

Sawbones 591: Sentinel Chickens

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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!

["Medicines" by The Taxpayers plays]

Justin: Hello, everybody! And welcome to Sawbones, a marital tour for misguided medicine. Me? Thanks for asking. I'm your co-host, Justin McElroy.

Sydnee: And I'm Sydnee McElroy.

Justin: I'm going to open my water bottle now. I'm trying to drink more water, Syd, and I am...

Sydnee: Yeah? Well, opening it is the best way to start.

Justin: Opening is step one every time.

Sydnee: You're never going to get in there if you don't open it.

Justin: I keep filling it up, and then at the end of the day I'm like, ah, I didn't finish you, did I? And it's just the one bottle. I gotta get better. So I'm just going to leave this precarious open water bottle around, Signs style, at all times, until my hydration improves.

Sydnee: See, I hesitate to drain my giant water bottle that I carry around all day, because it makes, like, a handy weapon just in case, you know?

Justin: Do you ever—

Sydnee: I look intimidating when I'm walking down the street carrying my gigantic Hydro Flask. [chuckles]

Justin: Do you ever forget that you put the generic MiO blueberry flavor in your water, and then when it hits it's like, *woof*. Because I was not expecting that particular berry blast, and I w—[laughs] I was—I was reaching for a nice cool spring, and I somehow ended up inside Kool-Aid man's spleen. [chuckles]

Sydnee: Can I tell you—

Justin: *Ugh!*

Sydnee: Can I tell you something, Justin? This is why I'm a purist. I like my drink to taste like it's supposed to. I like water to taste like water.

Justin: You don't like water.

Sydnee: I like water, and I like it to—I don't like flavored water. I don't—this is, I realize right now, we will never be allowed to do ads for flavored water of any kind.

Justin: I like flavored water!

Sydnee: Because I'm saying I don't like—I like my water to taste like water. I want my ginger ale to taste like ginger ale. If I wanted, what is this, berry blast?

Justin: I don't know, it's off-brand berry MiO. [chuckles]

Sydnee: I would—I would eat a berry!

Justin: [chuckles]

Sydnee: I don't want flavored water!

Justin: Sorry, if you wanted to—[chuckles] if you wanted to get hit with a berry blast Kool-Aid style, you wouldn't—you would just reach for nature's—[chuckles]

Sydnee: I'd eat a berry. I—

Justin: Nature's—nature's grape! The blueberry. Gross! That's gross, Sydnee. Yuck. [chuckles]

Sydnee: I never did like—I never drank Kool-Aid. The only thing, Hi-C grape as a kid. Box...

Justin: What about Ecto Cooler?

Sydnee: No. Teylor loved Ecto Cooler. I only did Hi-C grape.

Justin: Sharkleberry Fin?

Sydnee: Only Hi-C grape. And then I grew out of that, and I've never looked back. Don't drink juice. Hm. And I'm not saying don't—

Justin: Now—okay, so another—

Sydnee: That wasn't a—

Justin: ...another sponsor—

Sydnee: That wasn't a—

Justin: ...down the—

Sydnee: No. [chuckles] That wasn't an order. It sounded like I was... an instruction. I was saying I don't. I left out the "I." I don't drink juice.

Justin: Okay.

Sydnee: I like fruit, but not juice.

Justin: Fair.

Sydnee: There you go. That's not what we're talking about today.
[chuckles]

Justin: That's not what we're talking about today, it's just what's on my mind.

Sydnee: I want to start off—

Justin: I am going to drink the rest of this, by the way. Don't think me a hypocrite.

Sydnee: Okay, well you can.

Justin: I have to hydrate.

Sydnee: Our position on mosquitoes here at Sawbones has always been very clear.

Justin: We don't like 'em.

Sydnee: We don't like mosquitoes.

Justin: And we asked a bunch of entomologists one time.

Sydnee: Uh-huh.

Justin: Is that the bug one?

Sydnee: Yeah.

Justin: I can never remember the bug one or the word one.

Sydnee: Etymology is—

Justin: Okay.

Sydnee: ...is words. Entomology is bugs.

Justin: We asked a bunch of entomologists, "Hey, should we get rid of all the mosquitoes?"

And a decent number of them were like, "Yeah, probably."

Sydnee: Yes.

