PLANT PEOPLE Season Three Episode Two "Turkey Tail Fungi with Eugenia Bone" Transcript

Jennifer Bernstein Narration: Here at NYBG, we're old friends with fungi – the not-quite-plant, not-quite-animal life forms that keep our planet's biological processes churning. And whether you realize it or not, you are too. We rely on fungi in the soil to support the growth of earth's plants and to keep the natural-world-cycle of life and death on schedule. In many ways, our planet runs on mushrooms and we're only just beginning to tap their true potential.

Welcome to Plant People. I'm Jennifer Bernstein, CEO and the Williams C. Steere, Senior President at the New York Botanical Garden. On this week's episode, we welcome food and nature writer Eugenia Bone as we dig into the real magic of mushrooms and their benefits to human health.

We'll touch on everything from turkey tail supplements to psilocybin therapy. After centuries of use by cultures around the world, the scientific community is learning more and more about mushrooms as a source of wellbeing for all.

Jennifer Bernstein Interview: Eugenia, welcome to Plant People.

Eugenia Bone: Thank you for having me.

Jennifer: I'm thrilled you're here. And of course you're no stranger to NYBG.

Eugenia: No, I know. I love my relationship with this wonderful botanical garden.

Jennifer: Thank you and we are so glad to have you as part of our community. I know our community loves taking your courses and learning from you, so it's a real pleasure to have you on Plant People. And by plant people, I also mean of course, mushroom people. Of course, we love fungi at NYBG, and you are a real mycophiliac, if I can use that term.

Eugenia: Please do.

Jennifer: Tell us what first sparked your interest in fungi.

Eugenia: I came to mushrooms through my interest in foraging in the culinary world. For years, I wrote for the food magazines when there used to be food magazines and my beat was primarily foraging and wild foods. But over time I got less interested in pursuing critters that flee and more into critters that hid.

That was the window that opened me up to mycology. In order to find wild mushrooms, I had to learn a little bit about why they grew where. And, inevitably that dropped me down the wormhole of mycology.

Jennifer: Yeah, it's a fascinating world. For listeners who may not know, fungi occupy a unique space in the natural world as neither plant nor animal. Can you explain why that is and how our understanding of mushrooms has evolved both culturally and scientifically?

Eugenia: I guess the two are connected because for a long time, mushrooms were considered plants – just weird plants. And they were studied in botanical departments at universities. But then with evolutionary biology and DNA and all that interesting stuff, scientists began to understand that fungi occupied a kingdom all their own.

Not only that, but even though they've been associated with plants – and they are deeply associated from an evolutionary standpoint, they're very connected – fungi are actually closer on the tree of life to animals than they are to plants.

Jennifer: Yeah. Isn't that fascinating.

Eugenia: Yeah. Surprising…

Jennifer: Yeah.

Eugenia: …until you start looking at some basic things, like the way fungi eat is more like the way we do. They get their carbon from outside their bodies versus plants that that make their own sugars.

So we share many qualities with fungi. That's just one.

Jennifer: Yeah. The assumptions we made about them early on obscured learning more about their true nature, and we seem to be in a period of time when the interest in their nature is really growing. You've written about the psychoactive effects of mushrooms and we are also I think increasingly aware of the therapeutic benefits as well.

Lesser discussed, maybe, are the nutritional and general health benefits of mushrooms. I'm particularly interested, for example, in the turkey tail mushroom. Can you tell us more about the turkey tail? What makes turkey tail mushrooms special?

Eugenia: Medicinal mushrooms, they fall into two main categories in terms of their application for health.

One is as antigens, they potentially prime the immune system, at which, in essence provoking an immune response. Someone is prepared to fight off, say, another pathogen that might be coming their way. And also as antioxidants where they help cells stay healthy when cells get attacked by something, there's properties in some mushrooms that address that.

There's a lot of things in nature that are, that we consume that are antioxidants. Blueberries are too. It's just mushrooms, like turkey tail and others, are very trendy right now. Whether they are more effective than other antioxidants and antigens in nature is to be determined.

Jennifer: What do you think has made mushrooms in general – and maybe the turkey tail in particular, maybe, maybe not – trendy right now? What is catching people's interest, do you think?

Eugenia: I don't know, but my guess is that folks don't know very much about fungi. So when they start learning and realizing how pervasive the organisms are in nature, and how different they are from any other organisms that we encounter – plants or animals – they have this great, mysterious potential. It's really the imagination. I think.

Our imagination that we apply to this new kingdom of life – new to a lot of people for sure – that allows for expectations and hopefulness and maybe applying more possibility to the organism than the organism will maybe actually deliver once the science is complete.

Jennifer: Right. I'm sure that there are many ways in which we will benefit as a species from learning more about mushrooms. It may not be the ways that we imagine right now. It reminds me of when we first started using microscopes and it was like, oh aha. There's a whole world happening that we can't see.

