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SPEAKERS

Jenn Smith, Matthew Zipple, Gabriela Pinho

Matthew Zipple 00:08

Hello, and welcome to the Animal Behavior Podcast, I'm Matthew Zipple. Today I'm talking with Jenn Smith, associate professor of biology at Mills College, a women's liberal arts college in Oakland, California. Jenn studies social behavior and its evolution in mammals. She leads a long term study of California ground squirrels. And we'll talk about her work in that system. And the ways in which technologies that allow for remote data collection are changing the way that we do research. We'll also talk about her work studying the evolution of female leadership, and what it can tell us about the female leadership paradox in humans. This is a part of Jenn's work that I really admire. Because I see identifying evolutionary insights into modern human behavior as being one of the most noble and also challenging goals of animal behavior research. After the break, we'll talk about what it's like to be a faculty member at a small liberal arts college, and how she has relied on undergraduate researchers to build a really groundbreaking research program. Jenn Smith, welcome to the show. Thanks so much for being here.

Jenn Smith 01:07

Thank you, Matthew, I'm excited to be here.

Matthew Zipple 01:10

I want to start by talking about your work with California ground squirrels. So will you please just start us off with a description of the California ground squirrels natural history?

Jenn Smith 01:22

California ground squirrels are one of these species that is social. And that's why I'm incredibly excited to work on them. They also have a tumultuous relationship with humans. And a lot of people view them

as pests. And they really evolved alongside humans. And part of my research is focused on how they interact with us, but also how they interact with each other. And they are a major prey item for a number of different natural predators. And they've evolved a suite of anti predator defenses and sociality because of that, and have overlapping generations. And that's why I'm really, really excited to understand their social networks.

Matthew Zippel 02:08

And I was reading that one of those anti predator fences is, is, resistance to rattlesnake venom, is that right?

Jenn Smith 02:16

Absolutely, young squirrels are unable to cope with rattlesnake venom. But as the squirrels mature, and in particular, the mothers, once they get to be a certain size, they're able to deal with this rattlesnake venom. And we're finding that animals that are stressed are less likely to be able to do so. And their recovery time is much longer. But they have a number of different ways that they cooperate. They get in between a rattlesnake that's trying to attack one of their juvenile offspring, and they throw dirt at them and tail-flag and do all sorts of things. And it's really because they're at less of a risk than their offspring. So it's one of the forms of cooperation that I'm fascinated by.

Matthew Zippel 02:59

So I'm guessing that many listeners will be familiar with Belding's ground squirrels, and yellow-bellied marmots, but maybe less so California ground squirrels. So what should we know about California ground squirrels social behavior that's different from those kinds of classic study species that people's minds might go to.

Jenn Smith 03:16

There's a lot of parallels between California ground squirrels and Belding's and yellow-bellied marmots. In fact, my postdoctoral work before I started up California ground squirrel research, which is now in its 10th year, it's a long term study repeated measures same individuals. That was inspired by my postdoctoral work with Dan Blumstein at UCLA on yellow-bellied marmots. And the facultatively social behavior is comparable between those two species. In other words, in some places, they are social and other places the average phenotype, or the behavior that we see, is to be solitary. But for Belding's, Belding's are much more social than are the California ground squirrels and so they're pretty much always together, but a number of the types of antipredator behaviors that we see and hear, and the reason we hear them there are lots of alarm calls that the California ground squirrels produce. And some of the classic work from Belding's ground squirrels, is on their alarm calling and also their kin selection. In Jill Mateo's work on Belding's, I think is fairly probably consistent with what we would see with kin selection happening in California ground squirrels, but it's fairly an open question at this point. A number of my students have been finding, we've been using this this long term data and collecting alarm calls on individual squirrels. And we're finding that the acoustic properties of each individual

squirrel is unique, repeatable across time, and we suspect that the listeners of these calls are also able to identify them in the same way that we can identify them using technology. And the other piece that we noticed is some individuals will alarm call once or not at all, to a threat such as a coyote, others will elicit a threat such as a person walking by or a dog that's far away. That threat will elicit hundreds of calls. And that's also repeatable. So we're fascinated by some individuals responding very strongly to threats across their lifespan, and others not so much.

