

Sawbones 148: Arsenic

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

[theme music plays]

Justin:

Hello, everyone. And welcome to Sawbones, a marital tour of misguided medicine. I'm your cohost Justin McElroy.

Sydnee:

And I'm Sydnee McElroy.

Justin:

Hey, Syd.

Sydnee:

Hey, hey Justin.

Justin:

Hey, Sydster.

Sydnee:

Justin, I'm gonna name things and you tell me what they have in common.

Justin:

Like a quiz.

Sydnee:

Yeah.

Justin:

Like a fun quiz.

Sydnee:

It's like... Yes. It's a very fun quiz.

Justin:

Okay.

Sydnee:

It's a very fun, exciting, funny, I would say humorous—

Justin:

Okay. [laughs] So the—

Sydnee:

... like, jovial—

Justin:

So like—

Sydnee:

... laugh inducing—

Justin:

... something for everyone.

Sydnee:

... quiz.

Justin:

Okay.

Sydnee:

Okay. Brussels sprouts.

Justin:

Okay.

Sydnee:

Dark meat fish.

Justin:

Ew, that's gross. Okay.

Sydnee:

Rice.

Justin:

Rice.

Sydnee:

Specifically Jasmine rice.

Justin:

Okay.

Sydnee:

Beer and apples.

Justin:

Um, they are all part of a balanced diet and I think that... Well, I been told—

Sydnee:

Yeah, sure. Yeah. Mm-hmm.

Justin:

... I've been told at different times that they're all good for me, they all sound very helpful and health—inducing and, um, that's it. Uh, they seem very... sound like healthy foods.

Sydnee:

Eeh!

Justin:

Eeh?

Sydnee:

I mean, that wasn't what I meant.

Justin:

Oh wow. Well, wh— what's the unifying factor?

Sydnee:

They can all contain arsenic. Yay.

Justin:

They what? [laughs]

Sydnee:

They can [laughs] all contain arsenic.

Justin:

I didn't know that.

Sydnee:

Yeah.

Justin:

Wait, wait, like, I mean, anything can contain arsenic, right?

Sydnee:

Well, well, I mean, in the sense that if you put arsenic in it—

Justin:

Yeah. Right.

Sydnee:

... sure.

Justin:

Yeah.

Sydnee:

Yes. I mean—

Justin:

But—

Sydnee:

... we contain arsenic in that light.

Justin:

But the, but those things you mentioned have arsenic in them?

Sydnee:

The... So arsenic can be in any, I— in water and in soil and so it can get into any of our food products, but these are some things that have been listed as the most likely to contain—

Justin:

So Brussels sprouts?

Sydnee:

... higher amounts of arsenic.

Justin:

Brussels sprouts?

Sydnee:

Brussels sprouts, dark meat fish, rice, uh—

Justin:

And—

Sydnee:

... like I said apple—

Justin:

... I knew—

Sydnee:

... various fruits, apples though are, um...

Justin:

... I knew Brussels sprouts, b—

Sydnee:

... beer and wine—

Justin:

That, that one I can't—

Sydnee:

... unfortunately—

Justin:

... I can't count for that one, but Brussels sprouts, I knew, I knew, I knew there was something up there.

Sydnee:

They smell weird.

Justin:

Smell weird like arsenic. I always thought—

Sydnee:

No. [laughs]

Justin:

... it was like a arsenic kinda smell. I knew it.

Sydnee:

No, I—

Justin:

Wait—

Sydnee:

... that might be why Charlie wouldn't eat 'em.

Justin:

Uh, she said her baby's senses are more heightened than we are 'cause she's, uh, outpaced us evolutionarily. That makes perfect sense to me. What's up with arsenic though?

Sydnee:

Well, Justin—

Justin:

It's like a really bad poison, right?

Sydnee:

Yeah. Uh, well, it is, but we've used it as medicine for a long time, so I thought I would tell you about it.

Justin:

I would love to hear more about it. Are you gonna talk about the play, Arsenic and Old Lace That's the only thing I really know about arsenic.

Sydnee:

No. Not a word.

Justin:

Well, we just covered it.

Sydnee:

That was the only time you'll hear Arsenic and Old Lace mentioned in this podcast.

Justin:

Uh, maybe you can do one of your classic, uh, Justin searches the internet segment=

Sydnee:

[laughs]

Justin:

... later in the show.

Sydnee:

And you, and you can tell me about Arsenic and Old Lace?

Justin:

Yes, sounds good.

Sydnee:

That's good. Let's just tag for this episode, let, the only tag that you can search up that is searchable, Arsenic and Old Lace.

Justin:

Okay. Perfect.

Sydnee:

[laughs] This will be your Arsenic and Old Lace fan cast—

Justin:

That's how metadata works, folks.

Sydnee:

... brought to you by... I don't know how it work. Brought to you by Justin and Sydnee.

Justin:

So arsenic.

Sydnee:

Thank you to Damian and Ericka for both—

Justin:

For poisoning us with arsenic.

