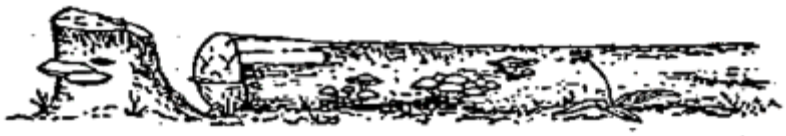
JAN/FEB 2024 VOL. 51, ISSUE 1

The Mushroom Log

Ohio Mushroom Society



President's Corner

I must report that our "Mushroom Guru" Walt Sturgeon has decided to step back from his board responsibilities. His retirement is very well deserved. He was one of our earliest members, joining in the mid-70s when our group was headed by Dick Grimm and still very small in terms of membership.

Walt began his mushroom journey when his wife, Trish, had given him the book, Mushrooms of North America for Christmas. Studying it over time, and then under Dick's tutelage, his curiosity about fungi turned into a near obsession. His extensive knowledge of mushroom identification, taxonomy and photography resulted entirely from his devotion to the subject, and by reading and asking the right questions of the right people.

Walt took over the presidency of OMS from Dick. They passed that role back and forth a few times with each other and another member over the years. Walt was the president of the club when I joined it couple or more decades ago. After a few years he asked me to take on the duties of president, which gave him more time to author books and lecture on mushrooms. He has delivered outstanding presentations at the Cleveland Museum of Natural History, the Lloyd Library Museum, Carnegie Institute, and St. Elizabeth Medical Center.

OMS has been incredibly fortunate to have such an accomplished mycologist at the ready to provide identification and presentations for many of our forays. Walt has served as the lead mycologist for the North American Mycological Association (NAMA) and for clubs from South Carolina to British Columbia to Newfoundland, and intends to continue doing so. We are delighted that he will also continue to make some time to ID and speak at some of our forays as board member emeritus.

One door closes and another opens…so I'm very pleased to announce that OMS has a new board volunteer!

Hugh Urban has been an OMS member since 1998. Always interested in the natural world, his focus on mushrooms began in his late teens. Borrowing his father's mushroom identification book, he took to studying his forest finds in earnest. His ID skills really blossomed after joining OMS and having the good fortune to take one-on-one hikes with Dick Grimm. He also credits our group forays, particularly those with Walt in attendance, as great learning experiences.

He met his wife, Nancy, herself a great mushroom hunter and cook, in 1998. When their daughter came along, she, too, joined them and their dogs in the woods before being able to walk. Hugh says that she always had the sharpest eyes in the family, particularly for morels! They have lived in the Clintonville neighborhood of Columbus for 25 years. You can expect to see Hugh at central Ohio forays, particularly at Mt. Gilead, Alum Creek, and A.W. Marion state parks.

I asked Hugh about his favorite mushrooms, and I chuckled when he gave me an extensive list of edibles, medicinals, and particularly photogenic species. His list tells me that he enjoys finding mushrooms throughout Ohio's seasons.

Gentlemen, thank you for your past and future service to the Ohio Mushroom Society!

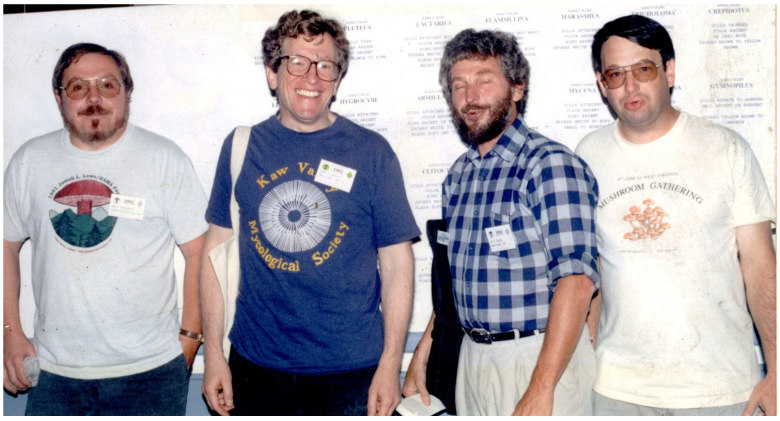
~ Debra

WALT STURGEON "MUSHROOM GURU" AT WORK AND PLAY

Noah Siegel, Walt, and Dick Grimm. Photo courtesy Marita King

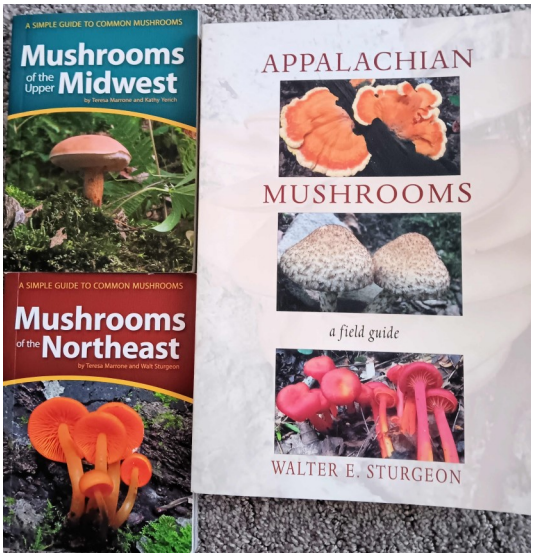
Walt at OMS Foray with Lonelle Yoder, the late Shirley McClelland, and Debra Shankland. Photo courtesy Marita King

Debra Shankland, Walt, and Martha Bishop. OMS Summer Foray. Photo courtesy Marita King.



Walt, Gary Lincoff, Bill Roody, and Jay Justice. Photo courtesy Jay Justice.

Walt & Jay Justice examining the finds



Some of Walt's works. Photo Bob Antibus

POISONOUS MUSHROOMS SICKENED 159 IN N.J. THIS YEAR AMID FORAGING RENAISSANCE

By Jackie Roman, NJ.com, 19 Dec 2023

This year saw 159 people exposed to poisonous wild mushrooms in the Garden State, according to the latest data from New Jersey Poison Control Center.