Matthew Zippel 05:35

Oh, super cool. Man, I cannot wait to read those papers. And I want to focus on a 2018 paper from the project that was for me, transformative in my thinking about our ability to study social behavior of small rodents in the wild, because the great challenge of studying these animals is that they spend a lot of time underground. And we previously had very little idea of what they were doing while they were underground. And more importantly, for a social animal, who they were doing it with. So talk about the solution that you developed to solve that problem.

Jenn Smith 06:08

I should say that the California ground squirrel is subterranean. So that means that they spend some of their lives below ground in some of their lives above ground. So in some species, we might be able to bring them into the lab and only look at what's going on below ground. And that would actually tell us everything about their social worlds, it would be in a lab setting, and we wouldn't fully know what's going on. But maybe we could study it there. The California ground squirrel is actually splitting its time, equally between life above ground where it's really open and free. And there's these spaces where they can travel a fair distance explore in the trees, or the grasses and in all those areas and interact with members of their own species and their social group above ground, but then they also spend time below ground in these what we call boroughs. And the boroughs are ones that they usually build themselves, they're ecosystem engineers, so they construct these, and they're really important in terms of shaping the environment. From the squirrels' perspective, they spend time below ground for safety, and also to interact with one another. And so I was just fascinated, okay, how are these animals interacting in these two major ecological situations, one that's fairly constrained, and another one that's really open and free. And, you know, since doing this work, I should just back up, but you know, I keep thinking about parallels to our own lives. And of course, during the pandemic, you know, we've been spending time often in these smaller "Shelter in Place" spaces and interacting their family members in a really closed, small environment, compared to when we're out in the world interacting more freely and openly. So that was kind of the, the, motivation was thinking, Okay, how are these squirrels interacting these two completely different situations. And what we did for this study is, we implemented this new technology, it had been used in studying birds and other things out in trees, but we were interested in putting these antenna loops in the entrance of each burrow. And each squirrel then has a microchip or we call it a PIT tag (Passive Integrated Transponders). Each squirrel has this and it's a lifetime unique identifier for that squirrel. So what we did is we did our classic behavioral observations that you might do above ground with binoculars, watching them, and we know who they are. And we have all of these social interactions that we can keep track of. But then we also created a social network based on the squirrels going in and out of the burrow. So every time a squirrel goes in, it scans them, and it scans

them just like a box of cereal at the grocery store scanning. What is that item? Well this is Umbrella, a squirrel that we know very well. And then that same individual, we can study their social interaction above ground, as well as below ground.

Matthew Zipple 09:13

What insights did you gain by being able to measure that below ground space use that you would have missed if you'd only had the above ground data?

Jenn Smith 09:21

By mapping out what they were doing below ground, we can ask whether animals that are more key, more central, more social in their social network above ground. Were also playing a similar role in a social network below ground that's otherwise hidden from human observers. And what we found is that they were remarkably similar. So animals that were social above ground in their social network are also remarkably social below ground and then others not so much. And that was fascinating to understand that these traits are fairly consistent across these two ecological contexts. Of course, it's also interesting just to be able to figure out what's going on in this hidden space that we as humans don't have access to.

Matthew Zipple 10:13

When I spoke with Dai Shizuka last year on the show, we talked about the challenge of understanding what is happening when space use and social network overlap. Because one possibility is that space use is constraining social partners. And that animals that overlap in space are limited in the short social networks that they can form as a result. But the other is that the social network and social preferences of individuals actually shaped their space use such that animals that prefer each other choose to use the same space or the same borough potentially. So given that below ground space use and above ground social behaviors are linked in this population. Do you think that that's primarily the result of space use dictating social partners? or social preferences dictating space use?

Jenn Smith 11:02

That is, that is the million dollar question. So it is something that we are particularly well poised to ask in this system. We don't know the answer yet. The hypothesis is likely that the preferences are developing in the burrow, what's going on below ground is likely establishing some preferences, but there probably are constraints on how far the squirrels are willing to move from their safe place. And they do have preferences. So we know that when my student, Chelsea Ortiz-Jimenez, she walks towards an individual squirrel, and asks how close she can get before they respond, that they have preferred burrows that they will go into for safety. So there is a constraint on how they choose these. We also are working on a project Erin Person at UC Berkeley is working on multi layered social networks. And that will allow her, in collaboration with this team, to be able to distinguish social preferences from spatial preferences. And so in that work, Erin Person will actually be able to quantify the social versus spatial preference to get at that.

