Episode 8

Announcer: Hello and welcome to Science sort of.

Justin: Welcome to Science sort of episode 8. I'm Justin and joining me, as always, are Ryan.

Ryan: Hello.

Justin: And Patrick

Patrick: Hello.

Justin: And together we're the Paleo Pals. The purpose of our show is to discuss things that are science, things that are sort of science, and things that wish they were science. This week's theme is preserving the stars. So, why don't we just, ah, start as we usually do. What are you drinking Ryan?

Ryan: Um, so, I felt bad because I felt like I was drinking beers that were a little too frufree and you guys were kind of mocking me last week. So, this week I'm drinking something out of a can and I'm going to prove that by opening the can (sound) like that and ah, yeah. It is ah, it is as Siamese Twin Ale from Uncommon Brewers. It is an ale brewed with kaffir lime leaves, lemongrass and coriander. It's made right here in Santa Cruz. Delicious.

Patrick: Wow. You really showed us. Drinking a standard manly brew there.

Justin: Yeah, I think you were trying to, ah, appeal to some breweries so we can get some more sponsors for the show.

Ryan: Yes, local breweries.

Patrick: You mean a sponsor for the show.

Justin: A sponsor.

Ryan: Email Paleopals@sciencesortof.com.

Justin: Can you buy beer off of Amazon?

Ryan: I don't know. This has 8.5% alcohol so it's pretty manly. It's a big can. It's one of those tall boy cans.

Patrick: That sounded better. Ah, well, let's see. I took a shot of Jim Bean before the show started and I'm drinking another one of those Fire Rock Pale Ales. This time my bottle cap says, ah, kee ai ee Aloha, it means life guard in Hawaiian.

Justin: Well, Ryan, you went down to the cans, I went up to the bottles and I'm drinking a Mississippi Mud Slow Brewed Black and Tan beer. I, actually, I've never had this before so I don't know if it's a fru-fru beer or not. But I've never had it and I got it at a 7-11 so.

Ryan: If you got it from 7-11, I don't know, Mississippi isn't really fru-fru. Are you drinking it straight from the jug?

Justin: Yeah, it, came in a jug and I'm drinking from a frosted mug, so, I think, even if you're not drinking a fru-fru beer, putting it in a frosted mug makes it automatically a fru-fru beer.

Ryan: Yeah, see, I'm drinking straight from the can today.

Justin: And we go to topic one. Patrick, what are we talking about?

Patrick: Ah, well, this isn't necessarily a scientific article but it's sort of a rap on what's happened at a science policy and science conference in South Africa. So, this conference was called Diversitas and this conference was mostly aimed at lamenting the fact that we will miss the 2000 target to stem biodiversity loss. And so, I guess, back in 2003 a 123 countries agreed to achieve by 2010 a significant reduction in the current rate of biodiversity loss at the local, national, and regional levels. And, apparently, we have failed.

Ryan: Shocker.

Justin: So, who organized, I mean, is this biodiversity targets in terms of what, ah, Diversitas figured out or who's targets are these?

Patrick: So, back in 2003, um, the U.N., it was a goal for the U.N. to achieve some significant reduction in the current rate of biodiversity loss by now. And, well, by January, I guess. And it really doesn't look like we're going to achieve that. Now, the press release that the conference put out didn't exactly address what the rate was in 2003 and they don't address what it is now but I'm guessing it must be pretty much the same or worse.

Ryan: Well, they also don't address any of the factors that are causing this biodiversity loss. I mean, is it climate change? Is it people poaching, I mean…

Patrick: They address a little bit of it at the very end. Um, one, let's see, I don't necessarily want to get, jump all the way there just yet.

Ryan: Okay.

Patrick: But they talk about some of the things that have happened that are particularly egregious. Um, here's the thing, there's going to be five round tables, or there were, this just wrapped up. Five round tables between top scientists and policy specialists are scheduled on key issues such as efforts to create a science-based global biodiversity observing system, GEO BON, to improve both coverage and consistency in observations at ground level and via remote sensing. So,that says to me, they don't even have a good way of figuring out how much diversity we're losing.

Justin: Well, we don't even know the numbers of species that are on the planet, how can you know the rate of biodiversity loss?

Ryan: We don't even have a good definition for species.

Justin: Right to make it even more obfuscated.

Ryan: Which blows people's minds when I tell them that because most people assume that biologists have at least a basic understanding of what's going on. I'm like, ah, I mean, doing pretty good but we don't even know what a species is.

5:00

Justin: It's a really hard problem. I don't think there is an actual thing as a species.

Patrick: Not really.

Justin: That would fit every definition.

Ryan: Yeah, it's pretty nebulous.

Justin: So, if you don't know how many species there are on the planet. If you don't, if it's not possible to categorize a species, it's still, I mean, it's worthwhile to try to put a handle on biodiversity loss. But how would you do that with, and at the same time get around these hurdles of not knowing how many species there are and what a species is and, etc, etc.

Patrick: Well, I mean, you don't have to know how many species there are to notice that there are some that you have already named that are going extinct.

Justin: Sure.

Patrick: So, you have, you have a decent sample even if you don't know every species there is. So, that's one way of knowing that you're loosing things even if you don't know everything that you have. Um, the other thing is, I mean, we have, I mean, some species are really hard for us to deal with, but some species are pretty cut and dried like the cheetah. I mean, we have a species and it's going extinct. We don't have to worry about whether it's the Florida cheetah versus the Texas cheetah versus the California cheetah. Are those, all three different species? We don't know. Are they all the same? Should we interbreed them to try to, or is that just polluting the stock of the Florida species if you breed it with the Texas species.

Justin: Right.

Patrick: Something, which is the case with our North American mountain lion. We have...

Ryan: There are no cheetahs in California?

Patrick: There's no...

Justin: There used to be.

Patrick: There's only, well, that's right, there used to be.

Justin: Cheetah's evolved in North America. Or, the ancestors to the cheetah.

