

HELP WANTED

Looking for *Psathyrella* & collecting (rare) fungi: how citizen scientists can contribute to mycological research

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(Mushroom Observer, NAMP, Herbaria/Fungaria... and YOU!)

This is an exciting time to be a mycologist, a citizen scientist, an interested individual, an amateur driven by curiosity. While it may be frustrating to watch the dizzying rearrangement of phylogenetic nomenclature, as DNA relentlessly reveals underlying evolutionary patterns, this is a small cost to pay for more accurate understanding of our environment. It would be nice if nothing changed. Science is an updatable series of observations, with abundant hypotheses, deductions and extrapolations, stirred vigorously together with peer discussions, and set to simmer slowly over time. Part of that stirring and simmering occurs when interested individuals go for hikes and keep their eyes open.

In the world of mycology, individuals everywhere can play important roles. As collectors, we all have the opportunity to contribute species that while easy for you to find, as you stumble upon them, are possibly precious data points in someone's research at some laboratory somewhere. In the case of the underwater *Psathyrella*, it would be impossible for a small group of (unfunded) researchers to adequately sample across a wide geographic range. Linking collectors with researchers is one traditional role of herbaria/fungaria, and now includes exciting online databases such as Mushroom Observer and GenBank. And now, The North American Mycoflora Project is ambitiously engaged in assembling comprehensive data sets and collections, and plans to provide a significant framework for this process. While these entities are unfunded or underfunded, this fundamental research is incredibly important. As we learn more about planet Earth's interconnected ecosystems, and the complexity of life in the soil, we are realizing that understanding this complexity is integral to managing it, preserving it, appreciating it, and sustainably benefitting from it. It may sound simplistic, but collecting and

documenting myco-diversity may just be one of the best things we humans can do with our time!

I personally have enjoyed collaborating with researchers and other collectors around the world: I have sent *Laccaria* to France, truffles to Corvallis, and LBMs to San Francisco. Over the past decade, facilitated in large part by electronic

communications, I have received collections from Europe and China as well as across North America, from fungaria and individuals, to examine and sequence in my small research laboratory at Southern Oregon University. I am one small node in a complex network of researchers and collectors around the world. It doesn't matter that I live in a

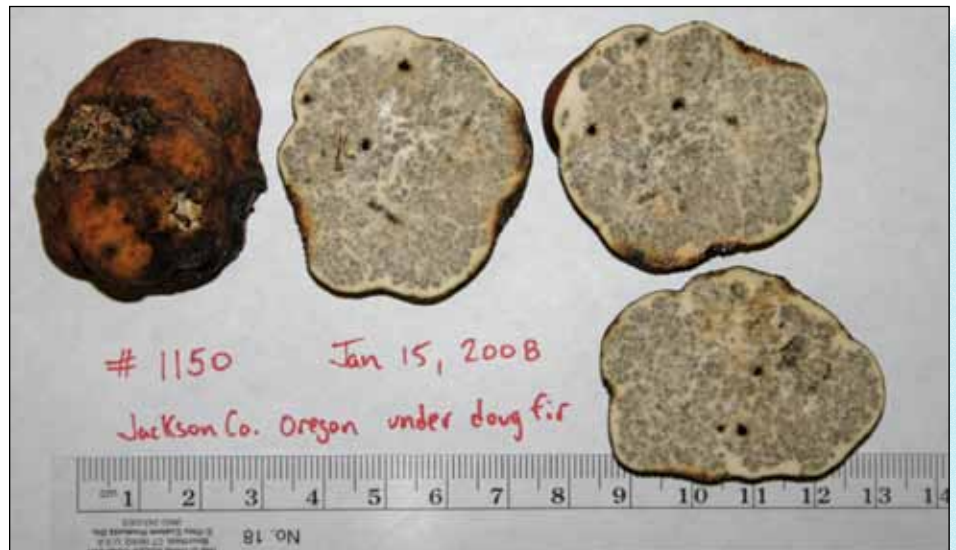


Figure 1. *Kalapuya brunnea* (JLF1150) sectioned for drying.