And now I think there's a sort of growing awareness that there's a whole world under the ground…

Eugenia: Yeah.

Jennifer: …that we're not seeing.

Eugenia: And it's key to plant health and all kinds of things. Environmental issues of all sorts. Like a big piece of our knowledge about our world was missing and is missing until you engage with fungi.

Jennifer: So to stick with the trendy turkey tail for just a moment, can you maybe describe it for people who haven't seen them or aren't mushroom people yet? Describe the turkey tail in a way that brings it to life for the listener/

Eugenia: So turkey tail, are polypores and they're saprotrophs.

Polypore is the kind of mushroom that you see growing on trees year after year. Same mushroom. Sometimes they just get bigger or the colony becomes more prolific; unlike mushrooms that appear overnight in the rain and there's a flush, and then you don't see anything until next season when they come back, if they come back.

So turkey tail are polypores and they're saprotrophs, which means the way they get their food is by getting nutrients from decaying wood. And they're helping decay that wood too. They are not a culinary mushroom, like you don't eat a turkey tail.

If you ate a turkey tail, which looks like it's like a tiny little turkey tail, literally, but really hard; very hard and crunchy. So you wouldn't eat it. But, people make teas with it, and those teas are used for their anti-inflammatory properties in particular; tumor reduction, potentially; a lot of cool things. But we're far from having good, solid science on this that says – that's reproducible, like it's gonna work for both you and me – but it's not gonna hurt you.

The worst case scenario is it's gonna hurt your wallet to be buying this tea. But there's no harm in it in the interim, as science does a better and better job of uncovering these specific qualities that may be of medicinal value.

Jennifer: You've touched on the fact that, the turkey tail isn't exactly culinary, you've also written extensively about, culinary mushrooms. Of course that's where your career started. How do you think we should think about this line between food and medicine?

Eugenia: Ah, that's such a good question because this is in a way the crux of the medicinal mushroom story in my view. People are buying extracts and powders and things like that. And there's nothing wrong with doing that, but many of these mushrooms you can just eat and enjoy that way and get the benefits. For example, hericium, lion's mane, is very trendy right now. People love it because they think that it's neurogenerative; that it helps build or extend neural cells.

Jennifer: So maybe protective…

Eugenia: Exactly. And maybe, not only have benefits in terms of degenerative disease, but also just empowering you to be like super smart and stuff like that.

Jennifer: Yeah, I remember when I was a kid, my mom always would give me – I grew up in the desert, so this was a big move – but she would give me fish the night before a test because she was told that was brain food. We've always been looking for these ways to be empowered by the food we eat.

Eugenia: Yeah. So you can buy hericium drops and other products – but, and there's people who take micro doses and stuff, which to me is nutty, but whatever, there's no harm in it – but you can also eat the hericium. It's a culinary mushroom.

You can get a big dose of it. And it's got all these other benefits. It's got fiber and it feeds your gut microbes, which do all sorts of positive things for you. The notion that medicinal and culinary are two separate categories to me doesn't make that much sense.

If you can eat it, it's just like blueberries are antioxidant, but can you take blueberry extract? I don't know, maybe, but are you gonna microdose blueberries? What for? Why not just put a whole bunch on your yogurt in the morning? So I feel the same way about mushrooms.

If we ate more mushrooms in our diet in general, there would be not only the benefits that the mushrooms provide and on their own sort of particular benefits, but, there's a lot of good reasons to fold mushrooms into your diet that affect wellness.

Jennifer: Yeah, maybe let's talk some more about that, because I agree with you. I think, there's a whole sort of industry that has emerged around, making food medicine when we can just eat things that are good for us without having to buy it separately.

And I think folding more plants in general, and definitely more mushrooms into a balanced diet is a really great way to go about that. So what are some of the reasons that people should consider prioritizing mushrooms in their diet? And maybe what are some of the ways that you like to do that the best?

Eugenia: That's a fun question. One of the things that I think would probably might resonate with our listeners today is that mushrooms are low fat. They're also low energy; they don't give you as much energy as a steak, but they're low fat. B they have a high grade protein. Not a lot of protein. They're mostly water. That's why they're low fat. They're 90% water. But the protein they have is good quality, which is, according to some studies, why when you eat a plate of mushrooms, you feel satiated. You fill up.

And the thinking is maybe that's because of the high quality – not quantity right – but high quality protein present. They have all nine amino acids in many cases, in all the mushrooms that have been studied that I'm aware of. So in a way that's like

a piece of meat. Only you don't deal with the saturated fats either because they are very low.

They're an unsaturated fat; they're more like eating an avocado than a sausage. You can't substitute mushrooms for a proper protein in terms of your daily requirements, or a woman my size that weighs 130 pounds would have to eat six pounds of mushrooms a day to get anywhere near my protein requirement.

