Episode 72

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Ryan: We lost Patrick. Patrick is gone. Long live Patrick.

Charlie: Well, I'm still here so if it's a nuke I should be gone in about five seconds.

Ryan: 3, 2, 1 and you're still here.

Music

Announcer: Hello and welcome to Science sort of.

Ryan: Hello and welcome to Science sort of, episode 72. This week's theme is leaving a deposit. I will be your host Ryan and joining me as always to talk about things that are science, things that are sort of science, and things that wish they were science, are my friends and partners in Paleo crime, the Paleo Pals, Patrick...

Patrick: Hello.

Ryan: And Charlie.

Charlie: Give me an S, c, i, e, n, c, e, what does that spell? Science.

Ryan: Science. We are the cheerleaders of science in your earbuds or speaker situation. If you're used to listening to the show you're probably used to hearing us start the show off a specific way. We're still going to do that but our show format kind of just evolved as we did it and we think it's time to maybe let a little intelligent design take over so we are going to do things differently. And with that in mind we're going to dive straight into our first story. Who wants to take point?

Patrick: I guess, Ryan, you sent me the first link that you saw about the story and then I found a more, something closer to the source from *Scientopia*.

Ryan: The *Neurotic Physiology Blog* at *Scientopia* I think.

Patrick: Ah, sorry, the *Neurotic Physiology Blog* at *Scientopia*.

Ryan: I think. I don't know, I'm just a guy.

Patrick: It's from Friday, a segment they do called *Friday Weird Science* and it is discussing, well the title of the blog post is "The magnificent mammal ménage a Trois" and it is specifically discussing whales.

Ryan: And I will go ahead and throw out a disclaimer to any younger listeners, parents or things like that, and so the story is a biology story but it does deal with some of the intricacies of whale reproduction.

Patrick: Right. Yeah, I don't know where to go from there.

Ryan: Well, okay, so, let's, we'll start, we'll start with the source, you know the basic physiology. We've got right whales, okay, so right whales or a species of whale that live in the Atlantic, they are...

Patrick: A baleen whale...

Ryan: A baleen whale, they are a Mysticeti.

Patrick: Yes.

Ryan: The mysticeti are the baleen whales and they are notable because they have the largest testicles of any animal on the planet.

Patrick: And perhaps the largest penis as well.

Ryan: Yes. So you would think the sperm whale, but no, you are wrong. It's the, it's the, to throw out some numbers, you're talking 8 foot for the penis...

Patrick: Yeah.

Ryan: And about 1000 kg, or was it 500 kg each for the...

Patrick: I think it was, well maybe total of 1,000 kg, I thought it was 1,000 kg each.

Charlie: One metric ton total.

Ryan: We’re talking basketball sized testicles.

Patrick: They said they were as heavy as a cow.

Ryan: Well, they are dense, I don't know, I always heard basketball. I had actually known the factoid about the right whale having the largest testicles on the planet before reading this article, don't ask. Yeah, and I mean the other thing is whales bendable, prehensile penises, and that's cool.

Patrick: Very handy for the whales.

Ryan: Necessary really.

Patrick: Yeah.

Charlie: Given their anatomy, they, they are very large and so it, and they are not, they don't fit together so nicely as other animals do so...

Ryan: Right.

Charlie: ...that makes sense.

Ryan: So, a male right whale is on average 13 to 16 m long. Does anybody have a conversion for our American friends?

Patrick: I mean, 45 feet.

Charlie: Yeah, 50 feet.

Patrick: Alright, so they are 50 feet long with a 2 to 2.5 meter long penis which is 13, it's 15% of the male’s total length, whereas for humans, our, the average male penis is 8% of our total length. So, not only is the penis gigantic but it is proportionally much bigger then our measly little ape things.

Charlie: The penis is taller than a man.

Ryan: Yeah. There's a, there's a photo in this article of a guy holding a killer whale member, it's terrifying. There's no other word for it.

Patrick: Right. So, anyway, why, you might ask, do they have these terrifying members and tons worth of testes? Therein lies the biology.

Ryan: Right. So what I knew about right whale sex before reading this article was that most species, the male, when males are competing for mating rights, it's, you want to be first, right. You want to be, you either want to be the exclusive male to mate with a female so you might defend her from other males, or you want to be first, because if you are first you have the best chance of actually, your sperm, getting there, getting to the egg and fertilizing it first so then the offspring will be yours. But, right whales, and I don't know if this applies to other whales, but right whales do it a bit differently because the process of intercourse tends to wash out previous sperm loads from the vagina so actually you want to mate as late in the game as possible because if you are the last one to mate it's more likely that your sperm will be possible, will be possibly inseminating for a longer period of time.

5:20

Patrick: Right.

Ryan: So, that's kind of cool.

Patrick: And I guess...

Charlie: Patrick was bringing up another biological point about the size of both the penis and testicles, right?

Patrick: Well, yeah, I think that since there is sperm competition going on that is, there's going to be sperm from multiple males in the female, it pays to have a lot of sperm in there. It increases your odds of winning the offspring lottery I guess.

Charlie: I was also reading that there was a study that testicle size in mammals corresponds to the average number of mates that the female of the species has. So, humans have relatively smaller testicles compared to their body mass because human females don't tend to mate with more than one person at a time.

Ryan: Interesting.

Patrick: As far as apes go though, I don't know how small they are in terms of...

Ryan: I think we are doing all right compared to our cousins.

Patrick: Yeah, it's, at least in penis size we are...

Charlie: Bonobos have much larger testicle to body mass ratio...

Patrick: Okay. They do have multiple partners as well.

Ryan: I guess I was, I was referring more to penis length in...

Patrick: Yeah.

Ryan: ...with humans, as we are comparing us to other apes, we have a proportionally bigger penis then other apes.

Patrick: And I guess some animals do this thing where they, where the sperm is delivered in a, in kind of a seal, sealed package...

Ryan: Yeah, it's a little package.

Patrick: Yeah, so you actually sort of wall off the vagina.

Ryan: Sperm plug.

Patrick: Right. And so if you have a longer penis you can come in later and break the sperm plug and put yours higher up which is possibly one of the reasons for increasing penis size.