Justin: [chuckles] Yeah.

Sydnee: Yeah, we don't like mosquitoes.

Justin: I thought if anybody was going to be like, "Oh, my precious children." Nope. There wasn't even one dork who was like, "Wow, they're beautiful!" Nope. Pretty much universally they're like, yeah, let's wipe these dudes out! [chuckles]

Sydnee: There was no—like, I feel like probably in all the sciences, everybody kind of has their little favorite thing of all the things that they're a specialist in. There's, like, the favorite. Like for me, my favorite antibiotic is Doxycycline. You know, this is classic knowledge. We know this.

I figured there must be somebody out there who's like, "My favorite bug is mosquito." But in that room, that cross section of entomologists, no one, nobody. Or at least they didn't... Maybe they felt intimidated. Maybe they didn't own it because there was so much anti-mosquito sentiment.

Justin: Yeah, they knew us, where we were at.

Sydnee: But mosquitoes are, like, the most, if you don't know this, if you haven't listened to our show before, if you haven't heard those episodes, mosquitoes are, like, the most—the most deadly creature on earth. Most deadly creature out there, because they carry all sorts of terrible illnesses that make humans sick.

And because of that, they've, like, changed the course of history with some of these illnesses. And what the entomologists told us is that they're not

particularly necessary to, like, the food web, that there are other things that would fill the void. So if we decided to eradicate all mosquitoes, it probably would be okay.

That was the sentiment in the room, I think, was like probably, probably. Famously, they spread malaria. That's probably what you think of first. But also lots of other things. Yellow fever, dengue, West Nile virus, Eastern equine encephalitis, Zika, chikungunya, there's so many.

And as the climate changes, we will start to see some of these spread to areas that maybe didn't typically see these infections previously. Because if it's warmer there, the mosquitoes will be there.

Justin: Right.

Sydnee: And if it's the kind of mosquito that can carry that virus, eventually it will take up residence in that population, right?

Justin: Right.

Sydnee: In Florida recently, there have been 23 cases of dengue fever. And these are locally acquired cases. There have been more cases in Florida, but they were able to connect them to travelers. So they left the country, got dengue and came back.

Justin: Mm-hmm.

Sydnee: There have been 23 locally transmitted cases of dengue in Florida. And that's a steep rise. There were only seven on August 8th. As of now, there's 23.

Justin: Hm.

Sydnee: So there's, like, three counties, Pinellas, Hillsborough, and Miami-Dade that have alerts out, because dengue is in Florida.

Justin: Ooh.

Sydnee: So that would be—I mean, this is—we've always occasionally had cases of dengue in Florida. But if we're seeing this, like, huge uptick in locally acquired cases, that tells us that mosquitoes in Florida now might carry dengue.

Now, in these articles, there was a concept mentioned that caught one of our listeners' attention. And that was Maddie. Thank you, Maddie, for this suggestion. In these articles about dengue in Florida, it was mentioned that Florida uses something called sentinel chickens—

Justin: Hmm.

Sydnee: ...to help with mosquito surveillance. So, I want to talk about sentinel chickens. [chuckles]

Justin: Okay. I've never heard that term.

Sydnee: I was about to say, have you ever heard the term sentinel chickens?

Justin: I've never heard the term sentinel chickens, and I'm pretty sure it would have stuck with me if I had.

Sydnee: I think I'm going to get into the history of sentinel chickens. But I think if you want to conceptualize what we're talking about, you've heard of—this is very West Virginia of us—you've heard of the canary in the coal mine.

Justin: Sure. Of course.

Sydnee: Well, this is a kinder, gentler version of the canary in the coal mine.

Justin: If you didn't know the canary in the coal mine, it's... if there were deadly gases that had been released in the mine, canaries would be especially susceptible to those, so they would take the canary down. If the canary kicked, it's time to go.

Sydnee: Time to get out of the coal mine.

Justin: Yeah.

Sydnee: This does not end in the same way. I want to preface with that, okay?

Justin: Great relief to all the canaries out there, I'm sure.

Sydnee: Well, all the chickens primarily, right? Okay. So one of the mosquitoes—I'm going to take you back to where this started. One of the mosquito-borne viruses I haven't mentioned so far is Murray Valley encephalitis, briefly called Australian encephalitis.

