

Lupinology with Dr. Bridgett vonHoldt

Ologies Podcast

November 19, 2019

Oh hey! It's your sense of thirst, just... wishing that you could distinguish me from hunger; Alie Ward, back with another episode of *Ologies*. Okay, so every morning I wake up and I get punched in the face by a wolf and I called this she-wolf Gremlin, she weighs 12 pounds, she looks kind of like a dirty mop possessed by an angel, and she does hit me in the face in the morning when she sees my eyes are open. She tries to gently tap my eyes to say, "It's time to watch me make water, Old Lady." So, often I start my day with a claw in my nostril. I love it. She is the result of between 18-32,000 years of genetic diversion and selective tinkering, and she is a wolf and poodle-y sheepskin. She's the daughter who will never tell me I suck and then ask to borrow the car. This week we talk about her and her ancestors; the wolf. But before we do, a little business.

Thank you to everyone at Patreon.com/Ologies who contribute as little as \$0.25 an episode to submit your questions. I named Gremlin after your aunts because I love you all so much. Also, thank you to everyone walking around in stuff from OlogiesMerch.com. Thanks to everyone who tweets, and grams, and tickchats, snaptalks about *Ologies*, for spreading the word that the world can be wonderful, and it is always weird if we just stopped to understand it. Thanks to everyone who rates and subscribes, most of all who leaves reviews to keep the podcast up in the top 10 science pods out there, and also for me to see and make my day such as [Morethanalittleconfused](#) who said:

I was just talking to my grandpa and got to amaze him with my knowledge of Spidroinology, (thanks Dad!) and he asked me where I heard this. So I told him about Ologies and he was curious, so I started giving him examples of some of my favorite episodes: Corvid thanatology, mycology, etc., and mentioned the demonology show, to which he said, "Where can you get these?" And I said 'there was a podcast app on your phone and it's called ologies.' Moral of the story, somewhere in the world an old man may be listening to you talk about demon sex. You're welcome.

[Morethanalittleconfused](#), boy howdy, thank you. And to your cool Grandpa, hi! Welcome to our world. Sorry I swear so much.

Okay, Lupinology, the study of wolves. Now would a wolf biologist call themselves a lupinologist? No, hell no, they'd be like, "Hi, I'm a wolf biologist," but here, I make the rules and I make the guests wear full regalia of their ology. This person is a lupinologist from the Latin *lupus*, meaning wolf.

So, what are you doing on November 23rd? I'll tell you. You're celebrating Wolfenoot. This is a secular, global holiday. It dates way back to 2018 when a then-seven-year-old New Zealander proclaimed to his mother, Jax Goss, that November 23rd of every year is when the spirit of the wolf brings and hides small gifts around the house for everyone and people who have, have had, or are kind to dogs get better gifts than anyone else. You eat roast meat, because wolves eat meat, and a cake decorated like a full moon. And according to a very helpful Frequently Asked Questions at Wolfenoot.com, vegetarians can partake, of course. Just roast whatever you like. The official motto is: No Hate, Only Snootboops. And the customary greeting is; Have a howly Wolfenoot! So, in anticipation of this day, I emailed a well-known lupinologist to ask for an interview and I got a two-word response: No thanks.

Burn.

So I reached out to another awesome one and she said, “Sure,” but first requested a list of the questions I’d be asking. And I thought, “What’s with wolf people? Why are they such PR divas?” But WHOOO boy, I found out while doing more research that wolf biology is a hotbed of strong opinions, expert retractions, debate, public controversy, and delicious ecological dramas. So, buckle up!

I sent this amazing, kind, and brilliant real-life wolf scientist a list of some questions and assured her I just want to know more about wolves, I’m not out to stir up any trubs, I’m not throwing anyone under any buses. She said cool. We set a time.

She got a Bachelor’s in Psychology and then went on to do a Master’s in Biology at NYU. She got her PhD in Ecology and Evolutionary Biology at UCLA. She’s now a professor. So this past Saturday morning, on her day off- because she is so kind- we embraced the magic of video conference. As her dog was - tragically - downstairs and out of frame, but as consolation, her cat was on her lap. We covered a ton of ground as a pack of two (three, I guess, with the cat) about what a wolf is, and wolf DNA, and how they hunt, and Alpha wolves, and howling, and moons, and fur, and teeth, and hunting, and lone wolves, and being raised by wolves. And how domestic dogs are like eternal puppies; and how they have similar genes to some of us; and where coyotes factor in; and if she will be celebrating Wolfenoot on November 23rd. So invite some friends over, roast... something, decorate a full moon cake, and hide little gifts to people who are kind, especially to wolves and doggos. But first, duck into the den and fill your heart with wolf facts with biologist and lupinologist: Dr. Bridgett vonHoldt.

Alie Ward: Do you make people address you as doctor?

Dr. Bridgett vonHoldt: I do not. My students do refer to me as professor. I do have to tell them, “You can all me Bridgett, it’s okay. That’s acceptable.”

Alie: You do not demand the title of Doctor Wolf, then?

Bridgett: No, I do not. *[laughs]* I do not at all. That’s never come across the table as a possibility, but I like it.

Aside: So, Doctor Wolf, as she does not wish to be called, is now an Associate Professor at Princeton University and has been working with wolves and wolf data for nearly 15 years. That is 105 dog years, and I want to be vulnerable and let you know that I went to the trouble of pulling up a calculator app to figure that out.

Bridgett: I started working on anything related to canines in 2004. That’s when I joined Dr. Robert Wayne’s lab at UCLA. Bob, affectionately. And from there everything took off, basically. I was able to expand out from just wolf focus. We were then able to investigate dog and dog evolution, and then coyotes, red wolves, and anything else.

Alie: Were you always interested in science? Were you always an outdoor kid or an indoor kid?

Bridgett: My dad was in the military so for what I consider the formable years of exposure, we lived in Florida. I say ‘we’ because I have a twin sister and my memories are always

wrapped with her in it. We would play out... In Florida, just across from our house there was a little estuary. It seemed just so mysterious, what was in the water, what could live in the water versus in this very unpredictable environment of tide. [*“What’s out there?”*] So that really sparked my interest in biology in general. We were always animal lovers, wanted to protect endangered species, and try to save the world, and that just butted into where I started which was conservation focused research.

Alie: Are you and your sister identical or fraternal?

Bridgett: We are identical.

Alie: [*gasp*] Do you think that informed any interest you had in genetics at all?

Bridgett: This is such a popular question and I really wish that I could say yes. It really didn’t enter my scope of thinking until I was much older and already interested in biology and science in general. I think for a long time it just seemed like such a special relationship, but nothing that was entirely unique. The older I get, the more I realize siblings vary quite dramatically in their relationships, let alone twins. Whether they’re identical or not. So, I do spend a lot of time now thinking about twin-based studies, and though we’re supposedly sharing nearly every one of our nucleotides, and have very similar upbringings, and very similar environments, we have our differences. So, I do end up thinking about that now more so than when I was a child.

