

You're listening to Fungi Town and this is episode 14: Halloween 2018.

[Fungi Town Halloween Theme Music]

[0:00:22]

Welcome to Fungi Town, where we uncover *Omphalotus*, juggle Jack-o-Lanterns, and frolic in fairy rings. I'm your host and mayor of Fungi Town, Jen Parrilli. Today, we're going to talk to Dr. Andrew Miller from the Illinois Natural History Survey about an appropriately Halloween fungus.

[0:00:39]

Halloween and fungi go way back. There is a slew of fungi with sinister names, like Death Cap, Witches' Butter, Witch's Hat, and Destroying Angel, and some with less terrifying monikers like Sweet Tooth and Candy Cap. Psychedelic mushrooms of different kinds have been used in shamanic ceremonies for centuries. And if you eat one by mistake - or one too many - you might have a pretty terrifying experience. You may even perceive spirits, animals, or demons carrying messages from the underworld.

[evil monster laugh]

There are many mushrooms that glow in the dark, which gave rise to several myths and legends surrounding them. Although these fungi have been around since prehistoric times, it wasn't until 1823 that the source of this strange glow was identified. It's sometimes known as Foxfire and it's a natural phenomenon called bioluminescence. This happens when an enzyme called luciferase reacts with another molecule called luciferin, when this oxidizes, light is emitted. This process doesn't just happen in fungi. It also occurs in glow worms, algae, and fireflies. But if you didn't know the science behind it, it might be easy to attribute supernatural qualities to the ghostly greenish glow of fungi.

Nobody knows just why some fungi adapted bioluminescence. That part is still a mystery. Some think it might be a way to attract insects to help spread the mushroom's spores. Others suggest that it's a warning signal to would-be predators, like the way the bright red-orange of a Monarch butterfly sends the message "don't eat me."

This time of year, depending on where you live, you might be able to find one of these glowing fungi growing in bright orange clusters at the base of trees. It's aptly named the Jack-o-Lantern fungus. Its scientific name is *Omphalotus* and when we come back from the break, we'll talk to Dr. Andrew Miller all about it.

[0:02:39]

Break:

I am extremely thankful to the guests who visit Fungi Town. Despite busy schedules, they take the time to share their expertise and enthusiasm with us. So I like to show my appreciation by sending them a hand-written thank you card. Even though we live in an age of instant connectivity, it feels pretty special to get a surprise in the mailbox, something you can hold and touch, something the sender put care into. But, sappy, mass-produced grocery store greeting cards are *not* for me. That's why I order all of my notecards from Haley at Lichen Landscapes.com. Each card features a gorgeous, hand-drawn illustration of a different lichen. The cards come in packs of four different designs and are blank inside so I can customize my message. Not only can you find a variety of card sets at Lichen Landscapes.com, but you can also order Haley's beautiful lichen prints. They're a great way to show your fungi love. So get on over to Lichen Landscapes.com and discover your favorite design! And when you enter fungi town in the notes portion of your order, a percentage of your purchase will go toward supporting the Fungi Town podcast! So what are you waiting for?

[0:03:48] Limited Perspective podcast ad

[0:04:19]

Welcome back. Before the break, we talked about the spooky glow that makes some fungi seem other-worldly. One of my favorites is the Jack-o-Lantern or *Omphalotus* mushroom, so I talked to a professional mycologist about this Halloween fungus.

[0:04:34]

My name's Dr. Andrew Miller. I'm at the Illinois Natural History Survey at the Prairie Research Institute at the University of Illinois in Urbana-Champaign. I'm the Mycologist here at the Illinois Natural History Survey, and I also serve as the director of the Fungarium and Herbarium. Both of those are actual collections that we have here at the Illinois Natural History Survey that house approximately about 1.3M dried specimens of fungi and plants.

[0:05:05]

Wow. That's impressive.

