

MOUNTAINS

A chance encounter with Russula mushrooms



Word from the Smokies
Frances Figart
Columnist

Chance Noffsinger started college at Montana State University knowing only that he wanted to become a scientist. But, unlike most of his fellow students, he wasn't particularly interested in plants or animals. So, almost by default, he chose to study microbiology.

"Most microbiology students focus on bacteria," he says. "However, I met some friends who were interested in eating wild mushrooms, so I began to forage for mushrooms and purchase books for identification. Soon after, I was able to sneak my way into a senior level mycology class as a sophomore."

His charismatic professor, Dr. Cathy Cripps, recognized Chance's potential and enthusiasm, and soon he landed an undergraduate research position in her lab, which led to a master's level research project. Now pursuing a Ph.D. in Ecology and Evolutionary Biology at the University of Tennessee, he finds himself 'shrooming' in the Smokies.

"My research focuses on understanding the diversity and distribution of the fungal genus *Russula* in the spruce-fir zone of the Southern Appalachians," he says. "*Russula* mushrooms are only found in associations with trees like red spruce and Fraser fir. While red spruce is widely distributed across the east, the range of Fraser fir is more limited, mostly found from Mount Rogers in Southwestern Virginia to just South of Clingmans Dome in the Smokies. The largest contiguous areas of spruce-fir forests are right here in Great Smoky Mountains National Park, so this is an ideal location to study the diversity of *Russula*."

Mushrooms are the fruiting bodies of fungi, like an apple or pear is the fruit on a tree. The genus *Russula* contains species of mushrooms that are characterized by colorful convex to funnel-shaped caps, gills that are attached to the stem, spores that turn bluish in iodine solutions, and flesh that breaks cleanly in half. These features make it easy to identify the genus; however, it is much more difficult to identify the species.

The name *Russula* means "red" or "reddish," but the various species of these mushrooms come in many colors — from red to purple to blue, green, and yellow — often making identification difficult. For example, one species may have a dark purple cap in some collections and an olive-yellow cap in others.

We imagine that scientists have described most, if not all, of the diversity of life on earth. When considering fungi, this could not be further from the truth.



Russula mushrooms appear in a wide variety of colors, sometimes making proper identification difficult. COURTESY OF CHANCE NOFFSINGER

"Scientists estimate that around three to five million species of fungi exist on earth, but we have only described about 5% of this fungal diversity," Chance says. "Our world is dependent on biodiversity, yet species and habitats are disappearing at an alarming rate."

In general, fungi play three main roles in the environment: They can be saprotrophs, mutualists, or parasites. Saprotrophic fungi break down dead organic materials and recycle nutrients for reuse, which builds up soil and allows nutrients to flow throughout ecosystems. Mutualistic fungi work together with other organisms to obtain nutrients. Parasitic fungi attack a living host — crops, trees, plants, or animals — to obtain nutrients. These can cause serious damage to agricultural systems, leading to economic issues for farms.

Chance's research explores fungal diversity in a unique and threatened environment. And while parsing out the species of *Russula* may seem like a mundane task, Chance explains that understanding which species are present in a given location helps us understand their importance in that environment.

"For example, they could be key mutualists for trees that allow them to adapt to a changing climate, or they could produce compounds of medical interest," he says. "Many fungi are responsible for antibiotics, like penicillin, and many others play important and often overlooked roles in the production of beer, wine, cheese, and bread, just to name a few."

It is estimated that around 3,000 species of *Russula* exist worldwide, and many of these species remain undescribed. Thanks to specialists like Chance, one of the relatively few mycologists who focus on *Russula*, we are learning more about this special genus every day. Through his work in Montana, he did (by chance?) find two potentially new species of *Russula*, which he



Ph.D. student Chance Noffsinger smells the stinky *Russula xerampelina*. COURTESY OF CATHY CRIPPS

hopes to publish and name in the near future.

"We still do not understand the growth requirements of *Russula* species," says Chance, "therefore, we cannot grow them effectively in the laboratory, which inhibits our ability to study their nutritional requirements and to use many newly invented genomic techniques. These challenges, along with the variation present in the genus, have made the study of *Russula* extremely difficult in North America."

Here in the Smokies, one of Chance's objectives is to assess how nitrogen deposition and acid rain affect fungal communities in the soil. His work could help us understand the effects of pollution from cities on fungal communities and their function within the Great Smoky Mountains. Here, like anywhere, promoting a healthy and sustainable environment by reducing pollution, protecting natural lands, and following leave-no-trace ethics helps all fungal species to thrive.

Please remember that picking plants is prohibited in Great Smoky Mountains National Park, but some fruits, berries, nuts, and certain mushrooms may be gathered for personal use within limits. No wild mushroom should be eaten unless its identification is certain, which usually requires an expert to determine. Many mushrooms are poisonous, some deadly, and the responsibility for eating any mushroom or fungus rests with the individual.

Frances Figart is the editor of *Smokies Life* magazine and the Creative Services Director for the 29,000-member Great Smoky Mountains Association, an educational nonprofit partner of Great Smoky Mountains National Park. Learn more at SmokiesInformation.org and reach the author at frances@gsmassoc.org.

STATE BRIEFS

North Carolina woman accused in death of unattended woman

HIGH POINT — A North Carolina woman has been

charged in the death of a 21-year-old woman with cerebral palsy who was left unattended in a car for nearly five hours, police said.

High Point police say the woman, whose name was

not released, was under the care of Briea Askew, 29, of Greensboro on Aug. 10, news outlets reported. According to police, the woman was left in a car that didn't have air conditioning for about five hours.

Officers were called after the woman was brought to a local hospital with a temperature of over 110 degrees and was pronounced dead a short time later. Police said excessive heat and humidity contributed to the death, police said.

Askew was arrested Monday and charged with second-degree murder. She is in the Guilford County jail under a \$200,000 bond.

Police: 'Historical' human bone found at NC dog park

ROCKY MOUNT — Police in Eastern North Carolina are investigating after a "historical" human bone was found at a dog park.

The Rocky Mount Police Department said someone reported finding the bone Wednesday at the Best Friend's Dog Park and a "preliminary investigation" revealed it was human, news outlets report.

The nine-acre "off-leash" dog park is managed by the Parks and Recreation Department in the city of about 58,000 people about 55 miles northeast of Raleigh. The department discourages digging at the park and no food or dog chews are allowed in the off-leash area.

Police have turned to an East Carolina University forensic anthropologist and the State Bureau of Investigation for help with their investigation.

"According to the anthropologist, due to the extensive weathering of the human bone, it is historical, which means it is estimated to be close to one hundred years old," police said in the release. "The Rocky Mount Police Department will continue to investigate the situation."

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