Sawbones 441: Anthrax

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Intro (Clint McElroy): *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 not try 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.

[theme music]

Justin: [singing to the tune of theme music] Hello, everybody, and welcome to *Sawbones*: A marital tour of misguided medicine. I'm your co-host, Justin McElroy. [normally] It was all the melody there. [singing] I'm your co-host, Justin McElroy.

Sydnee: And I'm Sydnee McElroy. And I feel like you're showing off that you don't have a sore throat.

Justin: Still, people are starting to get worried, Syd. I read on the blogs people are, like, "Is she okay?"

Sydnee: [chuckles softly]

Justin: "We're all really worried about Sydnee."

Sydnee: I don't read that. Now, listen.

Justin: It's two episodes in a row.

Sydnee: You don't read the blogs. [chuckles]

Justin: I— I don't. Are there still blogs? [laughing]

Sydnee: I don't know. I don't know. I try not to know. I ran for office. [through laughter] I try to avoid public commentary about myself as an individual.

Justin: I don't even read Twitter anymore. Do you know how many great hot takes I had about *Avatar: The Way of Water* that I just had to sit on? 'Cause, they weren't on Tiktok, and they weren't on Instagram.

Sydnee: Mm-hmm.

Justin: It was a tweet. And I— maybe a series of [chuckles] great, great tweets.

Sydnee: Which, the only thing that I regret about that is, um, then I had to hear them.

Justin: Yeah. That's true. [through laughter] That's— are you happy now, Elon? [wheeze laughter] Now my wife has to hear my *Avatar: The Way of Water* hot takes.

Sydnee: It's truly the worst thing you've done. [chuckles]

Justin: Yeah.

Sydnee: No. Um, I'm fine. I'm okay. I don't want anybody to worry.

Justin: Why do you keep telling me to worry so often and talk about how much pain you're in? If you don't want me to worry.

Sydnee: No, that's not true.

Justin: [soft strained voice] "Justin, I can't do another show."

Sydnee: I don't— I have never said that. I've never said that. It will go away, whatever is wrong with me. I'm not going to think about it. [laughs softly]

Justin: Okay. Good. Yeah, a winning strategy.

Sydnee: For everyone who is in healthcare, they're nodding, going, "Mm-hmm, mm-hmm. Yes, this is what we do. We just don't think about it. That's

perfect. That's exactly— that's the right response." And for everybody who is *not* in healthcare, they're going, "What? Why?" I understand. I'm fine. I'm getting better. I'm really— I'm fine.

Justin: You said this morning, "I'm not getting better." [wheeze laughter]

Sydnee: [laughing]

Justin: Which is it? [through laughter] You can't give a different message to the kids— to our listener kids and then not to me.

Sydnee: I feel like there's a—

Justin: Like, I'm not that strong. I can't have a stiff upper lip.

Sydnee: Like I said, I either think this is— I don't want to get into my own personal medical. I mean, I'm not being weird about it. I just— I don't think that's very interesting.

Justin: Just guaran—

Sydnee: It's not fun for you listeners to have to hear my theories on why I've had a sore throat for over a week now.

Justin: Just guarantee to me that by the next episode, it will be 100% better. And then nobody has to worry about it.

Sydnee: [softly] I can't. I can't guarantee. Listen, I would've thought that a few days ago, but I've plateaued, bud.

Justin: Oh, man.

Sydnee: That's not what we're here to talk about.

Justin: For some reason. [laughs lightly]

Sydnee: One of our—[laughs softly] One of our listeners wrote an email, thank you, Mark, asking if we had covered Anthrax. And I thought, "Well, yeah, sure, Mark." I mean, we've been doing this show for ten years.

Justin: Mm-hmm. Certainly!

Sydnee: Certainly, at some point. And I couldn't find an episode that we did on Anthrax.

Justin: It's a funny thing when you do a show as long as ours. We get a *lot* of emails from people who're like, "How could you guys not have done a show on this?" And then I'm like, "Let me look on Google. We *did* do that."

Sydnee: Mm-hmm.

Justin: Why don't you not Google before you suggest an episode? [chuckles] But then, even *we* can't keep track of what episodes we've done.

Sydnee: No, I don't blame you, 'cause I can't keep track either. And sometimes I go, "Oh, surely we did." Then I go, "Oh, we didn't?" Or I'm like, "Absolutely, I haven't." I've done that, actually. I've started to research again and then gone, "Oh, wait. This feels really familiar. I've done this episode."

