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Rod Horrocks
December 06, 2022

Interview conducted by Vincent Santucci
Transcribed by Teresa Bergen
Edited by Molly Williams

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Harpers Ferry Center
P.O. Box 50
Harpers Ferry, WV 25425
HFC_Archivist@nps.gov

Narrator: Rod Horrocks
Interviewer: Vincent Santucci
Date: December 6, 2022
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Transcribed by: Teresa Bergen

Transcript

[START OF INTERVIEW]

Vincent Santucci: And then we'll get a transcript to you so you can review it before we go too far.

Rod Horrocks: Yeah, I can probably add details and correct facts by doing it that way (laughs).

Santucci: Yeah, it's very helpful to have somebody review it. So, I have a short introduction that I normally give right at the beginning. And then we'll go through a little bit of background questions about you, things that should be fairly easy. And then we'll focus on your Park Service career at various parks. And any specific references to paleontology in those parks would be most of interest. Okay. So today is Tuesday, December 6, 2022. My name is Vincent Santucci. I'm the senior paleontologist for the National Park Service paleontology program. Today we are conducting an interview with Rod Horrocks, the chief of natural and cultural resources at Carlsbad Caverns National Park. Rod has a long career with the National Park Service working as a cave specialist at Timpanogos Cave National Monument, Great Basin National Park, Wind Cave National Park, and is currently at Carlsbad Caverns National Park. Today we'll focus on his work for the National Park Service and especially those topics that involve paleontology and fossils. The interview is being conducted by telephone from Rod's home in New Mexico and I'm in Pennsylvania. And we're joined today by paleontologist Justin Tweet who is working from his home in Cottage Grove, Minnesota. So, welcome and thank you, Rod.

Horrocks: Thank you.

Santucci: Sure. So we're going to start with the easiest question. When and where were you born?

2:02

Horrocks: I was actually born in Provo, Utah.

Santucci: Oh my goodness. You're young.

Horrocks: (laughs) You've got a few years on me.

Santucci: So, where did you grow up as a young man, both in terms of your elementary and high school education?

Horrocks: I grew up in Columbia, Missouri. And then went to Tucson, Arizona and then back to Columbia, Missouri. That's where I spent pretty much [unclear] five years in Pennsylvania I stayed in State College.

Santucci: Oh, wow. And did you move around because of parents' jobs, or—

Horrocks: Yeah. My dad is a professor. He moved from university to university.

Santucci: And so he was at Penn State. In what department?

Horrocks: Agronomy and horticulture.

Santucci: Wow. Excellent. And so during your growing up, were there any experiences that you had that got you interested in geology or caves?

3:15

Horrocks: Well, certainly caves. I had lots of experience with caves. Paleontology, are you interested in the caves?

Santucci: Yeah, I was going to start with caves and then talk about fossils, too.

Horrocks: Okay. Well, growing up in Missouri, known as the Cave State, it was easy to get enthralled with caves. I actually blame my dad for getting me involved in caves when he took me to a local rock quarry near our home in Columbia. And old overgrown rock quarry. In the middle of this quarry was a big, giant boulder. So we climbed up on top of the boulder. And when we got to the top of it, I heard this crashing on this scree slope in the bushes. And then out come these two kids at the base of this tails slope. And right at the base of this boulder. And so I asked them, "What are you guys doing?"

And they said, "We went in this cave up on the hill. And it goes clear through the hill!"

So I told my dad, "Oh, let's go see the cave!"

And he said, "No way." (laughter)

So I promptly went to the library and checked out J. Harlen Bretz' book on caves of Missouri and Lemar Holiday's book on caving or something like that. I can't remember the name of it now. But read those cover to cover and fell in love with caves.

Santucci: And the rest is history.

Horrocks: The rest is history. I've been doing caves and paleo my whole entire life, pretty much.

Santucci: And so any exposure to fossils as a young man?

Horrocks: Oh, yeah. I'd go out in the creek behind our house and I'd find fossils. *Archimedes*, other invertebrate fossils and brachiopods and nautiloids and all kinds of fossils in the creek bed. Crinoids, and calyxes. I grew up with the invertebrate fossils. Then when I got into high school, I

took a geology class. And that just really cemented my love of geology and caves, fossils, paleontology.

Santucci: Outstanding. And so when you were looking at a college or university to attend, did you look specifically for a geology program? Or what were you pursuing as an undergraduate?

5:49

Horrocks: Well, at that point I had followed my dad from Columbia to BYU in Provo. He got a job there. And I got in half price. (laughs) So that kind of made my decision for me what school I was going to. So I went there. And immediately went to the, it was called the Osherie then. It's now called the Earth Science Museum. But Dr. Jim Jensen, "Dashler Jim" as he is well known by, I went to him and told him I'd love to volunteer and prepare some of your dinosaur fossils for you. He profusely collected and I think underneath the stadium at that time he had thousands of plaster jackets. And so I figured they could use a lot of help. So I went to him and tried to volunteer and he said no. (laughter) So I kind of tucked my tail between my legs and went away.

But then a while later, I'm like, I really want to do that. So I went back to him and said, "I really want to volunteer for you." And he said okay. So, I guess maybe it was a test to see if I was really interested or not. (laughter)

Santucci: Very good. Well, he's certainly a legendary paleontologist.

Horrocks: Yeah. Legendary. And that really got me, I did an oral history interview with him back in the day.

Santucci: Wow. Do you still have that?

Horrocks: Somewhere. I need to find it. Because I don't know if anybody else had did one with him.

Santucci: That would be great to see.

Horrocks: That would be. I thought about that recently, too. I thought man, I need to find that. It's on a cassette tape. I remember that.

Santucci: I think a lot of people would be interested in that. That's great. Did you take any courses from him?

Horrocks: Not from him. But other, Wade Miller.

Santucci: Okay.

Horrocks: I took vertebrate paleontology course with him. And then of course I took historical geology courses from some geology professors. So I was kind of heading that direction in the paleo geology. And then ended up switching over to computer-aided cartography. And got my master's degree in that. But the whole time I did that, I worked at the Earth Science Museum. In

the summers I excavated dinosaur quarries and as a cartographer at the quarries. And then I'd work all fall and winter working fossil bones.

Santucci: Great experience.

Horrocks: And I also got involved in a lot of cave sites. Pleistocene cave sites. Worked with Tim Heaton. Like a cave called Crystal Ball Cave in western Utah. So I did a lot of cave excavations.

Santucci: Did you ever have a chance to meet the paleobotanist Bill Tidwell?

Horrocks: Oh, yeah. Absolutely. Went out to his famous fossil site there, the local site, not too far away. And had his book and had him sign it for me. Yeah (laughs).

Santucci: Yeah, he's a wonderful person. He donated his entire Green River fossil plant collection, Eocene, to Fossil Butte National Monument while I was there.

Horrocks: Oh, I didn't realize that.

Santucci: Yeah. Arvid Aase and myself would go down and visit him once a month or once every other month. He'd always want to go out to Chuck-A-Rama, the buffet restaurant. And he went there almost every day and he had his own table. And so, I remember the day that he indicated that he was going to retire. And that's when we talked about what he was going to do with his Green River collection. Which now a lot of it's on display at Fossil Butte National Monument.

10:05

Horrocks: Oh, really. I didn't realize that.

Santucci: Yeah.

Horrocks: Fascinating history.

Santucci: Yeah.

Horrocks: Yeah, when I was working at the Earth Science Museum, we did a couple-week stint collecting around the commercial quarries for the science museum. Man, we had an incredible two weeks. We found a stingray and a big banana plant, long thing. We just, for two weeks we made some incredible discoveries while we were there.

Santucci: Memorable experiences.

Horrocks: They were very memorable.