Sydnee:

Well—

Justin:

Your plot's been revealed.

Sydnee:

Yeah. They... You poisoned my email with a great idea.

Justin:

[laughs] It's not what poisoning means, [laughing] but, oh sure. It only has a negative connotation, but please.

Sydnee:

Uh, in this case, unless you hate this episode, in which case—

Justin:

Sorry.

Sydnee:

... blame them—

Justin:

Sorry.

Sydnee:

... not my fault.

Justin:

Yup.

Sydnee:

Uh, I— arsenic is an element, like it's in the periodic table, you know, the one with all the boxes.

Justin:

Right. Yeah, yeah.

Sydnee:

The one that's on that cool pair of TOMS I have.

Justin:

Yeah. [laughs]

Sydnee:

The coolest [laughs] pair of TOMS anybody had had.

Justin:

Uh, yeah.

Sydnee:

Uh, it's number 33, in case anybody is studying for a chemistry quiz, [laughs] these, uh—

Justin:

While you're listening to this podcast.

Sydnee:

... piece of information.

Justin:

What an amazing better serendipity that would be for you.

Sydnee:

Or taking a quiz and listening to this, in which case—

Justin:

Yeah.

Sydnee:

... your professor needs to pay better attention.

Justin:

Yeah, this is... By the way, number 13 is B. You messed it up.

Sydnee:

It's not. Justin never knows the answer to a chemistry quiz.

Justin:

That's fair.

Sydnee:

So it can be found just in its pure, like, elemental form, uh, but typically, arsenic is some of organic or inorganic compound. So a lot of different forms, a lot of different colors that you can find a substance that is in arsenic—based substance and because it, it compound with a lot of other different things. Does that makes sense?

Justin:

Yeah.

Sydnee:

Uh, it's, it's red. You just have plain arsenic. Uh, it has some uses in industry in treating wood, for instance, and in the past, we've used it more as like a pesticide and things like that. But some of these uses have faded over time because, you know—

Justin:

Arsenic.

Sydnee:

... poison. [laughs]

Justin:

Yeah, right.

Sydnee:

Um, it's actually... As I kinda alluded to, we have arsenic in our bodies. A trace amount of arsenic is necessary—

Justin:

Oh yeah?

Sydnee:

... in the human body. There are lots of things that we need in just little, tiny amounts and we need just a little dab arsenic.

Justin:

A little picante. A little picante of poison.

Sydnee:

Yeah. Just a, just a hint of arsenic. Uh, as well as a lot of other animals too, need, need a little bit of arsenic to function.

Justin:

They should update sugar and spice and everything nice and also just the faintest hint of arsenic.

Sydnee:

[laughs] Who's made of that?

Justin:

Girls. And then boys are made of, uh, slugs and snails, puppy dog tails and also, lest we forget, a little bit of arsenic, also. A little bit of arsenic in there.

Sydnee:

That's, you know... It's important to remember in these times where so many people who are trying to divide us, that the one thing that connects us, the one thing that unifies us to all that we all have in common and can share—

Justin:

Little bit of arsenic.

Sydnee:

... a little bit of arsenic.

Justin:

Yup.

Sydnee:

It is also the 53rd most commonly occurring element.

Justin:

Man, I'm, uh... This is fasc—

Sydnee:

[laughs]

Justin:

I'm on the edge of my seat.

Sydnee:

Like, I mentioned, it could—

Justin:

I don't know why I dragged my whole chair in here. I only needed the edge.

Sydnee:

[laughing] It can be found in water and dirt. It's in the earth's crust and it can accidentally sip into our food, which is when it becomes... poison.

Justin:

Poisonous.

Sydnee:

The most common form of poison that you would think of is arsenic trioxide, um, and when it is, that, that forms when you heat, uh, when air, heated air comes in contact with arsenic—

Justin:

Mm-hmm.

Sydnee:

... element of ar— arsenic. And, uh, when that happens by the way, it gives off like a garlic odor, in case you were wondering that fact.

Justin:

Okay.

Sydnee:

So, like, if you have some arsenic and then you heat the air around it and then it smells like garlic, run.

Justin:

So if you ever smell garlic, you should feel fair— If you get food and it smells like garlic, you should feel fairly certain that it's poisoned by arsenic?

Sydnee:

Either, either it's got garlic in it or arsenic.

Justin:

It's one of the two.

Sydnee:

One of the two, unless they put both, then that's a clever, clever murderer.

Justin:

Yeah.

Sydnee:

That's from an Agatha Christie novel, I bet. No. No, it's not. Justin shaking his head.

Justin:

Nope.

Sydnee:

It's not. [laughs] I never read any, but I bet. Uh, the word arsenic comes from the Syriac word [alzarnikha,] from the Persian [zarnikh] for yellow. And it's probably 'cause it's one of the most common arsenic compounds you can find, orpiment, is yellow.

Justin:

Okay. Make sense.

Sydnee:

Um, in Greek, it became, after it derived from that, it became arsenikon, which of course eventually is arsenic.

Justin:

The words transformer.

