

TPWKY

This is Exactly Right.

Erin Welsh

"It was a week before the holy festival of Mary Magdalene on July 14th, 1518 that Frau Troffea began her dance. One can picture her in the shadows of one of Strasbourg's half timbered houses, white linen cap limp with sweat and her skirt and apron swaying as she jumped awkwardly from foot to foot. Despite pleas from her husband to desist, Frau Troffea went on dancing into the evening in front of a crowd growing all the time in size and bewilderment. As the shadows of buildings and onlookers lengthened and she could barely raise her limbs, Frau Troffea collapsed into sleep. The repose only lasted until she had recouped enough energy to restart her dance. Early the next day she resumed. Frau Troffea went on dancing for a third and then a fourth day.

At this point the authorities intervened. She danced interminably, apparently heedless of the terrible bruises, blood sores, and lacerations that must have formed on her feet after so many days of near constant movement. We don't know what Frau Troffea thought or what she said while she danced, whether she screamed for help or maintained a troubled silence. We can be fairly sure though that she was in genuine distress."

TPWKY

(This Podcast Will Kill You intro theme)

Erin Allmann Updyke

Ooh.

Erin Welsh

Ooh, spooky!

Erin Allmann Updyke

So spooky.

Erin Welsh

So that is from the book called 'The Dancing Plague' by John Waller and that's the subject of this episode of This Podcast Will Kill You.

Erin Allmann Updyke

Yep, yep, yep!

Erin Welsh

Hi, I'm Erin Welsh.

Erin Allmann Updyke

And I'm Erin Allmann Updyke.

Erin Welsh

Welcome.

Erin Allmann Updyke

I'm so excited for today's episode, Erin.

Erin Welsh

I know.

Erin Allmann Updyke

I've been like barely able to contain myself.

Erin Welsh

It's really exciting, I mean we've been wanting to do another medical mystery type thing since encephalitis lethargica.

Erin Allmann Updyke

Yep.

Erin Welsh

And so I'm really excited to do this because a lot of people have asked us about it or sent us emails saying hey, have you read this? Have you heard of this?

Erin Allmann Updyke

Yeah. I have to tell you the thing, there's several things that I'm most excited to talk about but one is the fact that we're doing the format of this differently than our normal episodes, it'll be more similar to the format of our encephalitis lethargica episode. But even a little different than that, I feel like.

Erin Welsh

Just join us for the ride.

Erin Allmann Updyke

Yeah it's gonna be great. But Erin, I know absolutely nothing about the dancing plague.

Erin Welsh

Oh really?!

Erin Allmann Updyke

I had never, ever heard of it until you suggested this a very long time ago and then we've had a lot of people message us like hey, can you do the dancing plague, can you do the dancing plague. I know literally nothing about it.

Erin Welsh

(laughs) Excellent.

Erin Allmann Updyke

And I was so careful. Like you told me the hypotheses to research so that's what I researched and I was very careful to never google anything to do with the dancing plague.

Erin Welsh

Oh good. Oh good, this is gonna be a very interesting episode then.

Erin Allmann Updyke

It's gonna be so fun because I have these things that I researched that I'm like I have no idea how this ties in, I can make some guesses based on the fact that it's called a dancing plague. But oh my gosh, I just can't wait to hear all about this and then just do some hypothesizing with you.

Erin Welsh

Yes! Okay. So to ease this conversation along should we pour ourselves a quarantini?

Erin Allmann Updyke

A quarantini? I think we ought to.

Erin Welsh

Okay. This week's quarantini is called Boogie Fever.

Erin Allmann Updyke

Of course!

Erin Welsh

And it has tequila.

Erin Allmann Updyke

The dancing juice.

Erin Welsh

Yep. It has guava juice.

Erin Allmann Updyke

Cause it's pretty and tasty.

Erin Welsh

It has lime juice, sparkling water, mint, and then garnish it with a flower cause it looks pretty.

Erin Allmann Updyke

Why not?

Erin Welsh

Yeah. It's also delicious.

Erin Allmann Updyke We will post the full recipe for that quarantini as well as our nonalcoholic placeborita on our website thispodcastwillkillyou.com and all of our social media channels so make sure you check those out.

Erin Welsh Perfect.

Erin Allmann Updyke And we have new merch if you haven't seen our awesome water bottles, they are very, very cool and new smelling soap which smells so good.

Erin Welsh Yeah, check it out.

Erin Allmann Updyke It's very exciting.

Erin Welsh And our shirts should be stocked at this point.

Erin Allmann Updyke Soon, yeah.

Erin Welsh Yeah.

Erin Allmann Updyke If not now, very soon.

Erin Welsh I think in January, yeah.

Erin Allmann Updyke Yep.

Erin Welsh Okay.

Erin Allmann Updyke Oh we got some gifts from people but I haven't opened them.

Erin Welsh Open them cause it's Christmas.

Erin Allmann Updyke Oh okay. Oh my god. Okay so Kimberly Baxter sent us these adorable little knit microbes. (laughs)

Erin Welsh Oh my gosh that's right, she knitted little H1N1s!

Erin Allmann Updyke Yeah they're so cute.

Erin Welsh That's amazing.

Erin Allmann Updyke And the little beads are H's and N's. Oh my gosh.

Erin Welsh Oh thank you Kimberly!

Erin Allmann Updyke They're so, so adorable.

Erin Welsh Yay.

Erin Allmann Updyke And then also this is a long belated bu Nick Davis sent us an amazing box full of quarantini supplies and a customized quarantini.

Erin Welsh That's incredible.

Erin Allmann Updyke It's so incredible.

Erin Welsh Thank you so much.

Erin Allmann Updyke We are thrilled. We haven't been in the same place to drink it together yet but rest assured we will very soon.

Erin Welsh Yes, absolutely.

Erin Allmann Updyke So thank you so much.

Erin Welsh Thanks Nick, thanks Kimberly.

Erin Allmann Updyke You're too nice to us.

Erin Welsh Best Christmas ever!

Erin Allmann Updyke Yeah! Oh okay, I think that's all of our business now.

Erin Welsh Excellent. I guess we should jump right in.

Erin Allmann Updyke Yes! Let's dance right in. (singing) Dancing, dancing, dancing! Should we take a quick break first?

Erin Welsh Let's do it.

TPWKY (transition theme)

Erin Welsh Okay so you heard from our firsthand account a little bit about the 1518 dancing plague in Strasbourg but there's so much more to tell.

Erin Allmann Updyke Okay.

Erin Welsh So let's pick up where we left off in the beginning.

Erin Allmann Updyke Yes.

Erin Welsh But before I start I want to say that this story you're about to hear almost certainly happened, like the events, the baseline events really did happen no matter how bizarre it sounds.

Erin Allmann Updyke Okay.

Erin Welsh But what's less clear and the point of our episode today is why it happened.

Erin Allmann Updyke

Right, like what the heck happened to make this happen. Yeah.

Erin Welsh

Right, what's going on? Okay so let's set the stage a little bit. So Strasbourg is in present day France sitting close to the German border, back then it was part of the Holy Roman Empire.

Erin Allmann Updyke

Okay.

Erin Welsh

And it looks really lovely in pictures, it's like a little close to the mountains. Maybe we should add it to our TPWKY vacation destinations.

Erin Allmann Updyke

Ooh yeah, let's.

Erin Welsh

And the dancing plague that we're going to focus on because spoilers, it's not the only one, is the one that happened in 1518 in this town.

Erin Allmann Updyke

Okay.

Erin Welsh

What were the early 1500s like in Strasbourg?

Erin Allmann Updyke

Probably dirty and smelly like everywhere?

Erin Welsh

Exactly. Grim. Just really grim.

Erin Allmann Updyke

(laughs) Yeah.

Erin Welsh

As you may remember from our syphilis episode, that disease by this point was sweeping Europe, so like the late 1400s, early 1500s is when it kind of went everywhere. Plague like the actual bubonic plague would swoop in every few decades to carry off some proportion of the population.

Erin Allmann Updyke

Wow.

Erin Welsh

And then what goes better with plague and disease and syphilis than famine?

Erin Allmann Updyke

Of course.

Erin Welsh

Death was around every corner and to deal with this constant threat of death many people turned to religion because science as an explanation for things that happened to you wasn't really happening yet, like it wasn't en vogue yet.

Erin Allmann Updyke

Right, yeah.

Erin Welsh

And at this time the religion that dominated this region was a super fiery demon-fearing bible-beating Christianity with a very stark hierarchy. So if you were part of the clergy, you held the power and the answers and the wealth, and the people like peasants and so on, they turned to the church for guidance. And they would do this especially so during trying times which is like all the time in the 1500s.

Erin Allmann Updyke

Yeah.

Erin Welsh

Okay so what was going on is Strasbourg around this time specifically? In 1514 there was a terrible winter that frosted and blunted the crops and led to many people just straight up freezing to death.

Erin Allmann Updyke

Oh my gosh.

