

## Sawbones 507: Mushrooms

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**Charlie:** Sawbones is a show about medical history, and nothing the hosts say should be taken as medical advice or opinion. It's for fun. Can't you just have fun for an hour and try not to diagnose your mystery boil? We think you've earned it. Just sit back, relax, and enjoy a moment of distraction from that weird growth. You're worth it.

[audience cheers]

[theme music plays]

[audience cheers]

**Justin:** Hello, everyone. Welcome to Sawbones, a marital tour of misguided medicine. I'm your cohost, Justin McElroy.

**Sydnee:** And I'm Sydnee McElroy.

[audience cheers]

**Justin:** You didn't even a leave a gap for my—so sure were you there would be no applause for me!

**Sydnee:** Oh, I'm sorry!

**Justin:** You didn't even leave a gap for one! Wow!

**Sydnee:** I was distracted by how much warmer it is out here.

**Justin:** Ooh, yeah.

**Sydnee:** It's so cold downstairs!

**Justin:** Yeah. Um... wow, Syd. Okay. I don't know how we recover from that, though, hon. I mean, you just—

**Sydnee:** I'm sorry. Do you want me to—do you want—

**Justin:** Do we do it one more time? Just one more.

**Sydnee:** Do you want another—yeah.

**Justin:** I'm Justin McElroy!

[audience cheers]

**Justin:** And you—you can do another—you can do another one too, and...

**Sydnee:** And I'm Sydnee McElroy.

[audience cheers loudly]

**Justin:** There! Thank you, thank you. I need 70% as much love as Sydnee gets, or I can't do this show! Welcome, Cleveland. It's such a pleasure to be back here. Hello.

**Sydnee:** Thank you. That was Charlie, our daughter, doing the intro. I thought I should give her some credit. She did such a great job, didn't she?

[audience cheers]

**Justin:** Yeah. Paul didn't have the version that had Dad's intro in it, and I think it's so moving to see the next generation covering up for Paul's screw-ups.

[audience laughs]

**Justin:** [choking up] Just seeing it passed down.

**Sydnee:** Sorry, Paul.

**Justin:** It's moving.

**Sydnee:** Um, okay. So when we do live shows when we're touring, I try to find something relevant to the area where we're doing a show. I'm usually looking for something in their medical history, in your city's medical history, that is, like, bad or not the brightest. Um, but here's the problem with you.

**Justin:** We like a—we like a non-zero percent chance that somebody's gonna be like, "That's my grandpa!"

[audience laughs]

**Justin:** "How dare you!"

**Sydnee:** I mean, you've got some recent stuff, but those people are still alive, and that's not—that's not fun. You might know them. Um, but here's the problem with you, Cleveland. You've got, like, a lot of good stuff in your history.

[audience cheers]

**Sydnee:** I have—do you know how many hours I spent poring over medical history in Cleveland looking for just something, just something really... dumb that somebody did. And I keep finding things like, you did the first coronary artery bypass. That's great.

[audience cheers]

**Sydnee:** And, like, looking at the history of your institutions, like, Cleveland Clinic was founded by, like, four, you know, World War I returning veteran doctors who were like, "We need a nonprofit medical institution that will combine patient care and science and teamwork."

[audience cheers]

**Justin:** Snore!

**Sydnee:** That's not funny! That's good!

**Justin:** Unless the next part is, "And spells." Like...

[audience laughs]

**Sydnee:** Where are the bodies buried, Cleveland? Where are they?

[scattered shouting from audience]

**Sydnee:** Whoa.

**Justin:** Well, listen. Thank you for all your contributions to our nation. You're a great city.

**Sydnee:** I mean, really.

**Justin:** I wish you'd messed up more for my wife's sake, but hey.

[audience laughs]

**Sydnee:** It really was hard. I found myself looking at Justin saying there was a fire once in Cleveland Clinic back in the 1920's that was really bad. That's not funny.

[audience laughs]

**Sydnee:** It's interesting. It's not funny. So instead we had to find inspiration elsewhere. I'll tie it back together. But this is 20-Fungalore. And...

[audience cheers]

**Sydnee:** This is also our 500th episode of Sawbones.

[audience cheers]

**Justin:** I know.

**Sydnee:** I don't know how that's possible. But we have never talked about mushrooms and medicine.

[audience cheers]

**Justin:** Somehow.

**Sydnee:** Yeah. I don't know how that's possible. So I thought we would focus on mushrooms. I'll bring it back together. Don't worry, Cleveland. But you're just too good. You're too good at medicine to get bashed in a whole live episode of Sawbones.