Santucci: So how did you wind up getting into the Park Service, and what was your first position?

Horrocks: Well, I was actually volunteering while I was going to school at Timpanogos Cave National Monument. And when I had gone to the park, I had noticed that they had a very crude map of the cave. And that by then was my specialty was making detailed cave maps. And so I started daydreaming about doing a big project to remap the Timpanogos Cave system. And one day a guy in the caving club came to me – well, I don't know if he came to me. But he announced that he was doing a volunteer project at Timpanogos Cave where he was going to put airlocked doors on the tunnels that connected Hansen Cave and Middle Cave together. And I thought oh, this is my opportunity.

So I approached Larry and I said, “Hey, how would you like to do a joint project where you can build the airlock doors and I would lead a survey project and remap the cave. And we’d use the same group of volunteers.”

And he said, “That sounds great.”

So we went to the chief ranger. His name is Mike Trunnell and made this proposal. And Mike said, “When do you want to start?”

And I said, “Well, how about two weeks?” Because I’d already planned the whole thing in my head. So I reached out to sixty cavers and organized trips twice a week for the rest of the year. And started mapping the cave.

Oh, then I graduated with my master’s degree. And we surveyed Hansen Cave and Little Cave. And I was talking to Mike and he said, “Well, what are you going to do now?”

I said, “I eventually want to work for the National Geographic Society as a cartographer. But for right now, I think I’ll try to find some kind of cherry ass job in local city government, that kind of thing.”

And he said, “Well, how would you like to come work for me for four months and I’ll pay you to finish mapping Timpanogos Cave?”

Santucci: Nice.

12:51

Horrocks: So I went home to my wife and told her I got a job with the National Park service a week after I got my degree. And I just failed to mention to her he only hired me for four and a half months. (laughter) But as soon as I started, within a week, I knew that that was my career. That I could do paleontology, geology, caves, and archeology. You know, all my loves in one place. And so I immediately started like fourteen different projects at the cave. And at the end of four and a half months, I finished mapping the cave like he hired me to do. But then I had all these other projects ongoing. And he did what I wanted him to do. And he said, “Hey, Rod, would you consider being our first cave specialist, and making Park Service a career?”

I’m like, “Uh, twist my arm.” (laughs) So, never did get to the National Geographic Society. But I now have coming up on thirty-one years in the National Park Service. And I’ve

been lucky I've been able to work on all of these things, my loves, at every single park I've been at.

Santucci: That's outstanding. So what year did you come onboard at Timpanogos Cave?

Horrocks: That would have been 1992.

Santucci: That's the same year you graduated.

Horrocks: Yep.

Santucci: Okay. That's great. And then you and myself met when you were in a position that was a shared position between Timpanogos Cave and Great Basin National Park. I think we met in 1997.

Horrocks: Yeah, that sounds about right. Ninety-six.

Santucci: Ninety-six, yeah.

14:26

Horrocks: I think it was '96. And what happened there was when Mike hired me at the Park Service, he hired me as seasonal first. Worked me year-round for two years. Then he found out that's illegal. (laughs) And so he hired me for a term position. At the end of two and a half years as a term, he realized that he had to either create a permanent position or lose me. And so he didn't have the money to create a permanent position. So, he went to Great Basin, made this proposal, and said, "Hey, how about you guys go in with us half and half. We create a permanent cave specialist to be shared between the two parks?" And work like, was it nine days, I think nine days at Timpanogos Cave, be off four days, and then nine days at Great Basin. And then off four days. And then just such and such. So that's, they advertised the position. I applied and got it. Then that was really the start of my career, I guess.

Santucci: Yeah. Very cool position. But a lot of driving. (laughs)

Horrocks: Oh my goodness. Yeah. After two and a half years of that, I was pretty burnt out on all that driving. So I applied for the Wind Cave specialist job and got that one.

Santucci: Very good. So I think it was around 1997 is when we talked about a joint venture to hire Christian George as a paleontology intern to help you do an inventory of Timpanogos Cave. Can you tell me a little bit about that experience?

Horrocks: Absolutely. Christian turned out to be one of the best employees I ever had in the Park Service to this date. He was awesome. And I had identified several potential sites, including this one mine that was a fissure. It was just a short mine, but it intersected a cave, that fissure. And they reported some bones in it. So that was our primary target. And then we had a couple of other bone sites that I had found over the years.

So we went to that mine and did the excavations. And he ended up, I believe he did a master's thesis on that site, if I remember.

Santucci: Yes.

Horrocks: Yeah. And that turned to a love of Pleistocene vertebrate mammal paleontology. I think he's making a career of that now.

Santucci: Yes. Mm hmm.

Horrocks: So that was a pretty neat experience.

Santucci: That was one of our first ventures with a paleo intern. And Christian did just a really fantastic job and you mentored him very well.

Horrocks: Well, I have a love for paleo. And so, actually I went on all his work with him. Yeah, I really enjoyed that.

Santucci: And so, in terms of your time at Timpanogos Cave – we're going to focus mostly on Wind Cave – but what would you say was the most interesting fossil find that you had at Timpanogos?

17:49

Horrocks: Oh, I think it was that fissure deposit in the mine. I think that was the most interesting that I remember at this point.

Santucci: Okay. And then the same sort of question is working at Great Basin, and of course Lehman Caves, which used to be its own national monument, what were some of the more interesting paleontological finds that you had at Great Basin?

Horrocks: Well, Great Basin I actually didn't have a lot. Except for human bones. Some pretty interesting story there. (laughs) But that's more of an archaeology story than a paleo story.

Santucci: Right. And do you know the name Charles Rozaire?

Horrocks: No, I don't.

Santucci: Charles Rozaire, he was an archaeologist but he did a lot of faunal analysis. And I think it was back in the 1960s that he had done some excavations in Lehman Caves where he had collected some fossil vertebrates from the cave. Gordon Bell, who came on at Great Basin later on as a geologist, undertook a paleontological inventory for Great Basin looking broadly across the park in some of the Paleozoic rocks, and then of course in the cave as well. Some of that history.

Horrocks: I know in the '60s is when they did the excavations in the entrance room below the natural entrance where they found all those Native American skeletons, which I had got the

opportunity to repatriate, or put back. NAGPRA activities in the cave. That was pretty interesting.

Santucci: So, how did you wind up at Wind Cave?

Horrocks: Well when I started at Timpanogos Cave, the first weekend, I set two goals. I said I want to be the cave specialist at Carlsbad Caverns one day. And that was my primary goal. And then my secondary goal was to work at Wind Cave National Park. Two great caves. I had developed a real love for Wind Cave, Carlsbad Cavern, Lechuguilla Cave by that point in time. So that was kind of what directed me toward those parks. And so when Jim Nepstad, the cave specialist at Wind Cave, retired, I just threw everything I could into getting that job. And luckily was chosen for it.

Santucci: And so what year did you leave Timpanogos and go to Wind Cave?

20:40

Horrocks: That would have been 1999, I think.

Santucci: Okay.

Horrocks: Yup.

Santucci: And who was the superintendent at Wind Cave at the time?

Horrocks: Oh, I think that was Linda Stoll. Linda Stoll. I'll tell a story about her later. She made a rather famous quote about paleontology.

Santucci: A famous quote? (laughs)

Horrocks: I'm sorry, I missed—

Santucci: He had a famous quote about paleontology?

Horrocks: Yeah, about paleontology. I'll tell you that when I get to that story.

Santucci: Okay. Well, very good. So, did you live in park housing?

Horrocks: Actually, I did. Only for about a month. And, well, four or three months. I think it was three months while we were looking for a house in Hot Springs. We found a house and moved in town.

Santucci: Okay. And I assume you had a chance to work with Art and Peg Palmer?