Sydnee:

[laughs] Arsenikon, uh, which is actually related to—

Justin:

Protect the old spark, arsenikon.

Sydnee:

[laughs] It's actually related to the Greek word for male or virile, 'cause what's more male and virile than poison—

Justin:

Poison.

Sydnee:

... that kills you? Uh, it's known as the king of poison and the poison of kings.

Justin:

Both.

Sydnee:

Yeah. Uh, I think it's a clever play on words.

Justin:

Yeah.

Sydnee:

It's the best poison and also, it's been used to murder many kings.

Justin:

It's classy poison.

Sydnee:

It's a very classy poison. Do you know why it's such a good poison?

Justin:

Uh, why Syd?

Sydnee:

So it is, uh, in the trioxide form, it is a white powder that dissolves instantly in water and it is odorless and it is tasteless and cannot be detected in any way.

Justin:

So it's a lot like cocaine powder.

Sydnee:

It's exactly right. [laughs] It's like cocaine powder.

Justin:

I knew that's what you were building up to.

Sydnee:

It's, it's cocaine powder is what it is.

Justin:

Yeah.

Sydnee:

Is it, it's not. It's real. It's arsenic. You can though build up a little bit of a tolerance to it over time.

Justin:

Right. For the Dread Pirate Roberts—

Sydnee:

Little bit.

Justin:

... t— teach you to have a...

Sydnee:

Yeah. Don't try to do that, though. I mean, you can't do it like, like—

Justin:

You didn't hear from us.

Sydnee:

... the Dread Pirate Roberts.

Justin:

You know what? You probably can. We take it back. [laughs] Try that.

Sydnee:

I may, think confusing that with something else. Never mind. Uh, disregard that fact.

Justin:

Don't raise—don't raise that on us.

Sydnee:

So it's... So it's really good for killing off, like, heirs to the throne ahead of you in line. That's not a problem for Justin and I being the oldest children in our families.

Justin:

Yeah, no one's coming after us.

Sydnee:

Yeah, we don't need to use. Well...

Justin:

Oh.

Sydnee:

Oh, maybe they're coming after us.

Justin:

Oh, yeah.

Sydnee:

I know we don't have to murder anybody, but... I gotta watch my sisters.

Justin:

We gotta stay on our toes.

Sydnee:

Yeah. Um, and of course, kings that everybody hates or just that you wanna off. Um, and also, uh, well known used for, um, killing wealthy husbands that maybe you never really liked in the first place and you didn't wanna be stuck with till death do you part. Well, at least—

Justin:

Mm-hmm.

Sydnee:

... and till death—

Justin:

Till—

Sydnee:

... did you part. [laughs]

Justin:

Yeah. Yeah. You parted. You chose the time.

Sydnee:

You wanted them to do them part first.

Justin:

[laughs]

Sydnee:

Uh, however, that all aside, it has medicinal uses throughout history as well. Uh, Hippocrates was one of the first... he advised arsenic sulfides and orpiment, which we've already kinda talked about, for ulcers and abscesses in various skin conditions.

Justin:

Mm-hmm.

Sydnee:

He thought that the, you know, uh, creams and savs made of this pastes would be good for these kinds of skin problems. Uh, uh, the Dioscorides, uh, recommended it for the depilatory, [laughs] meaning—

Justin:

What—

Sydnee:

... um, for hair removal.

Justin:

Oh, perfect.

Sydnee:

Which seems like a crazy length to go to for hair removal.

Justin:

Yeah, you're kinda shooting the cannon and doors with that one. It seems like a, a bit of an overreach.

Sydnee:

Like, just pluck.

Justin:

Just pluck it, pluck it out.

Sydnee:

[laughs]

Justin:

Share it. Whatever.

Sydnee:

Shave it. Get some Nair. Uh, it is—

Justin:

Yeah, get some Nair, Dioscorides.

Sydnee:

[laughs] It was one facet traditional Chinese medicine, but, um, used like a lot of poisons would have been with a, based on the concept. Uh, one, one core tenet is that you use it to poison, to treat a poison.

Justin:

Sure.

Sydnee:

So, why not arsenic, the king of poisons? Uh, in Ayurvedic medicine, an arsenic containing elixir was thought to give immortality.

Justin:

Mm-hmm.

Sydnee:

I would argue the contrary.

Justin:

Yeah.

Sydnee:

Uh, Paracelsus who we've talked about before, the father of toxicology from the 1500s—

Justin:

Mm-hmm.

Sydnee:

... middle name, Bombastus.

Justin:

So good.

Sydnee:

One of the best middle names ever. Uh, was a big fan of arsenic too. Uh, he recommended—

Justin:

Arsenic II, that of course is the sequel. [laughing] To arsenic, it's way better, way fizzier, got the great caramel color you'll remember.

Sydnee:

Arsenic II, Electric Boogaloo. Yeah. He used it for syphilis, as well as he made a balm out of it to use for all kinds of various skin conditions, wounds and all sorts again, as well as anthrax. Popular for anthrax and carbuncles.