Patrick: And, ah, that's probably why, the pronghorn antelope is so much faster than everything else around.

Ryan: Ah, yes, I have heard that theory.

Justin: So, how are they measuring biodiversity? Is it, because there are different kinds of biodiversity, right? There's alpha...

Patrick: Well, okay, right, but remember this is mostly a policy conference so they're not, they don't worry so much about the nitty gritty about how we're going to measure biodiversity. We just want to stop loosing it.

Justin: Right, which is even more disturbing.

Ryan: Right, it seems like it's just politicians waiting for the scientists to say this is what we do and the policy makers go okay, well, here's why we can't.

Patrick: Well, this almost looks to me like an effort, back in 2003, that people put together this effort knowing that nothing was going to happen between 2003 and 2010. But they at least had a line in the sand to say that in 2010 we've got to get serious about this because we're still loosing species quickly. And so now, at least, there's something on the books that says we're supposed to be stopping this so now we have to, at least get serious about measuring what it is we're supposed to be stopping.

Justin: So, so, what is, do they mention the current rate? Or what's thought to be the current rate of species loss?

Patrick: No, they never mention, they never actually mention the current rate.

Justin: Because, I mean, if we had any kind of handle on the rate, even if, even if the error term in that analysis was huge, you could at least compare it to, I think I've seen, at least popular articles, try to compare, the extinction of modern species to the extinctions, you know, to the famous extinctions of the past. Like the KT extinctions, the Permo-Triassic extinction and...

Patrick: Mmmhhhmmm.

Justin: I mean, and then, then you'd actually be able to put some kind of understanding towards the magnitude of what's happening and you know, what's happening today, I'm sure, is close to what happened in the past with some of these famous boundaries. It is disturbing to me that we know so little but we are making laws about, I don't know, I guess I can see both sides and understand why you'd want to make laws to try to prevent some of these things. But it's also disturbing to me that you make the laws before you understand them.

Patrick: Well, yeah, I think everybody's, well, everybody at this conference, it seems like their heart is in the right place at least. They are trying to do something good even if they don't completely understand it. And nobody understands it completely and you're not going to until it's too late.

Justin: Exactly. And thats where, where do you start acting and what do you act on if you don't have the full picture.

Ryan: You can just stop killing shit.

Patrick: Well, one of the things that this conference was focused on was trying to point out the obvious benefits that biodiversity has to everyone and not just to people like us who like to study biodiversity. Ah, they spent a lot of time talking about what are called ecosystem services. So, these are things that nature does for you for free that if we had to do all by ourselves would cost us a lot of money. And they like to put a price on how much it would cost us if we just didn't have any more costal reefs or if we didn't have any more mangrove forests.

Ryan: I'm always a little dubious when they try to use economics to force people into wanting to conserve the environment.

Justin: That's the new trend in ecology though. That seems, I mean, I think people realize that it takes money to get people to move and it's true.

Ryan: But there are going to be instances where there's no economic benefit to preserving some given habitat and at some point you just have to decide, is it morally right or wrong for us as a culture.

10:05

Patrick: We can worry about that later but right now we could at least save the ones that there is an obvious economic benefit to saving.

Justin: Right.

Ryan: But if there is an obvious economic benefit then why aren't they already being saved?

Justin: Well, I think in terms of, you know, for instance, African systems, ah, there's a lot of short term gain to be had for, ah, I mean, going into an environment and taking it for all it's worth. Burning all the trees for charcoal. Just these, really, immediate needs. But, um, they're starting to realize that a lot of these environments can be, um, preserved for long-term monetary gain. You can preserve an ecosystem and bring in tourists who pay to see these animals and I think, that's, like, this eco, it's just ecotourism and it's not really been, it's only recently really been gaining traction in places like Africa. When people don't know there's a market then they're not going to exploit it and if you can slowly turn the market towards the ecosystems' benefit so that people make money and the ecosystem is somewhat protected then it is worthwhile to inject energy into that process.

Ryan: And politics starts coming in pretty heavy when you start talking about ecotourism because an area has to have a stable political structure in order to really benefit from ecotourism. Like, when I was in Costa Rica, Costa Rica has a booming ecotourism industry because it is an extremely safe and extremely stable country. As in a place like Nicaragua which has, basically, the same type of ecosystems on display has a very small or really bare ecotourism industry because people are afraid to go there because there's paramilitary groups running around kidnapping Americans.

Justin: I see your point, um, I wouldn't say Kenya is the most stable place. It's not the most unstable place either but it's certainly not the most stable place. They have their problems. But it's one of those places where, ah, certain areas of the country have realized that you can make some money off of preserving these environments whereas before they would have killed the lions to prevent the lions from killing their cattle. And now they are preserving them because they know that tourists will come in and pay and it's all very localized.

Ryan: You have to be able to get to those local communities though without being hacked.

Patrick: So, that, you know, bio, or ecotourism is one thing that they point out that is worth some money. But they also point out things that are, as basic as things like water purification or carbon sequestration. So, you know, you start cutting down trees, you know, they point to the fact that as an individual person building a house you don't think anything about cutting down trees. But, you know, these all add up and then before long you have to figure, you have to buy yourself some way to start sequestering carbon instead of the trees doing it for you. Or you pave over your, all this sand aquifer and then all of the sudden water can't percolate into the sand and be cleaned for free for you and you have to build a water treatment plant. So, I think it's more aimed at governments and larger entities starting to preserve areas that are of particular economic interest to them. Just because if it's gone it's going to cost them a lot of money, not that they make money off of having them. Ah, yeah, so, one, a couple of things they cite in particular are deforestation. This is especially expensive for us and that in terms of reducing biodiversity, things you would expect, like poaching are bad. Um, but also one thing that's really, a little surprising, is one of the aims of this conference is to crack down on the international pet trade. Apparently trading international animals the way we do often introduces new diseases and you know, pets tend to let their pets go when they are tired of them and those become invasive species if they survive in the area where they are released. So, places like the Everglades in particular, you know, have made, there's high profile cases of boa constrictors and caimens from South America and other reptiles and amphibians like this thriving in the Everglades and doing harm to native species.