Aside: Her sister, also a scientist, works to protect waterways. So, she deserves a Wolfenoot gift for that. But how did Bridgett end up running with wolves? She said she was never really a dog or a cat person, but after her Master’s in Biology, she happened to be emailing labs, asking if they were hiring for research positions. Just putting herself out there, like making cold calls but with typing.

Bridgett: Bob, Bob Wayne, had replied to my interest in looking for a research position by saying, basically, “We have hundreds of samples of Yellowstone gray wolves in our freezer and we’ve been waiting to analyze them.” What shocked me was that they were just sitting there; ready, no one was using them. The story was, ‘no one owns them in a research way’. I said would love to do that, and it all was really based in conservation effort which is exactly where I had started my highest level of enthusiasm. The basis of conservation efforts for the Yellowstone wolf population was brand new. No one had done anything, and he hired me, essentially over email, and that was the start of the canine work. That focus on conservation was so exciting for me.

Alie: And did you have to move to Los Angeles for that or were you based in LA?

Bridgett: No, I had to move to Los Angeles. I had just been living in New York City. I graduated with my masters from NYU and I wanted to do something. So, I picked up and drove cross-country with my cat. And my dad! [*laughs*] Dad drove over to help pick up all of my stuff. I mean, I didn’t have that much; I was living in a New York apartment. We packed everything into a single car and did a two- or three-day trip. We stopped to visit my sister, of course, in Wisconsin, and then completed the way all the way down through Colorado, which is where my parents were living, and then up through Los Angeles. [*laughs*]

Alie: What was it like when you got to Bob's lab and you got to see the freezer with the samples? Were you like, "Let me at 'em!"?

Bridgett: Yeah, it was pretty amazing. I was just shocked that this opportunity lay ripe for someone to come in and just tinker with and put their own spin on things. It was such an incredible moment, there were hundreds of samples. If I remember, anywhere between 400 and 500 blood samples and tissue samples. The Yellowstone Park biologists work annually to monitor their wolves. They not only take blood samples when they collar them and look at their overall health, but opportunistically, when they run into carcasses or if there happens to be any hunting permitted over the years, usually they'll get some sort of voucher specimen from the trapping or hunting efforts. So, there were just racks full of tubes in the freezer and it made for a lot of work in the beginning. A lot of organizing, but it just felt like the perfect thing. I felt so lucky, I was just at the right place at the right time. I honestly think there's so much more of that in people's careers in science than what, maybe, we acknowledge. You're just thinking about the right thing, at the right time, with the right technology, or the right people. I felt like that was the beginning of my career.

Alie: This is a stupid basic question but what is a wolf? What's the difference between a wolf, and a coyote, and a big fox, and a domestic dog, genetically speaking?

Bridgett: Oh, okay. Genetically speaking. So, all of these animals are carnivores, Carnivora. That means that there's a defining feature to be a carnivore and this is usually talking about skeletal shape, cranial shape, and teeth morphology. So, to eat meat you have to have certain physiology, you have to have certain teeth structure to cut and shear that meat. There's usually some olfaction and some visual sense in terms of being a predator that has a meat-based diet.

Within Carnivora... We're going to focus on more of the canine-related families and species. Foxes, coyotes, dog-like species, they do have common ancestors, so they do arise from this ancestral carnivore. The ecology that has shaped each of these lineages, their diet, their social nature, all of this variation is quite incredible. Wolves, broadly speaking, live across much of the Northern parts of all of the continents. This is called a 'whole Arctic distribution'. We usually find them in temperate or much more higher latitudes. Coyotes are a North American-evolved canine species, so you only find coyotes in North America. Jackals are also the Eurasian version, basically; we don't have jackals that evolved in North America. They are both a little bit smaller, typically, than a gray wolf. They live in a very different type of ecology.

So, if we focus on North America which is the continent I'm a little better at, coyotes and wolves, though they both live on this continent, they do essentially segregate out based on habitat and the presence of the other. Coyotes don't typically live in a pack structure, although they have been known to form packs over the course of their evolution. Typically coyotes mate as a pair and don't really form any larger groups than that.

Wolves have a much larger group, they will predate on much larger species, and they competitively take larger prey whereas coyote might come up and then try to steal whatever prey or carcass items are left from a wolf, and that's where conflict will

usually happen. [“Hey! Leggo my Eggo!”] Wolves are known to kill coyote. Alternatively, coyotes can gang up and kill wolves, especially if it’s injured, malnourished, or young, so there is competition between those two species.

Alie: And how big is a wolf? What kind of dog size would you compare it to?

Bridgett: Well actually, Malamutes can be much larger than wolves.

Alie: Really?

Bridgett: Yeah, I’ve seen Malamutes get well over a 120 pounds, and wolves can be very close to that size, but generally you can get them anywhere from 80 pounds upwards to 100-120. So, dogs can be larger than wolves, but also, we’ve bred them to be incredibly large, and maybe their diets have something to do with whether or not they’re larger. But wolves are pretty substantial creatures.

Aside: Okay, so how many species of wolves are there all over the world? I had no idea, like a hundred species? I don’t know. And I thought I’d get a clean answer, but holy moly is it herky-jerky and murky. So if you like drama you will freaking love wolves, man! So, I rolled up my yellow sweater sleeves and I dug into find: Three. WHAT on Earth?!? Did you know this? Okay, first let’s just so beep beep, back this puppy up.

So, the genus *Canis* includes jackals, coyotes, wolves, doggos, [in Australian accent] dingos, and even the dire wolf, which has been extinct for roughly 10,000 years. Don’t let George R.R. Martin pull any wool over your eyes. Dire wolf: two words, is a real animal and extinct. Direwolf: one word, *Game of Thrones* fiction. Okay, so the alive species of wolf on the planet include the African golden wolf, the Ethiopian wolf, and in North America and across Eurasia: *Canis lupus*. Now, America, studies have shown: we got one wolf *Canis lupus*; the gray wolf. Plus a bunch of subspecies. The timber wolf? That’s a gray wolf. Arctic wolf? Gray wolf. Mexican Wolf? It’s gray wolf. The extinct Oregonian brown wolf? That’s a gray wolf. The buffalo wolf or loafer wolf which was hunted to extinction in 1926? That’s also *Canis lupus*; a gray wolf.

There’s also a red wolf in the Carolinas and here is where wolf experts throw down. There is a ton of debate that’s gone on for decades and decades about if the smaller, ruddy wolf of the American Southeast is its own species and thus protected, or a hybrid of a gray wolf and a coyote and thus should be vulnerable to more hunting. As it stands in 2019, it’s endangered, but it’s protected, and is considered its own species, but many scientists are like “Eerrghhh... it is though? A lot of DNA says it’s a hybrid.” But, lets drop it and move on to the flaxen fields and golden snow of Yellowstone.

Alie: I know that this is a broad topic, but if you had to give a little of a history and an update on what is happening with the Yellowstone wolves and what’s been going on in the last couple of decades. Like, break it down.