Justin:

What are carbuncles?

Sydnee:

Uh, a carbuncle... Okay. So furuncles and carbuncles. Uh, you've heard an abscess or a boil?

Justin:

Yeah.

Sydnee:

You, you know what a boil is?

Justin:

Yeah.

Sydnee:

Most people when they see, like, a big, uh, almost like a big giant zit with a big whitehead on it on your skin somewhere, they'll call it a boil.

Justin:

Mm-hmm.

Sydnee:

The other word for that could be an abscess. If it has one head on it, just one little white, you know, that you just gotta scrape or pop or whatever head, it's a furuncle. If it's got multiple heads on it, it's a carbuncle.

Justin:

Oh this turned out way grosser than I thought it would, Syd. What do you got next?

Sydnee:

[laughs] In 1768, Thomas Fowler, who was British physician made what was initially called a liquor mineralis, um, later to be known by 1809 as Fowler solution.

Justin:

Mm-hmm.

Sydnee:

Now this was a medicine that was made of, uh, with 1% potassium arsenite.

Justin:

Just a little bit.

Sydnee:

So arsenic—based, based stuff. And, uh, he initially recommended it for things like, um, fevers and headaches. Um, it became really widely used in London, was very popular for the treatment of malaria and later became popular for the treatment of what was just being understood as sleeping sickness.

Justin:

Uh, didn't we have quinine by this point?

Sydnee:

Uh, it was alternative for that?

Justin:

Why did we need an alternative? Did quinine not work?

Sydnee:

No, it does.

Justin:

Does this work, you think?

Sydnee:

I'm... You know what? Uh, I— no.

Justin:

[laughs]

Sydnee:

Well... [laughing] I mean, it, it could kill you too, like, if you take too much arsenic. So it was, I would say it was an—

Justin:

If... Hey, listen—

Sydnee:

... inferior—

Justin:

... listen. Okay.

Sydnee:

... an inferior treatment. But I don't know, like, they—

Justin:

If you take too much anything, it's gonna kill you, Sydnee.

Sydnee:

[laughs] Yes. Yes.

Justin:

That's what too much means. [laughing]

Sydnee:

Uh, it, it... Well, I mean, there's some truth there. I'm gonna get into... There are some things that can be treated somewhat with arsenic. Um, so can you treat malaria with arsenic? Actually, yes, I believe you can to some extent—

Justin:

There you have it, folks.

Sydnee:

... but, but we have much better... Again, we have much better treatment for malaria now.

Justin:

Number one treatment?

Sydnee:

So I am not saying to go get arsenic for malaria.

Justin:

Fresh out the podcast, number one treatment for malaria, it's new, it's hot, it's off the shelves, all you friends that are still—

Sydnee:

No, don't use arsenic for malaria.

Justin:

... using quinine—

Sydnee:

There are... We have—

Justin:

... that's old news.

Sydnee:

But we don't, we don't typically go straight for quinine either these days. You can, but there, there are lots of other better treatments for malaria.

Justin:

A lot of side effect of quinine.

Sydnee:

But would it have killed any of the Plasmodium? Eeagh, maybe.

Justin:

Perfect.

Sydnee:

Maybe. I don't wanna say no. Um, I— by the time we get to, like, the 1880s, uh, because of Fowler's solution, we're seeing arsenic used for all kinds of other illnesses.

Justin:

Mm-hmm.

Sydnee:

Um, ba— based on the, I don't know, success perhaps of Fowler solution. Uh, so you see people prescribing it for heart burn, or because you have rheumatoid arthritis, uh, for tuberculosis. Um, I— again, for any kind of skin condition, uh, cancers of the skin, there are all kinds of arsenic—based, like, pastes and creams that you might put on 'em. Uh, for cancers of the breast, it was a common treatment. Um, other skin conditions like psoriasis, even things like hypertension were being treated with arsenic.

And there were other things made of arsenic that were very popular, there was Donovan solution, which was arsenic and mercury. [laughing] It's not enough. Here, arsenic in it. Um, there was a Dafalgan solution, uh, same idea.

Um, what was really interesting about Fowler solution is that in 1878, they figured that in people with a certain type of leukemia, if they were given Fowler solution, which contained arsenic, it would bring their white blood cell count down, which the white blood cell count is very high in this particular kind of leukemia. So this bringing it down like that indicated that it was treating the leukemia in some way.

Justin:

Oh wow. Ah.

Sydnee:

Um, and so this was used as a treatment for leukemia for a really long time, as a result of this prior to the advent of things like chemotherapy. Um, and, uh, and for a long time into the 20th century, Fowler solution could be found, uh, as a, as a commonly, like, in a, in a pharmacopeia or in a materia medica, you would, you would find Fowler solution up to, like, 1914. It was listed—

Justin:

Wow.

Sydnee:

... as a treatment for things that I've already mentioned, like syphilis and malaria and skin problems.

Justin:

So probably was effective in some way, right?

Sydnee:

Yes.

Justin:

That's far enough long in history that we weren't just, like, guessing it's things in the materia medica stuff.

