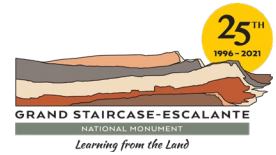


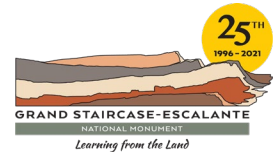


Monumental Science

Episode 1 Transcript



- Dr. Titus:** Welcome to Monumental Science! An informal look at scientific research that has happened in and around Grand Staircase Escalante National Monument over the last twenty-five years. I'm Dr. Alan Titus, paleontologist for the Bureau of Land Management, Paria River District and today I'm joined by Dr. Mikel Stevens, emeritus professor from Brigham Young University, who is a noted expert on botany, and in particular, has worked a lot with the penstemon flowers in the Intermountain West. Mikel, thank you for taking the time to be out here with us today.
- Dr. Stevens:** You're welcome, I'm grateful to be here. I enjoy talking about this subject.
- Dr. Titus:** Okay well, that's, that's my hope is that we will have a lot to say about it. So, I'd just like to start with some personal things about you and connections to the monument. And maybe you could share one of your best memories about working in, around the monument or experiences you had or even personal vacations there. Is there a particular place you enjoy or find special?
- Dr. Stevens:** I enjoy going all around. I think my earliest memories of being in the monument was when I was in Graduate School. I took my family and we drove from Boulder over to Escalante and went down that road in which I'm not sure I remember the name of the road, but on each side of it drops off and that was very impressive, and my children still have memories of that first trip. So yes, that was an amazing trip.
- Dr. Titus:** Yeah, we call that the whales-back coming up over all that slick rock.
- Dr. Stevens:** Yeah, that that never went away in any of our brains. Since then, I've gone back and started working the whole half of the southern half of Utah and love going back up in that same spot, brings back fond memories with the children.
- Dr. Titus:** Great. So why don't we also get a little background about yourself? How you got into academia and your interest in botany? And yeah, just get some basic background from you.
- Dr. Stevens:** I grew up in Brigham City, Utah, the northern half of the state, with a small greenhouse with my grand father owning that greenhouse, and it was on the back part of the property. So, I was indoctrinated early with horticulture.
- During my teen years I worked for the Boy Scouts of America and had an uncle who had taught me a lot of native plants that are common names, and I'd become reasonably conversive with those native plants. And so I talked at Boy Scout summer camps for several years of my late teens and early twenties, teaching nature conservation and then a couple of years teaching waterfront.



Loved my time in the outback. From there, went to school. Thought I'd become, what I was turning in those days. Being a forest Ranger and concluded that maybe I needed to have something that was a little easier to get into because they were telling us that in a lot of seminars we'd have to volunteer and do a lot, and I thought maybe it would be a little wiser, so I headed out in the aspects of agriculture and worked in horticultural sciences from the agricultural point of view.

From the agricultural POV and went to BYU after going to Snow College and started in their horticultural program, got a bachelors and masters at BYU, and then stepped out and worked for ten years. Owned a small greenhouse, that wasn't making enough money, so I worked actually in the rocket industry, blew up, working with chemicals that blow up.

Dr. Titus: That's quite a detour.

Dr. Stevens: It was, but at the same time I had the greenhouse, so I'm trying to run two things at once. Said this is a lot of work, why don't I go to school and get a degree while I worked that hard. I returned to school at the University of Arkansas and got a degree in plant science at the University of Arkansas with a specialty of plant breeding.

Dr. Titus: You're a Razorback!

Dr. Stevens: Yes

Dr. Titus: So am I. I got my masters at Arkansas.

Dr. Stevens: Oh Seriously! How fantastic.

Dr. Titus: Small world!

Dr. Stevens: Yeah, we were there from eighty-eight to ninety-three.

Dr. Titus: I was there ninety to ninety-two.

Dr. Stevens: Oh, you and I overlapped

Dr. Titus: We overlapped.

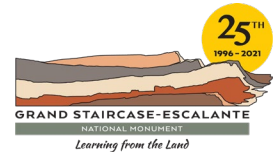
Dr. Stevens: Identical

Dr. Titus: Great!



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Dr. Stevens: So yeah, from there I was invited to work at the University of Florida at a research station and did a postdoc there. And during those same years, Brigham Young University contacted me and said we're thinking that we'd like to have you up here. So, I finished up a post doc and returned to BYU, and that's where I've been for the last twenty-five years.

My research focus has been in the area of disease-resistance in tomatoes. And then about two thousand seven, I concluded that I'd be retiring one day and that I love tomato work, but it would be hard to do in retirement, but native plants would be a lay-in-bed, do-it-easy kinda thing because it's so natural for me.

