

TPWKY This is Exactly Right.

Erin Welsh Before we get started on this very fun episode, we have a couple of things that we want to announce. So we recorded this back in November of 2020 and since that time, since we've recorded it, there have been two very exciting developments as it pertains to Matt Candeias. Number one is that Matt Candeias is now Dr. Matt Candeias, PhD. Heck yeah!

Erin Allmann Updyke What what, you heard that right!

Erin Welsh He successfully defended his PhD, woohoo!

Erin Allmann Updyke Congratulations. Thrilling. And number two is that not only did he defend his PhD but Dr. Candeias wrote a dang book.

Erin Welsh A whole book while he was hosting an amazing podcast; while he was working on his dissertation. I mean like that's incredible.

Erin Allmann Updyke Uh oh. And while stuck in quarantine. Like what?

Erin Welsh Yeah.

Erin Allmann Updyke It's called 'In Defense of Plants: An Exploration into the Wonder of Plants' and it's available for preorder now, it's scheduled to be released on February 16th, 2021. SO make sure you put in your preorder now. I can't wait, I've already ordered two copies.

Erin Welsh Absolutely. And we will link to it on our website as well.

Erin Allmann Updyke Okay, now we'll get into the episode.

TPWKY (This Podcast Will Kill You intro theme)

Erin Welsh Hi! I'm Erin Welsh.

Erin Allmann Updyke And I'm Erin Allmann Updyke.

Matt Candeias And I'm Matt Candeias.

Erin Allmann Updyke Yay!

Matt Candeias (laughs)

Erin Welsh And this is a very special crossover edition of This Podcast Will Kill You and-

Matt Candeias In Defense of Plants.

Erin Welsh What episode are we even covering today? What's the topic?

Erin Allmann Updyke Very stoked to be talking about Poison Ivy and like Poison Oak and stuff.

Erin Welsh: Yeah, oh yeah. I mean it'll be Poison Ivy, Poison Oak, Poison Sumac. Lacquer Tree, I'm sure lots of other stuff. I am super pumped, there's a lot more there than I thought in terms of the history. I have already so many questions for both of you two. So, yep, sorry in advance.

Erin Allmann Updyke: Uh oh.

Erin Welsh: (laughs)

Erin Allmann Updyke: (laughs) But yeah, so hopefully to make the question and answer aspect a little bit more palatable, let's talk about the quarantini for this week.

Matt Candeias: Let's do it.

Erin Allmann Updyke: Oh, let us.

Erin Welsh: So what are we drinking?

Erin Allmann Updyke: Itch cream?

Matt Candeias: Itch crème. Itch crème.

Erin Allmann Updyke: Itch crème, sorry. Crème de Itch!

Matt Candeias: Crème de Itch. (laughs)

Erin Welsh: (laughs) It's so appropriate because what is in the Crème de Itch?

Erin Allmann Updyke: Well of course many different cremes. We have crème de cacao and just regular crème, which is heavy cream. And an almond liqueur and then some grenadine just to make sure that it looks like what, Erin? What's the look that we're going for here?

Erin Welsh: I believe, Erin, that we are going for the look of calamine lotion.

Erin Allmann Updyke: Mm-hmm.

Matt Candeias: Oh yeah.

Erin Welsh: We are. It's not the smell of calamine, which is maybe a good thing, but I kind of like the smell of calamine lotion.

Matt Candeias: Yeah. It's oddly nostalgic. Oddly.

Erin Welsh: Yeah! Well, yeah. I mean it's a little too recent for me but yeah, it is also nostalgic.

Matt Candeias: That's true. I swear this quarantini tastes better than it sounds. (laughs)

Erin Welsh: (laughs) Yeah, it really does. It's a very 1950s quarantini for sure.

Matt Candeias: Yeah, I'll get on board with that.

Erin Welsh: And also I wonder, for those who are dairy-free out there, I would guess that coconut cream or coconut milk would work as well as heavy cream.

Erin Allmann Updyke: I bet coconut cream would work really well, yeah.

Matt Candeias: I bet it'd be pretty tasty, too.

Erin Welsh: Yeah. Hm. Well.

Matt Candeias: Let us know.

Erin Allmann Updyke: (laughs) Let us know. Well then.

Erin Welsh: Do we have business to take care of before we dive in? I feel like we should but I don't know if we do.

Erin Allmann Updyke: I can't think of any right now, maybe we'll have to record something and splice it in.

Matt Candeias: Behind the scenes.

Erin Welsh: Wouldn't be the first time. (laughs) All right.

Erin Allmann Updyke: No, I think let's just dive right in. I can't wait to hear about the history of this. I also always forget that we do these episodes in a different order every time.

Erin Welsh: I know, I know. This is our first rodeo.

Matt Candeias: Totally.

Erin Allmann Updyke: It is the very first time in our 63rd episode.

Erin Welsh: Or something, yeah. Who knows. (laughs) Okay let's take a quick break first and then we'll dive into the history.

Matt Candeias: Cool.

Erin Allmann Updyke: Awesome.

TPWKY: (transition theme)

Erin Welsh: I feel like everyone, well maybe not everyone, but at least a lot of people who have spent any time in U.S. forests have a poison ivy or poison oak or poison sumac story. Whether it happened to them or whether it happened to a friend or a cousin, these plants seem to have really left their mark in a 'well I learned my lesson' kind of a way.

Matt Candeias: Mm-hmm.

Erin Welsh: Is there any story that's not like, 'And that's the last time I'll use an unidentifiable vine as toilet paper'.

Erin Allmann Updyke: (laughs)

Matt Candeias: I know a sad amount of those stories.

Erin Allmann Updyke: Leaves of three, man, just let 'em be.

Matt Candeias: Let it be. Let it be.

Erin Welsh: I'm gonna put a pin in that because I have questions about the whole leaves of three thing, but we'll get back to that.

Erin Allmann Updyke: That's valid.

Matt Candeias: Deal.

Erin Welsh: So my older sister and my mom would get poison ivy rashes like every summer it seemed and there would always be cursing about gardening and the bathtub would be crusty with colloidal oatmeal gum and then there would be smears of pink calamine lotion on the most unexpected surfaces like doorknobs and carpet, whatever. (laughs)

Matt Candeias: What kind of upbringing did you... Just kidding.

Erin Welsh: Well I would just sit there and be unbearably smug because even though I spent most of my childhood playing outside, capture the flag or running to get the soccer ball after it dribbled off into the woods, I was always poison ivy-free. I was like, No, I'm not affected by poison ivy.' It was unbearable, I'm sure. So yeah, that was me until this summer.

Matt Candeias: Oh no.

Erin Welsh: And you guys know this story or at least bits of it, but for our listeners-

Erin Allmann Updyke: I've seen the pictures.

Erin Welsh: Yeah, the pictures are horrific and I will post them.

Erin Allmann Updyke: Yes!

Matt Candeias: Yes.

Erin Welsh: (laughs) I'll do progress pics because I took them every day. Okay but for our listeners, the long and short of it is that maybe don't brag about being immune to the effects of poison ivy at all and also maybe know what the plants look like and avoid them.

Matt Candeias: Bingo. Plant ID 101, start with the ones that can affect you.

Erin Welsh: Yeah! That's a great idea. (laughs) This summer I went to my mom's house in Kentucky for a bit. I helped out with gardening and cleaning up, namely around a fire pit, pulling tons and tons of viney plants off the rocks and bushes and then also burning it, which could've been a lot worse, I imagine.

Erin Allmann Updyke: Oh no.

Matt Candeias: Ooh. Wow, yeah.

Erin Welsh: And then a day or two later, everything on my body was itchy. A couple days after that, my arms, my legs, my torso was absolutely covered in the most painful, itchy rash I've ever experienced. I didn't get any sleep and I went through an entire bottle of calamine lotion, legit. And I eventually was in such unbearable discomfort that I had to go to urgent care and they gave me steroids because I couldn't just function.

Matt Candeias: Oh wow.

Erin Allmann Updyke: Yep.

Erin Welsh: I still have the marks on my arms, like this is six months later and it's still there. So anyway after I came out of the fog of this experience, I became super curious about this horrific plant, like it's history, why on earth my body reacted so badly after years of complacency, and most importantly to see if it served any ecological purpose so that I couldn't ethically go through my plan of ridding the earth of such a terrible substance.

Matt Candeias: (laughs) Please don't. We'll get into that, but please don't.

Erin Welsh: Okay, all right fine. I knew it. I stinking knew it. So that's when I texted you guys and was like, 'Can we do an episode on poison ivy?'

Matt Candeias: Yes please!

Erin Welsh: Cause I don't want to have to do all the reading myself. (laughs) Anyway, okay. But this episode isn't specifically about poison ivy, it's about the thing in it that causes this rash, urushiol, which I hope is the right way to say it. There are different pronunciations out there on the internet. It is spelled, in case you were curious, U-R-U-S-H-I-O-L.

Erin, I'm sure that you'll talk a lot more about its structure and its effects but basically urushiol is an oily mix of organic compounds and it can be found in a bunch of different species of plants, Matt I'll leave it to you to get to the specific numbers. But the human history of urushiol goes back thousands and thousands of years. The urushiol-containing sap of the lacquer tree has been used as this hard varnish or lacquer in Chinese, in Korean, and Japanese lacquerware for around 6000 years.

Matt Candeias: Whoa.

Erin Welsh: So like a really long time, and it's also been used to coat wood. It's very, very hard and durable so super cool. And the word 'urushiol' actually derives from the Japanese word for the lacquer tree, which is urushi.