Ryan: Creating... pressure.

Patrick: Apes don't do that, I don't know if whales do that or not but it's one possible reason for having a long, another reason for having a long penis in whales. The other, so we haven't even really touched on the ménage a Trois factor yet.

Ryan: Okay, yeah, so we've got, basically a group of male whales, they're all around this female and they are all trying to mate and kind of competing with each other. And it gets to a point where the female just kind of flips over on her back, this is happening at the surface because whales need to breathe. And then, for the first time, these scientists observed what they are going to call simultaneous intermission where two males both enter the female at the same time.

Patrick: And I think this happens not just in right whales. There has certainly been menage a trois behavior observed in dolphins and that's because people like watching dolphins. So it's probably something that is common to lots of members of the whale and dolphin family if I had to guess.

Ryan: Which is pretty crazy, I mean it's not like the whales, I mean, the male whales, as far as I know aren't investing any parental care into the offspring.

Patrick: Right.

Ryan: So, you know, it's all, it's all about just doing, just doing as much as you can during the mating and then kind of swimming away, right?

Patrick: Yeah, I think so, yeah, that seems to be, that seems to be right. What's interesting, I mean in general you would think it would behoove you to try to find, you know, a mate that you don't have to compete with but maybe that's just not doable or maybe there's another reason for doing this in a group. I don't know.

Ryan: I mean, every, the couple of sources I read on this basically made it sound like the female is surrounded by males so I don't know what the disparity is there that's creating that situation.

Patrick: Well, you know snakes do a similar kind of thing...

Ryan: Yeah, they do, they have the mating ball.

Patrick: Right.

Ryan: Anacondas, there’s, well, and juvenile male anacondas will release a female sex hormone to get the males to wrap around them to warm them up in the morning.

Patrick: And, I don't know...

Ryan: Kleptothermy.

Patrick: Which is, I'm surprised that works, actually. Because I think, size is a part of the, part of the equation and you know female anacondas are really big and males are generally a lot smaller. That doesn’t, that’s not the case in the whales. They are sub-equal in size.

Ryan: There’s no sexual dimorphism.

Patrick: Well, not a lot, not the way there is an anacondas.

Ryan: Right.

Patrick: So, I don't know if that plays into it or not. So, it's still kind of a curious thing why this is a good way to go about doing this. Although maybe...

Ryan: Right, because a lot of times if this kind of situation was presenting itself in the animal kingdom, the female would expect the two males to compete, assuming that the male that won the competition, was this, the more...

10:04

Charlie: The stronger, more fit...

Ryan: Yeah, the more advantageous mate. So it's just...

Patrick: Well, I guess they're still kind of doing that, right, it's just spread...

Ryan: Yeah. It's happening at a cellular level instead of a macro level.

Patrick: Right.

Ryan: Which maybe that's just, maybe the female gets tired of waiting around, I mean, she's surrounded by guys, yeah. I honestly don't know how whale estrus works so I don't know what her fertility pattern is like. There's got to be a mating season, I mean, they migrate so long.

Patrick: Right.

Charlie: Yeah.

Patrick: Yeah, I think that's right. Yeah, and there's so much based on calving in like, you know, in a certain place with lots of nutrient, you know high nutrient waters.

Ryan: Right.

Patrick: So, I'm sure there is a specific time of year that this goes on. Yeah, so if you're interested in reading the primary literature, you can, it's by Mate, et al...

Ryan: His name is what he studies.

Patrick: In 2005, "Observations of a female North Atlantic right whale" etc, etc, etc and "aquatic mammals" and you can find that link, we will put up the link to, at least this blog post and maybe that paper as well. And I should point out that former guest of the show Mary Roach sent the citation to this blog.

Ryan: Right. And we should also probably point out that there is an and NSFW warning on this website because there are photos of humans touching whale penises. So, just be aware if somebody might walk by your cube they might think you are into some sort of weird cetacean bestiality situation, I don't know. Alright...

Patrick: Yeah.

Ryan: Well. We decided to move the what are we drinking segment and replace it with cetacean ménage a Trois.

Patrick: Yeah, we are really, we are really cleaning this place up.

Charlie: Yeah. I'm definitely curious to hear what you guys are drinking because that story was a little awkward.

Ryan: Yeah, that's definitely more in depth than we've talked about that topic as the three of us. So, I am fumbling my words because, but it's a cool story and it's worth talking about.

Charlie: Yeah, it's definitely interesting in the...

Ryan: Who cares if Kepler found planets, there are whales doing it out there...

Patrick: Having immoral sex.

Music

Ryan: We usually start off the show with the what are you drinking segment. We decided to bump that for whale sex. So, now we're going to throw that out there. So, Patrick, we'll let you go first.

Patrick: Okay, well, nothing too fancy. I was grouching earlier because my beer is foil covered which makes a mess. So, Negro Modello is what I'm drinking.

Ryan: Oh, nice, that's a good standby.

Patrick: Yeah.

Ryan: Yeah. For, for a cooler night.

Patrick: So, once I got the foil off I'm enjoying it. Who's next?

Charlie: Yeah, those glam beers you always have to deal with the foil.

Ryan: Sometimes I just leave the foil on, just get that metallic taste to go with it. A little lime in there you've got some lime in there or are you doing it without the lime?

Patrick: No, no, I'm taking Ben Forth's advice and never mixing fruit with beer.

Ryan: Alright. I think Charlie and I have neglected that rule.

Charlie: Yeah.

Ryan: What are you...

Charlie: I take his, I take his other piece of advice and drink what you like.

Ryan: There you go. Do what tastes right. Well, Charlie, what are you, what are you having tonight?

Charlie: I'm drinking a nice bourbon from Noah's Mill Distillery in the hills of Kentucky, it's a handmade Bourbon, it's pretty boutique and I'm excited about this. I got it for Christmas gift and it's pretty strong alcohol content wise, so it's pretty warm. It's 114 proof so it's past the 50% mark so I like to add a drop or two of water just to take some of that fire down and smooth it out. But, it's quite delicious.