Bridgett: It’s been an incredible journey. I do have to say, I feel spoiled in working with the population of animals in Yellowstone and the Rocky Mountains more broadly, as well as the people involved. Not only did I meet these wonderful people, but I was faced with trying to help address the questions that the US Fish and Wildlife Service had with

respect to the recovery and the future of this endangered wolf. At the time, they were on the endangered list and needing serious recovery efforts.

Part of their goal was to think about long term recovery and delisting, one aspect of that was genetic surveys, and the genetic survey was broken down into a series of objectives. Can we validate breeding pairs? Can we validate their reproductive success? How many offspring? What about the future of the offspring? Do they go and reproduce? Do they disperse? If they disperse, where do they go? Are they traversing the state boundaries or much longer distances?

Aside: Lupinologists have questions such as, who was boning whom, and how far do they disperse? Some wolves can travel 10 to 30 miles a day and make it over 500 miles from their home territory. And like them, and their fluffy paws, their government protections are also all over the place depending on the year.

Bridgett: Now the outcome kind of changes depending on the political situation, the community support, and the agenda of the recovery program. The Rocky Mountain gray wolves originally started off as a federal managed set of populations. Over time, eventually some of those wolves were handed over to either the Idaho Fish and Game government, or Montana, or Wyoming, respectively. Yellowstone, as a national park, always has the protection of the species within the boundaries.

As these populations are connected and they might exchange individuals, then they might have seasons where they're allowed to have permits for take, and hunting, and trapping, and then other years they switch back to protection. It's been kind of a roller coaster in seeing how the science is applied, and translated, and then even facing public comment. What do what do people think about it? People that live in the area compared to people who don't live in the area? It's been a really intense and sometimes very frustrating process.

Aside: As you can imagine, the country is very divided on this issue. Some folks are like, "Get bent, wolves! You ate my cow!" And others are like, "The wolves were here before us and we shouldn't slaughter them to extinction because of ethics and their important role in ecology." So, when I wanted to just tiptoe carefree through the Wolf-land I did not realize what a thorny landscape this was.

Alie: How is the wolf population in Yellowstone right now compared to what it used to be?

Bridgett: So, the Rocky Mountains generally have really seen a giant increase in the wolf population since their reintroduction in 1995. Most of the numbers, kind of, settle off at a plateau which reflects what the habitat is willing and capable of supporting, as well as the local community of people. There are fluctuations. Sometimes we have a larger population in one year compared to other years where we might reach a low. Much of that can be looked at in terms of if disease is hitting the population, maybe one year we have something like distemper, or parvo, or mange which can impact the survival of the pups of that year. So we'll see these lovely fluctuations that do reflect natural process.

But when we look at that in a larger context of, 'are their permits to hunt and trap wolves', 'are there prey', whether it be elk or smaller prey items, are they available? Are

they not? That really gives us a complex ecosystem. The wolves generally do well if we don't step in and start changing policies from year to year. As we see animals moving across landscapes though, they start entering into new locations where wolves haven't been for a number of decades. We can start asking questions about how many is the local community willing to support, which is a different question than what is the ecosystem capable of supporting.

Alie: Now the reintroduction, how did that work? Were wolves just at a zero and then they were raised in captivity and then reintroduced? [*"Don't call it a comeback..."*] What was that comeback like?

Bridgett: It's such an incredible story, in my opinion. In North America, gray wolves historically had been found at higher abundance in Rocky Mountain habitats, temperate forests, throughout the lower 48. So, we're just going to focus on the lower 48 instead of Canada. [*Canadian speaker: "Sorey."*] As humans had gone through and converted landscapes and created agricultural farmland, this really changed and altered where wolf habitat was found. Over that amount of time, there was also prosecution of not only gray wolves, but also coyotes and any other canine that, basically, threatened livelihoods; whether they were viewed as pests, whether they were eating your animals, your hoof stock. So they, being canines, had been heavily targeted for control management.

Aside: Sidenote: 'control management' means killed for years with bounties. I did a little digging and according to a Montana.gov website, between 1871 and 1875 an estimated 34,000 wolves were killed in northern Montana and southern Alberta. The bounty for each one? Between \$1 and \$10. *34,000 wolves killed in 4 years!* So yes, wolves were hella shot. Unsurprisingly, they disappeared from large swaths of the lower 48 states. Although the populations are still doing well in Alaska.

Bridgett: Wolves were essentially defined as extirpated in the lower 48 in the early 1900s; 1920s, 1930s. It was really rare to have a sighting of a gray wolf. In the Rocky Mountains, there were series of years where perhaps there were no sightings of canines and they were deemed locally extirpated at least. There might still have been, and what we suspect now, is that there are a handful of animals highly elusive living in the depths of the Rocky Mountain forest, and we possibly have some genetic evidence of that. It's very minimal, it's very rare, and it's from decades ago.

Aside: Quick aside, what does extirpated mean? I looked this up for us and it means locally extinct. So, the species lives on but not in that area. Some wolfies were maybe hiding out, like, "Try and shoot my sneaky ass, suckers!" And then in the era of Corvettes, and discos, and sequin jumpsuits, something else magical happened in America.

Bridgett: When we, essentially, found that there was public support in the mid-1970s and early 1980s to bring back this predator, this carnivore, the governor then devised this plan: "Great, what are we going to do? How do we identify wolves from where and bring them down to the central part of the American Rocky Mountains?" There were a series of biologists that were capable of identifying and trapping wolves from comparable habitats in a couple different provinces of Canada. They identified two locations, two

source populations, and enough local trappers were aiding out our government agents to trap a number of individuals from the same location.

Aside: So lupinologists turn their eyes to the Great White North. But let's talk family dynamics first.

Bridgett: So, if we backup, we have this expectation that wolves travel in family groups or at least groups of relatives and the success of a particular individual is highly dependent upon having group members with it; pack members. Most of the livelihood of wolves depends upon multiple individuals coordinated in their social hunting and also cooperative raising of young and caring for each other. The goal was to identify some source populations in Canada and live capture a handful of individuals so we potentially maintain this pack cohesion where, upon release somewhere, these animals still maintain their group structure, still potentially had higher success as a group than you would find a few released one wolf somewhere on its own in the middle of a brand-new place.

These two source populations had locals helping out our government agents trapping handfuls of individuals. Putting ear tags on them, minimizing the time that we could keep them in captivity for transport, [*"Road trip!!"*] and the goal of the recovery was to release wolves in two locations. One was Yellowstone National Park and the other one was in Central Idaho. So, half of those animals went Idaho, half of them came to Yellowstone. The Idaho recovery plan was considered a hard release. It's called that because you, essentially, transport the crate with the animal, you open its door in its new location, and out it goes, and you wish it luck. And here, we released a handful at a time. [*"Okay byyyyye!"*]

Yellowstone implemented a soft release, which was to put animals into a 1-acre acclimation pen which minimized human interaction, but it also allowed - what is hypothesized - this acclimation to a new habitat, perhaps new prey items. So, some of the park biologists would periodically - I think it was every month, maybe it was more frequent than that, I don't recall - bring in fresh carcasses. Eventually, after about a month in the acclimation pen, I think, they would just cut a hole or break open the fence and allow the wolves to leave on their own.

