Diving into the World of Porpoise Penises and Dolphin Love
South Texas Stories Podcast
Maxwell McClure

[Dara Orbach]: Uh, I happen to have the world's largest collection of marine mammal penises in my lab on campus...So, this puts me at an excellent advantage that the sky is the limit in terms of questions and ideas…we take dead dolphin penises and we inflate them with Vaseline and pressurized saline to simulate erection, or we'll stretch a vagina, um, until it tears to look at its biomaterial properties and its mechanical force it can withstand...It's a weird thing to brag.

<<musical intro>>[1]

[Max McClure, host]: Hey everyone, my name is Max McClure. I'm a student at Texas A&M – Corpus Christi and your host. What you just heard is a snippet of the life of Dr. Dara Orbach, who is the world's leading researcher in reproductive studies of marine mammals. Her specialty is critically understudied, so she is perhaps one of the only scientists in existence that can tell you about the mating patterns of, say, dusky dolphins in Kaikōura, New Zealand, or harbor porpoises in San Francisco Bay. Sound interesting? Then you're in the right place.

I became interested in Dr. Orbach's work for two reasons. My wife is a biology major at Texas A&M - Corpus Christi and recently managed to land a research position in Dr. Orbach's lab. As soon as she told me about the kind of work that she does, I immediately wanted to learn more about her. Furthermore, I did some research work with Dr. Jen Brown in the history department over the summer and learned more about the history of dolphins. I've grown to love cetaceans, also known as marine mammals, since then, so when I got the opportunity to make a podcast with a topic of my choosing for South Texas Stories, I knew very well who I was going to choose.

In September 2020, I sat down with Dr. Orbach over Cisco WebEx and asked her to tell me the story of her career. Here is what she had to say about her early life as a college student.

[DO]: I'm Canadian, so I'll drop some "aboots" every once in a while (McClure laughs). And I grew up in Toronto, which is a very big city by lots of lakes, but not near the ocean. And I went to my undergrad, I was at University of British Columbia, which is in Vancouver in Canada, so very close to Seattle, Washington. And that's a six hour plane ride away, right on the ocean. The campus is a beautiful peninsula right on the ocean, and I fell in love with a way of life…The reason I eventually became a marine mammal biologist, it was not the most direct route. Again, I

[1] Adapted from Sunset Grooves, "Sunset Grooves Podcast 097," Last modified three years ago. https://soundcloud.com/sunset-grooves/sunset-grooves-podcast-097-goz.

didn't know what I wanted to do, and I was doing two bachelor degrees simultaneously: one in Classic Near Eastern and Religious Studies, a Bachelor of Arts, which is very different, and one in a Bachelor of Science in Animal Biology.

[MM]: Dr. Orbach did field work in the Yukon in her fourth year as an undergraduate. This put her in an interesting position when she started applying for graduate school. She started research-work much later than most aspiring marine mammologists, which made her feel unqualified to go the route that would lead her to the beach lifestyle that she dreamed of. Dr. Orbach told me that the majority start in high school, interning over the summer in order to gain an edge in the highly competitive field. She therefore made the decision to take an unusual detour in her graduate studies.

[DO]: ...I decided to do a master's degree looking at bat echolocation thinking that acoustics is a transferable skill set. And we know so much more about acoustics and echolocation in bats compared to what we know about in cetaceans, which are dolphins, whales, and porpoises. So, the idea was to do this, um—to learn a skill set that I'd then be able to apply towards the marine mammal world.

[MM]: Dr. Orbach got some amazing opportunities by doing this. She enrolled at the University of Western Ontario and was placed in a project that sought to determine why bats crash into stationary objects by looking at their echolocation, which is the use of sound to locate things in the environment. One of her research trips was in 2008 to Renfrew County, Ontario.[2]

<<bats chirping>[3]

[DO]: It was really roughing it. We were middle of nowhere, Ontario, camping. Um, there was an abandoned mine nearby with some water. We would just put our food in plastic bags and bury it in the mine instead of having a fridge.

[MM]: Oh wow.

[DO]: We used the generator, um, at nighttime to recharge our equipment, but we had to wait for it to rain to have a shower. <<rain sound>>[4] It was really, really roughing-it conditions.

