

### EPISODE 3 - Extinct African Megafauna

Rachel - Hello from your favorite Grasslands PR team. This week, we're back with another reason why overlooked and underappreciated ecosystems are objectively the Best Biome. I'm Rachel.

Nicole - And I'm Nicole. And today, we are talking about something that might be a little bit sad, but it's interesting. And I just need you to kind of hang in there and just come along for the ride. We're gonna talk about...

Rachel - Oh no.

Nicole - We're gonna talk about extinct animals of Africa.

Rachel - Oh no. Nicole I was just, just before we recorded, telling you about how depressed I got earlier reading about the Serengeti's history.

Nicole - I know, it was so hard not to say anything.

Rachel - Oh, I'm already crying. This is gonna be bad. Okay, let's go. I'm ready. Oh no.

Nicole - We'll start in the way back, and then we'll slowly work our way up to the present day, and talk about some conservation and like some good stuff too. So just, it's gonna be a good one, I think.

Rachel - I believe you.

Nicole - I hope. I hope it's not too depressing.

Rachel - Well, take it away, Nicole.

Nicole - Thanks. Did you want to do news? Oh, right.

Rachel - That. Oh, you threw me off guard so much for the topic reveal. Yeah, we just wanted to point out that we do have a newsletter you can sign up for at our website, [grasslandgroupies.org](http://grasslandgroupies.org). We try to put stuff out every week, including news events and more. So, not just promotional stuff for the things like podcast episodes we're putting out, but you know, actual news about stuff happening in grasslands and new research being published and all those fun things that we can find about grassland conservation and science. And we have another episode review. So thank you so much for the five stars on Parrots of the Plains. You guys are making us so happy and we just love you. So thanks for that. It made our day.

Nicole - It's true. Like literally every time we get like a new subscriber or a new review, we like text each other and we're like, hee hee hee hee. It's great. Thank you.

Rachel - Literally like that, yeah.

Nicole - Are you ready to dive into this?

Rachel - Yeah.

Nicole - Just relax. Deep breaths.

Rachel - Like the machine in Star Wars, you know, that coaches Padme on giving birth. Anyway, let's talk about extinct African animals.

Nicole - Okay. Okay. So I'm focusing mostly on the megafauna of Africa and a lot of the megafauna of Africa are gone. They're extinct. But we do also have a lot that are still living, which is a really interesting and unique thing about Africa. So I just kind of wanted to go way back in the past, but also, like I said, into kind of some more recent extinctions, as well as, you know, things that we can do for the future.

Rachel - Awesome.

Nicole - So just so everyone's on the same page, you know, what is a megafauna? It literally is just a big animal, mega big fauna animal. It's a big animal. That's it. Sometimes paleontologists can be kind of nitty gritty with the, you know, what exactly a megafauna is, but ultimately it's a big animal. And in pretty much anywhere but Africa, most megafauna are gone. They're long, long gone. And in a lot of places, like in North America, the reason for them to be gone is primarily due to climate change, but also human intervention. So humans saw these, you know, giant mammoths. They're like, wow, that's a lot of food. Gonna kill that thing. Gonna eat it all up, yum yum. And that did happen in Africa, but there was actually this really interesting paper that I was reading. It was in this magazine Science by Faith Rowan and a few other people. Sorry, I didn't write it down. I'm so sorry. And, you know, they were looking at ancient hominin impacts on African mega herbivores is how they described them. Cause they're specifically looking at, you know, the megafauna that ate plants. And they found that at least for Africa, it was mostly changes in climate that led to the megafauna extinctions, which is really interesting. Like I said, a lot of other megafauna had a huge human impact on their fall. But the megafauna in Africa started disappearing about four and a half million years ago, which was a period in time where there were no, you know, hominid species in Africa. And they found out by looking at all sorts of weird science stuff that I didn't really understand because I am not that kind of a science nerd. They looked at the teeth of ancient fossils and the soil layers and all that fun stuff. And they found that there was less carbon dioxide in the air, which in turn meant that there was a change from tree covered landscapes to actually what we see now of modern grass dominated the savannas. So the grasses expanded and killed all the megafauna.