Horrocks: Oh, all the time. Yeah, they came to the park pretty regularly. What I loved to do was go on survey trips mapping in the cave. And I'd always be on the lookout for something new and interesting. So each time they'd come—which was usually about once a year—they'd say, "Oh, what did you find, Rod?" And so I'd take them to show them the most interesting thing I'd found. And we did a lot of trips over the years and found everything from historic dynamite to

paleofill to 320-million-year-old fossilized bacterial strands. Needle-like bacterial strands that were in [unclear] bugs in Pennsylvanian, I guess, time period, and became fossilized. Those were pretty neat. That was a pretty interesting discovery to find that. And I found a lot of different types of minerals. They would come and check out some paleofill deposits.

Santucci: And so during your tenure there, there was quite a bit going on paleontologically, both in the cave and at the surface. And so, maybe we can start within the cave. So some of the fossils that you're familiar with from within the caves, anything of interest to share?

Horrocks: Oh, yeah. There's lots there. In my seventeen years I was at Wind Cave, I actually went on 379 survey trips and mapped over twenty-four miles of the cave. It was the second most of anybody ever. So I had a lot of opportunities to find things. And one time I found a fossil burrow. It was horizontal in relationship to the – parallel with the bedding plane. And this thing stuck out from the wall two-and-a-half feet. It was this long, sinuous snaking burrow with little side chambers along the side of it. And it had been completely dissolved by differential dissolution and in relief. That was probably one of the most spectacular things I found as far as invertebrate fossils.

And what's really neat about Wind Cave is that a lot of the fossils are, had been left in relief on the wall by dissolution. And so you would have incredibly delicate fossils. I paid a lot of attention to the fossil burrows. And over time I'd noticed five different types of burrows that occurred in the cave. From the one I told you about, the big, long, sinuous one to little straight vertical ones. The curvy ones, the branching ones. Just all kinds of different burrows that I found in the cave.

Then there's also, you would find [eth?] gastropods that would be eroded out in relief. Brachiopods are pretty rare. I found some – only one place did I ever find crinoids. You would think that crinoids would be more common there, but they're not. They're about the rarest fossil there, for some reason. What else did we find? Yeah, what was interesting about the invertebrate paleontology there is a lot of the fossils have been replaced. And replaced and then dissolved out. And sometimes coated with—and so it wasn't uncommon to be able to tell what the fossil was. But I have a terrible time determining exactly what genus or species it was because of the replacement. You had gypsum or other—

Oh, one of the interesting fossils that I often find is quite often in the bottom of chert layers I would find mass mortalities of brachiopods. And I think the reason we have those is it's fairly, this is of course down near the equator. And you had fairly shallow water. It varied through time for the Madison formation there that the cave occurs in. But sometimes it was thirty, sixty feet deep. Other times it was, you know, zero to ten or fifteen feet deep. And I think sometimes it actually, the sediment was exposed. This silica was deposited. And when it was exposed, you'd get these mass mortalities of the brachiopods. And then silica is deposited on top of that. And that's why you find these chert layers are just covered with brachiopods underneath them. Those were pretty interesting.

Sometimes we found, I wouldn't call them mass mortalities, but areas where there were a lot of gastropods. Those could be pretty prolific in areas. But again, not very common throughout the cave. But in some areas, they were quite common.

27:49

Santucci: Are there specific locations in the cave that stand out to you as important for paleontology?

Horrocks: Well I think all these fossil burrow sites are really interesting. I think I had to identify, oh, it was about five, four or five, six different types of brachiopods. Oh, yeah. There are some other, (laughs) there's some vertebrate paleo, too, in the cave. I have a really interesting experience of that. I can go into that real briefly.

Santucci: Please.

Horrocks: There's a room called the Chamber of Lost Soles. And Dr. Jim Martin from the School of Mines had an excavation there after some cavers had found some bones. And he did this excavation and found all these bones. A lot of them were stream rounded. A lot of them had wood rat nine on them. And of course this whole collection in these pits that he excavated in this room [unclear] up in the School of Mines. So I was just fascinated by that. And to me, that stream-rounding and gnawing the bones meant that somewhere there's an old paleo entrance near the Chamber of Lost Soles. And these bones had been washed down the stream, rounded. And then other bones that the wood rats would drag into this cave entrance, they would gnaw on them. I decided there had to be a paleo entrance and I was going to find it.

So I went to, took some cavers into that room. I need to start a survey in every little hole in the ceiling that we could find. And finally we found one that kept going. It went up at an angle probably about 20 degrees or so. And went past a little lake. And then kept going up and up. And then that hit a dirt wall plug. This complete wall-to-wall, ceiling-to-floor plug of dirt.

And so we brought some cave radios in and put the receiver right there at the plug. And then we did these transects on the surface until we could pinpoint the spot exactly above that plug. Turns out the very bottom of the Wind Cave Canyon, right in the middle of the canyon, six feet above that point was the bottom of the canyon. So apparently the bottom of the canyon at one time was open, a little paleo entrance. And this material washed in. And that was a pretty interesting and fun discovery.

Interesting story happened just after that. A Native American was looking at our map of the cave and saw Chamber of Lost Soles. And he made a request to the superintendent that he be allowed to go to that chamber to pray. So the superintendent gave me the task of taking him to this room. So I got him in with his gear with him. And we went to this room and I told him, "This is the Chamber of Lost Soles."

And he said, "Well, do you mind leaving me alone for a minute while I pray?"

And I said, "Sure. I'll just go back the way we came. But just yell. I won't be out of earshot."

And so I went back and I'm sitting there for a while. And then I hear him yelling. So I come back. And he said, "Why do you call this Chamber of Lost Soles?"

And I said, "Oh, it's because the cavers that found it found a boot sole from the 1800 explorers."

And he said, "Oh! That explains why I didn't feel anything." He was thinking it was lost souls, it had something to do with Native American lost souls. (Santucci laughs) But anyway, so that was a pretty interesting little story.

Santucci: Very good.

Horrocks: But that kind of led the project where I actually got a geology grad student from the School of Mines to come down. And we started looking for paleo deposits in the cave. Stream deposits. Stream-rounded cobbles and pebbles and looking for other paleo entrances. We ended up finding four or five other paleo entrances. And characterized the cobbles in types, and would find bones at all these sites. And we'd also find like charcoal.

So apparently what would happen is whenever there was a fire in the area, when it rained, it would be a flash flood kind of event. And it would wash all this charcoal from the fire down the canyon, and it would go down all these little paleo-entrances. So then you would find bones that are washed in, invertebrates, little insects that would be washed in. Sometimes they'd still be alive. You could tell when they washed in because they'd make webs and stuff. But then they'd die there. Just nothing to eat. So that was really interesting project. That's pretty much.

Oh, we found isolated skeletons. These usually were wood rats. But I think pine martens and other things were found. So, animals would use these old paleo entrances of the cave, and would go in and would wander around and then die in the cave. So we'd find these complete in situ skeletons that sometimes still had organic debris on them. Sometimes they're just the bones. But usually they were kind of mummified. And I found those throughout the cave. And I even created the map of all the wood rat paleo sites that are found throughout the cave at one point.

Santucci: Was this locality published on at all?

34:24

Horrocks: No.

Santucci: No?

Horrocks: No.

Santucci: And I assume you have photos and internal reports?

Horrocks: Oh, yeah. Those would all be in Mark's, you should have access to all those records.

Santucci: Okay. Excellent.

Horrocks: Yeah. The geologist didn't even, they did this senior thesis, he even did a really nice report. Mark should have that, too.

Santucci: And what was the name of the student?

Horrocks: Uh, I knew you were going to ask that. (laughs) I can't remember right now. I could find out.