Justin: Hence the amazing picture of the anaconda exploding after it eats the crocodile.

Patrick: Yeah, we should post that on the website.

Justin: That's amazing.

Ryan: Do you guys know anybody who has released a pet though? Like, I always hear that and obviously it happens because you've got pythons overrunning the Everglades but I've never met anybody who's been sick of an animal and just let it loose.

Patrick: We know that, you know, specific, I don't know anyone personally, I don't think. At least, that has owned up to it. But, you know there's the wild parrots of Telegraph Hill in San Francisco, there's a documentary on those.

Justin: Oh yeah.

Patrick: And there's, at the University of Texas there's a pond in the center of campus and there's some research turtles that live in that pond but there's also, once a year, they have to clean out all the pet turtles that have been dumped in there.

Ryan: I went to that pond.

15:00

Patrick: Yeah.

Justin: Really?

Ryan: Yeah. When I was in Texas. Or in Austin for...

Justin: Are there gators in that pond?

Patrick: No, it's a small pond. You're thinking of Florida.

Justin: Oh. Are there no crocodilians...

Patrick: There are alligators

Justin: …in Texas?

Patrick: There are, in East Texas, along the gulf there, there are crocodilians. Ah, well, the upshot is that it's gonna, potentially, biodiversity is worth a lot of money and it would be wise for us to start paying attention to maintaining our ecosystems and biodiversity and perhaps if there is no other, if there is no way to just convince people to do it then perhaps pointing out the economic value of specific things will cause them to start taking notice and do something about it.

Ryan: I still say we need to be careful though about having economic goals in mind when thinking about biodiversity and conservation. Because soon as you hit that one thing that's not at all economically viable or useful to keep around then you still have to make the decision of if it's worth keeping around for the sake of having biodiversity at all.

Justin: Agreed.

Patrick: Last thing and I'll shut up about, ah, so, they pointed out that coral reef services are, have an average annual value estimated at $172 billion um, so this is all the coral reefs in the world are worth. If we were to plow them under we would have to spend $172 billion replacing them somehow with man-made stuff. Um, that's somewhere between the gross domestic product of Alabama and Connecticut. So that is actually, not that, I was surprised at how little they were worth.

Ryan: You know, you could have a reverse affect where some industrialist or corporation could say, well, if we got rid of the coral reefs we could provide a new service and charge an arm and a leg for it.

Justin: That sounds like a very Lex Luthor thing to say.

Ryan: Yeah, I'm that's exactly what it sounds like but I'm sure if we were in on more of those board meetings we'd realize that there are actually quite a few Lex Luthors out there.

Music

Justin: Speaking of diversity, maybe we should move onto our next topic.

Patrick: You're getting, you're getting better at these Justin.

Justin: I've been holding that in for like ten minutes.

Announcer: Hey ya'll, it's trailer trash talk.

Justin: Today's trailer is *Sherlock Holmes*. You can find that at www.apple.com Come on Apple, be our sponsor.

Patrick: So, this trailer, you know, as a piece of art standing by itself, I don't have any complaints. Do I want to see this movie? Not so much.

Justin: Okay. So, just, just, for our listeners, this new trailer has, ah, Jude Law as Watson…

Ryan: Robert Downey Jr. as Sherlock Holmes and it's directed by Guy Ritchie. Rachel McAdams is wearing skimpy outfits and Mark Strong is evil.

Justin: Okay, so, you've got *Snatch* in the late 1800s.

Ryan: I don't remember, I don't remember anyone in *Snatch* looking like Rachel McAdams.

Patrick: Ah, yeah, she's, there was one movie, she's pretty cute. There was one movie in there that I saw her in that I was like, ah, she wasn't, it wasn't working right.

Justin: You know what, I've always thought Rachel McAdams would make the perfect Lois Lane.

Ryan: Maybe. I don't know. Lois Lane…

Patrick: Doesn't Lois Lane generally have dark hair though?

Ryan: She does but I mean

Justin: Rachel McAdams does too.

Patrick: She'd make a better Mary Jane.

Ryan: Nah, she's too old to be Mary Jane.

Justin: Well, I think we're all, so, so, I think we're all agreed that we are for Rachel McAdams?

Patrick: Yeah, sure.

Ryan: Yeah, that seems a little off topic but.

Patrick: Should we just by stock in Rachel McAdams?

Justin: Yeah, we can by stock in actors and actresses?

Ryan: That's true, we could!

Patrick: You can, yeah.

Justin: Really, well, why don't we do that.

Patrick: Well, maybe we'll put some money on Rachel McAdams then.

Justin: Excellent. What about *Sherlock Holmes*?

Ryan: I liked it

Justin: I'm worried.

Ryan: Why? Everyone says they're worried. I don't get it.

Justin: I'm a huge PBS *Sherlock Holmes* fan. I watch it once, every week. Ah, the, the 80's version of Sherlock Holmes. I forget the name of the guy who plays him. But, it's about the mystery. It's basically, like, science, right? I mean, you have this mystery, you have to figure it out. You have evidence, it's all about…

Ryan: It's rationalism, it's not necessarily science.

Patrick: That's fine but...

Justin: That's what science is...

Patrick: But that's what it's all about, you know.

Justin: You follow the logic. But this movie, it looks to be about, I mean, it's, it's going, I don't know. It looks to me like *Iron Man* in 1890.

Ryan: That's ridiculous. You are way off base.

Patrick: No, that's perfectly accurate.

Ryan: No, you are way off, base.

Patrick: That's a good, I like it.

Ryan: I don't agree with that at all.

Patrick: I don't see why...

20:00

Justin: No, I want to hear from Patrick. He agrees with me.

Ryan: What? That's not the role of the host.