Erin Allmann Updyke: Huh.

Erin Welsh

Yeah. And the very first descriptions of the rash caused by exposure to urushiol, they talk about how it appears in lacquer artists on their hands and arms, especially those just learning the art. And here in North America, poison ivy, poison oak, and poison sumac, these plants were all used by some Native American groups for various purposes such as dyeing or writing on textiles. So apparently like the sap will be a dark color that increases in darkness over time and it kinda continues to bleed. It's really interesting, there are pictures of this that you can see.

And they were also used as materials for baskets, as medicinal treatments including possibly hyposensitization, cooking, and also in some religious rites. So there are a bunch of different purposes for which these different urushiol-containing plants were used in North America by Native Americans. But the first written descriptions of the irritating effects of the actual poison ivy plant came from none other than John Smith.

Matt Candeias

Huh.

Erin Allmann Updyke

Huh. Like Pocahontas and...

Erin Welsh

Like Pocahontas, Jamestown, John Smith, yeah.

Matt Candeias

Wow, okay.

Erin Welsh

So he definitely wasn't the first European to observe the effects that the plant had but he based his observations on someone else's unpublished manuscript, which is cool. No, don't do that.

Erin Allmann Updyke

Just taking cred.

Matt Candeias

Citing unpublished manuscripts left and right.

Erin Welsh

(laughs) He didn't, at least from what I could read, he wasn't like, 'So I discovered this plant'. He wrote about it as if it had already been known, so yeah, anyway. But he wrote that, quote:

"The poisoned weed is much in shape like our English ivy but being touched causeth redness, itching, and lastly blisters and which howsoever after a while pass away of themselves without further harm. Yet because for the time they are somewhat painful, it hath got itself an ill name although questionless of no ill nature."

Erin Allmann Updyke

Hm. Yeah.

Matt Candeias

Okay.

Erin Welsh

So he's like, 'These don't mean to do anything, it's not that bad. Poison? That seems a little bit extreme.'

Erin Allmann Updyke

Yeah, it's not gonna kill you, like come on.

Matt Candeias

C'mon. Bro up.

Erin Welsh

And so this description, which was written in the 1600s of course, kind of sets the tone that a lot of early naturalists took towards the plant. They felt that it didn't deserve the name 'poison' but only a few of them dared to suggest that the plants held potential for commercial or medicinal use, despite having observed some Native American groups using the plants in these various ways.

So throughout much of the 1600s and 1700s, the urushiol-producing plants of North America didn't receive much attention from the botanists or naturalists, mostly just being written about as a curiosity. I do want to read a couple of excerpts from this description of poison ivy from the early 1700s naturalist Paul Dudley of Massachusetts.

Matt Candeias

Ah yes, Dudley.

Erin Welsh

Okay.

Erin Allmann Updyke

(British accent) Mr. Dudley.

Matt Candeias

I have no idea who he is. (laughs)

Erin Welsh

(laughs) Let's see. Here's a little bit of this description. So:

"The inside of the wood is yellow and very full of juice, as glutinous as honey or turpentine. The wood itself has a strong, unsavory smell but the juice stinks as bad as carrion."

Erin Allmann Updyke

(laughs)

Matt Candeias

Okay.

Erin Allmann Updyke

The juice?

Erin Welsh

The juice. Okay, a little bit more.

"First it must be observed that it poisons two ways: either by touching or handling it, or by the smell for the scent of it when cut down in the woods or on the fire has poisoned persons to a very great degree."

And then he talks about how it only affects some people.

"For I have seen my own brother not only handle it but chew it without any harm at all."

Which is horrible to think of. Absolutely horrifying. And then the third thing that he mentions is that:

"This sort of poison is never mortal and will go off in a few days of itself, like the sting of a bee. But generally, the person applies plantain water or sallet oil" which is olive oil, "and cream."

Matt Candeias

Okay.

Erin Welsh

And then he talks about how his neighbor who was so badly affected by it said that "from this point on he will always remember the touch of poison ivy because it is as cold as a piece of ice and he could distinguish it whether blindfold or in the dark from any other wood in the world."

And so in that description there were few mentions of remedies like sallet oil and cream but I also saw recommended to rub a mixture of charcoal and hog's lard on the affected areas.

Matt Candeias

Okay.

Erin Allmann Updyke

Okay.

Erin Welsh

Could've worked, who knows. I don't know if it would smell great. And of course to throw back to our quarantini, calamine. So I was like, well what is calamine lotion? What's the history of calamine lotion?

Erin Allmann Updyke

Good question. Two histories for the price of one here, Erin?

Matt Candeias

Spoiled.

Erin Welsh

I mean this is literally like a sentence, but yes. Let's go with that. (laughs) I did a tiny bit of digging because it's kind of hard to find a lot of substantial information but it goes way back. So calamine lotion, it's that pink liquidy lotion used to treat all kinds of itchy things, it's supposed to dry out the skin and relieve the itch that way. It's made of zinc oxide and ferric oxide and I found a mention in one book that calamine lotion has been used as far back as 1500 BCE in Ancient Egypt.

Matt Candeias

Whoa. Whoa!

Erin Allmann Updyke

What?

Erin Welsh

Yeah.

Erin Allmann Updyke

So wait. How is it different than like sunscreen?

Matt Candeias

Yeah, isn't zinc and all that in sunscreen too?

Erin Allmann Updyke

Yeah.

Erin Welsh

I don't know. I mean, so zinc oxide and ferric oxide and then there are some other things in there like phenol and stuff, I can't remember what else is in there. But zinc oxide and ferric oxide are the two active ingredients.

Matt Candeias

That's wild. Wow.

Erin Allmann Updyke

Interesting.

Erin Welsh

Yeah. So anyway. Erin, maybe you can tell us whether it does anything.

Erin Allmann Updyke

Do you want me to just spoilers? I mean yeah, it helps the itch.

Matt Candeias (laughs)

Erin Welsh Okay good.

Matt Candeias Dang it, I was holding out for that!

Erin Welsh (laughs) N of 1, that's me, yes I can attest to that, that it did help tremendously. I was coated. Okay.

Matt Candeias Little pink Erin, running through the woods.

Erin Welsh (laughs) During this time, unless you were living in areas where these plants flourished, you probably didn't know of its existence unless you were a super enthusiastic botanist like Matt, right?

Matt Candeias Indeed.

Erin Welsh And in which case you could even get some seeds and have them grow in your own garden, and that's exactly what people did. Poison ivy and poison sumac were grown in the English Royal Gardens at Kew, the gardens of the Faculty of Medicine in Paris, and also in the gardens of the Empress Josephine Bonaparte.

Matt Candeias That's rad. Good for them, good for them.

Erin Welsh Yeah, that's pretty cool. Yeah.

Erin Allmann Updyke (laughs) Good for them.

Erin Welsh It never reached super popularity status for reasons you can probably guess but it did earn a super fan in the late 1700s by the name of Andre Dufresnoy. He was an army physician and a professor of Medicine. So during this time in western medicine a lot of medicinal treatments were derived directly from plants and basically if a plant produced some sort of strong effect on the human body after contact or ingestion, it was thought, 'Okay, in smaller doses this could be helpful'. And this fine line between medicine and poison is definitely something that we've touched on in all of our poison crossover episodes, so like ricin, belladonna, wolfsbane. This two-facedness of these compounds. And so it totally makes sense that poison ivy and other related plants were looked at for their potential in medicine.

This guy Dufresnoy didn't start off as the world's biggest poison ivy fan. He was giving a lecture about various medicinal plants which included poison ivy and he was talking about the painful and itchy sores that it could cause, and there was some young dude in the audience who was like, 'Alright, yeah. I'll believe it when I see it.' And so after the lecture he went up and was like, 'Can I have some of those leaves? I'm gonna see if this actually causes the horrible blisters you said it will.'

Matt Candeias (laughs)

Erin Allmann Updyke Oh god.

Erin Welsh
And it did. Horrible, horrible painful itchy blisters all over his hand and wrist and he probably regretted his choice a little bit. But when the swelling finally went down, he noticed that an old sore that had been on his wrist for ages had finally disappeared. And so he went back to Dufresnoy and was like, 'Oh my gosh, this old sore disappeared, I'm pretty sure that the poison ivy treated it.' And so Dufresnoy was like, 'I've discovered the next big thing in medicine.' So he started cultivating this thing like crazy, he began prescribing poison ivy tea-

Matt Candeias
Oh god.

Erin Welsh
-which he personally tested out and noted, 'Oh it only causes mild stomach irritation and increased sweat and increased urine production.'

Erin Allmann Updyke
Oh great. Only.

Matt Candeias
I don't need to sweat anymore.

Erin Welsh
I don't think that would be a good idea. I'm horrified to think of drinking poison ivy tea, but...

Erin Allmann Updyke
Don't do it.

Matt Candeias
Yeah don't. Also I do want to rub poison ivy on anyone at a Q & A that says, 'really a comment more than a question' but I digress.

Erin Allmann Updyke
(laughs)

Erin Welsh
(laughs) Oh my god. Love that. Beautiful. So Dufresnoy was still somehow encouraged by what he was seeing, so he claimed it could cure anything from skin maladies to paralysis. Whether he actually did any controlled trials is not known and highly unlikely.

Erin Allmann Updyke
He was just making stuff up!

Matt Candeias
I'm gonna go out on a limb and say probably he didn't.