Matthew Zippel 12:24

What makes this work possible, of course, is your ability to record space use data remotely and continuously over a long period of time. And I see kind of the biggest challenge of big data as applied to behavior to be its, its impersonality, and the physical separation between animal and researcher. So if we think about Jeanne Altmann, or Kay Holekamp on the savanna, following baboons or hyenas, they were often writing down or dictating observations one at a time, right from a single animal doing a single thing. And I think that anyone who's done focal follows like that will say that that pace and approach lead to all kinds of questions and ideas that simply would never come into existence, if we're sitting at a room looking at RFID reads (Radio Frequency Identification), or social networks, or even more extreme, the results of some unsupervised cluster analysis of a video that we've never even watched. So here's an easy question for you. What is the right balance between kind of the power of big data and the distance that it creates between researcher and behaving animal?

Jenn Smith 13:30

That is, that's a fantastic question. I would say that, you know, that exact balance probably depends upon the question. My own personal preference in my work is to have a really nice balance between the two, where you have precise information about individuals, and can then pair that with technology that's collecting additional data that is paired with a known animal of a known age, sex, all of these physiological correlates, hopefully, genetic kinship and also other things about their ecological environment. And then additionally, adding a collar adding on a Fitbit for a squirrel or baboon, or whatever you're thinking about GPS collars, things that are added value to answer these fundamental questions. So for me, the magic intersection is to bring both of those pieces, the known ecology about the individuals all their attributes, and then to add on pieces about their worlds that otherwise a human might bias. So if we're doing a follow, we're following an animal on foot. As they just mentioned with the squirrels it's possible to startle them. So we can, we need to be aware as researchers of the ways that we can potentially impact our subjects. It's also possible with the addition of technology that there are only particular animals that we can put technologies on because of ethical concerns or maybe we're limited in how many. And so really that magic interplay between, you know, getting more value added from these technologies, but also really keeping in mind the basic ecology, I think is very, very important.

Matthew Zippel 15:22

Yeah, that makes sense to me. So I, I was very fortunate during my PhD to go to work with the longterm database from the Amboseli baboons and, Anne Pusey, who was on my committee, she kept telling me, right, every committee meeting, she said, you really you need to go to Amboseli, you need to see these animals doing things? And I was, I'll admit a bit skeptical kind of the whole time because, you know, this incredible data set exists, why would I need to go collect more? And then of course, right, like, the day after I arrive, I totally, I was completely convinced that she was right the whole time. And I think that it speaks to kind of the value of giving people and giving students a broad behavioral ecology and evolutionary knowledge base to then go out and use the technologies. And I think maybe the

parallel exists when people come in without that knowledge. And I, so my concern, which is kind of what motivated this question, is that I feel like what these remote tech- remote data collection technologies allow, is for students to have a ton of data at a very early stage. And I would, I'm certainly, I know from experience that that's extremely tempting to then just jump straight to data analysis without really thinking deeply about the system that you're working in. So I just think it takes a kind of conscious effort on the part of both students and mentors to avoid an outcome that ends up without kind of that deep thinking about ecology.

Jenn Smith 16:53

Absolutely. I couldn't agree more. And in fact, much of my doctoral work on the spotted hyenas use long term data. And I really couldn't ask the questions over these short timescales. I was looking at coalition formation, these cooperative events that are incredibly important in the lives of spotted hyenas, but actually don't happen that often. And so we really needed that long term perspective. But being in Kenya for a year living in a tent and seeing the hyenas every day, instead of understanding them that really offered an insight into new questions. So what was it about the ecology, I noticed that they were more likely to maybe form a coalition away from food than at food, which was sort of surprising. You know, these noticing of these nuances, gave rise to lots more questions that wouldn't be possible if I were just sitting back in the United States at a desk in my office by myself. And I think along those lines, field researchers that spend a great deal of their time watching these animals, and discussing their observations with each other, that collaborative process of being in the field and having those opportunities to discuss what you're noticing, is also really, really important.

Matthew Zipple 18:12

I want to pivot now to talk about your work studying female leadership in animals, and its evolution. And I really liked this part of your work because I feel a strong obligation to connect animal behavior research across disciplines to help us better understand ourselves as humans. And so let's start this part of the conversation, talking about humans. And we'll work our way back to non human animals. So first, let's get us all on the same page of what is leadership.

