Carnivore Ecology with Dr. Rae Wynn-Grant
Ologies Podcast
February 9, 2022

Oh hey, it's that little burp that just congratulated you on taking fish oil – hey, well done – Alie Ward. Back, *Ologies*, Carnivore Ecology. Meat eaters, what's their deal? What's this ologist's deal? Well, I begged her to be on, she said yes, and then a few days before we recorded, a little thing called SARS-CoV-2 appeared like a little dream-stomping pixie. Also, she had a brand-new baby and like 15 jobs, so we were like, "Let's raincheck." I was like, "I get it. We will have you on anytime you're ready." But meanwhile, we did the two-part Ursinology bear episodes without her but talked about her work in them. I visited a public library in Missoula, Montana and happened upon a life-sized poster of her and I stared longingly, just mumbling to no one, "I almost know her... I love her." Then, a few weeks ago, the proverbial bat phone rang. It was time!

She had time, I freaked out. I got a sweat mustache, I pored through the hundreds of questions submitted via Patreon.com/Ologies; you too can join for as little as a dollar a month, just saying. Then I talked to this California-born genius and media queen. She got her undergrad in environmental studies at Emory, got a master's at a little startup called Yale, and then became a doctor in ecology and evolutionary biology at Columbia University. She is an active, working, carnivore ecologist; 'carnivore' coming from the Latin for flesh devouring. Her job involves tromping around grasslands, and forests, and prairies, and jungles, tracking charismatic beasts like she's in a children's book or a fever dream.

She is a National Geographic Explorer and a research fellow, she's an affiliated researcher at UC Santa Barbara's Bren School of Environmental Science and Management. And then when she's not doing that, or being on the board of several science organizations, you can find her on camera, hosting things like "Crash Course Zoology" on YouTube. She also has her own PBS podcast now called *Going Wild*. You may have also seen her in the PBS special, *American Spring Live,* where she was cradling tiny baby bears, while snowflakes fell softly past her radiant smile and onto, once again, tiny baby bears she was cradling, in her arms. So, the first question I wanted to ask her was, are you even a real person? Because you're perfect. So, let's just meet her.

But first, thank you to everyone who tells a friend about this podcast. The iHeart Radio Podcast Awards were this week and y'all, we were nominated for Best Science Podcast! ... [*quiet but excited tone*] And we won! We won! I was watching the livestream from my kitchen this week and I was just munchin' on crackers. The moment it was announced, I was just, f- f- face full of crackers, absolutely shocked. So, thank you to everyone who has built us up just by listening, and telling friends, and rating, and reviewing. Each week I read a fresh review, just to prove that I see every single one and this week's was from For the Love of Blood who very sweetly described the show as:

> *Phenomenal fungi in a field of dung. A five-star audible experience.*

Thank you, Love of Blood, and wow, Love of Blood, perfect timing for a carnivore episode, I'm keeping an eye on you. That's weird. Also, big hugs to Type1ScienceTeacher, you know why.

So, get ready for flimflam, hibernation, cuddling, predator attacks, weird sleep schedules, career juggling, and why you should show some restraint at an all-you-can-eat sushi buffet, plus lions, tigers, and of course, bears with explorer, media icon, and my longtime ologist crush who texted back, large carnivore ecologist, Dr. Rae Wynn-Grant.

Alie: Hello?

Rae: Oh hi!

Alie: Hi, Dr. Grant!

Rae: Oh my goodness, it's finally you! Or I should say, it's finally me, honestly. [*laughs*]

Alie: It's us! Oh my god, how are you?

Rae: I am really happy to be speaking with you, Alie. Sooo happy. We've never met, ever, ever, ever and so I don't *know* you, know you. But I, of course, admire you very much, and we have acknowledged each other a zillion times on social, and it's just... [*both giggle*] I feel like we need to be friends.

Alie: Likewise. I feel like I'm such a breathless fangirl about you.

Aside: I continued to fawn over Dr. Wynn-Grant for an additional three-and-a-half minutes here until I was like, Ward, get it together. Cut this out. Ask this woman some damn questions, this is uncomfortable. So, let's get to it.

Rae: So, let's do it. Let's hit it.

Alie: Let's get into it. Okay, so I have known you as a carnivore ecologist. Can you explain exactly what is that? And even what is a carnivore? Because there are carnivores that are omnivorous, correct?

Rae: Oh, absolutely correct, absolutely. So, I am a carnivore ecologist, and just to break it down, an ecologist is a type of scientist that does ecology. [*"Mmk. What's that?"*] Ecology is the study of organisms and how they interact with their environment. And I think that's really distinct because it's a field of biology, but biology is just the study of living things, and ecology is special and I just love to emphasize it; it's the study of organisms and how they interact with their environment. And then I'm a carnivore ecologist which means I study carnivores, and essentially, those are meat-eating animals. But Alie, to your point, not all carnivores eat meat.

Alie: [*high-pitched*] What?!

Rae: Yeah.

Alie: What?!

Rae: Yeah!

Alie: How does that work? [*laughs*]

Rae: I have to say, I used to get confronted with this so much, especially in graduate school. I'd take all these tests or oral exams and professors would be like, "But are bears really carnivores?" So essentially, the reason that we call carnivores carnivores is because of taxonomy. As scientists, we fall back a lot on taxonomic trees and just where we have placed species in our understandings of them compared to each other. So, in taxonomy we have a taxonomic order, called *Carnivora* and there's over 280 different species of mammals in *Carnivora*.

Aside: Okay, so you can just call a vegetarian animal, or an omnivore, a carnivore? How? Why?

Rae: So, *Carnivora* is an order of mammals and it's defined by these animals that have super sharp teeth and, typically, very long claws, and a ferocity; they're these ferocious animals

that are able to hunt and kill. *And* they all have digestive enzymes, or basically, a gut microbiome that is able to process meat. And therein lies the clincher because it doesn't mean that a carnivore has to eat meat. They don't *have* to. But they could if they did.

Alie: Augh. Okay, so they have the microbiome, but also the enzymes to support the microbiome that can break down meat.

Rae: Yeah, yup. [*Alie exclaims*] And so, this can be surprising if you take something like... and I'm probably going to talk about bears a lot here, but if you take something like a panda, which is one of the eight bear species, it eats bamboo all day, but it's in the order *Carnivora* and it has the teeth, the claws, and the microbiome to process meat. So, it looks like the ancestors of the pandas we have today probably at the least ate insects. At the very least they probably grabbed a whole bunch of grubs, or larvae, or something and chowed down on them. But at most, maybe they did more than that; maybe they hunted prey and really ate meat. They still could, technically, if they wanted to.

Alie: Well, which carnivores are true carnivores that eat 100% proteins and other living animals? And then which ones are more generalist or omnivore? Or does it really depend on their proximity to urbanization?

Rae: Sometimes it depends. We do have what we call obligate carnivores, and those are a lot of our favorites; those are the lions, the wolves, the tigers. [*"Oh my!"*] Those animals hunt fresh prey and eat raw meat. They're not going to stroll through a berry patch [*both laugh*] and chow down very much. So, we do have those obligate carnivores. Even take polar bears for example; they hunt, they kill, they eat meat, and that is what they need to survive all the time. For those animals, their ecologies are slightly different than other carnivores because they are so driven by having to hunt. That's really how their whole lives are structured, are around, finding prey, finding prey, finding prey, and maybe stashing food if they did kill something. You know, take a mountain lion, for example, if it does kill maybe a deer and it eats as much as it can, it'll also find a place to cache that prey for later so it can come back to it, often enough.

Alie: Like up in a tree or...?

Rae: Like up in a tree, yeah, or some kind of hidden place because they have to expend so much energy just to get their prey, just to get their food, they don't have this dietary breadth that the omnivorous carnivores do.

So then, the omnivores are a lot of different bear species, we find coyote, and raccoon, possum, some of these mesopredators are able to definitely eat meat, but they can also scarf down a good root vegetable, a tuber. They love fruit, sometimes even grasses, honey, all those kinds of things also fuel them. And they're more concerned with getting fat. And so, they're like, "Whatever will get me fat. It might be protein, but it might also be carbs. Whatever will make me fat," is what they can eat. And then they have a wider dietary breadth, and that means that they can survive in many different types of landscapes.

Alie: Does studying all of this and also the diets of all of these animals, does it change the way that you eat at all? Do you make yourself say like, "You know what, I probably could use more antioxidants or..."? [*Rae laughs*] Does it change your choices at all?

Rae: I have literally never thought about that question. It's such a good question. I would say probably the answer is, no. But at the same time, I think I find that when I'm in a place where bears are, for example, eating a lot of salmon, I think I'm way more likely to eat fish.