Justin: Oh, did they—how did they—how did they shed it? How did they ditch that? [chuckles]

Sydnee: You know, I didn't get into that. There was—it was already called Murray Valley encephalitis, but then because there was a very, like, large and then publicized outbreak, people started calling it the Australian encephalitis. Probably, like, people outside Australia, right?

Justin: Yeah.

Sydnee: Like, that would be wild if you have multiple viruses that cause encephalitis, and you decide to label one after the country you live in—

Justin: Yeah, I—

Sydnee: ...when it already has a different name.

Justin: Yeah, no thanks.

Sydnee: You wouldn't do that. No, I mean, like, it was probably us, right? Probably us?

Justin: Probably.

Sydnee: I'm sorry. It was probably our fault. I don't mean, like, Sawbones. I mean, like, America.

Justin: Yeah.

Sydnee: It's usually us. There are lots of viral encephalitides.

Justin: That's a word?

Sydnee: Yeah.

Justin: Ooh.

Sydnee: I guess you could say encephalitises, but when I typed—

Justin: I'm so worried she's going to jump—she—I feel so worried she's going to jump and claw me. She's pondering.

Sydnee: Olive is sitting—

Justin: I can tell.

Sydnee: Olive is sitting on my lap.

Justin: This isn't—this is a very stressful recording environment now.

Sydnee: Do you want me to—

Justin: No, no, no.

Sydnee: Now she's purring.

Justin: Okay, well, I'm just saying—

Sydnee: Aw...

Justin: I'm not at ease with the energy in this studio. [chuckles]

Sydnee: I need to tell you about the encephalitides.

Justin: Okay.

Sydnee: Do you know what encephalitis is?

Justin: No.

Sydnee: You know what an itis is. What's an itis?

Justin: Sick. It's a illness.

Sydnee: Inflammation of...

Justin: Inflammation of the...

Sydnee: ...encephala.

Justin: ...encephala.

Sydnee: Brain.

Justin: Brain. Brain inflammation.

Sydnee: Yeah, brain inflammation.

Justin: Good. Yeah, if you told me each—what each of the components meant, I was able to [clicks tongue] cobble those together, those concepts, after you told me what each half of the word meant, the Latin. You thought I would just get a—

Sydnee: I thought you would know itis, because we—

Justin: Why?

Sydnee: We've talked about it before!

Justin: Yeah, but, like, we've talked about a lot of things before! That's the problem!

Sydnee: So, there are a lot of these encephalitides, viruses that can cause inflammation of the brain, that are carried by mosquitoes. There's things we've heard about, like West Nile virus.

Justin: Mm-hmm.

Sydnee: There's a bunch of encephalitises. There's Eastern equine, Western equine, St. Louis encephalitis. There's lots of them. The symptoms, they vary a bit from virus to virus, but they're sim—they're pretty much similar.

You initially get, like, some flu-like symptoms, something vague, and you feel bad, but it can progress to some really severe symptoms, seizures or delirium. You can even have comas, or you can even die in some cases. And it depends across different viruses, there are different degrees of severity. Okay?

Justin: Okay.

Sydnee: Specifically, when we're talking about Murray Valley encephalitis, it is in the same family of viruses as dengue, which we've already mentioned. It is a—I like to say flavivirus [first syllable pronounced like "flay"], although I've had many professors who say it flavivirus [first syllable pronounced like "flah"].

Justin: Uh, no!

Sydnee: Flavivirus is way more fun.

Justin: If you're doing a podcast with someone who's going to reference Flavor Flav when you mention it, you say flavivirus.

Sydnee: Yes, flavivirus. It is one of the flaviviridae. It's a flavivirus. They mainly infect mammals and birds, and they're usually spread... they're arboviruses, which is short for arthropod viruses. So, viruses that are spread by arthropods.

Justin: I was about to say tree viruses, so I'm really glad I kept that to myself. Oof.

Sydnee: They're spread by ticks and mosquitoes primarily. The reason they're called flaviviruses, and we may have talked about this before when we talked about yellow fever, but just as a refresher, flavus is Latin for yellow. This is why it's probably supposed to be flavivirus [first syllable pronounced like "flah"], because it's flav. Anyway.

And yellow fever is named because you tend to get some liver damage and jaundice. So, the yellow virus, the yellow fever.

