Everybuddies Podcast Episode 3

Podcasting Through the Cosmos: Comments, Cats, and a Galactic Brick

Camwadam: [00:00:00] We are now recording. Awesome. Episode three of Everybuddies podcast. It's been a week. I was outta town for a lot of it.

Jake the Bean: Yep.

Camwadam: we are now up to 19 subscribers as of today. we have, as of last night, 16,000 views and a hundred hours of watch time.

Jake the Bean: That's amazing.

Camwadam: Not bad for, two weeks work.

Jake the Bean: Yeah. And thank you to all of you that have spent the time to watch our content.

Camwadam: We really appreciate it. and we're having the time of our life and hope you are too. some technical changes we could not get. The video follows audio on the OC Stream deck to work consistently. We got it to work really well a couple of times, but, we needed something that would work consistently.

So we've now changed over to an [00:01:00] A-A-T-E-M, mini Pro ISO, significantly more expensive than the OC Go Stream deck. the OC Go stream deck was $295. This one was five 50. there are upsides and downsides to both. but this deck records all channels at once, right?

Jake the Bean: And one of the issues we were having was that, the USB bandwidth split between even two computers was too much for us to record all four inputs at once.

The one with the VFA and then camera one, two, and three right, all at the same time, and have a usable video. Since the, a temp records all four at once, we can do video follows audio in [00:02:00] post much easier. And for the most part, the video follows audio out of this deck. Should be okay, or does it not have it?

Camwadam: So this deck does not have video follows, audio

Jake the Bean: does not have it.

Camwadam: Okay. But, another reason I wasn't hesitant by this deck, is because it, it's owned by Black Magic, which also is the publisher of DaVinci Resolve and DaVinci Resolve Studio. Has its own auto switching so it can do video follows audio cuts and edits from Da Vinci Resolve Studio in post.

Jake the Bean: Okay.

Camwadam: In post. Yeah. And when I tested it, it did it well, hopefully it does it well for this.

Jake the Bean: Oh yeah, yeah. hopefully because we don't want to go through another stream deck.

Camwadam: So there is another alternative, which is to [00:03:00] buy, an iPad. And then there's software specifically for the ATM Mini.

and it has video follows audio.

Jake the Bean: Okay.

Camwadam: from what I've seen, that video follows audio feature works very well. But that would basically be another 500 bucks for the iPad and another 50 bucks

Jake the Bean: for the app.

Camwadam: Yes.

Jake the Bean: Okay.

Camwadam: hopefully just with what we have, we'll be able to Keep it going.

So are you ready to look at some comments? Since our last episode. Here is our first comment. I am your first YouTube supporter. Remember me this is the first comment on one of our full length episodes. That we posted to YouTube.

Jake the Bean: And who is it

Camwadam: from?

40 zips.

Jake the Bean: 40

Camwadam: Zips, Five days ago. What do you think?

Jake the Bean: welcome to the fold, my friend.

Camwadam: We appreciate it. Thank you. and we will remember you, all Mark 92 [00:04:00] 37 on, the clip where I'm talking about dark matter rivers that Go through the universe. A lot of brain dead yapping for absolutely no reason.

Yap. Fire 100. Awesome.

Jake the Bean: We appreciate the feedback.

Camwadam: I, I don't know, is there for no reason,

Jake the Bean: then it's the same as any other existence,

Camwadam: Firewater by design on the same video said reptilian. So this one kind of threw me off a little and it has a green duck emoji next to it threw me off a little. it could be, that she's saying that I have a reptile brain.

Jake the Bean: Hmm.

Camwadam: Or that, that your reptile brain, basically you're, you just pinball from one emotion to another. Your decision making is a series of emotional responses without any mitigating thought.

Jake the Bean: Okay.

Camwadam: it could also be referring to, the reptilian [00:05:00] aliens.

Jake the Bean: Yeah.

Camwadam: You know what I'm talking about?

Jake the Bean: Yeah. It, yeah. She could also be calling us reptilian, in the sense of one of those aliens, one of the aliens we're from the deep state to, Right. To influence your thinking. And,

Camwadam: I had, I had somebody tell me that, that she was sure Bill Gates was an alien.

Jake the Bean: Mm. Mom.

Camwadam: You see, here's the thing, a lot of people when they're around people who are CEOs or legislators or whatever, the image those people project and they do it with, help from a lot of people in marketing and PR and everything else.

and the image they project is that they're somehow, above everybody else. Right. That, obviously if you're gonna be the CEO of a company, you want the shareholders and everybody else to believe that, that you are just not a normal person. Right. Okay. But once you've been in a room with folks like that and you've [00:06:00] talked to 'em.

Right. And the,

Jake the Bean: you kind of break through the veil.

Camwadam: Right. And then it becomes pretty obvious that they're just regular people. Yeah. Another everybody else and Right. They gotta ride in the same elevator and shit in the same toilet and pay the same fucked up rates to Comcast and the gas company as everybody else.

and then you realize that they're, mean, I don't want to say there's nothing special about anybody, but you realize these are just people like everybody else. Right. And sure it'd be the same, even if you were in the room with a president or Bill Gates or anyone else once the facade, the public facade that they have to maintain the dissimulation they have to put out there for public consumption.

Once you saw through that, you would see this as just a normal person. Right. The thing is that, just saying that these are all just regular people, Right. Who make think regular thoughts and [00:07:00] make regular mistakes, that doesn't sell.

Jake the Bean: Yeah,

Camwadam: that's true. The conspiracy theories sell.

Jake the Bean: Mm-hmm.

Camwadam: Yeah.

Jake the Bean: Okay.

Camwadam: Anyway, this next pair of comments is on the clip I had talking about, Albert Einstein and his wife and how it was kind of an open secret that his wife helped write. His, his most important papers, his most revolutionary papers that were written early in his career were actually a collaboration between him and his first wife.

And one said, that's actually crazy. I didn't know that. hey, I'm read 27 45. Thank you. I'm glad I could share some information with you. Chris. Bart, 8,400 Feet said, I hate unsupported assertion. The dead giveaway was his stating it was an open secret translation. There is no evidence to support.

Jake the Bean: Okay.

Camwadam: What do you think?

Jake the Bean: [00:08:00] Usually, almost always, people cannot develop those kinds of massive frameworks on their own.

Camwadam: Yeah.

Jake the Bean: Massive discoveries on their own.

Camwadam: Agreed. Yeah. And, I'm not the only one who believes that, that she helped write those papers. Right. and actually one problem that we have is that at that time,

One problem we have still today is that very often people do work for others that goes into scientific papers and scientific research, and they're never given credit.

Jake the Bean: Right.

Camwadam: And, so there's no evidence to support, I'm gonna have to disagree. The evidence is circumstantial.

Okay. and to me it's convincing, but Chris bartend, I respect your position.

Jake the Bean: Okay. And, you mentioning that the evidence is circumstantial, even in like criminal [00:09:00] cases. A lot of evidence that gets people convicted within a shadow of a doubt is circumstantial.

Camwadam: Hmm. Yeah, that's true.

Jake the Bean: Leaving, leaving the scene of a crime at the exact moment it was committed is circumstantial evidence, but that is something that gets people convicted.

Camwadam: Sure.

Jake the Bean: the only thing that makes it actual, hard evidence

Camwadam: uhhuh,

Jake the Bean: is things like DNA fingerprints. Weapons, physical items, right. Pictures, stuff like that. Circumstantial is everything surrounding that.

Camwadam: Yeah, that's true.

Jake the Bean: So oftentimes circumstantial is, it can be even more convincing.

Camwadam: Well, in a legal setting, the circumstantial evidence is things like.

Same place, [00:10:00] same time.

Jake the Bean: Right.

Camwadam: they had a beef with each other. this person went and scoped out this other person's house. there, since we're selling this house, now there have been cases where people went to open houses. Cased out what people had.

Jake the Bean: Oh yeah.

They went

Camwadam: burglarized it later. And

Jake the Bean: the one thing in this house that people could steal is that TV downstairs. And we wouldn't even be,

Camwadam: we don't even watch it.

Jake the Bean: Yeah. We don't even use it. I haven't turned it on.

Camwadam: There's just too much to do. There's just so many things to do. Then sit there and watch TV or scroll social media.

all feels like a waste of time to me to do that. next comment.

Jake the Bean: Yeah.

Camwadam: Wired versus wireless cameras, latency and reliability explained, flax, andor said wireless cameras can be blocked with a J signal jamer. So a bad [00:11:00] choice. Wired cameras with a DVR and cloud storage is the way to go.

So we weren't really, I think he's looking at a different context than we were talking about. we were talking about in the context of doing our podcast.

Jake the Bean: we don't use anything, any of these for surveillance on our house or anything.

Camwadam: he, I think he was talking in terms of surveillance.

Jake the Bean: Yeah. Like protecting your home.

Camwadam: Ha. Have you ever heard of wireless cameras being blocked with a signal jamer?

Jake the Bean: it's, it's foreseeable. It's certainly plausible,

Camwadam: It makes sense to me, but I've never seen it done.

Jake the Bean: So, Bluetooth

is incredibly unsecure. Bluetooth's really easy to, you can look at, Bluetooth isn't private. anyone can access what you're broadcasting on Bluetooth. So

Camwadam: when you're, when you're connected to a Bluetooth device,

Jake the Bean: all the other devices around you can actually see and

Interpret what's being sent. So what's the point of the connection? [00:12:00] The point of the connection is wireless connection, but it's just not secure. So you can, makes sense to do it for music, videos, anything you don't need to be secure.

Camwadam: So don't use Bluetooth for anything that should be secure.

Jake the Bean: Right. and then radio signals as well, if it's, based through 2.4 gigahertz or anything that, or wifi, all of those can be jammed,

Camwadam: huh?

Yeah.

Jake the Bean: every one of those is based on light. All you gotta do is, yeah.

Camwadam: It's microwaves. Yeah.

Jake the Bean: Is make a brighter light. And then that signal is lost.

Huh.

but obviously if it's not the exact frequency, it's just gonna pass right through. Right. And you'll still be able to detect it, for the best terms of anti jamming mm-hmm. Is fiber optic. So if you're, if you're really concerned about jamming.

Camwadam: Run the cable to the [00:13:00] router,

Jake the Bean: run it, run it through, fire, fiber optic connection.

Camwadam: And I imagine if, if you're talking about high security installations, that's what everything would be.

Jake the Bean: Maybe. I have no idea. I just know that's how they, how they do, how they prevent, drones from suffering mps. Hmm.

When, forward attacking drones is a use fiber optic.

Camwadam: Oh yeah, yeah, yeah.

You mean in the, in the trenches in Russia and Ukraine?

Jake the Bean: Yeah. Yeah. You gotta use, I

Camwadam: guess it, they're

Jake the Bean: probably not, they're probably not that s sophisticated out there. It's

Camwadam: scary what's going on there, dude. I mean, it's basically trench warfare with drones being the artillery. Yeah. Like it's smart artillery.