[*Alie laughs*] So, I probably have a more salmon-rich diet in the places that bears are eating salmon. But honestly, it's not that different.

My diet, as a carnivore who is also omnivorous – people fall into this classification as well – I feel like my diet changes every couple of years. There are years where I'm like red meat heavy and there are years where I am attempting to be a good vegan, and there are years where it's across the board.

Aside: So, what fuels her from a molecular level may change, but what fuels her passions? (What a hack segue, but I did it anyway!)

Alie: When it comes to studying this, what was it about carnivore ecology that really got you?

Rae: Oh gosh, you know, I am... I don't want to really call myself basic, but I am a little bit basic in this way that, when I was a kid, I got hooked on nature shows. In particular, what stood out to me was scientists in the jungles of Asia studying tigers. And to this day Alie, I still have never seen a tiger, I've never been to tropical Asia, I've never done it, but it was something about tigers. It was just something about seeing tigers on the TV, learning that they were endangered, learning that they were also powerful and capable, and just these supreme beings, the largest cats, and just incredibly impressive. I think that once I finally got the opportunity to start studying wildlife and wildlife conservation that I thought to myself, "Well, I'm going to get as close to tigers as I can possibly get," and that landed me in this world of large carnivores and I'm very happy here.

It's not just because they're cool and impressive and as a society, we're really interested in them. But also, many large carnivores are ecosystem engineers. Them being at the top of what we call food chains, really makes a difference, and the conservation of these animals makes a huge difference for healthy, vibrant, balanced ecosystems. I'm like, 16 years into studying the environment... I do it today both because I think it's awesome, [*laughs*] I think these animals are awesome, and cool, and make for great stories and all that, but also because I know that starting from the top is very, very purposeful and keeping these animals around in these ecosystems is worth it and it's needed.

Alie: Do you ever look back on the things that influenced you as a kid to love nature and places that you wouldn't get to see otherwise, these amazing documentaries, and David Attenborough, stuff like that... I know I used to park myself in front of like, Discovery Channel, that was my [*moan of relief*] that was my zone. Do you ever find it lamentable that there's not as much of that programming on basic cable as there used to be? Or do you feel like there is, you just have to find it digitally, or through different smaller channels?

Rae: Oh gosh, no, I miss it, I really miss it. I think of what's actually out there in terms of programming… but if I'm on the right track, I would argue that we don't have, like, a household name, or several household names of people, individuals who are kind of the faces of natural history content. There's a lot out there that is super educational and I'm fortunate that I have young kids and they also love watching nature shows. So much of it is the blue-chip wildlife documentaries that are *fascinating* and they're enthralling, and they always have an awesome narrator and they're *so* good. [*Morgan Freeman narrating: "To explore, to observe, to understand the wider world we call the universe."*]

So, as much as I'm applauding them, I also feel very much that putting a face, seeing an individual, or two, or ten, in these spaces either interacting with the animals or explaining what they see on screen, is something that I really miss from my childhood. We got a lot of it back then and it's what helped me see myself as a part of nature or see that there's a career

that relates to this. I definitely don't necessarily think that the early- to mid-90s fear tactics that were all over the media are necessarily what we need to bring back because I remember thinking, "Oh my god, the world is going to end. If one more person litters, that's it, we're done for." [*both laugh*] We don't need to bring that back, but there was definitely a lot of messaging going on then, that wild animals were in trouble, but we can do something. But it seemed like you needed to learn a lot to become a person who could do something. Maybe that's what hooked me, was that I was like a soldier. I was like, "Okay, sign me up, I'm ready to be one of the people to tackle this problem."

I remember in the '90s, when I was a kid, bald eagles were on the brink of extinction, and they were our nation's mascot, and bald eagles are so symbolic, and it was like, "Oh my gosh, we need to figure out how we can work together to save these bald eagles," another awesome meat-eating animal that I think is incredible. And we did, we figured it out! Now, bald eagles are all over the place. And the same with a lot of the bears I study. Black bears, definitely; grizzly bears, they weren't doing so great, but we really kicked up conservation work and committed to a lot of things and, one way or another, we've got a lot more bears today. [*"Well done."*] And that messaging of, "This can work," I feel like is also not necessarily getting out there through the media today, maybe because we don't have those spokespeople that we used to have.

So anyway, I say all that, but I also really want to say that media is better than ever. Media is awesome these days, it's going very well. And I am old-fashioned [*both laugh*] so, that's my disclaimer.

Alie: I feel like you've been on PBS, we've gotten to see you crawling around in the snow in a bear den [*Rae laughs*] and holding, cradling, a baby bear, with permits, for science, [*Rae says, "Hi. So, this is one animal, one cub, we'll sex them in a little bit." Little groans from bear. Rae continues, "This is number two. And again, we just have to see exactly how many cubs are here with the mother, it's at least two, it could be three."*] for money, as your job, on television.

Rae: It's true, it's true.

Alie: So, how is that for you to also be working on a podcast, to be working for PBS, have posters of you in libraries and be like, "Oh shit, hold on, that's me!"?

Rae: It's completely surreal. Thank you for all those compliments. [*Alie laughs*] Thank you for keeping up with what I'm doing, I aspire to do more. I have been so fortunate that science communication has become more and more valued in the world and even in the institutions where I've been working because I *love* it. I love it. I love research, don't get me wrong, doing research is exciting for me. And I love science media so much and I love that I have been embraced in science media. I think there's some really awesome things on the horizon, including working with PBS Nature and putting out this awesome podcast that's telling stories. So, it's been surreal for me, it's been really surreal. I have to say, I'm pretty bashful about it, I'm a little shy. And I say this as a true extrovert, it's weird.

Alie: No, you're amazing, you're amazing. Everyone loves you. [*Rae laughs*]

Aside: So, Dr. Wynn-Grant splits her time as a media host and personality and a straight-up field biologist. What is a carnivore ecologist's job like?

Rae: A day in the life for me is really different each day. So, I have an active research project, I'm super proud of it, it's *really* cool. I am studying a population of black bears and mountain lions at a nature preserve on the central coast of California. And I have a lot of reason to believe that this population of bears and lions has very unique feeding behavior. [*"Tell me*

more."] What I'm hinting at is that I think these bears and mountain lions access the coast. So, they live in this beautiful oak woodland forest, quite inland, but it looks like, fairly frequently, they make their way onto the beach [*Alie squeals*] and eat food from the beach. We are finding the skeletons of seals and different pinnipeds far into the oak woodland forest that mountain lions have hauled in there, and we are finding black bear tracks on the beaches every morning. So, there's a lot of questions.

This research site has not had previous carnivore research done on it, so I'm the very first ecologist to do carnivore work here. It was private land for, actually, more than a hundred years and it became a nature preserve just a couple of years ago, and then it was closed for COVID [*laughs*] for a couple years, and it has been opened for the last 5 months. I have been out there for the last 5 months, and I think I will be there for the next 5 years, or 10, or 20, trying to figure out, are these mountain lions, are these bears relying on marine animals for their food? And if so, is that a new behavior, are they doing that because there's a lack of food resources elsewhere, because human pressures have forced them into this point, or is this actually what bears and mountain lions have always been doing in this region and it's not documented?

Aside: PS, I looked this up, I had to. Just to set the scene, this is a 25,000-acre parcel of land, north of Santa Barbara; that's more than twice the acreage of Manhattan, people… it's very large. That is 8 miles of California coast, it's home to about a dozen endangered species. So, imagine tide pools in the shadow of rocky cliffs, which give way to rolling golden grassland. There's chaparral and scrub brush, century-old oaks and pines, all mostly unaltered from evolution.

So, who owns this heaven? Not you, I'm sorry. So, it used to be a cattle rancher's land but in 2017, there were these two tech billionaires that gave the Nature Conservancy 165 million dollars to buy up the land for research and ecological observations. And I know you're thinking, "Nnh, couple of bros who probably get up at like, 3 AM to drink their own pee on a treadmill and make an app to rip off Wordle and then just write a check." But actually, it's named the Jack and Laura Dangermond Preserve, after two Geographic Information System, or GIS map developers. They created something called Esri which is the Environmental Systems Research Institute that's used all over the place. They are in their 70s, they're cute, they're married, they're casually worth 8 to 9 billion dollars, but they give it away to good causes, like, getting a record of what is happening ecologically.

Rae: You know, and again I'm saying not documented because there's also a really strong and important legacy of the Santa Ynez Band of Chumash Indians. Their heritage is from this place and there were many people for thousands of years living in this place. And the Santa Ynez Band of Chumash Indians are extremely involved in the conservation work being done in this nature preserve. And yet, they don't necessarily have a traditional ecological knowledge that speaks to what mountain lions and bears were consuming. Their presence, absolutely, a lot of their other behaviors, absolutely, but not necessarily their diets.