Justin: [chuckles lightly]

Sydnee: So, we haven't. I think we have, like, touched on it in a variety of different episodes. There's lots of aspects to the history of, like, the discovery of anthrax and then its use as a bioterrorism weapon and things that I think we have touched upon in different episodes.

Justin: Mm-hmm.

Sydnee: But we've never just talked a whole episode about Anthrax. [chuckles]

Justin: Okay.

Sydnee: At least, I hope. [through laugh] As far as Google showed me. [normally] I didn't go through— there is probably, like, a page where I could look through every podcast we've ever done just in a list, huh?

Justin: I mean, we have, uh, transcriptions for a lot of them.

Sydnee: Yeah.

Justin: On our website at themcelroy.family.

Sydnee: That would take a long time.

Justin: Yeah.

Sydnee: Anyway, um, it's old. It's interesting. I think a lot of people hear anthrax, and it's scary. Like, the word is kind of scary.

Justin: It is kind of—

Sydnee: It has a scary sound.

Justin: Well, depending on context, it's kind of rocking too. I mean, it's, like, a cool word. Like if—

Sydnee: It's like a band, too, right?

Justin: Yeah, it's a band. How is that not part of your research? I figured the second half of the episode is about Anthrax, the band.

Sydnee: I am a scientist, sir. [chuckles softly]

Justin: Well, music is— is— there's a lot of science in music.

Sydnee: I am not a rock 'n roller.

Justin: Um—

Sydnee: Are you about to tell me something about Anthrax, the band before this?

Justin: I mean, they're out there on the road, hon. They're getting it done. January 17th, they're gonna be in Boise. Get out there.

Sydnee: Do you know where the word comes from?

Justin: Yeah. The band, [through laughter] Anthrax. I'm looking right at it.

Sydnee: No. The word anthrax.

Justin: They're not coming to West Virginia or Ohio. So, okay, fine.

Sydnee: It's a reference to coal.

Justin: Oh.

Sydnee: From the Greek, anthracis. It's for coal because, um, the skin lesions— when you get the cutaneous form, the skin form of it.

Justin: Mm-hmm.

Sydnee: The things that appear on your skin are really black. You get these big black scars. But, anyway, they're these big black, like, sort of scabby lesions, and they look like coal.

Justin: Weird.

Sydnee: So, Hippocrates called it anthrax.

Justin: Oh.

Sydnee: 'Cause coal. Anthracis there.

Justin: All right.

Sydnee: I feel like, as a West Virginian, you should've known that.

Justin: Oh.

Sydnee: So, it's caused by a gram-positive rod, a bacteria, Bacillus anthracis.

Justin: Mm-hmm.

Sydnee: And it forms— the thing about anthrax, and I think that the reason that we talk about it as, like, a— I don't want to say, a good bioterrorism agent. Like, this is not a morality— [laughs softly] I mean, good— you know what I mean? I'm using—

Justin: It's not— effective is maybe a word.

Sydnee: Effective.

Justin: Effective would be a word.

Sydnee: It forms in endospore. So, it's got, like, this spore coat around it that protects it.

Justin: Mm-hmm.

Sydnee: So, it can, like, lie dormant for a really long time. It can survive for a long time before, like, in the right conditions, it comes back to life and causes an infection. And then becomes— and then causes harm. So, because it has that spore form, it makes it a useful agent if you're trying to, like, put something in a powder, for instance.

Justin: I'm really sorry. The cat is trying to pull the headphones off the thing. It's very distracting. I'm sorry, everyone, about our cat.

Sydnee: Oh, well, let her. She's, you know, she's in charge.

Justin: Okay. [thump in background] Ah!

Sydnee: The spores can live, like, usually in, like, dirt or on animals, honestly, most of the time. That's where people have— we'll talk about where people have contracted anthrax from, like, touching and coming in contact with animals. They can be out in the dirt. You can— there's different ways you can, like, have the spores enter your body. And the different ways that they enter your body causes different kinds of disease.

I feel like it's useful to sort of go over what anthrax is as a disease, because chances are you've never seen it. Chances are you don't know somebody who's had anthrax.

Justin: Yeah. That's accurate.

Sydnee: Yeah.

Justin: That's 100% right.

Sydnee: So, you can get it by either inhaling it— so the little spores, they're very tiny, so you can breathe them in. You can eat contaminated, you know, animal products.

Justin: Hm.