**Justin:** [laughs]

**Sydnee:** There are a lot of other cities who would love to be in your shoes right now. Now, we don't have a lot of, like, concrete scientific evidence on—because mushrooms in medicine, like, used medicinally, there's a huge history, and I'm gonna go through it. But spoilers. Do we have a lot of evidence to say if they work or not? Not a ton.

Um, and I was reading all these studies on medicinal mushrooms, and I think this kind of sums up why it's hard to tell, even though we've used them medicinally so much throughout history—I mean, time and place, different cultures, different countries. Why don't we know for sure if they work?

And I found this quote. And it says, "The lag in time for modern science to explore mushrooms for their medicinal properties is probably due to their nature. Mushrooms are ephemeral."

[scattered cheering]

**Sydnee:** "They may be in our experiential view for just a few days, whereas our encounters with plants and animals can last months or years. Mushrooms can feed you. They can heal you. Some can kill you. And some can send you on a spiritual journey. Speaks of their diverse chemical constituents. From an evolutionary and survival point of view, it is safer to avoid that which is poorly understood, yet so powerful." All we want in life is for someone to love us...

[audience laughs]

**Sydnee:** ... as much as this author, Paul Stamets, who's a mycologist, and Heather Zwickey, the coauthor of this article, love mushrooms.

People who study mushrooms love mushrooms in a way that I don't know most of us experience love.

[audience laughs]

**Sydnee:** I have read a lot of articles from people who study mushrooms, and oh my gosh. These people are into mushrooms.

**Justin:** Wait. They said plants and animals. Are you telling me mushrooms are neither of those?

**Sydnee:** No, they are fungi. They're a whole other thing, bud.

**Justin:** Nuh-uh!

[audience laughs]

**Sydnee:** You know that a mushroom is—mushrooms are fungus, right?

**Justin:** They're plants?

**Sydnee:** They're fungus.

**Justin:** They're plants.

**Sydnee:** They're fungus.

**Justin:** They're animals?

**Sydnee:** They're fungus!

[audience laughs]

**Sydnee:** Is this not something you knew?

**Justin:** Is it different?

**Sydnee:** They're fungus!

**Justin:** Don't mess with me! I know they're fungus. Stop saying they're fungus! Watermelon are fungus, but they're still plants! Right? I'm saying—

**Sydnee:** They're fungus.

[audience laughs]

**Sydnee:** No, they're... fungus.

**Justin:** I don't mean watermelon are fungus. I mean watermelon are plants.

**Sydnee:** No, not watermelons. Watermelons are plants. Mushrooms are fungus. Fungus!

**Justin:** Are you telling me fungus aren't plants?

**Sydnee:** Yeah, they're fungus, honey! I don't know how many more ways to tell you it's fungus. [laughs quietly]

**Justin:** Okay... [wheezes]

**Sydnee:** So here's the thing about mushrooms. Some of the stuff they produce might be good for us. Some of it might kill us. And that's because they didn't adapt to nourish us. Which is kind of cool. They evolved to survive, and we adapted to mushrooms.

**Justin:** Is the idea—is what they're saying—

**Sydnee:** I love that.

**Justin:** —that, like, it's harder to rely on them? 'Cause it's like, all of a sudden it's like, "Oh my god, mushrooms! Where'd you come from?"

And then a few hours later it's like, "Ah, dang! Where'd they go?"

**Sydnee:** Well, I mean...

[audience laughs]

**Justin:** You can't, like, count on them—you can't be like, "Oh, you got a headache? No sweat. Come over. Ah, man! They were just right—I just saw 'em, the headache ones! Dang it!"

**Sydnee:** Yeah, well, I mean, it is—okay. So not like a few hours. But generally speaking, like, mushrooms don't—you know, a tree just... it's there a long time.

**Justin:** Yeah, yeah, yeah. It doesn't move at all.

**Sydnee:** It doesn't—well, I'm not saying that the mushrooms move, per se. But they're not—I mean, they don't last as long.

**Justin:** Yeah, right. I understand what you're saying. You can't count on them as a medicinal source. It's like, what's the point of researching 'em? They're gonna be gone tomorrow. They'll be over there. They'll be George's. Then it's his deal.

**Sydnee:** Well, and I mean, it has to have also been the risk benefit, right? 'Cause it's like, should I eat it? I don't know. It might heal you. You might die. [laughs quietly] So, and then you—and when you think about mycelium, which is—okay. Mycelium is kind of the root system of mushrooms. It's like this big network of threads or hyphae that the mushrooms use to, like, communicate with each other? And to digest things, like other animals and materials. Yes. And they're essential to our planet. And, like, taken all together, they can be, like, 10 kilometers in size, these fields of mycelium. It's like the largest living organism. Mushrooms are kinda scary if you think about 'em too much.