Jenn Smith 18:43

In my work, I basically use a biological definition for understanding leadership. And I basically define a leader as an individual that has a disproportional influence on collective behavior. And leadership is very distinctive from dominance. Dominance is about priority of access to resources, whereas leadership is influence within a collective set of behaviors. So it's really within the decision making process. And for non human animals, we observe behavioral actions, often animals moving from one area to another. And we use that because we can't actually ask the animals directly and interview them. Well, who's the leader in your group? Who's the president? It's really quite powerful to start thinking about these animals in this way.

Matthew Zipple 19:42

And if we think about leadership in our lives, right? The role of leadership is obvious. And we think about maybe politics or employment or perhaps a sports team. But, but leadership and following leadership are much more pervasive elements, I think, in our lives than we might initially realize.

Jenn Smith 20:00

Leadership in human societies, we tend to think of one person being in charge and that structure. And you know, what I've noticed is there are power structures involved in who is in that leadership role in human societies. And that are our historical pieces that give rise to how people see who an appropriate leader should be. And absolutely, it influences things from governments, global decisions around climate change to smaller decisions within households. And leaders are pretty much everywhere. And once you start looking for them, it's just remarkable the amount of influence they have on day to day decisions.

Matthew Zipple 20:48

And in humans, there exists what's called the female leadership paradox. Can you describe that paradox for us and what we know about female versus male leadership in humans?

Jenn Smith 20:58

The female leadership paradox in humans is basically this idea that there's no empirical evidence or data suggesting that women or female leaders are less good at making decisions and influencing the outcomes of their groups. Yet, if you look around, and we can quantify this many different ways, looking at formal leaders, informal leaders, etc, but particularly in governmental structures, that there are far fewer female leaders than male leaders. And so this is really a paradox, because the evidence just doesn't align. So why, why do we not see more female leaders.

Matthew Zipple 21:49

And we're gonna come back and hopefully gain some insights into that by looking at your work in non human animals. So moving over to non human animals. Overall, you found that female leadership is pretty rare in animals in mammals, with about 10%, of mammalian species showing exclusive or majority female leadership. But the species where you do see female leadership provides some important insights into the ecological and life history conditions under which the male leadership seems to evolve.

Jenn Smith 22:20

We noticed that in one category of leadership, and this is work that is just coming out that females actually are the predominant leaders in movement. So we can after comparing for phylogenetic history, we find that female guides are actually the norm. So that's really, really interesting to me, that it's

somewhat domain specific, whereas in these between group conflicts, its males are often warriors, so to speak. But if we look across these four domains, which are movement, within group competition between group competition and foraging, we find that on average, females are not doing this more than males. Now, it's an open question. Still, it's possible that it's equitable. And we're finding that actually, you know that that is seem to be the case to a certain extent, within group that's kind of, it's maybe the males and females are doing it similarly. And we're asking that question now. And that seems to be the case. But there's certain groups that have female leaders and movement and female leaders in between group conflict. And those are the species that are incredibly interesting to study. Because by tackling okay, what makes these species different, what is their life history? What are their characteristics, and how do they achieve these leadership roles, and several species stand out. Spotted hyenas, for example, they are leading in warfare or these intergroup between group conflicts. It's the females that are out front, they initiate warfare, they are also more likely to be in the front lines of the battle, so to speak, they also are influencing when individuals will move and they live in female dominated societies. One common theme that we noticed is that particularly these long lived species like elephants, or orca whales, killer whales, they tend to have these matriarchs, these females that live a very long time. And they often have specialized knowledge, information about their ecology about where safe places are about where resources are. And it seems that this ecological knowledge in these long lived females is very important for seeing this bias towards female leadership. So in other words, it's not necessarily about being the largest animal that can fight the best, but actually having this understanding of what matters to stay alive, and that for animals is often eating and avoiding danger.