Erin Welsh

And then two years later a horrible harvest and another bitter winter led not just to people dying of freezing to death but also a huge amount of resentment and unease, resentment particularly towards the church. So prices for grain had more than doubled over the past few years and people were getting resentful of the church's demands for tithes and fees and whatnot. And there were active rebellions actually to try to overthrow the church or the clergy which is kind of interesting.

Erin Allmann Updyke

Yeah.

Erin Welsh

But none of them succeeded. So then in 1517 which is the year before the dancing plague, that year was dubbed by one chronicler as simply 'the bad year'.

Erin Allmann Updyke

Oh gosh.

Erin Welsh

So imagine this one year in the sea of bad years.

Erin Allmann Updyke

(laughs) So it was very bad.

Erin Welsh

Very bad. There was malnutrition, starvation, smallpox epidemic, the English sweat, so the sweating sickness which is another historical medical mystery, we touched on it a bit in the hantavirus episode but we didn't really go too much into it.

Erin Allmann Updyke

Yeah.

Erin Welsh

So that would dominate the region, Strasbourg, in 1517. So needless to say many people in Strasbourg had their faith severely shaken, kind of felt they were being punished for something. Okay so now we arrive in 1518 Strasbourg. Things don't look so great even though it's July and probably gorgeous weather except it wasn't, it was unbearably hot, it was like very hot and very dry. So when Frau Troffea started her dance, rumors of the devil's involvement circulated but they were quickly overruled by the majority who believed that her uncontrollable dancing resulted from a divine retribution, so a punishment for faithlessness and immoral behavior and sin and blah, blah, blah.

Erin Allmann Updyke

So it had to do with god but it wasn't demonic possession specifically is what they thought.

Erin Welsh

Right.

Erin Allmann Updyke

Okay.

Erin Welsh

Right so it was more of like you are being punished by god.

Erin Allmann Updyke

Okay.

Erin Welsh

And this was probably fortunate in a way that it wasn't viewed as being satanic or demonic possessions because then she probably would have been burnt at the stake or something.

Erin Allmann Updyke

Cool, okay.

Erin Welsh

Yeah. And so under this punishment, Frau Troffea danced for six days nonstop basically only to sleep and eat and then kept dancing and dancing against her husband's wishes and insistence.

Erin Allmann Updyke

Wow.

Erin Welsh

And it's funny cause the first well known chronicler that wrote a lot about the dancing plague came to Strasbourg I think around 7 or 8 years after 1518 and his name was Paracelsus and I've talked about him before as a medical historian/chronicler.

Erin Allmann Updyke

Okay.

Erin Welsh

And he hated women and so it's really very interesting. He's like, 'Oh well these women are just dancing because they're loose women and loose morals and blah, blah, blah, blah.'

Erin Allmann Updyke

Right. They won't listen to their husbands.

Erin Welsh

Exactly, he was like, 'She only started dancing to infuriate her husband.' So whatever. Anyway, as Frau Troffea danced more and more people arrived to gawk at her and then as I said in the firsthand, the medical authorities intervened and what that meant was that she was ruled to be sent to Saverne which is like a nearby place in the mountains where there was this shrine to St. Vitus. And the other name that was given to this dancing plague besides choreomania, 'choreo' from dance, choreography and stuff, and 'mania' meaning...yeah.

Erin Allmann Updyke

Whoa. All right.

Erin Welsh

This is St. Vitus' dance. Okay so who was St. Vitus and why would our dancing queen be sent to his shrine? So St. Vitus was a Sicilian martyr who didn't die after being burned in a cauldron of lead and tar or after being attacked by lions and he didn't succumb to the temptations of a bunch of seductive dancers to go back to Roman gods.

Erin Allmann Updyke

Sorry, he was burned in a cauldron of lead and he didn't die?

Erin Welsh

And tar, uh huh.

Erin Allmann Updyke

Okay.

Erin Welsh

I mean it was like the year 300.

Erin Allmann Updyke

Okay, okay, okay.

Erin Welsh

(laughs) Citation needed. He was a super popular saint actually, people prayed to him to be healed from epilepsy and also people struggling to conceive. Back then people viewed saints not just as being able to heal them of various things but also as having the power to inflict punishment in sort of the opposite way that they would heal. So if St. Vitus could cure epilepsy he could also cause it.

Erin Allmann Updyke

Oh, interesting.

Erin Welsh

So St. Vitus somehow became associated with these outbreaks of spontaneous uncontrollable dancing sometime during the 1400s and the only way to stop the dancing was to go to his shrine and ask for help or be ordered to the shrine. And so that's how Frau Troffea found herself there. Unfortunately we have no idea what happened to her after that and in all likelihood she stopped dancing and returned exhausted to Strasbourg. But whatever happened to her was overshadowed by what was happening all across the town which was that people had started to dance. At first it was just dozens of people in this frenzied sort of like...it was actually dancing, it was described as dance. And they would move to music in a circle until they dropped basically.

Erin Allmann Updyke

What?

Erin Welsh

Like they would dance from as soon as they woke up to when they just collapsed from exhaustion.

Erin Allmann Updyke

So they're not just like flicking about, they're dancing.

Erin Welsh

Right, they're actually dancing.

Erin Allmann Updyke

Okay.

Erin Welsh

Frau Troffea being the first one, happened in mid July, and then within a month it had turned to hundreds of people.

Erin Allmann Updyke

Okay.

Erin Welsh

By the end of the plague around 400 people had this uncontrollable dancing. This is in a town of 20,000 which is like not a small amount.

Erin Allmann Updyke

No, I mean 400 people in a town of anything is a lot to be dancing.

Erin Welsh

That's a lot of people.

Erin Allmann Updyke

And they according to chroniclers did not want to be dancing.

Erin Welsh

They did not want to be dancing. So a lot of chroniclers described them as sort of being in a trance-like state or at least that's our modern interpretation of it.

Erin Allmann Updyke

Okay.

Erin Welsh

Their minds were lost to them is sort of what would have been described.

Erin Allmann Updyke

Okay.

Erin Welsh

They weren't entirely lucid, it appears.

Erin Allmann Updyke

Right, okay. Oh my gosh. This is so bizarre, Erin.

Erin Welsh: It's so bizarre! And not everyone escaped, like not everyone would just dance and dance and then get tired and stop. This was a relentless entranced dancing that people could not seem to stop no matter how much they wanted to or how much they were threatened with fines or losing their dignity.

Erin Allmann Updyke: Can I ask a question?

Erin Welsh: Yes, of course.

Erin Allmann Updyke: And you might be answering this but I need to just know this now. Were they all dancing together? So Frau Troffea started this and then the next person, were they in the same vicinity as her? How did the next people start? And then was it like 400 people all in the same area that were dancing? Was it one giant dance party that no one wanted to be a part of?

Erin Welsh: (laughs) I mean kind of yes actually to the one giant dance party. So I don't know exactly and I don't know if it's in any chronicles exactly how the next people got started, it just sort of like more people started to dance.

Erin Allmann Updyke: Okay.

Erin Welsh: And so at the very beginning it was viewed as a medical condition which is kind of interesting cause when they referred to it they used the word for plague rather than the word for curse which would have implied like a spiritual condition.

Erin Allmann Updyke: Yeah.

Erin Welsh: And the town council or what was in effect the town council, they decided okay if this is a medical condition, we're gonna treat it medically. And they treated it with like needs like.

Erin Allmann Updyke: Oh, so like let's dance you more?

Erin Welsh: They constructed a wooden stage.

Erin Allmann Updyke: (laughs) Stop it!

Erin Welsh: They hired musicians.

Erin Allmann Updyke: Stop it.

Erin Welsh: They brought in dancers and they were like just keep dancing, just get it out of your system!

Erin Allmann Updyke: (laughs) Stop it, are you serious?

Erin Welsh: I'm serious! And then they're like oh my god...

Erin Allmann Updyke: You guys, I get it, you just need to dance it out, we'll make it happen.

Erin Welsh: I mean I kind of like that attitude. Just dance it. Come on.

Erin Allmann Updyke: I can relate to needing to dance it out but...

Erin Welsh: I can absolutely relate. (laughs) But pretty soon, like within a few days, they're like oh no, oh no, this is bad, this is not what we should've done. Like more people were joining in, more people were dancing and then people started to die.

Erin Allmann Updyke: People died.

Erin Welsh: People died.

Erin Allmann Updyke: From dancing.

Erin Welsh: Yes.

Erin Allmann Updyke: Oh my gosh, Erin.

Erin Welsh: So it's hard to say exactly how many people died. But one chronicler wrote that at the peak of the epidemic 15 people died every day.

Erin Allmann Updyke: What?

Erin Welsh: And so that has to be an exaggeration because the plague affected around 400 people and so if it everyday, that would imply multiple days, that would be like hundreds of people dying.

Erin Allmann Updyke: Yeah, how long did this whole thing last?

Erin Welsh: Around two months.