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[2] Dara Orbach and Brock Fenton. "Vision Impairs the Abilities of Bats to Avoid Colliding with Stationary Obstacles, " *PLoS One* 5, no. 11 (2010): 2, accessed November 7, 2020, http://dx.doi.org.manowar.tamucc.edu/10.1371/journal.pone.0013912.

[3] Apdapted from Mauhen, "East Finchley Bats.wav," last modified July 8, 2017, https://freesound.org/people/mauhen/sounds/397126/

[4] InspectorJ, "Rain, Moderate, A.wav," last modified September 5, 2017, https://freesound.org/people/InspectorJ/sounds/401277/.

[MM]: Yeah.

[MM]: Her hard work paid off. Dr. Orbach told me that bats typically give birth to their offspring around the summer, and since their babies weigh around twenty-five percent of their mothers' body weight, it was intuitively expected that the bats would crash into objects frequently. Her master's advisor told her that because of this, she wouldn't be needed in the field for that month, at least in Canada. He recommended that she go to Israel instead to teach a field course on the echolocation of bats. This particular location had previously done alcohol studies on fruit bats, which gave Dr. Orbach an idea: one that would bring her great publicity.

[DO]: So, I kind of put two and two together that I studied flight mechanics and decision making. I could combine that with alcohol. And so when I went to Israel, I designed a study where I got the bats drunk <<curious, lighthearted music>>[5] and fed, yeah (McClure laughs), I force fed them alcohol, and then flew them through a flight chamber and saw how they collided with objects...So, I was looking at their acoustics and their actual flight mechanics...Which went really, really well, and, um, actually won us a grant to send the whole lab to Belize to do a similar—

[MM]: —yeah—

[DO]: —experiment looking at many species of fruit bats.

[MM]: That's right, she got bats *drunk* in Israel for a research project. After completing her master's, Dr. Orbach attended a Society for Marine Mammalogy conference, bringing with her plenty of experience in acoustics, which most cetacean researchers highly value. However, while listening to the various talks regarding acoustics in marine mammals, she found herself thinking that there was no way she could be happy spending six years studying this. Dr. Orbach walked out in discouragement.

[DO]: But I happened to have walked into some other talks and I heard one about dolphins and mating and how almost nothing had been known about dolphin mating in the wild with all of the logistical challenges. And at the end of the talk, the student mentioned that dolphins have these really weird structures in their vaginas, and maybe they have something to do with sexual selection in some way, or a way to control paternity...And being the lateral thinker I am, I thought about a seminar I'd heard in my master's about spiders and sperm-dumping and the idea that the male can tap on a female and force her to ejaculate sperm from a rival male...And this made me think, "Maybe these vaginal structures are also a way for females or males to control paternity after copulation." ...So, I picked that idea to that student's PhD advisor, and he loved it

[5] Adapted from Rrrrrose Azerty (Loyalty Freak Music), "J'entends ses Patounes Parce que C'est un Chien!" last modified nine months ago, https://soundcloud.com/alpha-hydrae/jentends-ses-patounes-parce

and said, "This is a really outside-the-box idea." ...And so, he was very excited that this was something brand new, way-out-there questions that hadn't been addressed before.

[MM]: Dr. Orbach studied for her PhD at Texas A&M University Galveston and spent plenty of time researching marine mammal reproductive ecology there.

In other words, this was where the penis studies started.

<<transition to funky smooth music>>[6]

Some of her most popular work was done in San Francisco Bay, right on the Golden Gate Bridge. Here she observed harbor porpoises, which are among the smallest of cetaceans.[7] They are closely related to dolphins, which appear at about the same point in the fossil record roughly eleven million years ago.[8] For sake of visualization, you can just think of them as shorter dolphins with chubbier faces. Where they diverge from their cousins, however, is the way in which they mate.

<<transition to funky smooth music>>[9]

[DO]: So, if you stand on the Golden Gate Bridge at high tide and look down, uh, it's pretty often that you will see a splash, and that was actually a porpoise mating. The whole event is less than two seconds. It is aerial where the male leaps out of the water, the female has no idea he's in the area, she's swimming along. The male will come chasing her far away, dive deep, and they come up leaping out of the water at such force that he knocks her out of the water most of the time. And his penis extends all the way to his tail, so it's three quarters of his body length, and while in the air in less than two seconds, he has to wrap his penis around the female into her reproductive tract. So, his belly is towards her back, and his penis is so long it wraps around her body inside her, inseminates, end, then he lands in the water and she dives, and it's all like blink of an eye.