That's up 22% from last year, which had 130 reported cases of exposure to poisonous mushrooms.

But, the increase is not considered alarming, said Dr. Bruce Ruck, managing director of the New Jersey Poison Control Center at Rutgers New Jersey Medical School.

"The number bounces around every year," said Ruck.

Every year, the state Poison Control Center gets 100 or more calls concerning potential poisonings from foraged foods, including mushrooms. This year, the cases of exposure to poisonous mushrooms involved individuals ranging in age from 1 year old to 79 years old.

Of the 159 exposed to poisonous wild mushrooms this year, 48 went to the hospital and 21 had to be admitted for care, according to the New Jersey Poison Control Center.

"These individuals were treated, evaluated, and released," said spokeswoman Alicia Gambino.

There were no confirmed deaths from poisonous mushrooms in New Jersey this year.

There's no particular rhyme or reason for an increase in exposures to poisonous mushrooms any given year, said Ruck, who has been with the New Jersey Poison Center since 1989.

"It could be someone reads something on the internet, it could be people foraging in an unfamiliar place, and part of it is weather related," said Ruck.

While Ruck isn't sure the weather has been better for mushroom growth this year, he said, "it's possible."

Either way, Ruck said New Jersey isn't the only state reporting people sickened by poisonous wild mushrooms.

"Everybody sees people foraging," said Ruck.

Foraging, the practice of seeking food in the wild, has been experiencing a renaissance in popular culture. There are popular restaurants dedicated to foraged ingredients, suppliers making a living foraging, Facebook groups for those who forage, and even popular TikTokers bringing the lessons of foraging to the masses.

In New Jersey, foraging of any kind is prohibited on State Park lands, and on property owned, managed or under the control of the Division of Fish and Wildlife, according to the state Department of Environmental Protection.

However, residents can submit proposals for their foraging activities to the Department of Environmental Protection for review and the state may enter into a formal agreement for access and use depending on the circumstances.

There are no rules against foraging on private property, other than getting the owner's permission.

And there are no rules against foraging on public property in New Jersey, including the areas around streets, sidewalks, libraries and schools owned by local or county governments, unless there's signage or local ordinances stating otherwise.

But foraging is not risk-free. It can be hard to tell the difference between poisonous and harmless mushrooms. Even a few bites of a poisonous mushroom can cause severe illness, such as intense vomiting and diarrhea, damage to vital organs and in some cases, death.

In 2015, a Morristown woman was hospitalized in serious condition after eating poisonous mushrooms found in her backyard. And in the summer of 2018, a spate of poisonings from mushrooms led the state Poison Control Center to issue a special warning.

Anyone picking edible plants, fruits, or nuts should fully vet each ingredient—and the location in which it's found—before consumption, foragers say.

Using apps like iNaturalist—where users upload photos for help verifying certain plants, insects, and animals—can be a useful tool. There are also resources provided by the New Jersey Mycological Association, which is dedicated to sharing knowledge, ideas and experiences with fungi.

Anyone with concerns about a possible exposure, or questions about plants or mushrooms, can call the New Jersey Poison Control Center at 1-800-222-1222.

MOREL MUSHROOMS AT CENTER OF DEADLY FOOD POISONING OUTBREAK

Keely Larson, cbsnews.com, 13 Dec 2023

A food poisoning outbreak at a Montana restaurant that killed two people and sickened 51 more has highlighted just how little is known about morel mushrooms and the risks in preparing the popular and expensive delicacy for public consumption.

The U.S. Food and Drug Administration (FDA) conducted an investigation into morel mushrooms after the severe illness outbreak linked to Dave's Sushi in Bozeman in late March and April. The investigation found that undercooked or raw morels were the likely culprit, and it led the agency to issue its first guidelines on preparing morels.

"The toxins in morel mushrooms that may cause illness are not fully understood; however, using proper preparation procedures, such as cooking, can help to reduce toxin levels," according to the FDA guidance. Even then, a risk remains, according to the FDA: "Properly preparing and cooking morel mushrooms can reduce risk of illness, however there is no guarantee of safety even if cooking steps are taken prior to consumption."

Jon Ebelt, spokesperson for Montana's health department, said there is limited public health information or medical literature on morels. And samples of the morels taken from Dave's Sushi detected no specific toxin, pathogen, pesticide, or volatile or nonvolatile organic compound in the mushrooms.

Aaron Parker, the owner of Dave's Sushi, said morels are a "boutique item." In season, generally during the spring and fall, morels can cost him $40 per pound, while morels purchased out of season are close to $80 per pound, he said.

Many highly regarded recipe books describe sautéing morels to preserve the sought-after, earthy flavor. At Dave's, a marinade, sometimes boiling, was poured over the raw mushrooms before they were served, Parker said. After his own investigation, Parker said he found boiling them between 10 and 30 minutes is the safest way to prepare morel mushrooms.

Parker said he reached out to chefs across the country and found that many, like him, were surprised to learn about the toxicity of morels. According to the FDA's Food Code, the vast majority of the more than 5,000 fleshy mushroom species that grow naturally in North America have not been tested for toxicity. Of those that have, 15 species are deadly, 60 are toxic whether raw or cooked—including "false" morels, which look like spongy edible morels—and at least 40 are poisonous if eaten raw but safer when cooked.

The North American Mycological Association, a national nonprofit whose members are mushroom experts, recorded 1,641 cases of mushroom poisonings and 17 deaths from 1985 to 2006. One hundred and twenty-nine of those poisonings were attributed to morels, but no deaths were reported.

Marian Maxwell, the outreach chairperson for the Puget Sound Mycological Society, based in Seattle, said cooking breaks down the chitin in mushrooms, the same compound found in the exoskeletons of shellfish, and helps destroy toxins. Maxwell said morels may naturally contain a type of hydrazine—a chemical often used in pesticides or rocket fuel that can cause cancer—which can affect people differently. Cooking does boil off the hydrazine, she said, "but some people still have reactions even though it's cooked and most of that hydrazine is gone."