**Justin:** Yeah! Imagine if you didn't know a lot about 'em, apparently!

[audience laughs]



**Justin:** It's quite a trip!

**Sydnee:** You just figured out they're fungus.

**Justin:** Yeah! No, I know they're fungu—

**Sydnee:** Really?!

**Justin:** It sounds—oh my gosh. It's gonna make me so mad. I know that they're fungus. I understand that fungus is a thing. I thought fungus was part of plants as a group. 'Cause they weren't animals. And I figured everything is animal, plants, or rocks, 'cause that's how you play 20 questions.

[audience laughs]

**Justin:** [wheezes] I'm just saying!

**Sydnee:** You had to take, like, some science in school, right? Like, just, like, in... like in elementary or middle school?

**Justin:** I'm sayin', in 20 questions, animal, vegetable, mineral, right? So I figured... I guess I was kind of figuring—not, like, science-wise. But, like, I was kind of putting everything into those categories in my head, right? 'Cause if you were thinking fungus and they were like, "Animal, vegetable, or mineral?"

There's nothing, right? You lost. You already lost the game.

**Sydnee:** Well, and I understand why, like, you would think of them as plant-adjacent. Like, especially the way that we think of them in our lives. Like, we eat them. So that's like plants, right? [crosstalk]

**Justin:** You could be—you're being very generous with this plant-adjacent nonsense.

**Sydnee:** They're not. They're—they're fungus.

**Justin:** No, I'm saying—

**Sydnee:** Okay.

**Justin:** —if they're a umbrella of plants, there's a smaller umbrella underneath it, and it's mushrooms.

**Sydnee:** No, they're not. They're fungus.

**Justin:** They're shaped like a umb—I—

**Sydnee:** No, they're fungus.

**Justin:** I get it now, Sydnee!

**Sydnee:** It's fungus!

**Justin:** I so clearly see the error of my ways. I think I now know this better than most people know their first names. I'm just saying before, earlier, before I felt like I do now, in public, I thought—

[audience laughs]

**Justin:** —privately that mush—that fungus was part of plants because of 20 questions.

**Sydnee:** How did you name your whole tour after mushrooms and you didn't know anything about mushrooms?

[audience laughs and cheers]

**Justin:** I am so sorry. They are telling me not to say anything else. I am being advised... yeah. I'm sorry. I'm not supposed to comment on this any further. I'm sorry.

**Sydnee:** Okay. So the use of mushrooms in medicine dates back a really long time. A lot of what we understand today—and if you read about

mushroom supplements—'cause, I mean, it really is. Like, in the wellness industry mushrooms and, like, powdered mushroom supplements, it's a big industry. A lot of it comes from traditional Chinese medicine. But even before that we have evidence. So do you remember when they discovered Ötzi the Iceman?

**Justin:** Yeah.

**Sydnee:** Do you remember that? That was back in, what, '91? They found a mummy, and it was, you know, thousands of years—it was a very old mummy. And they were like, "Whoa. We found a very old mummy."

And this was a big deal in 90—like, I remember this in '91. Everybody was like, "We found this!"

**Justin:** [simultaneously] This is pre-internet so they were, like, losin' it, yeah.

**Sydnee:** "We found an iceman." One of the things they found on his person was a bag of mushrooms. So it—yeah.

**Justin:** Nice.

**Sydnee:** I know. [laughs] For medicine. For medicine. Medicinal mushrooms. And so the thought was that—well, actually part of them were used at the time for, like, worms. And we studied the remains of this iceman and found that, like, yes, he was infected with worms. So...

**Justin:** So they didn't work.

**Sydnee:** So they didn't work. [laughs quietly]

**Justin:** Yeah, that's too bad.

[audience laughs]

**Justin:** That's too bad. It's embarrassing.

**Sydnee:** Or his was in the middle of his course of treatment, clearly.

**Justin:** Maybe. Maybe he wasn't diligent about taking his worms.

**Sydnee:** And there was another kind of mushroom that was used for, like, tinder for fires. So not as exciting medicinally. You just burn these mushrooms.

But anyway, it just kind of highlights the idea that mushrooms—it's weird. Because I look at mushrooms, and—do you ever look at foods and think, who was the first person to look at it and go, "I'm gonna eat it"?