So, that soft release and hard release, the government wasn't sure which would be most suitable for pack cohesion, and it turns out there wasn't really any major difference between the two. [*"Six of one, half a dozen of the other"*] Yellowstone has a long history now of something like 12 or so packs who have come in, been formed, and their lineage is now very rich over the 25 years that they've been there. 25... Something like that.

Aside: Since reintroduction, the Yellowstone gray wolf population has fluctuated between 2003's high of 174 wolves at once, to - as of September 2019- there are 60 wolves in Yellowstone. That means there are more Rockettes at Radio City Music Hall than there are wolves in all 3,500 square miles of Wyoming's protected National Parkland.

Alie: How long do wolves live?

Bridgett: In captivity, they can live quite a while in this little posh, luxury element of being given food and safety. In Yellowstone, there's usually a mortality rate at about four-and-a-half years. Two to four-and-a-half is an average lifespan depending upon, again, what's the cause of mortality. There's a lot of intraspecific mortality, which means that wolves kill other wolves. Whether it's territorial disputes or some other some event, wolves are absolutely known for having battles that end in the mortality of conspecific.

Aside: P.S. Some of the finest people on the planet don't know what conspecific means and had to Google it just now. And it means *animals or plants belonging to the same species*.

Bridgett: But they are very social creatures, they maintain territories, and even though there is recognition of relatives, there are debates about 'how do you acquire new territory' or if you're a disperser and you need to find a mate and you need to have a new home range because you're going to have a litter, how do you acquire that new space and those resources to support that? Especially in a landscape, maybe, that's saturated with other wolf populations already. This battle usually does result in a give-and-take of boundaries, there's expansion or shrinking of home ranges, and then there's usually conflict, either around resources or territory usage. There's a lot of wolf drama.

Alie: What exactly is a pack dynamic like? Is there an alpha? Is there a beta? Do they take care of the elderly wolves if they make it that long? What is that little pod like?

Bridgett: It's very complicated. The original description of wolf society and this lovely idea of altruism and cooperation, that is still maintained but it's not necessarily that cookie cutter that every wolf pack is going to have that size and shape and dynamic. [*angelic choir plays in the background*] There are many packs that do enjoy this traditional idea of monogamous breeding pairs. They have annual litters of pups and maybe some of their older offspring will maintain membership in the pack to help care for the next generation of offspring, these packs to exist. [*record scratch*] There are, however, many other structures of packs where there could be a single male that breeds with as many females as he can. Most of the time, they're all unrelated to him. So, there is an element of avoiding inbreeding and kin recognition, but there are lots of structures and variation to that pack structure.

Again, we would love to have this idea that wolves are just always going to care exclusively for their pack members. There is a lot of provisioning for everybody else in the pack, but there is still this battle between "I want to reproduce, I want to be the dominant individual in the pack." That battle can be very much shaped by age and resource availability, body size, maybe just personalities of individuals. There are wolves that might be far bolder and others that are far shyer. That will shape how they interact in a pack and what that means for their rank in that system. [*clip from The Real Housewives: "What the hell was that? What was that? Don't take away my guests, I have four guests, and if you want to do something at your house, as I'm the hostess, I already invited everybody for lunch..."*]

Aside: Alright, let's move on to house pups, and apartment doggos, and domestic pillow snorglers.

Alie: You mentioned at the top of this that your dog is downstairs. What kind of dog is it?

Bridgett: I have an Old English Sheepdog. [*Alie coos*] She was the runt of her litter, and she's also food picky, so she's kind of a miniature English sheepdog.

Aside: Just for visual reference, an English sheepdog kind of looks like a Swiffer that's dusty gray in some parts and clean and white in the head area. But it's also giant and alive. Some scientists report that an English sheepdog, at the front of his face has two orbs that it uses to see, but in most of the photos I've looked at it just has a smiling mouth, and a boopable snout, and heavy bangs. No eyes.

Alie: That sounds like the cutest Muppet ever in the world. [*Bridgett's hums in agreement*] When it comes to domestic dogs and wolves, I feel like everyone has this question. How far down the line are they? How different genetically are they, and how did we get hairless Chihuahuas out a wolf? How did we domesticate that?

Bridgett: Yeah, dogs and wolves are really curious. They aren't very different at all. This is a huge and important question for evolutionary biologists, in asking: how do we get such variation, when we look at dogs? How do we get that when we have these dog breeds that we know came from this basic cookie-cutter of a wolf? Wolves don't vary that much. They might have different colors; they might have slightly shorter fur. Maybe thinner fur if they live in an arid desert environment, and a thicker coat if they're more Arctic, but they're not that different in size and shape as you get in dogs.

A lot of the work that's been done to understand the genetics behind why dogs are so diverse shows that there are a lot of mutations that have happened over the course of their domestication. It can be very few that happen that disrupt genes very quickly and you get a brand-new appearance. So, a puppy in a litter might carry a brand-new mutation and look totally different from its parents. That puppy might have a very interesting and desirable look. Whatever breeder happens upon this dog will want to use that dog – if this is their goal - and breed it further in hopes that the mutation gets passed on and maybe amplified as they're tinkering with who they're breeding with, and you get these brand-new sizes and shapes.

So, something like a hairless anything [*"So smooth. How are you so smooth?"*] is usually the result of a simple mutation that impacts the formation of hair. Even in Chihuahuas or these Chinese Cresteds that are typically hairless, having two copies of that hairless mutation is lethal. So, you won't have animals that carry both copies of that gene. They can only carry one copy to be hairless. And that means every now and then you'll have a dog that has what is called a 'powder puff' form. A Chinese Crested is actually then going to be covered in hair and it looks nothing like the hairless form, but that helps maintain a lower level of inviability in offspring. You have to have that segregating in the breed in order to keep the hairless a phenotype that's present.

Alie: Is dog breeding interesting for evolutionary biologists because it's like evolution super accelerated?

Bridgett: Yes, the domestication process and the presence of new phenotypes, or the origin of new phenotypes, has been a pretty rapid history and it's already been done. So, I don't

have to go into the lab and breed mice, or flies, or something else to see if I get the mutation and then to investigate it further. I already have these mutations and we know, essentially, how dog breeds are related to each other. We know how they're related to wolves, and I can go through and do a genetic survey that tells me essentially when and where these mutations occur. Alternatively, we can learn about health and well-being. So much of this is also anchored in understanding cancers, allergies, and other syndromes to help us understand the health of these animals in relation to their breed origin. But also we can learn about humans too from that perspective.

Aside: I'd always heard that part of what makes dogs THE BEST is that they are goofy floopy doofuses, like big hairy babies. So, science calls this genetic suspended childhood, innocence, and kindness 'neoteny'. I call it 'the thing that makes me want to wear my dog in a BabyBjörn and give her everything she desires'. I asked Bridgett what the deal is.