Patrick: Well, Sherlock Holmes is supposed to be all about the brains and he's supposed to solve things using his mind and this like an action hero.

Ryan: That's not true.

Justin: Listen, Sherlock Holmes is based off the character, I think he's based off the character from *Murders in the Rue Morgue* by Edgar Allen Poe which was, it's considered to be the first detective mystery. And the whole story, I mean, very little of the story dealt with the actual mystery of the murder. It's discussion back and forth about using logic to figure things out. That was the huge finding. That you can actually use logic to solve a problem. To solve what seems to be an

intractable problem and this is, to me, this is what's really exciting about science. You have this problem that seems really difficult and it is, but through logic you can figure it out.

Ryan: Sherlock Holmes knows how to fight. Like, in the books he is a fencer. He will become physical when he needs to. It's like McGyver. McGyver didn't often throw a punch but he still had to every once in a while. Cause you can't always use your brain to get out of things. And it's Guy Ritchie, he directs awesome action scenes. I don't know why you wouldn't want to see that. He's still going to do smart things. He probably just didn't want to reveal all the smart things that he's going to do in this trailer.

Justin: I think you bring up a good point because McGyver is almost like the modern day Sherlock in the way that he uses his mind to solve problems.

Patrick: Okay. Whoa, whoa, whoa. Modern day?

Justin: Well, modern, in our lifetimes.

Patrick: Okay.

Ryan: It's not going to be a huge action movie. I don't see it going that way at all.

Patrick: I mean, he's like diving out of a building at one point. Yeah, things like blowing up and he's like...

Justin: Yeah, like eight stories.

Patrick: Yeah, he's jumping out of buildings. He's more like more like a Teenage Mutant Ninja Turtle.

Justin: I don't even know what to say.

Ryan: That doesn't even make sense.

Patrick: Well, he's not flying around is, I guess, is what I'm getting at. There's not like, there's not like this suit. I mean, there's no like, crazy powers really. If he's like, apparently had some, like, ninjitsu training at some point.

Ryan: Which makes sense. I want to see cool scenes that I'm going to want to see in the theater. This trailer wins. I give it a thumbs up.

Justin: We might have to followup this trailer with an actual movie review.

Ryan: Wow, dude.

Justin: Strong words, huh.

Ryan: I mean, it's got a strong cast, it's got a director we all like, it's hilarious. I mean, why wouldn't he do a good job?

Justin: He is a good choice.

Patrick: I don't really remember Holmes being hilarious.

Justin: No, he's neurotic.

Ryan: Holmes is supposed to be a hyper rationalist. He's supposed to be rational to the point of being completely obnoxious. Everything I understood Sir Conan, Sir Arthur Conan Doyle he didn't even like Sherlock Holmes as a character and didn't expect him to take off as, like, this great literary figure. It just happened to be the people, for some reason thought he was interesting even though he was written to be kind of an asshole.

Justin: Well, Sherlock is a complete neurotic and I think Robert Downey Jr has a pretty good, I mean, he's pretty neurotic.

Patrick: The hyper-rationalism I'm not so sure about.

Justin: I could see, I could see Robert Downey Jr being a good Sherlock Holmes. I'm just worried about the rest of the movie. Like, I think the character is right and Rachel McAdams is in it. That's two pluses.

Ryan: Rachel McAdams deserves a full other plus for the late 1800s corsets with the...

Patrick: I'm going to say, I'm shorting my, my stock. I'm shorting my portion of the Science Sort Of account stock. There, I said it. I'm done. I'm out.

Ryan: Judas. You're a Judas.

Justin: I have to remember we're judging the trailer not the movie and so I'm going to short it.

Ryan: What?! Awww, long.

Patrick: Thank god. Finally, somebody...

Justin: Okay, short, short, long. That's the consensus.

Patrick: Short, short, long. Ah, but, Ryan, we are going to by some Rachel McAdams stock so cheer up.

Music

Justin: Um, should we talk about multiverses now?

Ryan: Okay. Well, basically I found a story that these theoretical physicists tried to quantify how many multiverses there are. How many different universes there are out there. Um, the number comes out to 10 to the 10th to the 10th to the 7th. Which is 1 with 700 zeros.

Justin: Which means nothing.

Ryan: Right. Which is one of the points that they made in the article which is that the human brain can't deal with a number that big. The human brain is only capable of 10 to the 10 16th...

25:03

Patrick: How is the brain capable of dealing with that number.

Ryan: I don't know, I don't get it.

Patrick: Okay, okay.

Justin: So, 10 to the 10 to the… what is it?

Ryan: So, it's 1 with a 160 zeros as opposed to 1 with 700.

Justin: Well, I guess that's more than all the protons and neutrons in the universe added together.

Patrick: In our universe.

Ryan: They tried to justify their use of the human brain's limitations in the calculations.

Justin: Well, right. It was something about the observer has more to, it's more based on the observer than the actual universe.

Ryan: Right, there's a Schrödinger's cat element where the universe isn't really doing anything until it's observed or something like that. This is some crazy physics but I guess the point that I really wanted to get to in talking about this was that we've probably done way more than 8 episodes if there are really that many universes out there. I mean, you know.

Justin: Are we going to be making that revenue or…

Ryan: Even if only one of them, even if only one in a million of those universes has us in it and again one in a million of those bothered to do a podcast, that's still a pretty big number I recon. Well, got a lot of episodes out there.

Justin: And, I think, we need to clarify, it's not physics that they're doing, it's mathematics.

Ryan: Oh, yeah.

Justin: And.

Ryan: Well, they talk about quantum fluctuations and stuff.