Jake the Bean: Yeah. Yeah. And what was it, was it a couple of us students that figured out,

Camwadam: They developed a machine learning algorithm that the drones could then use to go target on their own.

Jake the Bean: Right. Once, it was a guarantee that [00:14:00] radio signals were jammed.

Camwadam: Yeah,

Jake the Bean: they're long tangent, man.

Camwadam: true. the jamming has become the name of the game too in that, because what Russia started doing was taking all these bombs, all these old bombs they had in storage and putting wings on them so they could be gliders. Mm-hmm. And then the next step after that was adding a remote control so you could steer them.

And what they do is they drop these gliding bombs, these aviation bombs, they could drop them from, 40, 60, 80 kilometers away, from a plane high up. And, the reason they were doing that is because the Ukrainians kept shooting their planes down. So they started dropping these bombs from way, way out.

Mm-hmm.

And they would use 'em as kind of an inaccurate, not a very accurate type of artillery. but the thing is they're slow flying.

Mm-hmm.

So, what the [00:15:00] Ukrainians started doing was sending drones high up. To block, to jam the signals and then using an AA gun on a pickup truck.

Jake the Bean: Oh,

Camwadam: to shoot down the bomb.

Jake the Bean: The, those guide bombs, they are not a new idea at all. Us has been doing it for, I think over 30 years.

Camwadam: dark matter unveiling the Universe's Invisible web, blur Joka 3 1 1 6 says, where did this dark matter come from? All this coming from, nothing makes no sense any scientific explanation, otherwise, God did it.

Jake the Bean: Gotcha.

Camwadam: What are your thoughts?

Jake the Bean: My thoughts? I don't know what the scientific explanation is

Camwadam: there. There really isn't, there's a lot of conjecture.

Jake the Bean: Okay.

Camwadam: But there's no

Jake the Bean: hard founded evidence.

Camwadam: Right.

Jake the Bean: Okay.

Camwadam: so there are a number of, there's just a number of [00:16:00] hypotheses for where it could have come from or what it even could be made of.

Nobody even knows what it's made of.

Jake the Bean: Right.

Camwadam: so as far as scientific explanations, there's a lot of 'em, but there's no scientific consensus.

Jake the Bean: I've heard how can. Genetics exists without the existence of God,

Mm-hmm.

Things like that. How can life exist without the existence of God?

And you can harmonize your faith with the secular.

Camwadam: That's what I do.

Jake the Bean: And because science and all these ideas, You can interpret it as just the paper that God writes his ID ideas down on. Or the method of applying his vision to the universe.

Camwadam: So to say otherwise God did it. You're saying God did it either way.

to [00:17:00] me, and this is, a more of an emotional experience than it's not something I can just describe or give evidence for, and people go, oh, yeah, yeah, yeah. for me, there's no separation between, the physical and the ness, between, the mundane world and the spiritual world.

My spiritual belief can best be described as pantheism, which is the idea that divinity pervades. And, it's the idea that divinity both pervades and goes beyond our universe. So, to me, like studying science and thinking about science and growing spiritually, and I shouldn't just say studying science, studying art and history and humanity, and nature, to me it's growing in that way is the same as growing spiritually.

There's no separation, In my opinion.

[00:18:00] What do you think?

Jake the Bean: I like your view on it.

But yeah, I've had plenty of really Christian friends who are they still believe in, they still you. They don't really separate God from science. they believe that God is the science and that science is the way that God has written it down.

Camwadam: Do you think most people actually see it that way?

Do you think most people have no trouble merging the two? there was one other comment I saw that said, gummies, keep 'em off the streets. And it was, one of the space ones that where we were talking about space and the comment was gummies, keep 'em off the streets. And I assume the person was talking about us.

Gummies. I'm assuming THCI

Jake the Bean: have

Camwadam: gummies. Keep 'em off the streets.

Jake the Bean: I don't understand the comment

Camwadam: Well in answer to it. I don't, [00:19:00]

Jake the Bean: yeah, I don't consume.

Camwadam: this is a, deco Alcohol Wine St. Regis Deha Deco Alcohol, Cabernet Sauvignon.

Jake the Bean: Hmm.

Camwadam: so I don't even,

Jake the Bean: right.

Camwadam: Yeah. No alcohol, no nicotine.

Jake the Bean: The only drugs I consume are caffeine.

Camwadam: Sure. Yeah. I guess in, I drink cacao. And cacao contains theo bromide, which a very mild stimulant, mild compared to caffeine.

So yeah, we're, we're basically drug free over here, but, I don't know. I guess if we took gum music, we keep us off the streets.

Jake the Bean: Yeah. Maybe, maybe he sees us as contained.

Camwadam: Right. so we were, we were talking about, becoming who you are. Okay. Right, Nietzsche. Mm-hmm. becoming who you are and what that means.

Well, one, so one [00:20:00] of Nietzsche's, well, probably his best known line is that he said God is dead. Right? Yeah. And, the, the line actually is, it

Jake the Bean: begins Frederick Nietzsche f

Camwadam: Friedrich Nietzsche.

Jake the Bean: Okay.

Camwadam: And, and what he said it was, it's a aphorism in the gay science where he says, did you hear about the mad man who went out in the marketplace screaming, God is dead and we have killed him.

but it wasn't celebration or statement of news that he was putting out there. It was a lament that God is dead and we have killed him. and what Nietzsche explains later on in the Spectra is that, with evolution, with evolution by natural selection as it was laid out by Charles Darwin.

and I should say it wasn't an original idea from Charles Darwin, but what if you ever read his book [00:21:00] on evolution by natural selection, by means of natural selection, he basically lays out this case where he talks about species, different species from all over the world, different ecosystems from all over the world.

It's hundreds of pages where he just lays out this argument about the similarities and dissimilarities between them and their next closest, the species that's next closest to them.

And he makes this case that it's just by natural selection over, thousands and may millions of years that you have all this differentiation within ecosystems,

and what Nietzsche was saying was that we're no, with that as knowing that natural selection, evolution by natural selection is how humans came to exist on this planet. We can no longer look to an idea of God [00:22:00] as, as the unknowable creator. Of things, That we weren't just established through magic by a person, by, a deity that is a person.

And so we can no longer rely on those same religious traditions that gave us that deity. We can't rely on them for moral guidance either.

Jake the Bean: Okay.

Camwadam: We have to create our own morality, our own moral systems. And so a lot of his work was wrestling with how do you do that? How do you check out these traditions without checking out?

Basically, you could almost say, how do you not throw the baby out with bath water?

Jake the Bean: Okay.

Camwadam: How do you keep moral systems that keep people safe and keep people growing?

Jake the Bean: Well, I have I have a pretty good example of [00:23:00] those, systems agreeing with each other and when someone becomes addicted to a septum substance,

And they decide within themselves, they can no longer live this way. And they go into say, 12 step program. The 12 step program tells you to give. Your addiction unto God.

Camwadam: Okay.

Jake the Bean: And to basically say you are powerless to this addiction, and the only person who can help you through it is God, get you to the other side of it.

the thing is that with prayer and with meditation, they activate the same level of neuroplasticity in your brain that allows you to overcome addictions like that. So

Camwadam: wait, prayer and meditation activate [00:24:00] neuroplasticity.

Jake the Bean: Yes. So when you pray to, your God and you ask him to take away your anger in your brain, your brain physically changes.

When you ask him to take away these burdens, your brain enters neuro, this level of neuroplasticity that it does not have throughout the rest of the day.

And whether you see that from a religious standpoint or not. there are two approaches to reach that neuroplasticity. You can either pray or enter deep meditation.

And for a lot of people the method of prayer is a lot easier than say

Camwadam: it's, than

Jake the Bean: achieving that deep meditation. But it has to be just as genuine, just as your commitment to it has to be just as much.

Camwadam: I was gonna [00:25:00] say, it seems like prayer would be more accessible.

Jake the Bean: Prayer is more accessible for more people and to converge those ideas.

when you say, I cannot get through this addiction. I must on my own, I must give it unto God. You can converge those ideas and say, I am not bigger than this. If I do not treat this like my number one priority, my full-time job, my morning, noon at night,

I am going to lose this battle. Once addicts end up on the street, 98% of the time, they die as a.

from some cause from their addiction, whether it's exposure from being homeless, starvation, murder, suicide, all those things that [00:26:00] stem from their addiction, they have a 2% chance of escaping it. And for most people, the best way that they get through it is by giving that addiction unto God.

But first they must say to themselves, I no longer wanna live this way. I cannot. And they must be more willing to die than to continue living this way.

Camwadam: That's actually an interesting irony that you have to say, I would rather get clean and stay clean, even if it kills me. And in the process, you actually save, save your own life.

Jake the Bean: I, one person I really love is Coach Kelly on Instagram. He is a former, crack addict. he basically says all the same stuff.

Camwadam: Interesting. one, thought experiment, Nietzche proposed for. how do you create your own morality? How do you create a moral life is he [00:27:00] said, imagine that you had to take the life you're living and relive it again and again and again forever.

The decisions you make today and made yesterday, can you relive it again and again forever if you had to and be happy with it. Say, this is the best possible life that I could live. And he gives that the idea of eternal recurrence, And it's something that in, in human thought, historical human thought, that isn't such an unusual thought,

you could say the idea of reincarnation is the idea that you come back again and again. you could even say like the Christian idea, idea of heaven and hell, is that if you go to hell, you are forever condemned and you have nothing to do, but relive your mistakes. And if you go to heaven, you have nothing to do, but relive all the things you did.

and [00:28:00] you know, one interesting aspect of reincarnation to me is you're basically saying if you don't try to make the world a better place now. You're gonna be born again into the world that you helped create.

So if you ain't trying to make this world better, you're gonna be born into a world that's worse, that you made worse.

Right. Bought and paid for. Oh, yeah. Yeah. that, it actually kind of brings on this cosmological question to me. So you could say, if time goes on infinitely, and you could even say, you know, how far back does time stretch? it's, is it, is it primary to this universe? Is is it a primary attribute of the universe or is it an emergent property of everything else?

Right.

Jake the Bean: Okay.

Camwadam: and there are, there's conjecture about both. I tend to fall on the side that it's an emergent property, that it's a, a result of, of our perception and interactions. But you could [00:29:00] just as easily argue that that time is a primary, it is one of the primary attributes of our universe. but if you were to take time and say it goes on and on forever, then everything that's thermodynamically possible would have to happen.

Jake the Bean: Okay.

Camwadam: And it would have to happen again and again and again. So then you have to say, what's thermodynamically possible? Is there a limit to thermodynamic possibilities?

Right?

which then, then you'd say, okay, so if they're limited and time is infinite, then not only does it happen, it has everything that can happen not only happens, but it happens an infinite number of times.

Jake the Bean: Okay,

Camwadam: that makes sense so far, right? Yes. The alternative is to say there's [00:30:00] actually an infinite number of thermodynamic possibilities, and then the question is, which grows faster time or possible existences, right? So if you said, yes, there's, there will be an infinite number of thermodynamic configurations and, and possibilities, right?

But the, that the rate at which things become possible is half as fast as time passes by.

