Sidedoor Season 3, Episode 2:
The Mystery Bones of Witch Hill

[INTRO MUSIC]

Tony Cohn: This is Sidedoor, a podcast from the Smithsonian with support from PRX. I'm Tony Cohn.

Nicole Smith-Guzmán: Right at the top of the stairs – these are all human remains that I haven't gotten to yet. They're all in their original packaging.

TC: Oh, god that smell is like… musty. I don't even know how to describe that.

NSG: Oh yeah.

TC: In an old theater in Isla Naos, Panama, Nicole Smith-Guzmán [gooz-MAHN] is showing me cabinets full of thousand-year-old bones. And let me tell you -- they don't smell that fresh. But that doesn't seem to bother Smith-Guzman. She's a bioarchaeologist, which means she studies human remains. And her lab just outside of Panama City used to be a theater. Her main workspace is up on the mezzanine, which looks out over rows and rows of bone-filled cabinets.

TC: The bones are just kind of in like normal cardboard boxes… One of them just says "to wash." One of them says "human skeletons?"

NSG: No, "humano sueltos." So, "loose humans." It's a surprise, we don't know what's in all of these boxes.

TC: Something to look forward to.

NSG: Yes.

TC: The boxes are labeled in Spanish because this lab is part of the Smithsonian Tropical Research Institute in Panama. Recently, the Sidedoor team took a trip down there to visit with Nicole and check out her research. And, you guys, Panama is amazing. I mean, just before our interview, I saw a sloth hanging out in a tree. But up in the mezzanine, there weren't any sloths, which was a total bummer. Just a bunch of tables covered in neat piles of Pre-Columbian bones.

TC: How many bones do you think we're looking at right now?

NSG: So out on the tables there are at least 10 people represented.

TC: That's only a fraction of the lab's collection. Nicole guesses the lab holds the bones of about 450 people archived from past archaeological digs. And one of these sets of bones is really

special. Like, oh-my-god-I can't-believe-I-found-that special. Like, give-Nicole-all-the-fist-bumps special. Nicole says what she discovered in this particular set of bones was a once-in-a-career find. That discovery -- which we'll get to in a minute, I promise -- was the payoff of Nicole's painstaking day-to-day work. A lot of her time is spent separating out individual skeletons. Sometimes multiple people were buried in the same grave. Other times, the bones just weren't properly catalogued.

NSG: You can't read a book if it's in a bunch of little pieces, shreds of paper everywhere. You have to put everything back together again.

TC: The more complete the skeleton, the easier it is to analyze. Since Nicole spends so much time putting broken bones back together, she asked me if I wanted to try it out. And, honestly, I was a little reluctant. It seemed nerve-wracking to hold the bones of someone who lived centuries ago. I mean, what if I dropped them? The possibility brought on a little nervous laughter.

TC: Okay. So…

NSG: So, two hands when you're picking up a cranium.

TC: I am picking up the cranium.

NSG: Be careful of the delicate areas. So, like the eye orbits are delicate; the nose is delicate. You want to grab it by the heavy bones, like at the top of the head.

TC: Okay. I'm grabbing it by the top of the head and I'm placing it down.

NSG: Yep.

TC: This was a weird and sobering experience. I mean, these bones belonged to a person who lived in the world. Who had parents, and friends, and hopes, and dreams. And here we were in a lab, trying to put them back together.

TC: I just, I just…I shudder to think about the harder ones.

NSG: Yeah, this is easy. This is like the easiest. Literally the easiest.

TC: Okay. Oh, thank you. [Under breath] "Literally the easiest one in the lab." Okay.

TC: Nicole pulled out her masking tape to stick the pieces together.

NSG: Alright. We got our first piece.

TC: Okay! One down, 45 to go.

[FADE OUT]

TC: But we didn't travel all the way to Panama just so I could play Take Your Tony to Work Day with a scientist. We were there to talk to Nicole about the amazing discovery I mentioned at the top of the show -- the discovery of the mysterious skeleton of Witch Hill. This skeleton isn't just a pile of bones. There was something in these remains that Nicole had never seen before and likely won't see again. And what she discovered helps us understand how ancient indigenous people of Panama addressed deadly disease, and could potentially help us unlock cancer's secrets in the future.

[BREAK]

TC: In a conference room a few buildings down from the archaeology lab, Nicole Smith-Guzmán [gooz-MAHN] and I sat down at a table, no bones in sight.

TC: Okay. So Nicky, we're here to talk about one case in particular. Do you know which one I'm talking about?

NSG: Yes.

TC: Which is it?

NSG: So this is the, basically the only burial that was found at a site called Cerro Brujo, um...

TC: Which means?

NSG: Cerro Brujo is, um, "witch hill" or "wizard hill." Really like magic person hill, we'll say.