[audience laughs]

**Justin:** I don't feel that about mushrooms, though.

**Sydnee:** You don't feel that about mushrooms?

**Justin:** I grew up in the '80s. So it's like, Super Mario. You got, like, Willy Wonka we watched a lot. You know, them getting the whipped cream out of the top of the mushroom? Like, they looked very delicious to me. Alice in Wonderland? When they eat part of it and there's, like, cake nearby.

**Sydnee:** Okay. I'm talking, like, before there were, like, pop culture references to mushrooms for you to appreciate. Like, the first person to, like, point at a mushroom and be like, "I'm gonna eat it."

**Justin:** That's true.

**Sydnee:** "I'm just gonna eat it." It's like you—I always think that with, like, artichokes, right? Somebody was like—

**Justin:** That one's—that one I love.

**Sydnee:** "Not that part."

**Justin:** "Not this."

**Sydnee:** Not that part. Just keep eating. Something's gotta be good in here."

**Justin:** "Hey, has anybody invented butter?"

[audience laughs]

**Sydnee:** [laughs] "Call me back when they do." There's no phone.

So, there are Egyptian hieroglyphics that reference mushrooms. So we know that, like, these were very—in a lot of cultures mushrooms were—and probably because of this sort of ephemeral nature, they were the food of royalty. They were the food of the upper class. It wasn't something that you would necessarily have if you were a common person, because there were only so many. Um, and so they were connected to this sort of, like, elite, they must do something special for you.

They were used in particular by Romans, not just for the elite but also as some sort of, like, super food for, like, soldiers. Like, this is what you would feed the soldiers before they would go out to, you know, soldier.

**Justin:** That's what Super Mario Brothers is based on, actually.

[audience laughs]

**Sydnee:** Gladiator?

**Justin:** Gladiators eating mushrooms before going into battle, yes. It's the exact same idea.

**Sydnee:** There's a great story when it comes to the Romans and mushrooms that actually, uh, your dad, Clint, gave me a book about famous poisoners throughout history. I don't know why—[laughs] I don't know what that says about me. He was like, "You would love this book about women who poison people."

[audience laughs]

**Justin:** I don't love it.

[audience laughs]

**Sydnee:** But it's a great story about the fact that Emperor Claudius was more than likely poisoned by mushrooms because he was a huge fan of mushrooms so this, like, made him ripe for poisoning with mushrooms, right? If you let people know that "I really love these mushrooms..." "

**Justin:** "Just bring me a pile of the things. I'll eat whichever ones you put in front of me, no questions asked. I'm wild about these guys."

**Sydnee:** His son, Britannicus, was next in line for the throne. But his wife, who—okay. She was his fourth wife, and also in writings she's referred to as his terminal wife?

[audience laughs]

**Sydnee:** Who uses that? Like, I mean, I—okay, yeah, then he died. I get it. But... terminal wife? Am I your terminal wife?

[audience laughs]

**Sydnee:** That's a wild statement! Terminal wife.

**Justin:** Sweetheart, I—

**Sydnee:** Did he know?!

**Justin:** Honey, 20 minutes ago I thought that mushrooms were plant. I can't run the calculus on what's the right answer of "Are you my terminal wife or not?" In this kind of setting right now. Yes! I—yes. I'm gonna go with yes.

[audience laughs]

**Justin:** No? Dang it!

[audience laughs]

**Sydnee:** So, she hired a poisoner to come and poison Claudius. And, like, it was all this very secretive plant where, like, they had to get the food taster distracted for a minute.

**Justin:** [wheezes]

**Sydnee:** You know? 'Cause that was part of it. Like, he had one job, and he really messed it up, 'cause he didn't taste the mushrooms.

**Justin:** Yeah, you can't mess that up enough, huh? That is...

**Sydnee:** And Claudius was—I mean, he died. And then her son became the next emperor, and he would take the name Nero.

[scattered gasps]

**Sydnee:** Shocking, I know.

**Justin:** Whoa! And now you know—

**Sydnee:** They love that one in the New York Times Crossword. That's always in there. If it's a Roman Emperor, it's Nero. It's like the E and the O's in there. They love all the vowels. Yeah!

Which, he went on to employ the same poisoner, by the way, to then just kill Britannicus. Which, like, he was already emperor. He didn't need to do it. You know?

**Justin:** Wait, what? Who killed—who killed Brit—

**Sydnee:** Nero went on to go ahead and employ that same poisoner and, like, made her, like, the royal poisoner. Like, the—yeah. Like, you know how you have a royal poisoner.