Jennifer: That's a lot of mushrooms.

Eugenia: Yeah. But folded into your diet, it's low fat. They're a great substitute for meat because they can be cooked in much the same way. One of the qualities that mushrooms share with animals, and one of the things that is an indicator of how close we are on the tree of life, is that mushroom cell walls have made of something called chitin.

And chitin is a polysaccharide. It's like a type of sugar that exists in the animal world too, in, like, shrimp shells. So the chitin in the mushrooms is not digestible. Even if you cook it – I've argued endlessly with some mycologists about that – but I think basically it gets into your gut and then your gut microbes love it.

It hastens the healthiness of your gut microbiome 'cause they love to eat that chitin in it, at the end of the day, it helps you poop, which is good too. So chitin is really interesting. Why is it in the mushroom? I got very curious about that. And also how to cook it because it's really tough stuff.

It's the element that allows a mushroom to push through asphalt. It's 90% water, and you'll see 'em pushing through asphalt on the side of the road. How come they don't just fall apart?

Jennifer: Right. Yeah.

Eugenia: It's 'cause of the chitin. So the chitin is what allows a mushroom to be cooked, much like meat.

Jennifer: So there's the mushrooms that I think are widely available in sort of your average supermarket that people have learned to some degree or another how to cook with, like the portobello or maybe the cremini.

Eugenia: So the cultivated mushrooms you see in the supermarket are, you know, are excellent. The real problem is that if you had a very fresh white button mushroom, it would be a whole different experience.

Jennifer: It's true about many of the fresh fruits and vegetables in our food supplies that they've been cultivated to withstand a, a chain of events, you know: the transport, the shelf life. And as a result, you know, we've prioritized, um, that feature over other things like nutritional density or taste.

And that's why I think it's great if you can, you know, source your food from more local places or you know, ideally, grow some of your own food.

Eugenia: A lot of people grow shiitake mushrooms. You can grow 'em in your backyard, if you have the logs.

And shiitake also, you know, are used medicinally in TCMs. Traditional Chinese medicine. In fact there's an extract of shiitake that is used as a co-therapy for folks that are experiencing chemotherapy. Because – so this notion that mushrooms are gonna cure you is maybe like overestimating what they can do – but they can help you stay well.

That's how the Chinese have traditionally used them in, in many cases. And that's how people can potentially use them today. If you're experiencing something as traumatic as chemotherapy, the body is exposed to all kinds of pathogens – if your immune system is primed to help you deal with those secondary infections, that's a good thing and that's the role that mushrooms traditionally have played; do play in some medical institutions, not in this country, but elsewhere in the world, and I think potentially could play in the future here.

Jennifer: Yeah. So maybe we think about them less as a silver bullet for all that ails us and more as a complement – a program of things that can keep you well.

Eugenia: Jennifer, that's really key to what's happening with psychedelic mushrooms. There's so many people who have reached out to me, and I'm sure to other folks that are knowledgeable about psychedelic mushrooms, thinking that if they endure a trip – and they might be scared to try it – but if they do the trip, it'll be like a silver bullet that will resolve their depression.

Jennifer: Like a revelation, yeah.

Eugenia: Maybe that can happen; anything can happen – but it's on a spectrum, so it's not a reproducible response: psilocybin can cure depression.

Jennifer: Yeah. Particularly done in a lay environment. There's a lot of interesting research that's happening right now, and it may be that the medical establishment is able to distill some of the properties of psilocybin and other fungi in ways that add to our medical arsenal. We've talked about the potential therapeutic, maybe more research needs to be done, certainly the nutritional benefits; these organisms, fungi also play a big role in ecosystem health.

Eugenia: Oh yeah.

Jennifer: So if we go back to the trendy turkey tail, the therapeutic benefits of which may be overwrought, it is a really important decomposer. You mentioned it earlier, but I wanna talk about it a little bit more. Can you talk about the role that turkey tail and other wood rotting fungi play in the ecosystems in which they operate?

Eugenia: If it weren't for saprobic fungi, that is wood rotters, we'd probably be living under miles of plant debris. It just wouldn't be the same world at all. But, from an ecological perspective, they're moving nutrients back into the system. They're connecting the dead with the living – the end of a life with the beginning of new ones.

If we're talking about the cycle of life, certainly the cycle of life of a plant, and by extension soil, fungi are the connecting points. Fungi, they help, they help plants grow multiple ways as endophytic fungi that live between the cells of plants and as mycorrhizal fungi that live on the roots of plants.

Then they are pathogens of plants, which is how most of your audience probably knows fungi because they're the main enemy of most gardeners. So they kill plants and then they rot plants, creating a soil environment that is prime for the plants to get started again. They're the sort of poetry in motion that, that keeps ecosystems turning over and over again.