Justin: Gotcha.

Sydnee: Flavivirus. That's—

Justin: Gotcha.

Sydnee: ...where that all comes from. So anyway, this group includes other things like that we've already talked about, right? Like dengue or Zika, things like that. Okay? So, there have been several major outbreaks throughout history of Murray Valley encephalitis. We look back and we're able to say like, oh, you know that outbreak of something in 1917, that was probably—

Justin: Probably this.

Sydnee: ...Murray Valley encephalitis. Specifically in Australia. And there was a really bad one with 58 cases and a 40% mortality rate in 1974.

Justin: Oof.

Sydnee: So, I know that sounds like not a lot of cases, but remember, this isn't like—we're getting this from the mosquitoes. We're not spreading it person to person. So you're not gonna get the same sorts of numbers—

Justin: Yeah.

Sydnee: ...in a lot of these—

Justin: Can't spread the same.

Sydnee: Right? Like, that you would with COVID. But it is a very severe illness, so even a relatively, in the big picture, small number of cases, like 58 cases, is a huge deal! Because those patients are going to need probably a lot of intensive medical support, right? A lot of healthcare attention for each one of those patients. So, especially if it was in a smaller community—

Justin: You get taxed.

Sydnee: You could—you could get—

Justin: The resources—

Sydnee: ...overwhelmed.

Justin: Yeah.

Sydnee: So, this outbreak occurred in 1974. And because at that point they had identified the virus, they had gone back historically and said, hey, we think we know that these other outbreaks were the same. We know it's carried by mosquitoes. We need to find some ways to better control the spread of this virus.

Like, moving forward, we need to know when it's out there, and we need to mitigate the mosquito population and its ability to spread the virus. So, if we want to know, do the local mosquitoes right now carry Murray Valley encephalitis virus, how could we do that?

Justin: Uh, ask 'em.

Sydnee: Okay, they are bugs.

Justin: What if they make shapes, like Charlotte's Web? They do like drones, like fly and make shapes in the—

Sydnee: We've already covered this. Mosquitoes don't do anything helpful.
[chuckles]

Justin: Or cool or fun. Yeah, I don't know then, Syd.

Sydnee: I mean, you could try and catch 'em.

Justin: Yeah.

Sydnee: And look for the virus in them.

Justin: Can't tell by the taste?

Sydnee: No. Which you could do. I mean, and we do. I will say, that is done, what I just described, go out and try to catch mosquitoes. You can set traps—they're attracted to carbon dioxide. That's why they're attracted to us, is because we exhale carbon dioxide.

Justin: They're the worst. Ugh!

Sydnee: So, you can set up CO₂ traps to draw in mosquitoes, and then check them. So you can do that, that's one thing. You could let them bite you and see if you get sick, but that's not—

Justin: You think after they check 'em, they take them to Squish City? Got to, right?

Sydnee: I hope so. [chuckles]

Justin: Got to.

Sydnee: Or we could think about, are there other animals that get this virus? In this case, waterfowl and chickens. Both can become infected with Murray Valley encephalitis. The nice thing specifically about chickens is that while they can get infected, and this is true for some of the other things we'll talk about, they're considered dead ends from a virological standpoint, because the chickens do not get sick.

So, the virus gets in them from the mosquito. They have a very short period of time where if you were trying to find the virus in their blood, you would find it. And then they create antibodies against it, and they're fine.

Justin: Hm.

Sydnee: What that means, though, is that if you tested that chicken's blood after they were bitten by that mosquito, you could find those antibodies. And that would show you that the local mosquitoes are transmitting the virus.

Justin: How long does it stick around in there? Do you know?

Sydnee: The antibodies are going to be there for quite a while. The virus is not there... I mean, the antibodies, I guess—I don't know the lifespan of a chicken. Presumably the antibodies are going to be there the whole—the whole life of the chicken.

Justin: Hm, okay.

Sydnee: But you're going to do surveillance pretty frequently if you're going to do this.

Justin: Gotcha, okay.

Sydnee: Like, you're out there checking every two weeks, do these chickens have antibodies against this virus? Meaning that they were exposed to it. Meaning that—

Justin: So you have something to compare it to. [crosstalk]

Sydnee: Yes. If you're gonna—if you're gonna do this, you're gonna—and I mean, obviously, you also want to make sure that you check the chickens beforehand, and make sure that they didn't have antibodies beforehand.