Rachel - Oh my gosh, Nicole, this is gonna be good.

Nicole - Isn't that fun?

Rachel - That's so fun.

Nicole - I love that.

Rachel - And that's just for the mega herbivores in Africa, right?

Nicole - Yes, but a lot of times, you know, if you lose all your mega herbivores, and you're also gonna lose all of your large carnivores as well, because now they don't have anything to eat. So it kind of all goes hand in hand. I just thought it was, grasslands are the best, you know, we all know it's true. But the grasslands taking over this, you know, huge continent ended up with a huge decline in ancient megafauna, which included ancient rhinos, elephants, hippos, and some other things. So, I don't know, it's really fascinating.

Rachel - That is so fascinating, yeah.

Nicole - And real quick, just because I just wanna get, I wanna touch on this before I forget, but you know, why is it that megafauna in Africa have survived for the most part? Why do you think?

Rachel - Yeah, I don't know. Why have megafauna in Africa survived? Because it's been harder for outside influences to get into the continent and disrupt things.

Nicole - Yeah.

Rachel - It's gonna be one guess, I don't know.

Nicole - I don't know. You know, I'm realizing now that I know nothing about the paleontological history of Africa. And so, apart from, you know, the hominid emergence in the Serengeti region, like that's pretty much all I ever hear discussed in terms of paleontology and archeology in Africa. So I don't even know what these animals are or why some of the animals survive until now.

Rachel - Hey, well, I'm so glad you're here to learn some stuff.

Nicole - Me too! So from my research and then of course, I am not an expert on this at all. For the most part, I don't know a whole lot about ancient cultures, ancient peoples, ancient animals. I know some dinosaur facts. I know some dinosaur names, but that is pretty much it. But from my research, I've seen that resistance to climate change is a huge why for the megafauna that are still in Africa. And I saw one paper that kind of thought that maybe all of these animals that did survive, they ended up evolving alongside humans and early hominids, which led to a natural

aversion, which saved them from the fates of their brethren and the Americas who just got wiped out by humans as they moved on. Which I thought was a really interesting hypothesis.

Rachel - That is such a good hypothesis. Ooh, you're just listening to the sound of my brain exploding over and over again. Please continue.

Nicole - I'm so glad that I could be here to witness that. But yeah, I don't know. I thought that was really, really interesting. And I think that that is, I mean, sure, why not? That makes sense. You know, these animals, you know, don't know that humans have an ability to kill them. So they're like, hey, gonna go over here now.

Rachel - Oh my God, that's so cool. Please don't stop.

Nicole - Well, that's all I had for that.

Rachel - Oh, what?

Nicole - I mean, one of those questions that we don't really have an answer to right now is, you know, why did the megafauna survive in Africa when they didn't survive in other places? And I think that, you know, resistance to climate change and then, you know, evolving alongside humans are two very, very good hypotheses. But ultimately, we don't know and we might never know. And that's part of science is not knowing the answer.

Rachel - So that's okay. That's what makes science fun.

Nicole - So I just kind of picked some of my favorite megafauna, some of the ones that I thought were interesting, as well as some of the ones that are kind of good examples that I think people should know about. And the first one is Deinotherium. Do you know who that is?

Rachel - Isn't it kind of a Tasmanian tiger looking dude?

Nicole - No. Good try though.

Rachel - No, I don't know what that is.

Nicole - So Deinotherium was a genus of megafauna, again, big animal, that was the precursor to modern elephants, as well as mammoths that eventually evolved in North America. So they existed about nine and a half million years ago in Africa, and other species of this genus also existed in Europe as recently as three and a half million years ago. This is one of the reasons that climate change probably had a big impact on its downfall, but we don't quite know what ultimately led to their extinction. And these guys were really interesting. They're a little bit larger than modern day elephants. They're about 12 to 13 feet tall at the shoulder, whereas modern African elephants are about 10, maybe 11 feet tall. So, you know, a couple of feet taller, plus a nice big, chunky head up there. And they had super, super, super small ears, unlike most

modern day elephants. And they had really long tusks and a trunk, like modern day elephants. What is interesting about their tusks is that they actually curved downwards, and they are the lower jaw incisors, so the teeth right in front, versus modern day elephants, their tusks come from the upper jaw and curve upwards.