Matthew Zippel 25:21

So now let's turn to humans. And you write, and I love this line: "Although is it is exceedingly difficult and perhaps contentious to draw inferences from our analysis to the case of humans, it is something worth attempting." So what implications about women's leadership can we draw from your assessment of female leadership in non human animals,

Jenn Smith 25:42

it is often difficult as, as you mentioned, to, to go directly from these non human to human cases, humans are so complex in terms of our cultural traditions, and all of the different aspects and in the, basically, the reach the size of our societies are enormous compared to non human animals. But what I love about this research is that allows us to take a step back, and to quantify to assign evolutionary traits to a tree of life. And to look for general patterns, we can in a more systematic approach, use these numbers to look for patterns that might not be obvious when we're thinking about ourselves. What I noticed through this research is that in non human animals, females often lead in ways that are perhaps less conspicuous, and perhaps not always deemed as leadership, per se. So they might not necessarily be the head of state or the president or the person at the top of, you know, a boardroom meeting. But influence is happening on a day to day basis all of the time. And by a lens of looking at the ways that nonhuman animals influence the lives of others. It's incredible how much influence is actually happening. And I think the way that we think about leadership is quite constrained. And by looking at all of these examples of ways that females do influence the lives of others, and non human animals that gives us insights about our own lives, and helps us to really reflect on how much power female leaders

do have in fact. The other piece of this work, it's very collaborative. I'm a biologist, this collaboration is with evolutionary psychologists that think about the human brain and preferences that people have for particular leaders. And through that lens, I've started to understand that the human brain is used to looking around and thinking about, okay, who are the appropriate leaders, and basing that based on what we see. And so if there are, many female leaders around then we'll start to have preferences and think about, okay, this is what an appropriate leader looks like. And it's just incredibly important to think about, you know, race, gender, power, all of these things in human societies, and who we see around us matters and influences the decisions that we make. And even that idea of what's an appropriate leader is fairly socially constructed. But at the same time, there's this deep evolutionary route of the human brain evolving to make sense of our worlds. And so we can use that knowledge to actually construct worlds that maybe are more equitable and inclusive. And you know, that's where I think it's really exciting to think about ways that this might influence how we think about the human brain and human societies and so forth.

Matthew Zippel 28:54

Yeah, totally. And you reference a controlled natural experiment in one of your papers that took place in India that gets to this topic, and that I was previously unfamiliar with. And I think it's such an optimistic finding that I'd love for you to share with listeners.

Jenn Smith 29:10

Very, very optimistic. And this classic study in India, they looked at villages, and in these villages, they either implemented a quota for female leaders to assume these roles. And some of the villages had this quota and others did not. And they looked at this over a long period of time, and they noticed several things. They noticed that as the quotas were being implemented, more women were actually running to be leaders in these roles. So they had more women that were seeing themselves as possibly being candidates. They had more women that were being voted into these leadership roles. And for me, perhaps the most remarkable part about this is they saw outcomes for young girls, these young girls that were growing up in villages where there were more female leaders actually had better educational outcomes, and were more likely to see themselves as possibly becoming leaders. And all of this suggests that it really matters who is around. Who is in these leadership roles? It has inferences for thinking about gender, it has inferences for thinking about race, possibly, and all of these other pieces of the complex identities that humans bring to leadership roles. One piece of the study that was very striking to me is that prior exposure to a female chief counselor, actually improved the perception of how effective a leader is. So not only were young girls and women were likely to see themselves in these leadership roles, but the perceived effectiveness by men and young boys of these female leaders increased. And that really is a key to the female leadership paradox. So you know, there is no difference in how effective these different gender roles are. It is a perceived difference in human psychology. And through this randomized study, we actually shifted that perception of how effective female leaders are. And that, for me is very exciting. And that evidence suggests that we are able to shape the worlds that we see. And I'm very hopeful about the outcome of this work in India.

Matthew Zipple 31:48

And let's close this part of the conversation by talking about a new strain of your research listeners to 'Wait Wait, Don't Tell Me' already know this. But you've recently published an ideas article in Behavioral Ecology on the topic of privilege in non human animals, can you give us a brief overview of that review, and where you see that work going in the future?

