S1 E4 Ted Stankowich

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SPEAKERS
Ummat Somjee, Ted Stankowich, Amy Strauss

Ted Stankowich 00:00

Looking at an animal that can't talk back to you and tell you why they're doing what they're doing, but trying to look at their behavior and figure it out. I followed my passion and it led me to behavior.

Amy Strauss 00:11

Hello, and welcome to the Animal Behavior Podcast. I'm Amy Strauss. In today's episode, I speak with Dr. Ted Stankowich, who runs the mammal lab at California State University Long Beach, where he and his team conduct long term behavioral studies at carnivores and investigate the evolution of defensive armor, weaponry and coloration in a variety of mammal species. In this episode, we talked about why some mammals have evolved protective armor and others have not. Why pandas have such a unique black and white color pattern, and how urbanization seems to be affecting mammal populations differently across US cities. Then, after the break, we talked about how Ted incorporates museum collections into both his teaching and his outreach, and we discussed the benefits and challenges of using social media for science. We close by hearing about Ted's experience as a professor at an R2 Institution. I hope you enjoy it. Let us know what you think at animalbehaviorpod@gmail.com. My guest today is Dr. Ted Stankowich, an Associate Professor and Associate Chair of Biological Sciences at California State University, Long Beach. Ted's research integrates field and lab experiments, comparative phylogenetic analyses, and work with museum specimens to explore questions about the ecology and evolution of predator prey interactions in mammals. In addition to his research, Ted is deeply committed to both teaching and outreach, which we'll get to talk about later in the show today. Ted, welcome to the Animal Behavior Podcast. Thanks for being here.

Ted Stankowich 01:43

Thanks for having me.

Amy Strauss 01:45

This is the Animal Behavior Podcast. So to start, I want to get it how behavior drives or connects the really integrative work you do looking at the evolution of anti predator defenses.

Ted Stankowich 01:55

I see behavior as the first line of adaptation in response to changes in the environment or in selective pressures. I always am looking at how animals are first responding behaviorally before selection really starts to mold those more extreme morphological adaptations. So when we talk about defense anti predator behavior, usually the first line of response is playing sooner, running faster, forming groups. But then when you get more extreme sorts of predation risk, and then you start to see morphological changes happening at that point, you can have behaviors that are combined with morphologies, as well, you know, exposing color patches, or running quickly with specialized limb morphologies.

Amy Strauss 02:38

And these behavioral and morphological adaptations you're talking about aren't limited to mammals. So why do you focus on mammals specifically?

Ted Stankowich 02:46

So as someone who's interested in anti predator responses, mammals are a great group to study because they have armor in a number of groups, and they have weaponry in a number of groups. And then you have certain groups that I have studied a bit more like the carnivores and the ungulates that are just very diverse in how they behave and the adaptations that they have. And I've done papers across all the mammals, there are larger questions about how things evolved there.

Amy Strauss 03:09

Okay, so digging into some of these groups, can you tell us a bit more about some of the specific strategies different prey species have evolved to deal with the constant threat of predation.

Ted Stankowich 03:17

So among mammals, there's the truly behavioral strategies of rapid escape, fleeing into refugio like trees and burrows and water, camouflage coloration, forming larger, larger groups to look out for for predators or to defend against predators. Then you have the more morphological responses, your sticky sprays in the carnivores and other groups, the spines and quills of hedgehogs, tenerecs, echidnas, porcupines, and then the most extreme version, you might say, would be the armored shells of armadillos and pangolins.

Amy Strauss 03:51

Given how costly predation is, and thus, how closely linked to fitness it is, why don't all mammals have elaborate obvious defense systems?

Ted Stankowich 03:59

That's a great question. There's really two different ways to answer it. One is the cost of bearing such traits. And two, it's the strength of selection that favors them. Obviously, having an armored shell or big long spines is, it would be great for everyone to have because you'd be more protected from predators. But there are a lot of costs that come along with those and we can talk about those in a bit. But what we've found is that the animals that do bear these traits are the ones that that are at the most risk of predation or live in this what we call a danger zone.

Amy Strauss 04:31

And what taxa are those that live in this danger zone, or what traits are associated with that type of higher risk environment.