Sydnee:

We... Exactly. We were starting to actually try and test things by now.

Justin:

Vaguest hints of science.

Sydnee:

Yes.

Justin:

Uh, uh, was Fowler solution for anything else?

Sydnee:

Uh, well, Justin, I wanna tell you a little bit more about arsenic, but first, why don't you come with me to the billing department?

Justin:

Let's go.

[theme music plays]

[ad break]

Justin:

So Syd, what else was arsenic being used for this time period?

Sydnee:

So, uh, as I mentioned, arsenic was used for all kinds of different... Again, a lot of skin issues, but, but, you know, you know, stomach upset, anything

else. And because it was used in so many, for so many different illnesses, especially a lot of systemic kinda illnesses, uh, there were lots of different ways that you could prescribe it. Um, because it's not enough to rub arsenic on your skin, it's not enough to drink some, um, let's make into some tablets where you could eat it or a powder, why don't—

Justin:

Milkshake.

Sydnee:

[laughs] Sure. I mean, why not a milkshake?

Justin:

Why not a milkshake?

Sydnee:

Um, you could inhale it as a vapor. You could inject it.

Justin:

That seems... For a substance that too much of it can kill you, I'm not sure I would wanna go inhale. Like, I'm not sure I'd trust that method.

Sydnee:

A little harder to control, I think.

Justin:

Yeah, right.

Sydnee:

Uh, you could inject it in your muscle, you could inject it in your vein, IV arsenic, or you could give it as enema—

Justin:

Great.

Sydnee:

... if you're feeling really—

Justin:

I'll do the others.

Sydnee:

... spicy.

Justin:

I'll do the others. Thank you.

Sydnee:

You'll do the others?

Justin:

Yeah, the others are fine. Thank you.

Sydnee:

Um, it—

Justin:

I've got plenty of arsenic at the moment, I'd rather not an enema of it.
[laughing] Thank you very much for the offer, doctor.

Sydnee:

Well let me know if you change your mind.

Justin:

Yeah, no, I don't think I will.

Sydnee:

I have plenty.

Justin:

No, I understand. It's good.

Sydnee:

I bought a bunch of rice just for that.

Justin:

That's great. It's—

Sydnee:

I've spent the whole day—

Justin:

I don't understand—

Sydnee:

... isolating arsenic rice.

Justin:

Perfect. Yeah. I'm, no, I'm so good on that, on arsenic. I'm good. Thank you so much. I won't be back. Bye.

Sydnee:

In the Victoria era, uh, and we've mentioned this actually before, I think in, in one of our, um, on beauty episodes, uh, beauty products and things. Uh, women were fond of rubbing arsenic on their skin. Uh, the reason is that it would give you that really unhealthy tuberculosis glow that everyone—

Justin:

It was crazy ba— back then.

Sydnee:

Everybody... And we, we've mentioned this before, this was a time when it was really popular to look like you had tuberculosis, uh, because then you looked kind of frail and pale and like a fine lady who stayed out of the sun all the time.

Justin:

Your strong breeze that'll just slap you clean in half—

Sydnee:

Exactly. You just—

Justin:

... that was fashion.

Sydnee:

Set in side, uh, covered in clothing, coughing delicately—

Justin:

[laughs]

Sydnee:

... into a hanky.

Justin:

[laughing] Just a tasteful amount of blood.

Sydnee:

Uh, just a, just a tiny little, a little, a highlight of, of red blood—

Justin:

Yeah.

Sydnee:

... against the white background, that just, that popper color that every woman loves.

Justin:

[laughing]

Sydnee:

Um, they also would... There is also a compound made out of arsenic and vinegar and chalk.

Justin:

Ooh.

Sydnee:

Yeah. That you could eat, which also would make you look [laughs] kinda pale and sickly.

Justin:

Perfect.

Sydnee:

Again, really popular look. It also... Um, arsenic could sometimes give your cheeks kind of, uh, a red, um, flushed look so that, you know, you'd have that paleness, but then just a, just a faintest hint of color in your cheeks because of burst capillaries. [laughs]

Justin:

Great. So, like, gin blossoms, but in, but in your cheeks to your nose, right?

Sydnee:

Yeah, there you go. I'm waiting for the day where this comes and s— I mean, surely, like, everything comes around, right?

Justin:

We are not that far off.

Sydnee:

Like, right?

Justin:

We are not that far off.

Sydnee:

[laughs] Right now, everybody's just relieving the '90s and their fashion choices, sooner or later. Uh, one, one physician fairly famous for the use of arsenic was Paul Ehrlich. Now usually when I start to talk about a physician, h— uh, a historical physician on this show, I'm gonna tell you really terrible things [laughs]—

Justin:

Yeah.

Sydnee:

... about them. Doctor Ehrlich—

Justin:

Kind of a red flag if you talked about...

Sydnee:

It's—

Justin:

Like, if you're at the doctor's meeting, you don't necessarily wanna hear, "Hey, I heard about you on Sawbones this week."