Jake the Bean: Mm-hmm. Right?

Camwadam: Then you'd say time divided by possibilities is two. So everything that can happen would happen an average of two times.

Jake the Bean: Okay.

Camwadam: Right. So that, that would mean though, that some things would actually never happen.

Jake the Bean: Right. And some things would happen

Camwadam: a lot.

Jake the Bean: Yeah. [00:31:00]

Camwadam: So you'd actually have like this distribution of how often something that's possible happens, but then you can use that distribution to say things are more or less likely than others.

Jake the Bean: Okay.

Camwadam: have you ever heard of the three hairs,

Jake the Bean: like rabbits?

Camwadam: Yeah.

Jake the Bean: No.

are you passing me the P?

Camwadam: Yeah. Mm-hmm.

it's an optical illusion. What do you notice about that?

Jake the Bean: It seems three identical hairs moving in a spiral. Oh. But the ears, there's only three ears, but each individual rabbit has too.

Camwadam: Right. So it's an optical illusion.

that is from a church in Germany. That's that image there is from Wikipedia, from a medieval church in Germany.

So it's on a Christian building. But what does that have to do with Christianity? Keep it open.

Jake the Bean: the three hares

Camwadam: [00:32:00] Yeah. the three hairs this is where it first shows up, is in the Miguel Caves mug caves, in China. I have it marked. There's a map on there where it's marked and go.

Yep. Yeah. I believe it's, I can't remember exactly where it is, but it's, northern part of China, close to Mongolia, just north of all the mountains.

Jake the Bean: Yep.

Camwadam: And there's just tons of different religious statues and mosaics and carvings in these caves. I would love to go visit 'em. these are some of the earliest depictions, and you can see these are all from those caves.

And they're all from, between 5 81 and six 18 ad Yep. And we have no idea what,

Jake the Bean: what sparked it, why. Yeah.

Camwadam: But, when the Mongolians took over, everything from [00:33:00] Mongolia all the way up to Hungary. Eastern China, the Middle East. Right. when the Mongolians did that, they created this trade route called the Silk Road that went all the way from, Constantinople to modern day China.

Right. And it was called the Silk Road because that was what got traded along with silk. and as a result, all along that Silk Road, there are depictions of the three hares. if you go to the next, that is from a plate, a Persian plate, from medieval times. and you can see it's extremely ornate, but it's the same thing.

Jake the Bean: Hmm.

Camwadam: and there's a whole lot of religious significance that's assigned to it by different religions, by different mythologies and different traditions assigned different meaning to it. some say [00:34:00] it represents the cycle of life, death, and rebirth.

Jake the Bean: Okay.

Camwadam: So because the, hares are all following each other in this eternal circle.

Right. in Christianity, it was said to represent the Holy Trinity, the Father, the Son, and the Holy Spirit. Others have said it represents the Holy family. So Mary Joseph, in Jesus, right. go to the next, in medieval churches in, I believe this one is from England. You have the three hares juxtaposed to the green man.

the green man was covered with foliage.

Jake the Bean: Oh, okay.

Camwadam: And, people would say, well, the green man represents, the ancy of the earth, and hairs are a fertility symbol. In fact, hairs were, for a long time, they were thought to be born pregnant. They were like the Tribbles in [00:35:00] Star Trek.

I don't know, have you ever seen the Star Trek episode? The trouble with Tribbles? the Tribbles are these cute little, fluffy no face things. And they're cute and they're nice, but they just keep on reproducing. Like, if they have food, they just produce more and more.

Jake the Bean: Okay. So like bacteria,

Camwadam: right. And Dr.

McCoy says they, these things are practically born pregnant. the, they. Basically get into the ship's grain store. They eat the grain stores, and so finally to get rid of them, they beam them onto a cling on ship.

but yeah, hairs were thought for a long time to reproduce asexually, like they could just pop out more hairs all the time. there's no contemporary source to really tell you exactly what this symbol represents something different to everyone Al Ross.

Jake the Bean: I mean, it's just it's a cool design.

Camwadam: Yes. Oh, it is. Yeah.

Jake the Bean: Yeah. you assign whatever meeting you [00:36:00] want to, it's just cool.

Camwadam: there are versions of it that have four hares

Jake the Bean: Okay.

Camwadam: this, the words I put on that, those are, references to the blog pages I found those on. what that etching there shows, is from the golden legend,

Jake the Bean: my bad,

Camwadam: the Golden Legend, which was written by, Jacobis something or other, Jacob Jacobis of some.

Village somewhere. Okay. And he compiled the golden legend. And actually a lot of medieval writings, medieval stories are actually compilations of legends. if you ever read paral or the Arthurian Legends or anything like that, that it's, they're written by somebody,

and these people were all doing it by Quill or by Twig, dipping Ink, And then the way their stories would get spread is somebody else copies 'em, and at a time when the literacy rate was somewhere around four or 5% of the [00:37:00] population, so it wasn't like people could just sit there and read, you'd have to go somewhere to a church or, gathering of some kind where there was someone who could read and they would read the story, to maybe to you, maybe to probably to a whole crowd of people.

Jake the Bean: Right.

Camwadam: And, you would actually kind of pay them,

Jake the Bean: Yeah.

Camwadam: For their trouble.

Jake the Bean: the, what is it in church?

Camwadam: the collection plate.

Jake the Bean: Yeah. It goes around.

Camwadam: Right. and that's what bards were. very often they would tell these stories and they'd be told to music. And if you look at the Homeric Legends.

The Homeric myths, people would memorize the whole thing and they would memorize it to a beat and someone would sit there in the, in the amphitheater and ping out a beat.

Jake the Bean: Okay.

Camwadam: While the person repeated it. the writers of these legends in medieval times, because it would take so long to write something, they usually had a noble [00:38:00] person who was their patron.

Jake the Bean: Okay. Someone who put 'em up,

Camwadam: right. While

Jake the Bean: they wrote.

Camwadam: Yeah. this guy Jake bu he was a, he was a friar, so we have to assume, okay, the church was paying him somehow. He may have just lived in a monastery and his whole job was to write this stuff. But

Jake the Bean: yeah, if he was a friar, that's what I would assume,

Camwadam: right?

So he right in, in this particular engraving, he has the life of Adam, Adam, the first man. he says, a story and it isn't really well sourced, but here's how it goes. Adam, the first man he lived 930 years and before he died he told his son Seth, to go to heaven and get the oil of mercy, right?

And, the assumption is so he can be anointed and his sense purified, anointed with oil of mercy and his sins are purified and then he can go up to heaven.

Jake the Bean: okay.

Camwadam: And Seth goes up to heaven, he gets the oil of mercy and he also gets three [00:39:00] seeds from the tree of life. and he comes back down and says to it, the angel gives him the oil of mercy.

That's what I should say. Along with three seeds from the tree of life. So you have three, right? You have a another

Jake the Bean: Trinity. Yes.

Camwadam: Right. You have another recurrence of three. and he comes back down and he says to Adam, Hey, listen, the tree gave me these thi, The angel gave me these things.

And Adam laughs and then he dies. Seth pours the oil down his throat and puts the three seeds in his mouth and out of his mouth, those three seeds grow into three trees, which then, become part of the cross on which Jesus was crucified. Oh. Or they become the cross that Jesus was crucified on.

Which kinda throws me off because a cross is two boards.

Jake the Bean: Yeah.

Camwadam: So I guess you could say maybe there was something hold his feet up or what? I don't know.

Jake the Bean: Hmm.

Camwadam: you could say maybe it's the board on top that the board that says INRI that made the sun, that would be the third tree.[00:40:00]

So you have this whole thing where, Adam is the green man and three sprouts from the tree of life come from his mouth. the first man becomes the tree of life. And the tree of life creates the cross that gives everyone the route to eternal life.

Jake the Bean: Okay.

Camwadam: So you get that same idea of eternal recurrence within the green man legend kind of folded into this Christian legend, this biblical legend.

so that's actually the guy who wrote this blog, that was his conjecture, is that that's why you see the green man in all these churches. And it would make sense then that you could juxtapose it with the three hares

Jake the Bean: Okay.

Camwadam: That it's symbolism.

It's iconography that fits, Obviously it's mythological iconography. It's not, it's not [00:41:00] originally Christian iconography, but it works its way into the Christian religion through, I guess you could say extra dogmatic stories.

Jake the Bean: Okay.

Camwadam: Which, in my opinion are just as important as, the dogmatic tales because they allow people to relate to it themselves.

I wanted to tell you about the three hairs

Jake the Bean: I enjoyed. The three hares

Camwadam: Yeah. so what are your thoughts

Jake the Bean: on the three hairs and

Camwadam: So it's your turn.

Jake the Bean: All right. this week

Camwadam: here,

Jake the Bean: I went ahead and I,

Camwadam: hand it over to,

Jake the Bean: you can control, these are outta order, okay.

Camwadam: I put 'em in outta order.

Jake the Bean: I have notes on my phone, I'm gonna,

Camwadam: gonna use the phone.

Okay.

Jake the Bean: Look down on my phone a little bit. Just don't let

Camwadam: the computer fall off your lap, dude.

Jake the Bean: Okay.

I wanted to tell you about the genetic history of, cats. I wanted to tell you about the GenY of Cats.

Camwadam: [00:42:00] Okay.

Jake the Bean: so domesticated cats, they were first semi domesticated when we, when we first started, building farms, on the Fertile Crescent.

Camwadam: Okay.

Jake the Bean: 12,000 years ago.

Camwadam: Tell me about the Fertile Crescent.

Jake the Bean: the Fertile Crescent is right off of the, is it the med?

Camwadam: Okay.

Jake the Bean: Is it the men?

Camwadam: Yeah. Yeah. I believe so.

Jake the Bean: basically that's where we first started farming. That is the beginnings of where our civilization, like our no longer hunter gathering lifestyles began where it became these, these, villages centered around, bodies of water and farms.

immediately when we started building fields with full of food grain, right? Mm-hmm. M swear problem.

Camwadam: So rodents have always been a problem for agriculture. Yes. Problem for [00:43:00] agriculture.

Jake the Bean: in fact, in my fin in my, studying for this, rats genetically have followed, have followed this trend of essentially unintentional domestication by humans.

Camwadam: Really?

Jake the Bean: Yeah.

Camwadam: So, rats and mice?

Jake the Bean: Yeah, mice. My bad. Not,

Camwadam: not rats.

Jake the Bean: Not necessarily rats. I didn't see,

Camwadam: okay.

Jake the Bean: I only saw a specific call out for mice.

Camwadam: Okay. But it may very well include rats. It wouldn't surprise me if it did.

Jake the Bean: Yeah. so just as soon as we are, beginning to cultivate the, the ground, right?

Mm-hmm. we are semi domesticating cats. Mm-hmm. We are using cats to, manage roaded populations and protect fields of grain. And the first cats that we are using are the African Wildcat.

Camwadam: Okay. so would this then [00:44:00] first be showing up in North Africa? if it's African Wildcats or

Jake the Bean: it's in, they are, they are native to Africa.