Ted Stankowich 04:37

Small mammals can, no matter what their environment is, usually find a way to be cryptic, just because of their small size. They can hide and or have cryptic coloration and just avoid being seen that way. But as you get bigger and bigger, you know, squirrel to rabbit sized up to about a kilogram in size. It's harder to hide, especially in open habitats. And so as you get larger and larger, you become more visible and also a more desirable prey for predators. And therefore, you become much more of a target and much higher risk. But then as you get evolve larger and larger sizes towards a 10 kilograms and above, once you get past that point, most predators can't kill you. You've sized out of most of the mid sized carnivores in birds of prey. And so once you get past 10 kilograms or so there's not a lot that's going to kill you. So it's really these intermediate sizes that live in open habitats. That's this super, super risky area of morpho space that really does favor defenses. And in that zone, you see all of your defendant animals, you see your porcupines, armadillos, pangolins, your stinky animals, like skunks and all those guys. Then the other ones that live in that zone are other carnivores that can probably defend themselves with claws and teeth, they're usually fairly aggressive. Or you see jumping animals, you see saltatorial animals like rabbits, they also live in that space. And they solve the same problem just with super high speed. So what we think is happening is that these extreme morphological traits are favored by extreme predation risk in that zone that the benefits exceed the cost. And you can live in that zone without much risk and exploit it where other animals can't because it's just too dangerous.

Amy Strauss 06:21

Do you classify claws and teeth as something separate from weaponry?

Ted Stankowich 06:26

Yes, I call weaponry something that's evolved for a specific purpose to battle an opponent you know, sexual combat, claws and teeth, especially in the carnivores of those that evolved for prey capture. And those are great tools for prey capture, and you could call them weapons. Normally, when I at least when I talked about what weapon we were talking about some much more elaborate structure like a tusk or a horn.

Amy Strauss 06:51

Okay, so claws and teeth primarily have evolved for prey capture. These other elaborate morphologies have evolved for courtship battling horns, tests, antlers, do you see these also used for anti predator defense, or do those also tend to be distinct structures.

Ted Stankowich 07:04

So obviously, most of these traits that have evolved for sexual combat like antlers, horns and tusks, their primary function is clearly to win mates, right? Because males typically have them in the females don't, that's sexual selection for you. But they certainly have other uses. They can be used to scratch an itch, but also used in defense. So one of our past papers in 2009, was looking at the evolution of horns in the female ungulates in these animals are not using their horns to win mates, mainly what we found that they use their horns for that for those species that have horns, it's in species that tend to be very exposed in their environment, larger in size and living in more open spaces. So you're much more visible on the landscape. And then also in species where females are territorial, actually engaged in battle against other females for territory. So those are the two reasons, other reasons, why you might have a sexual weapon, but it's not common to evolve them specifically for those purposes, probably the genes were there. Already, it was fairly easy to just express them in the females.

Amy Strauss 08:06

In these cases, when female weapons do exist, are they morphologically distinct from what their conspecific male current counterparts have, due to the different functions you just described?

Ted Stankowich 08:15

The females that have horns, the horns tend to be straighter and slimmer than the males, they are probably more dagger like and less, less shaped for fencing than the male horns. So I think the overall shape is driven by what the males have. They do have other properties that might make them a little bit easier to use for stabbing a predator than a males horn might be.

Amy Strauss 08:42

Separate from weaponry, you work on skunks. While most of us think about spraying as their go to anti predator defense, you're researching the coloration of skunks as an anti predator defense. Can you tell

us about how coloration and spraying are functionally connected and what you've learned about the evolution of stripes in skunks?

Ted Stankowich 08:59

Sure. Aposematism, warning coloration, is a well studied phenomenon in the animal world. Most people who study aposematism work on insects, or frogs or snakes. And those things have really gnarly defenses, toxins, usually in their skin, and they're brightly colored and amazing research out there on the evolution of aposematism and those groups. Those are all passive defenses, and not much is known about aposematism with active defenses that actually go out and can harm the predator without having bitten down on the animal right is with those you have to actually chomp into the animal and you spit it out and hopefully you get away. Skunks are more unusual. And they have these really noxious anal gland secretions that can spray out at predators that everyone knows about. And just like other other species, they advertise them with these black and white warning coloration. Black and whites used and not bright colors because their primary predators who they're aiming at here are mammals, mammals tend to not see in color so colors aren't as important. The only real examples of color based aposematism in mammals are yellow and black and some porcupines have some yellow as well. In skunks, the pattern is they vary quite a bit geographically across North America. Where I live, they're all pretty much the same. They all have that two nice white stripes. But you go to another area like Tennessee, the patterns vary wildly from being almost all black, with just a white patch on the back of its head to almost all white, a whole white cape down the back. And even within one litter, you can have huge variation in striped patterns.

Amy Strauss 10:31

Wow, that level of variation and and aposematic signal seems counterintuitive. What explains that level of geographic variation in skunk stripe patterns.