Rachel - Interesting.

Nicole - Yeah, so some weird adaptations that led to upside down tusks, or I guess modern elephants have upside down tusks. And people have been so interested by this guy in trying to figure out why their tusks curve downwards, whereas modern elephants curve upwards. And one of my favorite hypotheses, which I highly doubt is any kind of true, but these guys were so large that for a while scientists thought that they lived in the water because there's no way that something so large could be on land. And there's a lot of ancient dinosaurs where we also thought of this, but we now know it's not true. And they thought that these, you know, ancient elephants would sit in the water and use their tusks to, like, prop their heads up out of the water so that they could breathe.

Rachel - Oh, that's hilarious.

Nicole - I know, it's so good. But, like, there's no way that they would evolve tusks facing downwards just so they could hold their head up.

Rachel - No, absolutely not. I mean, it could be a nice benefit, perhaps, but...

Nicole - Yes, yes. So we think that maybe they used them to kind of root around, dig for food, maybe in mating displays, and, you know, modern day elephants do a lot of those same things. So why not deinotherium as well?

Rachel - For the record, when you say these guys were probably affected by climate change, you're talking about, like, the climate shift that moved the forested biome toward a more grassland biome in this region?

Nicole - Yes. That and also just... because nine and a half million years ago was the end of the last ice age as well.

Rachel - Right.

Nicole - And again, these guys existed, Deinotherium as a genus existed from nine and a half million years ago to three and a half million years ago. So they had a really long span of time where they were slowly declining and maybe some species died out while other species did fine. So it's a little bit hard to talk about them as a full group and exactly what led to their extinction.

Rachel - Yeah.

Nicole - We'll get closer to dates that make more sense, I promise.

Rachel - Yay.

Nicole - In fact, we're going to jump way, way up in the timeline and we're going to talk about voayes. Do you know what those are? They're a genus of animals.

Rachel - No. Should I?

Nicole - No, I didn't know what they were. So that's why I picked them. No one's ever told me that, you know, there were these giant crocodiles that used to live on Madagascar. These are the Voay crocodilians. They were a genus of crocodiles that grew up to five meters long. That's 16 feet. The modern saltwater crocodile can get close to that length, but not very often. And really, since we're talking about something that died about 2,000 years ago, and we don't have that many fossils left of these guys, it's kind of hard to say for sure, you know, maybe the 16-foot long one, maybe it was only, you know, 15 years old, and it still had a lot of growing left to do. We have no idea. So I like to believe that they get way bigger, but there's no science to back that up. So, you know, take it with a grain of salt. And these guys, like I said, they lived on Madagascar. And Madagascar at this time had a ton of really large, weird animals on it, including elephant birds. And as, you know, all of these giant animals were wiped out, do you want to guess what wiped them out?

Rachel - Elephant birds?

Nicole - No, they ate the elephant birds.

Rachel - Oh, no! Was it the voays?

Nicole - The voays ate the elephant birds. The voays ate the elephant birds, but it was a very, it was a good relationship. It was just like any other predator-prey relationship.

Rachel - Ah, homeostasis.

Nicole - Yes, yes, until humans came in.

Rachel - Ah, it's always humans. I always forget about humans.

Nicole - I know, I know. So their decline very, very strongly relates to colonists arriving on the island and basically just eradicating all of the giant animals, all the megafaunas that existed there. So again, these guys went extinct about 2,000 years ago. So quite a bit more recent, versus, you know, 3.5 million years ago with the Deinotherium.

Rachel - There's a single tear just crawling its way down my cheek.

Nicole - Oh, no.

Rachel - RIP voay and elephant birds.

Nicole - I know. Elephant birds are so cool. I love them. My last one, well, not the last one, I lied. The next one that I want to talk about is the Atlas Bear. It's in the name. It's a bear. It's dead now. They used to live in the Atlas Mountains, and they would often come down to the grasslands and kind of move along the mountainside. And the Atlas Mountains, if you're not aware, is kind of the northern edge of Africa through Morocco and Algeria. And the Atlas Bear, once again, likely went extinct due to human contact and kind of encroachment on their territory, as well as a super huge push on hunting and collecting them for sport. So if you've ever seen, you know, especially movies and old, you know, pictures and drawings of, you know, gladiators fighting bears, those bears were probably Atlas Bears.