Erin Welsh
(laughs) Yup. But that didn't stop him from lovingly cultivating more and more and more of the plants and sending them to his botanist friends. And his love for poison ivy nearly got him killed, actually.

Erin Allmann Updyke
Oh dear.

Erin Welsh
Not by the plant but for political reasons. So he had sent some plants to one of his friends because his friend wanted to cultivate it and then he wrote a follow-up letter to ask how the plants were doing, saying: "How are our dear Rhus?" Like R-H-U-S because that was the genus back in the day. "How I long to see them." And unfortunately for Dufresnoy, the letter got intercepted and the authorities accused him of working with the Russians, like Rus's.

Matt Candeias
Oh wow!

Erin Welsh
Yep. But eventually he was like, 'No no, I am just a plant nerd, I really didn't mean it.'

Erin Allmann Updyke
(laughs)

Matt Candeias Thinking of all the times I've almost been politically assassinated.

Erin Welsh (laughs) I mean, I really feel like it's a dangerous profession. So he explained himself out of it. And sadly his poison ivy garden didn't outlive him by very much. After he died his pharmacist brother dug up all of the plants and destroyed them. He was like, 'These are terrible things'.

Matt Candeias (laughs) Yeah, to hell with this garden.

Erin Allmann Updyke He's like, 'Look, I know about drugs and this is not...we're not doing this.'

Erin Welsh Yes.

Matt Candeias We have medicine now, bud.

Erin Welsh The kid was described as his skeptical pharmacist brother. (laughs)

Matt Candeias What a skeptic.

Erin Welsh And urushiol-producing plants never did really seem to find another champion for their use in medicine but beginning in the early 20th century there was increasing attention paid to this group of poisonous plants as a whole. Botanists reclassified the plants from the genus Rhus to the genus Toxicodendron while chemists began trying to pin down exactly what it was about these plants that caused such irritation. In the early days of germ theory, some researchers floated the idea that it was actually pathogenic microbes in the plant that caused the horrible reaction in humans, it was actually an infection. And when that was shown not to be true - I kind of love the enthusiasm for microbes, though, it was just like, 'Microbes solve everything! Every question we've ever had? It's microbes!'

Erin Allmann Updyke Me too. I think that's adorable and I really like it.

Erin Welsh (laughs) But yeah, it wasn't true. And then people were like okay maybe it's a volatile oil exuded by the plant into the air or maybe it's a carbohydrate. But finally the mystery was solved in the 1920s when the Japanese scientist Rikou Majima described the exact chemical structure of the toxin, which is really a mix of organic compounds like I mentioned earlier. And he named it urushiol. And from what I can tell, poison ivy and other urushiol-producing plants have never really stood front and center in academic research although there does seem to be lots of comparative studies with other organic irritating compounds as well as some research into detecting tiny amounts of urushiol using UV light. But poison ivy did earn its place in popular culture with the song Poison Ivy by The Coasters recorded in 1959. Do you guys know this song?

Matt Candeias Classic! No, I have no idea, I've never heard that before.

Erin Welsh Are you serious? We used to sing this! I think cause my mom was so badly affected by poison ivy all the time, this was like a family favorite. I feel very weird. (laughs)

Matt Candeias It did not stick with you apparently. (laughs)

Erin Allmann Updyke Can you sing it for us? Maybe I would know it.

Erin Welsh	Okay I'm not going to sing it because I won't subject people to that, however I will read a few of the lyrics. Okay, this is from the middle of the song but you should go and listen to it.
Erin Allmann Updyke	Oh, okay. But I need to know how it goes to know if I know it, cause you know I'm bad at names.
Matt Candeias	Right, yeah, that's true. Maybe I have heard this. Come on, I've heard you do karaoke!
Erin Allmann Updyke	Could you just sing it a little? Come on.
Erin Welsh	(laughs) I'm so apologetic for that, now and forever, Matt.
Matt Candeias	(laughs)
Erin Welsh	Okay. You'll have to look it up. It's worth it, I promise.
Matt Candeias	Okay, okay.
Erin Welsh	"Measles make ya bumpy, and mumps'll make ya lumpy, and chicken pox'll make ya jump and twitch."
Erin Allmann Updyke	Yeah no, I do not know this song.
Matt Candeias	Definitely never come across this one.
Erin Allmann Updyke	Sounds like a very Kentucky thing.
Erin Welsh	(laughs) This is not a Kentucky thing! I listened to this when I was in Florida, okay? When I was a child in Florida. How dare you. Okay, returning to it. "A common cold'll fool ya, and whooping cough can cool ya, but poison ivy lord'll make ya itch. You're gonna need an ocean of calamine lotion, you'll be scratching like a hound the minute you start to mess around." And then it goes, "Poison ivy, poison ivy. Late at night when you're sleeping, poison ivy comes a creepin' around." You don't know that? (sings)
Matt Candeias	No, you know what-
Erin Allmann Updyke	Oh! She did it! Yes!
Erin Welsh	(laughs)
Matt Candeias	It's because two of us in this room have not grown up south of the Mason-Dixon line.
Erin Welsh	Oh my gosh. Okay, well.
Matt Candeias	We don't have the kind of folk music in New England or California that you do. That's not slight, that is not a slight against you but we didn't have-
Erin Allmann Updyke	We missed out! Clearly. Big time.

Erin Welsh: This is like pre-surf rock is what I would describe it as. It's like Buddy Holly-esque.

Matt Candeias: Oh.

Erin Allmann Updyke: Measles makes you bumpy, chicken pox makes you lumpy? That doesn't sound like surf rock.

Erin Welsh: I swear, okay. Let's honestly, right now, the three of us need to take a pause and we need to all go to YouTube and type in Poison Ivy, okay? We're doing it.

Matt Candeias: We're doing it.

Erin Welsh: Wow, I was just jamming on that for way too long. I missed everything that you guys have said.

Matt Candeias: I watched, I saw. I think you need to get the rights to be able to use that in this episode.

Erin Allmann Updyke: Yeah.

Erin Welsh: I would love to do that, I mean is it not a great song?

Matt Candeias: Sorry Bloodmobile. No that's great, and I take back everything I said about it being a southern ditty, that is totally exactly Buddy Holly era updo.

Erin Welsh: Thank you.

Matt Candeias: Yeah.

Erin Welsh: I love this song however, however, according to the songwriters it's not about urushiol, it's not about poison ivy.

Erin Allmann Updyke: It's about a girl named Poison Ivy?

Erin Welsh: Well, kind of. It's about an STI.

Matt Candeias: Oh no!

Erin Welsh: That you get from a girl. (laughs)

Matt Candeias: Oh no!

Erin Allmann Updyke: (laughs)

Erin Welsh: "Late at night when you're sleeping, poison ivy comes a creepin' around." I mean?

Matt Candeias: And it says you can look but do not touch? Oh no!

Erin Welsh: Yeah. "You'll be scratching like a hound the minute you start to mess around."

Erin Allmann Updyke: So what's it about? Crabs? It's about crabs?

Erin Welsh Well so the songwriter said the clap or gonorrhoea.

Matt Candeias I thought those burned.

Erin Allmann Updyke What? Okay they should listen to our episode, that's not consistent with the symptoms.

Erin Welsh I mean, it was the 1950s. Do you really think messaging on STIs was on point? This is how they had to get the info out. (laughs) Okay.

Erin Allmann Updyke Wow.

Erin Welsh And of course, in addition to that amazing song, there's also the Batman character Poison Ivy and a movie titled Poison Ivy about a murdering teen. Basically it became sort of the second code for an evil woman or like a sneaky, evil, villainous woman. But speaking of murder, I have one last story to tell you before passing the mic.

Matt Candeias Ooh.

Erin Allmann Updyke Ooh.

Erin Welsh Okay, so I definitely remember talking about an assassination attempt with ricin in that episode.

Erin Allmann Updyke Yep, big time.

Erin Welsh And a murder in I think the belladonna episode? About the guy who murdered his wife in the garden, he served her gin and tonic or something?

Matt Candeias Right.

Erin Allmann Updyke Oh yeah, yeah, yeah. Yeah, yeah. Yeah.

Erin Welsh Yeah. So I wanted to continue that really depressing trend.

Erin Allmann Updyke (laughs) Awesome.

Erin Welsh Okay. I found a news story. Forgive me, but I googled 'poison ivy murder' and I found a news story-

Erin Allmann Updyke (laughs)

Matt Candeias I don't forgive you.

Erin Welsh I found a news story about a Baltimore County woman named Roxanne Amick who was found murdered in 2006. And her body was discovered in a wooded area that was absolutely teeming with poison ivy plants. Detectives immediately suspected her husband, Michael Amick, because it's always the husband.

Matt Candeias As you do.

Erin Allmann Updyke

It's always the husband.

Erin Welsh

But also because his arms were completely covered in poison ivy and there was other circumstantial evidence, but that was like one of their key points of evidence in the trial.

Erin Allmann Updyke

Uh oh.

Erin Welsh

But also they weren't able to charge him for 10 years because they wanted to wait until they got better physical evidence and so that's-

Matt Candeias

For a decade?

Erin Welsh

For some reason it took them, in 2006-

Erin Allmann Updyke

2006! What?

Matt Candeias

Dang.

Erin Welsh

And so they finally got better DNA evidence and so he was finally convicted of second degree murder in 2018.

Matt Candeias

Whoa.

Erin Allmann Updyke

Wow.

Erin Welsh

Yeah. So yeah, that's the very odd and jumbled history of poison ivy.