Santucci: Okay. So before we go to the surface at Wind Cave, I wanted to ask Justin, Justin, do you have any questions at this point for Rod?

Tweet: Actually, we just heard from the student we have working there right now about a site with brachiopods which apparently was found in 1894 because there was all this graffiti from 1894 written over the brachiopods.

Horrocks: (laughs) Yep.

Santucci: Did you ever see that locality, Rod?

Horrocks: Oh, there's so much of that in the cave. All over the place. Yeah.

Santucci: And did you treat it as historic? Or did you try to clean it? How did you manage it?

Horrocks: We treated it as historic.

Santucci: Historic. Okay.

Horrocks: Yeah, Alvin McDonald was one of the early explorers in the cave. And he left his name throughout the cave. And I've made a map, too, of all the locations we found his name in the cave. I can't remember how many there were. But there were probably a couple dozen or more where he left his name. And then there's quite a few places, like he was saying, sometimes what Alvin would do is he would take people to a point in the cave and then they would all leave their name. Everybody on the trip. And he kept a journal, too. So you can go back and find in his journal the day he took certain people and the list of people, and then find their signatures of all of them in the cave. That's interesting.

Santucci: Yeah.

Horrocks: With that date on it.

36:54

Santucci: Definitely. And so, looking at the surface outside of the cave, any paleontological resources of interest at Wind Cave?

Horrocks: Oh, boy. (laughs) Is there ever. When I first got there, I guess it was probably, I got there in '99. It was probably 2002. I started noticing some reports by a Richard Klukas. He was a biologist at the park. This would have been back in the '70s, maybe mid-'70s, I think. And he had contacted Dr. James Martin from the School of Mines to come down and look at the White

River deposits. There was an Oligocene-aged formation exposed in the park. And he thought well, this would be the same stuff as over in Badlands. Maybe there's some fossil sites.

So Dr. Martin came down. And he and Richard found I think six sites or so. And they called them the Klukas sites. And not anywhere else spectacular that I remember that he found. But I was really intrigued by that. So I decided that I would start a cyclic fossil survey program where we'd go out and look. And Greg McDonald, he was at Denver at the time. He was a national, in your position, Vince. And asked him if he would be interested in coming to the park and help me do this fossil survey. And he said, "Well, we don't have any money for fieldwork." And so I arranged with his boss, I had him come out. And then he stayed with Chris Thompson at the Mammoth Site, who used to be his student. And Chris was the collections manager, I think, at the time at the Mammoth Site. And so he came out. And I had done my research and had the six sites, which we labeled WICA one, two, three, four, five and six. Or collectively the Klukas sites. And we started going out and doing surveys.

And boy, we just didn't find much the first day. And so, this is in July of 2003, I think. And so the next day, he came out like Thursday and Friday. And the next day, Greg said, "Well, why don't we go across the road?" Because the Klukas sites are all on one side of the road. "Let's go check the other side, because there might be some, I think there are some White River deposits over there."

So we made this kind of big circle. And we got to the top of the circle, looked at several exposures, didn't find anything. And were coming back. And there was like two exposures left to look at before we head back to the car. And I said, "Well, I'll take this hill."

And Greg said, "I'll go over the hill to the next site."

So I went to this hill in front of me and immediately found a fossil gastropod. And that caught my interest. So I started looking around. And then Greg comes running over the hill and yells, "I found a brontothere skull!" And waving his arms. (laughs) And I'm like yeah, right. Sure.

So I went back to looking for my, the fossils at that site. And I finally finished and I documented everything. And I went over the hill to see what he was up to. And sure enough, there was an upside down, teeth facing up. And that was freaking exciting. And he said, "Oh, I think this is a brontothere!" And must have been real low in the [unclear] 41:12 formation and maybe almost the underlying formation. So we were kind of excited about that. And we decided we'd better go tell the superintendent because this is rather significant.

So we went back to the superintendent. It's Linda Stoll. and sat down in her office and we told her about this discovery. And she said, "Oh, great! Now we're a paleontology park, too." (laughter)

I said, "Yeah, we're going to become a paleontology park. [unclear] have anything to do with that."

So we recommended, Greg and I, to the superintendent that we do an emergency excavation. Because it obviously had eroded already and was going to erode away pretty quickly.

And so we started planning this emergency excavation. I contacted Rachel Benton at Badlands National Park and Kris Thompson at the Mammoth Site, and asked them if they wanted to be involved. A lot of them were very interested. And they had both brought other people from their places of work. And I started getting burlap and plaster and all the supplies we need and the tubs. I was getting all this field equipment together. Because I had done this kind of thing for six years at dinosaur digs to gather dinosaur bones. So I was pretty experienced at that. Getting all the field gear together.

Greg came back and we all met out there. I remember Rachel was late that day. But we went ahead – oh, I think Darrin Pagnac from School of Mines was involved in that day too. So we decide to go ahead and start and wait for Rachel to get there. And we went up to the site. And Greg was just, oh, he was chomping at the bit. This was the first time he'd been in the field besides that month before in three years. (laughs) And he was really excited to do some excavation. And I was telling him, "Let us get some things done first." Rachel was going to set up a zero datum and put a rebar in at the top of the exposure. And Kris Thompson volunteered to help me screen loose sediment at the base of the hill to see if there was any bone in that. So I told Greg just to sit tight until Rachel gets here. We want to make sure we get this all mapped and collected properly. And I could tell he was just chomping at the bit, though. (laughs) It was funny.

We went down and Kris and I started screening. And sure enough, we started finding bone almost immediately that eroded down the hill. And so we kind of started following that up the hill. And finally Greg wouldn't be denied. (laughs) And so I got my assistant Marc Ohms to come and help Kris screen. So I went up there to make sure Greg didn't get too excited. Because he was already starting to pick up pieces and pile them in piles. And I'm like, "Oh, you're going to make this so hard for a preparator to put all this back together. You need to collect this as one block." He was just too excited. (laughs) And so it was kind of funny.

But then Rachel arrived. And they set up the zero datum and we started blocking out this block after we got it mapped in. We got the skull out. And brought in quite a bit of added bone as we were digging around the skull. It was obvious that there was more bone there, and we weren't going to have time to finish it. So, we planned to come back the next month, in August, and have a follow-up excavation.

So, after we got the block out of the skull, we covered everything up. And put burlap down, if I remember, we sprinkled dirt all over it to hide it. Then we headed, we took the bone, the jacket down to the Mammoth Site where I had arranged to–

Oh, I forgot a very important part of the story. Got to say this. When Rachel Benton first arrived, she walked up to us and she said, "That's not brontothere."

And we're like, "Okay. What is it?"

She said, "That's the *Hyracodon* rhinoceros." So it wasn't the brontothere that Greg had hoped it was. But it was *Subhyracodon*.

And so anyway, we took the jacket down to the Mammoth Site where I had arranged to have a volunteer prepare it out. And I helped a volunteer take the jack – pop the jacket off. And

then we put a grid down and mapped what we could see. And then we started treating that block like an excavation of the grid and everything, and mapping the bones as we found them. Found quite a bit. Obviously we weren't going to find the whole skull. But we found quite a bit of it. We found mandibles and part of the skull. And it was pretty rough shape. But we got that, excavated that.

A month later, Greg came back. And this time we had a little bigger excavation. And we started expanding the excavation. By this point, we decided to call the site the Centennial Site. Because 2003 was the one hundredth anniversary of the park. And we found this on the hundredth anniversary. So, Centennial Site seemed like a great name.

And we started finding bones from a little deer. What was the deer's name? Oh, I forget.

47:41

Santucci: *Leptomeryx*?

Horrocks: *Leptomeryx*, thank you. We started finding *Leptomeryx* bones. We started finding turtle bones. We started finding *Hyracodon* bones. *Mesohippus* horse bones. We started already theorizing what was the depositional environment this was in, and people, the first was probably a seep or something like that, a spring or something.