Bridgett: Right, so domestic dogs represent this unique change in development. We still don't understand a lot of that, let's put it that way. Even my advisor, when he was conducting his postdoc work, he was looking at this retention of juvenile traits in dogs, especially when you see the lack of that in wolves. Wolves mature into adulthood; they go through all developmental stages at a pace that's expected. In dogs, through domestication and some genetic changes, it seems that dogs retain their juvenile, puppy-like appearance and behavior, and vocalizations much longer. In fact, some will argue that some breeds, as adults, don't even really look like adults; they've maintained this baby-like nature for their entire lives. [*deep male voice: "Just a man, baby."*]

So, a wolf is typically not interested that long in humans, but a dog has this incredible draw to interact with people, to seek out that attention, and to have an interaction. What was interesting is that throughout some of my research, through my PhD with Bob Wayne and continued on now in my own group, we found some genetic changes in genes that we don't know that much about in dogs, but have been described very strongly and extensively in humans. We found a set of genes... We actually only found a couple of them. The family of genes are known to shape this syndrome in humans called Williams syndrome or Williams-Beuren Syndrome.

In humans, this syndrome is caused by a giant deletion of genes - up to 30 genes can be deleted- in a person diagnosed with Williams syndrome. The deletion of these genes results in a variety of clinical features and characteristics. There's some congenital heart disease, there's some systematic concerns. But for me, my interest lies in the behavioral characteristics of the syndrome, which is that people with Williams syndrome are often really, really friendly.

Aside: So, Williams Syndrome which is also called Williams-Beuren Syndrome, is a genetic condition. It presents with these wide smiles, kind of elfin features, starry patterns in the eyes, some possible cardiac and learning issues, and Bridgett says, a lack of fear of strangers.

Bridgett: When we think about dogs potentially as really amplifying one of these traits of Williams Syndrome, it's this lack of 'stranger danger', and this interest in interacting

with people, being distracted from a job or a task if there's a person nearby. It's almost like your spidey sense. Is there a person around? If there is and you're a dog, you want to interact with them. "I don't care what I'm doing."

Aside: Dogs, that feeling is mutual. [*crowd awes*]

Bridgett: And so, what we've really been trying to investigate is, does this appear in dogs? How can we quantify it, and does this relate to the same genes? And we're finding that... I'm not saying this is the end of the story, but it does seem like a lot of the genes involved in human Williams Syndrome and the behavioral changes are also altered and modified in dogs. What we're doing is trying to quantify... Of the different mutations an individual dog can carry, we already have ways to predict how social they are probably going to be with people. Although this is couched in the idea that you're still shaped by your upbringing and your early experiences in life, we have to account for that, but if we also just know the genotype, we have some fraction of that prediction that we can make. So, it all makes for a very possible story that just needs a lot more effort to unravel.

Aside: Bridgett says that, of course, different individuals of the same breed can have much different personalities. Like a golden retriever can be sassy, or shy, or playful, or mellow, and there may be genetic markers for those traits. So, if you heard the personality psychology episode, that biologist talks about how much genetics influences our personalities versus environment. I honestly think about that episode constantly. So, we are who we are, so let's just accept ourselves and each other. No hate! only snootboops.

Alie: Will you be celebrating Wolfenoot?

Bridgett: [*chuckles*] I feel like I do that as often as I can anyway. [*laughs*]

Alie: [*laughs*] I do believe that you deserve extra little presents for being kind to wolves and dogs, though.

Bridgett: I would love to have that. That's such a lovely idea. I think there's always this dichotomy and culture that wolves are an amazing presence in our world, and that's contrasted with this idea of big bad wolves and, you know, wolves will stalk you and bite you. I understand the cultural differences between each of those experiences. I find that it feels like a very sad empty world if we don't have wolves in it. They not only hold very significant place in ecology, but also in interacting with human civilization throughout the course of our history.

This is where dogs come from. Dogs are a domesticated wolf, and that bond in human civilizations and their function in helping humans evolve, I think, is a really special relationship that very rarely exist with, certainly, other carnivores. Dogs are the first domestic species and they're this incredible carnivore. So to me, every day is Wolfenoot. [*laughs*]

Alie: Can I ask you some quick Patreon questions? Is that cool?

Bridgett: Perfect!

Aside: Okay, but before we get to your amazing, and weird, and insightful Patreon questions. A few words about sponsors who make it possible each week to donate to a cause of the ologist's choosing. This week, Bridgett chose the Red Wolf Coalition at RedWolves.com, which teaches people about the value of red wolves to the ecosystem and to the people living in the restoration area. The Red Wolf Coalition works with the United States Fish and Wildlife service Red Wolf Recovery Program to stay up to date on red wolf restoration, and management issues, and to partner in the effort to maintain healthy populations of wild red wolves.

Remember, this is the type of canine that people keep going back and forth about whether or not they deserve protection if they're not a separate species. Bridgett says, "I continue to study red wolves and they currently need as much support as they can get from the public." I'll put a link in the show notes for more about that charity. Now, making that possible are a few sponsors of ologies, which I may talk about right now.

[Ad Break]

Okay, back to your lupine inquisitions.

Alie: Becky Woodruff wants to know: Has anyone ever actually been raised by wolves, and any idea where that expression came from?

Bridgett: [laughs] Isn't there the mythology of the brothers of Rome? That were raised by the mother she-wolf and she provided nutrition and safety to these two founders? I mean that. to me, perhaps extended further into our history, might explain 'raised by wolves' in either a positive or a negative connotation.

Alie: Yeah, it seems like the founders of Rome did okay, so it seems like a bit of a misnomer in terms of an idiom, but I'll look into it for sure. ["Et tu, Brute?"]

Aside: Okay, side note: I looked into this to see if there were other origins and the legend of feral kids raised by wolves is apparently a long-standing one. In the 1920s, a preacher in India claimed to have rescued two young girls from a wolf's den. Amala and Kamala, as they were known, walked on all fours, were said to have preferred raw meat, and not like people very much. Tragically, they died really young; Amala from a kidney infection at age 3 and Kamala from tuberculosis at 17, after a life of people trying to domesticate her.

People didn't really buy his story about the wolves, but history is peppered with tales of abandoned and so-called feral kids. The founders of Rome being of course, the poster children, and that's very sad. Let's also consider that dogs, who some researchers say have been domesticated to be more accepting of animals that are not conspecific, will mother abandoned kittens and piglets and ducklings, and I just went down a video rabbit hole watching dogs bottle-feed lambs. We already suspected that we didn't deserve them, but now we know factually. Speaking of cherubs on leashes:

Alie: Ryan Clark wants to know: If all dogs go to Heaven, does that include wolves?

Bridgett: [laughs] I don't see why it would exclude wolves.

Alie: Yeah. They're doing their best out there.

Bridgett: They're doing their best! *[laughs]*

Alie: I like to think there's a heaven that's just a bunch of wolves. *[laughs]*

Bridgett: *[laughs]* Just a bunch of wolves!

Alie: Bathbunny Art and Anakin Janiak both asked about lone wolves: Are there any theories about why some wolves become loners?