Sydnee: And that— you can get a gastrointestinal form— a GI form of it. So, you can ingest it. Or you can get it through, like, an open wound. So— and you're thinking about people who are handling animals, or handling animal coats or hides or whatever, and might have a cut or break in the skin or something like that. So, those are different sort of ways you can come in contact with the anthrax Bacillus.

Justin: Okay. I'm gonna sound stupid for a second.

Sydnee: Mm-hmm.

Justin: So, help me out. Okay? I think because I grew up in a time period, and we're going to get to this, where a notable quote, unquote "Anthrax" attack is kind of what brought anthrax onto my radar, like a lot of other people. And I think that I am unclear as to what, like— there was a lot of

discussion about it being, like, a powder at that time. It was in, like, envelopes.

Is it, like, a thing, like a microscopic bug that we're passing back and forth to each other, like Covid, or the cold, or the flu? Or is it, like, a substance that makes you sick, like asbestos or other toxins?

Sydnee: You were playing with the cat, so you missed this part.

Justin: Mm-hmm. I wasn't *playing* with the cat.

Sydnee: [chuckles]

Justin: I was trying to keep the cat from destroying our recording.

Sydnee: It is a bacteria.

Justin: Right. I understand that.

Sydnee: A gram-positive rod.

Justin: Right.

Sydnee: Bacillus anthracis.

Justin: Yes.

Sydnee: So, it is a germ.

Justin: Okay.

Sydnee: It is not a substance. It is not asbestos.

Justin: Okay.

Sydnee: It's a germ.

Justin: Okay.

Sydnee: That's, you know, a living organism. But you cannot pass it back and forth to each other. That is not the way we get anthrax.

Justin: Got it. Got it.

Sydnee: You get it from coming in contact with the spores out in the environment. And then, you catch it from that. You get— you become infected.

Justin: It is not contagious in humans.

Sydnee: It is not contagious.

Justin: Got it. All right.

Sydnee: If I have it, I'm not going to give you anthrax.

Justin: Got it.

Sydnee: So— and there— and like I said, the reason it works well in a powder is— I mean, it's a microorganism. You can't see it. Like, I can't have a pile of anthrax here on the table, and you see it. But because it has that endospore form that, it's very hardy and survives well for long periods of time, you can put it in a powder or something. And because it can be inhaled, if you have a very light powder that you have also put a vial of this sort of organism into—

Justin: Oh, okay. Right.

Sydnee: … then you inhale the powder, and in the power are the spores.

Justin: Got it.

Sydnee: Right.

Justin: I'm with ya now. Thanks for clarifying that.

Sydnee: Yeah. Or, like, drop it from a plane that way.

Justin: Whoa!

Sydnee: We'll get there.

Justin: Dang. Syd, you're ratcheting up the tension. It's like a bomb fell across from me.

Sydnee: I'm just saying. Well. So, this leads to different forms of anthrax. Like I said, there's the skin form or cutaneous form. It causes these, like, blisters that then you get, like, swelling and then the classic lesions that if you look at pictures, they're like these big black— like I said, as scars, they're thick black skin lesions. They— and then, like, they can ulcerate. They can be anywhere on the face, neck, arms, wherever you come into contact with the bacteria, right?

And, I mean, this is— yes, this is all treatable, by the way, now. In the early days anthrax wasn't. It's all treatable now. But there's— it's still a big deal, right? It's still a very dangerous disease to get. Any of the forms. The form where you inhale it can make you really sick. It— obviously, it affects your lungs at that point. You get pneumonia-like symptoms, and you can get pretty sick from inhaling the spores.

There's, like I said, the GI form, which is less common, but you get, like, diarrhea— like, bloody diarrhea and vomiting and stomachaches. And, you know, you can get very sick from ingesting it. And there's also a newer form. And by newer, I mean, like, in the last decade or so. So, newer in the sense of anthrax, which has been around since ancient times. Um, where you can actually get it from injection. So, we have found some cases in people who use injection drugs, where— and it's similar to, like, the skin form, except you actually end up injecting the bacteria into the vessel. So, it's a more invasive and quicker spreading cutaneous form. Does that make sense?

Justin: Yes.

Sydnee: So, and each of these are slightly different in terms of, like, the approach to treatment and management, how severe we expect the disease course to be, and what the mortality rate is. It is different for all of these different things. For most people, you develop it within a week of exposure, although it can take up to 60 days. That does allow for a little bit of a prophylaxis period.