Heather Hallen-Adams, chair of the toxicology committee of the North American Mycological Association, said hydrazine has been shown to exist in false morels, but it's not as "clear-cut" in true morels, which were the mushrooms used at Dave's Sushi.

Mushroom-caused food poisonings in restaurant settings are rare—the Montana outbreak is believed to be one of the first in the U.S. related to morels—but they have happened infrequently abroad. In 2019, a morel food poisoning outbreak at a Michelin-star-rated restaurant in Spain sickened about 30 customers. One woman who ate the morels died, but her death was determined to be from natural causes.

Raw morels were served on a pasta salad in Vancouver, British Columbia, in 2019 and poisoned 77 consumers, though none died.

Before the new guidelines were issued, the FDA's Food Code guidance to states was only that

MOREL MUSHROOMS, contd.

serving wild mushrooms must be approved by a "regulatory authority," though cultivated wild mushrooms can be sold if the cultivation operations are overseen by a regulatory agency, as was the case with the morels at Dave's Sushi.

States' regulations vary, according to a 2021 study by the Georgia Department of Public Health and included in the Association of Food and Drug Officials' regulatory guidelines. For example, Montana and a half-dozen other states allow restaurants to sell wild mushrooms if they come from a licensed seller, according to the study. Seventeen other states allow the sale of wild mushrooms that have been identified by a state-credentialed expert.

The study found that the varied resources states use to identify safe wild mushrooms—including mycological associations, academics, and the food service industry—may suggest a need for better communication. The study recognized a "guidance document" as the "single most important step forward" given the variety in regulations and the demand for wild mushrooms.

CHINA REVEALS 2023 MUSHROOM POISONING DATA

By Joe Whitworth, Food Safety News, 31 Jan 2024

According to recently published figures, mushroom poisoning remains a significant problem in China.

In 2023, the Chinese Center for Disease Control and Prevention (CDC) investigated 505 reports of mushroom poisoning, resulting in 1,303 patients and 16 deaths.

Incidents increased compared to 2022, but the number of patients was lower, according to the study published in the China CDC Weekly journal.

Mushroom poisoning in China is a significant food safety concern. Following an incident, CDC staff and hospital professionals collect mushroom specimens and photos, which are then sent to mycologists for identification. In parallel, toxin detection is performed on mushrooms and biological samples from patients, such as blood and urine.

97 poisonous mushroom species, including 12 newly recorded ones, were identified, leading to six distinct clinical manifestations. This brings the cumulative number of species involved in poisoning incidents in China to 220.

Newly discovered dangers

The number of patients per incident ranged from 1 to 15, with an average of 2—only six involved more than ten patients. Among the cases, 23 patients from 11 incidents consumed poisonous mushrooms purchased from markets, while 23 patients from nine incidents were poisoned after eating dried mushrooms. Also, 217 patients and five deaths resulted from 70 incidents where individuals consumed mixed wild mushrooms either self-collected or purchased from markets.

Between May and October, 461 incidents, 1,207 patients, and 15 deaths were reported, with a peak in June. May had the most deaths, with seven. Hunan, Yunnan, Guizhou, Sichuan, and Hubei were the top affected regions.

A total of 97 species of poisonous mushrooms were identified in poisoning cases, leading to six clinical syndromes. Among these species, 12 *were newly discovered as poisonous in China.*

Collybia subtropica, Russula brevispora, Russula flavescens, and *Russula pseudojaponica* were newly described species in 2023. *Coprinopsis strossmayeri, Gymnopus dysodes*, and *Gymnopus similis* were three newly recorded poisonous varieties that caused gastroenteritis.

The most deadly mushroom was *Amanita fuligineoides* with seven deaths. *Amanita subpallidorosea* and *Russula subnigricans* both caused two deaths. *Chlorophyllum molybdites* was associated with the most poisonings, appearing in 150 incidents and affecting 303 patients.

While some species caused acute liver or renal failure, others led to gastroenteritis or psycho-neurological disorders. Scientists said in many incidents, no mushroom specimens or photos were obtained, making it challenging to confirm the species of poisonous mushrooms and provide targeted treatment for patients.

Example incident

Another study published in the same journal reported on poisoning from a toxin in mushrooms. Wild mushrooms containing amanita toxins induce gastrointestinal symptoms initially, which are followed by potentially life-threatening acute liver damage.

CHINA REVEALS, CONTD.

In September 2023, five people in Xingtai City, Hebei Province, fell sick. All experienced different levels of liver damage, but none died. Patients were members of the same family and had symptoms including nausea, vomiting, abdominal pain, and diarrhea. They had a history of consuming self-forged wild mushrooms before the onset of symptoms. The group consisted of three males and two females, ages 34 to 45.

One patient, who had previous experience identifying and consuming wild mushrooms in Guizhou, said collected mushrooms were edible. Patients harvested the mushrooms themselves from a pine forest. They were later identified as *Amanita subjunquillea*. Health officials said the identification of toxic and non-toxic mushrooms should not solely rely on personal experience or appearance.

Local authorities initiated public education programs to raise awareness of the risks of consuming wild mushrooms and prohibited residents from foraging for and eating them.

WOMAN AT CENTER OF DEADLY POISONING CASE SAYS SHE BOUGHT MUSHROOMS FROM GROCER AND SUPERMARKET

By Kathleen Magramo, CNN, 15 Aug 2023

The woman at the center of a suspected mushroom poisoning case that killed three people in Australia claims she bought the ingredients from two separate stores, according to a statement she gave to police cited by public broadcaster ABC.

Erin Patterson, 48, said she wants to "clear up the record" because she had become "extremely stressed and overwhelmed by the deaths" of her loved ones, she was quoted as saying in a statement to police cited by ABC on Monday.

Patterson served a home cooked meal to former parents-in-law Don and Gail Patterson, Gail's sister Heather Wilkinson and Heather's husband, Ian Wilkinson, who were guests at her home in the rural town of Leongatha on July 29, according to Victoria Police.