So, it's a question. It's a question that all of us want to answer, what are these animals eating and why are they eating it here? And if they are dependent on marine resources, what does that mean for how we design conservation in the West moving forward? So, I'm super fascinated by these questions, it is awesome to be working with mountain lions. This is my first time working with mountain lions. I am going to be up close and personal with them. It's wonderful, it makes me giddy [*laughs*] just talking about it. And then also being able to contribute to discovery, to discover a secret that these animals have, it's really exciting.

So, I'm fortunate that I get to drive to my field site, it's about an hour from where I live. For most of my career, I've been flying halfway around the world to access my field sites [*both laugh*] so it feels really good to just be able to commute like a regular person. So, that's what I do, that's my research life, that's my data collection life, my research life, my professor life.

Alie: How are you collecting your data? Is it, like, camera traps? Is it going out at 5 in the morning and looking for tracks and measuring them? What records do you have to keep?

Rae: Yes, okay yes, great question. What is the data? Or I should say, what are the data? Gosh.

Alie: Right, I do that all the time.

Aside: Data is the plural of datum and if you care about correcting people who say, "What is the data," then I just want to say, huge congratulations on not having any other problems in your life.

Rae: So, my favorite way to collect data is to put a GPS collar on an animal. That is the work that I've done for basically my entire career, working with large carnivores. It's this interesting balance... It's a little bit invasive because it requires trapping and sedating the animal for a short period, like 30 minutes, to get the collar on it, but then not having to interact with it again for a year or two, which is really nice. So, just putting this collar on a bear, or a lion and the GPS device [*beeps and tinkles of communicating devices*] sends a signal to a satellite in outer space, which sends a signal right back to my computer and tells me the longitude and latitude point of this animal, about every 4 hours. So, you can imagine that over the course of a year, I'm getting many thousands of location points and it allows me to see, "Well where is this animal spending a lot of time? When it does go from Point A to Point B, which pathways? And then, if other animals are taking the same pathways, let's figure out how to protect those pathways."

Aside: Okay, so that's the work she does; tracking lions and bears, maybe not tigers, yet, but oh, boy howdy! What a job. So, thems the whats, but let's talk whys.

Rae: If we have a forest, a lot of times we think, "Forests are important for bears." And that is true, but a bear isn't going to use every square inch of a forest. There's going to be some areas that it uses all the time, maybe because it has the food it needs or the shelter it needs; and then some areas that it's going to avoid completely. It's really important to understand those differences and those patterns so that we can figure out where to put our efforts in protecting certain landscapes. We don't need to put a ton of effort into protecting a part of the forest that wild animals never use. But we need to know that information before we make those plans.

So again, conservation is very applied, it's very practical, applied work. And the ecology that comes before it is very theoretical and gives us the information we need to make really sound conservation decisions.

Aside: So, you can't conserve what you don't understand. And you can't understand what you don't know, and you don't know what you can't detect. What's my point? GPS collars... loves 'em.

Rae: That's part of the data, that's my favorite data [*laughs*] that I collect is the GPS data. But also, camera traps, Alie. I mean cameras are… talk about noninvasive. They're an excellent way to figure out where animals are, which areas they're moving through, et cetera. Sometimes you luck out with camera traps, sometimes you really don't. There's an element of chance to it; your animal could always walk right behind your camera, [*laughs*] over, and over, and over

again and you're getting data that shows "Nope, bears never use this pathway," when in reality they're just right on the other side. So, there's an element of chance with them. But for the most part, they're a very useful tool for us, as humans, to get way out of the way for animals but still be able to observe what they're doing, who is around, how many mamas with cubs or kittens, how many big males, and what the timing of the movements are like.

So, I have camera traps set out, and I have students that have been setting out camera traps all over the nature preserve where we're working and we're getting some great information. I have to say, one of my students set a camera trap and got an image of a coyote recently that had a seal's flipper, like a severed flipper from a seal, in its mouth [*laughs*] and had like scavenged it from the beach and was bringing it back inland. So, it's really exciting stuff that you get to see from those cameras.

Alie: Oh my gosh. I mean, it must be like your birthday every time you take out an SD card and you're just like, "Let's see what's in here!" or every time you're getting uploads.

Rae: It's so exciting. In fact, earlier this year I was actually filming someone else's show... I had a really great time appearing on this other person's nature show. We had set camera traps as part of the show, to show people how we do it. And then on camera, they captured our reactions of us looking at the results of what we saw. [*both laugh*] And I can't tell, I can't disclose what we saw in the camera traps, but I cried and that was not part of the plan. It was a serious science investigation, but I was so moved by what we were able to capture that when this show comes out, you'll see my crying [*laughs*] while just going through the data. Like you're saying, it can be very magical. It can be super disappointing, but it can be really, really awesome and just reinforces a lot of that purpose for why we do what we do.

Aside: Oh, back to three dimensions though, because when can I ask someone this question? Other than almost never.

Alie: Actually, one follow-up question: When you have a tranquilized wild carnivore, are you ever like, "I hope that this anesthesia works?" Is there ever a carnivore that is just, for some reason like, "Surprise!" How do you know?

Rae: Oh gosh, oh gosh. You know, that has not yet happened to me with a large carnivore. We always have backup drugs. It's one of those things where you don't want to give any of these animals very much of the sedative. It won't *hurt them* hurt them, but it's just not... even for a person, you just want to have the right amount. You don't need extra, it makes you groggy, it's a little weird. So, I always have a backup little syringe just in case the animal starts to wake up and I'm not done or something. But I'm happy to say I've never had to actually use it.

But one time, one time, not a carnivore, but I was working with lemurs in Madagascar, and it was my first time working with a small-bodied mammal. For me, from my background, it was a small animal, and I didn't give her very much of the sedative at all because I just wanted to be gentle with it. But she started waking up while I was still collecting data from her and she was going to escape because she's a primate. She was just going to dash off and go up a tree and it had taken literally weeks to capture her. This is actually a story that I detail in my podcast, so this is a great place for me to plug my podcast. Episode 1 of *Going Wild with Rae Wynn-Grant* tells this whole story of how I almost failed miserably at my one chance to help save a population of lemurs.

But I ended up having to give her a second dose of this medicine and it was one of those decisions where I felt so insecure about it because we were in the middle of one of the most

remote parts of the world I have ever been, and I was working with a population of primates that I wasn't familiar with, I had gotten enough training to legitimately be there and be working on them, but I just had so much insecurity because of this little petite body of this little animal. So, I under-sedated her and almost lost this critical piece of information, and luckily, I just added a little more. But to your point, it wasn't because I was in any kind of danger, it was more because she was almost the one that got away.

Alie: The one that got away, the lemur that got away.

Rae: The lemur that got away. [*laughs*]

Alie: Would have broken your heart! Well, people obviously adore you, [*deep voice*] they're very excited you're on.

Rae: You're too kind.

Alie: Can I lob some questions from listeners at you?

Rae: Oh my gosh! Yes please, wow! Yes!

Alie: You have been forewarned that *the* Dr. Rae Wynn-Grant is on, they're very excited. Okay...

Aside: Okay, your hot burning questions. But first, we like to take money and stuff it in people's pockets, and Dr. Rae Wynn-Grant chose this week's donation to go to the Texas-based nonprofit BlackOutside.org because only 1% of Texas State Park participants identify as Black or African American. So, Black Outside was founded with the simple mission of reconnecting Black/African American youth to the outdoors through culturally relevant programming, inspired volunteers, and connecting youth to the powerful history of Black people in the outdoors, to ensure safe and equitable spaces outside. Also, their merch is the first Black-owned gear shop in the nation. And did I just buy an owl shirt from there? I did. Again, check out BlackOutside.org, the link is in the show notes. And that donation was made possible by Ward-approved sponsors.

[*Ad Break*]

Well, this guest is just a *ray* of sunshine, and we all *win* when she *grants* us answers to your questions. Rae Wynn-Grant. Patreon questions. Let's go.

Alie: Great question, a lot of people asked, I'm looking at Yasmine Shelley, Batman Flight, Aly V, Lauren Cooper. They want to know, in Lauren Cooper's words: Why does their poop smell like rotten death? [*Rae laughs*] Why so stinky? Is it stinky to all animals? Wow.

Rae: Oh my goodness, and this is carnivores in general... yeah?

Alie: Carnivores in general. As a carnivore ecologist, I'm sure you've been around your share of wild dookie. Why is carnivore... Is it just because of rotten meat...? Because rabbit poop isn't something that you're like, "Oh my god, I stepped in rabbit poop, I'm burning my shoes." You know?