Rachel - I'm sorry, what?

Nicole - Yeah, Atlas Bears, from Africa.

Rachel - Oh my god, I thought we were talking about, like, the same time period and my brain just had to reshift and readjust its focus to take in the fact that an entirely different kind of bear existed and made its way into our history without us knowing about it somehow. Us as in you and me.

Nicole - Yeah, yeah, yeah. No, gladiators, like a while back.

Rachel - Like in Rome.

Nicole - Yes. The last Atlas Bear was reported, and it was killed by hunters in 1870. So this is getting closer to modern day times.

Rachel - How big was this bear?

Nicole - Um, I don't know. Let me Google it real quick.

Rachel - Also, tangentially, are modern bears like black bears, at least the ones that I am familiar with, I guess, in North America, like are the ones I'm thinking of, like are bears that size considered megafauna or no?

Nicole - It depends on your definition. So again, you know, archaeologists love them. They're so smart. They're amazing, but they can be kind of particular about what you call a megafauna. But then other people are like, if it's a big animal, it's a megafauna. So, and when you're talking about, you know, the great megafaunal extinction, usually that is referencing the last ice age.

And as the climate changed, we had, you know, a ton of big animals go extinct. But there are, like I said, a lot of modern day megafauna, mostly in Africa.

Rachel - Yeah.

Nicole - But yeah, the Atlas bear is about a thousand pounds, nine feet long. Adult grizzly bears are six and a half feet long, six hundred pounds.

Rachel - Oh, wow.

Nicole - Yeah. And that's an adult male, like a big boy. It's going to be about six hundred pounds.

Rachel - Oh, man.

Nicole - So these guys were, you know, significantly bigger than the modern bears that we have now.

Rachel - And like it existed during, I don't know, recorded history. So, yes. Do we know anything about its ecology or is it just like gladiator tales that we have?

Nicole - Like, I think it's mostly gladiator tales, honestly. You know, I was trying to find out some more information about them, and it's not easy to do.

Rachel - No ecology, just like, wow, that's a big bear.

Nicole - That's a big bear. I mean, I'm sure if you like, dove into it. It just seems like such a waste of our human resources that we're having to decipher this now through archaeological and paleontological means when people could have just written it down for us, you know? Come on, people, some of you could write. A lot of you could write, or at least pass down oral traditions. Like, come on. No, yeah, like Wikipedia, not that, you know, I only use Wikipedia or anything, but the Wikipedia article is two paragraphs long. Like, it's super small, and even when you go on to, you know, more in-depth websites that have, you know, actual scientific literature cited in their sources, it's mostly talking about, you know, the Roman Empire and how, oh, these are the bears you saw in gladiator rings, which is a really interesting fact, but it's like, okay.

Rachel- I want more.

Nicole - Right, right? I think that they were mostly considered herbivorous. But I could be wrong.

Rachel - I mean, that would be kind of true of modern bears too. Like they're very herbivorous.

Nicole - I mean, they're pretty omnivorous.

Rachel - I mean, yeah. Wait, did you mean like they just were strictly herbivores?

Nicole - Yeah, like...Yeah, like they, okay.

Rachel - My brain interpreted they're pretty herbivorous as they're omnivores that tend to eat more vegetable matter than other things for some reason. It didn't occur to me that a bear could, never mind. There are, never mind.

Nicole - No, you're fine. I think in general, bears eat a lot more plant matter and berries and, you know, all sorts of things that people don't realize. Like they think of a bear and they're like, oh, it's a flesh eating machine. But in general, bears actually do eat a lot of other things.

Rachel - But the Atlas bear could have been different.

Nicole - Yeah. And I think that that's true, that, you know, people think that it wasn't as carnivorous as modern day bears, which are admittedly less carnivorous than the average person thinks. Just to make it nice and confusing for you guys.

Rachel - Atlas bears. Super cool.