Bridgett: There are certainly many times in a wolf's life where they will absolutely choose to venture out on their own. That could be the random sighting that you're catching a wolf in mid-dispersal, or there's also perhaps this - I don't know how commonly it's known - but that wolf packs only exist as packs seasonally. *["No way!"]* In winter, when prey is usually a little more vigilant, snow is on the ground, food-for-prey species like elk or Caribou is harder to find. They are usually more vigilant against predators because they're more vulnerable on snow surfaces if it's packed snow and their long legs get stuck in that. They're quite vulnerable. So wolves really do well in the winter when they pack up. And in the warm months, when there's much more food resources, they're often not in packs.

So, you might see wolves on their own because they're just out, hanging out, doing their wolfie thing. They rendezvous with each other periodically, but wolves are often - for a good half of the year in temperate zones - on their own. Lone wolves absolutely exist, they might be out in pairs, hanging out with their favorite buddy. Often, they're not always that close in touch with each other.

Aside: So, stop using the term 'lone wolf' as a symbol of nefarious and secretive evil. Wolves deserve better. For canines, doing their wolfie thing is just introverting, kind of getting out of dodge for a bit, being independent. So, the next time you leave a party early, maybe don't Irish goodbye in shame. Just interrupt the din of conversations with a low, soulful howl and say, "Doin' my wolfie thing. I'm out." That's a power move. *[Bon Iver's "The Wolves" in chipmunk voices: "With the werewolves around me..."]*

Alie: Aleah and Isabelle B Holper both asked about a meme about the leader of the pack being the last one, the closing ranks. Is that meme true or not?

Bridgett: I believe that those behaviors exist. I kind of want to counter that with an example that I do know is true. Many times, it's hard to identify the animals of certain ranks. So, if you just get a picture and everyone's pointing to the last, giant animal; 'that's the leader who's making sure no one falls behind'. There are packs that probably have that structure, absolutely and especially in locations where wolves are watched every day. So, in Yellowstone, people can visually recognize who is the dominant animal or pair of animals in the pack. Absolutely, they will see that.

To follow up, I do know an example coming from Yellowstone where hunting is a very dangerous behavior. I would dare say that trekking through some wilderness is not actually the problem. It's acquiring food where animals are facing antlers, or horns, or hooves, or kicks from the prey item they're trying to acquire, *[computer voice: "Please don't."]* and that's when mortality is actually most risky. In a pack structure, however, acquiring food has a very specific rank. The youngest animals don't always know what

they're doing, the middle-aged animals have the most experience, they're probably at their peak of physiology and muscle build. And then we have usually the older animals which are running the pack. Even though they, essentially, have all this knowledge, they aren't always the first one on the scene.

The story goes that those middle, prime animals are the ones coming in at the most dangerous points because they know where to bite prey; an elk, let's say. They know where to bite and how to hold it. They're using these moments as training experiences for the younger animals who will eventually assume those peak, prime hunting roles. And then at the last minute, oftentimes we'll see the alpha run in once the major drama is under control. It's this weird balance of 'who's the most experienced' versus 'who is actually kind of in control of things' and making sure everything is done correctly, or that they get the last say, or that they're going to make sure that everything is done properly. There *are* roles, and these roles within the pack can change based on the environment and composition of a pack. So, yes that can be true, but I would hesitate to say that's exactly how wolf society works.

Alie: Is that alpha kind of just being a manager in the background?

Bridgett: *[laughs]* I don't know actually.

Alie: Man! That seems so political! Like coming in at the last moment for the press opportunities. "We got an elk, everyone!" Everyone's like, "What? You were behind the tree!"

Bridgett: "You weren't even involved!" *[laughs]*

Aside: But the notion of an alpha male as we think of them in concrete terms, like a CEO overseeing a terrified team of subordinates, is a myth. Canine ethologist David Mech, who's studied wolf behavior for decades, has disavowed some of his previous notions of alphas because they were based on captive wolf packs of unrelated wolfies. In the wild, most packs are just families of a pop, and ma, and their pups, and maybe a few other families and their kiddos, maybe an unrelated straggler or two.

Mech did report seeing some dominance behaviors and in his 2010 paper titled: "Prolonged intensive dominance behavior between gray wolves, *Canis lupus*," he describes a time he witnessed what his team thinks was a dad wolf straddling and harassing what may have been his son. Kind of like a test before the son took off for his own territory. So yes, you've been hazed, by your own dad. Oh, and your mom, when it comes to canine genomics, just took a DNA test and she is, in fact, 100% that bitch.

Alie: A lot of people asked about movies. Wolf movies.

Bridgett: Okay.

Alie: Do you have a favorite wolf movie? Maren Mossman wants to know: Does it bother you that when Disney needs a threatening animal in movies that they tend to pick wolves? Hannah Everhart wants to know: How bad is *Teen Wolf* in regards to actual wolf behavior and anatomy? Any thoughts on wolves in the media?

Bridgett: *Teen Wolf*? Like the Michael J. Fox *Teen Wolf* movie where he turns into a wolf and he's in high school? *[laughs]*

Alie: He'd probably have to pee on more stuff.

Bridgett: *[laughs]* Yeah! Actually, I think *Werewolf in Paris* or London?

Alie: Oh yeah! *An American Werewolf in Paris!*

Bridgett: I watched that more recently than other wolf-based movies. *[clip from An American Werewolf in London: "I was attacked! By this big wild dog."]* And yeah, I think there's always been this fear. The Little Red Riding Hood, the wolf is going to eat you. The wolf is just bloodthirsty and will kill for no reason. That is out there, people represent wolves and continue to portray them this way. It is upsetting because this is not any different than if any other animal... Well, I'm not saying that their bloodlust is true, but the defense of where you live and getting your food...

*We eat animals. We have a whole culture on how we acquire our animal-based protein. It does bother me, but I also realize it's Hollywood, and movies, and people represent lots of things incorrectly for the sake of creative license. I try not to watch it, there are things I cannot watch. The *Alpha* movie, that talks about domestication... I refuse to even watch that because I'm absolutely sure I'm just going to have to walk out.*

Alie: *[laughs]* I haven't seen it yet! I'm going to have to look into it though. It's on your shit list?

Bridgett: Oh, please do! I'm not even going to attempt watching it.

Aside: I just watched the trailer for this and it's about the first dog ever domesticated, I think? It looks like a beautiful piece of entertainment that would, yes, infuriate people who study wolves.

Alie: A ton of people... I'm going to read their names very quickly; Kelsey Warren, Sam G, Dakota Harriman, Anna Vallery, Jodi Kendall, Bader AlShawaf, Andrea, Theresa Bossenova, Mandy McComas, and Sarah Greer. Sarah Greer asked: My neighbor claims her dog is half wolf and that her dog is the offspring of a domestic canine who mated with a wolf. Is this biologically possible or is she just trying to make her dogs see more badass?

Bridgett: Both, both are probably true. The first one is certainly true. Dogs and wolves can absolutely reproduce, no question about it. The feasibility of her dog, or her dog's parent, coming across a wolf. I don't know if this is a captive environment, if someone's breeding dog-wolf hybrids, which is highly possible, or if they live somewhere rural enough where a wolf is running around and decided to reproduce. Both are possible, an offspring in that cross is absolutely viable.