Ted Stankowich 10:39

One of my former grad students Hannah Walker is looking at that and was examining how what factors like mammal predation risk bird predation, risk, habitat type, snowfall, urbanization, how those things influenced pattern. And overall, what she found was there was a slight effect where the stronger the risk, the wider the signal, the whiter the signal. But the most interesting thing that she found was that when predation risk declines, variation expands dramatically. In areas with very few predators, you see huge variation in striped pattern. So when predation risk is high, you expect natural selection to be favoring a very consistent signal. But when that selective pressure weakens and relaxes, then the stripes can start to spread out and the can start to drift away from from the standard to long white stripes. That's a really great example of how relaxation and selection can lead to a change in a really interesting trait that we thought we knew a lot about.

Amy Strauss 11:38

That's a really cool finding, besides skunks, who else sprays.

Ted Stankowich 11:42

There's actually among the carnivores. There's a number of species that are good sprayers. Skunks are part of a family Mephitidae and that those are all the skunks and the stink badgers, stink badgers are in Southeast Asia. And they're all good sprayers, so their common ancestor all had a noxious sprayer and they're all black and white. Among the Mustelids that's a very diverse group. And there's a group of polecats that live in Africa, they look just like skunks, and they spray and direct that spray just as well as skunks do but their secretions, the stinky stuff in their animal glands. It's actually very different in structure than than the thiols as we see in skunks, and they're totally different in chemistry. The actual spray is green, it's not, whereas it's gone to the to yellow or golden. But it's this really cool case of convergent evolution, solving the same problem exactly the same way with the same color pattern in just two different areas. They guess they both had anal glands to start with that we're used to communication like most carnivores use them. So there's some really cool groups like that. There's other things like ferret-badgers that can spray as well. And then there's a whole bunch of other carnivores that can just sort of make stinky smells, what when they get harassed. Within the carnivores, it's pretty diverse.

Amy Strauss 12:50

Are there mimics that don't have noxious spray, but have evolved the coloration to mimic or advertise falsely that they do

Ted Stankowich 12:57

Not to my knowledge, no. Everything that advertises it like a skunk does is typically stinky, or they have another defense to back it up with so you think of like a honey badger. They are mean ruthless, horrible animals that they just attack for no reason. Right? So aposematic coloration in mammals can not only be about stickiness, but it can also be about aggression, too. And you also have aposematic coloration in black and white on spiny animals. A lot of porcupines have striated, quills, black and white bands on their quills. Up close, you have this really bold pattern that you advertise. But from afar, that pattern makes them a little bit more cryptic. So that's really a balancing act there. For a lot of species. Striped skunks are pretty much aposematic, they can wander around without much care in the world.

Amy Strauss 13:44

Okay, so this type of bold coloration goes beyond skunks, of course, you've studied patterning in zebras, pandas, primates, etc. How do some of these other systems differ? Let's start with an age old question. How did the zebra get its stripes?

Ted Stankowich 13:59

My collaborator and I, Tim Caro had been studying black and white coloration in a bunch of different groups and discoloration in general. And we've looked at zebras and pandas in particular, because

they're just so unique. And people have been wondered for 1000s of years. Why? Why do these things have the coloration patterns that they do? We looked at a number of hypotheses for why the zebras have stripes, whether it's some sort of confusion effect when it's fleeing from predators, camouflage in a woodland environment. So it makes you more into more individually recognizable. Heat effect where the black and white stripes sort of established eddies of air that cools the animal off in high temperature environments. There's there's a hypothesis for aposematic shows that they're aggressive and can kick you. The one that we found was the best explanation for the presence of stripes in the first place was being highly exposed to biting flies. Savannah flies, tsetse flies, parasites that will suck your blood and pass on disease. So what we found was in species and subspecies that have six months or more of weather that would favor intense biting fly activity. Those are the equine species that have legs stripes and body stripes. And that was the best predictor of stripe evolution across that genus. Within the species, stripes may be shaped by other factors. But we think the original source of stripe evolution came from biting flies and since then other people have studied the mechanism behind that and they think it's messes with the vision of the flies. Makes it harder to land and when they observe flies landing on stripe coats, they bounce off. People often ask me so if I wear my zebra print coat, can I have flies? I don't think so, I think has to do with the orientation and the fact that the stripes are on fur I think play plays a role. It does capture a lot of people's imaginations. In fact, we were there was a joke on Saturday Night Live about the finding. I just wanted to retire at that point.

Amy Strauss 15:47

That's amazing. So I assume pandas are not trying to avoid biting flies, what explains their unique black and white color pattern?

