

Fall 2023

Notes of a Naturalist

A newsletter bringing you the species, landscape, history, and happenings of the Taft-Nicholson Center



Giant puffball mushrooms spotted on campus this fall



Shaggy mane mushrooms emerge from the ground after fall showers



Beautiful but toxic fly agarics are among the most recognizable mycorrhizal species



Lichens come in a wide variety of colors and forms

Fantastic Fungi

While this year's wildflower season was spectacular, fall brought another eye-catching bloom to Centennial Valley. Mushrooms burst forth from the ground and old rotting logs in an array of shapes, colors, and sizes, from delicate golden chanterelles to massive puffball mushrooms resembling abandoned volleyballs. In Montana, spring and fall are the main mushroom seasons. The exact timing varies by species (some prefer earlier in the year, while others are more frequently found later) and is dependent on weather. This year, we had plenty of late summer rain, which led to a mushroom superbloom, providing a perfect opportunity to appreciate the fantastic fungi around us.

Mushrooms are the most visible and charismatic component of a fungus. But what happens below ground and out of human sight is just as fascinating, if not more so. Fungi spend most of their lives unnoticed by us, and only a fraction of all fungal species even produce these fruiting bodies. The fungi kingdom is large and diverse, ranging from microscopic yeasts to sprawling, mushroom-forming species. And their life cycles and survival strategies are equally diverse.

Many fungi are parasites or pathogens, like the *Melampsora* rusts that turned the willow leaves yellow a little early throughout Centennial Valley this year. Some introduced parasitic fungi can wreak havoc on ecosystems, like *Cronartium ribicola* that attacks five-needle pines and causes white pine blister rust, or *Pseudogymnoascus destructans* which is responsible for white-nose syndrome in bats.

Other fungal species have more cooperative relationships with other species. Some of the most impressive examples of fungal mutualism are mycorrhizal networks. Mycorrhiza translates to "fungus root", an apt description for this relationship, where fungal hyphae interact with plant root systems to increase the uptake of water and nutrients in exchange for food. It's estimated that around 90% of all terrestrial plant species form this relationship with fungi.

There are two main types of mycorrhiza. The most well-known are ectomycorrhiza. These associations are common with conifer trees but can be found among many deciduous species, including aspens and willows. There are thousands of ectomycorrhizal fungal species, and among the ranks are some of the most famous, and highly coveted, mushrooms. Chanterelles, morels, boletes, and truffles are all ectomycorrhizal. That is part of what makes these mushrooms so prized – their association with trees and shrubs makes them difficult to grow commercially. Ectomycorrhizal fungi also include more infamous species, like the iconic and highly toxic fly agaric mushrooms.

While ectomycorrhizal fungi envelop plant roots, they don't penetrate root cells, instead forming a sort of sheath surrounding the root tip. Endomycorrhizal fungi, on the other hand, form connections with plants by growing into plant cells. Most of the fungi that form these sorts of relationships with plants do not produce showy fruiting bodies like the well-known mushrooms of the ectomycorrhizal species. But the impacts of these lesser-known fungi are farther reaching. Scientists estimate that arbuscular mycorrhiza, a specific type of endomycorrhizal association, can be found in at least 80% of all terrestrial plant species.

There are thousands of mycorrhizal fungus species, spanning three different phyla. And while they all play a similar role, the way they form relationships with plants varies. These plant-fungi associations have evolved separately many times throughout fungus history. According to the fossil record, mycorrhizal fungi first appeared about 460 million years ago. They were likely key players as plants began to establish themselves on land and continue to play crucial roles in ecosystems today.

Lichens are some of the most iconic, and extreme, examples of symbiotic fungi, in which two (sometimes more) organisms live so intertwined that they become one whole new organism. The majority of a lichen's mass is formed by a fungus, known as the mycobiont. It essentially provides a house for the photobiont – this is usually a green alga, but can also be a cyanobacteria or even a combination of the two. Similar to a mycorrhizal fungus, a lichenized fungus gives nutrients to its photosynthesizing partner in exchange for food in the form of carbohydrates. But the fungus in lichen serves other roles as well. It protects the photobiont from UV radiation, prevents water loss, and allows it to grow in places where it wouldn't usually be able to thrive, including arid deserts. But while they can live in some pretty extreme environments, they are very sensitive to pollution. Lichens easily absorb pollutants, making them important indicators of environmental health.

Meet the Artists



Gretchen Jude

Gretchen Jude is an award-winning experimental performer, sound artist and composer for film and dance. Much of her work could be described as synesthetic since she integrates the senses as a way to engage the human potential of her audiences.

Growing up a science-fiction fan in the wild state of Idaho sparked Gretchen's fascination with the tensions between nature and technology. Through embodied sonic practices such as soundmapping, field recording and soundwalks, she explores the enigmatic territories of vibration, noise and musical perception.

Years of living in Japan have shaped Gretchen's approach to aesthetics. She has studied multiple instruments and genres of Japanese traditional music, and her extensive listening and sounding experiences give her a unique perspective on audiovisual media.

Gretchen holds a Ph.D. in Performance Studies with an emphasis in Practice as Research from the University of California, Davis, and an M.F.A. in Electronic Music & Recording Media from Mills College, along with certificates from the Sawai Koto Institute (Tokyo) and the Deep Listening Institute. Her recent film soundtracks include Sundance and Berline features Free Chol Soo Lee (2022) and Midnight Traveler (2019). Cassettes and CDs on Full Spectrum and Edgetone Records number among her eclectic catalog of audio releases. Gretchen is currently Assistant Professor of Film and Media Arts at the University of Utah in Salt Lake City.



Sarah Grigg

Based in Bozeman, Montana, Sarah has lived and worked in the Greater Yellowstone Ecosystem for the past 20 years. Her childhood in coastal Virginia and the Appalachian Mountains of Pennsylvania provided her a background in the cultures of both regions and a broad education on the nuances of America's past and present.

She obtained her undergraduate degree from Washington and Lee University and then came to Idaho as a trout research intern for the Henry's Fork Foundation in Ashton, Idaho. From there, Sarah worked on some of the most challenging conservation issues in the American West, including field research on the rarest carnivores in North America, such as grizzlies and wolverines. Her passion for understanding landscapes defined by ranching and ecotourism economies led her to complete a graduate degree at the University of Georgia Warnell School of Forestry and Natural Resources, with field work in Namibia.

After a decade working in the nonprofit, private, and public sectors, Sarah stepped out as an independent creative in 2014, taking on assignments that carried her from the Seychelles to Cuba. In 2018, she completed her first book, Legacy of the Land, covering the sweeping history of two Montana ranches. Her narrative nonfiction was listed as "Notable" in Best American Essays and her commercial work has been recognized with several ADDY Awards. In recent years, she worked on a business biography and ghost wrote on the behalf of a U.S. President. She spends her free time chasing after two toddlers and a Brittany spaniel with her husband.

TAFT-NICHOLSON CENTER

Art Residency

We are now accepting applications for the 2024 Artist-in-Residence program. Apply at the Taft-Nicholson Center website.

<https://taft-nicholson.utah.edu/artist-in-residence/>

APPLICATION DEADLINE IS JANUARY 31