



MUSHROOM EDIBILITY

The Cow Town Curmudgeon
(Denis R. Benjamin)

“**W**hat is this called?” - the first question of the novice mycophile. The second is, “Is it edible?” This is unique to the world of mushrooms. One never hears a birder asking, “I wonder what that ‘tweety’ bird tastes like.” Nor do members of native plant societies, flower clubs, lichen and moss study groups sit around pondering the edibility of their chosen species. And heaven forbid if a group of whale watchers even suspects that someone is thinking, “I wonder what breast of humpback tastes like?” But in most mushroom clubs mycophagy is the *raison d’être* for many members.

Most everyone views mushrooms as little more than food. A few are fascinated by the biology, evolution, and roles that fungi play in ecosystems; or who marvel at the beauty and aesthetics of an unusual organism. There are those who give lectures, show pretty pictures, sounding erudite and knowledgeable. At the end of the lecture someone in the audience

always asks the question most have been thinking - “what does it taste like?”

As an aside I am fascinated by the observation that a substantial fraction of professional mycologists either don’t eat mushrooms or only eat a small number of species. Few exhibit the eclectic tastes of amateur mycophagists. What do they know that the rest of us do not? From the few interviewed so far, the reasons are varied: don’t like the texture, don’t care for the flavor, don’t do much cooking, am wary of the chemicals they contain etc. A more formal study is planned.

At one end of the amateur mycology spectrum is a group obsessed with “correctly” naming everything they find, even if the names have no reality beyond our human hubris and our artificial, ephemeral, classification systems. The vast majority of us occupy the other end of the spectrum where we use the simple classification system of primitive survival - it’s edible; it’s poisonous; we don’t care about those. We might wander around the displays at a foray or a mushroom show trying to memorize a few names, knowing full well that if it is

not some prized edible or deadly toxic mushroom we will forget it before we reach the parking lot.

When confronted with this very frequent question, my first response is often a snarky - “it’s probably edible, it’s just not worth eating.” This brings a look of astonishment, since the questioner assumes that any edible mushroom must be good. If I can resist this urge, I answer - “that depends.” And this is what this article is about: an exploration of two issues - is it edible and is it worth eating?

Here’s the rub. Our approach to mushroom edibility is different from all other foods. In the first instance it tends to be black or white. One poorly documented anecdote of poisoning can stigmatize a species forever. Detecting a few toxic molecules in a mushroom has toxicologists declaring a species off-limits. With “cut and paste” and the internet such cases move from urban legend to established fact in nanoseconds. On the other side of this equation are many websites, bulletin boards and social media discussion groups, some moderated, most not,

dispensing egregious advice, with no accountability for the facts; or the outcomes, if unsuspecting readers actually heed what they read.

What makes this unusual is that our common and accepted foods contain toxic compounds, from solanine in potatoes to cyanide in cassava (manioc, yucca, tapioca); from potent lectins in beans to myristicin in nutmeg. We have learned to deal with these in many ways - store potatoes in the cool dark to avoid the green skin where the toxic glycosides accumulate; we boil beans to destroy the lectins; we wash manioc to rid it of cyanide and we breed selective strains (i.e. genetically modify) that contain lower concentrations of toxic molecules in all our crops, like lima beans.

Moreover, most of us are fortunate enough to have a varied diet and do not limit our intake to any one food. This reduces the likelihood that any specific toxin, even if present, will reach a critical concentration. As Paracelsus noted in the 16th century - the only difference between a medicine and a poison is the dose. And so it is with food - unless that food happens to be a mushroom.

Complicating the simplistic duality we use for mushrooms, mushroom edibility is very poorly studied - an understatement if there ever was one. Wild mushrooms are not agricultural commodities so fly well below regulatory and scientific radar. Much of what we believe is cobbled together from a few anecdotes reported by adventurous palates. There are few formal studies that have investigated differences in edibility due to location, habitat, substrate, stage of life-cycle, strain, genetics or a dozen other factors that might influence edibility. Simply put, we know little

despite the so-called advice plagiarized from one field guide to the next without ever being re-examined or validated. Even worse are the unedited personal opinions posted on the internet.

One might assume that the accumulated wisdom of the ages and careful ethnomycology studies would by now have settled the issue. But one would be quite wrong. A glance at Charles McIlvaine's opus, *A Thousand American Fungi* (1902), suggests that not only are most mushrooms edible, but even delicious. True, we can't be sure that his identifications conform to what we call things today. And few of us have his iron-clad stomach. We have also come to recognize that similarly named species are not the same worldwide, even though they have been labelled that way for many years. *Lactarius deliciosus* may be delicious in Spain, but not so much in North America. With today's molecular biology and genetics the differences are being appreciated. The species happily eaten in Europe or China or Mexico might be quite different from the one we pick in our local woods.

The reason for adding the cautionary phrase "it depends," is that everyone has a unique digestive system, physiology and reaction to the variety of unusual compounds in all foods, especially fungi. Wheat illustrates this issue. Wheat is considered edible. It does have to go through an elaborate processing system with sophisticated technology to make it such, but now many people believe that they are sensitive to wheat - and some actually are. Mushrooms, apart from truffles, never evolved to be specifically eaten by any animals, so it is no surprise that some of us react adversely to eating them. In an

unpublished study we performed in the 1980's with two large West Coast clubs (Seattle and San Francisco), up to 20% of members reported adverse reactions to commonly eaten wild mushrooms. The NAMA Toxicology database is filled with similar examples. While I tolerate honey mushrooms quite well, my long-suffering spouse gets moderately ill from them. There are idiosyncratic reactions, true allergic reactions and a variety of other issues that might make a mushroom edible for one individual and abhorrent to the next.