Ryan: It is, it is definitely one of my favorite Bourbons. Hey, I'm having it too, I forgot to mention that so. And no, Charlie and I aren't...

Charlie: Cool.

Ryan: ...recording in the same spot, I just, I have my own bottle it's just, I've been on a major Bourbon kick lately so why not break out the good stuff. It is...

15:02

Charlie: What bottle number do you got. I got batch 10, bottle 170.

Ryan: I got batch 9...

Charlie: Oooooh.

Ryan: No, because everything....

Charlie: Yours is a little more aged then mine, nice.

Ryan: Everything at the store was batch 10, this was the last bottle of batch 9 that they had.

Charlie: You sly dog.

Ryan: This, this whiskey is actually, even if you bought it straight from the bottle like as soon as they bottled it, it's already a 15 year-old whiskey, so...

Charlie: Right.

Ryan: It's nothing too shrug at. So mine's, 16, you know, better than Charlie, but who cares. Did you say it's 114.3 proof. They actually take it out to the 10th decimal place.

Charlie: No, I didn't bother, I just rounded it.

Ryan: That's some science.

Charlie: I'm a physicist, I do order of magnitude.

Ryan: There you go.

Charlie: That's why I was like 50% even though it's actually...

Ryan: Yep, yep, I'll give a shout out to my, my boy Hunter who actually works for this distillery and who was the one who introduced me. I've had Rowan's Creek on the show in the past and it's the same, the same group of guys making some pretty fantastic bourbons.

Charlie: Good deal.

Ryan: Alright. So, now we have a trailer because it's Trailer Trash Talk, we are trash talking a trailer because it's either good or bad we haven't decided yet, listen and find out.

Patrick: Wow, good, that saves on finding bump music.

Ryan: Oh, I'm still going to overlay music, don't you worry. Thumbs up, thumbs down, sometimes we do the same, sometimes it's different, we argue, we talk, we chat about movies.

Music

Announcer: Hey ya'll, it's Trailer Trash Talk!

Patrick: Okay, so this week on Trailer Trash Talk we are going to do *Red Riding Hood* which is, this is a Gothic imagining of the classic fairytale. Follows a young woman who is confronted by a werewolf this time and gets caught in a teenage love triangle. Catherine Hardwicke will direct from a screenplay by David Leslie Johnson. Yeah, so, Catherine Hardwicke, if you are not in the know, has directed all of the *Twilight* films so far, I think.

Charlie: Awesome.

Patrick: I know, awesome.

Ryan: I'm team werewolf.

Patrick: That's Jacob.

Ryan: Yes. That's what I meant.

Charlie: I am team local town hicks.

Ryan: They always lose.

Patrick: Also Jacob. I am glad you guys agree.

Ryan: We just don't know we agree.

Patrick: Right.

Ryan: Alright, so, what's this movie about Patrick?

Patrick: Well, it's basically a combination of *The Village* and *Twilight*. Mostly you only get the *Twilight*, at the beginning it starts out really pretty good, I think. And then, you kinda hit, the like, cheesy rock music in the middle of the trailer.

Ryan: Oh, there's some serious cheesecake in that rock music.

Charlie: Yeah.

Patrick: And then the dialogue follows down a chain spiral. So, you know, I was, before I started this movie, or the trailer, I was just, just hoping it was going to be a werewolf adaptation, you know.

Ryan: Because for those of you that don't, those of you that are new to the show, Patrick has this weird desire to find the perfect werewolf movie.

Patrick: Which doesn't really exist.

Ryan: No, and that's a sore spot for you because of the vampire craze and the vampire, the vampire craze and the zombie craze and all of the crazes of, you know, you know next is going to be mummies, and you're still not going to get...

Charlie: Yeah.

Patrick: Right, yeah just a really rub it in.

Ryan: Right.

Patrick: Yeah, even, yeah, it's horrible. So, yeah. So, yeah...

Ryan: Horrorororororible.

Patrick: I'm always looking for the perfect werewolf movie but I think, I don't know what the problem is, the problem is it's very hard to do a, an in-depth character study on werewolves I think. So, they always wind-up falling flat, one way or another. But I, you know, I start this trailer, I'm hoping it's going to be a werewolf, it turns out it is going to be a werewolf and then, like, the bad music kicks in and I have to bury my head in my hands and beat my forehead on my desk.

Ryan: Yeah, this looks exactly, exactly what you would think if, if somebody told you the director of *Twilight* is doing *Little Red Riding Hood*.

Ryan: Yeah, pretty much.

Charlie: Yeah.

Ryan: There are two boys in a local town, one of them is a werewolf, we are not sure which. A red riding hood who is not very little engages them.

Patrick: Flirtatious.

Ryan: Yes, very, there is a lot of sultry glances.

Charlie: Yeah, sultry glances...

Ryan: Time in the woods...

Patrick: Yeah, time in the woods...

20:00

Ryan: Gary Oldman wears a doublet.

Patrick: There is the mention of going to grandmas.

Ryan: And, “My, what big eyes you have”.

Patrick: Yes. Which, you know, I like that, actually.

Ryan: Oh, sure, yeah, do the call back.

Patrick: Yeah, I’m not sure what else to say, I mean, you know I was sort of hoping it was going to be, what was the Johnny Depp one...

Ryan: *Sleepy Hollow*...

Patrick: *Sleepy Hollow*. It kind of has that...

Ryan: It kind of has that...

Patrick: Look about it.

Ryan: It looks like if *Sleepy Hollow* was closer in production value to *The Village* by M. Knight Shyamalan, that's what I, like, it looked very the village-esque. Yeah...

Patrick: Lots of like, the red cloak against, like, snow or against some other monochromatic background.

Charlie: Yeah.

Ryan: There are some cool looking shots because of that. I will give it, that, there are some interesting looking cinematography. Like, I don't nowhere this town is located that they are in a deep forest with Alpine mountains in walking distance, but...

Charlie: Well, it should be France or Italy based on the story.

Ryan: There's, ah, yeah, just Europe, generally Europe.

Patrick: Middle-earth.