AM: Yeah, we're actually the 9th largest in the United States for our collections. But we seem to be a hidden gem because we don't really have a public interface like a museum such as the Field Museum, or a botanical garden like the New York Botanical Garden, which are two very large Herbaria. So we're kind of a hidden secret here in central Illinois.

[0:05:28]

So, I found you because you wrote an article for the Illinois Natural History Survey about the Jack-o-Lantern fungus, or the *Omphalotus*. Is that how you pronounce it?

AM: Yeah, *Omphalotus*.

[0:05:39]

Can you give me a brief description of what that fungus looks like?

AM: So it gets its name as the Jack-o-Lantern for a couple of reasons. One, it's bright orange like a Jack-o-lantern pumpkin would be. But secondly it seems to fruit around Halloween. So it comes up when the weather turns cooler in these temperate areas, and we get a little bit of rain in September and October, and this thing starts to fruit, mainly at the base of trees. So it's a saprobe. It's basically eating and getting its nutrition off of the roots of dead wood, for the most part.

[0:06:19]

So it doesn't affect live trees?

AM: No, it doesn't appear to be a pathogen, actually. It seems to be more of a saprobe, is the understanding. So the material that it's growing on is actually already dead, and it's just turning that back into soil.

[0:06:38]

Well, part of the reason that we call it a Jack-o-lantern is that it's bioluminescent, right?

AM: Right. That's sort of the theory. Some people have claimed that they've seen it. I pretend that I've seen it, possibly. I can't really vouch for it. You have to be in a completely, totally dark room for 15 or 20 minutes or even longer and let your eyes really, really adjust. It probably has more to do with the number of rods versus cones in your eyeball in your retina than it does anything else. There are some funny rants that are on the internet. One is on MushroomExpert.com that I was recently reading about how the whole thing's a huge conspiracy and it's just a myth...

[0:07:23]

I read that, too.

AM: You read that. It really doesn't glow in the dark, it's just an excuse to waste people's time. So yeah, supposedly the gills do glow in the dark, they're supposed to. I'm not sure the accounts, the historical accounts are actually true where you could find your way home in the dark by following the glow of the Jack-o-lanterns. But that's been reported in old history books.

[0:07:54]

And you said it's the gills that reportedly glow, right?

AM: Right. Yeah. So it's not the cap or the stem, or the stalk or anything like that. It's actually the underside. It's the gills that are supposed to have the bioluminescent property.

[0:08:09]

Can you tell us about how the *Omphalotus* is related to other fungi, like what family it's in?

AM: Sure. Yeah. It used to be in a large family called the *Marasmiaceae*. And basically this was a huge family that included a lot of different genera in it, or a lot of different species as well, of mainly white spored mushrooms. So there's three major groups of mushrooms, kind of the white spored ones, the

pink spored ones, and the dark spored ones. So this used to be in this large family, *Marasmiaceae*, up until about, I think it was the 1980s or so, where someone came along and actually transferred it to its own family now, called the, I think it's called the *Omphalotaceae*. And this family now has about five or six different genera in it that kind of look similar to it. It's mostly just taxonomy and sort of how you want to shuffle the cards, and how you want to put things in their own little boxes. So most of these things are all similar. They're kind of white spored, they're large mushroom type things. And the DNA helps segregate them out a little bit for us.

[0:09:27]

So the spores are white, not orange?

AM: Yeah, exactly right. So you can't always predict what the spore color is going to be based on the gill color. A lot of times you can, you'll have *Amanitas* that have white gills, and obviously have white spores, but in many cases you have things that are orange gilled or even pink gilled, or even in a few cases dark colored gilled. And they actually produce white spores, so it kind of fools you.

[0:09:56]

So the color of the gills is not an indicator of the color of the spores.

AM: That's right. Exactly.

[0:10:03]

So there are other mushrooms that really do glow in the dark, right?

AM: Yeah, they do. I've seen a couple with, what do you call it, long shutter photography where they set up a camera system and it takes a long time, but a lot of these things seem to be little *marasmias* or *mycenas*. These small brown mushrooms that occur in mostly tropical regions.