**Justin:** Man. I would hate to get her at the Secret Santa. Of...

[audience laughs]

**Justin:** 'Cause it would be just like, no win.

**Sydnee:** What's weird is that we've done a lot of studies to show that in our bodies, we have a lot of receptors that interact with things mushrooms make. So when I said that, like, mushrooms didn't evolve to be anything to us, but we have evolved to adapt to mushrooms, which is probably why scientists and researchers have done so much work to try and investigate, what could they do for us?

Because we have receptors that interact with the stuff mushrooms do. In particular, they produce these beta-glucans which interact with a lot of elements of our immune system and can kind of get cells ramped up and make things happen in an immune response. And so the thought has been for a long time, could mushrooms be good for our immune system? Maybe. We don't know.

So I want to go through some of the different—'cause there's lots of mushrooms. [laughs quietly] Lots of 'em. And there's lots of mushrooms we can eat. But there are certain ones that we've actually, like, done studies to look and see.

Which, before I go into that, I did have a—the, uh, the mushroom that was used to kill Claudius is a death cap mushroom, which I have a picture of that—yeah. And it is commonly—I feel like this is just a public service. Which one is edible? Do you wanna be the judge?

**Justin:** Wait, can I actually guess? 'Cause I'm gonna say, not the death cap?

**Sydnee:** No. The other one.

**Justin:** Easy.

**Sydnee:** The other one is supposedly delicious. I'm never gonna take this gamble. Look at those. I would never know!



**Justin:** That is—okay. You said that about who would eat it first, and I didn't necessarily get what you were saying. I'm sitting here thinking about it. There's a weird triumvirate here of, like, so, it's a—what is this? It's a mushroom. Oh, cool. Okay, what does it do? Well, if you eat it, it either... kills you... gets you stoned outta your mind... or is delicious.

[audience laughs]

**Justin:** There's almost no instance where I'm in the mood for one of those where I would be okay with the other two, right?

[audience laughs loudly]

**Sydnee:** And then there's this—

**Justin:** You run the numbers. They're already a losing bet almost any way you slice it, right? Without a helping hand.

**Sydnee:** There's this fourth column which is, maybe boosts your immune system and is healthy.

**Justin:** Super ones!

**Sydnee:** Maybe. Right.

**Justin:** Yeah, Mario ones, obviously.

**Sydnee:** I don't know. Here is my advice. If you're not an expert in mushrooms, just don't eat any of this that you're looking—you don't know. I don't know. I wouldn't eat these. Don't eat these. But one of them is delicious, apparently. That's so tempting! "One of these is delicious. Good luck!"

**Justin:** Yum, yum, yum.

**Sydnee:** Take the risk.

**Justin:** Only the bravest will enjoy.

[ad break]

**Sydnee:** So, some mushrooms that have been studied. Let's get into are they helpful, and what do we know about them?

One is called the cordyceps mushrooms. You may have heard of this mushroom. It's the one that—it's a parasitic fungi. And it grows—

**Justin:** It looks like somebody left corn on the cob on the grill too long is what it looks like.

[audience laughs]

**Justin:** I was already pretty hungry after the mushrooms, but now I'm starting to get a little bit more worked up.

**Sydnee:** It grows out of, like, the heads of caterpillars. That's what you're—

**Justin:** Ehh, okay.

**Sydnee:** That's what you're looking at there.

**Justin:** Less appetizing, I think we can all agree.

**Sydnee:** See its long, like, fungal... arms? Just extending from the dead—like, it grows out of larva. Typically it'll infect, like, the larva of an insect. But, I mean, it can infect something, and it replaces the tissue with itself.

**Justin:** It really has very little to do with delicious grilled street corn, now that I think about it. It's not even like corn that much at all now.

**Sydnee:** Long, slender stems is how they're desc—again, somebody looked at this and was like, "Health food. This is health food." [laughs]

Um, and it's true. This has been used—cordyceps is one of the most commonly used, not just in traditional Chinese medicine but in a lot of

different medical traditions as, like, something that is, um, I mean, for really everything.

You will find studies that say it's anti-aging, that it kills tumors, that it's good for cholesterol, that it's good for heart disease, diabetes, kidney disease. That kind of, like, catch-all, inflammation.

**Justin:** Right.

**Sydnee:** Which, I mean, that's very common in the wellness industry. They'll tell you, like, "This is good for inflammation." Which just means, like, "I don't know. Something doesn't feel well, does it? Well, take this. It's good for that."