Nicole - 1870. So there's another one. There's one more that is extinct. Well, I lied. I'm sorry.

Rachel - You keep doing that.

Nicole - There's, in this section, there's one more extinct animal that I want to talk about. This one went extinct in 2011.

Rachel - No.

Nicole - Do you know what I'm talking about?

Rachel - The northern, wait, no.

Nicole - It was declared extinct in 2011. The last confirmed sighting was in 2003.

Rachel - Declared extinct in the wild?

Nicole - Extinct.

Rachel - Just straight extinct.

Nicole - Yes.

Rachel - Oh, I should definitely know this, but I don't.

Nicole - That's okay. It's a western black rhino.

Rachel - Oh.

Nicole - Yes.

Rachel - Okay. Yeah.

Nicole - And these guys, periodically, every couple years, there will be another kind of flurry of information about them and people being like, oh, wow, the rhino is extinct. But yeah, they were just cleared extinct in 2011. The last confirmed one was seen in 2003. And so the IUCN Red List, which is kind of the end all be all for is it extinct? How endangered is it? That kind of information, you know, they will wait five years, just in case, to kind of see if maybe another one's found. So they proposed it as extinct in 2006. And then again, you know, five years later, they're like, okay, it's definitely gone. And these guys, their decline is very, very strongly correlated to over hunting in Africa. And then once there were, you know, protections in place, poaching became a huge issue for these guys.

Rachel - Yeah.

Nicole - So most of our other rhino species are very, very much critically endangered. And there are other subspecies of black rhino that are still doing okay. A lot of rhinos in Africa are actually collared and, you know, very closely protected because there are so few of them left in the wild. And, you know, the measures that people go to to try to keep these guys safe is actually pretty impressive. And honestly, I'd kind of like an episode just on rhinos because they do have a really interesting conservation story.

Rachel - You know, it's hard with an animal that is so recognized like the rhino is to really remember all of these different species' designations. And I feel like, you know, with this northern white rhino subspecies extinction that we've seen, you know, some people, I feel like, see those headlines, realize the entire species is extinct, it's just like one little offshoot of it, and then they kind of feel like they've been baited and lied to and that it wasn't actually a big deal. And I feel like they've been baited and lied to and that it wasn't actually a big deal. And I feel like that's an interesting point and maybe an interesting discussion to have too about like, well, these might be subspecies, why is that still significant? Why is that still a loss that matters? And how can we be better in our communication with people about what exactly is happening instead of just making people really confused when they go to the zoo and see white rhinos are still there and black rhinos?

Nicole - Yeah, definitely. And you can see these guys in zoos pretty often. I want to say, at least in North America, there's maybe like 80 black rhinos that you can find. I'm not sure about white rhino numbers. And most zoos only have a pair of rhinos and maybe they're offspring, since

they are so endangered. You know, zoos are trying to get those guys back out into the wild as much as possible.

Rachel - Did you want to clarify on the northern white rhino, their situation? The last I heard, they only have two individuals of the same gender remaining, and one of those may have died recently. I just can't recall. So they're functionally extinct unless they're able to... I mean, no, they're pretty, yeah. They have to do some Jurassic Park type stuff to get them back at this point.

Nicole - Yeah, yeah. So there's only two females, I believe. And even so, the black rhinos that do exist in the wild now, the populations are so spread out that it can be really hard for them to, one, find each other to make babies, or two, as these populations get more and more spread out, even if they can find each other within that population, then you start running into inbreeding and genetic bottlenecks and all this not great stuff. So there is, I believe, also work trying to spread around genes and making sure that we try to preserve habitat between these populations so that they can intermingle as much as possible. And that's true for conservation of any species. You really have to take, and we talked about this with the parrots, I think, you really have to take an ecosystem wide approach. You have to not just have these little tiny parks where they're safe, and you have to make sure that they have protections in the whole country or maybe the whole continent. And that we have these habitat corridors where they can move and move between and make sure that the genetic diversity is there so that the populations are not just existing, but are thriving. I have one more extinct animal that I want to talk about, and this one, I kind of want to have a conversation with you. Not that we haven't had a conversation this whole time, but I'm curious about your perspective on this. And I have a lot of feelings, and I try to not let them show through so that I can hear what you think.