Erin Allmann Updyke: Two months! That's a least what, 60, no 15... I can't do that math, Erin. (laughs) 15 times 60, that's a lot of people.

Erin Welsh: (laughs) Like not everyone who danced died for sure.

Erin Allmann Updyke: Right, yeah.

Erin Welsh: And so another person just wrote 'many people died.'

Erin Allmann Updyke: Okay.

Erin Welsh: And I think that if you're in the 1500s and you're a chronicler and you say that may people died and you've seen things like plague and smallpox, it's a lot of people.

Erin Allmann Updyke: Yeah, okay.

Erin Welsh: We don't know. So then after it became pretty clear that hiring musicians and constructing a dance hall and encouraging this was not going to work, it actually was causing more problems-

Erin Allmann Updyke: Yeah. And this was all happening cause the first person, she was kind of in a town square type area it sounded like, like everyone came to watch her.

Erin Welsh: Yeah she was dancing outside, like she was visible dancing, public dancing.

Erin Allmann Updyke: Outside, okay. Public dancing. And then other people this all started and then they were like well let's cure this by having a giant dance party so then they brought in all these things and then it just kept escalating from there.

Erin Welsh: Yes. Yeah.

Erin Allmann Updyke: Okay, just making sure I understand. Ooh, this is good, Erin.

Erin Welsh: (laughs) I mean and these are like people who didn't look like they were enjoying themselves.

Erin Allmann Updyke: Right.

Erin Welsh: They had blistered, bloody feet, they were sweaty.

Erin Allmann Updyke: To be fair, Rory Gilmore wasn't enjoying herself at the end of the 24 hour dance-a-thon either.

Erin Welsh: She wasn't and there are a lot of parallels with that and this. (laughs) So welcome on this episode of This Podcast Will Kill You: Gilmore Girls edition.

Erin Allmann Updyke: Yes. (laughs)

Erin Welsh: It is sort of like it's really funny that there are a lot of comparisons made between these dance plagues and rave culture and the dance marathons of especially the early 1900s or the first half.

Erin Allmann Updyke: I did a dance marathon. UCLA dance marathon, yeah.

Erin Welsh: Yeah? Did you last?

Erin Allmann Updyke: Yeah I did, it was great.

Erin Welsh: Oh good.

Erin Allmann Updyke: I enjoyed it a lot. My little brother came, we all did it. It was so fun.

Erin Welsh: So after obviously this wasn't working, this public dancing. The town was like, 'Okay we've made a huge mistake and we are now outlawing dancing and if you are seen publicly dancing you'll be fined.' So it was just sort of like we're gonna try the opposite now.

Erin Allmann Updyke: Okay, okay.

Erin Welsh: And that didn't really work either.

Erin Allmann Updyke: Shocking.

Erin Welsh
People still danced, people were still being infected by this dancing craze, whatever. And so eventually they resorted to shuttling people either by wagon or on foot to the shrine to St. Vitus in the mountains which is around 30 miles away. And it kind of seemed to work, like there at St. Vitus they were prayed over, they were given red shoes.

Erin Allmann Updyke
Oh.

Erin Welsh
Like there was some strange order for a bunch of red shoes.

Erin Allmann Updyke
Dorothy.

Erin Welsh
Dorothy and Snow White and blah, blah, blah. Yeah, there was something about the color red that was associated with uncontrolled dancing and this fervor. I don't know.

Erin Allmann Updyke
All right.

Erin Welsh
Anyway and so yeah, this is kind of an abrupt end but basically they went to the shrine, most people recovered but the trauma stayed with them for a long time and for the people that had to witness this. And it didn't really fade into memory, people made drawings, they made paintings, they wrote stories and we're still talking about it today. And I think that brings me to you because we're still talking about it because it seems like such a bizarre event.

Erin Allmann Updyke
Extremely.

Erin Welsh
And it's hard to envision people having uncontrolled dancing until they died.

Erin Allmann Updyke
Yes.

Erin Welsh
And there have been several different hypotheses as to what caused this and we'll talk about them all.

Erin Allmann Updyke
Yes.

Erin Welsh
There's ergot poisoning, conversion disorder, mass hysteria, and probably a couple others that I'm sure you're gonna tell me about. So let's hear it from you, Erin. Tell me about these things, let's solve this mystery.

Erin Allmann Updyke
All right what we'll do is we'll take a quick break and then we'll go through each of these hypotheses one at a time and we can debate them. Does that sound good?

Erin Welsh
Perfect, love it.

TPWKY
(transition theme)

Erin Allmann Updyke
Okay so Erin, you had told me to research some specific things, right?

Erin Welsh
Yes.

Erin Allmann Updyke: These specific hypotheses. I'm gonna tell you what you told me to research. Ergotism which is ergot poisoning, we'll talk about it. Encephalitis which I'm just gonna say right now it's not that. (laughs)

Erin Welsh: Yeah.

Erin Allmann Updyke: Okay. We can briefly talk about that. Also mass hysteria which is a terrible term but we'll talk about that. And Sydenham chorea, we can talk about that as well. So those are the four. I can tell based on my research 100% the only thing that this could even possibly be.

Erin Welsh: Yeah.

Erin Allmann Updyke: Okay but let's go through these one at a time, starting with the absolute least likely, okay? That sound fun?

Erin Welsh: Sounds excellent.

Erin Allmann Updyke: Okay the most least likely - is that a good way to say it?

Erin Welsh: (laughs) I think it'd just be the least likely.

Erin Allmann Updyke: The least likely is encephalitis.

Erin Welsh: Yeah.

Erin Allmann Updyke: We've talked about encephalitis before. It is such a ridiculously broad term first of all to just say 'encephalitis' that I was like I don't even have anything to research. I don't have any sources for you on encephalitis because it's not a single disease. Encephalitis means swelling of the brain, most of the time it's viral but tons of different things can cause it. So you can absolutely have symptoms that include seizures, that's the closest thing I can think of that might be something like dancing plague, like uncontrolled movement.

Erin Welsh: Yeah.

Erin Allmann Updyke: Other than that it's like headache, fever, vomiting, stiff neck, maybe hallucinations, etc etc. So yeah, it's absolutely not encephalitis. We cool?

Erin Welsh: Get it out of here.

Erin Allmann Updyke: We should have a buzzer sound. Hypothesis 1. (buzzer sound) Two thumbs down. All right hypothesis 2 that it's definitely not, Sydenham chorea. So do you know what this is, Erin?

Erin Welsh: Only in the chorea aspect of it.

Erin Allmann Updyke: Okay so the term chorea and it was really interesting when you said choreography cause I think I knew that a long time ago but I didn't remember that to make the connection. I think I'm having too much fun. So the term 'chorea', it generally just means large, involuntary movements of usually the limbs but also the facial muscles.

Erin Welsh: Right.

Erin Allmann Updyke

So Huntington's disease is also characterized by chorea. Sydenham chorea is a specific form of chorea that happens as a result like following a Strep throat infection, a group A Strep infection.

Erin Welsh

Interesting.

Erin Allmann Updyke

It's not entirely clear exactly what causes it but it's pretty clear that similar to rheumatic fever and rheumatic heart disease, it's a result of antibodies that you make following this Strep infection that then go on to infect your brain.

Erin Welsh

But why just this type?

Erin Allmann Updyke

So it's thought that it infects your brainstem and so your brainstem has a lot to do with motor control and movement.

Erin Welsh

And it's just by Strep type A?

Erin Allmann Updyke

Group A Strep, yeah, yeah, yeah.

Erin Welsh

Group A Strep.

Erin Allmann Updyke

And group A Strep, there's a lot of autoantibodies that get made, that's why you also get rheumatic fever, rheumatic heart disease, now there's thoughts that there could be something called PANDAS but that's pretty controversial at this point. So yeah, there's definitely a lot of autoantibodies that can get made if you have a Strep infection that's untreated.

Erin Welsh

Gotcha.

Erin Allmann Updyke

Yeah so that's why, especially cause kids get Strep throat all the time, it's really important to get that diagnosed and treated because you can prevent all of these future complications if it's treated for the most part.

Erin Welsh

Gotcha.

Erin Allmann Updyke

So was this the dancing plague? (buzzer sound) Two thumbs down. Highly doubtful. It sounds like most of the people that were involved were adults, correct?

Erin Welsh

They seem to be adults, I think they were largely women.

Erin Allmann Updyke

Okay.

Erin Welsh

It does seem to be all age groups though.

Erin Allmann Updyke

I'm gonna put an asterisk in what you just said, mostly women. Okay, yeah. So that's then highly unlikely also because what it sounds like you're saying is there were coordinated type movements, it wasn't just irregular type sort of nonsensical movements. Right?

Erin Welsh

No it was dance.

Erin Allmann Updyke

It was dance.

Erin Welsh: It seemed to be structured, like they use different terms to describe epilepsy than they use to describe dance for instance.