Uh, there are, like, 400 different species of it. There are two, the sinensis and the militaris, that are the most commonly used in medicine. And we do—like, in terms of bodies of evidence, the most studies have been done on this specific fungus.

The problem is—I don't know. One, like, getting people to eat it? [laughs quietly] I don't know. Once you've ground it up in a powder it's probably not as hard. But the supplements that you will find have really been studied in small groups. When they say claims like "It's anti-aging," that was done in fruit flies. Which...

[audience laughs]

**Sydnee:** ... I don't know. If you've ever taken a genetics class, fruit flies reproduce really quickly. I don't know why we need them to live longer, personally.

[audience laughs]

**Justin:** Yeah.

**Sydnee:** 'Cause they just keep on going.

**Justin:** They're doing fine.

**Sydnee:** So there's no real evidence in humans. There's been a lot of lab stuff that's interesting. There's been some animal studies that are interesting. But it's kind of like a lot of the supplement world and the herbal medicine world where, I mean, we don't have big, high quality, double blind studies that we can hang our hat on and say, like, yes, this works, or not.

Another mushroom that has been studied are the reishi mushrooms. So—I know, they're beautiful, aren't they? Look! Those are lovely. Um, again—

**Justin:** They look like those cookies. You know the cookies that look just like—yeah, okay, thank you for the cries of recognition from my cookie friends!

[audience laughs]

**Sydnee:** They do!

**Justin:** "They do look like those cookies, J-man! Good call!"

[audience laughs]

**Sydnee:** Like, what are those cookies? Like, elephant ear cookies?

**Justin:** Yeah. Yeah, yeah, yeah, yeah.

**Sydnee:** Yeah.

**Justin:** Yeah.

**Sydnee:** They do. Everybody's yelling. They know.

**Justin:** Everybody's yelling names of cookies. I love it.

[audience laughs]

**Sydnee:** They're not cookies. They're mushrooms.

**Justin:** If you learn one thing tonight...

**Sydnee:** They're not plants.

[audience laughs]

**Sydnee:** They're fungus.

**Justin:** You know, Syd, tragedy plus time does equal comedy. But I don't think there's been quite enough time...

[audience laughs]

**Justin:** ... for us to all laugh about it.

**Sydnee:** And it's the same kind of thing. Like, these mushrooms have been tested. So there's a lot of research on whether it's cancer or, like, anti-inflammatory, or antioxidant. And it's basically putting stuff in petri dishes or in test tubes in a lab and kind of seeing, like, what does it do? And just because it works in that setting doesn't necessarily mean it translates to the human body.

And so that's kind of where we are with these mushrooms. We've done some stuff in a lab to see—specifically a lot of mushrooms are being studied to fight cancer. That seems to be the main—I mean, the everything. It's like—

**Justin:** Great place to start. I mean...

**Sydnee:** But, like, right now we don't have any evidence in humans. Another one is the lion's mane mushroom. You can probably guess why it's—I know! They're beautiful, aren't they? I get—I get why people who study these—why mycologists get so into them. 'Cause there's such a huge variety. They all look so different. They're beautiful. And I do like the independence of the fact they don't live for us. They don't care about us.

[audience laughs]

**Sydnee:** They're just doing their thing. I love that.

**Justin:** This was part of my gamer blend, wasn't it? Lion's mane is one that's used in my—in the pro gamer blends to try to increase your gamer proteins or whatever? [laughs]

[audience laughs]

**Sydnee:** I think lion's mane was in your gamer blend.

**Justin:** [wheezes]

**Sydnee:** Did it, um... did it help your with your... gaming? Ever?

[audience laughs]

**Justin:** We had a very limited sample size. [laughs quietly]

[audience laughs]

**Sydnee:** I can't ever test these, 'cause I only play—

**Justin:** Okay, with the limited size, it's 'cause I did it once, and the burps were so bad I couldn't ever do it again! So the research stalled. You know, the human cost was just too terrible. I couldn't get the board to clear it, that the ethics of it were just not fair. I can't burp like that around my kids for science.

[audience laughs]

**Sydnee:** Or me.

**Justin:** Or you, obviously, hon. But you've been with me through thick and thin. I can't, you know.

**Sydnee:** I only play Animal Crossing, so I don't know that you need lion's mane to get better at that. Uh, so anyway, it's been used mainly for, like, Alzheimer's disease. And so that—you know, improving cognitive function.

So that's why you would put it in something like a gamer's blend, or some other kind of—

**Justin:** [wheezes]

[audience laughs]

**Sydnee:** —performance enhancing... medication.

**Justin:** Honey, as we've said before, when you do the air quotes with your voice, you don't also need to do 'em with your fingers. It starts to get demeaning. It feels like every time you say gamer, but I'm sure there's other times. I'm just not noticing.