Justin: Yeah, but, you know, this whole thing is based, actually, ah, there's an article in *Discover* a couple weeks ago, I don't read it too often but it's by Roger, or, it's an interview with Roger Penrose who's one of the founding fathers of modern physics, really. And he believes that all of quantum physics, a lot of most, almost all of string theory, it's a mathematical construct and it's not actually true, it's not, it's something that approximates to, at least quantum theory, approximates to an incredible degree of accuracy. A lot of things we can observe and experiment with. String theory, obviously, well, maybe not obviously, it's not ever been proven in any way experimentally. It's just a mathematical construct. And he's saying that a lot of these things that seem to have these inherent contradictions are false. That they're not the actual, interpretation, well, they're just our interpretation of the world. It's not the actual world, um, or the universe. And so, this, and that feeds into this idea of multiple, of multiverses. Multiverses come out as basically a side-effect of these strange quantum interactions that he believes are completely false. So, I mean, I believe that these people that did this paper, they are much better mathematicians than I am or ever hope to be, but at the end of the day, it's just mathematics.

Ryan: Well, the funny thing is, these researchers presented this at something as a first step where they said the calculation of the number of universes is an important step towards an an even larger goal which is to define the probability of living in a universe with a particular set of properties. So, basically, they're saying, we've got these laws of the universe like the speed of light and the four fundamental forces and things like that. What are the odds that our universe would have those such that we could evolve, eventually, life that can wonder what the odds are. Which, to me, you know, you, like you said Justin, there's no way to test any of the properties of these other universes. So, if we assume that their number is correct then it's just one out of that number because there's no way to look in those other universes and see what their physical laws are, to see if maybe the physical laws are constant among all universes or if we are completely unique. It doesn't seem like a question that can be answered, I guess.

Justin: Well, and, if you take into account, I mean, let's say there is ah, a finite number of multiverses, um, and let's say that you know, the whole multiverse as a whole will expand and contract an infinite number of times, I mean, if that's true, if that's a premise, then the probability that there will be a universe where we can exist is one.

Ryan: Right.

Justin: Because if you do anything an infinite number of times some infinite number of those infinite numbers are going to be, ah, you know, congenial for life.

Ryan: It's not even unlikely, it's not even probable, it's definite, yeah.

Patrick: I would, so, on a somewhat related topic, I would say that it's, if you are intrigued about, you know, how our universe begins and what it, how, what it might be like at the beginning of one of these multiverses, in another universe in this multiverse, there's ah, there's a *RadioLab* episode that talks about, you know, what it might be like to start a universe.

30:03

And how little, and you think, you know, how this, when the Big Bang happened everything was crammed in this, this dot the size of a pinpoint, and that must have been incredibly massive. And they point out that you really only need about ten pounds of mass and that the energy that explodes this little bitty dot, and so, you know, you can create mass out of energy if you need to, because, just conserving mass plus energy. So, if you've got all this energy you can create more mass. So, you don't have to start with a lot.

Ryan: Hmm. Well, the last thing I wanted to say was that the DC Universe has ah a multiverse in it two different universes…

Justin: Oh, Jesus.

Ryan: And, ah, for the people that complain that that's too complicated it's, you know, I don't even want to run the numbers of how much less complicated that is than the actual universe in which we live.

Justin: 10 to 10 to 10 to the 60th?

Ryan: Right. Divided by 52. So, so, the DC Universe really isn't that bad. And, ah, if anything, James Robinson is determined to make sense of it.

Justin: And I will plug, ah, one study I saw recently. I can't remember if I saw it in *Science*, in one of their news pieces or where. But, ah, it was some people that thought that they could detect interactions between our universe and another nearby universe by looking at the, ah, homogeneity in the radio waves that we can detect from the very beginning of our universe. So, on where they detect things that are uneven, that these are not just random fluctuations but historical records of our universe interacting with another universe. But…

Ryan: Well I do remember hearing that um, that when the universe first exploded from the Big Bang that the amount of matter in it for awhile was dense enough that sound waves could travel through the entirety of the universe.

Patrick: So everyone could hear you talk.

Justin: That's kind of like our show.

Music

Ryan: Ah, last week, up in San Francisco, Bloomingdales started carrying a line of DC Comics inspired t-shirts which are ridiculously overpriced but some of them are pretty cool and to kick off the sale of these things they had an event co-hosted by Isotope Comics which is the comic book lounge up in San Francisco with its proprietor James Sime. And, ah, as a special guest they had DC Comics exclusive writer James Robinson there and I went and was able to interview him afterwards and we are going to go ahead and play the audio from the interview. So, it's a little loud in the background because we were at a bar after the actual event. But ah, the main thing I wanted to talk to James about was him with his writing and how he uses science in his writing or how he deals with topics of science in his writing because this is supposedly a science show. And, ah, James Robinson is mot famous for his series from the 90s, it was a book called *Starman* and one of the main characters in that book is a scientist and, ah, Justin, Patrick, did you guys have a chance to read any *Starman*?

Patrick: I read volume 1.

Justin: I read most of volume 1.

Ryan: Okay. Cool. Well, you guys actually had different volumes so you probably have read different amounts.

Patrick: Justin read most of the equivalent of my volume.

Justin: Right. I read something.

Ryan: Cool. So, ah, why dont you guys give me your impressions of *Starman*?

Patrick: So, okay, um, I would say that, there is a lot, I mean, it does move kind of slow and you warned me about that. But, it's really, it's really pretty dense for a graphic novel and I would compare it to the *Sandman* series that Neil Gaiman did in that it's clear that there is a lot of build up and a lot is going to happen at some point. There are all these interweaving prologues and epilogues going on. And I appreciate that. Um, the art, I don't know, should we talk, is it worth talking about the art Ryan?

Ryan: Yeah, for sure.

Patrick: Ah, the art, it's definitely clear that it was written in the 90s. Some of the outfits are, ah, sort of reek of 93' or 94'. Um, but, overall, you know, sometimes I have trouble,the main character, I guess, Jack Knight, occasionally when he's, when you're in an epilogue or prologue or something, you don't necessarily, I don't necessarily clue into the fact that it's him, right away.

35:04

Ryan: Mmmmhmmm.

Patrick: I don't know if there is some specific feature that is always the same that I'm not clueing in on. And the fact that he doesn't wear a costume, really, so, he's never really wearing the same thing.