And I think later on, I'll get to that later. But we changed our ideas on how that cave formed, or how that deposit was deposited. And we, as we started this excavation, we found that the bone layer was actually thickening as it was going into the hill. And we got excited that oh, this might be a major bone bed. But the interesting thing was, we didn't find a duplicate of any bone from any animal. So it was like a single *Leptomeryx* a single *Hyracodon*, a single turtle, a single *Subhyracodon*. And they were all juveniles, which was just fascinating to me. All juveniles and no duplicates.

So then we continued that excavation for a couple of weeks every day. We actually had our law enforcement ranger come out. And she camped, put up a tent near the site and camped overnight to watch it while we were all gone, just to make sure nothing happened.

And at the end of a couple of weeks, we got most of the major deposit excavated. We took another one or maybe two more giant blocks, and lots of small blocks. Then we, the bones started getting more sparse. We'd find one here, one there. And once it started changing and not being massive bone deposit because, we decided that it was time to end the excavation.

So we covered that up, with the intent of coming back and excavating it later. That didn't happen until 2009. But I'll get to that.

So we had all these bones to prepare. So I had a couple, Sara Wilson, who was the other ones? Oh, I could look up their names and add them. But I had a couple of volunteers. I had one that came up from the Denver Museum to prepare the skull for me. And we spent a lot of time in the lab at the Mammoth Site. They gave us a desk down there right in front of the window where people come to look. Because we were down there all the time preparing bones. And they liked people having something to look at. Because there wasn't a lot of mammoth bones being

prepared at the time. So we were preparing and cataloging these bones. And we were bedding them. We decided to do the whole thing right from the start. So we would put the bones in archival boxes in that foam bed and would cut out beds for these bones. We really put a lot of effort into making the collection really nice.

Then we started continued the next year. We decided to of course expand our cyclic fossil surveys is what we were calling them at that time. I didn't like the word "prospecting" that some people were using. I do cyclic fossil surveys.

And we went out to check all the Klukas sites. And by this point, I had a much better idea of what to look for. And sure enough, we found a lot more stuff than we did on that initial survey in 2003. And we started finding bones and all kinds of interesting, same fauna as we were finding before.

52:12

Santucci: All equivalent to the White River fauna from Badlands.

Horrocks: Oh, no. All equivalent. Yeah. And one thing we started doing, we started naming the sites. We decided that we didn't like WICA 1, WICA 2, WICA 3, WICA 4, 6, 8, 9, 10. That was just too boring. So we started naming all the sites. So we had the Rattler Site, the Centennial Site, *Ischyromys* Site and the, oh, I don't remember. But we found a bunch of new sites that year and kept up the process. I got to the point where I needed to hire interns from SIPs, or GIPs. GIPs. They were GIPs at the time. And so I hired graduate students at, recently graduated, to come down and do internships at the park and help me. I would spend two days a week prospecting. Then that person would, and two days in the lab at the School of Mines by now. And once we started the, well, let's see. No, that wasn't at school. We first started doing it at the Mammoth Site. And so we did it at Mammoth Site. Until 2009. I had, I think it was Joe Gandolfi was a GIP that I had. And they were just finishing the new paleo building in the School of Mines. This ten-million-dollar facility. It was really nice. And so I got to know Sally Shelton really well. The one they hired to be the curator there. And of course Darrin Pagnac I was working with. And Sally gave us one entire [unclear] this, what is the shelving called. It's on rails and it just collapses down or, I forget, expands out. But anyway, she gives a whole roll. And we decided that just make this Wind Cave National Park paleo. And so we put everything by age, ascending age, oldest to the youngest. And by sites. So, yeah. By this point, we're starting getting a lot more material. And these fossil surveys are really productive, these cyclic fossil surveys. We kept expanding the sites. I think we got up to 24 with Joe. And I'd only checked about 70 or so % of the White River deposits by that point.

So we kept expanding our search every year. I had additional GIPs come, more volunteers, preparators. And worked a lot with School of Mines students. Sometimes we even, Darren and Sally would bring down a whole class, paleo class, an invertebrate paleo class, or [unclear] other classes they had. But they would bring them down. And they'd help us with the fossil surveys. Cyclic surveys.

And this continued. And then 2014 I had another intern. I can't remember who she was at this point. Oh, I've got to backtrack. I'm getting ahead of myself. Two thousand nine, I

mentioned I finally got back to the Centennial Site. I talked one of the students at the School of Mines, Rachel Brown, into doing a master's thesis at the site, at the Centennial Site. And so we reopened the excavation and started that excavation. And where we had quit, where the bones were kind of sparse, they went, I don't know, maybe 30 more centimeters, sparse bones. And then it just completely ended. Yeah. But we started noticing, we got this chocolate brown clay. And in this chocolate brown clay we started finding microfossils, or microfauna, I should say. And all kinds of little bones from just a few millimeters to a centimeter long. We were finding complete whole bones and all kinds of different animals. And lots of them in this.

So we continued the excavation, excavating this little microfauna. And Rachel did her thesis on it. Took her a few years to finish if I remember right. But she finally did finish. And got that wrapped up. And then go back to 2014, had another intern. We were doing the fossil survey at one of the sites. And I found a vertebra just a little bit of the centrum, I think it was. Exposed out of the sediment. We started an excavation there and found several vertebrae and some other bones. And ended up jacketing that out. We found a jaw, a mandible there, too. Found quite a bit of material there in this little site. That produced quite a bit of excitement.

And then Darren brought a class down to do an excavation at the site. (laughs) We spent a whole week, excavated, and found I think one or two bones. It was pretty sad. But had a great time anyway. And just kept finding, the more we looked the more sites we found. I think it got up to 27 sites. And got up to maybe 80% of the deposits I had looked at. And continued into 2015. And then in 2015 is when I got a work detail at Carlsbad Caverns National Park. Designed the cave lights here. So I came up to Carlsbad for supposedly a two-and-a-half month detail. Turned into four-and-a-half months. Designed all 1100 lights. Then at the end of that project, the superintendent asked me if I'd come and be the cave specialist. So my goal had been completed. I worked at Wind Cave and Carlsbad Caverns. And got to do some fun paleo stuff here, too. But nothing quite like Wind Cave. [pause] You still there?

Santucci: Yes. Uh huh.

Horrocks: Oh, okay. (laughs) I'm talking so much that I put you to sleep?

Santucci: No. I wanted to see if Justin had any questions at this point.

59:46

Tweet: Sure. Yeah, actually. He was curious about the management of the White River group sites. Had there been backfill at just the Klukas and Centennial sites, or at others as well?

Horrocks: Has there been backfill?

Tweet: Well, I guess there has been.

Horrocks: Yeah. Do you mean the excavations? Did we fill them back it?

Tweet: Yes, as a safety measure to keep people from poking around.

Horrocks: Yes. Yes. And Centennial Site, I think we even put down tarps or something and covered those up so that anybody that excavated there in the future could easily tell where we clip.

Santucci: Okay. Was there any concerns about the public finding out about the sites and perhaps collecting?

Horrocks: Yeah. Yeah, there was. And this is why a law enforcement ranger came out and stayed at the Centennial Site for that whole excavation. When we did the fossil cyclic surveys, we would always see people driving up and down the road. NPS 5, I can't remember what the name was. But anyway, we'd see people. And so whenever we'd see people, they would always stop and talk to us and ask us what we were doing. And we were, "just mapping the stratigraphy of the rocks." (laughter) It was actually an issue. So whenever you'd hear a car come down the road and you were working on a site that was visible from the road, we'd all sit down and get our packs out and act like we're eating lunch. Just resting. (laughs) Yeah, we did. We went to quite a bit of effort to make sure that we didn't let people know that you could find bones at Wind Cave like you can at Badlands.