Rachel - Oh, okay.

Nicole - But... So, did you know the plains zebra, like the zebra that you see all over the place, whenever you see a picture of Africa, and it's the savanna, and there's a zebra, it's a plain zebra, 100% of the time. They're everywhere. There's so many of them. And these guys naturally have a very wide variety of striped patterns, to the point where some of them might be mostly black instead of mostly white, and sometimes even have spots instead of stripes. And there was this subspecies of plain zebra that is now extinct, and it was called the Quagga. It's spelled Q-U-A-G-G-A. I had to look up how to say this guy.

Rachel - The qua-ha

Nicole - The Quagga. The Q is barely there. And technically, it's supposed to be the qua-hha. You have to have a growly noise. But that's hard for me to do, because I'm white. But it's interesting because their name, the quagga, is an onomatopoeia for the noise they make. You know qua-hha, qua-hha, that zebra noise that zebras make. And I'm like, oh my gosh, and that really helped me kind of cement how to pronounce it. Yeah, I love that. But the Quagga is now extinct.

It went extinct. The last one was in the Amsterdam Zoo, and it died in 1883. And they found these guys, at first they thought that this was a distinct species from the plains zebra. But in 1984, they actually were able to pull DNA from a taxidermied quagga that was being kind of redone. And there's a little bit of flesh on there, and they pulled DNA from that sample of flesh and found that it was actually a subspecies of the plains zebra and not a distinct species as we first thought. And these guys, what is interesting about them is that there's actually a breeding project going on in South Africa. It's called The Quagga Project. You can go to their website, [quagga-project.org](http://quagga-project.org). Again, it's Q-U-A-G-G-A and kind of learn more about them. And The Quagga Project is breeding plain zebras and, you know, selecting for fewer and fewer stripes on the rump. So the Quagga, when it was alive, had stripes on its neck and kind of on its shoulders and on its sides, but had absolutely no stripes on its rump or on its legs. So it was just kind of like a light brownish color, and there were no stripes at all. And The Quagga Project is claiming to bring back the Quagga from extinction. So I'm just curious as to your thoughts on that claim.

Rachel - That is very interesting. This sounds, I mean, I've already referenced Jurassic Park, but it does feel a little bit like that. But it's interesting because it seems like they're basically trying to take the same evolutionary steps, but the driver in this point is, instead of natural selection, just human induced.

Nicole - Yeah, which is how we go from, you know, that's how we get all these different breeds of dogs, and how we get all these different breeds of cats. Like, selective breeding is very, very powerful, but by them doing this breeding, are they really bringing back an extinct animal? You know, how will we ever really know? And we do have the DNA from an actual quagga. I don't know, I just thought this was a really interesting project.

Rachel - It is, and god, okay, sorry, there's so much going on in my head right now. Let me try and organize it into a few specific things. I got so excited, I had to get up on my chair and perch so that I could think properly. So here's my thought. I don't think that they can recreate the quagga. I don't think that they can say they've brought it back from extinction. I do think that they can come really close, and I do think that, especially with our DNA technologies being so quick and effective now, and having that DNA sample, I don't know if it's like a full genome. Do you know if it's a full genome?

Nicole - I don't think so.

Rachel - Yeah. See, that's probably difficult, because if they had an entire genome sequence, they could really analyze and say how close we get. But the problem here is that there is more to the evolutionary process than just genetic breeding. It's more than the genes. There's a lot of environmental effects that cause epigenetic changes in these animals that we know are incredibly environmentally influenced. I think some people have been publishing clickbait titles lately about this kind of stuff, where they'll talk about how your genes have memories and it's not the DNA and that kind of stuff. But there is some truth to that in the sense that our evolutionary past is much, much deeper than just our genes. And so there's probably features that we cannot

detect anymore that would be impossible for us to detect that we just won't be able to replicate because we don't know that they existed. And we can't replicate the environmental changes these animals went through that drove their original evolution into the subspecies. So I think that they can create quagga that look the same and maybe in some ways they will act the same and make similar vocalizations and stuff, but they probably would never be the actual subspecies. And we could never, from a scientific or ecological perspective, we could never study what these animals do if they were, say, set loose in an ecosystem and assume that they were behaving in a similar way to the extinct animal.