**Sydnee:** I do this when we're recording too, and nobody can see me, but I'm still like...

[audience laughs]

**Justin:** [laughs]

**Sydnee:** Gamer's blend. There are studies on it that are things like—okay. To test if it could be good for depression, a study was carried out on Japanese women with many health conditions, including menopause. Hmm. Hmm! Some were given cookies made with lion's mane, and others were not. And then the one who got the lion's mane cookies did better with depression. [laughs quietly] So see, these are not exactly the studies we need.

**Justin:** Wait, I need to clarify something, Dr. McElroy.

**Sydnee:** Uh-huh?

**Justin:** Did the people who didn't get lion's mane cookies get any cookies? 'Cause I think...

[audience laughs]

**Justin:** I think I understand the source of their depression.

[audience laughs]

**Sydnee:** I think they—

**Justin:** That would only—"Oh no! My condition has been terribly exacerbated by my participation in this research! Look at them across the room! That could've been me!"

**Sydnee:** "They got cookies! They have the health condition of menopause, and they got cookies."

**Justin:** "Aww, man! Stupid!"

**Sydnee:** Um, shiitake mushrooms, which a lot of us have probably had at some point or another, are another very popular health food. They do have a lot of, like, different vitamins and minerals in them just naturally. And that's the thing. Like, a lot of mushrooms are kind of digesting other things on Earth. That's, like, their purpose. That's what they're doing constantly. So they contain all of these other trace elements of the things they've digested. That's a good thing. And—

**Justin:** These look—I hate eating mushrooms. These look so good, though. Right?

**Sydnee:** They do!

**Justin:** Don't you lo—they look crispy and kinda salty, a little bit. Oh, man.

**Sydnee:** They have—

**Justin:** I'd love to eat these guys.

**Sydnee:** They have a lot of minerals. They have a ton of copper.

**Justin:** Oh yeah! Nice!

**Sydnee:** Which, if you need that... [laughs quietly]



**Justin:** Couldn't hurt, right?

**Sydnee:** [simultaneously] That's great.

**Justin:** Get it in there, see what it does!

[audience laughs]

**Sydnee:** But it is—

**Justin:** I'm mainly focused on the salt and the crunch over here, Syd. These guys are delicious.

**Sydnee:** It's got copper.

**Justin:** In my imagination.

**Sydnee:** But it is—which you can get deficient in copper, especially if you use denture cream that has a lot of zinc in it, 'cause then you absorb all the zinc, and it replaces the copper, and you get rid of the copper, and then you get copper deficiency. This really happens. Think about it.

[audience laughs]

**Sydnee:** Anyway. Uh, it does have a lot of—

**Justin:** [simultaneously] Cool. Sleep tight.

[audience laughs]

**Sydnee:** I did that presentation—that was a real case report I did. I got an award for it. [laughs]

[audience cheers and applauds]

**Sydnee:** It really happened!

**Justin:** I love you. [laughs]

**Sydnee:** I cracked that case. It was very House. Uh, so...

[audience laughs]

**Sydnee:** You can be allergic to these mushrooms. Well, actually you can be allergic to almost anything, right? But there's a specific condition, if you're sensitive to shiitake mushrooms you can get shiitake skin.

[audience laughs]

**Sydnee:** [laughs quietly] Which is just dermatitis! But, like, it's just inflammation of the skin. It's like eczema, basically. But they call it shiitake skin, which sounds, like, really bad. Like, you have shiitake skin. No, you're just—

**Justin:** I'm not hungry anymore.

**Sydnee:** You have mushroom skin?

[audience laughs]

**Sydnee:** Uh, the other mushroom that's been extensively studied is the turkey tail mushroom. I know. It's beautiful, isn't it? I get why it's called that.

**Justin:** Don't let her trick you.

[audience laughs]

**Sydnee:** Why?

**Justin:** You love showing us delicious mushrooms and telling us the problems with 'em.

**Sydnee:** The studies—again, this one—this one has been studied quite a bit for anticancer properties. And again, it's the same kind of thing where, like, in a lab, a lot of things can kill cancer cells in a lab that we can't put in our

human bodies, right? Like, I don't know, a very powerful light. Or bleach, perhaps.

[audience laughs]

**Sydnee:** Where have we heard this before? There are a lot of substances that we use out in the world that we can't necessarily inject in our b—so it doesn't always translate, right? That's interesting, it's a basis for further research, but it doesn't tell us anything. It has been shown to be well tolerated. You can eat it. So that's nice.