And the s far east, I mean, not far east, near East Eng region.

Camwadam: Okay. Well, okay. I can believe that because lions were actually common throughout Mesopotamia. Until, up until just like 1500 years ago. they were a normal thing to have out there. It wasn't uncommon for people to killed by them and people would hunt them.

So when you tell me cats, these African wildcats were spreading in there too. That makes sense.

Jake the Bean: FS Ika.

Camwadam: Okay. Ika.

Jake the Bean: the first time that we actually began to. hardcore domesticate cats was about a thousand years after the, formation of ancient Egypt.

Camwadam: Okay.

Jake the Bean: the first time that, so

Camwadam: wait, the Egyptians were the first ones

Jake the Bean: to truly [00:45:00] domesticate them.

Camwadam: Okay.

Jake the Bean: and actually the first time that someone was buried with their cat was, 9,500 years ago in Cyprus.

Camwadam: Okay.

Jake the Bean: So for at least

Camwadam: 9,500 years ago?

Jake the Bean: Yes. Yeah, he was, someone was entombed with, they basically found a skeleton of a cat with him.

Camwadam: Hmm.

well that's long before ancient Egypt.

Jake the Bean: Right. So, there's some evidence that we were, domesticating them. so the difference between a semi domestication and a true domestication, at least in reference to cats, is how much we let them live inside. Okay. Right. obviously a 100% indoor cat is a domesticated cat.

Camwadam: Okay.

Jake the Bean: And a 100%.

Outside cat. Right. Like a barn cat or a mouser. Mm-hmm. Those are semi domesticated. Right.

Camwadam: [00:46:00] So if, yeah, it's probably nice enough to you when you come up to it, but it ain't living indoor.

Jake the Bean: Yeah. It doesn't want it hang out with you.

Camwadam: Okay.

I don't know, some barn cats are mean as fuck though, man.

Jake the Bean: Yeah, those are right.

Camwadam: Okay.

Jake the Bean: They're, semi domestication means human involvement essentially.

Camwadam: Okay.

Jake the Bean: let's see. So here,

Here on this graphic representation, it's just specifically speaking about the right side. Right.

Camwadam: Okay. On the right.

Jake the Bean: Is this, this is a genetic map of, centered around cats from the Near East, that fertile Crescent.

Camwadam: Okay.

Jake the Bean: And what this graph shows us is that these cats from around the world, Africa, Asia, Australia, east Asia,

The list goes on. Every domesticated cat that we have around the world Come from [00:47:00] the Near East region or otherwise, these, north African wildcat. And what the research researchers say is that, in a delta K of two, so you, in this graph, it goes from zero to two and zero to negative two.

A distance of two is a, a unique domesticated cat, genetically unique. And basically all,

domesticated cats.

Camwadam: So a, a dec, a delta cave of two then would be like its own breed. Is that

Jake the Bean: No, so these are, thank you for asking that question. These are random bread, cats.

So basically strays.

Camwadam: Oh, okay.

Jake the Bean: domesticated cats for particular pedigrees have only existed for about 200 years.

Camwadam: Oh, okay.

Huh?

Jake the Bean: So, ya there, he's a Norwegian. [00:48:00] Forest cat mixed with a random bred cat,

Camwadam: Yeah. With whatever came over the fence. Yeah.

Jake the Bean: anyway, those particular, those particular pedigrees have only started to exist for about 200 years.

And what's significant about this graph is that anything within a range of two is not genetically dissimilar from each other. Not significantly genetically dissimilar. And what that shows actually is that it proves all cats come from the Fertile Crescent. That's where they originate from.

Because almost none of these, There are some outliers that are over two from the center, but all of them are centered around cats from Near East.

Camwadam: So even the outliers average out to being

Jake the Bean: pretty close.

Camwadam: Huh. All So all

Jake the Bean: domestic like house cats? Even though there [00:49:00] are house cat sized cats

mm-hmm.

Native to South America. in San San Marcos, it is still. cats from the Near East.

Camwadam: No way.

Jake the Bean: Yeah. actually something significant of note is that in the new world, north America, all the cats have, genes from European Wild Wildcats. reinforces that cats came. All the cats in North America came from colonization by, the European by Europeans.

Camwadam: Man, that'd be hardcore bringing a cat across on a boat. That

Jake the Bean: m swear problem.

Camwadam: True. That's a good point. But I mean, I guess I, I have such an aversion to the smell of cat piss. Then again, so do [00:50:00] mice and I guess if you're out on a boat there and it's gonna be humid anyway and there's no latrine, I mean,

Jake the Bean: you do your best.

Camwadam: I guess, I guess all the other smells are gonna be so overwhelming anyway. It may not matter.

Jake the Bean: Right. may hopefully maybe they had figured out litter boxes by then, yeah. Maybe boxes of sand, Yeah. That's conceivable.

Anyway, the reason for anyone studying and figuring out where cats came from and what they are, genuinely is reason for the genotyping is so that, people who have cats as pets can figure out how to, take care of them better, have them live longer.

professor, I'm looking at my notes here. Toru, Miyazaki of the University of Tokyo. He has developed this vaccine, [00:51:00] which some of you may have heard of, that is aimed at doubling the lifespan of cats.

Camwadam: Okay.

Jake the Bean: And it's a treatment for chronic kidney disease, In cats and in humans. And all mammals is, you have this, chemical called a IM,

Camwadam: okay?

Jake the Bean: Which is the apoptosis inhibitor of macrophages.

Camwadam: Huh. Okay.

Jake the Bean: It's, is it a protein?

Camwadam: It would have to be, well, okay, so macrophages are, they're immune cells.

Jake the Bean: Well, this is, this is something that, that

Camwadam: axon,

Macrophages.

Jake the Bean: So the a IM protein, it tells the macrophage not if that it is functioning to not kill itself.

Camwadam: I That's pretty crazy. So its default is to kill itself unless this protein is present.

Jake the Bean: If it's damaged,

it prevents it from committing apoptosis.

Because when you split a [00:52:00] cell It releases, a chemical that causes apoptosis, that tells everything that is damaged around it to self-destruct.

Well, this tells macrophages not to do that because there is some cleanup to do where there is injury. And it is carried by the main, immunoglobulin, IGM Pentamer.

this is a massive protein. it actually carries multiple, Instances of the a IM You're muted right now.

And, in felines, basically the way that, a IM gets carried around on IGM is through polar bonding. In cats, it's a thousand times stronger of a bond than it is in human. So IGM

Pentamer is the main immunoglobin globulin, That, basically IGM Pentamer is when you have a foreign body in your [00:53:00] body

It sticks to it. And it serves as a red flag to your immune system as, Hey, come over and consume this, come over, destroy and consume.

But on this, IgM pentamer, in these slots, you can carry things and one of the things it carries is a IM Which is the, anti apoptosis.

In humans, the a IM separates from the pentamer really easily. And what that means is when you have an acute kidney injury. Some of the cells die, some of them don't. And the dead cells become debris that block your nephrons. Nephrons are tubules. That allow waste to process out into your urine.

Camwadam: So those tubules get blocked by cellular debris.

Jake the Bean: And the a IM inside those nephrons, what it, [00:54:00] what it promotes the surrounding, cells to do is to consume that debris and to get rid of that debris through urine.

Camwadam: Sure.

Jake the Bean: And there's a membrane between your blood and your nephrons. Those tubules.

And because in cats, the, bond between IGM and a IM is a thousand times stronger than it is in humans.

Camwadam: Oh.

Jake the Bean: That does not happen in their nephrons. And what professor, Miyazaki found was that, without a IM, the cellular debris never leaves. And the way he found out was by fattening up mice and, removing a IM.

in their kidneys, nothing was happening. Nothing was getting processed out.

Camwadam: Hmm.

Jake the Bean: [00:55:00] And he got that suggestion when he was in, I believe it was somewhere in Texas.

a doctor who studied cholesterol was Hey, try fattening up mice. The mice that you're studying on fatten them up.

And, Professor Miyazaki was he didn't think anything was gonna happen, but he was at a stopping point, so,

Outta desperation, he tried it.

And then he found out what a IM does.

And, anyway,

what, professor Miyazaki's vaccine is, is it's Unbound a IM and flooding a IM into, the cat's, bloodstream. It because Unbound a IM is what makes it into those nephrons.

Camwadam: Right.

I see. And so that allows cellular debris then to clog up those nephrons,

Jake the Bean: remove them, it promotes the cells around it to eat that debris and exit through the urine.

Camwadam: So what is happening in cats [00:56:00] that leads to the kidney degeneration?

Jake the Bean: So basically that debris is never removed and it creates blockages and prevents them from being able to get waste products out of them through their U urine.

Camwadam: And it's because of this higher affinity between a IM and IgM and IGM?

Yeah. Okay. Interesting. Okay. So basically their immune systems can't clear out the blockages in their kidney tubules

Jake the Bean: as well as, toxins in their bloodstream because they're blocked. Their kidneys eventually become useless. And basically whether you use, professor Miyazaki's vaccine,

whether you use it as a preventative measure or as a acute treatment.

It is effective in extending the feline [00:57:00] life.

Camwadam: Hmm. Okay.

Jake the Bean: So improving quality of life in felines that are suffering from chronic kidney disease.

Camwadam: So is is that something that's available now or,

Jake the Bean: so from what I read, it is unclear whether or not it is still in clinical trials or if it is, something that is available within Japan.

Camwadam: Okay. So it's not yet available globally?

Jake the Bean: Yeah. We don't have it. Okay. As far as I know, we don't have it yet.

Camwadam: We don't have it yet, but if it, if it proves to be safe and effective in Japan.

Jake the Bean: Yeah. currently all evidence points to it not being, having any side effects whatsoever,

Camwadam: really. Yep. So the, then the only question would be the cost of producing it Right.

Or the cost of, you know, producing, marketing and distributing it.

Jake the Bean: Right.

Camwadam: Which could be actually be pretty high [00:58:00] for a new pharmaceutical.

Jake the Bean: Yeah. Especially with a protein as complex as a IF.

Camwadam: Right. Because then it has to be made through, basically through a, you have to make it biologically.

Jake the Bean: Yep.

Camwadam: And so then you're fermenting all these components.

Yep. And then having to purify them and I can tell you With those pharmaceuticals like that, the purification is actually the most expensive and difficult step. Gotcha. Because what you need is you need a substrate that has more affinity for the complete molecule, the complete bioactive molecule than for all the little fragments and all the little other pieces.

And you can capture all the little fragments. And then you get a tube that has that substrate all around it and you push your solution through the tube. And then in the pro coming out the other side, you either get fragments or you get the purified [00:59:00] molecule.

But just developing that substrate and you're gonna have to push it through at a specific rate, temperature pressure. You have to get these perfect conditions in order to get your, pure form of your pharmaceutical. And that's actually what makes the process so incredibly time consuming and expensive is that the separation is just so hard to do.

Jake the Bean: Right. Okay.

Camwadam: Now a little bit about

Jake the Bean: Yeah.

Camwadam: The economic, not

Jake the Bean: something I knew.