Dr. Titus: Yeah!

Dr. Stevens: And there's so much available. So that's when I switched over and started working with native plants, and we've had to focus. So, I did penstemon.

Dr. Titus: Incredible! Incredible story! Appreciate you sharing that. How did you end up down in the Grand Staircase then?

Dr. Stevens: Ahh, that's a good question because when I started working on penstemon, the challenge with Penstemon was that I began to realize there were a lot of species. And the more I studied, the more I realized that Utah was or appeared to be, if not in the heart, right next to heartland of its origin, and there was a lot to look at.

One thing led to another. I learned there were seventy-six (species), and I said that's enough. I don't want to work on Colorado or the others because that would just mean even increasing a lot greater. So, I chose Utah specifically to focus on, and in doing that I stumbled onto two of them that are in Grand Staircase Escalante that are almost exclusively found in the monument.

There you find a little outside of the monument, but they're the rare of pockets of the plant. I went down with a colleague, and he was taking a biology class down there. I helped and began to connect with your predecessors there in Escalante and they said, "yeah come, get a permit," and so I got a permit and begin working from that point on collecting information and photos and samples as we worked the entire state. But yeah, I end up spending quite a few days working around the monument.

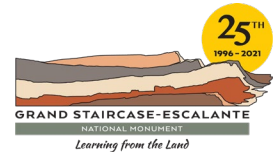
Dr. Titus: Do you know what year you first worked in the monument?

Dr. Stevens: Good question. I want to say, I could go back and find it.



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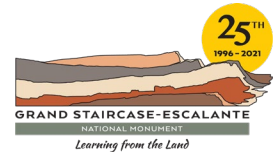


- Dr. Titus:** Just ballpark.
- Dr. Stevens:** But I think it was ten, eleven?
- Dr. Titus:** OK, and how do you feel your work in the monument has made a contribution to penstemon research? And if you might make some observation on the roles of national monuments in research.
- Dr. Stevens:** Ah, good questions. How Grand Staircase has helped out especially, it's has a diversity? I mean, I can get into areas there that are clay drought, heavy drought, and clay into sand piles and everything in between.
- Dr. Titus:** So just the diversity of the landscape you're saying, is really important?
- Dr. Stevens:** Yeah, yeah, the landscape itself. The variety in the ecology, ecological landscapes, especially associated with soils and yeah, the general layout. I mean you can get into some forested areas all the way down into some precipitation. that's, you know, gets just a few inches a year on average. So, yeah - a broad diversity.
- Dr. Titus:** So, did you find any particular challenges while you were facing or while you were conducting your research? Was there anything that made for good stories around the campfire later on?
- Dr. Stevens:** Yes, I think the ones that end up sticking out in your mind the most is ending up with a flat tire in some really harsh places. Yeah, and needing to change that tire across a rock bed that's you know, rocks in the neighborhood of a nine to fifteen inches in various angled shapes, and you lay on your back trying to get the jack underneath it and get the tire on in a safe manner.
- That's probably one of the most that sticks out. Another one was the largest rattlesnake I've seen the western United States, out near Wendover, that stretched across both the two-track that I was working on, and it was stretched across both. And both the head and tail, were on the opposite sides of each of the two-track. I never did see his head. I saw its tail because it kept going forward, but it was a very large one. So yeah, those are a couple that quickly come to mind.
- Dr. Titus:** Yeah, yeah, been there, done that with the flat tires for sure. Any fun in the gumbos getting stuck in clay?
- Dr. Stevens:** Yes, not down in Grand Staircase. I was very careful around Grand Staircase 'cause I knew the place. I recognize them when I was there.
- Dr. Titus:** The remoteness.



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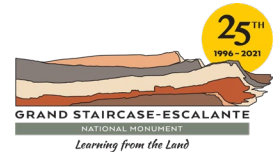