TC: Witch Hill, magic person hill…we'll just call it Cerro Brujo. It's an archaeological site sitting on top of an actual hill on Western Panama's Caribbean coast. Forty-eight years ago, a team of archaeologists led by Smithsonian scientists Olga Linares [LEEN-are-es] and Tony Ranere found human remains at the site. Today, the Ngäbe [no-bay] people live in that area, but there's no way of knowing if the bones belonged to someone from that group. Olga died in 2014, but I was able to call up Tony to hear about that dig.

Tony Ranere: It rained all the time and my recollection was that it rained the first 30 days we were there. So you wear boots and, yeah, you drink a lot of rum and coconut water in the evening.

TC: When he wasn't sliding around in the muck and drinking homemade piña coladas, Tony was excavating a series of what are called shell middens.

TR: Yeah, these are trash heaps, but their biggest component was shell.

TC: So, basically, think of them as really old garbage dumps. Food scraps like cassava rinds and plantain peels decomposed. The shells did not. Mounds of old sea shells might not seem that sexy, archaeologically speaking, except one day... they were digging around, and found a skeleton in the shell pile. Not exactly an everyday kind of find.

TC: How did finding that initial burial make you feel?

TR: Kind of surprised because we were digging in a trash dump.

TC: Now this was kind of a big deal because it's actually super rare to find skeletons in Western Panama. And Richard Cooke told us why.

TC: Richard, would you mind just introducing yourself and telling us what it is that you do?

Richard Cooke: Well, I'm an archeologist and, um, I have done nothing else in life rather than being an archeologist.

TC: Richard is totally selling himself short there. He's has been working in Panama since 1969, and since 1983, he's been head of the Smithsonian archaeology lab. As the go-to expert on Panamanian archaeology, the bones from Cerro Brujo eventually made their way to him.

TR: You're now in the tropics. You're not expected to find all these bones.

TC: Panama's acidic soil basically eats away at any bones in the ground. It also rains—a lot. And since rain is acidic, that makes the "eating away problem" even worse. But there are a few exceptions.

TR: In a normal situation, um, you'll only find human remains, animal remains, osseous remains where you've got shell to reduce the soil acidity. So, the bone preservation in Cerro Brujo where a lot of shell was being consumed was very, very good.

TC: In other words, the shells were like Tums for the soil. They prevented the acid from dissolving the bone, so the remains from Cerro Brujo were largely intact. Which seems fortuitous, until you realize that back in the day, the scientists weren't all that interested in finding human remains.

TR: You didn't really want to find burial sites because they were a pain in the neck to excavate. What we were all after was, as I say, was stratigraphy, ecology, lifeways. We weren't much interested in the cemeteries. It's a very, very, very infantile attitude, frankly, but this is part of the story.

TC: So, to Richard's generation, this discovery wasn't as exciting as, say, pottery fragments or

stone tools. Bones weren't really what the scientists were after. Plus, they didn't have the technology to unpack what the bones could tell them. Still, like a good archaeologist, Tony Ranere carefully excavated the Cerro Brujo skeleton. He cleaned and packaged the bones, and then sent them to the archaeology lab for storage. He also took note of everything buried with the skeleton: ceramic vessels and a shell trumpet, basically a big conch shell with holes drilled into it. After analyzing some other objects from Cerro Brujo, Tony and Olga deduced a few things about the skeleton. They guessed that the person lived at the site...

TR: Probably in a house, not very far from where he was buried, and at least a person of some importance or some, some status within the family to be buried with a, uh, you know, a pretty important a ceremonial object.

TC: Soooo Tony's hypothesis wasn't quite right. It turns out that the skeleton was buried on the site 100 years after the last inhabitants of Cerro Brujo left. But the miscalculation is understandable. Bones weren't Tony's area of expertise, and at the time, human remains weren't that compelling to archaeologists. They were more interested in how communities lived -- what they farmed and how they hunted. Lucky for us, though, sciences advance. Technology gets better. And as time goes on, we can learn new things from old stuff. That's how our bone scientist pal, Nicole Smith-Guzmán, ended up in a defunct theater in Panama sifting through human remains.

TC: Coming up next, we'll hear from Nicole about what she saw when she opened that box of remains nearly 50 years after he found them. Let's just say they weren't your average human bones. That's right after the break.