So, like, if you've been exposed for sure, absolutely to anthrax, and we know this, which would be hard to know, right? But, like, in a bioterrorism incident, we'd know. We can give you an antibiotic to take for 60 days to try to prevent this exposure from turning into an infection. Does that make sense?

Justin: Mm-hmm.

Sydnee: That kind of lead time is helpful sometimes. Like I said, it's been mentioned since ancient times. I thought this was interesting; some historians think that it is the fifth Biblical plague. The one where all the livestock died.

Justin: Hmm.

Sydnee: May have been anthrax. Although, I was reading about that, and there was, like, there are these, like, historical arguments. I was like, "No, it was probably actually this. Or it could have been this." I don't know. I don't have a scientific opinion on that.

Justin: Okay.

Sydnee: It may have been anthrax that killed all that livestock.

Justin: Mm-hmm.

Sydnee: There you go.

Justin: Sure.

Sydnee: There were scattered descriptions throughout Ancient China, Ancient Greece, Ancient Rome, and, of course, Egypt. Um, we see the first real clinical— like, the things we know are anthrax. I mean, obviously, Hippocrates named it, but, like, to actually say, "People are getting it, and here's what it looks like. Here's a clinical description." We don't really get until the 1700s.

Justin: Mm-hmm.

Sydnee: From Maret and Fournier. Fournier— I saw that name, and I was, like, "I know this name." If you're in medicine, you know the name Fournier because, um, he famously— Jean Alfred Fournier, is his full name,—

Justin: Oh.

Sydnee: … is a doctor who has a type of gangrene named after him.

Justin: What an honor.

Sydnee: Fournier's gangrene. Which is, of course, gangrene of the scrotum.

Justin: Ah, yes. I know it well.

Sydnee: [chuckles] You do?

Justin: [through laughter] No, I don't. It just sounds very unpleasant.

Sydnee: It's a bad gangrene to get.

Justin: As a scrotum haver, it sounds like one of the worst ones you can get.

Sydnee: [laughs softly] It— It's unpleasant. It's a very serious gangrene.

Justin: One of the rare unpleasant gangrenes.

Sydnee: [laughs softly] So, uh, not— this has nothing— by the way, the fact that Fournier also named scrotum gangrene after himself— well, somebody probably— He probably didn't name it after himself. Somebody else did, and he was probably like, "Cool."

Justin: "Oh, this one. That kind of gangrene? I want to be remembered forever."

Sydnee: [chuckles softly]

Justin: "Attach me to it."

Sydnee: Listen, as a practicing physician right now, in this point in history, I will tell you that if I get anything named after me, I'll be happy. I don't care what it is. I don't care how unpleasant or gross or weird. If I get anything named after me, I'll consider it a win.

Justin: I got a millipede named after me.

Sydnee: Unless it's, like— unless it's, like, doing a bad thing. Unless it's like, "Oh, you pulled a Sydnee." Meaning, like, you misdiagnosed somebody.

You know what I mean? Like, unless it's a bad— but, like, if I get my name on something, that's just— that's a big win for me.

Justin: Yeah, the McElroy millipede—

Sydnee: [laughs softly]

Justin: … is named after— that's named after our family. So, you get that. I think that's— that's a—

Sydnee: That wasn't even the name that I got, like, that's not even my original name.

Justin: Yeah. That's fair.

Sydnee: That's not— yeah.

Justin: That's fair.

Sydnee: Name something with Smirl. [chuckles]

Justin: [snort laughs]

Sydnee: Uh—

Justin: We just got an email from a listener who named their child after you. That's got to count.

Sydnee: That's a really good point.

Justin: Yeah.

Sydnee: Thank you, by the way, you know who you are. Thank you. That— it made me cry. And it's been a rough week, and I needed that. So, thank you. And good luck, little Sydnee.

Justin: Hm.

Sydnee: In—

Justin: Which is what I say every morning—

Sydnee: [laughing]

Justin: … as she goes off to work. [chuckles]

Sydnee: In 1876, um, anthrax helped play a role in developing Koch's postulates. We've talked about Robert Koch and his postulates before on this show.

Justin: Oh, yeah.

Sydnee: How he figured out, like, "how do you prove that a certain germ causes a certain illness?"

Justin: Koch's postulates.

Sydnee: Yes. He was investigating an outbreak of an illness in farm animals. At this point, they'd already, like, found the bacteria. Like, all these previous experiments throughout the 1800s, they'd actually seen the bacteria, but Koch wanted to prove it.