[MM]: Wow.

[DO]: It's pretty amazing.

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[6] Adapted from Sunset Grooves, "Sunset Grooves Podcast 097," Last modified three years ago. https://soundcloud.com/sunset-grooves/sunset-grooves-podcast-097-goz.
[7] Bernd Würsig, J. G. M. Thewissen, and Kit Kovacs, eds. *Marine Mammal Encyclopedia*, 3rd ed. (London: Academic Press, 2017), 770, http://tinyurl.com/y3ulnt7v.
[8] Würsig et al., *Marine Mammal Encyclopedia*, 770.
[9] Adapted from Sunset Grooves, "Sunset Grooves Podcast 097," Last modified three years ago. https://soundcloud.com/sunset-grooves/sunset-grooves-podcast-097-goz.

[MM]: Just in case you didn't comprehend that the first time: *his penis wraps around the female's entire body and inseminates her in less than two seconds*. That's both patently fascinating and immensely disturbing to picture. During their study from 2010 to 2018, Dr. Orbach and her colleagues photographed these mating events in order to understand the evolution of the porpoises' anatomy.[10] Here's what's interesting: in every instance observed, the male approached the female porpoise from her left side.[11] Now, you may be wondering, "What's so special about that, huh?" Let's have Dr. Orbach explain.

[DO]: So, it turns out that genital shape has, uh, coevolved with this behavior…there is an optimal approach that the male has to take for his penis to bypass all those vaginal folds and get close to the cervix. So, the idea being the deeper the penis can penetrate, the shorter the distance that sperm is going to have to travel to fertilize the eggs and the more likely he is to gain paternity. So, that's exactly what we found that for the best, deepest possible penetration, the male has to approach the female from her leftward side, and he has to approach her with his belly towards her back. And in any other position, the penis will not penetrate very deep.

<<beach noises>>[12]

[MM]: Dr. Orbach also got to spend a while in Kaikōura, New Zealand studying dusky dolphins there. These marine mammals are also quite small, typically not weighing more than one hundred kilograms.[13] They can travel great distances of up to seven hundred eighty kilometers and typically socialize in large "pods" so-to-speak of one hundred to one thousand when not hunting.[14] Dr. Orbach conducted several studies here. One of her most innovative ones involved her team using unmanned aerial vehicles, commonly known as drones, to study the dusky dolphins in a more efficient manner than previous researchers have done.[15] They are much more efficient when compared to other aerial research methods such as manned planes and helicopters.[16]

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[10] William Keener, Marc A. Webber, Isidore D. Szczepaniak, Tim M. Markowitz, and Dara N. Orbach, "The Sex Life of Harbor Porpoises (Phocoena phocoena): Lateralized and Aerial Behavior," *Aquatic Mammals* 44, no. 6 (2018): 620, accessed November 7, 2020, https://tinyurl.com/y4zvkfu2.

[11] Keener et al., "The Sex Life of Harbor Porpoises," 620.

[12] Adapted from Kwahmah_02, "Day 10 10th July acclivity Seaside Town Soundscape.flac," last modified July 14, 2015, https://freesound.org/people/kwahmah_02/sounds/315946/

[13] Würsig et al., *Marine Mammal Encyclopedia*, 277.

[14] Würsig et al., *Marine Mammal Encyclopedia*, 278.

[15] Jody S. Weir, Lorenzo Fiori, Dara N. Orbach, Sarah Piwetz, and Bernd Würsig, "Dusky Dolphin (Lagenorhynchus obscurus) Mother–Calf Pairs: An Aerial Perspective," *Aquatic Mammals* 44, no. 6 (2018): 603, accessed November 7, 2020.

[16] Weir et. al, "Dusky Dolphin," 603.

[DO]: And so, we flew the drone over these mating groups, and we are trying to understand, um, their behavioral patterns and to compare those to mating that occurs inside these mega-pods or these very large pods. And my thought was that if you're in a group of dolphins with, like, five hundred individuals present and you're mating, there's lots of dolphins in the area, you can't move around very much because there's so many dolphins around, there probably is more of a social function than a sexual function...Whereas in the mating groups, I thought it would be more of a conceptive function. It might be, um, for fun. It might be to build, um, dominance relationships, a way to work out dominance hierarchies.

[MM]: Um-hm.