Nicole - No, yeah, I agree. And there, if you look up interviews with the people that are running this project, occasionally they will admit that we're only making something that looks like a quagga. But on their website, it says, I don't want to quote them incorrectly. Let me just pull it up.

Rachel - Oh, okay. I actually just Googled the website and I'm looking at the pictures of these animals. They're very cool. I see what you mean about the brown and the lack of stripes in the rump.

Nicole - They're very distinct looking, absolutely. And it's interesting to think about what drove the subspecies of plain zebra to develop these stripes or lack thereof and the dark patterning on the rump, that really dark brown, whereas a lot of zebras are exactly black and white. And a lot of these, it wasn't just one or two zebras that looked like this. There were so many of these that we thought they were different species. Whereas some of those other examples that I was giving, the really, really dark zebras or the zebras that kind of have spots instead of stripes, it's like one or two individuals that look like this. So it might be more of just like kind of a weird genetic mutation more than with the quagga. Obviously, there was something pushing these animals to look like this, like you were saying. And that's never something that we could replicate artificially.

Rachel - No, and sometimes the pressures are actually on a different part, like a sort of invisible part of the animal. And the patterning just happens to go along with it because of the way the genes are affected. I think the most obvious example of this that people can recognize is the red fox breeding projects that have happened where by selecting for quote unquote friendly domestic traits, a lot of the physical characteristics that we recognize in domesticated canids just happen to follow suit because they happen to be affected in similar ways by that breeding. So, I mean, it could be that it wasn't even selecting for the stripes that there was something else there, and we just have no way of knowing that because these animals are gone.

Nicole - Yeah, absolutely.

Rachel - But I guess if you take that logic, if you did select for the patterning, maybe you could bring out some of the other traits. But it's hard to say for sure if you've got the entire picture, if you don't have the entire picture that you're starting from.

Nicole - Yeah.

Rachel - I do think even with any concerns about the legitimacy and over inflating the work that's being done, I think it's worth doing the work. I think it's worth doing this experiment and seeing like, hey, are there some traits that come back? And we can make some speculations about that kind of thing. And we can sure look at their genetics and see like, oh, hey, when we selected these stripes, these are the other genes that got pulled along with it. And here's what we can compare that to and make some speculations on their evolution. But we can never pretend like it's an answer, like a certain answer.

Nicole - Yeah, and I think that that's kind of my biggest gripe with this project is it's really interesting. And I think, especially if they take it like you're saying, and they really look at the changes in the genome and, you know, what selecting for a different striping pattern did, if they take it that far, then absolutely power to them. But I don't know that they will, and I hope that they do. But right now, it kind of just seems like I don't want to make enemies, but it kind of just seems like they kind of wanted to do it, so they did it. And it's not that I think that that's necessarily wrong. It's not like I'm worried that, oh, no, they're playing God or anything like that. Or, you know, it's just that perhaps all the money and the time, maybe this project is kind of detracting attention away from more important conservation work of animals that are already here, like our rhinos. And, you know, there's even some species of giraffe that are endangered. But, yeah, it's interesting. And they have actually released some of the Quagga that they've bred. Yeah.

Rachel - Sorry, that seems dangerous. Yeah, that was my first... They could just breed. Yeah, they would just breed back into the zebra populations, the regular plain zebra. Right?

Nicole - Yeah, no, I was very scared when I saw that. But it turns out that they are releasing them into game reserves and onto fenced areas. Yeah. So they're wild, but separate, which is good. I was very concerned that they were just like, let's take this animal that's been in captivity and selectively bred for four or five generations and just throw it out there. One, they would ruin all their hard work. And two, I mean, you don't want to do that. It would mess with the genetics of the populations that were already there.