Ryan: Well, and that's a thing I wanted to touch on, is, so, it's kind of ironic because you've got this fairytale, which, most of the fairytales that, that, that we know, especially the ones that, like Disney has touched, are pretty watered down from their original versions and the original versions are pretty gruesome.

Patrick: Yeah.

Ryan: So it's like...

Charlie: Well, not really, I mean this one is 700 years old so it's gone through so many different permutations...

Ryan: Right but...

Charlie: The Brothers Grimm, the German brothers that took a lot of oral tradition storytelling and then made them particularly dark in Germany in the 1800s is where, you, we get a lot of our dark interpretations of folktales, but...

Ryan: But, well, I guess what I'm saying is we are taking something that was very dark that has been subsequently lightened through time and now they are trying to make it dark again, but they are making a dark again with this, like, *Twilight* teen angst angle...

Patrick: Yeah.

Charlie: Yeah.

Ryan: Because, I mean, like you say that it wasn't that dark but in one of the original versions, the werewolf, you know, the wolf eats grandma before red riding hood even shows up. So grandma is dead, like, there's no hiding in the closet, there's no coming out of the stomach...

Charlie: Yeah.

Ryan: Grandma's dead and apparently...

Charlie: And the wolf eats Little Red Riding Hood to in most stories and then sometimes a hunter frees her from the wolf's belly, sometimes not.

Ryan: But there's even a version of the story where the wolf leaves grandmother's meat out, and says "oh, are you hungry from your walk, here have some of the meat that I made" and, like, he tricks Red Riding Hood into cannibalizing her own grandmother.

Patrick: I've also heard that, I mean, that the red cloak is symbolizing the loss of virginity in Little Red Riding Hood and the wolf is the taker of that virginity.

Ryan: Yeah, there are some versions of the story where are the wolf coaxes her to climb into bed with him before anything happens, so. It’s, I mean, so, it's messed up, there are some crazy things happening and, yeah.

Patrick: Well, I guess that’s enough fairytale and trailer discussion, should we go long or short or do you got something else you want to say Ryan?

Ryan: I’m going to say that if people want to watch this trailer you can go to sciencesortof.com, I'll link to the trailer, we will have a link to the Hollywood Stock Exchange where are you can bet on movie properties as though it was the actual stock market. sciencesortof.com.

Patrick: Very good, so now we're going to go around decide if we want to long or short this movie on sciencesortof.com. Ah, Charlie why don't you go first?

Charlie: I'm going to short it. I thought I had already seen this hand played once before at this game and that was on the *Twilight* trailer so I wasn't too, too entertained. Secondly...

Patrick: I like that you threw in trailer there Charlie. Don’t want to cop to watching the movies themselves?

Charlie: Oh, I’ve watched them all on the planes, they are awesome, they help you get through the flight. But, the second thing, I mean a part of the *Twilight* aesthetic is everything is totally anti-septic and clean and bright and shiny and lucid and that carried over to this trailer as well. But this is supposed to be, like, medieval Europe and things should be, like, dirty and gritty and grimy but everybody had, like, these cheap polyester clothing that they bought at the local thrift store or something and it just was taking me out of the time piece and I found it frustrating. Thumbs down.

Patrick: Do do you want to go next Ryan?

Ryan: I too will be going thumbs down because as much as I enjoy Gary Oldman and his tendency to over-act I just don't think that it's going to be enough to save *Red Riding Hood* from being a pretty paltry movie in an attempt to capitalize on the

teen angst vampire craze which again, like, I have nothing against a craze in and of itself. It's just that if it's a poor quality movie then it is a poor quality movie and this looks like a poor quality movie.

Patrick: I'm a little torn.

Ryan: Because you love werewolves.

Patrick: Because I love werewolves a, b, I know this movie is probably going to do decently well in the theaters.

Charlie: it's going to do well, it's going to do totally well, we're going to lose money on this.

25:00

Patrick: It's kind of silly, kind of silly to short it but we like to stick to, stick to our guns and say that if we don't like the trailer we short it. If it had been the first 30 seconds of the trailer I probably could've thumbs upped it, and, you know, in good conscience, but after that music kicks in I just can't do it.

Ryan: That was some bad music.

Charlie: Yeah.

Ryan: *Red Riding Hood*, get the official soundtrack by Nickelback. Available wherever music is sold.

Patrick: We're going 100% short on this one. Let's see how, how we are doing, what's doing the best and what's doing the worst for us. Alright, ah, *Your Highness*, currently making the most money for us and *The Rite* is losing money for us, which, we shorted it.

Ryan: Really? That's doing well?

Patrick: It's doing well.

Ryan: That’s, I’m impressed. Yeah, so, you can go join our league at the Hollywood Stock Exchange, which you can find if you go to sciencesortof.com.

Patrick: That’s right.

Charlie: Yeah.

Ryan: Yup. And I will tell you, I'll tell you right now, I cannot wait for the trailer for the new Batman movie because that’s going to be, well, actually, now that I think about it, I'll be honest, the trailer for *Dark Knight*, not a great trailer. So, there could be some interesting results when the new Batman trailer comes out.

Patrick: You think Batman will trade his cave for for a big pitcher plant.

Ryan: I’m hoping, I mean, because it would fit with science and Batman is a scientist and that's our next story.

Music

Ryan: Okay you guys, so, Batman lives...

Patrick: Okay Canadian...

Charlie: That sounded, that sounded like Ben. Did you try to?

Ryan: Okay you guys we are going to talk about bats now. Bats and physics.

Charlie: Well, a bat, you see...

Ryan: A bat, you see, you guys...

Patrick: Okay you guys...

Ryan: So, in Canada we love brown bats because...

Patrick: Flying mammals...

Ryan: Bats are volant you guys. Volant means to fly. That’s v-o-l-a-n-t, volant. What I was actually trying to say is that in Borneo, of all places, bats, they are not living in caves anymore they've moved up in the world and are living inside plants.

Patrick: It's interesting that it's in Borneo.

Ryan: What's that you say? Plants? Yes, pitcher plants, carnivorous plants that catch bugs and then eat those bugs. But bats eat bugs too, so wouldn't that create a problem, some sort of bad roommate situation? Like you're both eating each other's food? So what's going on Patrick?