Santucci: Was there any evidence of anybody ever digging at the site or disrupting the site?

Horrocks: Absolutely. Absolutely. At all five or six, all six of the Klukas sites, there were big holes dug in all of them. I talked to Jim Martin. He said they did no excavation at all. Just did surface collecting. And so somebody, it seems to me like someone who knew where they were, went out and dug holes in all of them. And so you still see those holes today. They tend to be long kind of trenchlike holes dug horizontally across the sites. And so yeah, there's lots of reason why we were being very careful.

Santucci: And so what was Jim Martin's role in these sites?

Horrocks: Well, he and Richard Klukas first found the first six sites or so. He did an abstract on the SVP, I think it was, about announcing the discovery of these sites. He had planned to write something up. But I don't believe he ever did.

Santucci: And where are the collections now?

Horrocks: All of them are at the School of Mines.

Santucci: Okay. Were there any other localities at the surface that you were aware of at Wind Cave?

Horrocks: Yeah. One time we heard there were some bones eroding out of a dirt bank. And so we went and checked that out. A law enforcement ranger told us about it. And we found a single bison bone. And for the life of me, I can't even remember what bone it was right now. But we jacketed—we collected it. I don't know if we jacketed it or not. But we prepared it. And I remember we bedded it in a foam, archival foam box. And it's up at the School of Mines now. It was basically where there was a lot of sediment in a valley bottom. And a stream had cut a vertical wall maybe six, eight feet deep in the sediment. And the bone was like near the, maybe a quarter of the way down from the top. Was it? Or deeper. It might have been deeper than that.

Maybe it was halfway down. Anyway, we didn't have data on that. We knew it was probably some antiquity to it, though. It looked like it was at least a few thousand years old. So there was that site.

Then of course the big, exciting thing was when Marc Ohms was out looking for caves and he found this little rock shelter. And when he looked into it, the floor had these rocks on it. And air was just whistling out. So he came and got me. And we went and looked at it. And we decided to remove the rocks. We removed these rocks and Marc found that the more rocks he removed, the stronger the wind got blown out of this hole. So we knew it was a significant cave there and was pretty excited about that. And all of a sudden he shot out of that hole (laughs) yelling, "Snakes!" And I looked in there and there was this big ball of rattlesnakes and green snakes all entwined together. And spending the winter in this, I guess this blowhole. Because the warm cave air coming out was keeping them much warmer than on the surface. So that kind of ended that project. We came back a month or two later and the snakes were all gone. I guess because we'd left it open. (laughs) So they went somewhere else. And we started excavating a little bit more on that and realized it was definitely a going cave. And I don't remember if we, we must have found some bones when we were excavating.

But I contacted Jim Mead who, by then, Larry Agenbroad had died down at the Mammoth Site and Jim Mead had replaced him. So I went down to Jim and I said, "Would you be interested in doing a paleontological excavation on this new cave? We named it Persistence Cave." Because Marc Ohms had been, at that point, and spent, I don't know, fifteen years looking for a big cave in the park and he finally had a chance to find one.

And he was very interested. So, we organized a big project. I had an intern, a paleo intern. And we put a date on the cave, because we knew it was going to turn into something special. And we started the excavation. And Jim was there. And we immediately started finding the bison. And I think we found some camel. And other Pleistocene bones. And he got real excited about it.

And then the sediment was very deep in this cave. And there was probably only six inches – five inches of air space on top of the sediment. And that's what the wind was howling out of. But the sediment was unknown depth. And we excavated down just a couple of feet and found tons of bones. We took it down to the park boneyard area where we set up a bunch of cow troughs with water in them. And we had a whole wet screen operation going on down there. And they set up this elaborate system of haul line from the, just near the entrance to the cave down to the bottom of the valley. Because this cave is near the top of a ridge. Within like ten feet of the top of the ridge. And let all these sacks of sediment down and would label them. He excavated by square I think centimeters in depth. And found lots and lots of bones. Jim had some carbon 14 dated. He was getting dates like twenty, thirty, forty thousand years. So it was some pretty exciting stuff. Found a ton of snake bones in there. And so we can tell that the snakes that we saw were not the first snakes to make that a snake den. Apparently it was a snake den for a very long time. And we found evidence that it was a bit of a natural trap. Also, it was a bat roosting site. We found tons and tons of bats in there. Bat bones. And that project, we started excavating horizontally. Continued to find bones. We never did excavate very far down, so we have no idea how deep the deposits were. That was what always interested me. Because then if you go deeper,

it's just going to be older. But we never did do that, at least there anyway. And continued to dig horizontally following this air-filled tube, expanding it to human height.

And then I left to go to do that detail at Carlsbad Cavern. Mark continued to dig. And I guess they just followed the ridge line ten, fifteen feet underneath the top of the ridge for hundreds of feet was still going. And they found bones along the entire route. And then, yeah, so kind of exciting stuff.

1:10:17

Santucci: Definitely. And they continue to work on it.

Horrocks: They're still working on it. Yeah. Still going.

Santucci: So in terms of other surface localities, are you aware of some of the invertebrate fossil localities, like a trilobite locality?

Horrocks: Well, I'll tell you about a conodont site that's rather impressive, one time I had a law enforcement ranger come up to me and said, "Rod, there's a guy that I caught collecting rocks out in the park. And he says he's from the Smithsonian or something." (laughs)

And so I said, "Oh, let me go talk to him." So I went out there and met the guy.

And he said, "Do you realize you have probably one of the five greatest conodont fossil sites from the Pennsylvanian in the entire world in this park?"

And we're like, "Nope, we didn't know that."

And he said, "It's right here."

And I said, "And do you have a research permit to collect that?" And he said no. so he handed it back to me and I kept it. And I said, "You know, we can give this to you. You just have to apply for a research permit. And you can do additional collecting. But you just can't come down to a national park and collect." And never heard from him again.

Santucci: Do you know what his name was?

Horrocks: Oh, I had the specimen there at the park. And all his information was with it. But apparently he's a specialist in conodonts. I can't imagine there's too many of those people around.

Santucci: Yeah. And so, are the conodont specimens in the collection? Or where would we find those?

1:12:12

Horrocks: When I left, they were still in my desk. They were supposed to go to the museum collection. I don't remember if I gave them to the curator to put in there before I left or not.

Hopefully I did. But if I didn't, they were in a bag and they had a label in there with the guy's name and phone number and everything.

Santucci: Very good.

Tweet: Theo has gone back to that site. I guess it's the same site. And has found conodonts there.

Horrocks: Who's what?

Tweet: Theo, the intern we have working at Wind Cave right now, has visited the site and has found conodonts there.

Horrocks: Oh, okay. So, he does know about that then. Good.

Tweet: I wonder if that might have been Bruce Wardlaw.

Santucci: That's the only person I can think of. Unless it's John Repetski.

Tweet: But then he passed away a few years ago.

Santucci: Yeah, Bruce did. I can contact John Repetski and see if he knows anything about this.

Horrocks: Yeah. He just said that it's one of the five best conodont sites in the world. He was pretty excited about it.

Santucci: Excellent. How about petrified wood? Any petrified wood at Wind Cave?

Horrocks: I don't remember petrified wood. In the burrow formation we did find lots of—oh, what are those called? Those little seeds from the trees. Oh, that's ridiculous. I can't remember, I've forgotten the name of—

Tweet: The hackberry?

Horrocks: Hackberry seeds. Thank you. We found lots of those out there. The fossilized hackberry seeds.

Santucci: Nice.