Jenn Smith 32:12

I am fascinated by looking at comparative frameworks and starting to think about ways that humans and nonhumans are actually kind of similar. In this work on privilege, I've been thinking about privilege in human societies as a big human problem. So inequality is rampant. As we know, some individuals have a lot more resources than others. And I wanted to think, okay, do we actually see similar kinds of patterns in non human animals? And I started to look at this and think about ways that anthropologists study this phenomenon in humans. In anthropology, there is this classic idea that wealth is something that's outside of the human body, and it can be transferred from one generation to another. And we were interested in understanding do nonhumans also see this? So we looked across the tree of life? And we we looked at, okay, do we see material wealth? Do we see items that get transferred? And in fact, we do. And we see lots of examples of this, there's land that's transferred, there's material items that are transferred. There are several examples that are particularly striking, that are undeniably advantaging some individuals over others and for us, that's privilege. Some squirrels, for example, I think a lot about squirrels. So some red squirrels, they inherit a midden, which is basically a pile of acorns. And a female may pass on her pile of acorns. That is this big resource, this cache that she gives to one daughter, but perhaps not to another daughter. And what was really, really striking is that we see across generations that those that receive this actually perpetuates across many different generations. So for example, a daughter that receives will start reproducing at an earlier stage. She'll have more offspring than a daughter that does not receive this resource. And in evolutionary ecology, reproduction and survival are there to two commodities that are incredibly important. And it makes this playing field sort of uneven from the get go. And so we're thinking about that and thinking about well, what does that have? How does that influence our way of thinking about privilege? Humans, and are we able to address it in some way systematically?

Matthew Zipple 35:06

Great, we're gonna take a quick break now. When we come back we'll hear a bit about your scientific journey to this point and your experiences as a faculty member at a small liberal arts college. But first, here's a two minute takeaway.

Gabriela Pinho 35:23

Hi, my name is Gabriela Pinho and I am a recently graduated doctor from UCLA. I am delighted to tell you about one of my chapters that involves yellow-bellied marmots, hibernation and aging. We studied a wild population of yellow-bellied marmots located in the Rocky Mountains of Colorado, where marmots hibernate from seven to eight months per year. Curiously, species that hibernate have a

longer lifespan than it would be expected based on their body sizes. It makes sense that hibernating in the burrow can protect animals from predators, allowing them to survive longer. But we suspected that the aging process is being influenced by hibernation. We use epigenetic markers, more specifically DNA methylation markers that were highly correlated with chronological age. Those markers were then used to build models of epigenetic aging, which showed us that the epigenetic aging is season dependent in yellow-bellied marmots. So, the epigenetic age of marmots increases when they are active, stop changing during hibernation, and then continues to increase in the next active season. Our results suggest that the biological and physiological processes involved in hibernation are important contributors to the long lifespan seen in hibernators. This has value not only to biomedical, and anti aging fields, but also for uncovering the reasons for longevity differences among species, populations, and individuals. If you'd like to know more about this research, please have a look into the latest issue of the journal Nature, Ecology and Evolution. Thank you so much for listening.

Matthew Zippel 37:33

Welcome back. I'm talking here today with Jenn Smith, associate professor of biology at Mills College. And I want to transition now to talking about your experience working at a small liberal arts college and the strategies you've employed to be such a productive researcher during your time there. But first, let's talk a bit about your journey to this point. You've been involved in long term field research throughout your career from the spotted hyenas at Mara to the yellow-bellied marmots at Rocky Mountain Biological Station, and now to the ground squirrel project that you've established. And I think a common experience for people who do intensive fieldwork is that there's a formative moment where they realize that there are people who actually get paid to study the way that these amazing animals behave in the wild. And as soon as we really understand that, we can't imagine doing anything else did you have an experience like that?

Jenn Smith 38:27

I had many. I am from a very small town in Maine, a little fishing village. Most of my peers didn't go to college and you know, worked on lobster boats and things like that. And my mom couldn't afford to go to college and but, you know, I, I was able to have that opportunity because of many scholarship supports and all of that. And the formative moment for me, I at Colby College in Maine, went to this information session, my friend was going it was about a field course in the Caribbean. And I went and I thought okay, well listen, you know, saw some beautiful photos and applied for a scholarship and got it and was able to go off in January to the British West Indies and I studied hermit crabs and their nocturnal behavior and boy was I hooked so I came back that was my sophomore year of college. I came back and I went to the study abroad office. Wow, you know, what can I can I go? I can go to places and see all these animals that I've been reading about in textbooks and, and all of that and so I went to Australia, I went to the Great Barrier Reef and I studied rainforest ecology did that for a semester and then I went to Kenya through The School for Field Studies, and lived in the Masai Mara and saw Kay Holekamp's spotted hyena camp and some years later, I found myself back there for a PhD. And so that sort of, you know, understanding that my education could offer this social mobility to explore the world, and to study animals, where they live in their natural situations was just... Yeah, that was that was what opened up my world for me. And I'm currently at an undergraduate only institution.