It takes effort to genetically and morphologically tell a hybrid from a purebred animal, let alone any back-crosses like third-generation wolf hybrid, but it's possible. There are lots of signals of that, and people work at that all the time to try to identify if there's a genetic test, or if someone who claims that they're selling dog-wolf hybrid: is it a true hybrid or just a wolfie-looking dog? Yeah, it's possible. It's challenging.

Alie: Have you seen a rise in that since *Game of Thrones*?

Bridgett: No, I don't know about the hybrids, but people were talking about an increase in husky or malamute purchases. I think the saddest or the most challenging part about dog breed purchases is not enough research on what that breed needs. So, having a husky, maybe, in LA is a very hard situation to face with a breed that has very specific needs. Not only energy needs, but temperament needs. So, I have read that *Game of Thrones* is responsible for husky and spitz-type dog breed purchases.

Alie: Are those more closely related to wolves or no? They just look like them?

Bridgett: Not really, they look like them. There is a possibility that those breeds in their history have a more recent influx of wolf genes through hybridization, but we can also make them look like a wolf without them being a wolf.

Alie: Got it. A ton of people, Natalie Mastick, Lauren Dean, Kristina Weaver, Andrea Levinson, Amelia Heins, Matthew Thomas Hill, John Sansone, Stephanie Malek, Anna Thompson, Jodi Kendall, Lucy Keegan, and Samantha G all had questions: Do wolves care about the moon? Do they howl at the moon? Do they like the moon? Does the moon affect their behavior? What is it with wolves and the moon?

Aside: What's up? Why in popular culture are wolves so horny for the moon?

Bridgett: Yeah, I see why that's a question. Wolves howl all the time regardless of what the moon is doing. So, a full moon will give more light at night, and although most wolves are not actually hunting in the middle of the night, the dawn and dusk times will have perhaps more light than normal, which might make hunting or movement a little more interesting, and maybe there's more activity. So, maybe there's more howling because there's more action, but this is just me speculating. I don't know of anything that ever talks about having to, basically, control for if there's moonlight or not on understanding a wolf behavior.

Aside: So, mystical wolf moon connections are flimflam, but wolves' communication devices, AKA songs sung from their boopable snouts, have a range of up to 10 miles, and it helps get the pack back together or intimidate others not in their clique. Essentially, they're saying, "I'm lonely," or, "Get away from me, you scare me, and I hate you." So a howl serves as nature's Twitter.

Alie: What about howling? Hollis wants to know: Is there different regional accents to howls?

Bridgett: I wouldn't say regional. Most wolf howls have a stereotypical structure. But what's interesting is the debate and focus on red wolves. One angle of data that people want to start analyzing is looking at the structure of howls between coyotes, gray wolves, and red wolves, and they all differ. So, that's a very interesting aspect of what happens when you have, perhaps, different species or different hybrids. A dog-wolf hybrid is expected to have a very different acoustic sound when it howls, [*dog-wolf hybrid howl: very deep*] than a pure gray wolf, [*pure gray wolf howl: sharper*] or a pure dog, [*dog howl: starts off with a small bark*] for that matter. [*Homer Simpson scream*]

Alie: Wow. I wonder if wolves howl along with the ambulances too or if that's just dogs.

Bridgett: I don't know about that. I suppose anyone who has a dog-wolf hybrid could talk more about that, and also zoos. I don't know what they have in zoos. I wonder.

Aside: So, one YouTube user Dustin Olson posted a video in 2016 titled, "Wolf howls at a fire truck siren!!!" And it was taken at the Miller Park Zoo in Bloomington Illinois. [*clip from YouTube video of wolf howling*] I hereby invite you to google 'wolf howling at a siren' for a wealth of returns.

There's another video taken at the Chicago Zoo by YouTube user CBrolley, and it features a pack of wolf singing to an air raid siren, and the imagery is so chilling. These regal beasts in an enclosure sounding a chorus of the wild to the tune of human war alarms. The result is beautiful, and sweet, and scary; like a really well-intentioned choir at a nursing home. [*clip from YouTube video; a cacophony of short howls with air raid siren in the background; very spooky*]

Alie: Jamie Pickles, RJ Doidge, and Stephanie Malek all asked if you wear any of the 'wolf pack howling at the moon' shirts, [*Bridgett giggles*] if you have a wolf shirt, or three-wolf moon shirts.

Bridgett: I thought heavily about buying one. I do not have a wolf shirt. I have to say, my mom loves to give me wolf items. So, I have a little jacket with an embroidered wolf on it that I only wear when I go to Yellowstone because I feel like that's appropriate. I do have a wolf tattoo.

Alie: You do?!

Bridgett: It's wolf skull with really great ornate decorations and it has a gold tooth.

Alie: Nice! When did you get that?

Bridgett: Years ago, maybe six years ago.

Alie: While you were already working on wolves?

Bridgett: Oh yeah!

Aside: I expect to be tagged in your wolf tattoo photos, kiddos. So, celebrate Wolfenoot, show me those skin paintings. Also, this next question was asked by patrons Chris Brewer, Allison Tuuri, Jess Spencer, Caitlyn Brett, Diana Silver, Anna Vallery, Justin Griggs, Tara McNee, and Jennifer Tran.

Alie: Several people asked about reintroduction of wolves in Yellowstone and why is that important for the ecology. What is that doing for the ecology there?

Bridgett: So, there is this tremendous effort to understand what the presence or the absence of a wolf has on the local ecology. It's been framed in terms of a few different aspects. One is the distribution and type of trees in the area which reflect, potentially, the abundance of herbivores. The idea is this connection between trophic levels, that if you have too many herbivores grazing and browsing, and you overgraze or browse trees, then you impact songbirds, and mesocarnivores, and plant distributions, and you shift habitat types.

Aside: By the by, a mesocarnivore is an animal that eats 30-70% meat and the rest of the diet is plants, fruit, and fungus. Like at a holiday party spread, they'd hover around

the deli platter, but they'd also fuck with the stuffed mushrooms and the grapes. Maybe, a celery stick.

Bridgett: Whereas if you have a wolf present to maintain, essentially, one angle of population control on herbivores, even though other predators will... Mountain lions, bears, and wolverines, but they don't quite have the impact of a wolf. Having the wolf back in the habitat, its action could reduce herbivory, which could then result in this recovery of trees, shrubs, and grasslands, and then passerines, mesocarnivores, and ungulates.

Aside: A lot of folks such as John Walker, Fruit Fly, Susan Kennon, Janna Wisniewski, and Allison Tuuri had questions about killing wolves.

Alie: What about hunting wolves in Yellowstone? Why is that necessary, or legal, or encouraged, or permitted?

Bridgett: Hunting of wolves in Yellowstone is not permitted because that's a National Park, but if a wolf leaves the park boundaries - and as we all know wolves can read signs. The moment they step outside of a park, if they're in Wyoming, or Montana, or Idaho, each of those states might have a permitted season for hunting wolves. My personal opinion is you don't need to hunt wolves. They're not necessarily more abundant than what they were X number of years ago, and that all depends on your timepoint. Are we talking 100 years ago or 3,000 years ago? Those numbers will be different. Hunting does also give the community some involvement, input, and some financial contribution to the state.