The edibility of mushrooms is also dependent on its preparation. Most should be cooked and cooked well, for a variety of reasons. The cell walls (chitin) are broken down, some of the nutrients become available and heat-labile toxins are inactivated. The classic example of this is the morel-toxic when raw, delicious when properly prepared. Even so a small number of individuals will have adverse reactions to cooked morels including some interesting neurological effects (Pfab et al., 2008; Sauvic et al., 2010). The false morel (*Gyromitra esculenta*), on the other hand, is generally regarded and labelled as toxic in the USA, even though it is widely eaten, especially in places like Finland. There it is often sold dried. As the toxin is volatile, the majority dissipates during the drying process (Benjamin, 1995). Its final preparation includes boiling and discarding the water a couple of times. This usually removes any residual toxin. And people know not to eat large quantities on successive days. We don't seem to trust our populace to be so careful. So we label the morel as "highly esteemed" and the false morel as "toxic." This example epitomizes the

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Watercolors of Nature

Original watercolor paintings of mushrooms

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schizophrenia about mushroom edibility. As has been pointed out even *Amanita muscaria* can be rendered edible with appropriate preparation (Rubel and Arora, 2008), although we are all loathe to remove “toxic” from our field guides or society’s recommendations. These authors also explore in excellent detail many of the vagaries of mushroom edibility and field guides.

I have determined that the appropriate phrase to use, although I disparaged it for years, is “yes that is edible, but with caution.” The caution takes into consideration one’s physiology, the location of the collection, its method of preparation, the amount eaten, and all the other unknown factors that may influence edibility. It suggests a reasonable level of cautious behavior and adherence to the known gospel of mycophagy, including:

- Be completely sure of the identification of each mushroom.
- Only eat a small amount the first time.
- Wait at least 24 hours before trying the next species.
- Never mix species.
- Save a specimen for the toxicologist.
- Eat a new species early in the day. Late night visits to emergency departments are problematic and we don’t want to be awakened at night.
- Cook all mushrooms well.
- Don’t feed wild mushrooms to guests unless you know that they have eaten them before and can tolerate them.
- When you give wild mushrooms to guests, make sure they are informed.

It may also be time to remove the edibility labels commonly displayed at mushroom shows and forays. These perpetuate the myth that Mother Nature is benign and our personal larder. Humans did not evolve with mushrooms as a major component of our nutrition. Fortunately we are promiscuous omnivores and can tolerate small amounts of just about anything. However that does not mean we should.

Some will accuse me of mycophobia. Far from it. I have eaten a large variety of wild mushrooms and many other foods. So many in fact I could audition for the show “Bizarre Foods.” But I am

quite conservative in my tastes and have reduced my preferences to a relative few. The rest just don’t impress me. Which brings us to a second important issue. Being edible only means that it won’t make you sick, or worse, kill you. It does not imply that it is worth eating. That is something entirely different. It is also an area in which tradition, personal taste, culture, ethnicity, and psychology dominates. And there is no simple accounting for human tastes.

Describing tastes and flavors is challenging. Often what gets enshrined by a food writer or a field guide bears no relationship to another person’s reality. Chanterelles are said to have an apricot perfume. Perhaps they do on the East Coast or in Europe, but I have yet to meet anyone who can detect the slightest aroma in the bland and insipid West Coast monsters (*C. formosus*).

Some food writers claim the morel has a smoky aroma. This is probably true for morels imported from India or China where they are dried over dung-fueled fires. Most bizarre is equating the name of the mushroom with its flavor - oyster mushrooms, lobsters, honey, chicken-of-the-woods, fried-chicken-mushroom and the rest. At a recent show a visitor noted that a gorgeous purple-violet *Cortinarius violaceus* was labelled as edible. She asked someone “what does it taste like?” - the response was a whimsical “just like grapes.” I can attest to the fact that the flavor of what we call *Boletus edulis* in Washington State is a mere shadow of the “same” mushroom in Italy. And much of Europe would cringe with what we pass off as truffles.

Many Russian mycophiles, which include almost all who understand the Cyrillic alphabet, actually seek out members of the *Suillus* tribe (slippery jacks). I tried a few early in my mycophagy adventures and found them a suitable substitute for prunes. Actually prunes-on-steroids. The following is a brief selection of edibility comments on some *Suillus* species from a variety of field guides: edible, but not very good; edible, but rather coarse and tasteless; edible, but rather poor; edible, slimy and insipid; edible, but bland; nauseating; edible and choice. Except for this last one, none of the descriptions inspire serious experimentation. Perhaps Arora (1979) phrased it best in the comment on *Suillus luteus* “According to one

source, ‘the best of the slippery jacks’ - a classic case of damning with faint praise.” But don’t tell any of this to those who love eating these mushrooms. This is only one illustration of how culture, tradition, and history determine food preferences. Whether it’s Spam in Hawaii, water beetles in Thailand, guinea pigs in Peru or horse meat in Italy, every culture develops and treasures its own favorite food-ways.

As so many factors determine personal preference for a particular food, one cannot make *ex cathedra* pronouncements about favorites, flavors or whether some fungus is worth eating. So when asked by a novice, “is it edible?” one can always resort to Gary Lincoff’s (1977) retort - “Any mushroom is edible - once!”

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