Rae: Right, right, right. This is so funny because, honestly, poop is a big part of my life, [*Alie laughs*] as a carnivore ecologist, a big part of my carnivore ecology life, I interact with poop a lot of the time. In fact, if you were to open my freezer right now, [*Alie laughs*] I have bear poop in my freezer from a friend's yard where a bear came to visit and I, you know… Anyway, so it's a great question and I would almost push back and say like, have you ever smelled horse poop or bison poop? Herbivores can have some stinky poop too.

But I am not disagreeing. Carnivore poop smells yucky and yeah, it's flesh and the waste that comes out of digested flesh, so it's gross. And also, because some carnivores are, like we've been saying, omnivores, sometimes this variety of foods creates more of a stinkier poo.

With that said, I have to say the poop that I interact the most with is bear poop and it dries pretty fast. I will say, when I come across carnivore poop, it's usually not fresh from the butt of the animal [*Alie laughs*] and so it's usually dry, and when it's dry it doesn't smell that bad. But the bears that, you know, when it's feeding time for salmon, that's particularly fragrant and it is particularly unpleasant because these bears just go through salmon so fast, it's almost like diarrhea. It's loose, gross, just kind of *blergh*, black, tarry, poop. [*"Very important information to share!"*] I don't want to get too graphic on your show Alie.

Alie: No, this is important, this is important information. I mean, who knew? Does a bear poop in the woods? More like, "Does a bear have sushi diarrhea in the woods?" Because that's really what we're talking about here. But don't they have a hibernation butt plug?

Rae: Oh my gosh! I know you did your whole show on bears already, Ursinology, I should say. But my goodness, hibernation is just so fascinating and totally wild. Because yes, speaking of poop, bears *don't* poop while they hibernate. And some bears hibernate for a couple months, but some bears hibernate for like, six months. And they don't poop, they recycle their own waste within their bodies and their metabolism really just shuts allllll the way down. So, they're not eating, but also, any waste recycles itself in their bodies. And that is just this superpower that bears have that we all need to bow down to because it's amazing.

Alie: I mean, what happens with protein breakdown, fat breakdown, ketones? Isn't that something where, in humans at least, you've got to get rid of those metabolites? Do they pee while they're hibernating?

Rae: They don't pee, they don't pee. And I will say that scientists, god bless us, but there's some debate in the scientific community about what actually happens in hibernation because for the most part, we don't see it. Although people like me will sometimes enter a bear's hibernation den, I don't stay there. [*laughs*] So, we haven't really been able to properly observe a hibernating bear, in the wild at least, ever. So, it's a lot of estimations, educated guesses, et cetera.

But the medical community, the human medical community, is doing its best to learn a whole, whole lot about how bears' bodies make it through hibernation and make it through without harm to our internal organs, without problems with ketosis, et cetera. And the medical community does think that there are some things we can learn from bear hibernation that could be very, very useful to humans in terms of metabolism and weight loss, in terms of improvements to our understanding of diabetes.

I will say there are some folks at University of Minnesota who are looking at the plasma in bears, the actual blood coursing through a bear's body changes, its properties change when it's hibernating and they serve as these preservatives, essentially. There's this idea brewing that there's something about the plasma of hibernating bears that could actually be useful to preserving human organs during organ transfer. If you're an organ donor and unfortunately you pass away and your organ is still viable, there's only a little bit of time before it can be placed in the recipient. Sometimes it's like 2 hours and we actually lose a good amount of organs in transit and a lot of people die because we just can't keep a heart or a lung alive to get from its donor to its recipient. There's this idea brewing that maybe there's some property of bear plasma that if we either use it or recreate it, it can preserve the vitality of

human organs much longer, maybe double the amount of time so that we can get people their organ transplants at a better rate. That could really revolutionize medicine.

So, I have to say, I have to hand it to bears. We're learning a lot about them, we're learning about them slowly because we need to give them their space while they hibernate, but they might have some incredible, incredible answers to some pressing medical problems.

Alie: God, that's so cool to think that there's someone in a lab right now analyzing bear plasma. What a great field!

Aside: I'm looking at you Dr. Paul Iaizzo of the Visible Heart Laboratory. And for more on his work, you can just stroll through papers such as "Plasma levels of ursodeoxycholic acid in black bears, Ursus americanus: seasonal changes." I poked around the Visible Heart Lab website and learned; hibernating bears go 10 to 15 seconds between heartbeats. Your sleeping heart rate: 60 to 100 beats per minute. A bear's sleeping heart rate? [*super slow motion*] 5 per minute. And when they inhale, their heart shoots up, 60 to 70 beats per minute and then it slooows back down. So, one day, you or someone you love may have a life saved because someone studied sleepy carnivores. But carnivores, they have heart, let's get to their brains though.

Alie: We have so many great questions. Chloe, first-time question-asker, wants to know about carnivores: What exactly do their levels of cognition reach? What kind of thoughts/emotions/situations are they fully capable of processing?

Rae: Oh boy, that is a tough one for me because it's a little bit outside of my expertise, but I'll give a bit of feedback. And again, I'm very bear-centric here. But most large carnivores are very smart and I think that is obvious because you wouldn't be asking that question if she didn't know that they were smart. Most of them are what we as humans consider smart, and bears in particular have one of the largest brain-to-body size ratios of any land mammal, so they are particularly considered some of the smartest carnivores because they have these huge brains compared to their body size. It makes sense because if you think about the circus or something, [*circus music plays*] back in the day we would capture bears and train them in the circus because they can perform, they can learn, they can perform really well. We can use them almost like our pets sometimes and that is unethical these days. [*record scratches*] But it was useful in the past because we could rely on their smarts.

And then take others, take wolves. We have these ideas that we got domesticated dogs from wolves because there was a learning process, right? When wolves would interact with humans over time, some wolves that took certain types of risks with their interactions with humans got certain types of rewards. And if they repeated that over and over, they became closely tied to humans and eventually were able to evolve into domesticated dogs. So, we have this idea that carnivores, large carnivores, and again, this is very general, are making decisions. A lot of the decisions they're making are fueled by instinct, and their instincts are usually pointed towards food. So, they're driven by hunger, for sure. [*"What could be more important than a little something to eat?"*]

But what I think has been super interesting, especially when I used to study lions, African lions in parts of East Africa, is that if you have a carnivore like a lion that is *not* hungry, studying its behavior when it's not hungry is really interesting. Because they all of a sudden become way less dangerous, way less protective of territory, very, very lazy almost, kind of giving this easy life. So, they're able to make choices, especially when their needs are met, they're able to think and make choices and really kind of impress us.

I know part of the question was about emotion and that's where I'm going to bow out because there's, again, a lot of debate in the scientific community about whether these animals feel particular emotions. If we look at mother-offspring relationships, if you were to ask me, there's more than just a chemical bond there. I really think there is something truly special and organic and emotional between these mother carnivores and their offspring, but I can't prove it, so…

Alie: Well, that dovetails kind of perfectly and tragically with the next question that we got from Kaylalala, Mo Casey, and Hannah Nuest. Hannah Nuest asked three questions about this, starting their third one with: Sorry, another weird cannibal question. [*Rae laughs*] Is cannibalism most often animals eating their own babies? And Kaylalala said: Could you please discuss animals eating their young, like lionesses eating their deceased cubs? When it comes to being a carnivore, how snacky-snacky on your own species or kin does it get?

Rae: Ooh! Yeah, there's a lot of misinformation out there but kind of as basic understanding... Usually, if there's any of this, let's call it cannibalism for lack of a better word...

Alie: Okay.

Aside: Just a little trivia aside: the word "cannibal" was coined by a guy named Christopher Columbus and this will shock you, but it has some racist origins? You don't say. Chris, A) did not know where he was, he thought the Caribbean was Asia, oops. And he assumed that the folks of the Caribbean engaged in anthropophagia, or people eating, flimflam that has since been debunked by teams of anthropologists and archaeologists and C) Chris misspelled "Carib" as "Canib," so a lot of oopsies there, pal.

According to the 2017 book, *Cannibalism: A Perfectly Natural History,* American Museum of Natural History biologist Bill Schutts writes that Europeans in the 1600s would attend executions with empty cups to collect the dead's fresh blood to use it as a medicine. They did not have CVS's then, they had to. The author also describes dining on human placenta, which he did, and apparently it tastes like liver, it sounds truly, truly awful... which is also an organ meat pun... which is awful. [*"Oof"*] But when Rae said, "Lack of a better word" here, I wanted to find a better word.