It's important to know that in general, the problem with a lot of these, like, mushroom supplements in the US is that they are regulated as supplements, not as medications. And I think it's always important to remember that they're not held up to the same standards in terms of, do they work? They are held to some standards in terms of safety, for sure. But they don't necessarily contain what they say they contain. [laughs quietly]

**Justin:** Good.

**Sydnee:** They don't have to. And so the amount of different—in a dietary supplement, the amount of actual active ingredient from bottle to bottle, pill to pill, you know, run of bottles to run of bottles, can be dramatically different. And so I think that's always important when you're talking about any kind of, you know, supplement in the US.

The one mushroom we haven't talked about yet that I feel everybody wants to know about in terms of its properties are the psilocybin mushrooms.

[audience cheers]

**Sydnee:** The magic mushrooms, if you will. [laughs quietly] And this—so, the reason—

**Justin:** Are you sure you're not a cop? You're, like, positive?

[audience laughs]

**Sydnee:** We figured out that this active ingredient existed in these mushrooms a really long time ago. Like, I found this article from Time Magazine. This was from June 16th, 1958. And, like, back then, researchers would take the mushrooms and then just, like—there's so many articles of scientists describing what it's like to be high in scientific ways.

[audience laughs]

**Sydnee:** And, uh—and so the scientist who isolated psilocybin the first time, Albert Hofmann, wrote:

"I am losing my normal bodily sensations. My perception of space and time is changing. Your faces appear strange."

[audience laughs]

**Sydnee:** "Now as I close my eyes I see a wonderful but indistinct kaleidoscope train of visions. They are vividly colored."

There are so many ar—if you're interested, there are so many articles like this. Of just, like, researchers very straitlaced in their white coats taking drugs and then writing about it.

Uh, so there is a lot of interest now in psilocybin as—and that family, this whole family of mushrooms. What can we do with this active ingredient that interacts with our serotonin receptors similarly to a lot of antidepressants that do that, that we have made, you know, synthesized to do exactly that?

They also increase our amount of dopamine. So there's a lot of interest in, could we treat anxiety, depression? There's been some interest in alcohol use disorder or other sorts of substance use disorders. Could this be a way to help people stop using other substances?

We really didn't move forward until it could be reclassified in 2019.

So the research on this is still relatively new. And the same researchers who write so eloquently earlier about mushrooms I found in articles recently, like Dr. Stamets saying, you know, this is going to be—this is the next frontier

are these mushrooms and all the things we can do, and we're just beginning to unlock their potential. And he said in this CNN article...

"I'm going to say something provocative, but I believe it to my core. Psilocybin makes nicer people. Psilocybin will make us more intelligent and better citizens." But I think it's important—

[audience laughs and cheers]

**Justin:** I think we're more cheering for, "That would be nice." To just—

[audience laughs]

**Justin:** Whatever—was it mushrooms? Yeah, sure, whatever he's saying. [laughs] Give us all you got!

**Sydnee:** But it's important that we take a scientific approach, just like we do with all of these other mushroom compounds that may or may not do something for us, as Matthew Johnson, who's a professor in psychedelics and consciousness at Johns Hopkins, who answered this by saying: "Well, people like being on it, but that doesn't validate the claims of microdosing. People like being on cocaine, too."

[audience laughs]

**Justin:** Okay, yeah...

**Sydnee:** So it remains to be seen. [laughs]

**Justin:** Alright. Alright, smart aleck, sure! [laughs]

**Sydnee:** But there's a lot of potential.

**Justin:** Alright. Well, here's hoping.

**Sydnee:** In fungi. Not plants. [laughs]

**Justin:** Thanks so much for coming to our show.

[audience laughs]

**Justin:** We've really enjoyed our time with you.

[audience cheers and applauds]

**Justin:** Um, we want to thank The Taxpayers for the use of their song, Medicines, as the intro and outro of our program. We're about to take a brief break. There will be an intermission, during which you can feel free to use the facilities, maybe purchase a beautiful poster featuring some primo fungus.

**Sydnee:** Oh yeah! There's some fungus.

**Justin:** Some fungus right there. Thank you so much for being here with us. That is gonna do it for us for this week on Sawbones. Be sure to join us again next time. Until then, I'm Justin McElroy.

**Sydnee:** I'm Sydnee McElroy.

**Justin:** And as always, don't drill a hole in your head.

[audience cheers]

[theme music plays]

[chord]

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