So, he took a cow that had anthrax, and he took some material from the cow's spleen that had these little germs, these rods that he suspected were anthrax in it. And he used a sliver of wood. Like, he got some cow spleen on a little splinter and poked a mouse with it.

Justin: Oh. [through laugh] Oh!

Sydnee: And it said, like, near their tail. By its tail. I don't know if they mean, like, by its tail. So, do I mean, like, in the tail? Or by the base of the tail? Or, like, in his butt next to the tail? So, he poked the mouse with the splinter of cow spleen. The mouse got sick. He got some material from that mouse's spleen. Poked some other mice.

Anyway, was able then to isolate the bacteria from further spleens down the road. [chuckles softly] Lots of spleens in this story. And proved that this was the bacteria that was causing this problem and developed his postulates.

Justin: And— and all the mice got better and had families? And a successful career in the arts. So, they were fine too.

Sydnee: Except they'd had splenectomies, of course. [laughs softly]

Justin: Other than that. You don't need your spleen.

Sydnee: [holding back laughter] So there are considerations when you're— well, you don't need it. I mean, there are some things you have to consider when you don't have a spleen.

Justin: But they were living—

Sydnee: Like, you have some specific concerns, but—

Justin: Yeah, but they were fine.

Sydnee: [laughs lightly] But they didn't have spleens. So, after all this work from Koch, Louis Pasteur decided, like— 'cause I guess they were kind of rivals, and Pasteur was like, "I'm gonna repeat all that just to make sure I buy it." And also, like, "I'm gonna make a vaccine because that would— I'm gonna next level. I'm going to one-up you."

Justin: Yeah.

Sydnee: I'm going to do—

Justin: You just came up with this problem. I'm gonna fix it. And then there's no problem anymore, and everybody can forget about you.

Sydnee: And he did. And it's— he did all these studies with it, and it's interesting. He proved stuff like, that if you buried— so if an animal died of anthrax and it was buried, and then it's down in the dirt, and there's anthrax spores in the animal— like, in the cadaver, that those spores could be carried to the surface of the soil by earthworms.

Justin: Oh, wow.

Sydnee: Yeah. Who then, like, poop the spores back out up on the surface of the— Isn't that wild?

Justin: That's totally wild.

Sydnee: Like— to sort of like find, like, where does anthrax live on Earth? There it is. It's in earthworms.

Justin: Oh.

Sydnee: So— and then finally he did, like I said, the vaccine study, where he did, like, a live public demonstration of giving a bunch of, um, vaccines to sheep, and then these other sheep didn't get vaccines, and then he infected

them all with anthrax. And all the ones who had the vaccine lived, and all the ones who didn't have the vaccine died.

Justin: Boy, they were hard up for entertainment back then, huh? I mean, a public demonstration of that does not sound particularly gripping. You do have to wait quite some time. It's not an instant thing, right? It's not like the elephant and the AC-DC current.

Sydnee: No. No.

Justin: You kinda gotta check back later, folks.

Sydnee: I'm assuming— I'm assuming there were, like, breaks. Like nap times. [laughs softly]

Justin: [laughing] Okay, everybody, we gotta a churro stand!

Sydnee: [laughing]

Justin: We got Rick's old-fashioned lemonade! [through laughter] We got— City Heat is gonna come play a show! We got Massing later on the main stage, and then we'll check and see if the sheep have anthrax.

Sydnee: So, while everybody is waiting for these sheep to get anthrax, or not, um, why don't you also take a break? [chuckles]

Justin: All right.

Sydnee: We gotta go to the billing department.

Justin: Let's go!

[theme music plays]

[ad break]

Sydnee: Okay. So, obviously, we're doing all these experiments in the 1800s. We're learning more about anthrax, about how you get it. Obviously, there's this livestock vaccine that's now been invented—

Justin: Mm-hmm.

Sydnee: … like, just for animals so far. And there are more cases of it. It starts to be known— this is a common name of it, woolsorter's disease.

Justin: [enunciates carefully] Wool-sorters disease?

Sydnee: Mm-hmm. Because people have come in contact with wool from sheep were likely to get it, because of the spores were in— you know. So, it's really connected to that. Like that— it's funny 'cause that was very much what you connected anthrax to prior to the biological weapon era. Which is where we get in the 1900s. As I said, like, it has this endospore form. It's useful if that is your aim, unfortunately.

Justin: Okay.

Sydnee: There's evidence that the German Army initially used it to infect livestock. Like, that was sort of the first way to like—

Justin: To try to wipe out food sources?