Patrick: Originally I was going to mention the Borneo fact, there's so much new, new taxts that are coming out of Borneo, new animals, new plants, everything. So almost all of the, the new amphibians, reptiles, and mammals that are being found on a, seems like a monthly basis, maybe a weekly basis, lots of them are in Borneo. I guess because we are just late to the game, white people are late to the game there, naming things.

Ryan: And that's your Borneo fact of the week, go to sciencesortof.com for more Borneo facts.

Patrick: So, the bat, I guess, I mean, I guess, it's not feeding in the plant, right? It's just kind of hanging out there.

Ryan: No, I mean, bats are nocturnal so they've got to go somewhere during the day and, you know, we know that bats like caves but these bats have created a relationship with a nepenthes, which is a carnivorous pitcher plant and so, okay, so to go, to back it up a little bit to do some basic biology. Plants, the limiting, limiting nutrients for plants are carbon, phosphorus, and nitrogen.

Patrick: Not so much carbon.

Ryan: Not so much carbon, so phosphorus and nitrogen are the two limiting chemical nutrients for plants.

Patrick: For the most part, I mean, you've got to remember that they are bathed in carbon, basically.

Ryan: Right.

Charlie: Yeah, it's the air.

Ryan: And that's our fault, anthropogenic. Anyway, so there are some plants that are trying to live and do their planty thing in acidic soil which is very nitrogen poor.

Patrick: Well, in general, rainforest floors, I mean, you would think that as much grows in rainforests that the soil must be incredibly rich. In fact it's incredibly nutrient poor.

30:02

Ryan: Right. Right. Which is a problem for people who are clearcutting rainforests to grow coffee because the soil actually doesn't last very long. But...

Patrick: Right.

Ryan: ...these, these plants that are trying to grow in this nutrient poor soil and are lacking in nitrogen, the carnivorous plants, what they are doing is they are capturing animals to get the nitrogen. So, there's...

Patrick: Right. And/or phosphorus.

Ryan: And/or phosphorus which I've only ever heard...

Patrick: Which, well animals have both in spades.

Ryan: Right.

Patrick: Well, so, what, are they eating the bats Ryan?

Ryan: No, they are not Patrick, because bats poop and it's called guano and that's a fact that most people know. But vertebrate feces tends to be pretty rich in nitrogen.

Patrick: Well, especially carnivorous vertebrate feces.

Charlie: Yeah. Guano makes incredible fertilizer, it's quite valuable.

Ryan: Yeah, so Patrick you are a stable isotope guy do you want to give a quick, you know, two cents on nitrogen fixation and all that.

Patrick: Well, in general, for most plants, it's tricky to get nitrogen. They can't fix it which basically means they can't turn, so, you know, there's a bunch of gaseous molecules that hang out together, like, for example, you often see oxygen abbreviated as O_2, that's because there's two oxygen molecules stuck together. N_2 is that way and most plants can't break those nitrogen bonds between those two nitrogen molecules in order to use it in other molecules. So, they wind up being, having to get it out of the soil rather than out of the air.

Ryan: Right, because there are bacteria that can do that and they fix the nitrogen in the soil.

Charlie: Yeah.

Patrick: Right.

Charlie: Yeah, they bring, they break it into a reduced form, usually in the form of ammonia.

Patrick: Right.

Charlie: And, a common fertilizer that you buy at the store is ammonia nitrate.

Patrick: Right. So, if your soil is nitrogen poor, you can't get nitrogen directly out of the air, then you go looking for other nitrogen sources. So, one way to do this is eating bugs.

Ryan: Right. But I guess my question is, why do carnivores, why does carnivores feces provide such an ample source of nitrogen.

Patrick: Well, because you're eating things that are chock full of nitrogen in general.

Ryan: Right. Yeah.

Patrick: So, if you are eating bugs, you are eating exactly what the plant would like to eat.

Ryan: Yeah.

Patrick: Something full of nitrogen and phosphorus.

Ryan: Yep.

Patrick: Yeah, but, if you are a carnivore, you, in general have lots of extra nitrogen, that is not a limiting nutrient for you. If you are an herbivore, you, it's possible to sort of, get out of nitrogen balance and to be lacking in nitrogen. If you are a carnivore, unless you are completely dying of starvation, you're not out of nitrogen balance, you have an excess of nitrogen and you poop a lot of it out.

Ryan: So...

Charlie: You may have scurvy though.

Ryan: So, if you are living inside of a pitcher plant and you are releasing your guano inside that pitcher plant the pitcher plant is getting the nitrogen it needs. We should probably take a second here and pause and give credit where credit is due, this is Dr. Ulmar Grafe and his team who found this in the hills of Borneo, so good on them for doing that. These are tiny little bats, obviously, I mean the bat fits entirely inside the plant and is basically living in there using it as a little daytime apartment and toilet.

Patrick: So, I guess the other part of the story is these, so these two species seem to have coevolved or have a symbiotic relationship and so it's kind of easy to see what the pitcher plant is getting out of this but it's less obvious with the bat is getting out of this.

Ryan: Right. What they are saying, or I guess what Dr. Grafe is saying is that they’re, living inside this pitcher plant keeps the bat free from ectoparasites. So I guess, I mean, I guess it would kind of be like, if you have the option of going home to your

apartment where are you lived alone versus going to a place that was really crowded and exposing yourself to all of the diseases and parasites that those people have.

Patrick: Right.

Ryan: Does that makes sense?

Patrick: Yeah, I think that, I think that's, do you want to sleep in the high school gym with everybody...

Ryan: Yes.

Patrick: ... else that lives in the town or do you want to you, yeah, go home to your own apartment?

Ryan: I like high school gyms. I feel like I'm exercising.

Patrick: Yeah, I've heard, I recently heard a story about ectoparasites in bats but I can't remember now how that game worked.

35:02

Ryan: I've been thinking about bats a lot lately but we'll probably touch on that in later shows. I think, I think it's just really cool, I mean jungles, and tropical rain forests and places like that have such high productivity and such rich bio diversity, the mutualisms that develop are amazing. I mean, the pollinator seed disperser interactions that occur, the parasitic loads and mice living on sloths and all these other things, like, it's just incredible how much life relies on life in these areas and it kind of sucks that we are cutting them all down.