So, this begins the story of sentinel chickens. New South Wales started by placing some what they called sentinel chicken flocks. Sentinel meaning, like, these will be a signal to us. These chickens we put out into areas where

there are mosquitoes, we have tested them to make sure they don't already—they haven't already been infected with this virus. And we'll put these flocks out in places where we know the mosquitoes will bite them. And then we will go draw chicken blood every week or two and see if they've got antibodies.

Justin: So, okay, I wish I had been there when they dropped these chickens off. Because I, if I'm a chicken, I'm like, "Okay, so guys, let me just get this straight. What am I doing out here? What do you want me to do? Just... kick it? There's noth—you're just—why are you leaving us here?"

Sydnee: Now—

Justin: "What are we doing out here?"

Sydnee: Now listen, the chickens also exhale carbon dioxide. So, they're going to get bitten by mosquitoes anyway, conceivably.

Justin: You said they put them in places where they—I'm just wondering what the chickens thought they were doing. That must've been very confusing for them to be dragged out to the middle of nowhere and left. And then every once in a while, some guys come back and take your blood?!

Sydnee: They don't kill 'em, they just take their blood. And this is good because, like I said, they are trapping, and even in the wake of this outbreak, they were trapping mosquitoes too. So they'll go out over the course of a night and trap mosquitoes.

But the thing is, just because you find the virus in, like, a mosquito, you don't know, has it raised to a level where we're going to see it transmitting in humans?

Well, the chickens are going to answer that for you. So, there was a quote. I love reading articles from Australia, because in this—in this quote from one of the professors from the Arbovirus Emerging Disease Unit there who was doing this work. "We estimate chickens are bitten by mozzies." That would be mosquitoes, I assume.

Justin: Ooh!

Sydnee: "We estimate chickens are bitten by mozzies up to 1000 times a night. And every time a mosquito bites, it injects saliva, and the virus is in that saliva. So it's a numbers game. With 15 chickens in each flock, the chances of finding the virus increase. As the number of positive birds in the flock increase, so does the risk of virus spillover to humans." That's from associate professor Linda Houston.

Justin: A thousand times a night?!

Sydnee: A thousa—mozzies bite chickens a thousand times a night.
[chuckles]

Justin: I, you know, maybe... maybe nuggets is a kindness. You know? Maybe by... maybe nuggets is, like, not that bad of a deal! Like, if the alternative is...

Sydnee: I mean, they don't—they don't get sick like we do though! Like we're—

Justin: A thousand! A night! [laughs]

Sydnee: We get sick when we get the virus. Chickens just kind of deal with it. Like, their little chicken bodies just fight it off and...

Justin: Tough guys.

Sydnee: They deal with it. So, sentinel chickens, they were also, by the way, about this same time, they were being used in the US, because there was an outbreak of Newcastle disease.

Justin: I don't think nuggets is a kindness.

Sydnee: No, don't.

Justin: Please don't email.

Sydnee: Yeah, don't email. He doesn't. There was an outbreak of Newcastle disease, which just causes illness in birds primarily. It usually is asymptomatic in humans. That was traced back to imported parrots.

But anyway, so they started using sentinel chickens in these two cases, and by the late '70s into the '80s, there were a lot of places that started using the concept of sentinel chickens. Let's put these flocks of disease-free chickens out to different places around the environment to get bitten by mosquitoes, and we'll surveil them periodically.

And what you do with that information is up to you. As I was reading—I was reading this great article from a family in New South Wales who has, like, a flock of sentinel chickens on their property. So they—like, the kid helps raise them and, like, they hug these chickens, and they're very sweet to these chickens.

And they're like—and then if we find out that they're infected, we can inform the public. Like, you know, use mosquito repellent, watch out for standing water. Like, you know, we can let people know to take safety measures because we're seeing an increase in whatever virus they're surveilling for.

I have also found, like, you know, and instead you could start, like, killing all the mosquitoes, spraying for adult mosquitoes. You could deploy mosquito larvae eating fish into the local waterways and kill all the mosquitoes. So, I guess what you do with this information is up to your... municipal government? I don't know.