Ryan: Right.

Patrick: From panel to panel. Um, but, overall I liked it. But I'm a little confused, is there a whole backstory about Ted, you've mentioned Ted Knight to me before. So, Ted Knight is passing on Starman to his sons in this volume one. But is there a

lot of, is there already a lot written about Ted Knight?

Ryan: Ah, well, you can't really say there is a lot written. Ah, Ted Knight is an actual Golden-Age character that originally appeared in Adventure Comics #61 which was published in April of 1941, created by Gardner Fox and Jack Burnley.

Justin: Now, now, Ryan, wait, did you have that written down in front of you or were you pulling that out of your brain?

Ryan: I had it written down.

Justin: Thank god.

Ryan: I did, I mean, I did know that he was a Golden-Age character from the 40s.

Patrick: That's an acceptable level of nerdiness.

Ryan: Um, so the basic premise is that Ted Knight was an astronomer and he figured out how to create this thing called a gravity rod which was later ah, re-invented as a cosmic rod which, basically, allowed him to, ah, manipulate stellar energy coming from the stars.

Justin: Alright, now this is where I have misgivings about the story. What kind of energy is is supposed to be. Is it some kind of electromagnetic energy or is it, do we find this on the interview.

Patrick: I mean, Justin, do you really, I mean, radioactive spider, does that really do anymore for you than cosmic rod?

Justin: Well, I don't, I go back and forth with this and this is my love/hate relationship with graphic novels and, because, I want it to be based, I want to be able to believe it. And, ah, you, know, I think that's why I like Batman a lot because, um, he's very believable character, especially in some of the more gritty novels where um, he doesn't really, he doesn't have super powers and everything he does has to be, somehow accounted for.

Ryan: So if I had to put *Starman* into a genre I would not put it into science fiction. It's almost, James Robinson's *Starman* as a whole series is almost more of, ah, adult based coming of age tale dealing with a relationship between a father and a son, brother and brothers, it's about family and it's about legacies and living up to what's expected of you as a man and a son and a brother and things like that. It's much more about these relationships and it's much more about history and fantasy and things like that than it is about science fiction. And I mean, you've got to remember, the problem with a lot of these comic book writers deal with is you've got things created in the 1940s or 50s that were literally created for 10 year old boys who are never going to care whether this stuff worked or not. So, you could just say a radioactive spider bit him or he invented a gravity rod and that was enough. And if you go back and read some of those origin stories of your favorite characters like Spider-Man or Superman or Batman, they happen in a page. It's not, you know, the point is let's get to them fighting the bad guys, and there's not a lot of exposition that goes into how everything works. But the problem is, if you want to maintain that same tone and stay true to the original creators you can't change it enough that it might make sense if the initial premise is so non-sensical. And this book, as far as the 90s is concerned, it's completely anathema that everything the 90s was about. I mean, the 90s was all about giant spectacle, ridiculous costumes, overly muscled people, um, you know, style over substance and all these other things and this book is a very understated, long form story with really subtle artwork.

Patrick: Well, I wouldn't be surprised if this, are they going to make a movie out of this?

Ryan: I don't know. Jack Knight, specifically, is a bit of a weird character because James Robinson and Tony Harris, the author and artist who created him have weird creative control over him even though he is technically owned by DC Comics. So, nobody is really allowed to use that character unless they get the thumbs up from James Robinson and Tony Harris.

Patrick: Okay. Well, with all that being said, I think we've more than introduced this interview. Should we roll the Robinson interview?

Ryan: Let's do it.

INTERVIEW BEGINS

Ryan: Ah, okay, so this is Ryan reporting for Science sort of with the comic scribe superstar James Robinson, writer of such titles as *Starman*, *Justice League: Cry for Justice*, ah, *Superman New Krypton*

James: And soon to be the writer on *Justice League of America*

Ryan: With Mark Bagman right?

James: With Mark Bagman. I'm very, very proud to be working with that guy.

Ryan: Yes, absolutely. So, our podcast is about all things science and all things geeky, basically things that wish they were science and comic books have a long history with science fiction…

40:00

James: Yes and also science fakery…

Ryan: Yes.

James: Where people haven't really done their science homework and ah, and yet purport to be writing Revenge of the space hero's and scientists and explorers dealing in things that are very scientific. Ah, I am guilty of that. Many times. But I'm endeavoring not to be that person when it comes to Dr. Light for instance. Where I actually, recently, was realizing that it's like, I've gone back to physics class which I was never very good at. It's the reason I got into comic books and the reason I didn't join the Merchant Navy. Thank you very much, by the way. We just had our cocktails.

Ryan: Well, that was something I noticed, I saw you tweet earlier this week that you were researching physics so that you could write Dr. Light properly and that struck me because I'd never seen any other comic professional mention doing homework on something strictly scientific to write a character.

James: I think that, there are certain writers, like Geoff, Geoff Johns, Mark Waid, Grant Morrison, Matt Fraction over at Marvel, and I'm talking about the high level guys, but I've come back to comics and they've really made me reassess my craft and like try and raise my game. And it does and sort of make you a better writer

but I realize that, like, in the past, with *Starman*, he went into space but it was very much a sort of, almost a fairytale journey through space. There was no explanation. In affect, he goes, for most of it, in, like a wooden Jules Vernonian spaceship.

Ryan: That's exactly what it reminded me of.

James: Well, it was meant to remind you of that. Ah, *From the Earth to the Moon* and, ah, the sequel there isn't there, Jules wrote two books ah with the multiple gun club which is the team that does it.

Ryan: And *Starman in Space* totally invoked that.

James: So, and that was what it was intended to but, *Starman*, this isn't *Starman*, I'm not that, that isn't what I do every time. This has to be intrinsic to the DC Universe, it has to feel like the DC Universe. And for that I really want to make the science make sense.

Ryan: Mmmhmmm.