Charlie: What's a parasitic load? And what's an ectoparasite, I am familiar with an ectoparasite but I am worried that not everybody would be.

Patrick: Yeah, so an ectoparasite it's something that lives on the outside of you like lice...

Ryan: Or a tick.

Charlie: Bedbugs.

Ryan: Bugs, bed bugs, Cooties...

Patrick: Not like, some kind of...

Ryan: Cooties.

Patrick: ... a tapeworm or something that you got inside. Something that you've got on the outside and that can easily jump onto the bat right next to you.

Ryan: My tapeworm can jump, I don't know what your tape worm is doing wrong, but my tapeworm is a good jumper.

Charlie: Parasitic load sounds like like a burdensome thing, what is it? I honestly don't know what a parasitic load is, I can't even say it.

Patrick: I don't know Ryan you brought it up.

Ryan: It’s the, it's the amount of parasites that you have in your...

Charlie: Ecosystem?

Ryan: In your body, really. So...

Charlie: Oh.

Ryan: So, I just, so I just looked it up so I would have an actual definition. It is a legitimate term, I didn't make it up. It's the measure of the number and virulence of parasites that a host organism harbors. So, if we were to tally up all of the parasites that you, Charles Barnhart, are carrying in your body right now, endo or ecto, and gave that a number, you know, a number, and gave that a virulence...

Charlie: Zero. It's all symbiotic with me.

Ryan: That’s not true.

Charlie: I live, I live and let live.

Ryan: You have parasites. We all have parasites.

Charlie: And I am fine with them. It’s symbiotic.

Ryan: That doesn’t mean you don't have them though. They are still parasites.

Patrick: It’s not, they are not called parasite if they are symbiotic.

Ryan: Right, if it is symbiotic they have ceased to be parasites. Your mitochondria are not parasites because it is a symbiotic mutualism.

Charlie: I’m just saying I have extra hair and skin to go around, they can have it.

Ryan: Parasites, no, but those aren't parasites. Parasites by definition have to reduce your fitness relative to their own. And if they are just taking your excess stuff then that's not actually a detriment to you.

Patrick: Right, if they are cleaning up your dead skin cells...

Ryan: Yeah.

Patrick: ...for example, that's fine.

Ryan: I mean, I legitimately think that we should do an entire show on parasites because...

Charlie: Yeah, it's fascinating.

Ryan: They’re fascinating, they are totally underappreciated as an ecosystem resource, I mean, we could have Kelly Weinersmith back on because that's what she does, so.

Patrick: Mmmhmmm.

Ryan: Things to keep in mind.

Charlie: Do we eat any parasites.

Ryan: Why don't you go to Science sort of and leave a comment on episode 72 and tell us about your parasites. What's your parasite load Paleo Posse?

Patrick: Do we eat any parasites? Ah, I don't know.

Charlie: Do we eat leeches?

Patrick: Chimpanzees do.

Charlie: We use leeches to...

Patrick: I guess, lampreys. Some people eat lampreys, they are parasites.

Ryan: Do we eat any parasites, that is a fascinating question.

Charlie: Because we eat almost everything else, we are just generally kind of creeped out about parasites.

Ryan: So have we just come up with and idea for like, I new hipster restaurant Charlie?

Charlie: The Parasitic Load?

Ryan: Yeah. Come eat your, come eat your host.

Charlie: At 16th and Valencia.

Ryan: Oh man, wow. That's awesome, that's a great idea. Because, I mean, you could totally do leeches like escargot which is butter and garlic, I mean, put enough butter and garlic on a muscle, it's going to taste fine. Or a muscle, or a mollusk I guess. I know, I know leeches are annelids not mollusks, but still. Do we eat parasites, this is going to bug me now Charlie. We probably eat parasites inadvertently.

Charlie: Of course.

Patrick: Yeah.

Ryan: Alright, well, you know what that's a great question for the Paleo Posse, do any of you out there know whether or not we eat anything that is a parasite. We have listeners all over the world and we love them for taking the time to download us and put us in their ear holes. So, thanks for that and what we love even more is when you get in touch.

Patrick: That's right.

Ryan: And we, we give that love back in a segment we call the Paleo POW.

Music

40:07

Ryan: Alright, well now it's time for the Paleo POW, that's a P-O-W at the end of that and it stands for "piece of work" because is the piece of work submitted by you, The Paleo Posse, that we appreciated or enjoyed or just had the enthusiasm to do the most this week. So, it's our shout out to you to thank for contributing and for being a part of the show. And with that in mind we've, hopefully got some new contributors this week thanks in part to our pal Patrick. Patrick, what do you have to say for yourself?

Patrick: Well, I want to say thanks to everyone who's volunteered to participate in my hair study.

Ryan: Go two sciencesortof.com and find out, find episode 71 if you're curious what that hairsperiment is.

Patrick: Right, there's also a link on the left-hand side of the page that says "Do science with Patrick".

Ryan: That might not be there forever Patrick. You might finish science years from now and people are still going to want to know what happened. So they need to go to episode 71 at sciencesortof.com.

Patrick: Okay, fair enough. So, if you found us based on that project, great, we are happy to have you. If you've decided you want to contribute to that project hopefully you followed the advice on that post or on the, on some of those hair links, thank you very much, I appreciate it. And thanks to Zack Wiener and Ryan North for posting links to the hair study itself.

Ryan: Thanks North and Wiener.

Patrick: Ah, yeah, so thanks a lot guys and thanks to everybody who is participating in this study, I'm getting lots of hair from all over the world and it's fantastic.

Charlie: Nice.

Patrick: It’s going to be great, I'm excited about getting all of the data.

Ryan: Zach and Ryan I have both been on the show. You can find those episodes if you go to sciencesortof.com and look through our guest archives.

Charlie: Cool.

Patrick: That’s right and if we get our act together and finish up that guests and interviews page...

Ryan: Oh, it will...

Patrick: I know Ryan North is on there...