So, I took a time machine to the 1981 paper, "The Evolution and Dynamics of Intraspecific Predation," which was written by Vanderbilt and UC Davis, scorpiologist Dr. Gary Polis, who tragically died in a boating accident on a scorpion expedition about 20 years ago. But Dr. Polis had written this paper, he had pored through 900 animal behavior papers to find that a staggering 1,300 species from salamanders, to sharks, to chimps, to of course, scorpions, which is probably what he was looking for, and some carnivores are known to engage in some form of intraspecific predation. So, in the name of Gary, what is happening here?

Rae: It is an aggressive male carrying out what we call infanticide. So, let's take a male animal, we'll call it a bear, let's just stick in bear world. Let's take a male bear and a female bear with young cubs. The male bear's whole mission in life is to get as much of its genes in the gene pool as possible. That's what we call survival of the fittest. Everyone's heard of survival of the fittest, and usually we think that means "whoever has the biggest muscles is going to win a fight and then survive." But really, survival of the fittest means ecological fitness, and I love talking about this because I'm such a nerd. But ecological fitness is, how many genes of yours are in the gene pool? Another way to say this is, how many babies do you have? So, for every species that scientists have been able to study, we are programmed to try to maximize our fitness. So, the survival aspect is your genes are surviving in perpetuity if you have more

kids. So, after you die, you don't really die because your genes are still out there living in someone else.

Aside: This... Exactly why your parents pressure you to get married and give them a grandbaby, right here. Absolutely just hounding you for a return on their gene investment. So, the humbling majesty of millions of years of nature just making you swipe through Hinge on the toilet. Here we are, the pinnacle of organisms, doin' it.

Rae: That's survival of the fittest. And so, if you take any wild animal, but particularly a large carnivore, let's say a bear, its whole goal in life before it dies is to have as many babies as possible. So, if a male bear comes across a female bear with some cubs, that means she's nursing her cubs, and if she's nursing her cubs that means she is not able to get pregnant right now, there's that little block. And this isn't always consistent with human beings, so this is not a sex ed class right now. [*Alie laughs*] This is not a birth control method! But in general, for animals, if a female is not in estrous, it's not reproductively ready if it is still nursing its cubs.

So, the male animal, the male bear, in order to bring the female into estrous, will kill the little babies and that's really hard for us to swallow because it's violent, it's sad, and again, it doesn't happen frequently enough because females are really good at staying away from aggressive males. But if the male is able to tell, "Oh, those aren't my offspring," then it may kill the cubs. Then eventually, because the female will stop nursing, her body will return to estrous and she'll be ready to reproduce again, that male will try to mate with the female in order to get her pregnant with *his* offspring. And this is a whole tactic related to survival of the fittest.

So, when this male kills the babies, sometimes they'll get eaten too. Sometimes it'll be not just a killing, not just infanticide, but also consumption of the bodies. Again, we don't see this a lot in science. It really takes a lot to be present for this. So, a lot of it is rumor, a lot of it is conjecture, [*"I'm being falsely accused, you know that."*] but there are enough accounts of maybe this sometimes happening that it kind of gets into public perception and it makes us feel really uncomfortable. So, to answer the question, it is rare, but it is purposeful because it's all about figuring out how to get your genes passed along in the gene pool and sometimes carnivores do it in these vicious ways.

Alie: But it's strategic, obviously, and probably instinctual as well.

Rae: Mm-hm, it's instinct.

Alie: Bears are gonna bear.

Rae: They're gonna bear.

Aside: But is carnivore mealtime delectable, or is it just perfunctory? What's the dining experience of hot blood? A few patrons, including Ali Vessels and...

Alie: Paul Cirillo and Charlotte Fjelkegård both asked, essentially: Do carnivores have taste buds? Can a lion think, "Oh, this gazelle today tasted really bad!" And Charlotte said: This was a question I was going to ask. Do they have cravings for certain types of animals or foods?

Rae: Oh my gosh, you know, I was really hoping that someone would not ask a question that I don't know the answer to. [*Alie laughs*] I was like, "Maybe I'll get off Scot-free and won't have to say, 'I don't know'." But here I am... I don't know if they have tastebuds. I kind of want to say yes, honestly, because I can imagine... now I'm thinking about all the times I've

watched carnivores eat things. I can imagine that a carnivore might take a bite of something and be like, "Eugh, oh my god, that's bad." That might happen if something is rotten.

But I think more than... this is going to be my cop-out to the question. I think more than tastebuds, most of the large carnivores of the world have an *incredible* sense of smell, I mean, a really amazing sense of smell. And as people, we know that smell is very, very closely associated with taste. Scientists have been trying to study how far away a bear can smell something and we haven't been able to nail down how far because they can just always smell stuff. Some scientists estimate up to 5 miles away, a bear could smell someone making a barbecue.

Alie: [*voice trembles*] Oh my god.

Rae: It's amazing, it's amazing. I can't smell it if I'm a block away but imagine many miles. So, I would say it's probably more smell. If I'm right, that does really influence what they do eat because they won't eat everything. They won't eat something that's rotten, that will make them sick; it probably smells and maybe tastes a little bit wrong. In general, we find that carnivores, the ones that do hunt, don't hunt people. They do not hunt humans, and if they do, they don't usually eat human beings. Some people think that there's something about the smell or taste of human flesh that is not palatable. A wolf, a grizzly bear, an African lion, kills a person, it's almost always in self-defense as opposed to, like, a hunting for prey. And then usually that self-defense doesn't result in consumption.

Aside: This is a whole field of research that could take up a person's entire career, just ask Spanish carnivore researcher, Vincenzo Penteriani, an author on the paper, "Humans as Prey: Coping with Large Carnivore Attacks using a Predator-Prey Interaction Perspective" which reports that, of a recorded 632 attacks on humans by large carnivores, only 17% involved predation. So, if you get attacked by a forest beast, there's less than a one in five chance it's because you're tasty and maybe 83% chance that you were annoying or just right place, wrong time.

So again, we covered a bunch of outdoor safety stuff in the Ursinology episodes, but three quick tips that Penteriani writes about are: 1) Don't hike around from dusk to dawn when large carnivores are out shopping for dinner. 2) Watch your babies, as the researchers more tactfully put it, "Parental vigilance and education for children may be key factors to reducing predatory attacks." Yummy, squishy babies, watch out. 3) Safety in numbers, buddy system. So, I hope that answers some of your questions about mountain lions stalking humans, Brianna Borka. For those big kitties, experts say, look big and scary, prey runs away from them and with speeds of up to 50 miles per hour, a giant cat will win. So, stay and haze it, spray it, freak it out.

Also, for anyone wondering about if we are the carnivores in the woods and why and how because we love to eat salads and cake, which are not meat, you can see the 2012 Swedish paper, "Impact of Carnivory on Human Development and Evolution Revealed by a New Unifying Model of Weaning in Mammals." Speaking of salad, what is that word salad? It classified our species as carnivores based on the percentage of meat typical in a human diet and how that affects how long we breastfeed. But also, when the global shit hits the existential fan, meat-eating species tend to die off faster, because the higher up on the food chain, the more an animal relies on other animals for food.

So, let's loop around back to tastebuds and culinary preferences, Alia Myers, Kyle O'Neill, and Kevin Glover. So, Dr. Wynn-Grant was totally right, carnivores have tastebuds, just

fewer of them as smell is much more important in finding lunch or dinner. Also, Dr. Gary Beauchamp, who is a Pennsylvania scientist found that domesticated and wild cats don't have much of a preference for sweet foods, likely because some carnivores like cats, and sea lions, and fur seals, and harbor seals (can see the Pinnipedology episode for more on them) and spotted hyenas, have mutations on the Tas1r2 gene, which codes for sweet taste receptors. So, they're like "Nnhh, can't really taste it. I don't really care, don't really like sweet." That's what a lot of carnivores are doing.

Also, this led me down... [*sighs*] 10 different rabbit holes. One of which was that fruit flies and dogs taste water, dogs do it with the tip of their tongues, so water tastes like something delicious, which I guess comes in handy when you're thirsty and there aren't any Bang Energy drink machines in your vast grassland. Would that keep a carnivore up all night? Do they want that?

Alie: Joe Porfido asked a question, so smart: Are there more predators out hunting at night or in the day? Are carnivores typically nocturnal or dinural? Or diurnal, I always say that wrong. [*AI voice, "Diurnal"*] And what does that mean for people who are trying to reduce, perhaps, encounters?

Rae: Sure, you know what I think is so cool is that many large carnivores are diurnal. Many of them are and it's mostly because of evolution because they evolved without any natural predators themselves. If you think of a grizzly bear, a grizzly bear isn't afraid of anything because there's nothing that attacks it or eats it. Same with a wolf, same with a mountain lion. So, they are able to be diurnal because they don't have to hide.