[BREAK]

TC: So, in the 1970s archaeologists found a curious skeleton in a centuries-old trash dump in Western Panama. The scientists who had come across the burial site didn't know much about who the individual was, except that it was found in an area where the Ngäbe people live today. At the time, human remains just weren't prioritized at archaeological sites like Cerro Brujo. Unlike today, they didn't have great technology to analyze the bones. Still, the archaeologists packed up the bones and the artifacts buried with them and put them all in a box labeled CA3-6H. So we'll just call our friend 6H for short. The box of bones eventually made its way to Richard Cooke's archaeology lab near Panama City. That's where bioarchaeologist Nicole Smith-Guzmán first made the skeleton's acquaintance, almost 50 years after it was dug up. At the Smithsonian Tropical Research Institute, Nicole is the principal investigator on a project to inventory and analyze the lab's large bone collection. She wants to better understand the ways different groups of Pre-Columbian people lived. She remembers the first time she opened the box of bones at the lab.

NSG: So yeah, I got it out. It was pretty dusty. And the bags inside, actually this happens a lot here, the plastic bags that the bones were in were all falling apart. Like, disintegrated because how old they are.

TC: One of those bags held 6H. But the bones looked different than others that she had seen at the lab.

NSG: I saw, obviously there's something going on with the arm of this person, but I sort of wrote it off at first. I saw it and I said, “Oh yeah, that's just a fracture. An old fracture and the bone is healing itself and it wasn't totally healed back together by the time the person died. No big deal.” We see these things all the time.

TC: Nicole put the box aside. But a few days later she pulled out the arm bone to take another peek. The specimen didn’t really look like a normal arm bone that healed from a break. There were these weird holes in it. These were bigger holes and there was a material that was protruding out of the hole from underneath. I had to see this arm bone for myself.

NSG: And if you hold it up, you can see. See the little yellow things coming out?

TC: No.

NSG: Okay. Maybe it's easier. Look at this side.

TC: Oh yeah. It's, it’s…it’s like almost like a wax or something that's covering.

NSG: You can tell that this is a really dense, harder material.

TC: Yes.

NSG: Than the other bones.

TC: It’s like unnatural looking.

TC: You know when you spackle over a hole in a wall and you don’t do the best job? That’s kind of what 6H’s arm bone looked like to me. It’s easy to see how archaeologists who didn’t know a lot about the bones might have missed it. Even Nicole skipped over it the first time.

NSG: And so, looking at it closer…looking under a microscope, at some point it sort of clicked in my head that “okay, we have a material inside that's growing, and a bone outside that's dissolving. And usually, if we see both of these processes going on at the same time—bone growth and bone dissolution—it's cancer.”

TC: Okay. You just said the C-word.

NSG: Yeah.

TC: Talk to me a little bit more about that.

NSG: There's this sort of rumor going around that cancer is a modern disease. Uh, we have cancer because we have introduced all of these chemicals and preservatives into our diet. Um, there's a lot of blame put on modern society when it comes to cancer, but we actually see evidence of cancer going way far back in the past. Um, even dinosaurs, there's some evidence of cancer in dinosaurs.

TC: Really?

NSG: Yeah.

TC: Even though there's evidence that cancer extends all the way back to prehistoric times, there isn't much to show for it. For one, cancer is more likely to appear in older folks, and ancient people didn't live a super long time. Plus, cancer tends to plague the soft tissue. When a body decomposes, tumors go with it. So, finding cancer clues in old skeletons can be hard. But 6H was likely a teenager when they died. And because 6H's cancer was in the bone and because that bone was buried with a bunch of shells that cut the soil acidity, the cancer was preserved. So Nicole kind of hit the jackpot. It's like the universe wanted her to open those dusty boxes. And today, 6H is officially the oldest known case of cancer in Central America.

TC: How did that make you feel?

NSG: I was really excited. I mean, but I was really excited, um, once we definitely knew that we were talking about bone cancer because it's so rare. I mean, we have literally a handful of cases worldwide of a primary bone tumor. So most bioarcheologists have never seen one.

TC: Finding out that 6H had cancer raised all sorts of questions for Nicole.

NSG: "Okay, this person had cancer. What did that mean for them? What did that mean for their community and how did they cope with that?"

TC: Those are the big picture questions Nicole would like to answer. But there are some more basic details to dig into. Like, who was this mysterious skeleton of Cerro Brujo? And what was this person doing there at that particular time? To shed a little light, Nicole turned to another Smithsonian expert.

Ashley Sharpe: I have, here is the tooth that we studied, we used the second molar.

TC: Ashley Sharpe is a Smithsonian zooarchaeologist [zoh-archaeologist], which means that she mostly works with animal remains. But she has expertise in determining the origins of bones, so she could help Nicole figure out if 6H was from Cerro Brujo… or somewhere else entirely. With bone fragments and tooth enamel from 6H in hand, Ashley and Nicole headed to the lab to test for something called strontium. Strontium is an element in bedrock, so that means

it gets in the soil and we eat it. It’s in our pineapples and potatoes and basically everything else that comes from nature.

AS: And strontium itself looks similar to calcium. So your body sometimes gets confused by strontium and puts strontium where calcium should be in your bones and your teeth. But it's completely natural.