Sydnee: Yeah. Exactly, for, um, allied nations. So, you just— you feed it to— you put it in animal feed that is getting snuck to your enemy's cows. So— man, poor cows. So rotten. And so, back in World War One, this was being used. During World War Two— by this point, in World War Two, we really understood, like, the possibility, and we didn't yet have protections in place that said, like, "you can't use biological weapons", right?

Those would come later. Well, you can't. You aren't supposed to. We have rules against that. If you can have rules against such things. We try to make rules against such things. So, during World War Two, both the US and the UK experimented with anthrax as a biological weapon.

Justin: Hmm.

Sydnee: Meaning, like, they were prepared to use it. I don't have evidence that they did, but they were ready, just in case.

Justin: Mm-hmm.

Sydnee: To use it, um, against the Nazis. So, the U.S. filled 5,000 bombs with anthrax.

Justin: Geesh.

Sydnee: Just in case.

Justin: Just in case. You never know.

Sydnee: Just in case. And, like I said, because similar to, like, the envelopes full of powder, if you drop a bomb full of anthrax over an area and the spores sort of float out over the area, you could infect a lot of people that way.

Justin: Yeah.

Sydnee: As I said, the U.K. also began to test bioweapons using anthrax. Specifically, they were testing it on this small island, called Gruinard Island. And they— uh, basically, they would release these bombs of anthrax over the island, where they had 80 sheep, to see if, you know, "Would the sheep get anthrax if you—" Same idea. Like, "Does this work?" And what they found is, like, one, yes, you can give— Yes, the sheep got anthrax. The sheep died. So, like, you could spread the biological weapon that way.

But the other thing that they found out is that once you do that, the spores are there for a very long time. So, it's like— I mean, if you're going to do that, you're really sort of salting the earth.

Justin: Mm-hmm.

Sydnee: In an area, for a while, at least. The island remained uninhabitable until 1986.

Justin: Whew.

Sydnee: And that was only because, at that point, they had to decontaminate it, by soaking the island in a mixture of formaldehyde and seawater.

Justin: Oh, my gosh.

Sydnee: So that you could disinfect it, basically.

Justin: [blows air through teeth]

Sydnee: So, it's— I don't think that you need me— I don't think my voice needs to be part of the chorus saying that, "Biological weapons are inhumane and should never be used, obviously."

Justin: Mm-hmm.

Sydnee: But another example of why these weapons were so incredibly dangerous. They're cruel. They're inhumane. You can't control the spread of disease. Although, the other thing that made anthrax attractive to a lot of people who were trying to do this is exactly what I told you. I can't give it to you.

Justin: Mm-hmm.

Sydnee: So, you could target a population in a way that, with some other germs, you wouldn't be able to, right?

Justin: Right. It's not gonna escape. It's confined.

Sydnee: Right. You could accidentally end up infecting your own side, so to speak.

Justin: Yeah.

Sydnee: Now, all of this use of anthrax and deve— like, experimentation and development, and the understanding that, like, it is possible to use germs as weapons— Which, I mean, we have a whole history of this. We could talk about smallpox, but—

Justin: Right.

Sydnee: But this is about anthrax. Um, there was growing international concern that this isn't a good idea. And so, obviously, we took steps to ban the use of biological weapons and to put protections in place. We also destroyed a lot of, um, stores of these germs. Not all. No one destroyed all of them.

Justin: [scoffs]

Sydnee: Everybody's got them somewhere.

Justin: You gotta keep a little bit.

Sydnee: You gotta keep a little bit, just in case. Well, I mean, that's the thing, right? You never know what the other people are keeping.

Justin: Right.

Sydnee: So, everybody kept a little bit, but they did lead to destroying a lot of these stores. And also, it would lead to the creation of the vaccines.

Because all of a sudden— well, we don't know what they have, but if we vaccinate our team against it, we don't have to worry about it so much.

Justin: Yeah.

Sydnee: The first— like I said, the first, um— we had this vaccine that Pasteur had used in 1937. There was another one made. A live spore vaccine for animals that was done so well, it's still used in many countries today.

Justin: Hmm.

Sydnee: Max Sterne made that. The first anthrax vaccine for humans was created in the 50s. It was actually tested in a group of goat hair mill workers. They were either given the vaccine or a placebo. They were followed for up to a two-year period, and they found out the vaccine was 92.5% effective.

Justin: Hmm.

Sydnee: In preventing the skin form, the cutaneous form, of anthrax. Which is what you're most concerned with people who are handling goat hair all day, right?