Matt Candeias

All right, all right. Not at all what I was expecting.

Erin Welsh

It doesn't quite have the same Janus two-faced character nature as some of the other poisons that we've covered but it has inspired great pop songs, an annual poison oak show in California that I forgot to mention.

Matt Candeias

Poison oak show?

Erin Welsh

Since 1982, they have wreaths and stuff.

Matt Candeias

Show. A show for that. Okay.

Erin Allmann Updyke

What? I never knew that.

Erin Welsh

A show. A show. Yep, yep.

Matt Candeias

I wanna meet the people that go to that show.

Erin Allmann Updyke

Is it not like you? Are you not those people?

Matt Candeias

No, I would not, personally. Not my jam, but I'll talk to 'em.

Erin Welsh (laughs) I would like to go and just wear a full body, I don't know, biohazard suit, yeah.

Matt Candeias Tyvek suit.

Erin Welsh I'm so scared of poison ivy now. Okay, Erin. Please tell us what on earth this plant does to us.

Erin Allmann Updyke I am thrilled to do so but I'll take a quick break first.

TPWKY (transition theme)

Erin Allmann Updyke Okay. Poison ivy, poison oak, poison sumac etc. I'm really excited and I won't tell you why yet but we'll get to the point why I'm really excited to talk about this today. But first I have to give a huge shout-out to this one paper that I found, it was by Gladman in 2006, it was a single author paper which never happens anymore, but it honestly was so comprehensive and straightforward and laid out all of the basics of what somebody would want to know about the biology of poison ivy and I haven't found a paper like that in a very long time. So I really wanna give them a big shout-out.

Matt Candeias Yeah.

Erin Allmann Updyke Thank you so much, it made this research journey a lot simpler. So I will obviously link to that. Okay, so. The compound, like you already mentioned, Erin, that is found in all of these plants that causes us such distress is urushiol. Let's go with that.

Matt Candeias Good job.

Erin Welsh (laughs)

Erin Allmann Updyke So urushiol is, like you mentioned, Erin, it's an amalgamation of organic compounds. It's a phenolic lipid compound, okay. That basically just means it's made up of fatty acids and a phenol ring, which is one of those six carbon rings, okay. And then the different specific forms of urushiol that are found in different species of plant differ in their carbon side chains which are called catechols, I think.

Erin Welsh Oh, okay.

Matt Candeias I vaguely remember that.

Erin Welsh Yeah.

Erin Allmann Updyke Please don't ask me anymore organic chemistry questions than that cause even that was a challenge for me. Okay. So what it means for us. Let's focus now back on the biology side of this. The chemical that poison ivy produces, this urushiol, it's a resin. You kind of already mentioned this, Erin. So it's an oily substance and what's important - and Matt, I know you'll talk more about this - this is a compound that's contained within the plant tissues itself. It's not something that's excreted by the plant. So you have to have damage to the plant to actually release this compound. Is that right, Matt?

Matt Candeias Yeah, correct, totally.

Erin Allmann Updyke

Okay. So if you just touch an intact leaf just by gently brushing it, you're not likely to come in contact with urushiol, right?

Matt Candeias

Yeah, that's my favorite thing to do in my floristics class is to touch the leaf and go, 'What is this?!' Throws 'em.

Erin Allmann Updyke

And they're like, 'Whaa!'

Matt Candeias

Yeah. 'I don't know!'

Erin Allmann Updyke

But if you're like pulling weeds, Erin, or bushwhacking or cleaning brush out of your mom's yard, Erin, you're going to be exposed.

Erin Welsh

(laughs) Yeah. I am exposed right now, actually. By all of this very pointed language.

Matt Candeias

So exposed.

Erin Allmann Updyke

Some other things that are important about this oil: it's non-volatile, so it doesn't just dissipate into the air like say, ethanol or something like that, but it does dry very quickly onto surfaces and once it's dried it maintains its antigenic properties, which means that if a deer came by and munched on a bunch of poison ivy - do deer eat poison ivy?

Matt Candeias

Oh yeah.

Erin Allmann Updyke

Okay, I thought so but I just made things up, so. If a deer came by and munched a bunch of poison ivy, so a bunch of urushiol was released and dried and then you brushed past that vine, well now you can be exposed. Okay?

Erin Welsh

Mm-hmm.

Erin Allmann Updyke

And what's important is that as little as 2mg of urushiol can cause a reaction.

Matt Candeias

Whoa.

Erin Allmann Updyke

I have no idea how much a plant produces.

Matt Candeias

A lot more than that.

Erin Allmann Updyke

(laughs) Okay, that's what I guessed.

Erin Welsh

Oh dear.

Matt Candeias

A lot.

Erin Allmann Updyke

And like you mentioned, Erin, it can be aerosolized in the smoke and then it can actually affect your respiratory tract. So that's pretty serious. It's estimated that anywhere from 50-75% of the U.S. adult population is sensitive and this goes, really it's across all ages, it's just by the time you get to adulthood it's about 50-75%. And there's some thought that maybe there's a genetic link because if you have two parents that are both sensitive you have an 80% chance of being sensitive but it also depends a lot on exposure. So let's talk about the exposure, shall we?

Matt Candeias: Yeah. And then I have a question.

Erin Allmann Updyke: Oh! Do you wanna ask it now?

Matt Candeias: Yeah actually it'll probably be better if I do that now for everyone listening.

Erin Allmann Updyke: Okay, go.

Matt Candeias: So dad, my dad, not sensitive to it.

Erin Allmann Updyke: Okay.

Matt Candeias: My mom, extremely sensitive to it. When she was like, I'll just say many months pregnant for me, she was doing what Erin was doing, weeding in the garden, sweating, going like this-

Erin Allmann Updyke: Oh no, oh no.

Erin Welsh: (gasp)

Matt Candeias: -wiping it all over her. And there is the most tragic picture of her, I'm guessing like eight months pregnant for me, in a chair, covered in calamine and just blistery crustiness, just looking very sad. And I'm wondering, I am not sensitive to it, is it the genetic component from my dad not being sensitive or did I get some weird antibody resistance from being in the womb when my mom was...

Erin Allmann Updyke: Fascinating.

Matt Candeias: Yeah.

Erin Allmann Updyke: Fascinating question, Matt.

Matt Candeias: Thank you.

Erin Allmann Updyke: What an interesting question. Basically I'm going to, I'm not gonna guess, this isn't a full guess, this is an educated guess. (laughs)

Erin Welsh: (laughs)

Matt Candeias: I'll take it, I'll take it.

Erin Allmann Updyke: Based on what I know about the pathophysiology which we're about to get into, you got lucky.

Matt Candeias: Yes.

Erin Allmann Updyke: This is not from your mom's exposure. (laughs)

Matt Candeias: Okay.

Erin Allmann Updyke Yeah.

Erin Welsh I have a question for Matt, it's actually more of a comment.

Matt Candeias I'm gonna rub poison ivy on you.

Erin Allmann Updyke (laughs)

Matt Candeias No no, go ahead.

Erin Welsh My question was do you think your mom would be willing to share that photo?

Matt Candeias Ooh, for me? Her boy? Probably. But if she knew how many people might see it... I won't tell her that and I'll just get her to share it with me, how's that?

Erin Allmann Updyke No, tell her, Matt. You can't do this dishonestly.

Matt Candeias No I'll tell her. I wouldn't do that to her. I wouldn't do that to my mom. No I'll ask, I'll try. I love her to death and I don't want to take advantage of her but she'll probably share it.

Erin Welsh (laughs)

Erin Allmann Updyke (laughs) It sounds like an amazing picture.

Erin Welsh It does.

Matt Candeias It's so tragic. So tragic.

Erin Welsh Everyone send us your worst poison ivy pictures.

Erin Allmann Updyke Oh gosh. Yes, please do.

Erin Welsh Yeah, we'll start a thread on Twitter or Insta or something, I don't know.

Matt Candeias Do it on Reddit so it can get weird.

Erin Welsh (laughs) Oh, good idea.

Erin Allmann Updyke Good idea. Okay so listen, let's talk about how this happens because this is the part, you guys, that's I'm really excited about, okay?

Matt Candeias I'm stoked.

Erin Welsh (laughs) This is the moment?

Erin Allmann Updyke

This is the moment. Okay. And the reason I'm so excited is because we get to talk about hypersensitivity reactions, which I think are so fun and interesting, okay? All right. So clinically the rash that you get from poison ivy - everyone knows it causes a rash, okay. Right? If you don't, we'll talk about it in a minute, so don't worry. The rash that you get from poison ivy, it's called an allergic contact dermatitis. Okay? So from that we already know a lot. It's inflammation in your skin - dermatitis - you get it from contact with a plant, we already talked about that. But it's caused by an allergic reaction to the plant. What the heck is an allergic reaction? (whispering) Let's talk about it.

Erin Welsh

Ooh, fun.

Erin Allmann Updyke

Okay. There are four different types of hypersensitivity reactions, okay. Types I-IV. Recently they were updated so that actually types II and IV both have multiple subtypes but we're just gonna go with I, II, III, and IV. Okay?

Matt Candeias

I won't tell.

Erin Allmann Updyke

Thank you. And all hypersensitivity reactions have to do, at least in part, with antibodies being formed to something that stimulates an immune response. That's what like antibodies are supposed to do, we talked a lot about that in our vaccines episode. But in the case of hypersensitivity reactions, the amount of immune response that ends up being generated is OTT. Over the top, for some reason.