Ted Stankowich 15:55

The pandas were a lot harder thing to figure out because they're the only species that has it right. We have to break down coloration by body part in carnivores and say. Okay, what factors favor evolution of darker or black legs, or whiter or lighter bodies or whiter heads and sort of put the puzzle together? Overall, what we found was dark legs are found in species that live in shady or environments, forced environments, and whiter bodies are found in species that live in snowy or environments. Pandas are the only bear species that is actually does not go undergo some sort of shallow hibernation. So they have to be active in both the snowy environment in the winter, and the shady forcing environment that summer. And so this coloration pattern might provide some sort of disruptive coloration where they blend into their surroundings a bit more way back when they had they had some more predators that they don't have now when they had a larger range. And so those predators might have selected for some sort some sort of disruptive coloration on their body, there's a good chance that has to do with blending into your surroundings.

Amy Strauss 16:58

I want to make sure we get to talk about another project, you're working on looking at urban carnivores in the Los Angeles area. And for this, you're partnering with the Urban Wildlife Information Network. Can you tell us about this project in this collaboration?

Ted Stankowich 17:09

Yeah, so I came to Long Beach in 2012. And a few years into it, I was approached by a representative from Urban Wildlife Institute, at the Lincoln Park Zoo, they were putting together an urban wildlife Information network. Continental collaboration of partners, where everyone establishes their own camera trap project. Following the same protocol, all the partners have at least 25 cameras in a metropolitan urban type area, but going from urban areas to rural areas. And the cameras are all put up the same way. During the same seasons of the year, we upload all of our pictures and data to the same database. We've been doing this for three and a half, almost four years now the collaboration has just grown and grown and grown. There's more than 35 partners now across the country. And the great utility of this project is that we can all share data and you know replicates of every experiment across all different types of cities. And what a paper that just came out last year that among the partners was, we found that animals respond to changes in green space and housing density in different ways, across different cities, city specific differences in how wildlife respond to urbanization. And it has to do with the characteristics of the city. It's there's not one answer. So you can't just look at one place and say, okay, raccoons respond to urbanization in this way. And because I found this this response in, in Houston, Texas, that that response in Houston might be very different than the response in Seattle. This is a great opportunity for us to all share information and ask these larger questions. And we're actually also working on a COVID paper right now where we all kept our cameras on during COVID time, those of us who have our cameras on before can we compare data before and after and see how when sheltering in place came into effect how human activity might have changed wildlife responses.

Amy Strauss 19:05

And you can choose to do your own projects and ask your own questions from the specific angle of your lab using all of the partner data, right?

Ted Stankowich 19:12

I have a student at Katrina Cazel, who's just defending next week, actually, who was looking at how do skunks and armadillos which have morphological defenses vary in their responses to urbanization in predator guilds compared to undefended species like a raccoon or an opossum? And so she's looking at those types of questions with the same data from different partners. Our goal is to expand out and at these established locations where we have data already on some members of the community we can expand to other, other taxas as well to get a broader idea of how urbanization really impacts wildlife in cities. My first year grad student Jordan Rodriguez is doing small mammal trapping, the number of the sites to look at how small mammals and large mammals change with urbanization together. How does that, how do those foodweb change over space? Well, one of the benefits is that if you provide data to a project and you help with the paper revision and that kind of stuff, you become a co author on the paper. So all these papers are these giant collaborative papers. And it's a great way to build your portfolio as well, right?

Amy Strauss 20:17

It's always exciting to hear about large scale collaborative efforts like that. So beyond camera traps and small mammal trapping, can you tell us about some of the field work you do with mammals, particularly looking at behavior?