Rachel - We have enough horror stories of mistakes like that, exactly like that we've already made in the past across the world. We don't need to do it again. We should have learned by now. Yeah, this is very interesting. And you're right. I do want to point out, I think that at least for me personally, I want to be careful implementing too many things like what about isms with regards to what we choose to spend our resources on. And that kind of thing. Well, because you know, like there's different pools of resources and people have different varying abilities to contribute to conservation and stuff. But that's not to negate anything that you said, because I still think it's fair to be like, hey, should we continue pouring resources into this one endangered species, for example, when there are so many others that we could actually save without as much human intervention? And I think those are good conversations to have. And I think that

that's totally fair. Just acknowledging that there's sometimes a lot of more complex things that go into those decisions, and that's understandable.

Nicole - Oh, yeah, for sure.

Rachel - I'm not trying to defend this project, so I don't know nothing about it, but I'm just saying.

Nicole - Right, yeah. Please, Quagga Project, don't get mad at me. I'm just voicing opinions. I don't have any control over any money, so don't worry. I just have opinions, and I like shouting them into the world.

Rachel - Don't we all?

Nicole - Yes.

Rachel - Well, fascinating.

Nicole - Yeah, yeah. I just thought it was a really interesting project, and I kind of went on a rabbit hole with them, and I found some cool videos that I'll definitely post on our blog post for this episode, so check them out if you're interested. And if you find... Well, never mind, I was gonna say, if you find resources on protecting any of these species, having literally just forgotten everything is extinct, so it doesn't matter.

Rachel - Aw, no, okay, okay. So, okay, that was really loud. I blew out my mic.

Nicole - To get away from the doom and gloom, there are a lot of really, really cool, amazing conservation efforts that are going on in Africa, especially around, you know, those large, charismatic megafauna-like elephants. And some of the most successful ones usually involve bringing income to those local communities that are there already. Things like ecotourism are obviously very huge in Africa. And there are many organizations that will funnel that money directly to the people that need it. So if you are going on a vacation to Africa, make sure that you, you know, research your travel agency, research your tour guide that's giving you their time, and you're giving them your money. Because sometimes those organizations are not so great, and sometimes they are really awesome. So take that time to make sure that your money is going towards a reputable organization. And that's true no matter where you're traveling.

One of my absolute favorite stories of really cool conservation work is the story of the elephants and the honeybees. Elephants are big. They're destructive. They will absolutely destroy a farmer's crop field. However, elephants also are terrified of honeybees. So they found that if you kind of circle your crop field with several honeybee hives, the elephants will be too scared to go past the hives to then eat or trample your crops. So now you have a natural deterrent rather than, you know, shooting the animal or scaring it away or, you know, building a fence that then will block their migration routes and all that fun stuff. You just have a row of honeybee hives and that farmer now has crops that are safe and he also has a second source of income in the

honey that those honey bees are making. So I love it. And the honeybees are helping pollinate their crops as well. So win, win, win, win all the way around. Something that complicates the conservation of megafauna in particular is this is a really big animal. They need a lot of food. They need a lot of room to roam to find that food. And they're slow to mature. So it takes a long time for a little giant to turn into a big giant that can then have offspring. But there's a lot of advantages to being giant sized as well. And that's why we used to have a lot of megafauna. For herbivores, a giant body means a giant digestive tract to help break down plants because plants are really hard to break down. If you are giant, you have very few predators. And then if you're a giant carnivore, that means that you can eat a lot of smaller things. So there's advantages to being a megafauna, and there's also disadvantages. And their conservation story is constantly evolving. But there is hope. There's a lot of organizations out there that are doing a lot of really cool work with these guys.

Rachel - Excellent. Well, thank you, Nicole, for teaching me so much. Thank you to our listeners for listening to our podcast. As always, if you enjoyed this episode, please share with a friend and consider leaving us a review on Apple Podcasts or Podchaser. It really helps us a lot and it makes us smile. So two great things right there. Give us a follow on Facebook and Twitter, or leave us a voice message or text us. All the links are in the thing that has our description right there next to your podcast app. We'll even give you a shout out for that love. And I guess that's it. So we're signing off.

Nicole - We'll catch you on the flip side.

Rachel - We'll catch you on the flip side. And remember, if you're feeling depressed about the state of conservation, then go do something positive for conservation. Excited to see you guys next week.