With that said, humans these days, [*laughs*] we really impact wild animals and their ecologies. And because wild animals are usually adaptable, we often see changes in animal behavior based on what people are doing. So, even in some of the places that I've studied bears, we know that black bears, grizzly bears are diurnal; they're awake in the day and make these sweet little beds at night and go to sleep, it is adorable. But in some places where there's a lot of human activity, they actually shift that and they are more active in the evening. And again, they don't pull all-nighters, but they're a little more active in the evening because it seems like it's a little bit safer from human beings.

Then you can take some animals, like take the African lion, which is just mostly sleeping, period. So, they sleep up to 20 hours a day. [*laughs*] And I would say, if they are active, it's usually during the daytime but they can just be sleepy, sleepy little critters.

Aside: So, patron Jesse Hurlburt who said they'd always heard that male lions were lazy, I looked it up and the males sleep about 33% more than the females; 20 hours a day as opposed to 15 hours for the poor, sleep-deprived lady lions. So, koalas, they do between 18 and 22 hours of gentle snoozing per day. But giraffes, a meager, bleary 4.5 hours a night and in short, tiny bursts via power naps while they're standing up. And dolphins are like, "Hold my bottlenose, because we sleep while we're awake." That's right, dolphins' freakishly, giant, curly brains just dim one hemisphere at a time while they just keep swimming and being the popular kid in the ocean with the other side of the brain. Okay dolphins, good job, you win.

Let's get back to terrestrial carnivores. When it's the season to bulk up before winter, a grizzly is busy out there trying to consume 84,000 calories a day, meaning it's pulling 20 hours shifts, doing overtime, and napping just about 5 hours a night when it is not actively gorging.

Alie: What do bear beds look like though?

Rae: Oh my goodness, bear beds. So, one thing I love about bears, again I could talk about them all day, is because they're just so big and awesome, they just go to bed wherever they want; they just sit down, [*Alie exclaims with adoration*] at the end of the day they just sit right down and go to sleep. Often, when I'm out hiking in the wilderness looking for them, I will come across a bed before I come across them. It's usually... let me think of the last bear bed I saw, it wasn't too long ago; it was in a grassy area, an area where there was some forest but there were some grassy little meadows. And it's just an indentation, like a bear-sized indentation in the grass. And when they're hibernating, they obviously stay in the same place for many, many months but bears don't necessarily come back to the same bed every day. It's just, wherever they are, when they feel like the day is done, they just sit right down. And it is just awesome, I feel like there's a lesson in that for people. [*both laugh*] When you're ready, just shut it down. [*continue laughing*] Shut it down.

Alie: Can you imagine how many people at their cubicles would just be like, "Annnd, I'm done."

Rae: Yup, yup, exactly, exactly.

Alie: You know, Xavier V Quinne, Derrick Allen, Stephanie all had questions about in your professional scientific opinion, which carnivore cub is the squishiest, the snuggliest, do they purr? Derrick wants to know: Are they as soft and fluffy as they look?

Aside: So does Miranda Panda, first-time question-asker Rachael Jay, who asked about heart-warming experiences, and patron Kiera Sears who wrote in: Bears, why so cute if no hug?

Alie: I mean, this is what happens when you're on TV cuddling a bear cub in the snow, people are going to ask you this.

Rae: I know, I know. It is just so special. Well, I don't want to burst everyone's bubble here, but they are so not cuddly. [*Alie squeals then laughs*] Oh my goodness. Let me tell you, it makes for a great little picture, but I have these permanent scars on my chest because their claws are just like razor sharp. It's one of those things like, you see a picture of a little bear cub in my coat, or many, many biologists who do this work... Again, let me be clear, the snuggling part is because these cubs are so little that they cannot thermoregulate yet, they can't create their own body heat. And so, ethically, if we are going to do checkups on their little bodies, we have to give them body heat. So, for the few minutes that they're away from their mother, it's our job to hold them tight and keep them warm. So, that's why they're in our coats. So, it is adorable, and I'm super glad that they can't thermoregulate because then I get to cuddle them. I'm very, very grateful for that. But again, it's purposeful, it's part of the science.

But they will rip you apart, and again not because they're afraid or uncomfortable but because they are wild animals with razor-sharp claws that they use to defend themselves so it's actually a very painful experience. [*laughs*] And their fur is soft, but like, not some little manicured puppy or something. It's soft but coarse, very, very coarse. It can be a little rough. We're taking these cubs directly from the den, the dens are nice and warm and nice and safe for them, but they're also full of sticks, and rocks, and burrs, and that kind of thing. So again, it's not the snuggly, kind of soft, cushiony experience that it looks like. With that said, it's the very best thing in the whole entire world and I'm so lucky to be able to do it.

Alie: No one needs to go out trying to cuddle wild bear cubs.

Rae: Please do not, please do not. Every time there is a picture of me or any of my colleagues with a bear cub in our jacket, mama bear was sedated in advance and that process in itself is very, very nuanced. Takes a lot of training, takes a lot of care, and is dangerous. So, never do this yourself, ever.

Aside: For more on just how bears are sedated, I invite you to skim the 2018 paper, "THE USE OF KETAMINE-XYLAZINE OR BUTORPHANOL-AZAPERONE-MEDETOMIDINE TO IMMOBILIZE AMERICAN BLACK BEARS (URSUS AMERICANUS)." And also, unlike every other article I have found in the National Institute of Health's archives, this one's title... all caps, which lends a certain urgency to sedating a 1,000-pound animal who has hands like Freddy Krueger and a mouth that could literally crack a bowling ball like a Tootsie pop.

But anyway, the study explained how researchers use a ketamine preparation, or a cocktail of Butorphanol-Azaperone-Medetomidine, AKA, BAM. But once sedated, how do they rouse these fanged beauties once they've collected their data? Well, to reverse BAM, they give bears Naltrexone, which is also used in humans for opioid and alcohol use disorders. But to shake off ketamine, they administer Yohimbe extract, which you can get at the mall at GNC.

Yohimbe bark is an over-the-counter supplement that's used as an aphrodisiac, energy pill, and a fat-burning cure-all. I know this because I took some for an article I wrote for a newspaper about Valentine's supplements. In my experience, it involved having a panic attack at my work cubicle at 1am, wired, trying to finish a story, while also having the biggest, dampest pit stains of my life. I looked like someone being interrogated for a crime that they most definitely committed.

And if you search Reddit for posts about Yohimbe, you will find harrowing first-person accounts such as, "I suffered a significant increase in libido. I also suffered unpleasant GI side effects. Total clear out, sorry." Another person wrote, "I started getting anxious and my heart rate shot up to 190 BPM, my whole workout was filled with anxiety. It was kind of like taking acid, a weird body high that felt like a panic attack. Overall, it was not an enjoyable experience, but I'm going to try it again." Anyway, they use Yohimbe to wake up bears so please do not try this unless you are a sedated bear.

Patron Holly Spencer asked a question that was on all of our minds: Have you ever had a super scary close encounter with a carnivore? And Mallory Nettleton likewise asked about unexpected surprises. And on that note, Amy Lea said: What is the best protection weapon for people who want to go deep woods BLM camping but are terrified of getting stalked by carnivores?

Alie: Do you have a particular cautionary training that you go through before you're out working with large animals? For example, Val McKelvey wants to know: Do bear cans really work? Are there certain precautions that you need to take?

Rae: Yes. For all of my work that I've done in the United States on different carnivore species, all of my training has come from the state wildlife agency. So, the United States is the country it is and every state in our country has a state wildlife agency. I live in California, it's called California Department of Fish and Wildlife, and every state has its own. And in order for me to do my own independent research on these animals, I have to get permission from the state wildlife agency, and I have to apply for permits from the state wildlife agency, and part of that permitting process is an evaluation of whether I know what I'm doing [*both laugh*] when it comes to getting my hands on these animals. And sometimes I don't know what I'm doing and then they offer trainings. They offer trainings that are like, in the classroom and

they offer ride-alongs, where I get to learn firsthand how to do it from a certified state wildlife biologist.

So, all of the training that I've gotten has been from other people. I didn't just go to college and then say, "Great, give me a bear cub." [*Alie laughs*] You know, there's a lot of these processes. But with that said, it is very possible, it's not impossible to get to this level; there are pathways for it. So, if you hit the right marks, anybody can end up in this position to be able to do this cool work.

Aside: And because she's trained to predict and identify carnivore behavior, means she practices all kinds of safe bearing.