Ted Stankowich 20:28

I like to say that I scared deer for my PhD. So I worked on black tailed deer up in Northern California and looked at how they responded to approaching humans and to predator models. You're at the top of this peninsula looking out over the Pacific Ocean, it's the sunset and like, how do they get here? I'm a first year grad student. It was great. A lot of our current fieldwork focuses on interactions between skunks and coyotes and or skunks and predators to ask how do skunks perceive risk in their environment from predators, different types of predator cues? And then how do predators learn to avoid skunks? Because this stuff has never been looked at in mammals. Most of the research is in you know, like I said, insects and birds. We've done work with skunks where we've looked at how do they respond to playback so things like great horned owls and coyotes, we found that they responded more strongly or more fearfully to our we'll call them in the coyotes. Coyotes, they're well defended against coyotes don't mess with skunks, they don't want to get sprayed. Owls, though, are the one predator that can kill a skunk fairly easily. They can fly down silently attack from above and kill the skunk and they are fairly anonymous, too. They don't smell that well. So that's why owls are particularly dangerous. I currently have a student Hannah Rabitoy who's doing a study with our robotic coyote model. Obi Wan Coyote. So this is six years of skunk trapping and looked at how chemistry of their secretions of it varies by site. Always a lot of fun. We haven't trapped in a couple of years. We've gone to there's a facility in Utah, the predator research facility in Millville, Utah, that that has 100 captive coyotes in it. And we've done studies with skunk models to train coyotes to not attack skunks and see how well they can learn. You took these brown furry plates with big brown fur on them and put their food on top of it and put them in the pens with the animals. These are big open pens, you can experiment on the animal that's great. Once they were conditioned to eat off of these brown furry plates, we then swapped one out and put a skunk plate in there. And if they tried to attack this skunk plate, they got sprayed in the face with the skunk oil. So some animals are sprayed one time and never again attacked. It's good model. Others got sprayed nine times in the face and kept going backward. Coyotes are very flexible and have broad ranges of personalities. And so we think that they have some bold animals we have some fearful animals. We're still exploring how things like pattern, in contrast, influence the responses of coyotes to skunks as well. This is an ongoing area of research to really understand how mammalian predators respond to epigenetic patterns that hasn't been looked at in mammals before.

Amy Strauss 22:58

Sounds like fun and stinky field work. I imagine Obi Wan Coyote must really smell from being sprayed over and over is that the case?

Ted Stankowich 23:05

Never. Skunks don't want to spray. So that's a big myth. They want to go about their business and tell you to go away. I say if you ever get sprayed by a skunk, you either tripped over because you didn't see it, or you've done something really dum. Didn't heed their warning, they will display. Your dog is not so smart that they don't pick up on the cues like charging and tail up. We've approached them with the model on many, many, many times and they will either just flee immediately, or they will hold their ground and stomp and charge and stamp and tail up and then run away. But we're also testing them in more open sort of park environments where they can easily just turn and run. I think if we ever had a case where they were sort of pinned up against a wall and couldn't really escape, I think we would get sprayed. I've been sprayed once. Day one, year one I got sprayed when one woke up from sedation and it was in the trap to get to hold the door the trap open, let them walk out. This animal didn't want to come out. My hand got sweaty and door slipped down slam shut and I put my hand back down over the door to lift it up. They sprayed my hand so I got sprayed on the hand which is gonna get sprayed it's not so bad. If you just respect them treat them with care, you're probably not gonna get sprayed. Skunks don't stink. There's a big misconception is skunks are really stinky.

Amy Strauss 24:19

Good to know. Thank you for busting these skunk myths. Let's pause now for a quick break. When we come back, we'll shift gears a bit away from your particular research area and talk about your commitment and creativity when it comes to both teaching and outreach as well as your experience with the tenure process at an R2 Institution. First, here's a two minute takeaway.

Ummat Somjee 24:37

The smallest deer species is the tiny pudu, it's about the size of a small dog like a pug. And it has tiny pointed antlers that account for 1/10 of 1% of its body mass While the biggest deer species we know to have ever existed, extinct Irish Elk, had massive glaring antlers 12 feet across that accounted for about 10% of its body mass. Hi, everyone. My name is Ummat Somjee. I'm a Postdoctoral Research Fellow at the Smithsonian Tropical Research Institute in Panama, and I study the evolution of exaggerated traits in animals. My research focuses on drawing connections between two often separately studied patterns in nature. The first pattern, which I alluded to earlier, is the pattern of positive allometry, where large individuals like the Irish Elk invest disproportionately more in sexually selected traits compared to small ones like the pudu. While this pattern is found in relatively few animal groups, it is found in diverse taxa. Positive allometry is found in the antlers of elk, but even in the tiny antlers of antlered flies. The massive tusks of elephants and the miniature tusks of tusked weevils. The ornamented feathers of many birds, but even in the feather like ornaments in canopy dwelling mosquitoes. And one question we can ask is, why is it that large animals in these diverse groups can invest more in sexually selected traits compared to small ones. The second pattern is the economy of energy gained by large size. As animals get larger, the energy used typically becomes more efficient. In a broad sense, a larger animal will use less energy per gram of tissue to cover the same amount of distance compared to a small one. And they pay lower relative cost to maintain metabolically active tissue as well. So one open question is do these energetic savings gained by large size all contribute to this pattern, allowing large animals to

bear disproportionately large exaggerated centrally selected structures, like the massive antlers of the Irish Elk?

Amy Strauss 26:39

I'd like to talk now about some of your work and experience in this field beyond your research program. As a professor, you're deeply committed to student learning. And you've designed a really unique and engaging course in mammalogy that relies heavily on the specimen collection at CSU Long Beach. Can you tell us about how you integrate museum specimens into your teaching and how the use of specimen supports your teaching objectives.