Matt Candeias

Oh, is that the medical acronym?

Erin Welsh

(laughs)

Erin Allmann Updyke

No. That's from Love Island.

Matt Candeias

(laughs)

Erin Allmann Updyke

Okay and that causes a problem in and of itself, okay? So I'm gonna very, very briefly go through the four types and then we're gonna focus on the one that causes allergic contact dermatitis, AKA poison ivy. Okay?

Matt Candeias

Cool.

Erin Allmann Updyke

So type I is an IgE, which is a specific type of antibody, you have like IgG, IgM. So IgE mediated reaction is type I and this is what you probably think of when you think an allergic reaction. Okay? So like anaphylactic shock, that's type I.

Matt Candeias

Okay.

Erin Allmann Updyke

So like shellfish allergy, peanut allergy, that kind of thing. Even like hives that you get, okay. These are... Basically what happens is this type of antibody binds to these cells called mast cells and they release a whole bunch of histamine and then boom, you get a massive inflammatory reaction. Okay? That's type I, classic allergies.

Type II is called a cytotoxic or IgG or IgM, so it's a different type of antibody response and it causes things like autoimmune hemolytic anemia, which is a type of anemia where your red blood cells go boom. Also Goodpasture syndrome which is a kidney disease. Okay. And so this is antibodies that are directed against our cell membranes.

And then type III is what's called an immune complex-mediated response, so it's the same type of antibodies as in type II, IgG or IgM, but basically what happens is these antibodies kind of glom onto each other and then deposit places that they shouldn't and then make you sick. So that's like a more complicated one.

Matt Candeias

Okay.

Erin Allmann Updyke

So something like serum sickness, if you've ever heard of that, that's a type 3 response.

Erin Welsh

Oh, okay.

Erin Allmann Updyke

And then we get to type IV. Okay.

Erin Welsh

(laughs) We're there.

Matt Candeias

Ooh.

Erin Allmann Updyke

We're finally here. So the allergic contact dermatitis caused by urushiol is a type IV hypersensitivity reaction. This is called a delayed or a T cell-mediated response. And if you wanna know the specifics, it's a type IV A response. SO how does this one work? Okay. It's a little bit different than all the others.

Matt Candeias

Exciting.

Erin Allmann Updyke

So the first time that you're exposed to poison ivy oils, the catechols which are part of that urushiol compound, they bind to and penetrate through your skin cells, okay. And then underneath the surface of your skin, they bind to the surface of these cells that are called antigen-presenting cells. In your skin, these are often called langerhans cells and their job is to internalize antigens, process them, and then travel back to our lymph nodes and present those antigens to T cells. Okay?

Matt Candeias

Whoa.

Erin Allmann Updyke

And that's a normal thing that they would do, okay. That's their job, they're an antigen-presenting cell. So they travel back to your lymph node and they go, 'Hey T cells! I found this stuff and I think it might be bad, I don't know what to do, I'm leaving this for you.' And the T cells are like, 'Great! Thank you so much, langerhans! Appreciate it. Thanks for bringing it. We're just gonna make a bunch of copies of it, we'll be on the ready, we'll have a big army of cells back here just whenever we need it, okay? We gotchu.' And that's exactly what happens.

So urushiol causes a large amount of these T cells to be made kind of at the ready and they just hang out in our body until the next time that you're exposed. So on subsequent contact with urushiol, those T cells happen to come in and they're like, 'Oh hey, I recognize this. Call in the army!' Right?

Matt Candeias

Attack!

Erin Allmann Updyke

And they immediately get to work destroying skin cells, so killing cells wherever they find this antigen.

Matt Candeias: Wow.

Erin Allmann Updyke: And then also upregulating your immune response, releasing all these other immune modulators that produce things like vasodilation to help increase blood flow so you get further inflammation, and then you also have a response in your skin cells themselves which are called your keratinocytes that further this inflammatory response. They release more cytokines, they increase inflammation, and it's like this feedback loop.

Matt Candeias: Huh.

Erin Allmann Updyke: Cool?

Matt Candeias: Yeah, that's wild.

Erin Welsh: Well, also horrible. But yes.

Matt Candeias: Yeah.

Erin Welsh: Fascinating.

Matt Candeias: So they're recognizing it as something bad and trying to do everything possible to kind of nuke that site?

Erin Allmann Updyke: Exactly.

Matt Candeias: Wow.

Erin Allmann Updyke: And it's like the first time that your body is exposed to it, you just make these T cells, these memory T cells, and they're just there. Just to have on hand.

Erin Welsh: Right.

Erin Allmann Updyke: And because it's T cells that are being made and not just antibodies, okay, we're not just making antibodies against this compound. You're making T cells that are going to be able to come in. And so because of that, this is a delayed type response because it's not like you're just immediately binding antibody and then decimating things right there. These T cells are not everywhere all the time, there's a certain number of them that might be present in your body and then they just have to happen to come into contact with that urushiol the second time. Does that make sense?

Matt Candeias: Right, yeah.

Erin Welsh: Mm-hmm.

Erin Allmann Updyke: So that's why what the symptoms of this look like is that it's a delay after exposure. Okay. So generally around two days, around 24-48 hours but usually about 48 hours after exposure, that's when you first start to see the symptoms of poison ivy.

Erin Welsh: Cool.

Matt Candeias

Dang, that's awesome.

Erin Allmann Updyke

Yeah! So we can talk a little bit more specifically about the symptoms, although Erin, I feel like you told us them pretty well.

Matt Candeias

You covered... (laughs)

Erin Welsh

Blisters, itching, pain. Don't run your arm or rash under hot water, even though it feels really good because it's horribly miserable afterwards.

Erin Allmann Updyke

Oh, that sounds bad.

Erin Welsh

Like it feels insanely, like such relief.

Erin Allmann Updyke

During it?

Matt Candeias

Yeah.

Erin Welsh

During the hot water and then after you're like, 'Well, cool.'

Matt Candeias

I learned that lesson with bug bites. Yeah. It came back to bite me.

Erin Welsh

(laughs) Yeah. Ooh!

Matt Candeias

Ooh!

Erin Welsh

But I'm curious to know more of the other, like especially the smoke inhalation symptoms.

Erin Allmann Updyke

Well, so let's talk about kind of the general symptoms and what happens and then I think we'll be able to understand what could happen if you inhale it. Okay?

Erin Welsh

Yeah, yeah.

Erin Allmann Updyke

So like I said, usually around two days, it can vary quite a lot. I think two weeks is like the highest end of when you can potentially still have symptoms after exposure and at the low end it could be like a number of hours. You first get areas of redness, so it gets just kind of red, and then you would get some small bumps, they usually start out as bumps, and even just this redness and bumps are super, super, super itchy. Super itchy. And then over time, those small bumps develop into vesicles, which are basically, like if you think of what a chicken pox rash kind of looks like, little clear fluid-filled bumps. So these bumps fill with fluid.

And when it gets really bad like what Erin had, they can get all the way into what are called bulla - I think that's how you say it, or bullae, I don't know how you actually say it - which are ginormous fluid-filled blisters. Kind of confluent, like your whole arm can be one giant fluid-filled blister. And if you get severe reactions, these bullae can get really, really large, you can get really severe swelling or edema, because of how much inflammation you're having just under the skin.

Matt Candeias

Oh wow.

Erin Allmann Updyke

And it's incredibly uncomfortable. So if you inhale it, then that exact same inflammatory reaction is happening in your respiratory tract because the epithelia, so the cells that line your respiratory tract, are not very different from your skin cells.

Matt Candeias

Oh.

Erin Allmann Updyke

So the reaction is going to be essentially the same except it's a small space and so there's no room for inflammation to happen, so you could close off your respiratory tract.

Erin Welsh

Ugh, that's horrible, horrible.

Matt Candeias

I have heard of people dying from that.

Erin Welsh

Yeah.

Erin Allmann Updyke

Right. The other thing that can happen if you inhale it is that it can kind of more... I'm not exactly sure the pathophysiology of this specifically, but it can cause a more generalized dermatitis as well, where you get that inflammatory reaction across your whole body rather than only where you were exposed.

Erin Welsh

Huh, weird.

Erin Allmann Updyke

Right? Sounds awful.

Erin Welsh

Yeah.

Matt Candeias

Yeah, no good.

Erin Allmann Updyke

Without any treatment at all, it's a long course of disease. It's anywhere from 3-6 weeks to completely resolve, which is a very long time to be miserable.

Matt Candeias

Oh god. Yeah, no thanks.

Erin Allmann Updyke

Yeah. There are a couple of other really uncommon things that you can get, there's something that's called black spot dermatitis which causes something that kind of can look a little bit like a melanoma, literally like a black mark on your skin that is often permanent.

Erin Welsh

Oh geez.

Matt Candeias

No good.

Erin Allmann Updyke

But what I don't know about this is whether that... It's not painful from what I understand. It's just something that can happen as a result but it's pretty uncommon. And then also what's really uncommon is you can get something called erythema multiforme which you can get from other things as well but it's widespread super itchy bumps that can kind of come up all over your body, not just where you came into contact.

Matt Candeias

Wow.

Erin Allmann Updyke So this would be like on top of just having this hypersensitivity, your body's going like, 'Whoa let's go full-fledged!' And like everywhere.

Matt Candeias Yeah.

Erin Welsh I had heard about the rash spreading, which I know it's not contagious because the oil you wash off your body but I also heard that the rash can spread in the way that it's just like an inflammatory response.