But it's being used at this point for multiple arboviruses that we've mentioned. West Nile, dengue, all kinds of things. And there are programs now in different states across the US. So specifically Delaware, California, Virginia, and Florida.

Justin: Oh, no. That means Disney World.

Sydnee: I want to tell you about how this connects to Disney World now, Justin. I'm very excited to tell you about Disney World. But first we have to go to the Billing Department.

Justin: I knew you were gonna do that. All right, let's go.

[theme music plays]

[ad break]

Justin: All right, Syd. You—we're gonna go down to the Dis'.

Sydnee: Okay. As I was doing this research, I started seeing in my search terms the word "Disney" tacked onto the end of them as an option.

Justin: Mm-hmm.

Sydnee: And I—and I thought, why would I add, as I'm researching, like, the first use of sentinel chickens, why would I be asking about Disney? And it led me to this question.

Justin: Mm-hmm.

Sydnee: We've been to Disney World.

Justin: Sure.

Sydnee: Why—have you ever been bitten by a mosquito at Disney World?

Justin: I have no memory of that.

Sydnee: Me neither, I can't. And I thought to myself, I don't ever think about mosquitoes being a problem at Disney World.

Justin: I'm a super tough guy, though. I don't think I'd notice an individual mosquito bite.

Sydnee: Well, but it's in Orlando, Florida.

Justin: It's true.

Sydnee: Which, there are a lot of mosquitoes there.

Justin: Mm-hmm.

Sydnee: Right? This is a mosquito-ridden area of the planet.

Justin: Yes.

Sydnee: So why, if you're in the middle of Orlando, Florida, are you not getting bitten by mosquitoes?

Justin: Well—

Sydnee: There is an answer to this.

Justin: Go on, Syd, tell me about it.

Sydnee: Did you—do you already know this bit of history about Disney?

Justin: No, Sydnee! I don't know, it depends. You gotta tell me what it is first, and then I'll tell you.

Sydnee: Do you know who William or Joe Potter is?

Justin: Do I know who General Joe Potter is? Yes, I do. The green boat that takes you from Disney to the different resorts. That's called The General Joe Potter. You can remember it's green because he was in the army.

Sydnee: Okay, so he was, yes, he was a retired army major general.

Justin: Mm-hmm.

Sydnee: And do you know what he did for Disney Parks, specifically?

Justin: I mean, he was very much the one who made the parks physically... There's a lot of ideas behind it, but he was the one who really helped the ideas physically happen. He was in charge of a lot of the construction. He had overseen, I think, I want to say the Panama Canal or some work at the Panama Canal, something like that?

Sydnee: He was governor of the Panama Canal Zone in 1956.

Justin: Radical.

Sydnee: Yeah.

Justin: Wild.

Sydnee: He worked mainly in, like, pest management. He knew everything about mosquitoes in an environment that was fairly similar—

Justin: Ah! That makes sense, yeah!

Sydnee: ...to Florida. And basically, Walt Disney's, you know, plan is to build this giant theme park, and more, in a swamp.

Justin: And more, so much more, Sydnee!

Sydnee: [chuckles]

Justin: A theme, a simple theme park? [chuckles]

Sydnee: So a—

Justin: It's a resort!

Sydnee: He was—he was the—after he served as governor of the Panama Canal Zone, do you know how they met?

Justin: I don't!

Sydnee: So, he was appointed executive vice president of the 1964 to 1965 New York World's Fair.

Justin: Oh, yeah.

Sydnee: And that's where he met Walt Disney.

Justin: Makes sense, yeah.

Sydnee: And apparently Walt Disney was impressed with him, and his history and his knowledge. And so when he began, you know, planning the Florida Park, he recruited General Joe Potter to come help him with basic engineering.

Like, this is a swamp. How are we going to turn it into, like, solid ground? And then also, because it is a perfect place for mosquitoes, how do we make it not a perfect place for mosquitoes? So the biggest thing at Disney World are what are called Joe's ditches.

Justin: I don't—I'm—don't—I don't know that term, Joe's ditches.

Sydnee: That's—that is the canal system that keeps water from standing in the swamp land that is Disney World.

Justin: Wild.

Sydnee: And it's a series of canals that just continue to move water out of there.

Justin: Where are they?