Ted Stankowich 27:00

Since I arrived at Cal State Long Beach, I've been the curator of mammals sort of tasked with maintaining our teaching collections and building our research collections. It's been a great experience, we... I was lucky to arrive and actually have already had a really great collection there to work with. But I want to make the experience even better for the students. I want to get them as many animals as they can and things that they wouldn't see anywhere else. And they can touch and hold and learn from. So my goal has been to expand our collections and get rare families and new, new species that we didn't have before. So one of our big donors has been the San Diego Zoo, you know, twice a year, we get a big truckload of frozen animals, red panda, porcupine, capybara, giraffe legs, rhino legs, all sorts of really cool stuff that we then bring into the lab and we train students to clean them and prep them. And so that's part of the learning experience. And so students get these great opportunities to learn outside the classroom as well. And we've also even invited in students were working on their their medical art certificate to come in and draw animals with no skin. So we skinned the cheetah one time and they were all over it, they wanted to come in and like look at all the muscles and see how it worked and everything. So for things that are hard to get or hard to store, I've turned to 3D printing. I worked with our innovation space that the big 3D printing facility we have here at Long Beach, I was able to acquire a bunch of high resolution scans of bat skulls, and we printed them out in large scale, so 15 centimeters long, and so students can learn from those in the classroom. And rather than having looked under the microscope at the two structures, they can actually hold this giant bat skull in their hand and see all the traits that they might not see under the microscope. We did that back in the spring. And then in the fall we went the other direction is is I got a bunch of whale skull scans, I printed out I had the students print out a bunch of whale skulls at 25 centimeters long. So even like a blue whale skull is like this big map and you can see all the details on it. I have been able to accumulate a skull from every single every single whale family that are printouts of all of them fall when we're back in person again, students will be able to actually learn to identify all the families now based on their skulls, rare river dolphins, humpback whales even have a narwhal skull. And now we're working on fossil animals, much rare rare marsupials that we just can't ever get. We've really tried to expand our collections a lot to help the experience with students.

Amy Strauss 29:25

What a great resource for these students to have at their fingertips. Where do you get the high resolution scans that enable you to print out the skulls?

Ted Stankowich 29:33

In recent years, there's been a big push to digitize collections. And one of the main ways to do that has been CT scanning specimens from all groups of all organisms, birds, mammals, reptiles, everything. There's several resources. So I've gotten a lot of mine from Sketchfab, which is an online repository for 3D models and they have beautiful models in there and you can spin around and using it in classes. I use them in my class all the time. A lot of those are downloadable. You can download the model to print out yourself. A lot of them have to pay for or they aren't available. If you say you're from university and you want to print it for educational purposes, I've never been turned down. But MorphoSource is the other big place that we've gone to, they have a huge number of scans. They're people who do morphology to use CT and micro-CT scans for morphological studies will upload their data onto these repositories. And often as part of their funding requirements. We've just been using them for teaching but we do have a project on armadillo armor evolution that we are now pulling some scans that you actually use in research for the first time. They're, they're just great resources altogether. The scanning plus printing has just blossomed and made possible so many different things that you couldn't do before. And you know, I'm just starting to dip my toes into it. But my first foray was with this 3D printing for my class. And it's been a been a great experience so far.

Amy Strauss 30:53

In addition to the museum resources you just talked about, you also do some pretty cool field trips with the students in the context of this class. Can you tell us about that?

Ted Stankowich 31:01

Sure. So I teach mammalogy every semester, we do two field trips. One is a weekend, a techniques weekend where we go out and do an overnight camping trip, they learn to do small animal trapping, track plates, radio telemetry, hide some collars out in the brush and make them find them. And then we do a night hike and look for mammals. It's a short, it's like a one day trip. But we usually capture a few rodents and they learn you know how handling works and what to measure. And these students are all from Los Angeles. Most of them have never seen anything other than a rat running across the floor or cross the ground. So to see a wild rodent, a wild native one up close that we're holding, you know, and say here's how you measure its foot and its tail and look at look at this trait and this trait. And you can see how you key out an animal. That's a really cool experience for the students. And they're always really, really interested in. Love that part of it. The other thing we do is we do field trips to the San Diego Zoo. It's a great resource to have obviously, I'm lucky to be in SoCal. I've written a scavenger hunt. When they arrived, they go out on their own, and there's a page I have and they have to look at these clues that are mammal bio related. And you know, find the animal in the zoo that fits this clue. And then I asked them to report some things, something off one of the signs at the exhibit like the name of the of