Erin Allmann Updyke Do you wanna know a little more about it?

Erin Welsh I do!

Matt Candeias I desperately do. Mostly cause of the faces you're making.

Erin Welsh (laughs)

Erin Allmann Updyke You're totally right, Erin. It's not contagious and the fluid that's in those vesicles, it doesn't have any antigen in it. Okay? So you shouldn't open up blisters because you should not open up blisters. But if you did accidentally scratch open those blisters, you're not gonna spread the rash by itching it or anything like that and you're not gonna give it to anybody else. However the oil itself can dry on surfaces and remain antigenic. So if you got the oil on your clothes or under your nails and then you itch it, you can spread it.

Erin Welsh Or if it's on your dog's fur?

Erin Allmann Updyke If it's on your dog, exactly.

Matt Candeias Shout out to my friend Amy.

Erin Allmann Updyke Yep. And so that's why sometimes you can get new lesions like a few weeks after initial onset, if it's just still somewhere whether it's your clothes, your dog, your nails, whatever.

Erin Welsh Yeah.

Erin Allmann Updyke You can then continue to spread it. Yeah.

Matt Candeias Didn't that happen to our dear friend Sam from a chair that she sat on that had... She sat on it with poison ivy pants and then continued to sit on the chair.

Erin Welsh Yes.

Erin Allmann Updyke Oh no! Oh yes. Oh gosh.

Matt Candeias Yeah.

Erin Allmann Updyke Awful.

Erin Welsh It's horrible.

Erin Allmann Updyke: Yeah. And then like you said, Erin, washing it off. Turns out that only helps if you do it right away, within 30 minutes pretty much any oil that you've come in contact with has been absorbed, so.

Erin Welsh: Yup. (laughs)

Erin Allmann Updyke: And there's at least some research that suggests using soap can actually spread the oil a little bit further-

Matt Candeias: Oh good.

Erin Allmann Updyke: So just washing it off with water, if you can. Like if you're like, 'Oh no I just touched poison ivy!' As quick as you can, wash it off with just water. That can be helpful.

Erin Welsh: So the best bet really is just learn what the plant looks like and avoid it.

Erin Allmann Updyke: Avoid it.

Matt Candeias: Yoink.

Erin Allmann Updyke: There have been... What's really interesting in researching this is that I have found that there are a few barrier creams that exist that are supposedly effective at preventing a reaction but some of them maybe actually make it worse. (laughs) So I'm not sure... And they're not ones that I had ever heard of so I'm not sure how widely available they really are. But Dial Ultra, which is dishwashing soap-

Erin Welsh: Oh, yeah.

Erin Allmann Updyke: -as well as a couple other soaps and one of these very specific creams I've never heard of seem to help prevent the rash even after you've been exposed. So it's not washing the oil off your skin but somehow it's helping to prevent the rash. I don't know, it's worth a try. Dial is cheap, so this is not an ad.

Matt Candeias: Yeah, why not.

Erin Allmann Updyke: But otherwise treatment, like you said Erin, colloidal oatmeal baths, calamine lotion, and then if it gets really bad like what you had, oral steroids are really the thing that you need. Topical steroids can be helpful but you need a pretty high dose and you can only use those on certain parts of your body and only for a certain amount of time, so they're not all that helpful. Antihistamines, this isn't a histamine response, guys! Because that's a type I hypersensitivity reaction!

Matt Candeias: I just learned that! Yay!

Erin Allmann Updyke: So that's why antihistamines aren't super helpful in this case.

Matt Candeias: Good to know.

Erin Welsh: Unless like for me it helped me sleep before I resorted to steroids.

Erin Allmann Updyke: Yes.

Erin Welsh: But within like a few hours of steroids, everything was better. It was unbelievable.

Erin Allmann Updyke: Good. I'm so glad that you finally went to the doctor.

Matt Candeias: Well that's good, I'm glad.

Erin Welsh: Yeah, I know. (laughs)

Matt Candeias: Are you stubborn like I am?

Erin Welsh: I'm very stubborn. I am very bad about accepting any sort of vulnerability in my physical body, it's bad. Real bad.

Matt Candeias: Yeah, yeah. I feel you.

Erin Welsh: I have questions.

Erin Allmann Updyke: For me or for Matt?

Erin Welsh: For you, Erin.

Erin Allmann Updyke: Oh gosh, okay.

Erin Welsh: So first of all, 50-70% of people are sensitive.

Erin Allmann Updyke: Yep.

Erin Welsh: Why? What is the difference between sensitivity and insensitivity?

Erin Allmann Updyke: It's a really good question and it's not clear because it's across all ages, it's across ethnicities, it's across races, it's across everything. Anyone could be sensitive, so in large part it's probably exposure. Are 100% of adults in the U.S. exposed? No, definitely not. So would it be 100% if everyone was exposed a certain number of times? I don't know, I don't know. But it's a very interesting question that I could not fully find the answer to as to what is it that makes one person specifically more sensitive than another person. Like you, Erin. You went so much of your life not being sensitive and it's not like you were only exposed twice in your life, right?

Erin Welsh: Right, no.

Erin Allmann Updyke: So I think a lot of it is repeated exposure. So people who have occupational exposures are at much higher risk of being sensitive if they're constantly coming in contact with it.

Erin Welsh: Well and that brings me to another question about hyposensitivity. So like can you actually become-

Erin Allmann Updyke: Desensitize yourself?

Erin Welsh	Yeah.
Erin Allmann Updyke	So desensitization has not been shown to be effective for poison ivy the way it is for bee stings and things like that.
Erin Welsh	Okay.
Erin Allmann Updyke	Which is really interesting.
Erin Welsh	Well that leads me to thinking a lot of other questions but I think that this is where I need to direct them to Matt, so. (laughs)
Matt Candeias	Fair enough.
Erin Allmann Updyke	(laughs) Phew, thank goodness. Cause I know my answers were just like, 'Eurgh'.
Matt Candeias	Maybe.
Erin Allmann Updyke	Matt, what the heck. Tell us all about it.
Matt Candeias	Okay.
Erin Allmann Updyke	But let's take a quick break first.
TPWKY	(transition theme)
Matt Candeias	All right, so we've covered a lot of ground in this episode, but let's talk about the plants. And this is where things get really interesting and this is why, I always say it but it's so true, I love doing crossovers because I learn so much. You send me down these weird, interesting roads and they're never as simple or as straightforward of a narrative as I hope they are. Or I think they are, I shouldn't say hope. I usually hope for more interesting things. And this is what we found.
	So let's back up. We talk a lot about poison ivy and poison oak and to some extent, poison sumac, because these are plants that people at least here in North America have a chance of running into, having encounters with, whether gardening or hiking or doing anything of that. But if you back up for a second and look at the family that these plants belong to, Anacardiaceae, do you know what common food that you've probably all eaten to some degree or another?
Erin Allmann Updyke	Mango.
Matt Candeias	Yes, mango. But the name of this family is very specific to something that you would eat, say, in trail mix.
Erin Welsh	Peanut?
Erin Allmann Updyke	Peanut!
Matt Candeias	Not peanut.

Erin Allmann Updyke

Sunflower seed.

Matt Candeias

Nope.

Erin Allmann Updyke

M&Ms.

Erin Welsh

Grapes.

Matt Candeias

It's very popular, you were closer with peanut, and it's very popular in some Asian foods.

Erin Allmann Updyke

Cashews.

Matt Candeias

Cashew, yes.

Erin Allmann Updyke

Oh, cashews! Oh cashew nuts!

Matt Candeias

Yes. So the group of plants we're talking about all come from what they call the cashew family, Anacardiaceae. And Anacardiaceae, I would normally not use the common name but the etymology of Anacardiaceae literally means 'upward heart' which is in complete reference to the seed of the cashew apple.

Erin Allmann Updyke

Yeah!

Matt Candeias

Which if you've ever been to Central or South America and seen a cashew growing, a cashew is a small nut attached to the bottom of a large apple-like structure called the cashew apple, and that's what they're referring to with this. So Anacardiaceae is a large family of plants that's found all over the globe. We happen to know a lot of the temperate representatives but if you've ever eaten mangoes or pistachios, you have also eaten members of this family.

Now, urushiols are present in about a third of the family. So this is not something that's unique to any of the ones that we're familiar with, this is something that the family's pretty well known for. And I actually, recently - I'll probably be releasing the episode in conjunction with this one - spoke with the Deputy Executive Director of the United States Botanical Garden, Dr. Susan Pell, who just happens to have devoted her entire career to understanding this family of plants.

Erin Allmann Updyke

Oh my god!

Matt Candeias

And it's absolutely fascinating, yes.

Erin Allmann Updyke

Oh my gosh, we should've listened to that episode in prep for this, Matt.

Matt Candeias

(laughs) I was so happy I did the interview. It'll come out whenever this does, but yeah. It's fascinating and she can speak to any number of botanists that have only gotten more sensitive over time to repeated exposure.

Erin Allmann Updyke So some of the most famous ones besides the mango, the cashew, the pistachio, we've already covered poison ivy, poison oak, and poison sumac. Now if you're a United States botanist or in North America doing botany, they are Toxicodendron. But if you are a European, specifically certain people that work at Kew, they still lump them into Rhus. There's a lot of taxonomic uncertainty but it would behoove you to familiarize yourself with some of the ones you're more likely to encounter.

Erin Welsh Behoove, nice. (laughs)

Erin Allmann Updyke Behoove. (laughs)

Matt Candeias Yeah. These quarantinis are doing a number on my vocabulary.