Rae: But there are precautions; I take bear spray wherever I go. I personally choose not to have a weapon, a firearm, but I have colleagues that carry personal firearms, legally, again, with permitting, as self-defense in case they ever have a close encounter. But bear spray for me is usually enough because there's a lot of precautions we take before bear spray would even be necessary. Let me tell you, we are trained; there are strict protocols with how to do this work.

But in general, for a lot of the people that I communicate with, and I think probably a lot of the listeners and the folks writing in are people who likely recreate in nature or want to recreate in nature and want to do it safely. That really comes down to making sure you're not attracting carnivores to you. [*"Here kitty, kitty!"*] Going for a hike is usually very safe, especially if you have two or more people with you, just because these large carnivores, as big, and bad, and bold as they are, they also are afraid of us and don't want to be bothered, so if they hear you, they're usually out of there. But bear spray, just not having food smells that would bring anyone in, it's usually pretty easy to recreate safely in bear, mountain lion, or wolf territory and have a great experience.

Aside: More bear and camping advice, again in the double Ursinology episode of course. Also, we need a big cats episode, don't we? I mean, I'd be *lyin'* if I said we didn't.

What about reintroducing pumas and such? Patrons Dawn and Eric Easton and Micah Weir asked about this, BeckyTheSassySeagrassScientist wondered: Would all the problems in America be solved if we just dropped a bunch of wolves everywhere?

Alie: You did mention wolves and Shelby Reardon and Ali Vessels both had some questions about Colorado. They're in the middle of reintroducing wolves, it's a controversial topic, and Kelly Shaver and Nicole S also wanted to know what you thought about carnivore restoration.

Rae: Oooh, that's a good one. I'm glad that I'm being asked my opinion because a lot of this podcast has been, "Let me give some facts." Here, I want to be crystal clear that it is my opinion because I'm really into the idea, I'm super, super into it. I am into the idea of carnivore restoration in different parts of the country or the world, where they have been extirpated. Even where I live and work right now, we're having this discussion. The state of California used to have grizzly bears, there's a grizzly bear on our state flag, right?

Alie: Yeah! I know, isn't that nuts? I didn't know that until this year! I didn't even realize that we had them. People are like, "There's gold in them there hills. First things first, let's kill off the grizzly bears and then put it on our flag to brag about it."?

Aside: Sorry, I really lost my shit here, but for more on this, check out the Ursinology episode. If you like flags, hit up the Vexillology episode. Also, patron TT asked specifically about this and said: I for one am very into this and think it's vitally important.

Rae: Grizzly bears used to be all over the great state of California and now we have zero of them. It's been about, I think more than 100 years since we had a grizzly bear here. There's talk of, should we bring them back? And that's not talk of, "Should we wait for them to come back on their own" but actually, bring them from elsewhere and fly them here and restore them to the landscape.

So, I'm really into these ideas for sure. Again, there's this very purposeful nature of having top predators in ecosystems. Having complete native wildlife communities enhances ecosystem function, puts us in a place for a more sustainable future. There is a lot to be said about having an intact native wildlife community in a place. It might not make us feel comfortable as humans, but dare I say, all of these animals existed in this place before human beings did, so there's a lot to be said about how that's what the environment needs.

A lot of my work deals with, well what's realistic? Because we don't ever want to bring carnivores into a space where they're going to have a crappy time. [*laughs*] We don't want people to have a bad time, but we also don't want these carnivores to have a poor experience because it's really hard to live adjacent to where people live or sometimes in the same places where people live. So, I think it's important that coexistence is figured out, and that is going to look different in every kind of place, and goodness gracious, in the human-wildlife coexistence conversation, there really needs to be conversations about justice and equity and about which types of people, on which places in the land are we talking about?

Aside: And Rae says that there are so many people working on figuring out the best ways to reintroduce these species in a way that's forward-thinking and equitable to all communities of Earth's humans. Speaking of Earth, a few patrons had questions.

Alie: Allison D wanted to know: Is climate change causing more wild animals to venture into cities? And Starr asked the same question, same with Felix Lasselle, Derrick Allen, Caitlyn Schmaus, Matt Ceccato. In Derrick's words: How are human and wildlife conflicts managed? And also, is always a fed bear equals a dead bear? I know that's something that you're really vocal in terms of how not to put animals in danger.

Rae: Mm-hm, mm-hm. These are all great questions, oh my gosh!

Alie: I know, people love it.

Rae: Let me start, let me go backwards. So, is a fed bear always dead bear? Not necessarily, but usually, usually. When it's not the case, that is a blessing. And for anyone out there who doesn't know what a fed bear is a dead bear means, [*"Break it down for me."*] it means don't feed the wildlife. [*laughs*] When it comes to carnivores, and bears are a great example, they are driven by hunger, eating enough food means that they live another day. It's the exact same with people, it's just people have created technology that allows us to access food way more often than our ancestors. But you can imagine, if you just rewound the world to early human life, we had to figure out how to eat every day and we did nothing but think about how to get food in our mouths. And that's what large carnivores are doing all the time.

So, feeding them, or giving them easy access to human food, whether that means the bowl of dog food you left out on your back deck or the extra barbecue you threw in your trash can, or actually deliberately putting food out to attract a large carnivore, those things make them access human areas more often and might habituate them to human areas. So, they might not be afraid of people anymore. And because they're wild animals and they can technically be unpredictable, when a wild bear or a mountain lion, or a wolf, ever shows signs of not

being intimidated by humans or human presence, it means that they're technically a threat to human safety.

The state, the government, is always going to choose to euthanize an animal before it might attack a person. Human safety is always going to be prioritized, and I argue that it should be prioritized. Again, this is an opinion, but my argument is that human safety *is* the most important. But it gets complicated if humans are messing with animal behavior to put them in situations where they then have to be euthanized. We can prevent that by not deliberately feeding large carnivores but also not creating situations where their instincts are pulling them toward us to get food.

Alie: You know, and I have to say, I'm guilty of this. Even just earlier this year, I visited my sister-in-law, Samantha. She moved to this great, wooded area, and I got her a bird feeder so that she could watch some birds and it was like a suet bird feeder, and literally within like four days she was like, "Well, we have a black bear in our backyard." And I was like, oh my god, it's literally sniffing under the spot where she hung the bird feeder I got her. And I was like, "Oh my god, I didn't even know." Is there something that you feel like is a myth that you're like, "Okay everyone, please stop doing this!"?

Rae: You know, I have to say Alie, I really appreciate you, kind of, fessing up to doing this, using yourself as a model, because it's hard. A lot of the communication I do is giving people the bad news that, "I'm so sorry, your bird feeder is causing a big problem. It is disrupting the ecology of wildlife." Bird feeders are supposed to be for birds but raccoons, possums, coyotes, bears are attracted to it, and they will come out of the safety of the forest, again they can smell your birdseed from maybe five miles away. [*Alie shudders*] They have this sense of smell that is unreal, and they will beeline for your backyard. That's why I gave the example of dog food. A lot of times we don't think about it. Your dog or cat is an outdoor animal and you put it out. No, the bears can smell it.

I have to tell people about their little, beautiful little fishponds with koi in their gardens. I'm sorry, but I have a friend down the street who I actually work with, who is a scientist and has a beautiful little koi pond and found a mountain lion fishing from it recently and I said, "I'm sorry, you can have a pond, but it's got to be free of fish, it's going to have to be a pond on its own." Little decorative fruit trees or whatever it might be, and even things literally like, if you grill food in your backyard, please clean it off right away.

And this applies to people who live in proximity to wild animals. If you are in an apartment in Manhattan, go for it with the bird feeder, do whatever you want, that's fine. But I'm really talking to people who live in smaller towns, or in suburbia, or any place that could attract a wild animal within a few miles.

Aside: Okay, so patron Will Plewa wanted some hot, hot gossip and asked: What's currently controversial in carnivore ecology? Ooo! And Anna Cole wrote that they are looking at going to grad school to study carnivores and they're wondering what might be the biggest hurdle in getting established in research and academia? And on that note...

Alie: Last listener question, and I know we've got a couple minutes before we've got to let you go. Janelle Shaw had a great question: Any advice for those trying to join your field of study? Everyone says 'get experience', but it's often unpaid. So, any advice for students who can't afford to work for free?

Rae: Oh yes, yes! Was this Janelle? Is that the name of the person?

Alie: Mm-hm.

Rae: Thank you so much Janelle for asking this question. Again, I'm going to offer my opinion, but I really hope it's helpful. My opinion is: Do not take the unpaid work, don't take it. Experience helps, but it is not mandatory to get into this field. Because wildlife ecology and conservation is really important, it's quite a mission-driven field, we have some very serious problems that need solving right away, we as a field can't necessarily wait around for people to gather their experience before they join us. We would be doing a disservice to all the endangered species out there if we were like, "Uhh, I mean, she's smart, she's passionate, she has a lot of energy, she's ready for this. But she doesn't have an internship background." You know? We would be shooting ourselves in the foot and really losing so many important animals every day if we were basing who we bring into this field off of volunteer work.