Among the four relatives who came for lunch, three of them died with symptoms of "death cap" mushroom poisoning, police said during a press briefing last week. One remained under critical condition in hospital.

Victoria Police's homicide squad, which is investigating the case, urged people to stay away from wild mushrooms and only eat those that are available at supermarkets as they tried to work out the details of the case.

But Patterson claims she bought dried mushrooms from an Asian grocer in Melbourne months ago and button mushrooms from a supermarket chain more recently.

She said both sets of mushrooms were used in a beef wellington that she cooked and served in the family lunch, ABC reported citing Patterson's statement.

"I am hoping this statement might help in some way. I believe if people understood the background more, they would not be so quick to rush to judgment," Patterson was quoted as saying in the report.

"I am now devastated to think that these mushrooms may have contributed to the illness suffered by my loved ones. I really want to repeat that I had absolutely no reason to hurt these people whom I loved."

Patterson has not been arrested or charged over the deaths.

In a tearful exchange with local media outside her home last week, Patterson previously denied any wrongdoing.

Patterson's full statement to Victoria Police has not been made public. It was also later obtained by The Age newspaper which published a report that matched ABC's reporting. Victoria Police declined to comment on the statement.

"There is no further update on the investigation, and we will not be commenting on specific parts of it at this stage," police told CNN on Tuesday.

Beef wellington is a baked dish that involves encasing a long tenderloin cut in pastry with a pâté or mushroom filling.

In their initial account last week, police said Patterson's two children were present at the late July family lunch but did not eat the meal.

However, according to ABC's reporting Patterson's statement said the children were away at the movies. The following evening, she served leftovers but scraped the mushrooms off for the children because they do not like them.

Police said they searched Patterson's home on Saturday and seized a number of objects for forensic testing. Police say they are keeping an open mind about what happened, and that the investigation is ongoing.

THE INTERNATIONAL SPACE STATION IS GROWING MOULD — INSIDE AND OUTSIDE: STUDY OF RESILIENT FUNGI COULD LEAD TO NEW KINDS OF MATERIALS FOR USE IN SPACE

CBC News, 28 Jun 2019

New research being presented at the Astrobiology Science Conference shows the International Space Station has an irritating mold problem—not only on the inside, but the outside, too.

The spores—which astronauts spend hours cleaning every week—can survive X-ray exposure at 200 times the dosage that would kill a human being, according to Marta Cortesao, a microbiologist at the German Aerospace Centre in Cologne, who is presenting the research.

And that's not all. The common mold spores found on the ISS—aspergillus and penicillium—can also survive extreme temperatures, ultraviolet light, chemicals and dry conditions. Their resilience not only makes it harder to clean, but more likely to survive long-term.

"We now know that [fungal spores] resist radiation much more than we thought they would, to the point where we need to take them into consideration when we are cleaning spacecraft, inside and outside," Cortesao said in a statement.

"If we're planning a long-duration mission, we can plan on having these mold spores with us because probably they will survive the space travel."

The research touches on this, and it warns astronauts to follow recommended planetary protection protocols designed to prevent visiting spacecraft from contaminating other planets and moons in our solar system with microorganisms from Earth. The study suggests that, because of the risk of contamination, these fungal spores may need to be considered a more serious threat.

But the spores may not be all bad though. Cortesao's research is looking for ways the space-growing fungi may help us long-term, investigating their capacity to grow in less than ideal conditions. The study's aim is to harness the hardy microbes as biological factories to create materials astronauts may use on longer missions, such as antibiotics and vitamins.

Although the research is vast, it did not address the spores' ability to withstand the combination of radiation, the vacuum of space, the cold and low gravity.

Experiments designed to further test fungal growth in micro-gravity are set to launch in late 2019.

MORE THAN 100 'MAGIC MUSHROOM' GENOMES POINT THE WAY TO NEW CULTIVARS

By Cell Press, Phys.org, 4 Dec, 2023

Scientists have amassed genome data for dozens of "magic mushroom" isolates and cultivars, with the goal to learn more about how their domestication and cultivation has changed them. The findings, published December 4 in the journal *Current Biology*, may point the way to the production of intriguing new cultivars, say the researchers.

The study shows that commercial cultivars of the mushroom *Psilocybe cubensis* lack genetic diversity because of their domestication for human use. Meanwhile, a naturalized population of mushrooms in Australia has maintained much more diversity, they show, including unique gene variants controlling the production of the mushroom's active ingredient, psilocybin.

“What was surprising was the extreme homozygosity of some cultivars of magic mushroom," says Alistair McTaggart of The University of Queensland, Australia. "Some of these cultivars have been nearly stripped of any diversity except at their genes controlling sexual reproduction."

"Whether this happened intentionally, by targeted inbreeding to fix traits over the last half century, or unintentionally through a lack of diversity to cross against is hard to know," he says. "The trailblazers who domesticated magic mushrooms have set the stage for how we can advance cultivation and innovate with shrooms as we improve our understanding of psilocybin and its benefits."

As part of the study, the team sequenced genomes from 38 isolates from Australia and compared them to 86 commercially available cultivars. They wanted to find out whether the mushrooms were introduced to Australia and how domestication has changed those that are commercially available.

Their analyses showed that the Australian mushrooms are naturalized, having bounced back to a population size large enough to maintain

'MAGIC MUSHROOM', contd.

genetic diversity after their initial introduction to the country. By comparison, commercial cultivars are sorely lacking in diversity across their genomes. The findings suggest that some of the unique gene variants in Australia may allow for differences in the synthesis of psilocybin and related compounds. McTaggart says that research into these mushrooms has been driven by an underground community of people interested in magic mushrooms, many of whom are co-authors on the new study. With no financial support for the effort, the wider community of people interested in magic mushrooms collected the cultivars and isolates under study, sending samples at their own expense and risk. Ultimately, the researchers sequenced and assembled DNA data for more than 100 varieties of magic mushrooms.

The data they've generated on mating compatibility and diversity at the genes controlling production of psilocybin "will advance breeding for 'designer shrooms,' in which heterozygosity of psilocybin alleles may unlock variety in the production of psychedelic tryptamines," McTaggart says. In fact, he reports, their start-up company, Funky Fungus, has already started to translate the findings for developing designer cultivars.