And, you know, it's really because of those formative experiences that I had as an undergraduate and starting to see the world through that lens, that that's the group of students that I find I connect with best. And my students come from lots of different backgrounds. And I found that that's really important, in promoting equity, diversity, inclusion, all of those pieces in my lab, and also for getting these amazing insights and different perspectives, through the different roles that the students play.

Matthew Zipple 40:59

So it'll come as no surprise to listeners that graduate students and postdocs are responsible for a huge proportion of the work and innovation that happens in academia. And there, of course, aren't any graduate students in your lab at Mills, but you've managed to maintain a robust research program by relying on undergraduate researchers to fill those same roles? So how have you done that? And what, if anything, do you think that undergraduates bring to the table that grad students and postdocs might not?

Jenn Smith 41:27

My students do things that graduate students that other institutions might have opportunities to, but undergraduates are, you know, that the top level they are, they're the ones writing the scientific papers, they're working through the statistics, they are collecting the data, they are presenting at national and international meetings. So in my lab, I often have students that will start in a project early on in their undergraduate career. So in their first or second year, they might start doing some systematic work. And as part of the long term study, one aspect of that that's quite valuable is we actually have these protocols that need to be done every year. And they're excellent access points for folks with varied backgrounds to come in and start understanding how we do the science. Those same students then move into leadership roles in my lab in their junior or senior year. And so then they'll start to take ownership for particular aspects of the project. And those opportunities, being able to see themselves as part of the science has been just really, really impactful and inspirational for me, and I love that

Matthew Zipple 42:52

You're the first small liberal arts college faculty member we've had on the show. And I think that a lot of listeners will have no firsthand experience whatsoever with that kind of institution. Which I think is a shame. I wish I did, but I don't yet. So just as a baseline, can you tell us a bit about what your job is like, who the student body is? What's the mission of the school? And what are your responsibilities?

Jenn Smith 43:20

Right, so I'm currently teaching at Mills College, and we are a Hispanic Serving Institution in urban Oakland, California. And we have, you know, about half of our students are first generation college students, half are LGBTQIA+ identified students, we have students that are coming from lots of different backgrounds. And so a lot of my job is meeting students where they're at, and supporting where they want to go. And what that means is a lot of in class instruction in the classroom, that's normal, and a lot of mentoring that's informal, as well. So I teach classes as a professor as an

instructor. I also teach the lab sections. So at larger institutions, there might be teaching assistants that are involved in that instruction, or it might be other faculty that are supporting the labs but are not necessarily in the classroom. So a couple of things that it means on the ground, it means that I'm spending probably more hours in the classroom and more time in preparing for teaching these classes than perhaps folks at large institutions. And it means a lot more interaction. So when I'm the, my favorite parts of the job is that I have the same students in multiple classes so I might meet them in animal behavior and I'd see that same student in ecology or marine biology or vertebrate biology. And I know pieces of what they've known. And I get to also fill in pieces that maybe I haven't exposed them to. But I also see growth of those same students. So in a smaller institution, or any institution, really with a liberal arts focus, there's this idea of exposing students to new ideas, and really circling back with those same students is really a part of my job that I love to be able to see.

Matthew Zipple 45:37

I want to end by talking about job preparation and getting a job at a liberal arts college. Perhaps, understandably, research focused institutions don't always do a great job of training students to be successful teachers as well as successful researchers. So what advice would you give to a graduate student, or maybe a postdoc whose dream job is a liberal arts position, but it's currently working at a research first institution.

Jenn Smith 46:04

So most of us get our PhDs from large research institutions. And, and that makes sense, because those are the institutions that are focused on producing doctoral students. The skills that are helpful for a position at a liberal arts college or any university that's more focused on teaching is, of course, opportunities to teach. And one thing that I've noticed that's been really, really important is to have an opportunity to be an Instructor of Record. So it's very prestigious, within a PhD to have a NSF, a National Science Foundation, scholarship support, that fellowship allows for a dissertation student or doctoral student to pursue their research full time. However, what ends up happening sometimes is if a doctoral student who has so much fellowship support that they don't have the opportunity to teach, and they find that something that's really of interest to them, it is a hole that can be in their resume or their CV. And one piece of advice that I would recommend, and really to anyone is to take an opportunity within graduate school to teach and to if the opportunity presents to be the instructor of record, so that's the professor that's assigning the grades, choosing the textbook and really organizing the class and do it for a summer perhaps, or do it for one semester. And that's really important. So I found that that on both on the job search side of looking at other candidates and hiring IT folks haven't had experience teaching, it's really difficult to evaluate and assess that and to know, and I think it's important for anyone to try out as well to see if that's what they want. The other piece that I would say is that advocate for yourself. So if you think you want to be a going on and teaching and you think you're doing a really good job of it, there are teaching awards, and sometimes it does take self-advocacy to, to go up for those. And so that's a piece that I would also recommend.