Erin Allmann Updyke I love that your vocabulary gets better after the quarantinis cause mine does not.

Matt Candeias I get more brave in trying to use those words. But as a group of plants, as you already mentioned, urushiol is a suite of compounds not just one. And when you think about what is this doing for the plant, you know, the first thing I always go to is defense. You know, it's very easy to see why we would touch this, get a rash, and be like, 'I'm never messing with that plant again.' But I wanna go back to something Erin said about the delayed reaction.

Erin Allmann Updyke Yeah.

Matt Candeias Does it make sense for a plant to have an anti-herbivore defense compound that takes a day or two to kick in?

Erin Allmann Updyke Well also, isn't it only humans and some primates that have a response to this?

Matt Candeias Yes.

Erin Allmann Updyke So like herbivores don't care.

Matt Candeias Yes, yes. For all intents and purposes, this plant only affects us and some of the higher primates, nothing else is affected by it with this allergy. It is by no means an anti-herbivore defense, in fact everything from birds to goats to deer to mice and numerous insects will feed on the foliage and fruits of this plant, of all of these plants, with little to no problem.

Erin Allmann Updyke What the heck, Matt?

Matt Candeias Yeah. It's bizarre.

Erin Allmann Updyke Why?

Matt Candeias We'll get there. It's very bizarre. And that's what's really interesting is to think about how bad our reactions can be to it and it's really just us, we're very much alone in this.

Erin Allmann Updyke (laughs) It's just us.

Erin Welsh (laughs) Of course humans would name it poison ivy, too.

Erin Allmann Updyke

Right? Yeah.

Matt Candeias

Exactly, yeah.

Erin Welsh

What would a bird name it? What would a deer name it?

Erin Allmann Updyke

Delicious berries!

Matt Candeias

Delicious, fatty berries. Yes, exactly. So as you can imagine, the complications with the human immune response, it makes it a very difficult group of plants to study in a lot of great detail, at least for that third that produce the suite of compounds. So this is a woefully understudied sort of biochemical ecology, we'll say.

But there has been enough interest in it, obviously because of how much it affects us, that there have been hints and insights gained over time. And some of the best hints as to what the function of these compounds are come from where they're produced. And now it's a big family, it's a lot of plants that have it, but you gotta figure we really only look at the ones that we either are more likely to come in contact with or that we have some sort of economic use for. So most of the work has been done in poison ivy and mangoes, cashews, and pistachios.

So if you look at at least poison ivy, most of the urushiol is contained within the young leaves, the young stems, the bark, and the fruits. And interestingly enough, it's not found in the pollen and poison ivy pollen happens to be a surprisingly common ingredient or at least component of most commercial honey.

Erin Allmann Updyke

Huh.

Erin Welsh

Oh.

Matt Candeias

Yeah. So we'll get into the ecological benefits of this species in a little bit but when they looked at urushiol's function in poison ivy, they found that urushiols and its derivatives are really effective at killing certain types of pathogenic fungi.

Erin Allmann Updyke

(gasp) Awesome.

Erin Welsh

Oh. Hence the early growth or whatever.

Erin Allmann Updyke

Yeah.

Matt Candeias

Exactly. So young leaves, young stems, things that are really tender, very susceptible to infection. Now it's also been found - but in a lab setting, this is important, this is not found on the plant itself - to be really good at preventing biofilms and killing a lot of bacteria. So you think about all of the surface area of a plant is ripe for the taking in terms of being, you know, a growth medium for bacteria. They don't wash themselves regularly and they've got a lot of pores that are open to the environment, so.

Erin Allmann Updyke

Yeah.

Matt Candeias

Anything that can be present in a plant that can help prevent detrimental microbes from finding their way into the plant is probably a good thing.

Erin Allmann Updyke

Huh.

Matt Candeias

Yeah. Now, in mangoes it's really interesting because the urushiols are highly concentrated in resin ducts, specifically and most importantly around the fruits, which is why a lot of people will get a reaction to eating mangoes, especially if you're getting mangoes that have gone feral.

Erin Allmann Updyke

Oh, yeah.

Matt Candeias

So it is present in the domesticated ones but if you get 'em off the street from a seed that's just germinated, you are really risking it. I mean your best bet is to avoid the skin because that's where it's concentrated but even if you cut into a mango, what gets on the knife and then travels into the fruit can be enough to really mess your day up. Or week up, I should say.

Erin Allmann Updyke

Wow.

Erin Welsh

I have a question, if you're ready, about distribution of the plants.

Matt Candeias

Okay yeah yeah, we'll go there before I get into some of the interesting mango results.

Erin Welsh

Okay. So does urushiol or the amount of urushiol or anything like that, does that follow any sort of geographic distribution in terms of latitude or in terms of rainfall or in terms of predator or herbivore density or whatever?

Matt Candeias

That's a really cool question to ask and I don't know the full picture of it, but I will say that it is very much present in both tropical and temperate representatives. But I will get into something in a little bit dealing with climate change and CO2 that kinda lends to this.

Erin Welsh

Ooh. Yeah.

Matt Candeias

But no, I think overall it's a compound that's very much found in varying degrees in different tissues maybe by latitude and habitat but, you know, poison ivy's gonna affect you just as much as pistachios and mangoes are, kinda thing.

Erin Welsh

Okay. Right. So it's not like, 'Oh this poison oak contains more urushiol than poison ivy,' it could be 'This leaf on this plant contains more urushiol...' Like there's more variability within the plant than there is across plant species? Okay.

Matt Candeias

Right, right. So especially like Toxicodendron poison ivy, I don't know too much about poison oak just because I grew up on the East Coast but it is a highly variable species and anytime you talk about plant chemistry, it carries with genetics and populations.

Erin Welsh

Right, okay.

Matt Candeias

As my old botany professor used to say, "It's like good dope and bad dope, you never know what you're gonna get."

Erin Welsh

(laughs)

Erin Allmann Updyke

Mm-hmm, mm-hmm.

Matt Candeias

Variation within a species, it's important. So in mangoes a lot of the urushiols are concentrated in these resin ducts, so you can picture them as sort of like veins, vascular tissue that goes through the rind of the mango and is just chock-full of these compounds. And what they found is that in plantations or any sort of commercial production for mangoes, the more dense the resin ducts are in the tissue, the less the mangoes are affected by flies, ovipositing flies looking to lay their eggs on the fruit.

Erin Allmann Updyke

What?

Matt Candeias

And what happens is when the female fly lands on and stick her ovipositor into the tissue to lay her eggs, she ruptures those resin ducts and it just floods the egg chamber, killing the resulting eggs and larvae.

Erin Allmann Updyke

Oh, stop it! That is awesome.

Erin Welsh

That's really interesting.

Matt Candeias

And so on top of all of that, the other part of it too is just antimicrobial. So really I think the impetus, the evolutionary pressures that really set urushiol on its trajectory and why we see so many different variations within this class of compounds has to do with antimicrobial properties, infectious disease-causing microbes from fungi to bacteria and everything inbetween.

Erin Allmann Updyke

Oh my gosh, my brain is reeling. This is fascinating.

Matt Candeias

Yeah, so it absolutely has nothing to do with us, in fact we were up in Indiana Dunes over the summer and there was a poison ivy covered in sawfly larvae that were just devouring it. And birds eat it like crazy, I mean they saw 'leaves of three, let it be'. Let it be for a lot of reasons, let it be cause you probably don't wanna get what Erin came down with and just be itchy scratchy, having a horrible time. But it's also extremely ecologically important, at least Toxicodendron radicans, what we know as poison ivy and I'm sure it extends to poison oak and it definitely extends to poison sumac although you definitely have to work to find true poison sumac. They say you have to find a high quality bog, you have to trip and fall and the first plant you grab will be poison sumac.

Erin Allmann Updyke

(laughs)

Erin Welsh

(laughs)

Matt Candeias

But they are ecologically extremely important, their foliage feeds many different species of animal, especially insects. There's lots of leaf and stem boring insects, there's lots of caterpillars of numerous different species of butterflies and moths. The flowers are visited by a wide variety of insects for pollination, mainly by beetles actually, it is primarily a beetle-pollinated species but bees will find it too. And the fruits, oh my god are the fruits of poison ivy so extremely valuable. They're one of the few species that has a white fruit and you can guarantee if it's a white fruit, at least in the east, you probably should leave it alone, so. But they're really high in fat and they happen to appear around the same time that all of our migratory songbirds are making their way south.

Erin Allmann Updyke

That's so cool!

Matt Candeias

And so it is a vital component of their diet as they migrate south. And so if you have this plant on your landscape, it's not hurting you, you're not gonna come into contact with it easily, consider leaving it. It's got beautiful fall foliage, turns very red and contrasted with the white berries, it's really, really pretty. And, you know, birds disperse the fruit, that's how it gets around so it's really important for them. But one of the most interesting things is what's going on specifically with poison ivy and climate change. And they used... Have you heard of the FACE experiments? The Free-air CO2 enrichment?

Erin Allmann Updyke

Mm-hmm.

Matt Candeias

Yeah, where they basically set out all of the CO2 enrichment stuff, it's waste product CO2, it was going to find it's way into the atmosphere one way or another, but they concentrate it in an area and look at how plants respond. So it's a way of trying to study what elevated CO2 levels are gonna do for plants. Well, someone got it in there head to see what was gonna happen with poison ivy in the context of CO2 enrichment. And what they found is that poison ivy really loves extra CO2 hanging around in the atmosphere. So CO2 enrichment increased photosynthesis in poison ivy by 77%.