McTaggart says these developments may have significance for the use of psilocybin as a natural compound, with potential benefits for treating mental health disorders.

"Magic mushrooms are the cheapest source of psilocybin and may fill a niche in natural drug development," he said. "There is yet more to understand about how magic mushrooms produce other compounds that may impact a psilocybin experience, and this will be an exciting area of research to watch unfold."

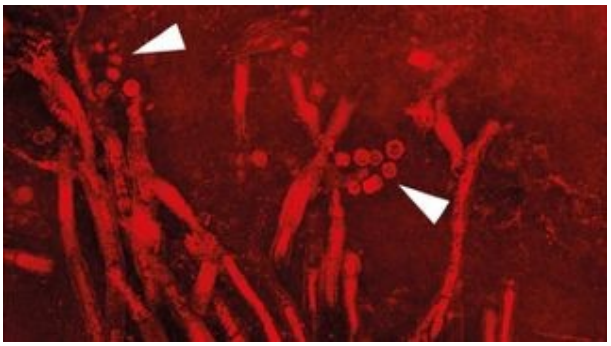
EARLIEST KNOWN PARASITIC FUNGUS DISCOVERED IN FOSSILIZED PLANT FROZEN IN TIME 400 MILLION YEARS AGO

By Carys Matthews, Live Science, 13 Dec 2023

A fossilized plant in a museum collection contained the oldest known disease-causing fungus, with microscopic images showing it bursting through the plant's wall.

The oldest disease-causing fungus ever found has been discovered within a museum's fossil collections.

Estimated to be 407 million years old, the newfound fungal plant pathogen, named *Potteromyces asteroxylicola*, is a filamentous fungus—a type of fungi commonly associated with infections.



Microscopic image showing the fungus bursting through the walls of the plant. (Image credit: Strullu-Derrien et al/Nature Communications)

The parasitic fungus was found growing in an ancient plant called *Asteroxylon mackiei* in a specimen held at the Natural History Museum in London. The newfound fungus had burst through the plant's outer wall, killing its host's cells and absorbing its nutrients.

The plant appeared to have developed dome-shaped growths in response to the fungus, which researchers said indicate that it was alive while the fungus was attacking.

This is the earliest recorded evidence of a fungal parasite causing disease in a plant. The researchers described their findings in a new study, published Dec. 1 in the journal *Nature Communications.*

While analyzing plant samples under a confocal microscope to create a 3D image, researchers realized one slide at the Natural History Museum London contained what appeared to be a never-before-seen fungus.

However, because the appearance of fungi can differ between individuals, it wasn't until another specimen was found that the team was able to confirm it was a new species.

The second specimen was found in the National Museums Scotland collection. "Working on fossil fungi is not like working on dinosaurs," lead study author Christine Strullu-Derrien, a paleontologist

PARASITIC FUNGUS, contd.

at Natural History Museum London, said in a statement. "When you find a dinosaur, an individual can be described as a new species, but for fungi you have to find more than one to be really confident you have something unique. I found the first Potteromyces specimen in 2015, but it took years until I discovered another so that I could describe it."

Fossil samples housed in both museums were taken from the Rhynie Chert, a layer of rocks that contains preserved plants, bacteria and fungi, as well as animals from the Early Devonian period (419 million to 313 million years ago). The site in Scotland is regarded as vital in understanding the early evolution of plants and associated fungi.

"Although other fungal parasites have been found in this area before, this is the first case of one causing disease in a plant," Strullu-Derrien said. "What's more, Potteromyces can provide a valuable point from which to date the evolution of different fungus groups, such as Ascomycota, the largest fungal phylum."

The fungus' genus is named after children's writer and mycologist Beatrix Potter, who is better known as the author of "The Tale of Peter Rabbit" (1901). Potter's detailed illustrations of fungi and study of their growth were in some cases decades ahead of scientific research at the time, according to the statement

'FEW INSECT ORDERS HAVE BEEN SPARED': WHY DEATH BY PARASITE KEEPS LIFE IN THE FOREST THRIVING.'

By Alison Pouliot, Live Science, 16 Dec 2023

There are around 1,000 known species of parasitic fungi, which infest and feed on their insect hosts until just a shell remains. In the adapted excerpt below, from "Meetings with Remarkable Mushrooms" (The University of Chicago Press, 2023), Alison Pouliot encounters a species that targets the larvae of ghost moths, revealing how deadly fungi bring balance to the forest.

I was in the depths of north-west Tasmania's Tarkine Forest when I spied a stick that looked suspiciously like it might not be a stick.

Going by its size, it was probably more twig than stick, but I didn't think it was a twig either. Its slightly pointed tip and slender stature was the first clue to another identity. Running my fingers down its length I felt its fine sandpaper-like texture hinting at something non-twig. Sizing up the rather emaciated-looking thing, I reckoned it might in fact be a special type of fungus. Beneath the ground, I suspected there might be a caterpillar attached, on which the fungus fed. I carefully excavated the soil around the "twig" with my pocketknife.

Brushing the soil away with my hand, I dug a little further and, sure enough, the perfect mummified form of a caterpillar magically materialized. This unassuming twig-like sporing body of the vegetable caterpillar is easily overlooked. Originally named *Cordyceps robertsii*, it was the first vegetable caterpillar fungus scientifically recorded in Australasia — in New Zealand in 1836 — and is probably one of the largest in the world.

While many fungi parasitize plants, vegetable caterpillars seek out invertebrate hosts. Despite their common name, they don't just grow on caterpillars but on a great variety of arthropods, as well as the occasional truffle. Known as *Ophiocordyceps robertsii* today, this fungus usually targets moth larvae from the family Hepialidae, such as the Victorian swift moth.

During the larval stage of their lives, caterpillars spend time mostly beneath the soil in the silk-lined shafts of their burrows. Under cover of darkness, they emerge to forage among the leaf litter. Although darkness might spare them from daytime predators, life in the litter presents multiple risks to a caterpillar, not least the chance of encountering fungus spores. Most of the millions of spores a caterpillar is likely to meet do not pose any great threat.