- Dr. Stevens:** But I got into trouble here about four years ago just above us here in the Provo-Orem area, up above Soldier Summit. And that was the most hair-raising half-hour drive. A thunderstorm came in and it took me a half hour, spinning from each side of the road to get out of there. I didn't want to spend the night out there.
- Dr. Titus:** So, what do you feel like is one of the most exciting discoveries that you made actually in Grand Staircase? Was it the two new species?
- Dr. Stevens:** They were already named.
- Dr. Titus:** Oh named. Okay.
- Dr. Stevens:** Yeah, they were already named.
I knew that they were in the area. The one called *Penstemon ammophilus* has probably some of the most interesting, unique characteristics of a penstemon I've run into, and that is, is that the try Combs or the little hairs that grow on the plant, exude a sticky substance, so that if it's not grown next to something that's blowing up on it, it actually feels like when you would touch it, it would feel like a sticky honey gooey kind of stickiness.
- Dr. Titus:** Is that unique among the penstemons?
- Dr. Stevens:** It happens in plants. Often, it's used for insects to trap insects, but not this one. It's not using it for that. What it's using it for is, it exudes it out and it grows in the blowouts of that Navajo sandstone, and so when the sand moves around, it actually goes up and it adheres to that sticky, gummy material. And now when you touch it, it feels like you're touching a piece of sandpaper.
- Dr. Titus:** Wow!
- Dr. Stevens:** So, what they have done is, it's exuded that out. It collects the sand onto the stickiness and now as the sand blows it's not going to penetrate the plant at all because it's got its own armor.
- Dr. Titus:** Armor.
- Dr. Stevens:** It's picked up its own armor by using sand to protect itself.
- Dr. Titus:** I've ... I've never heard of that before. Incredible.
- Dr. Stevens:** Yeah, it is really interesting. When I send you the slides, that'll be on the picture of that.
- Dr. Titus:** Oh, okay – yea, great!



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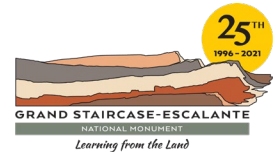


- Dr. Titus:** So, we're going to wind down a little bit. What would you say would be your take-home message from all of the research that you've done in and around the monument?
- Dr. Stevens:** I think the take home message is number one, those lands are really, really fragile and I'm really grateful to see them being watched over and giving some management, because otherwise there will be some issues. We're capable of doing that quickly with modern-road vehicles and our ability to hike and more people. So, I'm very grateful to see them being watched over and managed.
- There are some unique materials there, not just in Penstemon. That if I stay in the botanical-world alone, there's many, many unique, very drought tolerant plants in there and they have usefulness in urban landscapes. Somebody needs to work on them, and I don't mean misuse them in the monument, but seeing them there, recognizing them, getting tissue samples, seed samples, testing them and they would then have value across all regions in the world were there are drought problems and especially here in the Intermountain West and southwestern United States.
- So, it's a little gold mine, and so is the rest of the western United States, but right there that, that land is fragile and so many unique environments we can find stuff that could have tremendous value everywhere.
- Dr. Titus:** Okay great. So, what do you see is your potential future work there then, are you winding down or are you still making plans to continue active research in Grand Staircase?
- Dr. Stevens:** One of the things we haven't even mentioned is ... It's dropping my mind – the name of the Canyon we've worked. There is a penstemon that grows in that canyon. Oh gosh, I should've written that down. There's one called jonesii. It's a hybrid between a white penstemon with a larger, boldest kind of flower and a very tubular like red flower, and it's a natural hybrid. And it grows only in that canyon there over in Zion, and that is a lot of fun to study. And I'm actually interacting with some people out of South Carolina. We're working mostly down on the border, but some of the things we've gone up and photographed and identified, and collected materials for as part of our sampling regime is that Penstemon jonesii – that natural hybrid that's forming in those areas.
- Dr. Titus:** Interesting, sort of an ecotone of some sort?
- Dr. Stevens:** It's a, we call it, when we write it down, we write Penstemon and then an X like the times-table X and then the name. And for years they hypothesized that it was between the two species that are there, but no one had ever done a study. And about seven years ago I got an undergraduate and I went to work on it. Actually,



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two or three and one of them really did the hardest work and we actually figured out all the aspects that looks very solid that those two parents are the parent, the intermediate, the hybrid that most people talk about is a burgundy color, a deep wine, a purplish la, no not lavender, can't use the word lavender, but it's that deep reddish burgundy and that's not the first-generation hybrid. And my plant breeding experience told me that no, that's not what we would expect, and as a result I was a little bit surprised that we were finding it regularly in the landscape, but not what I expected as being the hybrid.

Well, it turns out it. It appears there's some sort of selection-pressure that's selecting progeny from those first generation and they end up growing toward the burgundy that seems to be what lives in the landscape the most frequently.

Dr. Titus: Interesting, I wonder what that would be? Maybe relationship with pollinators?

Dr. Stevens: That's where the study is going with my South Carolina colleague I'm working on. We think that pollinators are.

Dr. Titus: Selecting the burgundy color.

Dr. Stevens: Yup, selecting toward that burgundy, yes.

Dr. Titus: Well, this has really been fascinating. That's actually all the time we have for the broadcast. But I'd like to thank Dr. Stevens again for joining us today and want to thank all of you for listening. Thank you and take care.