Sydnee:

Oh no.

Justin:

Oh no.

Sydnee:

Uh, Doctor Ehrlich actually, they... Don't worry that much about him.

Justin:

Oh good.

Sydnee:

You don't have to. This is, this is kind of a nice one. Uh, he's a German physician. He lived in the second half of the 1800s. He invented a lot of things, he did a lot of work in the field of immunology. He actually would go on to win a Nobel Prize. Uh, he invented Salvarsan. Salvarsan was a very popular medication, and he did this by the way with the, with the help of Doctor Sahachirō Hata. Uh, and the two of them created this compound to target syphilis, which was a... It was the great pox—

Justin:

Big, big problem.

Sydnee:

It was a, a huge scourge of, of the, of the time, um, of, of a lot of human history, really. Uh, and he found that this compound specifically targeted the, the spirochetes, the tiny little bacteria that cause syphilis.

Justin:

Spirochetes.

Sydnee:

Spirochetes. I know you like that word so much.

Justin:

I love that. That's so good.

Sydnee:

They're little corkscrew—

Justin:

Uh—

Sydnee:

... looking things.

Justin:

... little birds.

Sydnee:

What?

Justin:

The little corkscrew birds, when we talked about—

Sydnee:

Oh, that's right.

Justin:

... like, corkscrew birds.

Sydnee:

Corkscrew birds. I almost forgot. I was gonna say, "Honey, they're not birds, they're bacteria."

Justin:

I know. I get it. Just—

Sydnee:

Yeah, I know. I'm with you.

Justin:

Think of spirochetes birds.

Sydnee:

I love those drawings that everyone sent us of the spirochetes.

Justin:

Yeah. Mm-hmm.

Sydnee:

Um, so they, so Salvarsan and arsenic-based substance, uh, arsphenamine, um, and it was, uh, called compound 606, which all I can think of is Formula 409 when I heard that. [laughs]

Justin:

Yeah?

Sydnee:

Except for, you know, this was the arsenic one that you'd put on your syphilis.

Justin:

[laughs] But other than that, it's indistinguishable for Formula 409, popular—

Sydnee:

But—

Justin:

... over-the-counter cleaning—

Sydnee:

[laughs]

Justin:

... solution.

Sydnee:

[laughs] It's basically the same. Do you think that this is a—

Justin:

[singing]

Sydnee:

[laughs]

Justin:

[singing]

Sydnee:

Do you think this is in the same, like, the same line, like the same... You know what I mean? Like one, Formula 409, do you think eventually became compound 606, like this was—

Justin:

Honey, honey the countertops look terrible. I'm sorry, dear, I got the... I got the syphilis. [laughing] I don't know why they make the bottles look so close to each other.

Sydnee:

[laughs]

Justin:

The color and everything is indistinguishable.

Sydnee:

[laughs] Uh—

Justin:

Um, but I mean, God help you if you go the other way. [laughing] That, that was probably worse.

Sydnee:

[laughs] Um, that was the, that was actually the first really effective treatment for syphilis. Uh, up till then, mercury had been really popular and this, this overtook mercury, uh, as, as what you'd wanna use on your, on your syphilis. Um, and in, in 1910, it was the most widely [laughs] sold drug in the world.

Justin:

Wow.

Sydnee:

Which says something about its effectiveness, as well as something about the prevalence of syphilis. [laughs]

Justin:

Yeah. A lot of willing to do whatever it took.

Sydnee:

A lot, a lot of syphilis going on then. Um, and it remained the mainstay of the treatment of syphilis until we get to the antibiotic era in the 1940s when penicillin was discovered.

Justin:

Yeah.

Sydnee:

Thank goodness. And things got a little bit for everybody.

Justin:

Thanks again, penicillin.

Sydnee:

Thank you, peni— [laughs] Thank you, penicillin, for fixing syphilis.

Justin:

You made our podcast less interesting, but we do appreciate you curing the, all the syphilis.

Sydnee:

It's true. The antibiotic era really killed Sawbones.

Justin:

Kinda ruins our... Yeah. The story is usually like... [laughs] The average Sawbones episode is almost always uh, bullcrap, bullcrap, bullcrap, bullcrap, bullcrap, bullcrap, antibiotics and here's what we did today. Like, [laughing] that's usually the arc.

Sydnee:

That's... You know what's scary that, Justin, is that as more and more bacteria become resistant to our antibiotics—

Justin:

Don't do this to me. Don't—

Sydnee:

[laughs]

Justin:

I'm not, I'm not gonna play this game with you right now. Please, I'm living with you, you know I have anxiety disorder. Please don't, like, tell me about superbugs. I can't swing it right now.

Sydnee:

I'm just saying, just don't get too comfortable.

Justin:

Yeah, I'm, like, so good—

Sydnee:

I'm just saying—

Justin:

... I'm not being comfortable.

Sydnee:

... if your doctor says you have a virus and you don't need an antibiotic, trust him. That's all I'm saying, okay? That's all I'm saying.

Justin:

This is a public health message from us to you.