Justin: Okay.

Sydnee: Um, so, it was made available specifically to people working in these kinds of mills after that. It was really targeted at specific occupational exposures at first. It wouldn't be until 1970 that we get— and this is always the history with vaccines. We've talked about them a lot on this show. You make your first one, but you're always trying to see, like, is there a better form?

Justin: Sure.

Sydnee: Is there a cleaner form? Nowadays, we have a lot of those early questions answered. We don't have to go through all the same steps that we used to. But there is always the possibility that we could refine something and make it better. If we're *not* doing that in medical science, we're doing something wrong.

Justin: Mm.

Sydnee: It's rare that we reach— where have we reached the pinnacle?

Justin: Podcasting?

Sydnee: Well, I meant in medical science, but—

Justin: Oh, okay. Yeah.

Sydnee: [laughing]

Justin: Sorry.

Sydnee: So, they had continued to develop and perfect the vaccine. And the one that was released in the 70s is the one that we still have in use today. It, again, is— you have not, probably— statistically, if you are listening to this podcast, you probably have not received a vaccine against anthrax. You may have, 'cause people in specific occupations— well, now it is more targeted for members of the military, because of this long history of the use of anthrax as a biological weapon. It's also, specifically, people who work in certain jobs where they come into contact with animals.

Justin: Oh, yeah?

Sydnee: Like certain veterinarians and things may have had an anthrax vaccine or animal handlers in different occupations. People who work in labs with anthrax, obviously. [chuckles softly]

Justin: Yeah. Yeah, I would ask for that day one, I think. [laughs]

Sydnee: But it's not a standard vaccine given to everybody. In medicine, certainly, like, I have never had an anthrax vaccine. You know, most of us have not, but there is one that is available.

Justin: Well, okay. Well, um, do I need it?

Sydnee: No, Justin. Do you have any of the jobs that I just—

Justin: I'll take any vaccine. Give them all to me.

Sydnee: Yeah, I mean, like—

Justin: I want to walk the world unafraid.

Sydnee: [chuckles lightly] Don't get me wrong. If vaccines were— if all vaccines were just widely available, easily, cheaply, freely, even better—

freely available to everybody all the time, I would have no problem just getting all vacc'ed up against it. Whatever. Just why not?

Justin: Yeah, why not?

Sydnee: Just in case.

Justin: Whatever you got.

Sydnee: Just in case. I mean, I think the issue is more the supply, like, because so much stuff is profit driven—

Justin: Mm-hmm.

Sydnee: Especially for some of these vaccines, there are only so many. And so, from a health justice standpoint, I am not at risk of anthrax. [chuckles softly] At least, that I know of.

Justin: Yeah.

Sydnee: [laughs softly] At least, high risk. And so, it would not make sense for me to utilize that limited resource. Now, in a perfect world, it would not be a limited resource, but—

Justin: Yeah.

Sydnee: Anyway, so, in 2001— this is what you'd referenced at the beginning of the show.

Justin: Yeah.

Sydnee: There was a— an attack of a bioterrorism weapon using anthrax in the United States, following the attacks of September 11th. It was very scary. It was— Amerithrax is what it was dubbed. That was the code name of the FBI investigation. Did you know that?

Justin: No. [through wheeze-laughter] That's not very good.

Sydnee: There were letters—

Justin: Sounds like a company that comes to your house and fixes your windshield. [chuckles]

Sydnee: [laughs softly] Amerithrax is what the FBI called it. There were letters that were laced with anthrax that were mailed to people. All in all, five U.S. citizens were killed, um, as a result of these attacks. 17 became sick. It was the worst biological attack in our history.

Justin: It's hard to— and it's hard to, if you didn't live through it, to really appreciate how we were already in a pretty fractured state, like, mentally.

Sydnee: Mm-hmm.

Justin: Everyone is processing the idea that terrorism is something that, like, we have to be concerned about here on a wide scale. And then this attack happens, and it's something so innocuous. It's, like, open the mail and whatever. So, in the— it was a very, very big deal, because we kind of thought, "Is this going to be our life for now?" Like, are we just constantly going to be under threat of, you know, terrorist attacks, so—

Sydnee: Well, and it's the— I mean, I think that's the thing— that's the other thing about biological weapons, outside of how cruel getting someone sick is, the idea that you would open a piece of mail and that letter—I mean, like, these letters said things like, "We have this anthrax. You die now. Because by the time you are reading these words, ostensibly, you've already inhaled what's inside."