Those of *O. robertsii* are another story. How caterpillars become infected with *O. robertsii* spores is a mystery. Caterpillars breathe through tiny holes called spiracles on their abdomens, so they may unintentionally inhale spores, or perhaps they brush up against spores that have already sprouted hyphae. The hyphae may then dissolve the caterpillar's cuticle (outer layer) with enzymes, allowing the fungus to penetrate its innards.

It seems more likely that the caterpillar consumes the spores along with the organic matter on which it feeds but, whichever way the fungus finds its way into the caterpillar, it's a coup de grâce for the luckless creature. Once the fungus is inside, the caterpillar's interior provides the ideal habitat for the mycelium to proliferate.

FEW INSECT ORDERS, contd.

The fungus swiftly colonizes and liquefies the caterpillar's delicate innards via powerful enzymes that pervade the creature's entire body cavity, effectively consuming the caterpillar from the inside out. In the process, the fungus kills the caterpillar and transforms it into something resembling a fungal mummy (known as a sclerotium).

Once satiated, the fungus sends its reproductive structure out through the head of the caterpillar and above the soil surface. It releases its spores out of tiny receptacles called perithecia (minute pores in the perithecia, called ostioles,...give it the sandpaper-like texture I felt with my hand), and they are dispersed by wind and passing animals that happen to brush against the fungus. And so the cycle begins again.

I turned the segmented, mummified remains of the parasitized caterpillar over in my hand. I hadn't witnessed the process of its demise in the darkness of the subterrain, just the leftovers of a fungus's meal. Mulling over the caterpillar and the unassuming twig-like sporing body, I wondered how this bizarre union might play out at an ecosystem scale. Vegetable caterpillars are highly specialized fungi.

They have evolved a swag of tricks and chemicals that enable them to manipulate the physiology and behavior of their hosts, inspiring scientists and science fiction writers alike.

Along with other entomopathogenic fungi (those that grow in or on the bodies of insects), they play an important role in regulating populations of insects and other arthropods such as centipedes, spiders, and scorpions. Arthropods, like fungi, are vital to forest function. At times, forest conditions can change in such a way that they favor a particular species or group of arthropods.

These changed conditions can result from local disturbances such as fire or forestry, or more global processes such as climate change. Taking advantage of the new favorable conditions, an arthropod species can multiply rapidly. The increased pressure of a population explosion on forest resources can trigger a slew of effects. These can deplete resources for other forest inhabitants, and dramatically alter forest dynamics. This is where the parasitic nature of vegetable caterpillars can do the forest a favor.

Most species of vegetable caterpillar have limited host ranges, meaning they only associate with a small number of species. For example, one might target a particular ant genus; another might be restricted to a particular beetle genus. This specificity means they are likely to play a role in regulating arthropod population dynamics.

By preventing any one genus or species of arthropod from gaining the upper hand, they help keep ecosystems stable. Few insect orders have been spared, with vegetable caterpillars capable of infecting the majority. Several hundred species of vegetable caterpillars have been described worldwide, occupying diverse habitats from rainforests to alpine environments and deserts. In forests they are found in soil, leaf litter, the canopy, and almost everywhere in between.

The best-studied group of vegetable caterpillars, however, are those that parasitize ants.

Much has been written about the so-called "zombie-ant fungi" of the *O. unilateralis* clade, which can modify ant behavior. This species penetrates the ant's cuticle, infiltrating its body, invading and commandeering its muscles. The ant effectively becomes a prisoner in its own body as the fungus swiftly takes the reins and compels it to climb a plant stem. Here the fungus releases chemicals that direct the contraction of the ant's jaw muscles, forcing it to latch on to the underside of a leaf.

With its body cavity now flooded with the mycelium of the fungus, the ant dies. From this elevated vantage point, the fungus sends its spore-laden reproductive structure out through the head of the ant, raining spores on its unlucky ant allies below.

Parasitic fungi like *Cordyceps entomorrhiza* (pictured here emerging from a beetle larvae) can become specialized so they favor specific species or groups of arthropods. (Image credit: Ian Redding/Getty Images)

FOR BETTER MUSHROOM TEXTURE,

PRESS OUT EXTRA LIQUID AFTER STEAMING

By Claire Redden, tastingtable.com, 16 Dec 2023

Nobody likes a slimy mushroom, and whether it's your typical Portobello or a delicacy like jian shou qing [*Lanmaoa asiatica*, a bolete], achieving a meaty texture that highlights their savory flavors is everything when you're serving up fungi. Added to everything from pizza to soups and burritos to burgers, mushrooms have the power to make or break your meal. To get a better mushroom texture that will elevate all of your favorite foods—and is never, ever slimy—the best thing you can do is press out any of the extra liquid they're holding onto after you steam them.

Steaming might not seem like the way to go if you're trying to avoid something slimy, but it's actually the first step many chefs take when they're making dishes that feature mushrooms. , you can continue to let them brown in the pan or prepare them another way—but, if you want an extra meaty texture, press out the extra liquid from them first.

A quick steam before sautéing mushrooms collapses the fungi and draws out the moisture from within them. Afterward, they'll just need a bit of cooking time for the liquid to evaporate. Then, you can continue to let them brown in the pan or prepare them another way—but, if you want an extra meaty texture, press out the extra liquid from them first.

Whether you're roasting, sautéing, or frying, a quick preliminary steam ensures that your mushrooms won't absorb any of the cooking oil you use. Pressing out the moisture by squeezing them between two paper towels is an extra step you can take to make sure that they come out extra dense and meaty, making them the perfect meat alternative for your vegetarian dishes.