Erin Allmann Updyke: Right, okay. So Sydenham chorea. (buzzer sound) Okay we've already very, very quickly eliminated two of these hypotheses.

Erin Welsh: I mean it's pretty...yeah.

Erin Allmann Updyke: Okay so then ergotism.

Erin Welsh: Yes.

Erin Allmann Updyke: We're gonna spend some time on this because I did a ton of research on this.

Erin Welsh: Okay good cause I have a huge section on this too.

Erin Allmann Updyke: Oh great! Okay so let's talk about what ergot is. Ergot is a fungus kind of, it's a group of fungi kind of.

Erin Welsh: What? (laughs)

Erin Allmann Updyke: It's a little bit weird and complicated. So when people talk about ergot, especially in the context of ergotism or ergot poisoning, they're talking specifically for the most part about a fungus called *Claviceps purpurea*.

Erin Welsh: Yeah.

Erin Allmann Updyke: This is a fungus that infects rye, it's actually a parasitic fungus, it grows into the ovum of the rye flower and then replaces the kernel.

Erin Welsh: Oh cool.

Erin Allmann Updyke: So this *Claviceps* fungus produces this little nugget within that flower that replaces a kernel of rye for example. So the ergot part of it is kind of that specific kernel but then ergot is also a term used to refer to that whole group of fungi. So it's a little bit weird.

Erin Welsh: Okay.

Erin Allmann Updyke: Does that make sense?

Erin Welsh: Yeah. But for this episode we'll talk about ergot meaning-

Erin Allmann Updyke: The fungus.

Erin Welsh: Yeah.

Erin Allmann Updyke

Yeah, okay. We're not gonna talk in depth about the life cycle, it's very interesting. It's a plant parasite so that's kind of the important part that you need to know and the other thing is that ergot produces a ton of alkaloids. We've talked about alkaloids a lot in some of our crossover episodes with Matt Candeias of In Defense of Plants because alkaloids are organic compounds, so that means they are carbon-based compounds that have basic nitrogen atoms attached to it that are really commonly produced by plants, bacteria, fungi, etc. These tend to be defensive compounds that plants and fungi produce.

Erin Welsh

Okay.

Erin Allmann Updyke

And in the case of ergot they produce a bunch of different kinds of alkaloids. There are a couple, ergonovine which is also called ergometrine, don't ask me why.

Erin Welsh

Okay.

Erin Allmann Updyke

Actually I'll tell you why, it's because it was discovered in multiple places at the same time and they called it two different things.

Erin Welsh

(laughs) Classic.

Erin Allmann Updyke

Classic. So ergonovine or ergometrine and then also ergotamine, those are kind of the two biggest ones or the most common ones. But there's a whole bunch of different alkaloids that are produced by ergot. And it turns out that these are rather similar in structure and therefore in our bodies tend to have actions at serotonin receptors in our bodies.

Erin Welsh

Ooh.

Erin Allmann Updyke

Okay?

Erin Welsh

Okay.

Erin Allmann Updyke

Most people have probably at least heard of the word serotonin I'm guessing, it gets a lot of press because it's called the happy hormone sometimes. So a lot of antidepressant medications, their action is to increase the amount of serotonin in your brain. So serotonin is an important neurotransmitter, it does a lot of things in your brain, we don't really understand all of them but they also importantly, there are serotonin receptors in other places than just your brain and central nervous system. There are serotonin receptors in your gut, in fact a lot of serotonin is produced in your gut.

Erin Welsh

Interesting.

Erin Allmann Updyke

In your uterus.

Erin Welsh

Interesting.

Erin Allmann Updyke

Which is very important and I can't wait to tell you about it.

Erin Welsh

Oh my gosh.

Erin Allmann Updyke

And your smooth muscle in other places like your blood vessels and things like that. Okay?

Erin Welsh: I have so many questions but I'm just gonna wait.

Erin Allmann Updyke: Erin. Okay here's the other thing I was so excited about for this episode. I knew you were gonna have so many questions and my notes are so disorganized but I have like 16 sections where I just have asterisks with 'here's a question Erin's probably gonna ask' and then the answer for it.

Erin Welsh: (laughs) I'm so predictable.

Erin Allmann Updyke: I love it, it's so good. Okay so it's important to also know that dopamine, serotonin, histamine, all these things can sometimes cross react on the same receptors and so the ergot alkaloids can also react on a number of different receptors, not just the very specific serotonin in your brain receptors. Cool?

Erin Welsh: Okay.

Erin Allmann Updyke: Okay. So that's the ergot alkaloids, they act on serotonin type receptors. I have a few sidenotes here because I got very excited in researching this because we actually use ergot alkaloids, specifically ergonovine and ergotamine, we use them medically in two main areas. Ergonovine, I'm on by OB/GYN rotation right now, we just talked about ergonovine the day before I was researching ergot alkaloids for this episode.

Erin Welsh: Oh my gosh. Stars aligning.

Erin Allmann Updyke: I know, it's so exciting. It's like I was doing work I was supposed to be doing. So one of the main things that we use ergonovine for is to improve or control postpartum hemorrhage because it turns out that there's so many of those receptors in the uterus, ergonovine attaches very strongly to those receptors and causes uterine contraction and increased muscle tone of the uterus.

Erin Welsh: Really? What?

Erin Allmann Updyke: Yeah, I know! Isn't that fascinating?

Erin Welsh: How did anyone even figure that out?

Erin Allmann Updyke: I don't know. So ergot has been used throughout history for uterine type-

Erin Welsh: No.

Erin Allmann Updyke: Yeah, yeah, yeah.

Erin Welsh: Throughout history?

Erin Allmann Updyke: Yeah, yeah, yeah. Yeah. Totes. Okay then there's also ergotamine which is the other most common alkaloid, that is used commonly today for the treatment and prevention of migraines.

Erin Welsh: Okay.

Erin Allmann Updyke: So migraines, a lot of treatment for migraines, it's thought that migraines have to do with vasodilation in the brain and increasing pressure in your brain blood vessels. So you treat it with vasoconstrictors that kind of specifically target those blood vessels in your head and that can reduce-

Erin Welsh: Interesting.

Erin Allmann Updyke: It can actually abort migraines if you get it early enough.

Erin Welsh: Really?

Erin Allmann Updyke: So ergotamine is one of the drugs that we can use for prevention and treatment of migraines.

Erin Welsh: That's amazing.

Erin Allmann Updyke: I know! Also medically, not medically but recreationally LSD is very similar in structure to the ergot alkaloids.

Erin Welsh: Yes. Right.

Erin Allmann Updyke: So all of these ergot alkaloids have what's called the lysergic acid backbone, that's the name of the main structure of all these alkaloids. LSD is lysergic acid diethylamide.

Erin Welsh: Okay.

Erin Allmann Updyke: So that's LSD.

Erin Welsh: Yeah.

Erin Allmann Updyke: So it's not produced naturally by ergot, LSD is a synthetic derivative of lysergic acid.

Erin Welsh: Yeah.

Erin Allmann Updyke: But if you think about the fact that LSD caused massive hallucinations right, huge amount of hallucinogenic effect, so it's not unreasonable to think that poisoning by ergot can cause hallucinations because we know that LSD can cause that and it's not that different in form or structure from LSD.

Erin Welsh: Right.

Erin Allmann Updyke: And because we're talking about a fungus that grows on a plant, we know from all of our crossovers with Matt that the ratios and amounts of these different types of alkaloids is going to differ a lot between and among different individual fungi and different strains of the fungus or the plant that it's growing on.

Erin Welsh: Right.

Erin Allmann Updyke

Cause it's gonna also depend largely on the environment in which it's grown, how many of these alkaloids they produce, what specific types of alkaloids, and in what ratios. Okay, cool. So that's kind of ergot, like an overall picture of ergot and its alkaloids, how they're used today. So what happens if you get ergot poisoning?

Erin Welsh

Yeah.

Erin Allmann Updyke

Okay so when one ingests ergot-infected rye, rye is the most common grain that ergot infects but it can also infect rice, other grasses, it can infect a lot of different monocots. There are three main syndromes that you can get from ergot poisoning, most of the literature says two but more recent literature divides it into three.

Erin Welsh

Okay, I only saw two.

Erin Allmann Updyke

Yeah, gangrenous ergotism, gangrene is like if you imagine your limb turning black and then falling off. That's gangrene. Enteroergotic, 'entero' meaning your gut, so you can have a form of ergotism that's more specific just to gastrointestinal symptoms.

Erin Welsh

Okay.

Erin Allmann Updyke

And convulsive ergotism.

Erin Welsh

Right. So the gut makes sense and the convulsive makes sense. Why does it cause gangrene? Is that one of the questions?