Justin: Mm-hmm.

Sydnee: And that— I mean, I think that the fear that you can create with that kind of weapon is so— It's just, I mean, it's horrifying to consider. It's inhumane. It's… yeah.

Justin: Mm-hmm.

Sydnee: It wasn't until 2010 that that investigation was formally concluded. It took a long time to, like, trace the origins of the strains of anthrax, and, like, do the proper testing to figure all that out. Um, they brought charges against a Doctor Bruce Ivins, but he died by suicide before the charges could be filed, so— and then the case was closed a couple of years later.

I will say, other than these bioterrorism episodes, there have been a couple unique ways, um, that people can get— and these are for all of you out there who might be studying medicine. These are your board questions. A drum maker from New York City—

Justin: Mm-hmm.

Sydnee: Yes, someone who makes drums, got sick while on tour with a dance troupe. It was in 2006. He had just returned from Africa. He had gotten some goat skins that he was making drums out of. He had processed them to remove the hair, but he didn't use any chemicals to kill the germs. And stretching the goat skins over, he came in contact with hair, and dust particles, and anthrax particles, and inhaled anthrax. And got inhalation anthrax from making these drums. So, if there is a drum maker who gets sick on a board question, think anthrax.

Justin: All right. Got it.

Sydnee: I had one of those questions once on one of the many exams I have taken. There was another woman who got sick in 2009 while attending a drumming circle and got anthrax.

Justin: Somebody hates these drums, guys.

Sydnee: [laughs softly]

Justin: We gotta stay out of drumming circles, okay? Be smart out there.

Sydnee: And, like I said, the newest form, the thing I had a personal interest in kind of keeping track of, is in 2010 in Germany, they started to see—

Justin: From her— from her Batman-style wall of monitors that she uses to keep tabs.

Sydnee: [laughing softly] In 2010, they saw an outbreak of— well, not an outbreak. I shouldn't say outbreak, 'cause it's not contagious, right? They saw multiple cases of a newer form of anthrax— injection-based anthrax. Meaning that something in the materials that you're using to inject a substance has become contaminated with anthrax. And then, when you inject it, you know, contract the disease. Which would be possible if you didn't have clean materials when you were injecting.

So, that is— I found some scattered case reports on that. But I thought that was an interesting thing to— I specifically tend to take care of people who use injection drugs, so that is of interest to me. So, that is the history of anthrax.

Justin: There it is.

Sydnee: Bioterrorism is bad. Bio-weapons are bad. [chuckles softly]

Justin: Okay. I mean, you heard it here first, folks. There's not a lot of room for equivocation there. Bio-weapons are bad.

Sydnee: Before, you know, I had to— I did a military tropical medicine course when I was doing my residency. I'm not in the military. I am a civilian, but I was able to access it through my residency program through my Global Health Track. And there was a specifically—

Justin: We lived inside Chevy Chase for a month.

Sydnee: Mm-hmm.

Justin: It was wild.

Sydnee: The place. But, specifically, there was one lecture on bioterrorism and bio-weapons and that kind of thing. And they had to, like, I remember they came up to me the day before, and they were like, "We just wanted to let you know you will be allowed to attend the lecture tomorrow. We checked you out." [laughing] And I was like, "Wait, what?" [laughing]

Justin: Yep.

Sydnee: [through laughter] "Wait, what? What did you do?"

Justin: Mm-hmm.

Sydnee: Which is— and totally makes sense.

Justin: Yeah.

Sydnee: No problem with that, but I didn't know anybody was doing any checking on me to make sure I could attend the lectures.

Justin: They're always checking.

Sydnee: So, I did attend the lectures, specifically on bioterrorism, and I have learned from it. And I hope I have helped pass that knowledge on to you.

Justin: Was it classified, though?

Sydnee: No.

Justin: Okay, good.

Sydnee: It's for educational purposes.

Justin: Thanks so much for listening to our podcast. Thanks to the Taxpayers for the use of their song. "Medicines" is the intro and outro to our program. Hey! I saw something. Did you know we have a book? It's called *The Sawbones Book*. It was illustrated by Sydnee's sibling, Teylor, and it's very good. You can get it wherever there's books. The newest version has a— the paperback has, like, stuff about quarantine and Covid and things like that.

[outro music plays]

Justin: That is going to do it for us for this week, until next time. My name is Justin McElroy.

Sydnee: I'm Sydnee McElroy.

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

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