Camwadam: Pharmaceutical production. Yeah.

Jake the Bean: So, I imagine it will be probably a significant amount of time before that process is standardized. For this particular application,

Camwadam: dude, that's cool as hell.

Jake the Bean: Yeah. And, all that is to say all domesticated cats are genetically incredibly similar.

Camwadam: Huh. We'll have to see if, what's the professor's name?

Jake the Bean: Professor [01:00:00] Miyazaki.

Camwadam: Okay. I'll send him an email. Tell him we talked about him. Okay. see if he wants to come and talk to us. We'll try.

Jake the Bean: She said Japan, my friend.

Camwadam: That's all right. Well, hopefully he speaks English or has a friend who can, or I believe he speaks English.

we can, if nothing else, we can get Chat, GPT to give us English subtitles,

Jake the Bean: Okay.

Camwadam: there's a thousand ways to skin that cat.

Jake the Bean: Hmm. another kind of footnote is that even though Professor Zaki, the reason why Professor Zaki actually cares so much about cats is a, he likes cats and be a friend of his.

That was a. Who had a chronic disease, really, he had a cat that he really loved Uhhuh, and, he kind of exposed Professor Miyazaki to this love of cats. Huh. And what Professor Zaki actually kind of hopes to do with [01:01:00] this, a IM research is not only it be applied to cats, but humans Oh, okay. Suffering, chronic kidney disease.

And also, so Professor Miyazaki is a immunologist.

Camwadam: Right, right. Wow. That's actually, some people will say that's actually the most complex subject,

Jake the Bean: so. Yeah. Well, I mean, he, he, he basically had no idea what exactly a IM did until something random just worked. And it's not random, but what I mean, Uhhuh, it feels just as random as anything else when you're

Camwadam: Right.

Well, a lot of trying to figure things out scientifically is you throw a dart at the board and say, okay, we're gonna examine this Right. And see what we come up with.

Jake the Bean: Right. Yeah. Yeah. He's basically been on this for.

Camwadam: Probably

Jake the Bean: a couple. I think, I think the article said 20 or 30 years. Oh,

Camwadam: [01:02:00] yeah.

Well, when you're talking about St Proteomics

Jake the Bean: mm-hmm.

Camwadam: that is just something that takes so long to, 'cause you're, you're looking at the specific reaction pathways and this activates this, which activates this, and you're right, you're not just talking about proteins, you're also talking about interacting with, with DNA and RNA, just, it becomes so complex.

And, tracing those, all those different pathways and I even identifying the proteins and what they're, what amino acids make them up and how they're folded. Like it just take to find one pathway can take years.

Jake the Bean: Gotcha.

Camwadam: Yeah.

Jake the Bean: Hmm.

Camwadam: Dude, that was cool. Hey, don't close it up yet.

Jake the Bean: Okay.

Camwadam: Yeah.

Jake the Bean: What are your thoughts on,

Camwadam: that was

Jake the Bean: domesticated cats, Steve.

[01:03:00] Keep that, keep Oh, okay.

Camwadam: I actually had no idea that domesticated cats came from the Levant from that fertile crescent area. I knew that in Egypt, cats were religious icons. they were almost angels. it was illegal in ancient Egypt because the whole trade economy of ancient Egypt was built on grain.

'cause you could grow more grain in Egypt than in all the area around it combined. Egypt was this treasure, you've heard the jewel of the Nile.

Jake the Bean: Okay.

Camwadam: it was this treasure for the Romans and for the, you could say the Byzantine, but the Byzantines also considered themselves Romans,

the caliphate, when they took Egypt, because Egypt was the bread basket of the Mediterranean, and you would feed entire civilizations. just on the grain that came from Egypt. so in Egypt, the [01:04:00] religion arose that cats were super sacred. And it makes a lot of sense because, it only takes a few rodents to

Destroy your entire grain storage.

Jake the Bean: you're impoverished. The thing that makes 'em so valuable, is that they're obliged carnivores.

Camwadam: Oh, they

Jake the Bean: won't eat the grain.

Camwadam: If it was dogs, they might eat the grain

Jake the Bean: they won't eat the grain. that cat might eat the grain almost.

that's true.

But that's the difference between the inception, that's the difference between random bread and, pedigree seeking.

Camwadam: Mm. Okay.

Jake the Bean: Domesticated lineages.

Camwadam: they lose the instincts that would've let them survive in the

there was a story I heard, or there is a story that's written, in.

Basically in hieroglyphics about how a boy accidentally killed a cat, ran it over with his wagon [01:05:00] and basically the crowd beat him down. People's justice. Yeah. They did him in, they executed him for killing a cat. killing a cat was a capital crime in ancient Egypt. That's how imp important They were that.

They, they weren't just a fun thing to have around, they were critical to the survival of the society,

Jake the Bean: an economic asset, not even just economic though. That was survival.

Camwadam: Right. They were critical to the, the civilization in the state. Yeah. And, and not just that, but tons of people's livelihoods.

Jake the Bean: Right.

Camwadam: So, have you ever heard the term coyote ugly? Okay. There was a movie called Coyote Ugly. I think I had maybe

heard it before, heard the term Coyote Ugly before the movie, but they talked about it in the movie. The movie is basically about a girl who wants to become she's a songwriter and she's trying to get her [01:06:00] song, produced, the song is.

it's not actually about the actual songwriter of this song. the song is Can't Fight the Moonlight, the song she's trying to sell. and in the movie, she successfully sells it. And in real life it was successfully sold. It became it was like a number one country hit, like in the early two thousands.

coyote Ugly is a bar, and she gets a job at the bar, as a bartender. And it's just this crazy bar. all the bartenders are women and they are just off the chain. one of 'em asked her, what, you don't know what coyote ugly means? And she, and she's like, what does it mean? And she says, well, it's where you, you leave the bar with someone and you wake up with 'em in the morning, and you know, they were beautiful when you, when you went home with 'em, but you look over and they're,

Jake the Bean: yeah,

Camwadam: they're, they're so, and they're, they're laying on your arm and they're, they're so ugly that you don't wanna wake 'em up.

So you [01:07:00] chew off your own arm.

Coyotes will chew off their own leg to get out of the, bear traps and some coyote traps. They

Jake the Bean: they ensnare the leg.

Camwadam: They bite the leg.

Jake the Bean: coyotes are smart enough to chew off their own leg.

Camwadam: They will chew off their own leg to get out of the trap.

Jake the Bean: They are smart enough and driven enough. That is insane.

Camwadam: the thing is when that trap is closed up for a long time, that flesh dies anyway. And once that flesh is dead, you can't feel it. So you would think it would be painful, but you actually, feelings I,

Jake the Bean: I was saying, I figure, I thought you were saying while it's fresh and maybe it's only been 12 hours.

Camwadam: I mean, think about it. If you had that thing clamped down on your leg How long would it take for those nerves to be so overstimulated that you wouldn't even feel it? because there was that guy who, he was what in, was he in Arches or was he in Zions where [01:08:00] he basically got his arms stuck in a rock and wound up cutting it off with a Swiss Army knife.

But the interview I saw where he was talking about it, he said he actually couldn't feel it. The feeling was gone from that arm,

Jake the Bean: it's

Camwadam: just as Well, as it turns out, bacteria do the same thing. So go to the next slide.

Jake the Bean: this is an African wildcat. This is a domesticated cat.

Camwadam: And they look the same.

Jake the Bean: They look almost exactly the same.

Camwadam: So you recognize that

Jake the Bean: that is a phage,

it's bacteria phage, It's basically a viral infection for bacteria.

Camwadam: Yeah. that is bacterial phage, sp zero one SP0 one. in, this study I'm about to talk about, they looked at SP0 one and S PPP one, I went and got a picture of the other one and they [01:09:00] look almost exactly the same.

very quickly, if you want to go to the next, what phages do they attach on? And you can see on there, it's multiple phages will attach to one bacteria. Right. And every virus, when it attaches to a cell, it doesn't randomly attach. It has to find a specific receptor that it, that it's the tip of its.

Projector has been, basically built for right. and then it produces specific enzymes to open up that receptor, right? if you look at the case of COVID, what happens is the receptor attaches to the ace, I believe it's to, ace two receptor.

And there are enzymes from the cell that saw off pieces of the spike and eventually allow the virus to inject its RNA, right?

Jake the Bean: So your own immuno

Camwadam: [01:10:00] response, not immune response, but your own cell, your own cell, your cell's enzymatic machinery,

Jake the Bean: actually

Camwadam: helps it to enter, right?

if it didn't help, it wouldn't enter. that's the same story here. It attaches to a specific site. I'm sure there's something enzymatic that happens. And it wouldn't surprise me if it's an enzyme within the bacterium that Allows it to release.

Jake the Bean: so the representation, I saw that I'm glad that you explained that.

'cause the representation that I saw made it look like the phages stab and inject.

Camwadam: Yeah. there's enzymatic assistance that leads them to do that. if you go to the Nest, so bacteria have developed a number of different defense mechanisms to try to stop that from happening.

One is, to block off the receptors that the phage would use, And the [01:11:00] bacteria could do it because it's been attacked by that phage. it could also do it because other bacteria around it have been attacked by it and have released messenger chemicals, To say, Hey, this thing's around and it's attacking us.

Bacteria actually kind of communally fight viruses.

Jake the Bean: Well, anyone on its own wouldn't be capable of preventing,

Camwadam: So, yeah, anyone can be killed by 'em. another thing they'll do is they'll try to block the injection itself from happening, so the phage attaches, but the bacteria inserts kind of a blocking enzyme that keeps the RNA.

Fermenting.

there's another, there's another thing there. you see up on the upper right hand corner. What it's doing is it's, methylating all that phage, RNA, it's attaching a [01:12:00] lot of methyl groups to it, basically to inactivate it.

Jake the Bean: Hmm.

Camwadam: So after the RNA is entered the virus successfully, like did what it wanted to do,

Jake the Bean: did its attack. Yeah.

Camwadam: Right. But now the bacteria is trying, the bacteria's machinery is trying to stop that RNA from ever being able to replicate. if you go to the next slide, have you ever heard of CAS crispr?

Yes. what CAST does is it goes along and it tries to just recognize different strings of RNA or different strings of bases within the cytoplasm within the bacteria.

And, it'll basically keep a copy of it. What that that protein can do is it goes along when a bacteria has been infected by a virus, at some point that CAS molecule, [01:13:00] that CS protein will keep a copy of that invasive RNA.

So it's almost like it's an immune system for the bacteria. And what it does is whenever it runs into a strand of RNA, it goes and the CRISPR gene envelops it and checks all along it to see, oh, does it match this previous invader, RNA that came in? And as soon as it finds where it does, it just chops it.

Jake the Bean: Oh, that's awesome.

Camwadam: Right. actually that discovery that it did that, I believe it was in 2009, that that's what allows, that's why it can be used to genetically modify cells, mammalian cells is because you can use it to clip at any point within a strand of DNA or RNA.

Right. Okay. I believe what that other one shows is

Jake the Bean: I did not know [01:14:00] that CRISPR and CAS were. Something that already that naturally existed.