Erin Allmann Updyke

No but we'll talk about it! (laughs) That's one of the things I will of course explain. So remember I said that one of the uses of the ergot alkaloid is for vasoconstriction in your brain. Okay so we know that ergot alkaloids can cause vasoconstriction. If you have vasoconstriction in the small vessels of your limbs that can lead to necrosis which is tissue death, which necrosis on a large scale is what gangrene is, it's the death of a large amount of tissue. Once that tissue starts dying it's very easy to get a superimposed bacterial infection on top of that. So gangrenous ergotism can become so severe that you can lose entire limbs. Entire limbs or parts of limbs will die to the point where if you just hit them they will fall off completely with very little bleeding at the site where the tissue falls off from cause all that tissue is also dead.

Erin Welsh

That's horrifying.

Erin Allmann Updyke

Yeah it's really gnarly. So gangrenous ergotism is also called St. Anthony's Fire because it's not just a chill process of your limbs slowly dying, like oh no big deal it's just slowly... Okay that's obviously a massively huge deal but it's also not like a painless process.

Erin Welsh

Right.

Erin Allmann Updyke

This is also associated with very intense neuropathic pain, so nerve type pain, these violent burning pains that shoot through your limbs.

Erin Welsh

Yeah.

Erin Allmann Updyke

And back when first of all they didn't know exactly what caused ergotism or how to prevent it from infecting grains and how to separate it from the rye and back in medieval Europe they used rye for everything, right.

Erin Welsh: Right.

Erin Allmann Updyke: Like all their bread was made of rye, everything was made of rye. So apparently this form, gangrenous ergotism, was so common and had such specific symptoms that that's why it got its own name, St. Anthony's Fire.

Erin Welsh: Yeah.

Erin Allmann Updyke: So I think that's pretty interesting.

Erin Welsh: Yeah.

Erin Allmann Updyke: Yeah.

Erin Welsh: I have a little bit about St. Anthony and the whole thing.

Erin Allmann Updyke: Oh cool. Okay so then let's talk about the convulsive form of ergotism.

Erin Welsh: Yeah.

Erin Allmann Updyke: This is most likely more what people were thinking when they thought the dancing plague might be associated with ergotism, right.

Erin Welsh: Right.

Erin Allmann Updyke: Because it wasn't like people were dancing and then legs were falling off. Well maybe legs were falling off but...

Erin Welsh: They weren't though, so that's something. I'll talk a little bit about sort of the evidence pro and against or whatever in terms of contemporary accounts but yeah, there doesn't seem to be like 'oh so and so's leg fell off'.

Erin Allmann Updyke: Yeah.

Erin Welsh: It's just more of the convulsive thing. But do you know the proportion of gangrenous vs convulsive?

Erin Allmann Updyke: Excellent. This was one of the questions, Erin. So not just what is the proportion but what determines whether you get gangrenous or convulsive form?

Erin Welsh: Right. Is it different strains are more prone to some?

Erin Allmann Updyke: We have absolutely no idea quite honestly is what it seems like.

Erin Welsh: I thought that there was something though, I read something that was like strains in Eastern Europe tend to be more convulsive and west is gangrenous.

Erin Allmann Updyke

In the past in Germany people west of the Rhine River usually got gangrenous ergotism, east of the Rhine they tended to get convulsive. So it's been suggested that it might be due to chemical differences in the different strains of fungus but there's been at least one study that showed that that wasn't the case, there isn't that big of a difference in the chemical composition of the alkaloids to specifically explain that. Someone else had suggested it might be concomitant vitamin A deficiency.

Erin Welsh

Right.

Erin Allmann Updyke

So if you're also vitamin A deficient then you would be more likely to get the convulsive form but that also doesn't seem to hold water either. It's not entirely clear. What's interesting is that within an outbreak, especially in more recent outbreaks, it's often the case that some people will get gangrenous and some people will get convulsive but it's very rare for someone to get both gangrenous and convulsive at the same time.

Erin Welsh

But even with in the same outbreak you don't have-

Erin Allmann Updyke

You can get both.

Erin Welsh

Interesting.

Erin Allmann Updyke

Yeah. So my guess would be it probably does have a lot to do with the combination of alkaloids but it might not be as easy to separate this strain vs that strain, it might just be very environmentally dependent. Like growing in this type of en you might be more likely to get this combination of alkaloids etc but then it also probably has to do with individual susceptibility, so there's probably some combination effect going on. So with the convulsive type I will say that you often also get GI effects.

Erin Welsh

Okay.

Erin Allmann Updyke

So nausea, vomiting, diarrhea, this is really common especially early on in convulsive ergotism but then you will get more of that neuropathic pins and needles sensations. What's really common is something called formication.

Erin Welsh

Ooh, what's that mean?

Erin Allmann Updyke

Not fornication. So that's the sensation that ants are crawling underneath your skin.

Erin Welsh

Oh my gosh, like form! Okay.

Erin Allmann Updyke

Yeah like the family name for ants. Okay then you'll also get like small muscle twitches, large muscle spasms, convulsions, you can get whole body spasms, etc etc. You can also get hallucinations, dementia, delirium, mania, it can be really bad. So that's ergotism. What do you think, Erin?

Erin Welsh

Okay so there are a couple things I wanna talk about cause I knew that ergotism was one of the things and I didn't know anything about it except that it was caused by a fungus in rye flour. But there has been a lot of discussion about whether ergotism was the cause of dancing plague.

Erin Allmann Updyke

Yeah.

Erin Welsh: Okay so let's go through some of the things. So first of all there's that convulsive ergotism can cause these jerky movements and whatever convulsions and so on. But that's not how you would describe dance.

Erin Allmann Updyke: No, not at all.

Erin Welsh: And so the fact that they very clearly used the words for dance and dancing indicates probably not ergotism.

Erin Allmann Updyke: Right.

Erin Welsh: Secondly, ergot poisoning as you said doesn't affect every person in the same way and it's not entirely predictive.

Erin Allmann Updyke: Yeah.

Erin Welsh: In some people could cause like you said these hallucinations and some people could be just having diarrhea. So ergot poisoning, yeah it could cause hallucinations and maybe convulsions looking like dancing in an individual but not 400 people.

Erin Allmann Updyke: Well yeah. And it's not gonna be called dancing by any stretch.

Erin Welsh: No, it's not gonna be called dancing. And the other thing is that people knew about ergot poisoning. They knew what it was, it had been written about from I think the first instance had been written about in 857.

Erin Allmann Updyke: Yeah.

Erin Welsh: And even around the area where the rye flour went through pipes to be packed into bags, at the end of the pipes were these horribly distorted faces that had been put there as a reminder. Like historians think now it might be a reminder of the hallucinations that ergot poisoning can give you.

Erin Allmann Updyke: Yeah. Fascinating.

Erin Welsh: And so it's called St. Anthony's Fire, like who is St. Anthony? So it was this Catholic order of monks that were really talented at healing people who had the holy fire and it probably was because they just left and had other sources of food.

Erin Allmann Updyke: Yeah. Most people, it's surprising that even people who had very severe convulsive ergotism, the mortality rate was only 10-20%.

Erin Welsh: Yeah.

Erin Allmann Updyke: Which is really low when you consider that at that time there was absolutely no treatment essentially.

Erin Welsh: Right. And it's cumulative, right?

Erin Allmann Updyke: Yeah it can be, absolutely.

Erin Welsh: Okay. So the fourth thing is that ergot poisoning can cause some of the symptoms maybe that were described with the dancing plague but it wouldn't give you the energy to dance on end for days after days to the point of death.

Erin Allmann Updyke: Definitely not.

Erin Welsh: Your extremities makes them numb maybe or would restrict your ability to dance.

Erin Allmann Updyke: Yeah, yeah, for sure.

Erin Welsh: So it's probably not ergot poisoning.

Erin Allmann Updyke: I say definitely two thumbs down.

Erin Welsh: Two thumbs down.

Erin Allmann Updyke: (buzzer sound)

Erin Welsh: But we're not entirely done with the discussion of ergotism if that's okay?

Erin Allmann Updyke: No we're not.

Erin Welsh: Okay, good. Are you gonna talk about what I'm gonna talk about?

Erin Allmann Updyke: I'm ready to talk about what I know you're gonna talk about.

Erin Welsh: The Salem Witch Trials?

Erin Allmann Updyke: Absolutely.

Erin Welsh: Yes! Amazing, okay.

Erin Allmann Updyke: I think I might have read the same paper as you when I was looking through your sources.

Erin Welsh: 1976 by Caporael?

Erin Allmann Updyke: Yes. Yeah, yeah, yeah.

Erin Welsh: Okay. So yeah so this episode we wanted to focus on the dancing plague but you can't really talk about ergot poisoning without talking about the Salem Witch Trials.

Erin Allmann Updyke: You can't.

Erin Welsh: Cause that's like one of the modern explanations for what was going on. All right. Do you know - well I guess now since you read that paper you know more about the Salem Witch Trials.

Erin Allmann Updyke: I know a little bit. I knew almost nothing except like yes, the Salem Witch Trials happened. (laughs)

Erin Welsh

Yeah, same. As a kid i thought for the longest time that it was in Salem, Oregon. So that's where they happened. (laughs) I still have this sense of Salem, Oregon being a very spooky, haunted place. I don't know why.