James: And there's a lot to take in in any one, ah, excuse me, ah, I'm just going to have a sip of this delicious, ah, gin Gibson. And let me toast you.

Ryan: Thank you sir. And I'm having a gin and tonic which listeners will remember me having before.

James: There's so much science in the DC Universe that I can't physically write the books and learn everything I need to learn but I intend to try. Like, before, there will be, ah, an aspect, in the future, that will involve the Earth itself and geological science at which point I'll involve Cave Carson but I will still, hopefully know what the hell I'm talking about when I'm writing about this. So, at the moment, the character that really, I want to try and make work, is Dr. Light. I want to make her into a really great character and it occurred to me that apart from, I kinda have it, I think I have it down in terms of personality in what she's trying to do, but it's the science and it's the light. Light isn't just light. It's different sorts of light, lasers are light, you know, from lasers to neon to inert gases to…

Ryan: Radio waves that we can't even see.

James: Radio waves that we can't see. It's all light. So, I want to try and use all of that and understand it so that the characters feels bigger and better than she has in the past.

Ryan: At what point do you, do you look at the science and say, okay, that's something I can use and then, do you ever feel hampered by it where you're like, well, I'm going to have to bend that or tweak that to tell the story that I want to tell.

James: Well, yeah, this is something we talked about, ah, before this interview started, which is that the story is always the people, the characters. So, with that in mind, the science is and should be, not secondary but, it's not that I'll ever be hamstrung by it. It's always like, what's best for the story. What's best for the emotional resonance of the story. But at the same time, when I'm listing scientific facts I want them to work and I want there to be a logic, and a linear logic that can, and also, um, well, just that readers, that it's clear for readers what I'm talking about as well. That I'm not just listing scientific facts. I have to understand what I'm talking about in order to make it clear and concise. So that it can be expressed and then we move on to the next emotional beat.

Ryan: Mmmhmmmm. Is that how you've always felt as a writer or is that something you've come to.

James: Well, I think, I havent really had to sit down and think about the science of comics as much as I have now. But, and I do think that ultimately at the end of of the day, people don't walk away going wow, he really explained photons so brilliantly in the comic book. They care about the people, the love, the hate, the primal emotions.

45:03

That's what drives us as the human race. That's what drives people to uncover the secrets of science, is primal emotions.

Ryan: Exactly.

James: But, at the same time you have to understand, at least as a laymen, the basics of science if you're going to have these scientific characters and you know, from, you know, the green emerald ring is emitting a green light, well, that's why. Understanding that is an important part of being a writer. I think, if you try to deal with more, the broader scientific world in the DC Universe.

Ryan: So, outside of the strict science, one of the characters that you wrote for a very long time was Ted Knight and he is a scientist. That's his entire, I mean, that's a big part of who he is as a character. How did you approach him as a character.

James: Well, this is the thing about Ted Knight, is that I kind of got around it. Basically, because, everything that you see about Ted Knight and his science, is somewhat through the point of view of Jack Knight who is not interested in science. So, I could, I could move through things and not talk about them. It was a way that I could be lazy and not write about science.

Ryan: Mmmhmmm.

James: And yet, deal with the scientist. So, and I got away with it once and I think I did it brilliantly. But, I'm not going to do it again. This time everything is going to be working.

Ryan: Well, there were, there were issues that focused specifically on Ted though and did you, did his role as a scientist make you treat him differently as a character when you were thinking about his motivations and how he views the world and his role as a superhero in it?

James: I understood that, like, Jack being the rebel of his son, of his father, had some sort of metaphysical belief system and that Ted Knight didn't believe in god. And the argument, in the DC Universe, is whether or not you believe in god. In our world, in the world of the DC Universe, there's no way that you can't believe in god.

Ryan: Mmmmhhmm. Because you've got the Spectre…

James: You've got the Spectre, you've got Doctor Fate, you've got, um, a million, a million, a Dark Deadman, a reason reinforcements that there was a life after death. Um, so, the idea that he didn't believe in it, I found very interesting. And yet he was the kindest, gentlest, most human of all of the characters I think, in the book that I...

Ryan: Was he a non-believer before you took over the character or was that something you introduced?

James: I think I introduced it, but I don't think people, I mean, when I took, when I came on the book, which is the early, 1991 I think, was *Starman Zero*, I mean, people just didn't deal with that sort of thing. So, you know, since then I notice America has really polarized between, you know, Darwinism and Creationism and all this sort of thing. So that it's more of a, a yardstick or a line in the sand that people fall one way or the other. Which, quite honestly, I find bizarre and strange. And I think that if you study, you know, Buddhism or many religions, you can combine the two. I know America is not particularly down on the Koran at the moment, but they, there is sort of science in scripture as well as faith. And uh, so the idea that you can perhaps combine the two is not necessarily an alien idea except that now it seems it is. That you either believe that the Earth is 8,000 years old or you believe that the Earth is billions of years old.

Ryan: The screaming heads won't allow a middle ground.

James: Or that, you know, if there is a higher power he might of had, he might have been around for longer than 8,000 years, yeah.

Ryan: Why put limits on it.

James: Well, exactly.

Ryan: And I just really want to talk to you about how you deal with ah, science in your comics.

James: Well, then the big, the honest answer is I haven't but I will. And I have done what every lazy writer does do which is shirk around it and make it just, oh, it's science, or it's science fiction, or, there's a cosmic ray from beyond and that's what most people do.

Ryan: So, when you're writing superheroes do you consider it science fiction, pulp, it's own genre entirely, what mindset are you in?

James: Well, to say that is to examine science fiction as a larger genre in that there are a lot of writers that are very, very science specific, science heavy, trying to make sense of every point in terms of, um, the planet, the creation, the race, everything else.

Ryan: Mmmhhhmmm.