1:14:07

Horrocks: And we found other fossils. We might have found some fossilized wood at that site. I can't remember for sure. But something that sticks in my mind that we found something. It's up in the School of Mines, what we found.

Santucci: Any fossil wood associated with the Dakota Formation, the Cretaceous units?

Horrocks: No, I even looked for the Morrison Formation. It's supposed to be in that area. And I couldn't find it.

Santucci: Very good. So I would be remiss if I didn't ask you about a local site. Not necessarily in Wind Cave, because it's attached to Wind Cave historically. And that's Fossil Cycad National Monument.

Horrocks: Oh, yeah. (laughs)

Santucci: And so you've helped us. You've gone out and photographed some of the locality. Can you tell us what your thoughts are about Fossil Cycad?

Horrocks: So, interesting story. I remember your presentation that you gave on that whole history. It was fascinating to me. We did one field trip out there. I don't think we ever found anything. We wandered around, took pictures. We decided, if I remember, that this is the bridge where a cycad was found, underneath a bridge in the sediment. But not—I guess the thing about that is just it's really unfortunate that Wind Cave superintendent was in charge of that. But it's just, I guess, a collateral duty and didn't have interest in it. Or for whatever reason didn't take much interest in managing that. And that whole site was lost. But I didn't have a lot to do with that site.

Santucci: Sure. And then one last question, and I'll see if Justin has any. So in the visitor center is one fossil that's in the exhibit. It's a coral. Are you familiar with that? Do you know anything about its history, where it came from? Why it was put on exhibit?

Horrocks: I don't. There's several colonial corals and rugose corals that are found in the Madison limestone. And we had various types of corals that have been differentially dissolved and left in relief in the cave. And a lot of these horn corals, these solitary corals, we would find, they were a fairly rare fossil, too, but we would find them. The colonial corals were more common than the solitary ones.

Santucci: Great.

Horrocks: But still fairly uncommon.

Santucci: Justin, any other questions from you regarding Wind Cave?

Tweet: Well, I was going to ask if there were any sites that you would like us to have a look at while we're working on this project. Particularly in the cave systems, since it's a little hard to get out right now on the ground. I mean, I'm going to let Theo know about these burrow sites, definitely.

Horrocks: Yeah, there's a bunch of those. And I wrote up a trip report about that one two-and-a-half foot long burrow. So you can find some detailed information about that one. Where it's located and when they found it and everything.

Santucci: Would that be in your resource management files? Or where would we find that?

Horrocks: Yes, And if you can't find it, I kept copies of all that stuff, too.

Tweet: Good.

Santucci: Great. So I guess we saved Carlsbad for last. Your home now. And we had the pleasure of being able to work with you on a paleontological inventory for Carlsbad Caverns based on your interest in trying to undertake that for Carlsbad. So can you share with us a little bit about that project?

1:18:49

Horrocks: Yeah. That, as you alluded to, I always try to combine my love of caves and paleo together, everywhere I go. So I was very interested in your, you were doing these paleontological assessments in parks. I remember asking you if you were interested in doing one at Carlsbad. And your answer was absolutely yes, or something to that effect. Very interested. We got Kottkamp, what's his name?

Santucci: Scott Kottkamp.

Horrocks: Scott Kottkamp was the GIP intern we got to do the fieldwork for that. And I would go out with him when I could and show him, and I would take him in Carlsbad to look at the espalsus sponges in the lefthand tunnel. Showed him that. Showed him trilobite locality. Then of course the museum collection. Showed him what's been found. And Carlsbad of course has some very, with muskox cave, very famous paleo site. But also Slaughter Canyon Cave, where jaguar and camel bones have been found in. And Carlsbad Cavern itself, ground sloth. Of course when you guys came to the park, I took you to, I was originally going to take you to the site where the ground sloth bones were found. There's an upper and lower in that. And it's called secondary stream passage area. And we were going to go, I was going to take you to the lower, where I had spent the previous month finding out where that was. Did a couple trips with a local caver volunteer named Tom Bemison. He had been there before. So between the two of us we were able to rediscover that site. And found lots of fragments, little, tiny fragments of bones. I should say flakes of bone. And little bit of stuff, some surfaces that could still be identified.

But in the end, I decided to take you to, instead of that site, an owl site that had been reported. And Wallace Lee, the geologist, USGS geologist who did a National Geographic expedition to Carlsbad in 1924, he reported finding this owl in the top of Devil's Den. And I was talking to a caver that helped on the cave lighting installation for the cables and wires and stuff. He told me, "Hey, I found these bones." And he told me about where they were. And I said, "Yeah, yeah, that's really not too far from what Wallace Lee said was an owl site. Owl bones. He's like, "This is an owl skeleton. Owl skeleton."

So, I decided to take you there, and also take you to American lion site, which was discovered in the 1950s, when the, 1953, I think, when the park did a project. They called it the cave seating project. In creating seats, concrete benches, basically, for visitors to sit down while interpreters gave their presentation at various sites. And they decided, they were debating between Bat Cave and what's called the Amphitheater in the Twilight Zone to put the seating. They finally decided to do it in Bat Cave. And so they started the project and while they were digging they started finding all these bones. It turns out to be American lion bones.

And then of course took you guys there. And you guys started finding – oh, I think, Vince, you found – I'm remembering this right, correct? Stop me if I'm remembering this wrong.

But you found articulated, not articulated, but a foot, lagomorph, a rabbit foot. And you found, I guess it was you probably found that, too. An old side passage and a really interesting fossil site that we've never found one like this before in Carlsbad, so it was really neat. It was a fissure deposit. It turns out it was only about a centimeter or two wide. And there was a ledge. And on top of this ledge was a space maybe six inches high. And apparently bats used to roost in there. And when they'd die, their bones got washed down this little crack in the floor. That crack was apparently a weak spot and this piece of ledge fell off. When it fell off, it exposed this matrix of bones. I think Gary Morgan identified like three or four different species of bats, which is rather unusual for Carlsbad. Usually you only find one species at our paleo sites. So it's quite unusual. And then we'd never found this fissure built in a deposit before. So that was a real neat discovery.

Then we went down to look for this owl site and didn't find it. But I contacted the caver and he says, "Oh, I'll show you where it is." And so he came out to the park. From Arizona, even. (laughs) John, his name. And I was very grateful to him to do that. But he came out and took me right to it. And I thought those look like owl bones. That probably is the owl that he's reported. But there was no skull. And the owl skull would be a real diagnostic. And I wondered that there used to be a skull there and that's how he knew it was an owl skull. Wallace Lee in '24. But sent a picture of those bones to Gary Morgan and he identified them as probably owl. So that was kind of a neat little find there.

But going back to the ground sloth, what's interesting to me is you have the lower site and the upper site and the secondary stream. The lower site was a low area with a bunch of sand. Obviously water had settled. And all the little bones settled out. And all the bones collected from that site were small. All from one juvenile ground sloth. Then there's the upper site. And the upper site, the bones are all larger. So obviously the larger bones were deposited by some kind of flash flood event up higher. And then the stuff settled out, the little bones. Then the lower site. So, pretty fascinating paleo site.

The other interesting paleo site, (laughs) I have to use the word "site" very loosely here, (laughs) when the guys are blasting tunnels and making the trail, they're doing a lot of dynamite blasting of bedrock to make the trail. And every time they'd come across a fossil, they took the fossil down to what's called Top of the Cross area. And Top of the Cross, there's a giant breakdown block that has large, maybe five-inch-diameter ammonite in it. And they would concrete in all these other fossils they found. So there's brachiopods and bryozoa and sponges and a whole bunch of different animals that they took down there and concreted into the same rock. So all these fossils are together now. (laughs) But we're really not even sure when, who did that or when it happened. Because I've never been able to find any reference to that at all. Anywhere. Something that's just, at this point it's lost in history.