Erin Allmann Updyke

It probably is, I don't know.

Erin Welsh

Who knows? But so for you all out there listening who may know just as much as we did before we started this episode about the Salem Witch Trials, let's just give you some background.

Erin Allmann Updyke

Yeah, do a recap.

Erin Welsh

Okay. So the Salem Witch Trials took place in 1692-1693 in Salem, Massachusetts, not Oregon. And so in the early 1600s the population there consisted mostly of these super religious people, pilgrims would come to North America for religious freedom or whatever but this brand of religion was pretty extreme. And over the next 100 years as the area became more and more populated, the population of the merchant class grew and the merchant class being lighter on the religious side of things.

So anyway what all of these things led to be is that in the late 1600s in Salem it was a pretty fractious town. There is a huge divide religiously, politically, and there was a lot of infighting in this town, I think 'quarrelsome' was one word I saw used to describe it. The neighbors were always fighting with neighbors over property lines of who didn't go to church that week and there was always gossip and petty revenge being enacted. And then there was witchcraft which was assumed to be a real thing, it was not an uncommon accusation, and it was just part of the religious aspect. Like not necessarily witchcraft itself but communing with the devil and whatever else. Okay so do you know around 100,000 people are thought to have been put to death for practicing witchcraft?

Erin Allmann Updyke

100,000?

Erin Welsh

Uh huh, around 100,000 people in Europe yeah.

Erin Allmann Updyke

No, I had no idea it was that high.

Erin Welsh

It was really high. And so this literal witch hunt had more or less died out in Europe by the mid 1600s and in part due to scientific revolution. But Salem was a bit behind the times. Okay so here we are in this quarrelsome town that firmly believes in witchcraft and is full of a bunch of people with a lot of time on their hands and petty revenge that they wanted to carry out. So it started when several young girls accused three women: Tituba, a slave from the West Indies, Sarah Good, a poor woman who didn't go to church, and Sarah Osborne who also didn't go to church and she had also remarried and indentured servant. So anyway, these women did not have a lot of standing in the community. So the accusers claimed that the invisible spirit of the witch would pinch, choke, prick with pins, and bite them, also causing them to thrash and writhe about. And the number of afflicted girls in a few days increased as did the number of accusations until - I saw somewhere there were over 150 witches accused.

Erin Allmann Updyke

Yeah.

Erin Welsh

78% of them were women by the way.

Erin Allmann Updyke

Shocking.

Erin Welsh: And then trials went about as you would expect. If you confessed you were pretty much fined and released or let off with light punishment but if you maintained your innocence you were executed.

Erin Allmann Updyke: That's so interesting to me if you're like yeah, yeah, yeah I did it, I'm a witch, they're like 'alright, stop doing it.'

Erin Welsh: Yeah!

Erin Allmann Updyke: And if you're like no really, I'm not a witch, they're like 'we're gonna burn you at the stake!' I did not know that until reading this.

Erin Welsh: It's really strange.

Erin Allmann Updyke: Yeah.

Erin Welsh: Also no one was burned at the stake.

Erin Allmann Updyke: Oh.

Erin Welsh: 19 people were hanged, 1 person was pressed to death, like crushed.

Erin Allmann Updyke: Okay that's horrible.

Erin Welsh: Yep.

Erin Allmann Updyke: I mean so is hanging.

Erin Welsh: And 5 people died in jail while awaiting trial.

Erin Allmann Updyke: So how come you think of witches as being burned at the stake?

Erin Welsh: Probably because they were in Europe and other places.

Erin Allmann Updyke: Oh, okay.

Erin Welsh: Also in the U.S. but who knows? Okay so that's the very short version, there's a lot of really fun reading out there, really interesting reading out there where you can get a lot more information.

Erin Allmann Updyke: Yeah.

Erin Welsh: Okay but where does ergotism come into play?

Erin Allmann Updyke: Yeah.

Erin Welsh: So in this 1976 paper by Linda Caporael that was published in Science she proposed that ergotism was the reason for the symptoms of the afflicted girls, so the twitching, the choking sensation, the pinprick feeling, hallucinations, and these all kind of fit in fairly nicely with how ergotism acts on someone.

Erin Allmann Updyke: They do.

Erin Welsh: And then there's the fact that ergotism had been known in Europe for hundreds of years but there was no evidence that it was known to occur in North America at this time. It wasn't until the early 1800s that it was referred to in writing. So it could've been just not written about but known, whatever. Then she also points out in this paper the climate conditions, so really good for fungal growth, warm, damp summers, whatever.

Erin Allmann Updyke: Yeah.

Erin Welsh: Spatial pattern kind of fits.

Erin Allmann Updyke: Yeah, it kind of fits.

Erin Welsh: I don't know I was less convinced by that in terms of which households were affected.

Erin Allmann Updyke: Okay.

Erin Welsh: Okay. And then there's the abrupt ending of the whole event, one day it was just like and then it's over, no more afflictions.

Erin Allmann Updyke: Yeah.

Erin Welsh: So what do you think? Are you convinced? Did you read the reply to the 1976 paper?

Erin Allmann Updyke: Ooh, no I didn't see that there was a reply.

Erin Welsh: Oh yeah, I'll tell you about it.

Erin Allmann Updyke: Okay. I mean I was absolutely not 1000% convinced. I don't think that I would ever be convinced about something that is so difficult to try and actually pinpoint.

Erin Welsh: Yeah.

Erin Allmann Updyke: But it was a very interesting idea and I like the idea that someone is trying to put an explanation. I gotta be honest, I didn't know that during the Salem Witch Trials it started with girls who had these symptoms that then accused other people of being witches that did those symptoms to them.

Erin Welsh: Right.

Erin Allmann Updyke: I didn't realize that aspect of the story. And so I think thinking about those initial cases being cases of ergotism, yeah, okay, maybe, maybe.

Erin Welsh: Maybe.

Erin Allmann Updyke: But it's a little weird that nobody else then would've had symptoms if it was a really bad year for ergot then how come there wasn't any men who had symptoms or other people in those same households that had symptoms if it was a geographical thing? So it's kind of like it's fun to figurize.

Erin Welsh: It's a fun hypothesis.

Erin Allmann Updyke: Yeah.

Erin Welsh: Yeah. And so I read this reply to this paper which was like here's a pro side, here is a negating every single point that the 1976 paper made.

Erin Allmann Updyke: Okay.

Erin Welsh: And so the two authors, Spanos and Gottlieb, talked about the gangrenous and the convulsive form and then they talked about the hypothesis that vitamin A deficiency usually is present when the convulsive form appears and Salem is not likely to be a place where vitamin A deficiency happened, so there was ample fish and cows. There was also so mention of any gangrene during this time.

Erin Allmann Updyke: Yeah.

Erin Welsh: And the age structure of those who were afflicted doesn't match either.

Erin Allmann Updyke: Yeah.

Erin Welsh: So convulsive ergotism happens mainly in young children apparently but only three of the eleven afflicted girls were under 15 years old and I think one was under 10.

Erin Allmann Updyke: Yeah.

Erin Welsh: And you would expect like you said more small children or more people to have convulsions.

Erin Allmann Updyke: Or even more of people who work with rye, so like bakers, things like that, people who are being more exposed constantly too. I would kind of think maybe that those people would have had some symptoms as well.

Erin Welsh: Yeah. Right. And then the 1976 paper tries to make this spatial argument that in this household, in this household, but really it wasn't a household-wide affliction.

Erin Allmann Updyke: Yeah it wasn't. It was just girls in those particular houses.

Erin Welsh: Right.

Erin Allmann Updyke: Yeah.

Erin Welsh: A couple of other people who have then refuted this reply or whatever have said, 'Oh people have different susceptibilities to ergotism, different strains of the fungus might play a role here.'

Erin Allmann Updyke True.

Erin Welsh I think overall what it seems is just like you said, it's a fun hypothesis but it's probably not that well supported.

Erin Allmann Updyke Yeah, yeah. That's how I would feel about it. I would say that ergotism is a better fit for the Salem Witch Trials than it is for dancing plague.

Erin Welsh Oh for sure.

Erin Allmann Updyke To get back on that track.

Erin Welsh So real quick though, back on Salem, I saw one of the hypotheses somewhere for the Salem Witch Trials or for these afflictions was encephalitis lethargica carried by birds.

Erin Allmann Updyke What?

Erin Welsh Yeah. And there was no citation at the end of this for me to read more about it but like what?

Erin Allmann Updyke Encephalitis lethargica carried by birds? 100% makes no sense.

Erin Welsh No. But they weren't saying 'this is what I propose,' they were saying this is one of the hypotheses.

Erin Allmann Updyke That is really weird.

Erin Welsh Isn't it?

Erin Allmann Updyke Yep. Well so let's get back on the track of dancing plague, that was a funny little aside.