Sydnee:

That's all I'm saying.

Justin:

Please, just for me, just this once, just don't put the antibiotics, you know, in them.

Sydnee:

[laughs] Uh, he also studied various arsenic—based compounds for African sleeping sickness. And I kinda alluded to that, that we had figured out that maybe Fowler solution kinda worked for that.

Justin:

Mm-hmm.

Sydnee:

So he, he looked into that a little bit more. Um, this is called, this is also called trypanosomiasis or sleeping sicknesses, a lot of people call it. Um—

Justin:

Oh, a better thing to call it.

Sydnee:

[laughs] I don't know. I kinda like trypanosomiasis. Um, and it did, it did actually kill these, these little creatures as well.

Justin:

Mm-hmm.

Sydnee:

It was actually somewhat effective, but the side effects of it could be fairly severe. Uh, there was a medicine that actually was derived from this in 1949, um, melasoprol, uh, which is used for the treatment, can still, of the

second stage of sleeping sickness. The first stage, we have some really, uh, much safer effective treatments for it, but the second stage of sleeping sickness, we still don't have really great medicines for the... There, there some that work, but they're, they're also very high risk. This one in particular is an arsenic compound that we use to treat this because this disease is so serious—

Justin:

Yeah.

Sydnee:

... can be fatal, it is worth the risk of this medication which has this possible side effect called reactive encephalopathy.

Justin:

How common is that?

Sydnee:

Uh, three to 10% of people who—

Justin:

And—

Sydnee:

... take this drug—

Justin:

That ain't, that ain't enough for me. That's...

Sydnee:

No, that's a very significant side effect and it can be fatal. Uh, but the thing is the, the disease itself is so dangerous—

Justin:

Yeah.

Sydnee:

... that I— in some cases, you just have to give this medication. I— I actually remember hearing about this on a television program when I was a kid. I remember watching, like, a special show about this, how we need to help... It was, it was probably, uh, some of, like, call to action. It was probably like some donation that had I had money as a child, [laughs], had I

had money, access to funds, but I was a kid, I would have wanted to donate to.

But I remember watching this television program about how we have sleeping sickness which is so dangerous and the treatment for it is this awful arsenic—based medicine. And surely, we can do better and money is needed for research. Um—

Justin:

And you're, and you as a kid were watching this?

Sydnee:

Yeah.

Justin:

Man, you must've been a cool kid. I wish I—

Sydnee:

[laughs]

Justin:

... we'd been closer back then.

Sydnee:

I remember this—

Justin:

I feel like I—

Sydnee:

I, I told everybody who had listened, every adult who would listen to the story and said, "This is what... You know, I'm gonna go into medicine, I'm gonna be a doctor and these are the things we have to fix. These, these are the things we should be putting money at, or giving money to. Why, why are we... Why can we not do better than this?" It amazed me. Um, and it was sad as I was, as, I was, you know, researching this that that was still something that, uh, we have to use today.

Justin:

Yeah.

Sydnee:

Um—

Justin:

Uh, that we didn't fix yet. And—

Sydnee:

I mean, there are other options. I'm not saying that's the only one, but it is still used because there aren't, there aren't great options and sometimes it's all people have.

Justin:

Right. Exactly. If you would like to make, um, uh, uh, an impact on that, we would recommend a donation to Doctors Without Borders. So you can... They're, they're, they're on the frontlines there, battling sleeping sickness at doctorswithoutborders.org and donate.

Sydnee:

That'll be a wonderful thing for you to do—

Justin:

That'd be a wonderful thing for you to do.

Sydnee:

... if you're so inclined.

Justin:

Okay. Okay. So Sydnee, today, what, what do we use arsenic for?

Sydnee:

Let me tell you about today, uh, I wanna tell you one quick point. This poor doctor Ehrlich was raked over the coals for this, for Salvarsan, for this treatment he found for syphilis, which like I said, was the only effective treatment for a really long time. Because if we treated people with syphilis, they were more likely to have more sex. Though, that was the, that was the prevalent thought. "So if you got syphilis, we should let you just have it as punishment. So don't treat it." This was the... So there was a lot of backlash in society.

Justin:

Hey, hey, people that were mad about that, I like to pretend that, like, bad doctors are the villains of, of, uh, Sawbones, but it's really you. It's really people like you, you creeps.

Sydnee:

Yeah, let's treat the syphilis, okay?

Justin:

Let's just treat the syphilis, you creeps.

Sydnee:

We all like to get a loving now and then.

Justin:

Hey, listen—

Sydnee:

Ain't no crime in it.

Justin:

... hey, listen, we're all just trying to get through this thing [laughing]
What... Sydnee, today, arsenic.

Sydnee:

Today. So mainly, we think of arsenic as a poison, um—

Justin:

Yup.

Sydnee:

... that's the, that's the primary thing. When you say arsenic, again, you think of things like Agatha Christie and Arsenic and Old Lace. And, um, and if you get arsenic poisoning, it can be pretty dramatic, uh, if you get, if you were poisoned with a lot of arsenic. And this wouldn't be something like, "I ate an apple that had a little bit of arsenic in it." This would be like, "Somebody poisoned me."