[DO]: It could be for social bonding. It could be practice and learning. There's a lot of reasons why an animal might mate besides for, um, conception.

[MM]: Dr. Orbach described Kaikōura as one of her favorite places she has ever visited, and she has been to forty-six different countries. She loved everything from the indigenous Māori culture to the charismatic marine mammals that surrounded the shores. I asked her what her favorite memory is of the area.

[DO]: We had heard there was an orca in the area, and I hadn't seen them in the wild before, and so, we got in our boat and we were looking, looking, looking, and the Department of Conservation boat was nearby us, and we were on the radio saying, you know, "Where?" and he's saying, "It's somewhere around where you are." And all the sudden, it popped up less than two feet away from us, <<water splashes>>[17] um, scared us (McClure laughs)...but the person on the Department of Conservation Boat took a photo of us, and when I look at that photo, I can still, like, in my mind hear my field assistant screaming, "Oh my god!" (McClure laughs) It was just, like, the most amazing, unexpected moment. Um, it was really, really special for me and just—I mean, these animals surprise us...

[MM]: Memories like these are the reason that she hopes to return there someday. As of 2020, Dr. Orbach is working on multiple projects, which often leads her to working twenty-hour days in her lab for months at a time. As of right now, she operates in a laboratory that she calls "FABAEMM!" with an exclamation point: Functional Anatomy and Behavioral Ecology of Marine Mammals, which is the lab that my wife works in.

[DO]: Um, some of our research for example, I have a PhD student started who just started, who's going to be looking at sperm properties that are collected using a biomimetic synthetic vagina to understand if you get a better quality of ejaculate when you use an artificial

[17] Adapted from Rrrrrose Azerty (Loyalty Freak Music), "J'entends ses Patounes Parce que C'est un Chien!" last modified nine months ago, https://soundcloud.com/alpha-hydrae/jentends-ses-patounes-parce

reproductive tract that simulates the natural elasticity and shape of a natural vagina. So, we have some aquaria that we'll be using that for voluntary semen collection. Um, we'll be artificially inseminating some dead animals as well, so a lot of work understanding semen characteristics.

[MM]: Dr. Orbach also planned on taking her honors students to Iceland to visit the Phallological Museum, also known as the "penis museum" in order to 3D scan the world's largest collection of mammal penises for a research project. However, the COVID-19 pandemic forced the trip to be canceled. That hasn't stopped Dr. Orbach and her team from working on other tasks, though.

[DO]: There's so many unknowns. We have this amazing opportunity to take the research in different directions, and that's what I love about it that it's constantly evolving and for every question we answer, there's five new questions that come up. And, um, this is for me, like, the joy of being a researcher is this discovery component to it and understanding these biological patterns, and I'm constantly blown away by how little we know. Like, some things that we take for granted as being known facts are simply not known. People ask me all the time…"I saw it on a Snapple bottle, is it true that dolphins have sex for pleasure?"…the answer is, "No one's ever studied that before besides from me, and I haven't published that data yet." So...whether or not Snapple thinks this is true, like, this is something people just assume, but we haven't answered these questions yet.

<funky upbeat music>>[18]

[MM]: In other words, when you want to study about dolphin sex, you have to be prepared to do some *unsexy* work, even if you get into the shoes of Dr. Orbach. A lot goes on behind the scenes of her international endeavors. She had to rough it out in the Canadian wilderness, watch drunk bats fly into stationary objects in Israel, and spend countless hours in her labs studying the genitalia of marine mammals, but it landed her right where wants to be: on the beach every single day where she can stick her feet in the sand and ride out on the open Gulf waters for a living. Thanks for listening.

<<musical outro>>[19]

[MM]: Music from this episode was adapted from Sunset Grooves and Rrrrrose Azerty from soundcloud.com. Special thanks to them for providing some groovy soundtracks. Check them out at the link in the footnotes of this episode's transcript. Also, if you are interested in a career

[18] Adapted from Sunset Grooves, "Sunset Grooves Podcast 097," Last modified three years ago. https://soundcloud.com/sunset-grooves/sunset-grooves-podcast-097-goz.
[19] Adapted from Sunset Grooves, "Sunset Grooves Podcast 097," Last modified three years ago. https://soundcloud.com/sunset-grooves/sunset-grooves-podcast-097-goz.

related to what Dr. Orbach does, you can read her advice in the full transcript of this interview on South Texas Stories' website. See y'all later.

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