Erin Welsh Yeah, it was a long little aside.

Erin Allmann Updyke It was but it was good. Now we don't have to do a whole episode on the Salem Witch Trials.

Erin Welsh Bye!

Erin Allmann Updyke So dancing plague. Ergotism? (buzzer sound)

Erin Welsh (buzzer sound)

Erin Allmann Updyke What's funny is because again I knew nothing about dancing plague before this and so when I was researching this I was like yeah, maybe it was ergotism, you can have a lot of spasms. But I had no idea the dancing plague was literally people dancing on a town hall stage until they dropped.

Erin Welsh Yeah.

Erin Allmann Updyke So yeah, no. Definitely not.

Erin Welsh: Nope.

Erin Allmann Updyke: Okay. We should take a quick break I think before our last hypothesis.

TPWKY: (transition theme)

Erin Allmann Updyke: So the last hypothesis we've already mentioned is of course in air quotes "mass hysteria".

Erin Welsh: Yeah, what's a better term for this? Cause that's what I saw a lot of the places.

Erin Allmann Updyke: Mass psychogenic illness is one of them.

Erin Welsh: Okay.

Erin Allmann Updyke: Also - let me find the exact terminology for it - outbreaks of multiple unexplained symptoms.

Erin Welsh: That's a mouthful, okay.

Erin Allmann Updyke: It's a very broad term. Yeah so let's start right there, actually. The term 'mass hysteria' is a terrible, terrible term. It's simultaneously very othering, anything when you refer to something as mass blah, blah, blah illness, it's very like 'Oh those people, the masses.' You know?

Erin Welsh: Right.

Erin Allmann Updyke: Which is problematic in a lot of ways. But the word hysteria-

Erin Welsh: Hysteria has roots. Yep.

Erin Allmann Updyke: This is a thing we'll do a whole episode on someday.

Erin Welsh: Oh for sure.

Erin Allmann Updyke: So if you are unaware, the term hysteria comes from a Greek term that meant womb, like the root 'hyster' is from a Greek term for womb which is why we still call a uterine removal surgery a hysterectomy. So hysteria used to be thought to be something that only happened to people with uteruses and it was the result of a wandering uterus.

Erin Welsh: The wandering uterus. Can that be our band name?

Erin Allmann Updyke: Yes, 100%. Is there not already a band called The Wandering Uteri? (laughs)

Erin Welsh: There's got to be. (laughs)

Erin Allmann Updyke: Yeah. So for a very long time this was used as an excuse to brush off and explain away any potential pain, issues, emotions, anything that a person with a womb might have. It's like, 'Oh they've got hysteria, they must be hysterical.' So yeah, that is a terrible term.

Erin Welsh: Well maybe Frau Troffea just had a dancing uterus.

Erin Allmann Updyke

Maybe she had a dancing uterus, she just couldn't contain herself. So yeah, what's also really interesting is that when I was trying to research this I was googling on Google Scholar 'mass hysteria' of course because that's what it was called and it's really infuriating how many relatively recent papers still exist using that terminology. But if you wanna find more information about it, the most common term I found was mass psychogenic illness or mass psychogenic response. It's still kind of not a great term quite honestly. Right? It's not perfect, it still is using these masses of people and in general we don't know very much about psychogenic illnesses. So a psychogenic illness is a term that's used to mean any number of either what's called somatoform or dissociative disorders. So either disorders where it's thought that you have psychiatric stressors of some kind that cause actual somatic or bodily symptoms, that's a somatoform disorder. And then dissociative disorders which are disorders where again psychiatric stressors cause a change in consciousness or identity of some kind, so like a fugue state, that's a dissociative disorder.

Erin Welsh

Gotcha.

Erin Allmann Updyke

So that's kind of what that term a psychogenic illness means. So first of all at some point people have tried to separate mass psychogenic illness into two types. You have mass panic and then you have mass motor disorders.

Erin Welsh

Right, yeah.

Erin Allmann Updyke

Okay? And then other people have tried to be like no, it's actually one in the same. So I don't know the consensus. If there's something I know less than biochem it's psych quite honestly. So sorry in advance. I'm not sure where the consensus lies at this point, whether mass psychogenic illness is two separate like mass panic vs mass motor psychogenic illness. But in this case either way we're talking more about motor symptoms, right? Yes there was probably panic going on but what we're really talking about is a bunch of people that are having physical symptoms, uncontrolled dancing that they don't want to be doing. These are voluntary movements in that they are voluntary muscle groups moving but they are involuntary movements in that the person does not want for them to happen and feels that they are not in control of them happening.

Erin Welsh

Right.

Erin Allmann Updyke

So that is actually, if that happens in an individual it's often called a conversion disorder. So to talk about mass psychogenic illness in this instance we actually have to also talk about conversion disorder.

Erin Welsh

Yes. This is fascinating.

Erin Allmann Updyke

It really is and again I apologize and I'm probably not doing a super great job of it because psych is not my strong suit. But conversion disorder is unexplained bodily symptoms, usually neurologic symptoms but also anxiety type symptoms have often neurologic components as well but they can also have things like vomiting, diarrhea. A lot of times conversion disorder are neurologic things like muscle twitching, movements, facial twitches that are not associated with any underlying medically known disease. You do all kinds of EEGs which is looking at your brain waves, you do EKGs to look at your heart, you can do tests on your muscles to look at nerve conduction and you find that everything you can test for is normal but this person still has a twitch or something that you absolutely cannot explain, that might be called a conversion disorder. Generally you also have to have some kind of psychiatric stressor associated with it, so a lot of times it might be past traumas or things like that, some kind of outside stressor that might be causing this that is associated with this conversion disorder, not just someone who has no - no one has no stress in their life, but you know.

Erin Welsh

Right.

Erin Allmann Updyke

Okay. So the thing about mass psychogenic illness is that there have been a lot of instances of it where things have been diagnosed and called mass psychogenic illness. A lot of times these happen in schools or in workplaces.

Erin Welsh

Oh. Are you going to talk about the laughing epidemic?

Erin Allmann Updyke

No I wasn't gonna actually talk about any epidemics.

Erin Welsh

Oh.

Erin Allmann Updyke

What's the laughing epidemic?

Erin Welsh

It's a laughing plague. So in 1962 in Tanzania near Lake Tanganyika at a mission school, several girls started laughing uncontrollably and then it was also interspersed with crying and this became highly contagious and soon 95 of the 159 students could not stop laughing. So they shut down the school cause it was just they you couldn't do anything.

Erin Allmann Updyke

They couldn't do anything, yeah.

Erin Welsh

And then this created more of a problem as everyone went home, the students went home and they went to their hometowns and then there they spread the laughter as well. So by the end of this epidemic several hundred cases of uncontrolled laughter were reported over a few months or something.

Erin Allmann Updyke

Oh. Well that's fun.

Erin Welsh

But there's also other dancing plagues.

Erin Allmann Updyke

Yes.

Erin Welsh

And so I think that's really interesting. There have been cases also of contagious fainting, maybe that was one of the ones that you talked about in schools as well.

Erin Allmann Updyke

Yeah, a lot of it in schools is things like fainting, passing out. One of the things I did read about was actually very recently in Australia following HPV vaccination there was a series of girls that all got very nauseous, dizzy, some of them fainted, some of them went to the hospital. Nothing was wrong with any of them but every single one of those girls was trotted out through a central quad where everyone could see them as they got taken to the nurse's office.

Erin Welsh

Oh.

Erin Allmann Updyke

So this is a really important part of mass psychogenic illness and it's why I was asking you how this first started after Frau Troffea began dancing.

Erin Welsh

Right.

Erin Allmann Updyke

Because they tend to, well they do spread by sight. And like visual and auditory type stimulation. So it's either people seeing directly something happen to someone or hearing this is happening to everyone in this place or in some cases smell as well.

Erin Welsh

Smell?

Erin Allmann Updyke

Yeah.

Erin Welsh

Do you have any instances of smell?

Erin Allmann Updyke

There have been a lot of cases where someone for example in a school, a teacher came in and smelled gas. She said, 'I smell gas' and then she started getting nauseous, dizzy, lightheaded. And then throughout the whole school they've done tons of testing, they found absolutely nothing, no gas, no toxins in the environment, no gas leaks of any kind. But a bunch of students in that school including the teacher, they all got dizzy, nauseous, there was vomiting everywhere, things like that.

Erin Welsh

Interesting.

Erin Allmann Updyke

Yeah. So it can often start with a single smell. So that's another thing about this idea of mass quote unquote "hysteria" or mass psychogenic illness is it tends to occur in women.

Erin Welsh

Yes.

Erin Allmann Updyke

So one of the big issues with calling something mass psychogenic illness is that you really have to rule out that there's not anything else happening, right?

Erin Welsh

Right.

Erin Allmann Updyke

Because any type of psychiatric disorder, especially a conversion disorder, you have to rule out, you can't just call it conversion disorder because you don't know as a physician what's going on with somebody. Right?