the animal on exhibit, like the it's given name, or the sub species name things they can't look up on Google, they can just even if they know what the answer is, like, what animal I'm talking about, they can't just Google the answer because I don't want I want them actually go see everything and walk around the entire zoo. And they love it. It's a three days at the San Diego Zoo and they get to walk around and see all this stuff. They learn about all sorts of things. Doing those field trips is a lot of fun. My colleagues who are teaching ornithology or theology, they can often do a lot more in terms of field trips with wild animals, because a lot of those things are diurnal. In the morning you'll birding or flip over rocks or whatever and collect things. But mammals they're mostly nocturnal. So there's not much mammaling you can do in normal daylight hours.

Amy Strauss 33:00

Moving on from teaching, you also do an impressive amount of community outreach. What kind of outreach do you do in the LA area?

Ted Stankowich 33:07

One of the things I'm really passionate about is seeing kids and sharing sharing science with kids in our local area. So in normal times, we often have open houses where we open up the museum, school groups come through with summer camps like the Boy Scouts come through. And we put out all our displays of animals. And unlike a museum, you can come in to our lab room and they can touch stuff, they can hold a skull and touch the floor of an Arctic fox or a skunk. And some kids are still like scared of things even though they're rarely not alive. It's great because you get to interact with the kids one on one and answer quick questions and say, you know, we have all this cool stuff that is if there's anything you want to see that we don't have out, I can see if we haven't I can pull it and they can make requests. I can pull out a skull of a of a lion or you know, a weird animal that that we hopefully we have on hand. I've gone and given talks. I just did a program with the City of STEM, which is a huge science outreach event every year. This year. They were online of course and Bill Nye and Kareem Abdul Jabbar were the headliners in Vegas, they talked about science and outreach and then somehow they put me next. How did that happen? I've noticed that the more you put yourself out there, the more you... those types of opportunities come with that. With a a website, with social media presence, reporters learned that you're available. Being in Los Angeles means you're around too and there's a lot of media out here now too. But I got a call on Saturday night about this the viral rabid bobcat video that got spread around a lot, we can got called from the New York Times Saturday night, randomly. It's all about making opportunities for yourself, you know, doing it for outreach too and sharing your science with people. I think that's really important because we can't just hide in our labs we have... we have to share what we know and tell people why what we're doing is cool and why wildlife is important to them.

Amy Strauss 34:59

Your lab, the mammal lab, has an active social media presence, another potential platform for outreach. Why do you maintain a social media presence?

Ted Stankowich 35:08

There's obviously the clear ability to share your work with the world. Twitter is where all the academics really are. I've shared our work on there and gotten a lot of feedback on it. I've found so many cool papers and studies that people have shown just through Twitter, the quality of students I get wanting to come to a master's in my life has really increased. It's not a huge number of people. But you know, every year, I get three, four or five students who contact me from all over the country, that are really excellent students, it's because of them seeing me on those places, I tell people who are reluctant to do it, you know, if you're comfortable with doing it, and you're interested in it, it really does have some major advantages to you personally. Because you get better people, you get more exposed people learn about your work can be fun, it can be overwhelming, and you can put it down, you know, I go off and don't look at it for a week or two and come back to it. That's not the best thing in the world, for your followers and for your numbers. But as a scientist, you have to prioritize your time. Overall, it's just fun. I enjoy I enjoy meeting new people and interacting with people. And when I go to conferences now I get approached a lot more saying hey, you know, I follow you on Twitter or Instagram and we have a beer and we chat about science. It's great PR for the school too, the more you can reach out and be visible that raises the profile of your institution. That's a big feather in your cap if you can say you've raised the profile of the school, if people who make decisions know who you are and see you as a value to the school, it can be quite helpful.

Amy Strauss 36:34

Okay, so I'm going to give you the opportunity to do a bit of community education right here. I recently moved to San Francisco and I live right next to Golden Gate Park, a large urban park. Since moving there, I've encountered five coyotes, three skunks and many raccoons while out walking my dog. As a field biologist, I'm intrigued and excited in these moments. As a dog owner, I'm nervous. What advice do you have for me when I'm out with my 60 pound dog to avoid an aggressive or problematic encounter?