Sydnee: I mean, they're all over the grounds of Disney World. I don't know. Fountains are another big piece of that. So there's—and I've never thought about it, walking through various aspects of Disney World, all the, you know, the Magic Kingdom, all the—Epcot, everywhere. But do you notice any areas where there are giant bodies of standing water, or even small pools of standing water?

Justin: I mean, obviously, like, the lake and things like that.

Sydnee: Everything is moving. There are—they have—all water in the parks is moving in some way, whether there's fountains to keep it circulating, something. There are no pools of standing water anywhere throughout the Disney parks.

Justin: I mean, even the lakes are getting, like, churned pretty regularly by a bunch of boat traffic and what have you.

Sydnee: Mm-hmm, yes, because standing water is where mosquitoes will lay their larvae, and then that leads to increased mosquitoes. So we know that one of the—and this is known worldwide. One of the best ways you can mitigate mosquitoes in your population is to not have pools of stagnant standing water, because that is where mosquitoes are going to want to lay their eggs, and then you're going to have baby mosquitoes, and so on and so forth.

So, that was a big—that was a big piece of it. There are other things that Disney did that—not just Joe Potter, because he did a lot of the, like, big construction engineering.

Justin: Right.

Sydnee: Like the ditches and the canals, and knew the basic principle of standing water. But then as they engineered the rest of Disney World, they took that even further. So, not only do all the water features move, the buildings are constructed in such a way that they will not allow pools of standing water to sit on them. Everything is angled or curved.

Justin: Sure. Yeah, that makes sense.

Sydnee: I mean, even if you think of the design of the—not the golf ball, the geodesic dome.

Justin: Mm-hmm.

Sydnee: At Epcot, there's nowhere for water to stand on it.

Justin: Mm-hmm.

Sydnee: It's all angles. And so the architecture at Disney world is specifically made so that there will be no pools of standing water for

mosquitoes to breed in. Beyond that, the plants that they grow are chosen to not have any areas where the leaves would cup and collect pools of water.

Justin: Mm-hmm! Oh my gosh.

Sydnee: They choose plants that water will drip off of—

Justin: Wow.

Sydnee: ...so that there's nowhere for mosquitoes to continue to breathe.

Justin: And obviously—

Sydnee: Breed.

Justin: Sidewalks and stuff have to be angled for, you know, maximum drainage, because after it rains, they don't want those—they want those to dry out as quickly as possible.

Sydnee: So everything in—that is built and planted and grown, every water feature—I mean, obviously there's a lot of reasons, but a big piece of why they do it the way they do it is to keep standing water out of the parks, so that you aren't breeding mosquitoes in the parks.

Justin: Mm-hmm.

Sydnee: Now beyond that, a lot of the areas where there are water are filled with those fish that I mentioned earlier, that will eat mosquito larvae. So if any mosquito manage to lay their eggs in the water, the fish are going to come eat them. So—

Justin: Nice.

Sydnee: That's going to eliminate them. They also occasionally will release, and this is, I don't think Disney has ever actually stated this, but there are multiple people who have, like, I think Business Insider, there are different groups that have done investigative reporting and probably talked to like former Disney employees who have been like, "Well, you want to know this

one cool thing we do..." They will occasionally release predatory wasps into the parks, and these wasps only eat the mosquitoes.

Justin: That's...

Sydnee: They do not sting humans, and they are very short lived. They have very short lifespans.

Justin: Wow.

Sydnee: And they will help eradicate any stray mosquitoes that have managed to survive in Walt's dream.

Justin: Wow. That's wild. They just send out some hunter wasps?
[chuckles]

Sydnee: Yes, they send out hunter wasps to stop them. They also, so, you know what the Smellitizer is.

Justin: Smellitizer.

Sydnee: Oh, Smellitizer?

Justin: Smellitizer.

Sydnee: Would you like to explain what the Smellitizer is?

Justin: Yes, I'd love to explain what the Smellitizer is. [chuckles] So the Smellitizer is like a way of adding additional scent into Disney. So if you walk down Main Street, for example, and you see, like, the confectionery store, things like that, the smell of, like, candy is being piped out, out of there into Main Street, so you get that smell. And that technique is used throughout the resort, throughout their parks.

Sydnee: And mostly these are smells that are meant to transport you, you know, through the scent memory connection to, like, a childhood time, like a candy store kind of vibe, or to make you feel warm and safe, to make it feel more magical. To invoke... Soarin' uses this.