Camwadam: Yeah. it's basically a bacterial immune system. Hmm. And another thing they'll do is they'll actually try to block, if all this hasn't worked, right.

Last ditch, this is this is like the Hail Mary. it will have it, they have a bunch of proteins within the bacterial cell that can attach onto viral proteins within are being produced by the cells. So now the bacteria's machinery is being completely hijacked and it's producing these viral proteins.

Right. But it has other proteins that it already had sitting out there, like landmines. Okay. And what they'll do is they'll glom on to different parts of these viral proteins to try to keep them from actually forming the complete capsid. [01:15:00]

Jake the Bean: Gotcha.

Camwadam: then you gotta assume the rest of it is somehow trying to fight to get its machinery back.

it's kind of aI may not be able to stop you, but I'm gonna take you to hell with me,

Jake the Bean: I don't know ifI don't know if you came upon this, but even with all these prevention methods, they're basically helpless to these phages. Really? Yeah. Yeah. that's actually

c diff is so prolific and it's so, mm-hmm. antibacterial resistant.

Camwadam: Yeah.

Jake the Bean: There are researchers working on using phages to

Camwadam: try to stop it.

Jake the Bean: Yeah. Developing phages. I will.

Camwadam: the difficulty with phage therapy, it may very well work on c diff because it's within your gut.

Yeah. inside the gut contents itself, you don't have a whole lot of active immune system. Your active immune system is just outside of that. Right. Okay. But part of the problem with [01:16:00] phage therapy within the body is that your immune system also attacks the phages.

Jake the Bean: Oh. You know,

Camwadam: and your immune system will overcome 'em.

Jake the Bean: Yeah. Well, they're not particularly Compared to mammalian cells, they're not all that complex. Oh yeah,

Camwadam: for sure. and they're not very good at masking their presence. thing when you talk about COVID, it's good at masking that it's even there. In fact, it deactivates your immune system a little bit within the first three days.

It keeps your immune system from recognizing it. part of the reason why COVID is able, when it gets a foothold, it usually has a strong foothold because it's had three days, it's had 72 hours to start replicating.

Jake the Bean: Mm-hmm.

Camwadam: if you go to the next slide, there is a new mechanism, that was found.

because of that, you can actually use phages to inject desired RNA into bacteria [01:17:00] and have them start to produce the molecules you want 'em to produce. you can use phages. You

basically take a phage, you remove, its RNA, you put the RNA codes for the protein.

You want it to produce into the phage. You have the phage go. Basically put that in the bacteria. Now the bacteria is gonna produce the protein you needed.

Jake the Bean: Hmm.

Camwadam: it's actually, you call it phage therapy it's, basically using a virus to help you get a bacteria to produce, a therapeutic molecule.

Jake the Bean: Yeah.

Camwadam: Super interesting.

Jake the Bean: Possibly a IM

Camwadam: possibly. I just wanted to point out, for this next study I'm about to discuss, this is the molecule they used, to actually put in RNA they desired, to put in RNA They desired into to basically create mutations within a population of bacteria.

And [01:18:00] they used it to create random mutation. basically it's a plasmid, which means it's, a chunk of cell membrane that can see it's circular. You'd put, your desired molecule on the inside of it. And when that plasmid hits the cell membrane of the, bacteria, it merges with it.

And in the process, it opens up. And your desired molecule if you go to the next slide. what they did, they took this, bacteria, bacillus subtilis, and it's actually a probiotic bacteria. It exists within your gut. which, and, it's been studied for hundreds of years, like e coli.

as soon as you had microscopes, some scientists was I wanna look at my own shit under that. that poop.

in fact, ESIA coli, it was named Esia coli. Coli is colon and Esia is the guy who studied it. it's basically the bacteria [01:19:00] from his own colon, that he studied. septus is used a lot because it's easy to mutate. It's easy to manipulate.

Jake the Bean: Okay.

Camwadam: it's been one of the most heavily studied.

Bacteria and it's used for other bacterial studies. And what they did was they mutated this specific gene, and you should see on there where it says Delta YJ bh, delta YJBH, and then there's some green letters that say wt. WT is wild type. unmutated and then that delta, YJBH, that delta YJBH has had the YJBH gene obliterated from it.

Jake the Bean: Hmm.

Camwadam: there's a couple others on there. and I believe Delta YJBH is in red. And then there's a couple others on there where it's [01:20:00] been manipulated, either been moved around or replicated on within the, bacteria's genome. and that's in blue and yellow. And you can see the, explain in a second.

so what they did was they, spread the bacillus subtilis into Petri dishes, and you can see that on the upper left. And then they infected it with SPO 0 one.

Jake the Bean: Okay.

Camwadam: Right. And you can see lesions on there. And the legions on the wild type are very small compared to where YJBH was deleted.

Jake the Bean: Mm-hmm.

Camwadam: And then there's another mutation of YJBH and then another, and you can see that yellow mutation appears to be better at fighting off the SPO one. Okay. The wild type is on the bottom. you can see, so in that middle band on the [01:21:00] left, the image is red and green or orange and green.

It has both orange and green. so that red is, they stain the bacteria that were delta YJBH, they stain them red. So the ones without the gene are stained red. The wild type is stained green and they infected it. And you can see within a few hours the red is dead.

Jake the Bean: Yeah. Red's basically gone.

Camwadam: And then the green slowly starts to grow back over 16 hours.

So the wild type made it the red, the with that gene deletion, it really didn't. And in the bottom left hand corner, that shows how much was left after they. injected it with 10 to one of SPO two, to the bacteria. So 10 times as much virus as bacteria was injected onto, and you can see where was at [01:22:00] 10 to one on the lower right.

The population of that delta YJBH group just

Jake the Bean: Yeah. It died,

Camwadam: yeah, it just collapsed. And in fact, you only had 23% of it that survived. While with the others, with the wild type, made it until it ran out of food. so you have this gene, YJBH that is shown now to be a way that this, that communities of this bacteria fight off SPO one,

Mm-hmm. So then the question is how, how are they doing it?

Jake the Bean: Okay.

Camwadam: So go to the next, this is where they did it with SPP one, and they stained that YJBH Pro, protein, they stained it red. I believe that. Yeah, I believe that's it. Yeah. They stained it red and then the blue [01:23:00] stain is, that other protein loci,

Jake the Bean: L-A-C-L-C-F-P.

Camwadam: and what this allowed them to do was, see, when the SPO was infecting these cells, or SPP one, when it was infecting these cells, it allowed them to see where that YJBH protein was going.

Jake the Bean: Okay.

Camwadam: and you can see it's focusing in on specific sites within the bacteria. And so there were specific sites where

this Y-G-B-A-Y-J-B-H was accumulating when they were infected with SP one.

Now, what would you expect, what else would you expect to find at those sites?

Jake the Bean: What do you mean?

Camwadam: Why would it be accumulating at those sites? Just gimme your conjecture.

Jake the Bean: That's where YJBH is.

Camwadam: Why would Y-J-B-H-P accumulating at a specific site [01:24:00]

Jake the Bean: to block

Camwadam: It's doing something with that bacterial RNA, You would expect, well, that's gotta be where the RNA.

Jake the Bean: Okay.

Camwadam: And, that the point of that blue is that.

that blue protein is believed to have something to do with how that RNA enters the cell and stays in it.

Jake the Bean: Okay.

Camwadam: So go to the next and what that shows, I'm sorry, did go back. what that shows is that the red and the blue were accumulating together.

Jake the Bean: Mm. Okay. Alright.

Camwadam: Okay. So what this shows, let me take a look here.

How about this shows, what it shows is that where you would have that YJBH, accumulating, the cell would also start to divide, right? So you have YJBH [01:25:00] appears to be

glomming onto the RNA The invader, RNA, and then the cell is starting to divide just above where it's at.

Jake the Bean: Hmm.

Camwadam: And I think if you go to the next slide, there's a video Yeah.

Go ahead and hit play.

Jake the Bean: It's already playing.

Camwadam: Yeah. So you can see that it's, it's basically cutting off the point where that,

Jake the Bean: where the phage has infected it.

Camwadam: Right. It's just dividing. It's just dividing right there.

Jake the Bean: And presumably that portion will die.

Camwadam: Right?

Jake the Bean: Okay.

Camwadam: I, I don't know. I should have another, another image on the, oh, oops.

We're out

Jake the Bean: spoilers,

Camwadam: right? So that's what the cell is doing is,

Jake the Bean: sorry, dude. I'm,

Camwadam: YJBH is attaching on to this [01:26:00] RNA kinda glomming it on, glomming onto it, holding it in place, and then the cell is cutting off the limb, chewing off its own arm.

Jake the Bean: Oh, peyote ugly.

Camwadam: Yes. It went to bed with SPO one virus and it woke up,

Jake the Bean: chewed off its own arm

Camwadam: to get away.

Jake the Bean: Okay.

Camwadam: How do you like that? I like that.

Jake the Bean: All right. Are we going onto the brick?

Camwadam: You want to talk about the brick?

Jake the Bean: Do you want to talk about the brick? Yeah, let's talk about the brick. Okay.

Camwadam: That is Sagittarius pointing an arrow at the brick.

Jake the Bean: Okay.

Camwadam: So what I want to talk about is the molecular cloud, Sagittarius, I believe it's S two.

Jake the Bean: Okay.

Camwadam: Sagittarius S two, and I shouldn't say it's a molecular cloud. It's an entire structure with clouds in it.

Mm-hmm.

And the [01:27:00] brick. And these are both located in the central molecular zone of the Milky Way.

Jake the Bean: What is the central molecular zone?

Camwadam: Go ahead. And the next, so that's the Milky Way. that is the ESAs map, the European Space Agency's map of the Milky Way.

in the center there. that's the CMZ. Right. and if you go to the next slide, if you look toward the bottom of this version of the map, going toward the bottom from the center, you can see where the sun is.

Jake the Bean: Yep.

Camwadam: So the sun is about 27,000 white years away from the central molecular zone and that central molecular zone.

at first it was thought to be a small area, like 500 light years across. Right.

Jake the Bean: Yeah.

Camwadam: 500 year light years across. Well, the Milky Way is [01:28:00] a hundred something thousand, Years across, I think it's more like 150,000 white years across. it keeps on getting bigger because we keep getting better and better at finding things

Jake the Bean: Oh, okay.

That

Camwadam: are within the Milky Ways orbit. And if you want to talk about the dark matter halo of the Milky Way, it's it's so big that it extends all the way to the end andro to galaxy. Which is 2 million light years away.

Jake the Bean: it's coming this way though,

Camwadam: Yeah, that's the thing is, is how do you define what a galaxy is?

How do you define where it starts and ends? And that's kind of the problem you have with the Central Molecular Zone. Is, that central molecular zone, it has, it contains it. basically the density of gas within it is just enormous compared to

Interstellar space. so if you were to take, that central molecular zone, [01:29:00] the.