I say all this fully knowing that there are way too many barriers for entry into this field. I and *many* of the people I work with and many of the people I know are working really hard to break down those barriers. But I can truly say from my own experience that when I was in college, when I was in graduate school, my jobs were babysitting, or being a waitress, or being a receptionist at a gym. I had to work for money, and I wasn't able to have internships; that wasn't available to me.

So, when I did show up in the professional space, I really emphasized my passion, my innovative ideas, my energy for this work, and my dedication for it, and that's what I know I look for and a lot of my colleagues look for when we see applicants to school or to jobs, is not necessarily what you've been spending your time doing... unless you've been spending your time working for a gas company, an oil company that's like drilling into the ocean or something, then we might have some questions. But if you've been spending your time working for money with the goal of getting yourself in a financial situation so that you can work for the environment, that's worthy, that's worthy of being here.

I give a lot of advice to young people a lot of the time, especially young people from diverse financial backgrounds. I grew up as someone without access to financial resources. I give a lot of advice that your passion is more important than your performance, and the best thing you can do to be a leader in the environmental field is to take care of yourself.

Aside: Buckle uuup for a life lesson right now.

Rae: Because we have to figure out some huge global problems and having a sound mind, having your mental health in check, having some kind of financial stability, even if it's a little tiny bit, is way more important than hustling, than overworking, than stressing yourself out, or putting yourself in a vulnerable position in order to be in this field. And I really hope that more leaders in the environment are hearing this and breaking down these ridiculous barriers for entry, because we need strong-minded free thinkers, to help us really innovate how we save all of the world's wildlife.

Alie: That's such a good point, that's amazing advice. Last questions I always ask: the thing that is the hardest thing about your job or your several jobs? [*laughs*]

Rae: Okay, what is the hardest?

Alie: Or the most annoying even, whether it's ticks, or emails...? [*both laugh*]

Rae: Oh gosh. I haven't done a lot of complaining on your show but there's definitely things I can complain about because I made it sound so good. I'm like, "Come cuddle animals with me." [*both laugh*] There's a lot that's hard. Right now, what is very hard for me is leaving home for work because I have a 6-year-old daughter who is awesome, and I have a 13-month-old baby. And leaving home for work makes me feel good; it's fun, it's exciting, it feels like me, I

like it. But leaving home for work also makes me feel terrible because motherhood, at least for me, my version of motherhood is a constant thing, it is a every minute of every day thing, and being an active mom, interfacing with my children is something that brings me a lot of joy and helps me feel connected. I'll spend a week away or ten days away and then three weeks at home and I just do that back and forth pretty often. For example, I'll be away all of next week and I'm really excited about it. But it's a really good balance for me and my family is finally structured in a way that it's working for the family, at least right now. And my gosh, I just feel like an incredibly, incredibly fortunate woman.

So, I have a tension right now with how much I love being away and how much I love being home. So, I would say, right now, and it'll change because it used to be different, I think it'll be different in the future, but right now, that's the hardest thing for me.

Alie: I bet. I'm sure there's part of you too that's like, "Can I just be a mama bear that just hibernates for 6 months?"

Rae: [*deep voice*] Oh my gosh!

Alie: Can we all just take a six-month nap?

Rae: Can't we all just press the pause button for half a year? Can't we just learn from the bears? Yes. [*both laugh*]

Alie: Someone cuddle my babies while I keep napping, put them in your jacket. [*Rae laughs*] What about, I mean this is going to be so hard, but your favorite thing?

Rae: Oh gosh... Yeah, my favorite thing is that I get to physically challenge myself a lot and I guess maybe mentally challenge myself too and those things are tied in together. I have to say, I have to hike a lot for work just to get places in the field, and hiking is hard. If you're someone out there who is like, "Hiking isn't hard," you know, good for you [*Alie laughs*] and go have a seat. It's hard. I'm in pretty good shape but it's still hard. And sometimes it's boring, and sometimes it's just tough.

Going through that, not for fun but for work, there's always a benefit at the end. I never finish a hike and think to myself, "I wish I hadn't done that." [*Alie laughs*] I almost always finish a hike and say to myself, "Woah, look at me, I just did a hard thing." And it's very personal; a lot of times, I'm by myself, no one saw me do it, there's no evidence of it. But sometimes the biggest challenges and triumphs that I have are very, very personal and kind of invisible to anybody else. But I really love that my actual job offers that to me often enough. So, I get to have these moments with myself where I transform or I push through something, that's not too hard, it's not impossible, but that is just challenging enough that I get in touch with myself in a way that I really appreciate, and I really love that.

Alie: Augh, that's a beautiful thing and it's such a good reminder too to get out in nature if you can, whether it's hiking up a hill, or being outside, or challenging ourselves in other ways, it's never something that you regret.

Well, thank you for being such an inspiration to future bear cuddlers, [*Rae giggle*] to people who have decided to not cuddle bears and just get a rescue poodle instead. Even more cuddly, just saying. [*laughs*]

Aside: For more of Dr. Rae Wynn-Grant which we all want and need, you can find her PBS podcast, *Going Wild.* There are episodes titled, "Near-Death Experiences in the Field; Black. Female. Scientist; Leeches, Rice and Tampons." There was one on poachers and stories about having asthma and *E. Coli* on the job, and that is just the first season, people.

Rae: We're trying to tee up Season 2 and I welcome everyone to give it a listen, give us some feedback. I guarantee you're going to love it and I guarantee it's going to surprise you. I guarantee it's not what you think you're going to be listening to. There's a lot of surprises in there.

Alie: That's *Going Wild*, you can find it wherever you get podcasts.

Rae: This has been such an honor, you are amazing. This is just such a highlight for me. I really appreciate it.

Alie: Oh my gosh, I was like, "Ah, today I'm talking to Dr. Wynn-Grant. Do I put on lipstick? It doesn't even matter, she's not going to see me, I'm just excited!" So yeah, this has been a big deal.

So, ask smart people, not-smart questions because how else are you going to learn weird stuff about carnivore pee and dolphin hubris? We're all going to become fungus in a dung field so there's no point in being embarrassed. Now, to find out more about this delightful person, you can see RaeWynnGrant.com, you can follow her @RaeWynnGrant on Twitter and Instagram. Also, follow Dr. Wynn-Grant's frequent collaborator, this incredible photographer Tsalani Lassiter on Instagram; I love his stuff, he takes breathtaking photos, many of which have bears and sometimes Rae in them and he is @Tsalani and I'll put that in the show notes as well.

We're @Ologies on Twitter and Twitter, I'm @AlieWard on both. We have merch at OlogiesMerch.com; shirts, and hats, and totes, and stuff. And thank you Erin Talbert for adminning the *Ologies* Podcast Facebook group with assists from Shannon Feltus and Boni Dutch. Thank you, Emily White of The Wordary, who makes our professional transcripts. Caleb Patton bleeps episodes, those are up at AlieWard.com/Ologies/Extras for free.

Every two weeks we release an episode of *Smologies* in this feed, and they are cut-down digests that are de-filthed for all ages. Thank you Zeke Rodrigues Thomas of Mindjam Media for being on top of those. Thank you, Noel Dilworth and Susan Hale, for all the scheduling and behind-the-scenes help. Thank you, Steven Ray Morris, for all the years of editing. This show would not happen or get any awards without all of those folks, including lead editor and professional husband, Jarrett Sleeper, also of Mindjam Media, for the late nights making this show happen. I am recording this at 3:24 AM on February 8th so... we pull some long nights. He's asleep, but he's going to have to edit this as soon as he gets up. [*tired laugh*] We're doing our best, it's a weird world, people. Nick Thorburn did the music and he's in a great band called Islands.

And if you stick around until the end of the episode, I tell you a secret and this week's secret is, I listen to music while I'm working, and I just switched from Spotify to Pandora Premium, I went for it. I used to listen to Pandora for years when I was a journalist, you know, like at a cubicle, sweating Yohimbe out of all parts of my body past midnight. I had to log in to Pandora with an *LA Times* email I hadn't used in like, a decade. But all my music was there, and I worked on this episode listening to the Neko Case station, which honestly, was amazing, and it served up some Neil Young's "Harvest Moon" which was nicely played. And meanwhile, it's almost 4:00 in the morning so we're going to finish this episode and on to the next one. Okay, berbye.

Transcribed by Aveline Malek at TheWordary.com

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