Justin: Oh! Yeah! Yeah! Soarin' uses these throughout. That's a... like a reproduction of a—like you're flying through different regions of the world.

Sydnee: Like hang-gliding.

Justin: Hang-gliding sort of, yeah. Sometimes you're in... there's one that's just through America, there's one that's through, like, all the world, but—

Sydnee: There's one just through...

Justin: I think there's one that's just through California.

Sydnee: But I was going to say, the California one, that would be Disneyland.

Justin: Yeah.

Sydnee: I don't—and I—did they ever—well, did they ever do that at Disney World?

Justin: They had a limited time where they did—I think that they ran that, and then returned to Soarin' Across the—Soarin' Around the World. I'm not sure.

Sydnee: But they use—they use different smells.

Justin: They—I think they switched to Soarin' Across America for the... for the 50th anniversary.

Sydnee: Oh.

Justin: For, no, sorry, the 250th anniversary, for the... for America.

Sydnee: So... So the—so these are all ways in which it is being used to, like, there—with good smells.

Justin: Yes.

Sydnee: Occasionally, allegedly, the Smellitzer is also releasing tiny amounts of a garlic aroma. So small that humans wouldn't detect it, especially with all the other scents. Garlic aroma is repellent to mosquitoes. So, if you are concerned that there is a density of mosquitoes, if your other measures are not adding up, you can also release some garlic aroma, via the Smellitzer—

Justin: Yeah, that's why—

Sydnee: ...to repel mosquitoes.

Justin: That's why if you really, really want to avoid mosquitoes, you used to be able to hang out at Pizzeria Rizzo. And that's—that was the place—that was the perfect place. Because a—or Pizzafari.

Sydnee: That's true—

Justin: I mean, if you're at Pizzafari.

Sydnee: I miss Pizzafari. And finally, to bring it all back home, yes, you—as you may have guessed, Disney World has sentinel chicken flocks.

Justin: Nice.

Sydnee: I've never seen them. I—like, that was my next journey, now that I have told you about this, is to try and find someone out there. There's a Disney fanatic who has taken a picture of a sentinel chicken flock somewhere in Disney, right?

Justin: I can't imagine they're allowed to roam the park. I mean, what if they ended up—

Sydnee: Well, no, they're not allowed to—

Justin: ...in the Animal Kingdom?

Sydnee: No, they're not allowed to roam the park.

Justin: Eaten by a lion.

Sydnee: No, generally you keep, I mean—[chuckles] generally your sentinel chicken flock should be kept somewhere where they can't move around, so that you can kind of control what they're exposed to.

Justin: Yeah.

Sydnee: That's better experimentally.

Justin: I gotcha.

Sydnee: I will say that a lot of the people, especially as I was reading these articles from Australia, the people who tend to these chickens—like, they are caring—these are well-cared-for chickens. I don't want you to feel bad for these chickens. They love these chickens. They're part of the family. Yes, yes, they have to get blood drawn.

Justin: And they get bit a thousand times a night, yeah.

Sydnee: But they love these chickens and they care for the chickens. I can't find much information on where Disney keeps their flocks of sentinel chickens, but they do. And they do blood draws to look for the presence of disease in the local mosquito population, so that they—because, you know, that would probably be pretty bad press if you had an outbreak of dengue at Disney World. So, that's the history of sentinel chickens!

Justin: Thanks. Thanks, chickens! Appreciate you. That's going to do it for this week on Sawbones! I thought I had more for chickens, but I don't feel like we got a lot in the audience, to be fair. Especially not after I said that nuggies was a— nuggies was a mercy or whatever.

Sydnee: We don't—we don't feel that way—

Justin: We don't feel that way.

Sydnee: ...about nuggets. We don't.

Justin: About nuggets.

Sydnee: We don't. I—

Justin: Thanks to The Taxpayers for the use of their song "Medicines" as the introduction and outroduction of our program. We still have some Sawbones stickers in the merch store. If you go to mcelroymerch.com, you can get stickers of our new Sawbones logo, designed by Matt Taylor. And that is going to do it for us for this week, I think, Syd, yeah?

Sydnee: Yeah.

Justin: 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.

["Medicines" by The Taxpayers plays]

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