Gas density within it on average is about, on the order of 10,000 molecules per cubic centimeter. to give an idea on earth, it's on the order of, 10 to the 19 Molecules per cubic cide. So you have about a hundred trillion times as much gas density on earth as you do in the central molecular zone, but, it's so dense compared to the interstellar medium.

the thing is that you basically have clouds, molecular clouds within it that are up to a hundred times, that are, can be hundreds of times as dense as

Jake the Bean: the average.

Camwadam: So even within the central molecular zone, what you have is clumps of dents of dense gas and, and material.

And then outside of it, [01:30:00] it's much more diffuse. But, some people say the, the central molecular zone, we can actually say it's the inner 40% of the galaxy.

Jake the Bean: Okay.

Camwadam: Because of how much activity goes on there. and you'll notice there's two bars within the central molecular zone, you see the football shape?

If you look at it long ways, it looks like there's a couple bars coming out from the center.

Jake the Bean: Okay. And those are one, one going one way and one going the other.

Camwadam: Yeah. So those galactic bars are where gas is coming in from the rest of the galaxy. It's getting sucked in like a vacuum cleaner.

Jake the Bean: Interesting.

Camwadam: Toward the center and then it gets pushed back out from the center.

Jake the Bean: It's like the opposite of like a quasar,

Camwadam: Well, it kind of is what's going on with the quasar though. It is a lot of materials getting pulled in and then it's also getting pushed out.

Jake the Bean: right. It just, it's, it looks the opposite.

Camwadam: Yes. it appears [01:31:00] the opposite. so this image is the galaxy, what it would look like from above, like from Galactic North,

Jake the Bean: Yeah. Using the plane, like looking at it as if it were a disc,

Camwadam: right. So you have from the horizontal plane materials getting sucked in and then it would be getting pushed out through the vertical plane.

Jake the Bean: Okay.

Camwadam: Because if, if you were actually above this, you know, our, our galaxy, it doesn't, obviously the black hole, our, our central black hole isn't super active, so it's not like spewing out all these x-rays and everything. But you would still be catching a fair amount of radiation if you were above galactic North.

Jake the Bean: No.

Camwadam: Right. So that central molecular zone, it's somewhere between 300 parsec and, you know, 1900 parsec.

Jake the Bean: When is the parsec again?

Camwadam: 3.2 light years. Okay. [01:32:00] Right. So go ahead to the next.

So this is Spitzer's map of the CMZ. Because we look at it from the side.

Jake the Bean: Yeah.

Camwadam: Right. the Spitzer Space telescope was active, from about 2003 to 2020.

Jake the Bean: Okay.

kind of a short lifespan for a telescope.

Camwadam: it did what it could. It was infrared telescope and it had two phases. It had a cold phase and cryogenic phase.

And a warm phase. Right. So the cold phase is where it was being cryogenically cooled by, it had a canister of helium, and so that helium was being released into the telescope's lenses to keep them cold so they'd be more sensitive. Mm-hmm. Right. And then after oh nine, it, it ran out of helium and it entered the warm phase [01:33:00] of its service.

it stayed active till 2020. mapping the universe. You see the bright spot, SGRA star?

Yes. That's the central black hole. And it's the, the, the thing is, our central black hole is surrounded by. a massive number of stars, Okay. Tens of thousands, hundreds of thousands maybe, of stars that surround the black hole and they're zipping around it and at an incredible rate of speed.

Right. And, they're cranking out all kinds of light and radiation across that whole CMZ. there's tons of other structures in there, but I, I don't have time to talk about all of them or memory enough to riff about all of them. but the two I'm gonna discuss are the brick and SGR. Is it SGRS two

Jake the Bean: or [01:34:00] SGRB two?

Camwadam: SGRB two. so if you go to the next slide, talking about the E em spectrum. Mm-hmm. We're looking at the near and mid infrared parts of it. So the near infrared spectrum is at 1.5 to five microns and mid infrared goes from five to 25 microns. And that's the infrared spectrum.

We're ignoring the rest of this, and a lot of that is because. That CMZ has so much gas and dust in it that it's become opaque to visible light and to x-rays and everything else. they just can't get through, at least not through most of it. So infrared is actually what comes through the best.

In fact, the previous image you saw was an infrared Oh, really? Image, right. It was colorized, but those Spitzer images were all infrared. [01:35:00] So when you, if you go to the next slide, you can see the Milky Way. That's the Milky Ways bulge, invisible light. Right. But when you look at it, and it's setting over the Rocky Mountains, but when you look at it, you see lots of big black spaces.

Jake the Bean: Yes.

Camwadam: And that, that's the center of the galaxy. It should be super lit up. You should be, it should be super bright, but instead so much of it is occluded by molecular clouds shit like that.

Jake the Bean: Oh, okay. So the infrared just passes through those molecular clouds? Mm-hmm.

Camwadam: Sort of. Not entirely. We'll get to that, that image there, that's inlaid, that's a Hubble image.

Jake the Bean: Mm-hmm.

Camwadam: of the center of the galaxy. And you can see, even though it looks like a bright spot, it's loaded with different structures and stars.

Jake the Bean: Yeah.

Camwadam: [01:36:00] Yeah. so go ahead and go to the next,

Jake the Bean: the red giants were striking in that image.

Camwadam: Oh yeah. Yeah. There's so much cool stuff.

That central molecular zone is, it's the most active part of the galaxy and it's so interesting. You could study it forever. the thing is though, there's so much radiation there, so much gamma and x-ray radiation that the chances you'll find anything living are so small. Right? Right.

and if you could actually trace those gamma rays that come out of there, you would see that they actually follow along

the arms of the galaxy. 'cause what creates those galactic arms is magnetic fields. Within the galaxy. like we talked about with Mars or with Earth, where you have the magnetic field, where you have this convection current of basically conductive metal.

You have this convection current of iron and nickel. And you have this initial seed of a [01:37:00] magnetic field. And when that current starts moving conductive metal starts to circulate, it creates an even stronger magnetic field, which creates an even stronger electrical field.

And you keep going until it reaches equilibrium, Mm-hmm. and that's the same as happens with galactic arms. You have all this gamma and x-ray radiation that's flying through, these streams of dust, And that galactic dust, some of it is gonna be ferromagnetic, some of it's gonna be iron or nickel or whatever it is,

And so it creates a magnetic field, and that magnetic field builds on itself. And so you wind up with these arms of material, So you have arm and then you have, nothing, and then you have arm, well, not nothing, but this is just another map that shows all these different [01:38:00] objects within the CMZ.

And if you want to go to the next.

So this is obviously a blob. Mm-hmm. did you

Jake the Bean: make this? No.

Camwadam: in the show notes, I have all the references. Okay. So I didn't include the references for this specific in this, but the show notes are gonna be on the website, this particular part of our presentations, just the brick and the CMZ, the brick and Sagittarius S two, or Sagittarius B two.

just a slideshow on them and it has all the references, but, basically what happens, you see how you have that constant background, so that's all the stars on the other side of the CMZ. And then you have the foreground, which is all the stars and between us and the CMZ. And you can see the CMZ just kinda blocks that background light.

And it's, again, it's all the gas and [01:39:00] dust, soaking up that, that light. and so you have to try to figure out ways to map the objects within there, You can't just look, you have to deploy a lot of mathematical, you gotta

Jake the Bean: interpretate. Yeah.

Camwadam: So if you go to the next, when you lose starlight,

That process is called extinction.

Jake the Bean: Okay.

Camwadam: but extinction doesn't happen to all of the light at once. It happens at specific wavelengths.

Jake the Bean: Yeah.

Camwadam: You understand why,

Jake the Bean: certain things are opaque to certain frequencies,

Camwadam: When they're opaque, it means they

Jake the Bean: absorb it,

Camwadam: And so they'll absorb it and then if they get heated enough, they'll release it at other wavelengths,

Jake the Bean: Okay.

Camwadam: but then some of the other wavelengths continue to get through. as you go through dust clouds or molecular clouds, you're stripping off [01:40:00] like one wavelength at a time. You can think of it like a bunch of arrows going through the sky and some are getting knocked down.

Jake the Bean: Yeah.

Camwadam: But some are making it,

So what you have to do is look for those wavelengths that make it. Mm-hmm. And as it turns out, blue light is the bluer, the light is the more it gets absorbed,

So red or light is more likely to make it all the way through the CMZ. So you can, maybe you can see that background light, or maybe you can just see light that's absorbed within the CMZ.

So this is a, it's a velocity map of gases within the brick. the brick is not too far from SGRA, An SGRA is cranking out all this radiation,

So it heats up the gas within the brick. And believe the brick is only like [01:41:00] 30 light years away. just is not far from that black hole.

And if you look on the z axis on the vertical axis, you can see that it says kilometers per second.

Jake the Bean: yes.

Camwadam: And so what you're actually looking at is if you look on the bottom, that's the XY axis. Yeah. So that's what you would see in front of you, If you were looking at an image of the brick, it looks like a flat postage stamp,

And so at the bottom you can see that dark, that dark thing. That's the brick reflection. that's the image of the brick.

Jake the Bean: Okay.

Camwadam: And what you have above that is how fast the gas is moving at those different points that you'd see.

Jake the Bean: I didn't realize that they were Oh, and so the faster it goes, the darker looks.

Camwadam: So, that isn't, that's just kind of this graph. there [01:42:00] are some gases in the brick that are going up to, 150 kilometers per second.

Jake the Bean: Okay.

Camwadam: so that, that if you say 60, that that's the equivalent of about 38, 37, 38 miles per hour. Mm-hmm. Or I'm sorry, 37 or 38 miles per second,

Jake the Bean: Mm-hmm.

Camwadam: The speed of sound on earth is about a fifth of a mile per second.

Jake the Bean: Right.

Camwadam: So that gives you an idea of how fast the molecular clouds within that brick are just zipping to say it's supersonic is it's an understatement, how fast these are going. I mean, kilometers, kilometers

Jake the Bean: per se.

Yeah. It's not even, it's an understatement to say hypersonic.

Camwadam: But the funny thing is the temperature, you know, even though it's hot, you're talking about temperatures of 50 to 400 kelvin. So you're not even getting to, [01:43:00] you're not even getting to freezing

Jake the Bean: 400. Yeah.

Camwadam: 400 Kelvin. I guess that would be above freezing.

Jake the Bean: That's oiling.

Camwadam: Is it? A

Jake the Bean: hundred Kelvin is C,

Camwadam: That's right.

Jake the Bean: Zero Kelvin is negative. 273.5. Yeah, that's

Camwadam: right. You're right. So you'd be above boiling.

as far as like stellar temperatures go though, it ain't, that is

Jake the Bean: incredibly warm

Camwadam: for, for if it's,

thank you for correcting me on that. Go ahead to the next,

Jake the Bean: but 50 to 400. That's such a wild variance.

Camwadam: Well, 50 is still really fricking cold. So if you look at this picture of the brick, you can see that even the black part, the part that's black looks kind of more like a dark brown.