Figure 2. *Melanogaster* sp. (JLF1844).

remote corner of the Pacific Northwest. In fact, the effort to catalogue the world's fungi will require many people in many remote corners.

If you are interested in contributing collections and observations to research, all you need to do is follow a few basic guidelines for how to collect, photograph, annotate and preserve specimens. While these vary from small truffles, to delicate LBMs, to robust macrofungi, to oddities such as the underwater *Psathyrella*, some basic principles are consistent. Desiccate specimens thoroughly, in as large a portion that makes sense (taking into account size of specimen and especially any insect damage). Keep a dedicated notebook and record a unique collection number for each collection. I recommend using your initials followed by a 3, 4 or 5 digit number, that is basically sequential over time. Some collectors have unique ways of creating their collection numbers and that can be fine, but any confusion can greatly diminish the value of your data. The collection number accompanies the vouchered specimen, collection notes with date, location, habitat, etc., any pictures and, if possible, DNA sequence data. When digital images are uploaded to Mushroom Observer, researchers can subsequently contact you and request a specimen. If the specimen has been well preserved and curated, it can add an important data point to a variety of research projects. Additionally, you can contact herbaria curators and possibly deposit your collections in accessible research centers. Over time, these

herbaria, with help from NAMP and other organizations and individuals, will compile more and more comprehensive understandings of earth's mycological diversity and distribution.

Researchers are presently investigating basic diversity (what is out there), cryptic species, species complexes, and phylogenetics. Some researchers may be interested in culturing certain species. These are very exciting possibilities. But don't be impatient. These studies often take several years, so it is possible that you may not hear back about your special *Mycena* or *Boletus* or truffle for a few years. It is always satisfying to contribute a mushroom you collected to a paper, or to a GenBank submission. After all, it could be something completely new.

If you're interested in gathering mushrooms for research as well as for the pan, bring these standard items on your hikes: wax paper bags, a tackle box, note pad and pen, digital camera; a map and a GPS (and a water bottle and snacks).

Once you have collected something interesting and taken pictures and notes, carefully transport the specimen(s) back to your home or laboratory, using wax paper bags, the tackle box, or other containers. Be careful to not saturate or squish the mushroom. Once home, finish all note taking including color changes as the collections dry, bruising reactions, and microscopy if possible. For gilled basidiomycetes set out a cap or two, or a portion of a cap or two, to make a spore print. Finally, carefully

slice the specimen into sections. For truffles, depending on the species, slices 1.5-3 mm thick (Figures 1 and 2). For large mushrooms, slice the specimen in half into two longitudinal sections. For the underwater *Psathyrella* and other small fungi like *Mycena*, or *Vibrissea*, dehydrate whole mushrooms. Dry in dehydrator (or equivalent) at 85-105 F, relatively low temperatures. The sooner the specimens are dehydrated, the better. Well preserved specimens are more likely to yield usable DNA sequence data. For long term storage and to kill insects, freeze for 3-5 + days and keep bone dry in air tight containers such as zip lock bags or jars. Check that no moisture enters containers (moisture will make the dried mushrooms soft and leathery—if this happens dehydrate until totally dry). Mushrooms can be frozen for 3-5 days every 6-24 months for long term storage. Be careful, if containers are not air tight, moisture may enter when in the freezer.

In the case of the underwater *Psathyrella*, it would be great to have as many eyes as possible gazing at streams and rivers around the world. This is one of many opportunities for interested amateurs and professionals to participate in mapping and monitoring of earth's mycobiota. With these simple steps and these powerful electronic databases, the science of mycology will start to chip away at the estimated 80- 85% of global mycobiota that remains unknown. Remember, everywhere you look, a vast mystery is looking back! †

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