Justin:

Right.

Sydnee:

Or there was a large amount in drinking water, which has happened unfortunately in the past. Um, uh, you can get sh— you can go to shock, you can have co— uh, seizures, you can go into a coma, um, you can get really severe GI symptoms, like bloody vomiting and diarrhea and

dehydration. Uh, for chronic toxicity, meaning that, like, when you hear the stories of, like, somebody was slowly poisoning somebody over the years with arsenic.

Justin:

Right, right, right.

Sydnee:

You know those kinds of things? Um, you can see some more, like, subtle symptoms. You can start to get, like, a peripheral neuropathy, meaning that, um, you can get, um, numbness and tingling and pain in your hands and feet, nerve damage and pain. Um, you can get li— damage to your liver and kidneys.

There is a classic kind of dermatitis, uh, like a skin inflammation that we always call dew drops on a dusty road. [laughing] 'Cause in medicine, these were the things—these are things we came up with. Um, you can even get these, like, white lines on your fingernails. We call 'em knees lines, um, they look like from some sort of injury, but it a— it's actually arsenic exposure over time.

Justin:

Mm-hmm.

Sydnee:

Um, now, we do still use it in a couple different medical ways, like, there are, there are medical... As I, as I already said, like, for sleeping sickness. In addition, they're studying the use of a form of arsenic to use in PET scans which help to look for, like, the spread of, maybe tumors throughout the body.

Justin:

Mm-hmm.

Sydnee:

Um, they're studying it for that, um, to locate tumors better. The other thing that we use it for, that I actually very recently have treated a patient with, is to treat promyelocytic leukemia, uh, specifically—

Justin:

Hmm.

Sydnee:

... relapses of this. Since 2000, it's been FDA approved that we can use ar— arsenic trioxide to treat leukemia.

Justin:

Wow.

Sydnee:

It is an effective treatment.

Justin:

Look who's back.

Sydnee:

Um, ever since Fowler solution back in 1878, we knew that this was possible and this absolutely is something that we use today. And again, I treated somebody with this, um... not three weeks ago.

Justin:

Wow.

Sydnee:

I mean, not on my own. I'm not an oncologist. Like, I just helped. [laughs]

Justin:

But still, like, it's, it's a thing.

Sydnee:

It's still a thing that we do today.

Justin:

Uh, thank you to everybody for listening to our program. We sure appreciate you. Uh, wanna thank the maximumfun.org network, uh, uh, for, for hosting our show and letting us be part of their extended podcasting family.

Uh, listen, I wanna remind you, if you haven't done this yet, um, uh, another show I, I, me, My Brother, My Brother and Me, uh, we're working on an expansion for a card game called Monikers which we haven't played. It's kind— sort of like a, um, uh, a s— charades on steroids. I guess you could say it's a...

Sydnee:

It's a really fun game and that comes from me, a person who doesn't really like games traditionally. I sound like such a bum. They stress me out. They make me nervous, but it's super fun.

Justin:

But we working... We made an expansion for this game, we wrote other cards for it and there are a few cards that Sydnee and I wrote, based on Sawbones. So if you're a fan of Sawbones, you might wanna check that out. Mcelroycollection.com is where we're selling that for 10 bucks then expansion. You get Monikers itself and the McElroy collection for 35 bucks, I think. Uh, the expansion, uh, was just 10 bucks. But mcelroycollection.com.

We are only selling that, uh, as a pre-order for the next, like, five or six days, and then after that, it's, it's over with. So, if you would be interested in that, go pick it up, mcelroycollection.com.

Uh, Sydnee, anything you wanna plug in? Anything going on out there?

Sydnee:

Uh, the only other thing I'd say is, we mentioned this last week, um, if you haven't checked it out, my dad, Tom Smirl and my uncle, Mike Meadows have a new podcast called Court Appointed, uh, which is sort of like a legal version of what we do here on Sawbones. Kinda telling you some interesting weird facts on the history of different law and, and my dad cracks a bunch of corny dad jokes. And it's really funny and really cool. So check that out, Court Appointed. Uh, it's iTunes and, and all other fine podcast distributors that you're used to checking. [laughs]

Justin:

Yeah. So check it out. It's very good show. Um, uh, thank you to The Taxpayers for these, their song Medicines as the [inaudible 00:35:52] our program, you can find them on Bandcamp, I believe and also several... Let me, let me double check that because I don't wanna, like, talk out... Yeah. Taxpayers.com... Uh, uh, sorry. Taxpayers.bandcamp.com is the address there. Go get that. They have a really alternate version of Medicines that we actually in the, uh, before the billing department, but it's great. It's all very great. So go check it out.

Uh, folks, that's gonna do it for us. Until the next time we have, uh, uh, um, a medical topic for you, my name is Justin McElroy.

Sydnee:

I'm Sydnee McElroy.

Justin:

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

[theme music plays]

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