You see all this dark brown and this is actually this is A-J-J-W-S-T image, So it's in infrared. The JWST is an infrared [01:44:00] telescope. It has two different cameras that were used to analyze this. You have near cam, which is near infrared camera and Miri mid-infrared.

the mid-infrared imager. but you can see even in all this, you have the dark brown, but you also have within the black, it looks somewhat reddish.

Jake the Bean: It's got a little bit of a

Camwadam: And what that is, is that is stellar light. That that is the light from stars that is not being completely extinguished as it as it passes through the brick.

This has also had the foreground, the foreground and background stars removed.

So the

Jake the Bean: golly that is some really complex analysis to get it to this point.

Camwadam: and what you're filling into, you're kind of, when you remove that foreground, you're making a guess at what the background would look like.

You're kind of making a continuum calculation.

So it's possible that behind those foreground stars, you [01:45:00] actually have other structures that just aren't entirely visible. Right. If you go to the next slide, so that is, that has the foreground stars removed. That is the dots are the stars that their analysis estimated are there or located in those positions

Jake the Bean: in the background

Camwadam: or either behind the brick or within the brick itself.

Okay. Right. But you can see in the center, it's still struggling

Jake the Bean: to Yeah. It doesn't see anything.

Camwadam: Yeah. It's struggling toward that middle to, to even pull those out. And this is with the best telescope we have, so that just tells you how much gas and dust is within that brick. it's also known now that gas and dust, contains a fair amount of, high metallic, which metallic [01:46:00] within astronomy refers to anything that's heavier than hydrogen and helium.

Jake the Bean: Right.

Camwadam: and what that means is there had to have been lots and lots of stars and supernova

Jake the Bean: Yep.

Camwadam: Within that in the past in order for that to have accumulated. and it's funny that it's all still sticking together like that,

Jake the Bean: Likely to recombine, do you think?

Camwadam: Maybe, but, all that radiation that's hitting it.

Mm-hmm. And it still isn't completely dispersing.

Jake the Bean: Oh, okay.

Camwadam: So that, what that tells me is I think my conjecture is that there's actually a ton more stars within that Than were able to be revealed by JWST, and that they're in there kind of holding that whole thing together.

That it's not just this split up diffuse, obviously thicker than what's around it, but still relatively diffuse, you [01:47:00] actually have all these stellar bodies that are anchoring it together. Right.

Jake the Bean: You gotta have something that's pulling it together.

Camwadam: Right. Like nodes Yeah. Or like points.

So where it's sewn. Yeah. So that's the same image with the foreground

Jake the Bean: Dude, that's so cool. Yeah.

Camwadam: The foreground is the stars between us. Mm-hmm. The brick. Yeah. if you were, if you were gonna be like a science fantasy writer, the brick is where your villains would come from. Mm-hmm. So this is SG S two, and that's also with near cam and mirroring. And with near cam, you can see, all the, you can see kinda individual stars.

It looks like individual points, right? Yeah.

Jake the Bean: So I, correct me if I'm wrong, but the reason we use infrared is because, because it's [01:48:00] the shortest wavelength that really has direction.

Camwadam: That could be, that could be okay. yeah, obviously the tighter the wavelength,

Jake the Bean: the, the more line of sight.

Camwadam: Right? so JWST was actually built to, to observe the most distant objects in the universe.

Jake the Bean: Okay.

Camwadam: Which would then be the oldest, but also the youngest. Okay. Because you're looking back into the past, right? So when you look long distances in the universe, you're also looking into the past.

Jake the Bean: Okay?

Camwadam: So when it looks at a quasar, that's. 13 billion light years away.

Jake the Bean: That happened 13 billion years ago.

Camwadam: Right. So that, that's actually the reason for the infrared on the JWST. But it's incredibly useful for this. And, you, you saw too, where it was used to image three i Atlas, which is actually currently being imaged [01:49:00] by all these Mars orbiters from NASA ESA in China. it's believed that perseverance also got a photograph of it.

Jake the Bean: Oh, really?

Camwadam: Yeah, but I haven't seen the photograph.

Jake the Bean: Okay.

Camwadam: But, I, I just read that there was one. MIRI is showing all these, these, these clouds and, and other objects, right? And near cam is showing specific stellar objects. so there's all kinds. Sagittarius S two is the most active star forming object in the universe or in the universe in the galaxy.

Right. at least that we can see. half of the star forming activity that's going on in the CMZ is happening in sagittarii. But the interesting thing is, given the molecular density of the CMZ, there should actually be four times as much star forming [01:50:00] that's going on. So it's kind of a mystery why exactly it's happening.

But some of the objects you'll find in there, that one on the upper left, that's a mazer, that's these objects, these specific objects are not in Sagittarius, SG two Oh, Sagittarius S two,

but they're, they're actually objects that are mostly in other galaxies, but I, I put 'em on there so you could see what they would look like on their own.

That first one is a Mazer, which is, it's basically large clouds of molecules that are absorbing light and releasing microwaves. So it's a, a microwave laser or a microwave spitter outer. Oh, right. on the right you have an HII cloud or an H two cloud, which is basically a whole bunch of, superheated ionized hydrogen, but it,

Jake the Bean: so basically [01:51:00] just protons,

Camwadam: right?

Yeah. And they release all kinds of light, but it, it's basically hydrogen plasma that is not a star. It's just being super heated by other radiation sources. And then at the bottom, what you have is hot cores and a hot core. In this case, it's not talking about the core of a star, it's talking about basically protostar.

so you have a, a protostar where you don't yet have full on fusion

Jake the Bean: going on,

Camwadam: but you do have the, the, the cloud around it, the cloud of material around it that's sweeping in. Okay. like the, a proto-planetary disc you could say. And when you talk about just like those ionized hydrogen clouds, there's at least 50 of them that have been observed in Sagittarius S two.[01:52:00]

Okay. Just think how big that is, So in addition to all the young stars that are in there, which you saw a bunch of those in near cam,

Jake the Bean: yes, you

Camwadam: have tons of this other shit that's going on in there. And you can see these wisps in front of it. And then what you have also within it, within the objects, Sagittarius S two, you have these multiple other stellar clouds, these multiple other molecular clouds within S two.

That have been detected. And those molecular clouds themselves can have stars in the middle. But then they're absorbing the light out of those stars and that heats up those clouds. So they start, you start to get a high velocity of gas within them. And within that gas, you also have, you have high metallic [01:53:00] streams that form within them.

So streams of carbon, silicon, oxygen, And what you have is these splotches, like on the lower right, these splotches of light, which is that infrared light escaping through those streams of metallic within those clouds.

Jake the Bean: Okay?

Camwadam: Yeah.

And this is another object that was suspected to be in there, but, and it's not entirely 100% certain what it is, but there's four other similar ones, what of what it's believed to be. And those four on the left are all planetary nebula. they're not actually planets. A planetary nebula is what's left over after a gas giant.

After a red giant phase is done. So with a red giant, it isn't just one [01:54:00] single phase. so after a star's core has been burning hydrogen for a super long time, all this helium accumulates and you get too much helium in there for hydrogen fusion to keep going. And the star collapses, It's no longer heated.

It collapses it, then it gets hot enough for that helium to start to fuse.

Jake the Bean: And then that pushes.

Camwadam: So it all pushes it out, And you, so you don't just have this shockwave from all this material hitting. you also have the shockwave from this incredibly high. the fusion of helium is much hotter than fusion of hydrogen,

And it pushes it back out, And that helium starts to fuse into carbon. And, that carbon, helium to carbon fusion is much hotter. And so it pushes it out, but it doesn't last nearly [01:55:00] as long because it's burning so hot. And then after you have a carbon core collapses down again. You have another ricochet while the carbon starts fusing.

carbon illium start fusing into oxygen and nitrogen it becomes really complex, but you can keep on having that cycle go on until you get to iron and iron. the reason you run out at iron, you have

Jake the Bean: the energy diffuse is higher than the energy,

Camwadam: right?

Jake the Bean: it generates,

Camwadam: when you talk about fission, you can look at fission on this side.

Mm-hmm. The energy diffuse above iron Right. Is costs more energy than you get out of it. But what's interesting is fission acts the same way. you have uranium over here, right? And you can keep on doing fission on all these atoms until you finally get to iron. And then you actually have to put in more [01:56:00] energy to get fission

Jake the Bean: Oh.

Camwadam: Than you would get out of it. iron is this, the

Jake the Bean: zero point. Yeah. Yeah. It's

Camwadam: the trough for, for nuclear energy. that's why with planetary nebula, you get these, these different layers of ejected material, and that's on the right. That image from Sagittarius S two is believed to be a planetary nebula.

Okay. Okay. it wasn't something they were specifically looking for and it isn't for sure, but it looks like it's there.

Jake the Bean: Okay.

Camwadam: And I think that's it for our slideshows.

Jake the Bean: Alright.

Camwadam: We're done. Yeah. what are your thought?

Jake the Bean: Astronomy is so cool, dude. All those images, all the post-processing that they had to do to figure out just what lays beyond dude, that is just so [01:57:00] incredibly cool and it looks incredibly complex.

Camwadam: It is. one thing with scientific studies now, is there, there are no, it's there's no simple scientific studies left. Mm-hmm. There's no more looking through a telescope with a pencil.

Jake the Bean: Right. You know

Camwadam: it. It's you find these objects and then you need all this mathematical processing behind it.

you're using astrophysics, chemistry, and mathematics and computer science.

Jake the Bean: Right. Study of light. I don't know what that that is. But the study of light as well.

Camwadam: Right. and so it's like all scientific studies have become these collaborative processes where you need all these different people who have these different skills,

Jake the Bean: right.

Camwadam: To make it work.

Jake the Bean: Right. [01:58:00] Mr. Miyazaki, he's a immunologist, but he got a suggestion from, basically someone who studies cholesterol, huh? Yeah.

Camwadam: So I have enjoyed collaborating with you today.

Jake the Bean: Yeah,

Camwadam: dude. Thanks for watching us on Everybuddies podcast Today. We talked about,

Jake the Bean: our first thing was holy shoot, we went

Camwadam: through our comments.

Jake the Bean: Yeah.

Camwadam: We talked a little bit more about Nietzsche and the three hares

Jake the Bean: Yep.

Camwadam: Eternal return.

Jake the Bean: Yes.

Camwadam: we also talked about the green man and, how he fits into some biblical legends in mythology. we talked about

Jake the Bean: genotyping cats

Camwadam: and how cats come, well, where cats come from.

Yeah. And then, we looked at,

Jake the Bean: Oh, coyote

Camwadam: Ugly.

Jake the Bean: Oh, okay. Okay.

Camwadam: Bacteria GNA off their arm to get away from viruses. [01:59:00] And finally we ended with a discussion of the brick and Sagittarius S two within the CMZ.

Jake the Bean: Yeah.

Camwadam: And we are grateful to all of you for being with us today. I believe the ideal life is a nonstop process of learning and growing.

Thanks for learning and growing with us. Stay on your game and we'll see you next time on Everybuddies podcast.

Jake the Bean: Alright.

Camwadam: Good work. Yeah. Yeah,

Jake the Bean: dude, that was fun. That was Beastie. I

Camwadam: wonder how long that

was.