TC: Over the years, scientists have mapped all kinds of strontium that exist all over the world. That means that our teeth are like geographic markers showing all the places we've ever lived…and all the places 6H ever lived.

AS: So, uh, what we found was, um, first of all, this person did not look like the other people in that region. Um, her strontium was definitely not local. Um, the other people in the area had strontium that matched, um, a coastline environment. People who live near the coast, within a few kilometers, tend to have a very particular strontium signature. And all the animals that we tested from that area had that, and so did the other humans. This person had a very strong volcanic signature, almost as if she came right out of the volcano.

TC: Ashley and Nicole’s results are still preliminary. But it doesn’t seem likely that our anonymous skeleton even lived at coastal Cerro Brujo when she died.

NGS: I really wasn't expecting the isotope results that we got. I, I thought we had sort of figured out a hypothesis about this person's life history. But if they're from further inland and towards the highlands, they could be the only skeleton that we have from that community.

TC: And that makes the find even more valuable. Could the volcano have contributed to the cancer? Is there evidence of other rare cancers in similar populations? 6H could help provide answers.

[Music bed]

TC: Nicole now has a new hypothesis about who 6H—the skeleton with the oldest known case of cancer in Central America—was. And just like a broken cranium, I am going to put it together for you piece-by-piece. We can’t say for certain, but since the bones are small and delicate, 6H was likely female or a sick young male. For the purposes of this story, we’ll call 6H a “she.” Probably between 14 and 16-years-old when she died around the year 1300. Her illness was probably visible, meaning that she had tumors or swollen arms. So the community knew she was sick, and may have buried her in a ritualistic way. And they probably chose to bury 6H at Cerro Brujo because the site was important to them.

NGS: So, burying them with their ancestors or on a site that is, that is known to the community for the purpose of, uh, either helping that individual make it to the afterlife or to mitigate somehow with the spiritual world.

TC: To that indigenous community, Cerro Brujo might have been a place that would help 6H have a good death. Perhaps it was the denseness of the tree ferns and giant walking palms. Perhaps it was the awe-inspiring view of the lush, verdant canopy below. Perhaps it was the sacred energy that ran through the place. Whatever the reason for choosing Cerro Brujo, we know 6H's people carried her up the hill and carefully laid her to rest amid the shells of bygone generations.

NGS: People, people like to say that these groups in the past where, uh, were very violent or are they, they're just doing everything in order to survive. But cases like this really give a personal face to, to the individuals that lived in the past and to the communities that cared for these individuals that had very real world or modern condition to what a lot of people are living today.

TC: Now, Nicole's discovery of Central America's oldest case of cancer, tucked away in some flimsy box from the 70s, is pretty great. But remember there are about 450 sets of bones in the lab. Nicole's only unpacked about half of them. I can't even imagine what secrets she'll find lurking inside femurs or clavicles yet to be catalogued. Or what mysteries 6H may still reveal. Neither can Richard Cooke.

RC: And so there's a moral to this—you've got to keep collections. You've got to keep them and look after them, because as science advances, the possibilities of acquiring more and more information increase exponentially.

TC: Obviously, we've only scratched the surface of our understanding of how ancient people lived and died. Just think of how much more we'll know in 10, 50, 100 years from now. Who knows? In the future 6H might hold the keys to understanding how cancer mutates, or even help scientists uncover a cure. And as long as there are bone whisperers like Nicole Smith-Guzmán, we'll be able to decipher what those old human remains are telling us.

[CREDITS]

TC: You've been listening to Sidedoor, a podcast from the Smithsonian with support from P-R-X. If you want to learn more about the Smithsonian, and Panama, visit the Smithsonian Tropical Research Institute's website at S-T-R-I dot S-I dot E-D-U. Sidedoor is made possible by funding from the Secretary of the Smithsonian and the Smithsonian National Board. We are also supported, in part, by the Alfred P. Sloan Foundation, enhancing public understanding of science, technology, and economic performance. More information at sloan dot org. Join us next week, because we are heading into the Panamanian wilderness to look at nature's deadliest animal… mosquitoes. And if you've got some wanderlust of your own, you can visit our website, S-I dot E-D-U slash Sidedoor, to check out some of the places that we visited for this story. Our podcast team is Justin O'Neill, Haleema Shah, Rachel Aronoff, Jason Orfanon, Jess Sadeq, Greg Fisk, and Elisabeth Pilger. Special help this episode from Lauren Ober. A huge thanks to all of our Smithsonian colleagues down in Panama for their help in making this episode possible. Our show is mixed by Tarek Fouda. Our theme song and other episode music

are by Breakmaster Cylinder. Extra support comes from John Barth and Genevieve Sponsler. I’m your host Tony Cohn. Thanks for listening.

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