Santucci: I guess you have some interesting remains of bats, fossil bats, in the cave?

1:27:43

Horrocks: Yeah, in fact, oh, they're throughout the cave. Literally throughout the cave. This ground sloth site I told you about, secondary stream, there's mummified bats scattered around

there and bat bones everywhere. In the ceiling, there's a whole bunch of brown-stained areas you can tell the bats were roosting. So at one point, that was a fairly major roost.

At Dark Side of the Moon, in the big room, there is a large deposits of bat guano that's been dated to about 35,000 years old. And the species of bat there is actually an ancestor to the bats that we currently have. It's a different species. But it's very similar to the Brazilian freetail bat that we have in great numbers in the cave right now. In lower cave, there's a whole passage that's just littered with bat mummies. And we have no idea why so many bats were killed down there or how they were killed or what could have killed them. It's quite a mystery.

But then they've climbed some of the domes in the cave. There's one dome, they climbed 270 vertical feet using helium balloons, and pulleys and ropes. They'd hook a stalagmite and then climb up in this upper loft area. And that whole upper area is just littered with thousands and thousands and thousands of bones. Bat bones everywhere.

Then of course in Bat Cave itself, there was a deposit that apparently at one point was 100 feet deep. In 1903, they started mining. By 1911, they had removed that 100-foot, that deposit of guano and sold it to the citrus groves in California. And they found, interestingly, a human skeleton in that bat guano. I'm sure it was Native American. Of course, we don't have it today. Just thousands of bones, of course, all throughout that guano. Millions, I should say. Millions of bones. Then over in Slaughter Canyon Cave, there's a really interesting deposit of bones. Again, a species that, a new species was identified there. And these bones were found by guano miners again. They were buried underneath a [unclear] layer maybe four inches thick. And there's a thick deposit underneath that and just millions of bat bones in that deposit. And those things, that flow stone was dated to a minimum 350,000 years old. So we think that deposit is probably between 350 and 500,000 years old. So it's a very old, quite a significant bat.

And then those guano miners I mentioned, they came across a camel bone. They came across jaguar bone. So I'm sure there's an absolute ton more paleo in that cave.

Santucci: So, you know, I think we don't want to forget about another really important cave, Lechuguilla Cave. Are you aware of any paleontology associated with Lechuguilla?

Horrocks: Absolutely. Pat Jablonsky, who is working up at the Denver Museum, she did a volunteer project when some bones were found in Lechuguilla Cave. And these were probably a couple hundred feet from the entrance. And I think the thought is that those bones were washed into that point, that a ground sloth had fallen down a natural entrance. And then some localized rain event dumped a bunch of water in the cave that squashed the bones down into a low spot, and they settled there. She actually collected those bones. In pretty rough shape, the bones are. But ground sloth again. So that was interesting.

Lechuguilla has more spectacular fossils than Carlsbad does. There are a lot of delicate brachiopods with all the structures exposed in relief in these delicate—it's just unbelievable details in the whole crinoid stems of branches and calyxes and bryozoa. Just incredible invertebrate fossils from Lechuguilla Cave. And these are mostly in the back reef deposits. Some are in the main reef itself. A lot of them are from the back reef. Got some really, really, really cool fossils from that cave, invertebrate.

Santucci: Excellent. Justin, anything from you?

Tweet: Not so much about Carlsbad. So. I'm very fascinated to hear about well-preserved Paleozoic fossils. So no complaints there.

1:33:28

Santucci: So, Rod, Carlsbad is adjacent to Guadalupe Mountains National Park. Is there any sort of relationship or connection between the two parks?

Horrocks: Well, we work together quite a bit. They're in the same Guadalupe Mountains. So a lot of the same things that are found in Guadalupe are also found in Carlsbad. There's caves there. Not as big, spectacular caves that we have in Carlsbad. But the caves are much older there. And they're six to twelve million years old, while the Carlsbad are three to six million years old. So the Carlsbad Caves are formed much more recently. And a lot larger.

Santucci: And the park geologist Jonena Hearst retired. Has her position been refilled?

Horrocks: No. It has not.

Santucci: Do you provide them any sort of assistance with their caves?

Horrocks: No. Not really. They don't have a lot of caves. And they're smaller. So they don't have a lot.

Santucci: They have Upper and Lower Sloth Cave. They have Pratt Cave. A couple other ones. But—

Horrocks: There's several. But a lot of their caves are associated with some pretty neat archeology.

Santucci: Mm hmm. Very good. And so, Justin, did you have anything else outside of Carlsbad that you still wanted to chat about?

Horrocks: No, nothing for me.

Santucci: Okay. Did we forget anything, Rod?

Horrocks: Oh, I'm sure we did. (laughter) I was at Wind Cave for seventeen years. I did a lot of stuff there. But yeah, send me a transcript and I'll look through it.

Santucci: Definitely. Hey, I guess one thing I forgot to ask you is when did you leave Wind Cave and show up at Carlsbad?

Horrocks: That was up there in early 2016.

Santucci: Twenty sixteen.

Horrocks: Yeah.

Santucci: And so what's your next park you're heading to?

1:35:47

Horrocks: Retirement.

Santucci: Retirement. Okay. (laughs)

Horrocks: Yup. I've had thirty-one incredible years in the Park Service. I did a lot of incredible things. I had a good career.

Santucci: You definitely did. You're certainly a legend. And you've made so many important contributions. Of course, we very much appreciate your real interest and focus in paleontology associated with caves. And so we thank you for all of that.

Horrocks: Yeah, you're welcome. Yeah. That was when I was even writing up an article about the invertebrate fossils in Wind Cave. And I did publish something on that. But I never did finish the more extensive work I'd planned to do. I left before I finished that project.

Tweet: Are there any drafts of that?

Horrocks: Yeah, published in the, it was in the Colorado Grotto maybe newsletter, I guess it was. A basic little article about the invertebrate fossils at Wind Cave.

Santucci: Do you have a copy of that you could send us?

Horrocks: I'm not sure if I do have a copy. I know Mark had one. But I don't know if he knows where it is anymore.

Tweet: So even if it was just like you took a picture of the pages with a cellphone or something, that would be fine.

Horrocks: Yeah, I'd have to find it to do that.

Santucci: So, some of the grottos are pretty good at archiving their publications.

Horrocks: They are.

Santucci: Which grotto was it?

Horrocks: Colorado Grotto.

Santucci: Colorado. And do you know what year, approximately? Because maybe we can search online for that.

Horrocks: I don't remember what years. I want to say 2009-ish. But I can't remember for sure. But I might be able to find the actual volume and number for that one.

Santucci: Yeah, we'd be real interested, and definitely would want to cite that in the Wind Cave paleontological inventory report.

Horrocks: Yeah, I did a fair amount of work on that project. And I worked with Mark [Thanbock?] up in Rapid City. And he was helping me with some of it. Yeah, I had lots of plans identifying all of the like five different types of species of brachiopods and the corals. I got some of it shipped down but I can't remember exactly. I didn't finish it, unfortunately.

Santucci: Well, we still appreciate your time and sharing your story all the way back to your days in Missouri. Getting interested in caves and fossils. And again, we congratulate you for an incredibly successful and productive career.

Horrocks: Well, thank you. Someone besides my wife appreciates me now. (laughter) All right.

1:39:21

Santucci: We're going to sign off, Rod. Thank you again.

Horrocks: Sounds good.

Tweet: Thank you.

Horrocks: Thank you.

Santucci: Have a great day.

Horrocks: Let me know how I can help you.

Santucci: Thanks.

Horrocks: All right.

Santucci: Bye-bye.

Horrocks: Bye-bye.

Tweet: Bye-bye.

1:39:36

[END OF INTERVIEW]