Ted Stankowich 37:03

Sure. So first of all, welcome to California, the coyote is not going to come attack your dog unless in the January, February, March months, they will become more aggressive towards larger dogs. Small dog when you see a coyote pick it up off the ground and then act aggressive toward that animal, you need to protect your dog and have it on a leash. If we can sensitize the coyotes to be fearful of us as humans, be aggressive wave your arms, chase it, you know, try to instill some some level of fear or keep a level of fear. We don't know how effective that really is. There's some studies that show it's maybe kind of effective, but at least it's something so with coyotes with a large dog like you have, I wouldn't be too worried about it. I know people whose dogs go out and play with coyotes in the wild. It's not advisable but sometimes it's okay. Yeah, the skunk is the one thing they will spray a dog without hesitation. Coyotes can learn to avoid skunk dogs are so artificially selected and certain breeds are so artificially selected, have hypertrophied reward systems for attacking and guarding and killing chasing an animal. They just love it. The reward that they get the neuro hormonal reward that they get far exceeds the pain that they experienced on the back end of it when they get sprayed or spiked by

porcupine. My advice is to keep your dog on a leash if you think there's skunks around if your dog is sprayed peroxide, baking soda and liquid dish soap, mix that all together. It's a strong oxidizer, and the thiols in the secretions that stink but the things that actually do stink, will it will oxidize those styles and make them into compounds that don't stink. If you get if skunk spray your deck or your house bleach will work fine too. But you don't use bleach on your pet obviously.

Amy Strauss 38:56

The last topic I want to talk about is your life as a professor at an R2 institution. Can you explain what an art to institution is? And what that means for you as a professor there?

Ted Stankowich 39:06

Sure. So like I said, I'm at Cal State Long Beach. We're not a UC, but we're also not a small liberal arts college. And so that means we're somewhere in the middle for me, I sort of see it, it's half teaching, half research, and then some level of service as well. And so we have master's students, I normally teach one to two classes a semester, but all these types of schools vary a lot. If you're on the job market and looking at state schools like this, you really need to ask what the teaching load is because it can vary from being five classes a semester in some places to being, you know, one or two classes. So for me, it's a great balance because I do love the teaching aspect of it. I love doing the research. The pressure of an R1 is not there. R1 there's huge expectations to get grants, to turn out bunch of papers, and to have a bunch of PhD students and have this giant operation. And that's great for some people who want to do that you can do that my research is such that I'm, it's fairly inexpensive, I can do a lot with a little. And I don't like the pressure of writing a lot of huge grants. So while we are still encouraged to do it, and I still try to get those grants that does help help the research, I enjoy having having less pressure. And that allows me to have a more normal schedule. Most of my most of my weekends, I'm not doing a lot at home. Somewhere in grad school or postdoc, I sort of came to the realization that I didn't want to set sacrifice my sanity for the top job in the country, I can still do the work that I love working on the animals I like to work on answer the questions I want to work on, it's very rewarding. I love my job. If you can get one these days, the job markets pretty brutal. It obviously took me six years as a postdoc to get the job. Even still, it's a lot of pressure here. So it's not enough for everyone. Find the balance and time, take time for yourself, establish those boundaries, find a way to not drive yourself into exhaustion.

Amy Strauss 41:02

Why do you study animal behavior?

Ted Stankowich 41:05

I went to college wanting to do biotech, genetic type stuff. And my grades were always a little bit higher in the genetics, biochemistry, some elective courses, because the answers were so specific, you could find the answer. Behavior is different. You know, it's more subjective. There's more sort of looking at the animal and trying to figure out why they're doing what they're doing. And it was the why questions

that really drew me in looking at an animal that can't talk back to you and tell you why they're doing what they're doing, but trying to look at their behavior and figure it out. That was the big draw. I think that that's what hooked me in. So not the most lucrative career in the world. But it's what I loved though. So I followed my passion and that led me to be here.

Amy Strauss 41:45

And that's a great place for us to leave it today. Dr. Ted Stankowich thank you so much for joining us. I enjoyed our conversation.

Ted Stankowich 41:52

Yeah.

Amy Strauss 41:55

The Animal Behavior Podcast is produced by me, Amy Strauss, and Matthew Zipple. If you like what you heard, please subscribe wherever you're listening now, leave us a rating or review and share us with your friends and colleagues. You can contact us at animalbehaviorpod@gmail.com and find us on Twitter @AnimalBehavPod or just search our full name. Our theme song is by Sally Street, Assistant Professor in evolutionary anthropology at Durham University in the UK. You can find her on SoundCloud under the artists name RainbowRoad. Musical transitions by André Gonçalves, a researcher at the Primate Research Institute at Kyoto University. His Twitter handle is @fieryangelsfell. Our logo was designed by Adeline Durand-Monteil, a master's student in ecology and evolution. You can find a link to her website in the show notes. The Animal Behavior Podcast is produced with support from the Animal Behavior Society. Thanks for listening, and we'll catch you next time