Fuligo cinerea. Source: https://flickr.com/photos/70626035@N00/6427148111

O'NEIL RAY COLLINS, NOTABLE AFRICAN-AMERICAN MYCOLOGIST

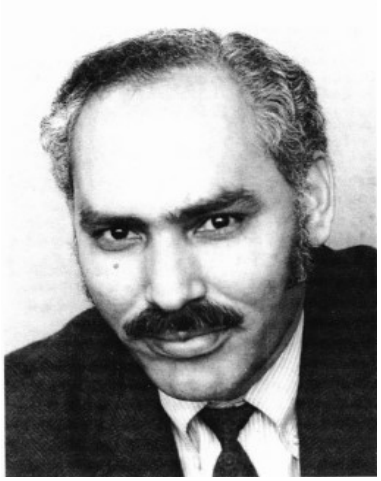
By Bob Antibus

February being African-American History Month, you might be wondering about notable African-Americans in the field of mycology. Most people know George Washington Carver and may even know that he was interested in fungi as plant pathogens. He isolated a number of fungal pathogens during his career. However, you may not know the name O'Neil Ray Collins. I met Professor Collins on several occasions and attended several presentations he gave at national meetings of the Mycological Society of America.

Ray, as he was known, was born 9 March 1931 in Opelousas, LA, one of eight children. His father was a cotton farmer, and Ray rose from this humble beginning to be a world expert in slime mold genetics and the first African-American faculty in botany at the University of California, Berkeley.

Ray received his undergraduate degree in botany at Southern University in Louisiana. He received his Ph.D. at the University of Iowa. There he studied with the renowned mycologist Constantine J. Alexopoulos. His work involved studying the mating of slime molds using single spore isolates. He established that *Fuligo cinera* was homothallic whereas *Didymium iridis* was heterothallic thus requiring + and - mating types.

After teaching at several universities, including Southern, Ray was hired at UC Berkeley in 1969. He went on to publish more than 75 papers and serve on the editorial board of *Mycologia*. At Berkely, he helped develop a Graduate Minority Program and a "Biology, Evolution, and Race" course. I recall Ray as a warm presence and welcoming person to students at MSA meetings. He passed away from Hodgkin's Disease at age 58. The university recognized him posthumously with the Berkeley Citation, their highest honor.



SPRING FUNGI 101: URNULA CRATERIUM, THE DEVIL'S URN

By Thomas Roehl, Fungus Facts Friday, 18 Sept 2016

The creepiest thing about this black cup fungus is its name. Unfortunately, there's no good story to go along with the name. If you're a little disappointed about this, here is a story that I just made up: Some say that each mushroom holds a dead soul that has come back to haunt the world of the living. Sometimes you can even see the soul rise out of the Devil's Urn and disappear into the air. Although this story is fictitious and tailored to fit the mood of the season, it does have some truth in it. Ascomycetes, which include cup fungi like the Devil's Urn, often forcibly discharge their spores in a small puff when the air around them is disturbed (by, for example, picking it up or blowing on it). This helps the fungus get its spores into moving air, which can spread the spores across great distances. This fungus also goes by the names Black Tulip Fungus and Crater Cup.

True to its name, *Urnula craterium* is shaped like an urn or a deep goblet. Aside from the hole at the top, the mushroom is roughly shaped like a small (2-15cm), upside-down teardrop. The exterior of the mushroom is brown to dark brown and scaly at first. The interior, spore-bearing surface is black and smooth. The rim of the cup becomes torn and curled back as the mushroom matures, giving the rim a jagged appearance. Old specimens of the mushroom are often split into pieces. You can find *U. craterium* fruiting from the bases of logs and occasionally from buried wood. It has a particular affinity for fruiting from the areas which retain the most moisture, so look for it where logs meet the forest litter. For mushroom hunters east of the Rocky Mountains, these fungi are harbingers of morels. The Devil's Urn is one of the first mushrooms to appear in the spring, usually just before the delicious black morels.

U. craterium is placed in the phylum Ascomycota, class Pezizomycetes, order Pezizales, and family Sarcosomataceae. This means its closest relatives are other cup fungi, morels, false morels, and elfin saddles. There are a number of both poisonous and edible fungi in this group, but the Devil's Urn is neither. It is too tough to be considered edible, though it is apparently non-poisonous. Some people confuse this mushroom with the edible *Craterellus fallax/cornucopioides* (Black Trumpet chanterelles), but a close examination of the Devil's Urn coupled with growing season (Black Trumpets only grow in the summer) should be enough to tell the two apart.

Urnula criterium. Source: texasmushrooms.org

EDITORIAL MUSINGS

I wish to thank Debra Shankland for her thoughtful comments on Walt Sturgeon's major contributions to the Ohio Mushroom Society over a half century. I am likewise, grateful to Marita King and Jay Justice for sharing their photos. I haven't known Walt as long as these folks but have always appreciated his amazing knowledge, approachability, selflessness, and humor. I also don't know anyone with as many mushroom t-shirts as Walt. I hope to keep interacting with him at future forays here in Ohio and at other foray events. I wish to share the following tribute to Walt by Dick Grimm from Jan/Feb 1997 Mushroom Log:

"Walt Sturgeon and I talked about several things at the OMS Fall Foray in Nelsonville. We both arrived early and had some free time for a change. We talked about old times in the field when I was teaching him the fungi. I remembered when suddenly he was telling *me* what we were looking at instead of me telling *him*."

As a teacher, of whatever subject, let me assure you this is the shining hour — when a student takes the initiative to forge ahead and become "expert" in the subject. I'm sure there are many out there for whom Walt was their teacher.

The current issue follows up on two mushroom poisoning stories (Australia and Montana) we encountered in 2023.

OHIO MUSHROOM SOCIETY

2024 CALENDAR OF EVENTS

Advance registration is required for all forays. All registrants must be current OMS members.

Mini-forays are subject to cancellation and/or rescheduling due to weather and other conditions. Check the OMS website for the most current information. Group size is limited; be sure to contact the host in advance to register.