[0:10:28]

Is there any taxonomic connection between the mushrooms that glow?

AM: No. Really, nothing that we've found so far. They seem to evolve independently in their bioluminescence. The reasons why they do it, I'm not really sure. And I'm not sure anyone's really proven why they do it. There are different theories out there that it might attract insects that would come and spread the spores of the fungus. And that certainly seems like the most plausible explanation for it, since the gills glow and other parts that don't contain spores don't glow. So it does make sense.

[0:11:06]

With the bioluminescent types, if you pick it, how long does it still glow?

AM: Yeah, I've heard reports on that, especially when it relates to the Jack-o-lantern mushroom is that the fresher the better in most cases. So if you pick it and you can get into a dark room sometime within the next 24 hours you might have a better chance of seeing it glow. After that, and it starts to dry out a little bit, I've just heard that it doesn't glow as brightly and it really diminishes quite a bit. So I think the fresher the better, but in a lot of cases people find them after they've already fruited and they've

been out there a few days and they're already starting to dry up. So I guess timing would be one advantage you would want to use to try to see this supposed bioluminescence of this fungus.

[0:12:00]

The Jack-o-lantern is like, big and orange, and comes out in the fall. But it's not edible, and I've heard that it can be confused with another edible mushroom, the *Chanterelle*. Can you tell us how to tell the difference between the two?

AM: Sure. Yeah. Once you see the difference between these two it's really hard to get them confused after that. Basically, like I said previously, the Jack-o-lantern is quite large. It occurs later in the season, usually in the fall, in September and October. But the size of the caps can be almost as big as a full sized dinner plate. They're almost up to a foot in diameter. And they grow densely clustered together. So you'll find five, six, or ten of these things all together and kind of fused at the base. And again, growing on dead wood at the base of trees. You can compare that with the *Chanterelles* that, very rarely do they ever grow together clustered in a big cluster. You might find two or three together, and they're going to be much smaller, maybe, I don't know, I would say a couple inches or so in diameter, but definitely not huge and great big. And they grow in the soil as saprobes as well, but not on dead wood. And they occur earlier in the season, so mostly in the summer. They can get into the early fall a little bit if we have warmer weather. The other easy way to tell them apart is just turn them over and look at the gills. A Jack-o-lantern is going to have true gills that are well defined, whereas *Chanterelles* really just have veins or ridges, and not true gills underneath them.

[0:13:45]

Do the gills stop at the stipe, or do they continue down the...

AM: Yeah, kind of in both of them it sort of continues down the stalk a little bit. So that's not a great characteristic, but... Because you can kind of get the wrinkles or veins continuing down the stalk in the *Chanterelles*, and gills do run down the stalk in the Jack-o-lantern. But yeah, once you see these two different ones, they're pretty hard to look the same after that.

[0:14:18]

Once you see them next to each other you're probably not going to make that mistake?

AM: Absolutely. Yeah, that's right. And you know, the good thing is the *Omphalotus* just makes you sick. It's not one of our deadly mushrooms that's actually going to kill you. So you'll make the mistake once if you eat a young, small *Omphalotus*, but you won't go back to the Jack-o-lantern again after that. Not for eating.

[0:14:40]

Pretty strong learning tool there.

AM: That's right, exactly.

[0:14:44]

I know that they're poisonous to us, but do you know of any other animals that eat them?

AM: No. I haven't really seen them eating the Jack-o-lanterns. I have seen deer and turtle consuming *Amanitas* before, and you know, I don't think that seems to be a problem for some of these animals. I know some of these things can be toxic to dogs, but I really think that most other animals, outside of humans, are smart enough to stay away from these and not eat them most of the time. It doesn't seem to be such a large concern as the dog ownership committee would have you believe that, you know, every mushroom in their front yard is going to kill their dogs. I think for the most parts, the dogs really kind of sniff them and well, I don't really care about these mushrooms so I'm going to just leave them alone.