50:00

James: And, you would be better to point out who those authors are than I am but I know that when I try to read those guys it bores me to tears. And then you have authors like Issac Asimov. I mean, he jumps right to the forefront of my head when I said this, with the *Caves of Steel*, Elijah Baley books. Where they're just really, really compelling whodunnits that happen to use science as a means, as, like, I guarantee everybody that's read *Caves of Steel*, about a third of the way through says this is the crappiest book I've ever read because I know exactly how this was done.

Ryan: Yeah.

James: And then he says, and then Elija Baley says the same thing and then he and we are proven to be idiots and then he does it a second time.

Ryan: Yep.

James: Because round about, about two thirds of the way through you begin to, oh, I've got more of an idea of what's going I on here, now I know what's going on, and then he does it again. And then he did the same thing with ah, the second book...

Ryan: *Naked Sun*.

James: *Naked Sun*, which... And my point being that when you're writing, I guess what I'm going all over the place, bear in mind if you can put this in, I am toasted. I've been drinking while I was signing and now I'm getting more toasted. But

point being...

Ryan: Cheers to that.

James: There we go. But the point I'm getting at is that science, I think, can help good writing and good drama. But when it's the thing that is held over it, it can be a detriment. When you, when it's too science specific it can be boring and dry. When you have a genius like Asimov who is combining great drama and great humanity, then, it works perfectly. He had his science as a back-up for what was a great story. You could have probably transposed those stories and turned them into a story in, like, crowded Manhattan in the 30s and less crowded Tucson Arizona in the 1930s...

Ryan: Totally.

James: And it would still have had, still of worked because the characters work.

Ryan: Uhhuh.

James: So, in terms of getting back to what you asked of me, I'm trying to be more diligent about my science in order that the Justice League, and I'm dealing with big things now, I'm creating planets, I'm dealing with races, I deal with alien races and the internal science of that and also the internal, what was I saying, that I do believe that, first and foremost you need good drama, good characters and good emotions to drive that drama. But at the same time when you deal with the DC Universe, when you deal with a company who's books include strange adventures, mystery and space, you have to make, for me, for many years, it was all plot driven with the science very much fiction. We're at a point now where I have to be, be true to it and make sure that characters like Dr. Light, the bizzaro world. What else do you have, let me just, I'll tell you what we have up and coming, like, the New Gods, the Rebels, the Brainiac, the Brainiac's offspring. All of that stuff has to make sense. I can't just fluff through anymore. So, in terms of science I think it's me choosing to do it but I just want to take it something that ultimately, people won't look back and go, oh, it's just a comic book fluffing through science.

Ryan: Excellent. Well, one of the last things I want to talk to you about was New Krypton and you know, you mentioned you've been dealing with alien planets and alien races and the Kryptonians have always been a race that's been portrayed as scientific to a fault.

James: Yes.

Ryan: And a lot of the origin stories of Superman have dealt with ah, the Kryptonians abandoning their gods and then at the last minute, when their science has failed them, calling back to their gods. Now you've expanded the culture of Krypton.

James: Well, that was me, actually. It was Alex Ross wanting to do this fantastic cover with all these different Kryptonians and I was thinking about it and it was the guild and I thought about making the guild and trying to make, and I got this from Geoff Johns who with, for instance, his Toyman story, and, actually, that's Geoff Johns. His Green Lantern story really envelopes, embraces and makes work everything that happened with the Green Lantern.

55:00

James: And I just thought, let's just do something with Krypton where we, all these different characters and all, Head Bans, John Burns, Kryptonians, Kryptonians all these different characters and then he threw in the, ah, the movie Kryptonians, Alex Ross did, so I was, let's make it all work, let's make it come together, that's a challenge. And I think, as a result, we came up with something. And then working with Greg Rucka who was very, very anally retentive specific about some things. But, he will admit that, but, it's like, I like the sweeping grandeur and he likes the minutia and as a result, that book, the culmination of the pair of us, like, arguing back and forth until we had this thing that's neither of us and yet it's both of us better than we were before.

Ryan: It's been fantastic and it's awesome to see the world of Krypton completely fleshed out in a way that it's never, that I've never seen before. Ah, it finally feels like there's a life and a vigor to all these different guilds and characters.

James: I know. And I think it, and I don't want to say too much, about this but I believe that Krypton is taken a life for itself. The New Krypton has taken a life for itself.

Ryan: You've even had stories where the wildlife is going out of control and they have to go take care of that.

James: Well, that is even a small piece of the puzzle of the final, of issues 10 through 12 which we almost space.

Ryan: Excellent.

James: So everything is part of it.

Ryan: That's awesome. Great.

Music.

Justin: Okay guys, well, that wraps it up for the show. Episode 8 of Science sort of. I am, if you have any questions about the show, I am justin@sciencesortof.com.

Patrick: I am patrick@sciencesortof.com.

Ryan: And I'm ryan@sciencesortof.com. You can also email paleopals@sciencesortof.com for general…

Justin: Alright, that wraps it up. We will see you next week.

Patrick: Bye.

Ryan: Bye.

Justin: Later.

Music

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 at twitter.com/sciencesortof. You can get in touch with us at sciencesortof@gmail.com or on our Facebook fan page. A great way that 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 who you think might be interested tell them to give us a try. That's all this week, thanks for listening and see you next time on Science… sort of!

Ryan: Did you guys like *Snatch*?

Laughing

Justin: I loved *Snatch*.

Ryan: Would you say that *Snatch* is an action movie? Why is Patrick laughing at me so much? All I want to know is if you think *Snatch* is an action movie.

Justin: And there's only 60 people subscribing to it. 60 times, 60 to the 10th to the 10th to the 60th. I don't think you're allowed to say that an the radio.

Patrick: I'll tell you what you're not allowed to say on the radio, snatch. Ryan said it about 12 times.

Justin: That's what, I thought that's what you were laughing at but I guess I thought I'd also give you the benefit of the doubt but apparently you were…

Ryan: You're so immature.

Patrick: So, have you guys seen *Snatch*? Do you like snatch?

Ryan: You are so immature Patrick.