SUMMER FORAY **July 26 - 28 at Zaleski ODNR Complex** near Lake Hope State Park. Registration information TBA

FALL FORAY **Sat, Sep 28, 10 AM - 3:30 PM at the Long Science Center near Kirtland Hills**; same immersive ID format as last year (limited to 15 OMS members). Registration information TBA

MINI FORAYS

Information on how to register will be posted as details become available—check the website for the latest updates

Sun 21 Apr, time TBA in Delaware Co. (part of a larger bioblitz hosted by Ohio Wildlife Center and Otterbein University's Zoo and Conservation Science program)
Register via Lonelle Yoder: lonelleyoder@ohiomushroomsociety.org

Sat 1 June, time TBA in Hamilton Co.
Register via Crystal Davidson: crystaldavidson@ohiomushroomsociety.org

Sun 30 June, 1-3:30 PM at NE OH location TBD

Sun 21 July, 1-5 PM in Geauga Co.

Sun 21 July, 1-5 PM in Hancock Co.

Sat 10 Aug in Hamilton Co.

Sat 17 Aug, 10 AM - 1 PM in Lorain Co.

Sat 21 Sep in Huron Co.

Sun 22 Sep, 1-3:30 PM at NE OH location TBD

Watch for announcements of **pop-up forays** in central and SE OH this summer when mushrooms are fruiting in response to rain events! OMS members will receive notification by email.

Dick Grimm Memorial Banquet **Sun 27 Oct at noon, Location TBA**

Non-OMS 2024 Forays and Events

NAMAMX 24 - August 3-9 2024 in Valle de Bravo, Mexico — minnesotamycologicalsociety.org

44th Telluride Mushroom Festival - Aug 14 - 18 in Telluride, CO — telluridemushroomfest.org

NAMAZona 2024 - August 22-25, 2024 - Strawberry, AZ — arizonamushroomsociety.org

11th Annual Northwoods Foray - Sept 5-8 in Cable, WI — wisconsinmycologicalsociety.com

2nd Ohio Mushroom Festival - Sept 12 - 15 in Hammondsville, OH — ohiomushroomfestival.com

24th Annual Gary Lincoff Memorial Foray - Sept 20-21 in Western PA — wpamushroomclub.org

62nd Annual NAMA Foray - Oct 31 - Nov 3 in Randle, WA — namyco.org

New Member/Membership Renewal Form

Name: (printed) _____ Address: _____

City: _____ State: _____ Zip: _____

Telephone: _____ Email Address: _____

Enclosed please find check or money order for (check one):

____$15.00 annual family membership

____$150.00 life family membership

Both types of membership include our bi-monthly newsletter, The Mushroom Log, which will be emailed to you as well as available on the members-only portion of our website in perpetuity.

Would you like to be an OMS volunteer? In what way? _____

How did you hear about our group? _____

OMS will not share your information with any other group, business or individual, ever.

LIABILITY RELEASE AND PROMISE NOT TO SUE:

I understand that participating in the activities of a mushroom club involves a moderate amount of risk. This includes all of the risks of being away from home, risks associated with moving about in fields and woods, risks of encountering inclement weather, risks involved in eating wild mushrooms, risks of losing personal property by theft or misplacement, and all other expected and unexpected risks, including illness or injury. While a member of the Ohio Mushroom Society; or as a non-member attending any event hosted by the Ohio Mushroom Society, I agree to assume total responsibility for my own safety and well-being; and that of any minor children under my care, and for the protection of my and their personal property. I release the Ohio Mushroom Society, its board members, club members, contractors, and any and all entities such as parks or preserves, or any private property owner who may host an Ohio Mushroom Society event, and all other persons assisting in the planning and presentation of any Ohio Mushroom Society event, from liability for any sickness, injury, or loss I or any minor children under my care may suffer during any event or as a result of attending or participating. I further promise not to file a lawsuit or make a claim against any of the persons or entities set forth above, even if they negligently cause me or my minor children injury or loss. I agree to hold the Ohio Mushroom Society harmless from any liability they may incur as a result of any damages to any property I may cause. This release and promise is part of the consideration I give in order to be a member of the Ohio Mushroom Society, or to attend any event which they host or attend, whether a member or a non-member. I understand this affects my legal rights. I intend it to apply not only to me but to anyone who may have the right to make a claim on my behalf.

Signature:_____ **Date:**_____

Return form and check or money order to: Ohio Mushroom Society,
c/o Jerry Pepera, 8915 Knotty Pine Lane, Chardon, OH 44024

2024 Ohio Mushroom Society Board

President

Debra Shankland
debrashankland@ohiomushroomsociety.org

Treasurer/Membership/Circulation

Jerry Pepera
jerrypepera@ohiomushroomsociety.org

Newsletter Editor

Bob Antibus
bobantibus@ohiomushroomsociety.org

Foray Organizer

Martha Bishop
marthabishop@ohiomushroomsociety.org

Hospitality Chair

Sharon Greenberg
sharongreenberg@ohiomushroomsociety.org

Web Manager

Lonelle Yoder
lonelleyoder@ohiomushroomsociety.org

Other Board Members:

Pete Richards
peterichards@ohiomushroomsociety.org

Crystal Davidson
crystaldavidson@ohiomushroomsociety.org

Kyle Canan
kylecanan@ohiomushroomsociety.org

Glenn Kotnik
glennkotnik@ohiomushroomsociety.org

Hugh Urban
hughurban@ohiomushroomsociety.org

Emeritus Board Members

Walt Sturgeon
Dick Doyle
Dave Miller

CALL FOR SUBMISSIONS

Have you read or written something interesting and fungus-related that you think other members would enjoy? Please send it to Bob Antibus for consideration for future newsletters!

We welcome any submissions, from anecdotes to scientific reports.

Ohio Mushroom Society
The Mushroom Log

Circulation and Membership

Jerry Pepera,
8915 Knotty Pine Lane
Chardon, OH 44024

Editor

Bob Antibus,
161 South Mound St
Bluffton, OH 45817

The Mushroom Log, the official newsletter of the Ohio Mushroom Society, is published bi-monthly throughout the year.

Contributions of articles and ideas for columns are always welcome. Articles may be edited for length and content.

Non-copyrighted articles may be reprinted without permission in other mushroom club publications, provided that *The Mushroom Log* is credited. We appreciate receiving a copy of the publication.

www.ohiomushroomsociety.org