[0:15:35]

I guess it depends on how smart your dog is.

AM: That's true. That is very true. Or how hungry he is as well, I suppose.

[0:15:46]

It's time for de-funked, a segment where I debunk fungi myths and misconceptions. One of the oldest and most prevalent myths about fungi centers around fairy rings. A fairy ring is a series of mushrooms growing in a nearly perfect circle and people notice them most often on lawns and in clearings. Legends about these rings can be found in Germany, France, The Netherlands, The Philippines, Britain, Ireland, and Scotland, among other countries. Some say that the rings are left by fairies or witches dancing in a circle. In some legends, these rings are set as traps for unwary humans and are especially dangerous on Halloween night. Fairy rings abound in artwork and literature from around the world. I've even seen a few myself - the rings, not the fairies. But, what is a fairy ring really? Does the appearance of one in your backyard tell of bad fortune? I asked Dr. Marin Brewer of the University of Georgia to help unravel this mystery.

[0:16:51]

The myth of the fairy ring. So a fairy ring is a ring of mushrooms that appear in the grass or in the forest. What's going on there? We can safely assume it's not fairies.

MB: Right. The reason why that happens is - and I always talk about fairy rings when I talk about how fungi have radial growth, meaning they grow outward in a circle - so what happens when you see that fairy ring is at some point, the fungus had started growing somewhere in the middle and then it was growing outward. So, the grow radially and they keep growing - and I have this picture, it's perfect. It's of a fairy ring growing in a lawn. And you can see, inside the ring of mushrooms, the lawn looks really healthy and green and the grass is even taller. That's because that fungus is actually there, breaking down organic matter, and it's actually helping the plant because it's already broken down some of the compounds. So it's more accessible to the grass, to the plant. So it's not damaging to the lawn. The fungus will continue to grow outward until it gets some sort of cue. So either it's rained, or there's a change in the light, or something has happened; there's been a cold snap or warm that'll signal for it reproduce. So, most of the fungus is actually underground and you don't see it. But that fungus gets

the signal to reproduce and it produces that ring of mushrooms. All the mushrooms are produced at the youngest part of the fungus, which is the outer part. So that's what that is, which makes me think of another thing that people, I don't think, usually think about with fungi, is when you see - on the side of a tree, if you see a bracket, or a shelf fungus, or in the lawn, if you see a mushroom, that's not hardly any of the fungus. That's just the reproductive structure. So if you have a tree with those growing out of it, and you think, Oh, I'll just cut this off, it'll be fine. Well, no. Most of the fungus is actually in your tree or most of the fungus is in the ground beneath the soil. Most of it's out of sight. So most of the time, we don't even see fungi until it rains a lot or something happens where they produce these reproductive structures like mushrooms and brackets that are making all their spores.

[0:19:15]

That wraps up episode 14 of Fungi Town. Thanks to Dr. Andrew Miller and Dr. Marin Brewer for sharing their knowledge of Halloween fungi and to Rowen Cannon who provides transcription for Fungi Town.

[0:19:27]

Fungi Town is written, edited, and produced by me - Jen Parrilli and hosted by Podbean. The special Halloween theme song is by local Athens band Shehehe. You can find all of their awesome songs on their BandCamp page at Shehehe.bandcamp.com. Episodes of Fungi Town are released roughly every other week. Be sure to subscribe so you don't miss the next episode, where we talk to contestants in the Fungal Olympics. You can join the conversation and share your fungi photos with Fungi Town on Facebook, Instagram, and Twitter @fungitownpod. Now you can explore the lighter side of Fungi Town on YouTube, where you'll find my attempt at cooking with corn smut, and unboxing videos of cool fungi-related toys and products. If you like this podcast, please subscribe and leave me a review on iTunes. This goes a long way toward helping more people find their way to Fungi Town. Thanks for listening!