By permitting the hunting and take of maybe a hundred wolves in a state, then the community is involved, and they do have a stake in the matter. So, hunting wolves does happen in states that feel that the population in their state can persist even under loss the of a hundred animals or whatever they've estimated to be adequate.

Alie: And what about encounter? Sadie Neuman, Mariko Shinn, Kerri, Isabelle B. Holper, and a few people asked: What should I do if I see a wolf when I'm hiking or backpacking?

Bridgett: I would say it's not very different from bear gear. I would have bells and whistles on my shoes and backpack and blowing one these survival whistles will just pretty much deter an animal who already doesn't really want to interact with you. [*Gina from Brooklyn 99... "Okay byyyye."*] Having pepper spray is never a bad thing. I would just probably turn and walk the other way or back up. They're a little bit different... they're not quite like bears.

Usually a wolf is already going to see you long before you've ever seen it. I would be surprised if you happen to surprise a wolf, although I'm sure it can happen. It's not anything I've ever worried about. In Yellowstone, wolves know that you're there. Especially those that are highly visible on the landscape. Most of the time they're going to avoid you, and they'll take a really long circuitous route to get as far away from you as possible, and yet go the route that they wanted to achieve. I would say this is a rare event that you would happen upon a surprised wolf.

Alie: A bunch of people wanted to know: What can we do to help the Wolfies? Dakota Harriman asked: How can we save them, especially red wolves?

Bridgett: Email! Email or send a letter to your congressman or congresswoman, your local government. I know that there are many agencies that are pro-red wolf or pro-gray wolf. NRDC, there are red wolf foundations in many locations. You can donate money; you can donate services. Yellowstone will always use their park entrance to also help with their programs and run the national park. Just be a voice, just announce it.

Aside: [*with radio filter*] Announcement, I would like to help the wolves.

Alie: Last two questions I always ask is: What sucks the most about your job? What do you hate about your job?

Bridgett: [*laughs*] What do I hate about my job? I think the most challenging part of my job is that I don't have enough hands and arms. I feel there's not enough hours in the day. There are so many things I want to do every day that I don't have enough time. I think it's because everything is so interesting, and I'm so excited to see what I'll learn from this result. Pressing any key on my keyboard to show me the new table, or the new figure, will lead to another 20 questions that I want to start exploring, and I just don't have time. I can't do all of that but I'm so excited about it all. That's hard, it's so hard to prioritize.

Aside: So, wolf researchers, they need seven times the hours because there are so many things to learn. Also, Bridgett mentioned that wolf research grants aren't easy to get and sometimes she funds her own research with money she would use for hobbies. So, if you'd like to toss her a bone, she has a link to a Benefunder page on her website, which I'll put in the show notes just in case you'd like to impress the canine spirits in honor of Wolfenoot. Also, her site says: "If you are a dog owner and interested in participating in the behavioral genetics study of canine sociability, please visit the products web page DoggosForScience. It's the best.

Alie: And what about the best thing about your job? What do you love about you do?

Bridgett: Oh my gosh! That I get to do this. I can't believe that this is a job! I mean, it's amazing. Every so often, you know, you have those rough days, and you think, "What else could I do?" Nothing! I would never want to do anything else. I can't imagine whatever a normal job would look like. I get to sit and research something that's invisible, right? We can't see DNA, we can't see evolution tangibly from 3 million years ago, and yet we press some buttons on our computer and some really lovely evolutionary theory, and we expose what our history looks like. We can understand more about something we can never possibly observe, and I think that's just so incredible.

To use that in forward-thinking, that's really where I find the biggest challenge. It's a positive challenge, but moving from hindsight to future vision, and trying to get people to think about, how do we preserve our world? Even though you've never seen how evolution gave what we see today, we now have to think about where it's going forward. And that long-term vision is hard when we're not going to be around to see it, maybe our great-great-grandchildren, and it's hard to think about those people we don't even know.

Trying to maintain this planet, and its diversity, and all of its beautiful inhabitants and ecology, we can't see that. But that's the hard part, connecting those two, but I think that's a really incredible opportunity that I can help give something like that.

Alie: And it can start with a bunch of frozen wolf blood.

Bridgett: It does! Absolutely!

Alie: Thank you so much for doing the work you do. Say hi to the wolves for me!

Bridgett: I will! Thank you for inviting me! This is very fun.

So, catch some eye contact of a nearby ologist and ask a smart person a stupid question, 'cause we're only roaming this landscape for so long, what do we have to lose?

Also, you can follow Dr Bridgett vonHoldt on Twitter [@TheBeepz](#), not the boops, the beepz. There's a link to her [Princeton website](#), and to the [Red Wolf Coalition](#), and the sponsors of this episode in the show notes. There's always more links up at [AlieWard.com/Ologies/Lupinology](#). *Ologies* is @Ologies on [Twitter](#) and [Instagram](#). Say hello there. I'm @AlieWard on [Twitter](#) and [Instagram](#).

Thank you, Hannah Lipow and Erin Talbert for adminning the [Facebook Ologies Podcast group](#) full of wonderful, compassionate nerds. [OlogiesMerch.com](#) has all of your *Ologies* podcast merch needs, t-shirts, hats, sweatshirts, all sorts of things. If you post a photo to Instagram, tag it with #OlogiesMerch and we'll repost you on Mondays. Thank you, Shannon Feltus and Boni Dutch for helping manage that. They're two sisters who have a brand-new, wonderfully fun podcast called *You Are That*, it's out wherever you get podcasts.

Also, thank you to Emily White and all the Ologies transcribers for helping make bleeped episodes and transcripts available for free to anyone who needs and wants them at [AlieWard.com/Ologies-Extras](#). Assistant editing was done by Jarrett Sleeper of MindJam Media and of the excellent mental health podcast *My Good Bad Brain*. And thank you to a bright shiny-sky moon, Steven Ray Morris of *The Purrrcast* and *See Jurassic Right* for helping assemble the pieces of the show each and every week.

If you stay 'til the end of the episode, you know I tell you a secret. And this week's secret is my dog, Gremmie, Gremlin, has been eating this food that has fish oil in it for a good brain, so I guess she could do crossword puzzles faster, and a shiny coat. Her mouth smells like Satan's outhouse. It is so stinky, and I still kiss her on the cheeks, and I asked her why she's so pretty, and also sometimes I'll give her a Greenie and be like, "Clean that up, woman. Wow. Wow." I just want to snuggle her constantly. I'm pretty sure that she's hijacked all of my molecular neurobiology, and I'm not mad at it.

Okay, so go celebrate Wolfenoot, make a cake that looks like a full moon, celebrate an ancient one-year-old secular non-traditional holiday. Say hello to the doggos in your life, hide some presents around the house, and remember: No Hate, Only Snootboops.

Okay, berbye!

Transcribed by Lisa

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