the hospital with severe liver damage. Even though the case was in my hometown, it was handled by



Gyromitra olympiana. Courtesy M. Beug.

Gyromitra melaleucoides. Courtesy M Beug.

a doctor who, citing patient privacy laws, would give me no information. Based on the common name “snow mushrooms,” I had guessed that the man had consumed *Gyromitra montana*. Other cases may also have involved misidentification or may have involved either consumption of raw or only lightly cooked *Gyromitra montana* or cases of individual sensitivity.

After all, morels also cause numerous poisoning cases every year. Virtually everyone who eats morels raw or undercooked gets sick as a result. A few people are intolerant of even well-cooked morels if consumed with alcohol; others are sensitive to well-cooked morels whether or not they consume alcohol. My conclusion is that *Gyromitra montana* can be considered edible if thoroughly cooked, though a few collections have been shown to contain traces of hydrazines. I would recommend cooking these mushrooms outside or with good ventilation so that the volatile hydrazines, if present, are not inhaled. *Gyromitra korfii* is probably also reasonably safe. There are no poisoning reports in the NAMA data base for *Gyromitra korfii*, though that is no guarantee there have not been poisonings that were not reported to NAMA. I estimate that we only hear about roughly 10% of all poisoning cases. Since the various “pig’s ear” mushrooms (*Gyromitra ancilis*, *Gyromitra leucoxantha*, and *Gyromitra olympiana*) are in the same subgenus as *Gyromitra montana* and *Gyromitra korfii*, my guess is that they are also edible. Thirty

years ago, I used to eat them and serve them to students, but found the flavor and texture to be mediocre, so I quit cooking “pig’s ears.” There are no poisoning reports in the NAMA database. *Gyromitra melaleucoides* is very different genetically but very similar macroscopically to *Gyromitra ancilis*. Since we have no poisoning reports for *Gyromitra melaleucoides* either, it is probably edible (and mediocre) as well. The other close look-alike is what we know of as *Disciotis venosa*, a close relative of *Morchella*, the true morels. *Disciotis venosa* itself has not yet been found in North America. We have at least two look-alikes that remain unnamed at this point. Presumably North American species of *Disciotis* would cause no more trouble than eating true morels. There is no information in the NAMA database

about the edibility of the two species in the subgenus *Pseudorhizina*, *Gyromitra californica* and *Gyromitra sphaerospora*. I also do not know if they are consumed very often. I would hesitate to try them. There is also no information in the NAMA database about poisonings from the two species in the subgenus *Caroliniana*, *Gyromitra caroliniana* and *Gyromitra brunnea*. However, I do know that many people eat *Gyromitra caroliniana*, known as the “red morel” and “red false morel.” *Gyromitra caroliniana* can be huge, up to seven pounds, and is reportedly delicious. Like all epigeous (aboveground) Ascomycetes, it must be thoroughly cooked. I conclude that *Gyromitra caroliniana* and *Gyromitra brunnea* (the two species are easily confused) are probably no more dangerous to consume than *Morchella* species. †



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