Erin Welsh

What? (laughs)

Matt Candeias

I just want you to sit with that. 77% more photosynthesis.

Erin Allmann Updyke

Wow.

Erin Welsh

Oh boy.

Matt Candeias

Yeah. So not only did that lead to better performance, it led to bigger plants overall, they made better seeds that were more likely to germinate and grow just as extreme or more than the parents that produced them. But the most alarming of all is the production of this triene congener of urushiol increased by 153%.

Erin Welsh

(laughs)

Erin Allmann Updyke

What?!

Matt Candeias

Which is the most allergenic form of urushiol.

Erin Welsh

As if we needed one more reason to slow climate change down.

Matt Candeias

Right.

Erin Allmann Updyke

To slow climate change. We're gonna be taken over by mutant poison ivy that makes the most allergenic urushiol.

Matt Candeias

And sadly it's a double whammy because not only are we increasing the amount of CO2 in our atmosphere, we're creating through habitat destruction - especially of forests - a lot of edge habitat. So when you fragment a forest into tiny little chunks, all of those edges suddenly present a ton of really perfect niches for poison ivy to grow. So it's this double whammy of we're increasing its niche availability which increases its numbers on the landscape, but we're also making it extremely potent and vigorous in the process.

Erin Allmann Updyke

Wow!

Erin Welsh

Wow.

Matt Candeias

Which is good news for ecology in a lot of ways, when you think about all of the ecological impacts. But in terms of us being outside and enjoying being in the woods, which again, I'm not sensitive but I also don't want to push my luck for the reasons you mentioned. It's a really interesting thing and there is some speculation that it's because with CO2 enrichment, you get warmer temperatures, you tend to get higher humidity spikes.

Erin Allmann Updyke

More fungi and things, yeah.

Matt Candeias

Could result in more fungi, bacterial infections, those sorts of things. So...

Erin Allmann Updyke

Fascinating, Matt.

Matt Candeias

Yeah. It's a really cool group of plants but like I said, woefully understudied for obvious reasons. And in talking with Dr. Pell, she desperately wants grad students to work on this stuff, it's just a kinda hard sell. (laughs)

Erin Allmann Updyke

So if you're interested, listeners, check out Matt's episode on In Defense of Plants and then you can get all of that info.

Matt Candeias

Yeah. And, you know, in botany and in ecology it's easy to think that all the low-hanging fruit have been taken, all those early naturalists took all the fun, easy stuff. This is proof that there's areas that are ripe for exploring, so.

Erin Allmann Updyke

Yeah.

Matt Candeias

Curious, brave minds.

Erin Welsh

(laughs)

Erin Allmann Updyke

And then why in humans does that same compound produce this hypersensitivity response? That's so bizarre.

Matt Candeias

It's strange.

Erin Welsh

Are there analogs of it? Are there compounds that are super similar where it's just sort of this coincidental, 'oh bad luck for humans'?

Erin Allmann Updyke

That's what I'm wondering.

Matt Candeias

Yeah, I think it's just kind of bad luck. You know, there's a lot of things that can be said of just kind of happenstance.

Erin Allmann Updyke

Right.

Matt Candeias
Take THC for instance. Cannabis is not producing that because it has this psychoactive effect on us, we just happen to have receptors that are receptive to it, you know? And so there's a lot of questions about the happenstance of these evolutionary dynamics, this trajectory that takes the species or clade of organisms in one direction and humans are just so apt to try and experiment and move around the globe that we're bound to come into contact with this stuff on some point. And sometimes it affects us, sometimes it doesn't.

Erin Allmann Updyke
Yeah.

Erin Welsh
Yeah. Evolution does not have a goal or an endpoint or a plan.

Matt Candeias
There is no agency! And that's what's so cool to think about is just, when you talk to even experts on this, they're like, 'Yeah. I think it's just unfortunate for us.'

Erin Allmann Updyke
Yeah. Oops. How cool!

Matt Candeias
Oops, yeah.

Erin Welsh
Oh man.

Matt Candeias
But yeah, my recommendation is don't eat anything you can't identify and learn the species that can affect you, Erin.

Erin Welsh
(laughs)

Erin Allmann Updyke
If these episodes don't convince people to learn at least the species around them that can affect them, I don't know what will.

Matt Candeias
Nothing.

Erin Allmann Updyke
Nothing. (laughs)

Matt Candeias
And what are we gonna do about that?

Erin Welsh
Maybe the pictures of my poison ivy rash will convince you. (laughs)

Erin Allmann Updyke
There we go.

Matt Candeias
And hopefully my mother's, if she's feeling willing.

Erin Welsh
Yes.

Erin Allmann Updyke
This is a fun episode.

Matt Candeias
This was.

Erin Welsh
This is so interesting.

Matt Candeias
Thank you for your suffering, Erin, that inspired it all.

Erin Welsh (laughs) I cannot say that there's anything that is worth that suffering but this was a very nice little consolation.

Erin Allmann Updyke Consolation prize.

Matt Candeias Fair enough.

Erin Welsh But no, this was super fun. What a weird group of plants.

Erin Allmann Updyke What a weird group of plants.

Erin Welsh Yeah. Well should we do sources?

Erin Allmann Updyke Let's.

Matt Candeias Sure.

Erin Welsh Okay. So like you, Erin, I found a couple of papers that were super great for the history that kind of laid it all out. So one was called, by Rostenberg from 1955, 'An anecdotal biographical history of poison ivy.' And then by Vogel from 2000, 'Oriental lacquer, poison ivy, and drying oils.' And then finally there was an article on sciencehistory.org called 'No Ill Nature: The Surprising History and Science of Poison Ivy and Its Relatives' and that was actually a really interesting and great article, it had tons of information in it. So yeah.

Erin Allmann Updyke Awesome. Yeah I already mentioned my main one by Gladman in 2006 was really great but I do have a few others that I will certainly post on our website thispodcastwillkillyou.com.

Matt Candeias Yeah so I had a bunch of sources cause I had to kind of search high and low for people that have braved this, but some of the bigger ones I pulled from I will obviously send you the links for all of the ones. 'Resin Ducts in the Mango Fruit: A Defence System' by Joel, 1980. There was 'Beetle interactions with poison ivy and poison oak' by Senchina, 2005. 'Insects feeding on poison oak (*Rhus toxicodendron*)' by Howden et al, 1991. And the climate change one was 'Biomass and toxicity responses of poison ivy (*Toxicodendron radicans*) to elevated atmospheric CO₂' by Mohan et al, 2006.

Erin Allmann Updyke Nice.

Erin Welsh Awesome. Yeah, we will post all of these references and links to them on our website thispodcastwillkillyou.com so if you want to do some continued reading, check it out there.

Erin Allmann Updyke Definitely.

Erin Welsh Yeah.

Matt Candeias Yay.

Erin Welsh Well, thank you Matt, so much, for coming on and doing this really fun episode. This is just like one of the most fun, I think. It was nice and relaxing, weirdly. Yeah.

Matt Candeias Yeah.

Erin Allmann Updyke It was. Even though you had to relive your darkest days, Erin?

Erin Welsh I mean honestly, time is meaningless at this point. (laughs)

Matt Candeias It's all the same. 2020.

Erin Welsh And also if my suffering can in some way alleviate the suffering of others and prevent their exposure to poison ivy, that's great. That's great.

Matt Candeias There you go. How noble of you. Thank you both so much as always for having me, it is a wonderful blats to talk with you and I always learn so much. Check me out, In Defense of Plants podcast, @indefenseofplants on all major social media outlets. If you google it you will find me. Stay tuned, a lot of good things over the horizon.

Erin Welsh Yes, yes.

Erin Allmann Updyke Definitely if you're not already following Matt on all the things, make sure that you are because it's like quiche, it's incredible.

Erin Welsh Oh my god. Ugh, the Insta, I'll say again, is incredible. Just the best. Beautiful.

Erin Allmann Updyke Oh, yeah. Truly.

Matt Candeias I have a lot of fun with it.

Erin Welsh You do a great job.

Matt Candeias But thank you for what you two are doing, you are putting out just such wonderful and meaningful content, so thank you again. And your fans are just fantastic, I love interacting with them, so.

Erin Allmann Updyke (whispering) You're the best, it's true.

Erin Welsh (laughs) They put the 'fan' in fantastic.

Matt Candeias Oh!

Erin Allmann Updyke Oh! That's so good! Oh no! That's so good. (laughs)

Matt Candeias All right, I'm done.

Erin Welsh (laughs) Oh, boy. Well thank you to Bloodmobile for providing the music for this episode and all of our episodes.

Erin Allmann Updyke And thank you to you, fantastic listener!

Erin Welsh Fantastic fans! (laughs)

Erin Allmann Updyke

Oh, seriously though.

Matt Candeias

I won't rub poison ivy on any of you.

Erin Welsh

(laughs)

Erin Allmann Updyke

Seriously, thank you so much for listening, we love getting to make this podcast. Thank you so much.

Erin Welsh

Yes. Well until next time, wash your hands.

Matt Candeias

You filthy animals.

Erin Allmann Updyke

(laughs)

Matt Candeias

Sorry, I didn't mean to step on your toes.

Erin Allmann Updyke

I loved it.

TPWKY

(outro theme)

Matt Candeias

You're gonna be itchy kids, you're just gonna be itchy.