Ryan: Oh, it will be finished, it will be finished by the time the show goes up, I can guarantee that.

Patrick: Okay.

Ryan: So, go check out our guests and interviews page over atsciencesortof.com and find those interviews Zach Wiener and Ryan North, creators of your favorite web comics.

Patrick: Yeah, what else we got guys?

Ryan: We've got a Facebook page Patrick, you can find it at facebook.com/sciencesortof. Sometimes people write things there for us and Charlie has more.

Charlie: Sometimes we've got activity all the time there so it's a good place to stay involved with the Paleo Posse. But, ah...

Ryan: That's the thing I love about the Facebook page is because there are times where, if the three of us just happened to be busy all day, the Facebook page just runs itself because the Paleo Posse is interacting with each other and...

Charlie: Yeah, it's pretty cool.

Ryan: It's really cool! So thanks guys.

Charlie: So, on January 26 Danielle wrote "I had this conversation with a friend who's time is too absorbed by grad school to listen to the podcast"...

Ryan: No excuse.

Charlie: Yeah, boo. So she had this conversation with a friend about the brachiolope, our mascot. Her friend, Chris: "Those aren't antelope antlers, those are moose antlers." Danielle: "Yeah, but the name is from a Jackalope I think." Chris: "But it should be something like a Moososaur with moose antlers." Danielle: "The entomology of the word has nothing to do with the structure of the antlers." Chris: "Okay, you might be able to convince me that those are caribou antlers so it could be a brachiobou but it's no brachiolope."

"And now he's going to call the brachiolope a brachiobou which has a certain ring to it but it's still not as good as a brachiolope."

Patrick: Agreed.

Ryan: Yeah, I mean there brachiolope...

Charlie: It does have a ring to it.

Ryan: No, the brachiolope is where it's at though. Listen, you can't call it a Moososaur, Christopher, because a Moososaur would imply but it is a moose with lizard characteristics. But this is a dinosaur with moose characteristics, therefore it is a brachiolope. You've got to give precedence to the thing that is the base animal for the concoction.

Patrick: I guess.

Ryan: I'm a fan of cryptozoology, I know how this works.

Patrick: Anyways, the follow up to this post...

Charlie: Anyway, so, Science sort of apparently like this comment but then Sarah writes "I've had this dilemma as well. It's true that those are not antelope antlers but the etymology of the word antelope may indicate how beautiful the eyes are and have nothing to do with the shape of the antlers. Therefore the brachiolope has eyes more in common with the antelope than the antlers, does this make sense. Does it have to?"

Ryan: If you are completely confused about what the brachiolope is, if you are listening to this on an iPod, our art, our work for this episode is the brachiolope, that big red skeletal thing or you can go to sciencesortof.com.

Charlie: You know, I've been hearing it a lot lately, at night, it may be a fog horn but I'm pretty sure it's a brachiolope call.

Patrick: So, as even more of a follow-up to that conversation, we got an email from Danielle.

45:00

Charlie: That's right, we did get an email from Danielle. "Hey guys, as per the Facebook comment about my conversation with my friend about the brachiolope moososaur brachiobou, I made a brachio-boo, it's already been approved by my said friend, enjoy." - Danielle. And this is a most impressive specimen of the brachiobou, it's a picture of fossilized remnants, as far as I can tell from this, this might actually be a I specimen that Danielle actually, that she has in her possession, so I would be very intrigued to hear more about it. Perhaps it could be a good addition to the brachiolope, brachiobou, everything that's in that whole genus.

Ryan: Right, so like, what are we calling it, is it like a sister species, a sub species, a, is it sexual dimorphism and it's a fossil so we just can't tell?

Patrick: Oh, it could be, yeah.

Ryan: Who knows, cause there are, you know, there are female ungulate species that have antlers like Caribou.

Charlie: That picture of the brachiolope being slightly more of a plains species, sometimes it may wear battle armor.

Ryan: Really, because I always saw the brachiolope as more of a browser in the forest and I would think at the brachiobou would be maybe, the more grassland, savanna species.

Patrick: It may be semi aquatic...

Charlie: I think the brachiobou...

Patrick: ...based on other sightings.

Charlie: ...as a tundra, tundra species.

Ryan: No, it's true, we have seen aquatic morphs, there is some sort of aquatic component going on here that we have to talk about.

Charlie: That most likely would be the bratcaboose.

Ryan: The beaverolope. Brachioberlope.

Patrick: The lopenessmonster.

Ryan: Yeah, the lopenessmonster. It’s getting, well, all I can say, I don't think we anticipated, when we discovered the brachiolope skeleton and decided to start this show, which is actually how the show started, I don't think we anticipated that there would be future discoveries that would require some sort of cladistic analysis. So we are going to have to do some parsimonious reconstruction of the cladogram that explains the brachiolope. And if you are, if you don't know what a cladogram is, Patrick wrote a blog post and you can find that blog post over at the Paleocave.com which is our official blog for the show.

Patrick: I, yeah, it's less official blog for the show and more like sister project to the show.

Ryan: Yes.

Charlie: So, Danielle thank you for the fantastic discovery and all of the other Paleo Posse, keep your eyes out there for relations to the brachiolope.

Ryan: Yes, and grad school is no excuse not to listen to the show because we started the show as grad students. So, if we can do the show as grad students you can listen. Spend some time in the lab and enjoy some podcasts, that's what I say.

Patrick: Yeah.

Ryan: Alright.

Charlie: I can't argue with that.

Ryan: Well, listen, if we were gonna commission somebody to go out there and find us a brachiobou, it would be Mycleverinternetnickname who left us a review on iTunes on January 21, 2011. Why are you guys laughing? This is, this is serious, this is iTunes, this is where the big money is.

Patrick: That’s right.

Ryan: Thanks to all of our Zune listeners, here is our iTunes we view this week.

Patrick: Well, if Zune listeners would write a review we would read it.

Ryan: That would be fantastic Zune listeners.

Charlie: Even angry ones.

Ryan: Just give us some thing, give us, we read, don't, we read our negative reviews?

Patrick: Yeah. Not that I am encouraging you to leave one.