And that's why it's so heartbreaking when we use agricultural practices that undermine fungal life.

Jennifer: Right.

Eugenia: So that would be in two ways from above and below. When we use fungicides that are broad-based, that's like using broad-based antibiotics that kill the bacteria that we need to digest food and also bacteria that might be causing disease.

Broad-based anything means the good goes out with the bad: collateral damage. And so when we use broad-based fungicides on fields, we're also killing all of those helpful mycorrhizal and endophytic fungi that are necessary for the plants' robustness. At the same time when we add nutrients to the soil like nitrogen, for example, the plant – who has to trade sugars with mycorrhizal fungi in the soil in order to get nitrogen and other micronutrients – plant says, "Forget about it. I don't need it. I'm getting it for free from the farmer." And so the fungi withdraw.

So fungi have this incredible other thing nobody ever talks about and nobody really knew about. I got t-shirts older than this knowledge. It's about glomalin. So glomalin is the sheath that surrounds the fungal hyphal threads. And it is a waterproofing and it's sticky and it's one of the things that helps create little soil particles. It's the glue of soil and it also is a really key for carbon sequestration.

When the fungi withdraw – because the plants are saying, "I'm not gonna give you any sugars because I can get my micronutrients elsewhere" – fungi withdraw. But with them goes the ability to create those soil particles that hold soil together, that retains water so you don't have runoff.

Jennifer: Yeah, so you go from having soil to having dirt. Something alive.to something that's dead.

Eugenia: And then it creates all kinds of problems, downhill, 'cause you have nitrogen runoff and overgrowth of algae and all kinds of things that steal oxygen. It's just cascading effects. But look, a lot of people don't – didn't know about how important the role of fungi is in the wellbeing of plants. Now they know. So there's no excuse.

Jennifer: Yeah, I think we are waking up to the degree to which there's systems that are working in tandem that benefit the plants and benefit us.

So if someone is curious, if they listen to this conversation and thought, I really do wanna learn more, what steps – I think you've mentioned getting involved with your local mycology society…Are there other steps that you would encourage people to take if they're interested in diving into this world like you have?

Eugenia: I think there's a lot of different lenses or a lot of different windows that you can open to get into mycology. So if you're interested in the culinary aspect, that's a forager's life; and so hooking up with a mycological club, and those people in the club who are into foraging or joining foraging trips – they're all, they're going on all over the place.

So if you're doing culinary and you're foraging for food, there's that way. If you wanna get into microscopy or you're fascinated with little ascomycetes – stuff that looks like bumps on logs – there's microscopy clubs, believe it or not; microbiology clubs that look at that stuff in classes.

There's a great class here at the Garden that teaches how to look at tiny things. If your goal is taxonomy and identification, for me the clubs are the real, like they open all these doors, and then you can pass through depending on what is interesting to you.

But there's also internet sites like iNaturalist. If you're curious about the psychedelic world, you have to be pretty discerning because there's a lot of advocates out there who would be prone to saying, "whatever your problem is, you

need psychedelics". Which, I just say, get your like BS meter finely tuned for that kind of thing.

But in general, I would say you can, there's a lot of information on the internet. There's some good sites like iNaturalist where you can see where mushrooms are growing in different parts of the country. But at the end of the day, for a non-professional, peer-to-peer learning is the most rewarding. And that's where you meet the community of like-minded kooks like you.

And the way you find your club is you go to the North American Mycological Association's website, and they list all the clubs in the country. So you can find one near you without too much problem. And then these days, botanical gardens all over the country, because I've been to many, provide ecology classes; basic mycology, get up to speed on it. It's fascinating.

Jennifer: Yeah, absolutely. I encourage that as well. And I also encourage everyone to. Read your wonderful books. That's a great way to get into this world.

Eugenia: Thank you.

Jennifer: Eugenia, thank you so much for being with us today.

Eugenia: Thanks. So glad to have been here.

Jennifer Narration: Want to dig deeper into the world of fungi? Sign up for a continuing education class at NYBG through the link in our show notes and visit eugeniabone.com to learn more about her work.

Plant People is sponsored by Bartlett Tree Experts and a co-production of NYBG and PRX Productions. From PRX Plant People is produced by Ali Budner, Courtney Fleurantin, Genevieve Sponsler, Adriana Rosas Rivera, and Pedro Rafael Rosado.

The executive producer of PRX Productions is Jocelyn Gonzales. From NYBG Plant People is produced by Charlie Nork, Cossette Patterson, Matt Newman, Kait Tyler and Michael Crowley.

Views expressed by guests are their own and not necessarily representative of NYBG.

If you're a plant person and wanna give us a boost, please rate us on whatever podcast app you use, like iHeart, Spotify, or Apple Podcasts, or share us with a friend.