Matthew Zipple 48:32

Yeah, great advice. Sticking on this topic a bit. Just this week, I was talking with a colleague, who as long as I've known her, has wanted to be a faculty member at a small liberal arts college. And she's also a really great researcher. And I've heard more than once from people giving advice that when it comes to getting a job at a liberal arts college, having a strong research record can sometimes harm one's prospects. Do you think that's actually true? You obviously had a strong research record when you got your job, and you've continued a very strong research program alongside your teaching.

Jenn Smith 49:05

That's a fascinating question. I would say a strong research record that complements teaching is helpful. The key piece that I would emphasize is student participation in that research. So at an institution that values teaching, more and more, they're really valuing and actually expecting and that is part of the selection process for these jobs oftentimes, is to involve undergraduates in research projects. So research that is accessible to undergraduates is valued and seen as a major plus. So to the extent that it can be detailed on a candidate's record that undergraduate, we're involved in this research and that mentoring is key to the success of the research, I would say it's absolutely a plus. And in fact, many institutions are looking for that. They are looking for it in the context of educating undergraduates. So it's really about that piece. And it's, it's helpful to think about projects that would succeed. And some in, some places there are some research programs that require certain pieces of equipment, for example, or certain travel experiences to make them work. And so really thinking about how the research involves students and what will be practical, within the context of having a large teaching load, thinking about seasonality. So I've found, for example, that it really works well, doing field research in the summer, collecting samples in the summer, bringing those back to the lab and assaying them and so forth during the academic year, when I'm teaching my classes, and my students are doing their coursework. So kind of pairing it in that way. So I would definitely say that research is value added, and really thinking about the way that it supports the goals of the institution. And yeah, do what you love. And if you love research, your students will too. And I've absolutely found that to be the case. And in fact, for me, I don't see that much of a division between my teaching and the research. In fact, they they support one another.

Matthew Zipple 51:34

Yeah, that makes a ton of sense. Great. Well, let's leave it there. Jenn Smith, thanks so much for being here.

Jenn Smith 51:41

Thanks so much for having me. I look forward to asking more questions. And this was great. I appreciate your time.

Matthew Zipple 51:50

The Animal Behavior Podcast is created by a great team of animal behavior researchers and science communication professionals. Amy Strauss and I prepare and conduct the interviews. Our content editing team is Naomi Person, a longtime radio producer, Poppy Lambert, a PhD student studying tool innovation in cockatoos and children at the University of Veterinary Medicine, Vienna, and Niko Hensley, an NSF postdoctoral fellow studying the evolution of neuro sensory systems and their implications for animal communication at Cornell University. Our communications director is Casey Patmore, a PhD student at the University of Edinburgh studying the behavior of burying beetles. You can follow us on Twitter @AnimalBehavPod, or find us at our website animalbehaviorpod.com. And you can always get in touch by email at animalbehaviorpod@gmail.com. We'll be rolling out our website throughout the season, including new educational resources that will accompany select episodes. Those materials are being developed by our new education team. Emily McLean, assistant professor of biology at Oxford college at Emory University, and Georgia Lambert, a PhD candidate studying parental cooperation in burying beetles at the University of Edinburgh. Our sound directors Brian Leavell, a PhD candidate studying the evolution of acoustic signals at Ximena Bernal's lab at Purdue University. This season I'll be recording my side of most conversations in the Cornell Broadcast Studios with engineering support from Bert Odom-Reed. Our art is all produced by animal behavior researchers. Our logo was designed by Adeline Durand-Monteil our theme music is by Sally Street and transitions are by André Gonçalves. We receive financial support from the Animal Behavior Society. Finally, if you'd like the show, then you probably know other people that would like the show to but don't know it yet. Do them and us a favor and tell them about us. Thanks for listening and see you next time.