Erin Welsh

Right.

Erin Allmann Updyke

Just because you don't know doesn't mean there's not something going on. And very importantly it doesn't make the symptoms any less real.

Erin Welsh

Absolutely. So you're saying that a lot of these conversion disorders or a lot of cases of conversion disorder and a lot of instances of mass psychogenic illness happen when there's extreme trauma around a situation.

Erin Allmann Updyke

Yes, absolutely.

Erin Welsh

And so that's why I spent a lot of time at the beginning talking about the years leading up to the 1518 outbreak and why I talked a little bit about Salem and stuff like this is that you can't just discount, you're like 'oh well whatever, that mass hysteria was just caused because whatever, a bunch of people got crazy.'

Erin Allmann Updyke

They were crazy.' Yeah.

Erin Welsh

Right and it's like no, there was these extremely traumatic events, there's this extremely important cultural context and historical context that you have to consider when these are happening. And it does seem very dismissive when it's like oh, mass psychogenic illness. Yeah, the othering of it is a very good point I think that you made.

Erin Allmann Updyke

Yeah. So it is very difficult but at the same time what's difficult too is when you have a situation where you don't want mass panic and if there isn't anything happening, like of example in the case of the HPV vaccine, after that incident, there have been many, many studies before and since that incident to make sure that there really wasn't anything going on with that vaccine. But you don't want people to then not vaccinate because they're worried about this side effect of vaccination that actually had nothing to do with the vaccine itself.

Erin Welsh

Yeah.

Erin Allmann Updyke

It really was a psychogenic response. So the the other thing is in this first person who had it, so in Frau Troffea, did she have something like a medically diagnosable illness that caused her to be acting in this way that then became a mass psychogenic response in the general population? And this is something we can see happening often in things like real gas outbreaks or neurotoxin exposures where you have maybe a release of some toxic gas in an area that really does have an effect on people and then in surrounding areas kind of expanding from that you can have it amplified by this mass psychogenic response. So then it's even harder to differentiate what people really need this medical care because they were exposed to something vs people who need medical care but it's not gonna be the same medical care because they weren't actually exposed to anything that are causing the symptoms that they have.

Erin Welsh

Right.

Erin Allmann Updyke

Right? It's really complicated.

Erin Welsh

Yeah. That is really complicated.

Erin Allmann Updyke

So I wanna talk about something that I found very cool about mass psychogenic response.

Erin Welsh

Ooh, okay.

Erin Allmann Updyke

That was trying to explain why the pathophysiology of why mass psychogenic response happens.

Erin Welsh

Okay.

Erin Allmann Updyke

This is so cool. This is a very human reason pathophysiologically and I'm not saying this is the absolute reason but this paper was very interesting. So this paper suggested that mirror neurons are involved in a mass psychogenic response.

Erin Welsh

Ooh.

Erin Allmann Updyke

Okay let's talk about mirror neurons, have you heard of these? Okay so mirror neurons are these neurons in your brain. So in my brain when I see someone doing something, these mirror neurons in my brain activate the same region in my brain that's activated in your brain by whatever you're doing. Okay so a concrete example of this, if you Erin are scratching your nose - scratch your nose.

Erin Welsh

Scratch scratch.

Erin Allmann Updyke

Right. A certain part of your brain, the nose scratch region is activated while you scratch your nose. When I see you scratch your nose the mirror neurons in my brain activate my nose scratch region.

Erin Welsh

That's wild.

Erin Allmann Updyke

I know!

Erin Welsh

But does this happen... We're friends.

Erin Allmann Updyke

We're friends.

Erin Welsh

Does this happen to strangers?

Erin Allmann Updyke

Oh great question. As far as I know, absolutely. Yeah.

Erin Welsh

Okay.

Erin Allmann Updyke

It's suggested that this mirror neuron system is involved in a lot of our higher order functions like imitation which is something that's really important for learning and also for social behavior. Right, imitation is something that we do very naturally, a lot of times you don't even realize that you're doing it. But if you're with a group of people, people start to sort of imitate unconsciously what other people in that group are doing.

Erin Welsh

Yes.

Erin Allmann Updyke

But it's also very likely that there's inhibition on this system because we don't go around imitating absolutely everything that we see, right, that would be socially unacceptable and weird if you did that. Right? Okay. So I wanna go through some of this paper's hypotheses that they lay out in support of why mirror neurons might be involved in mass psychogenic illness. One of them, first of all, is that the features of mass psychogenic illness very commonly like I said already, they spread these symptoms by sight or by sound or oral communication. That is often the way that mirror neurons also function both visual and auditory stimulation have been implicated in mirror neuron stimulation.

Erin Welsh: So if I said to you, 'I'm scratching my nose, we're all scratching our nose over here,' then your nose neurons would scratch?

Erin Allmann Updyke: Maybe. Gotta be honest, I don't know a lot about mirror neurons.

Erin Welsh: Okay. (laughs)

Erin Allmann Updyke: Really don't. Okay so also in addition to motor imitation which we know mirror neurons are involved in, so scratching your nose, etc, it's also suggested that mirror neurons play a role in emotional cognition. So the tendency to catch emotions of other people and be able to recognize emotions in other people.

Erin Welsh: Oh yeah. Is that empathy plus...?

Erin Allmann Updyke: Yeah. But mirror neurons might kind of help us get empathy essentially, right, access empathy.

Erin Welsh: That's very interesting.

Erin Allmann Updyke: So it's possible that mass psychogenic response might be this kind of emotional contagion where you're seeing this emotion of other people and that's causing that same type of response in you, especially in the case of something like panic, right. If other people are panicking, you're more likely to panic, right?

Erin Welsh: Well that seems like it would be an evolutionarily favored response.

Erin Allmann Updyke: Absolutely. Although it's how I ended up in therapy. (laughs) Other people's anxiety giving me anxiety. Anyways yeah, so overall that's kind of like a very bare bones look at mass psychogenic illness. What do we think, Erin? Dancing plague?

Erin Welsh: I think mass psychogenic illness.

Erin Allmann Updyke: It's the only thing that seems from a medical perspective possible. I think what's really important to keep in mind whenever you're thinking about something like any psychogenic illness is that it doesn't make the symptoms any less real. Just because we can't identify what it is medically or somatically that's causing that illness, just because it's your maybe outside stressors that are manifesting in this bodily symptom, it doesn't make those symptoms any less real and that's so, so important. These people suffered and died in cases.

Erin Welsh: Died, yeah.

Erin Allmann Updyke: And it might just be it's not something that we can explain with a disease or an illness or a malnutrition or anything like that.

Erin Welsh: Yeah.

Erin Allmann Updyke: But our brains are incredibly, incredibly powerful.

Erin Welsh: It's amazing.

Erin Allmann Updyke: It's incredible.

Erin Welsh: Yeah.

Erin Allmann Updyke: Yeah.

Erin Welsh: Okay.

Erin Allmann Updyke: Oh this was so fun, Erin.

Erin Welsh: This was really fun. I had a really good time.

Erin Allmann Updyke: Me too.

Erin Welsh: More medical mysteries, what's next?

Erin Allmann Updyke: We'll find another one.

Erin Welsh: Yeah, we'll come up with more or send us more.

Erin Allmann Updyke: Yeah if you know of medical mysteries we will add them to our list.

Erin Welsh: Yes.

Erin Allmann Updyke: Awesome.

Erin Welsh: Okay.

Erin Allmann Updyke: Now sources times?

Erin Welsh: Sources. All right I already mentioned the dancing plague book by John Waller, I also read a little bit of a book called 'Keeping Together in Time' which is about sort of the anthropological history of dance by William McNeill.

Erin Allmann Updyke: Cool.

Erin Welsh: And then a few papers, that 1976 Caporael paper about ergotism and then the reply by Spanos and Gottlieb, a couple other papers about dancing plague. And I will post all of these on the website.

Erin Allmann Updyke: I have a number of very cool articles about ergotism, several on mass psychogenic illness, and a few resources if you'd like to look more into Sydenham chorea. I'd like to give a special shout out to a paper by Lee on 'The history of ergot rye from antiquity to 1900' and another more recent one by Belser-Ehrlich about ergotism since 1900. And there are several other on ergotism. And then that paper on mass psychogenic illness and mirror neurons was by Lee et al in 2010.

Erin Welsh: We will post all of these sources and a few more that we didn't mention on our website where you can find them at thispodcastwillkillyou.com.

Erin Allmann Updyke

Thank you so much to Bloodmobile for providing the music for this episode and all of our episodes.

Erin Welsh

And thank you to you, listeners for listening to our podcast and allowing us to make this because it's really fun and we really enjoy doing it.

Erin Allmann Updyke

I hope you have fun with this episode, it was so fun for us.

Erin Welsh

Yeah. Okay well until next time, wash your hands.

Erin Allmann Updyke

You filthy animals!