Ryan: Thank, I mean, you know, thank the brachiolope we haven't got a negative review in a while, but this latest review in iTunes, which, iTunes is our dominant source for traffic, so, if you subscribe through iTunes, thank you very much, we hope you are enjoying the show. If you do enjoy the show go leave us a review, at the very least, go click us a rating or say that you like some other reviews. Mycleverinternetnickname says, in his review, “Sortofing, atop Mt. Alice, Alaska, 5 Stars. I suppose it is time I paid homage to one of the three best podcasts on earth. Sorry fellas you don't even rate on other planets but keep trying. I say that it's time because I have listened since the very first episode. So, to mark this occasion I decided to climb the beautiful Mt. Alice here in my home of Seward, Alaska. The climb started this morning in the snow but lunchtime has brought me to the summit and some beautiful sunshine. So, I behold the winter wonderland that is Resurrection Bay, 4,700 ft, that’s 1,462 meters for you sciencey types, below me.”

Charlie: Or a hundred, ah, hundred previously mentioned numbers.

Ryan: “So, I dialed up the latest addition of SSO and crack open a special bottle of Caribou Kilt, a fine scotch style ale from Kassik’s Brewery in Nikiski Alaska.” Where is Alaska getting these names from, I've never seen so many k’s in my entire life. Anyway, that was me, sorry.

Patrick: Yeah.

Ryan: Ah, “Here’s to you Paleo Pals, Long Live the Pod! And for those of you who haven't tried out the podcast yet give it a try and you will not be disappointed. It's science and sort of related at a good pace and not overly heavy on the minutia that bogs down many of the other science shows. Great hosts, great guests, great topics, great science, oh and of course, great beer.” I thought that review was helpful.

50:19

Patrick: It is, it was helpful

Charlie: I thought it was too. And just clear up my sloppy math that's 15 right whales stacked, end to end.

Ryan: 15 right whale members or 15 whales.

Charlie: 100, no, 115 meters long...

Ryan: The whole whale.

Charlie: Right whale, yeah, the whole whale.

Ryan: That does not sound very conservation minded Charlie, to kill that many whales and put them in Alaska. I mean, not only, so one, you are killing whales, two...

Charlie: It’s a way to measure the height of Mount Alice.

Ryan: I’m just saying...

Charlie: Stack up 15, you stack up 100 whales.

Ryan: Your carbon footprint of transporting dead whales to Alaska mountains is just going to be atrocious.

Charlie: How do you think they measure the height of the mountain?

Ryan: Point. You've got a point and it's a valid point. Well listen, we love all of the feedback we've been getting and we want to encourage as much feedback as possible because it's one of the things that honestly keeps us enthusiastic about doing the show. And, it makes us want to keep going every week and it's an important part of the show that we give back to the people that give us so much content and attention. If you want to give us content and attention you can do a number of different things. Number one, sciencesortof.com, click on the about the show it's got all the links you need right there. Links to Facebook, links to Twitter, we are tweeting all of the time, we are interacting with people, twitter.com/sciencesortof, we've already mentioned the Facebook page. You can email us at Paleopals@sciencesortof.com. That's a great way to get in touch with us. P-a-l-e-o-p-a-l-s@sciencesortof.com. We've also got a voicemail line, check that out.

Charlie: Please leave us a message. Please.

Ryan: Charlie wants to hear you, Charlie is a an auditory learner. He, it turns out Charlie can't read, all right? We spend a half hour...

Charlie: Neither can bats. They operate auditorially too.

Ryan: Charlie is like a bat, he lives inside a giant plant, we have to read him the stories ahead of time so he knows what we are going to talk about. Charlie only speaks the language of math. He can read numbers with the best of them. He's like John Nash but he lives in a plant. So leave a voicemail for Charlie won't you and you can do that by calling 312-Paleo-Pals which we know is too many letters but the numbers that correspond to it are 312-725-3672. I'll say it again, 312-725-3672. Call and leave us a voicemail tell us if you're calling on top of a mountain in Alaska because that's interesting. Throw out a question, give us something to talk about and we will really appreciate it, we will play it on the show. And we're also going to have a new segment, right Patrick?

Patrick: Yeah, that's true, we are going to try some thing out called, we are going to try something out called "Sorry I Asked" and it's where you, the listener, asks us a non-science question and we possibly science it up, possibly not. We might just tell you what we think about it. But, no matter what, you're going to get at least three

people who think for a living, thinking hard about your question and giving you some kind of answer to it. So, give it a shot and maybe you'll like the result and maybe do you won't.

Ryan: I mean, that's probably five times the usual the thinking you put towards making decisions.

Patrick: At least.

Ryan: If I am doing the math correctly which I'll have to check with Charlie that I am.

Charlie: Well, based on the way I did that last bit of math don't ask me.

Ryan: Alright, well that was our show this week. It was episode 72, the theme was leaving a deposit. I think if you put together the pieces of all the segments you will see that we stuck to that theme ridiculously well. Thank you so much for listening, please do feel free to get in touch with anything that's on your mind, especially of a science or a science sort of topic and we will see you next week, episode 73, it's going to be a good one, I guarantee you're going to want to listen and you get a whole lot more science...

Patrick and Charlie: Sort of.

Announcer: Thanks for listening to Science sort of. Our show notes are available at sciencesortof.com, which will have links to all the stories we talked about today. You can follow us on twitter@twitter.com/sciencesortof, you can get in touch with us at paleopals@sciencesortof.com or on our Facebook fan page. A great way you can support the show is by subscribing to our feed on iTunes and writing a review so other people have a better chance of finding the show. And if you have a friend you think might be interested, tell them to give us a try. That's all for this week. Thanks for listening, and see you next time on Science sort of.

Music

Ryan: Yeah, I don't like that our show is getting so professional, I liked when we were the laggy morning radio drive time show, this is your drive time science show with Charlie, Patrick and the R-Machine. Hey, hey, hey, we're giving out about $10,000 of science party cash.

Patrick: On the hour, seven minutes after every hour.

Ryan: To our 314th caller, pie caller, you’re on the air at Science Sort of.

Transcriptions provided by Denny Henke of Beardyguycreative.com