

Ichthyology with Dr. Chris Thacker

Ologies Podcast

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Heeeyyy, Ologites! It's yer Ol' Dad over here, Alie Ward. I'm not recording in my closet today. Can you believe it? I'm 16 floors up in a hotel in New York. It's midnight on a Friday night and I'm out here for work shooting this new show. If you listen to the very end of each episode, I usually tell a secret to the people who stick it out past the credits. So, you may have heard it last week; if not, more on that when they let me tell you, legally, or whatever. But, I'm excited about this episode wiggling its way into your consciousness. It's a good one. This ologist is... [*sighs*] Imagine when an Italian chef kisses his fingertips. She's so good. Also, if you hear any weird sirens or the people in the hotel room next to me coughing or doing other things, sorry.

So, fish. They're out there. They're underwater. They're deep in the sea or skimming the surface of lakes with fins. They've got fleshy lobe fins, sharp noses, sometimes blobby faces, and big teeth, and sucker mouths, and we really like them. Some people *love* them. And I like fish, but I love the people who love fish. I love them. I'm a creep for fish people; the way that their eyes light up when you talk about swim bladders, larval stages, and biodiversity. So, I was giddy as hell to talk face to face about fish.

But, while we're talking creeps, let's get to our intro segment, "Creeping Your Reviews," in which I thank you all for leaving reviews on iTunes. It really helps get Ologies up in the charts. Since launching this dream project in September, this podcast has pretty much hovered in the top 30 or 20 science podcasts on iTunes; which is a very big deal for me and my heart. Thank you for putting it there with your ratings, and reviews, and by subscribing, and telling a friend. It really matters. So, I'm going to read the reviews that really tickled me. I'm going to say RareCactus said:

Infotainment? Entercation? Whatever your favorite portmanteau is for the intersection of learning and laughing, Alie Ward lives in that space.

I thought, "Her use of 'portmanteaus' really moved me." Also, "portmanteau" is a portmanteau. Whatever. We'll talk about it sometime. I also want to thank Shen-Yun, who said:

This is the holy grail of podcasts...

Like, no pressure.

So much wisdom and knowledge to be gained with every episode. I've listened to over 400 different podcasts in a frantic, desperate search to find meaning and clarity in my daily life. This podcast delivered those goods in spades and now I finally feel better about my nightmarish existence and have the inner fortitude to do normal things like take out the trash. Thanks, Alie!

Thank *you* for that review because it's relatable. Sometimes you're like, "Ugh, I have to take out the trash during this nightmarish existence of life on planet Earth right now?" And, you did it. And I relate. High fives.

Thank you, real quick, to all the patrons who support via Patreon. You can kick in and keep the podcast going. As a thank you, your questions get asked to the ologists; just you guys. Thank you for that. You can support for as little as 25 cents an episode, which is crazy cheap. But, I like to be inclusive and if every listener actually pitched in that much, or a little more, man... WHOO! I would spend all the extra money probably on hot dogs and gold teeth. But, as it is, I appreciate all of the support so much. You guys are funding the podcast. Also, OlogiesMerch.com has incredible t-shirts with pithy sayings from the show. There are hats, pins, totes, mugs... all kinds of stuff. And proceeds go to keep this show up and running. So, get yourself something and feel like a good person, because you are one. So says Ol' Ward.

Okay, onto the episode. First, the etymology of ichthyology. Pretty straightforward: *ichthys* means fish in Greek. It also sounds like a cat sneezing. Like, [*softly*] ichthys! Do it. Do it right now. [*softly*] Ichthys! Right? Whatever. Okay, so this ologist let me into the bowels of a natural history museum, to the very basement where she walked me through - floor to ceiling - grey metal shelves filled with jars of fish suspended in these amber chunky liquids, past these articulated fish skeletons. Apparently, the collection in the museum is over 5 million specimens of just fish, which weigh a lot of pounds. So, they gotta put them on the bottom floor because they're so heavy. That's the thing with museums: what you see on display is the tiniest fraction of what they really have. So much is kept in the back in libraries and warehouses. It's like a catalog for research. So, we pulled up some chairs in this little library, and this ologist, honestly, she has the regal presence of Robin Wright, but she has the timing of a comedian and she has the obsessive fish knowledge of a savant and I just could not get over her. I couldn't get over her! I was like, "You're amazing." So, you'll learn about the touching relationship between a fish and a shrimp that I want to write a quiet indie movie about; why you should never name a species after yourself; what seafood you should not eat; the worst fish husbands; peeing in the ocean; embarrassing mating strategies of fish; where they got 5 million goddamn jars; and how you can save the planet. You. And me. So, we cover a lot of ground. And by ground, I mean ocean. So let's *dive in* with ichthyologist, Dr. Chris Thacker.

Alie Ward: So, you are an ichthyologist?

Dr. Chris Thacker: That's right, I study fish.

Alie: How often do people spell that wrong?

Chris: Pretty much every time. And it's very awkward to say, "Oh, there's two Hs in that," because that kind of doesn't make sense. People are like, "Two Hs? What? Ichthyo... what? What??" It's constantly misspelled. It's misspelled on my badge.

Alie: Is it really?

Chris: Yeah! It was on my old badge. The one I have now is fixed.

Alie: How long did it take you to notice?

Chris: I noticed it right away. I noticed it right away but it didn't bother me, it's so common.

Alie: How long have you been an ichthyologist?

Chris: [sighs]

Alie: Since birth?

Chris: Yeah, since ever.

Aside: Chris has worked at the Natural History Museum of LA County for almost 20 years. And she's been studying a specific group of little fishies for almost 25 years. That is a long-term relationship with fish.

Alie: How did you fall in with this gang of fish?

Chris: The fish that I work on are called gobies and they are a group of reef fishes and stream fishes. They're found all around the world. I fell into them completely by accident. I was fascinated with larval fish. I was fascinated with the tiny little larvae that are so complicated and yet tiny. I was living in Hawaii. I was working on a master's degree. I was studying a larval fish called schindleria.

Aside: Schindleria definitely sounds like a disease you'd pick up at a college party, but it's actually one of the smallest vertebrates in the world. So how itty bitty is this fish? Well, it only weighs about a tenth of a gram when it's fully grown. So, it's everywhere in the Pacific and Indian oceans. And, the common name for it is: stout infant fish. Which I feel is a really good insult if you're feeling fancy.

Alie: Okay, if they're so tiny, how do you even see them?

Chris: It's just like a clear little shimmer in the water. When I went out to catch them, I asked a guy who knew about these fish, what they looked like. And he said, "Go down in the water and look for this shimmer, like steam rising off a boiling pan."

Alie: That's how you find these things?

Chris: Yep. You go out there, you pull a net through that shimmer and you come up with schindleria. Or, you can go out at night and just pull plankton nets. So, I did a lot of night plankton work.

Alie: In Hawaii?

Chris: In Hawaii.

Alie: Did that not suck?

Chris: It was the best! Except for the time I almost hit a whale.

Alie: What happened?!

Chris: [laughs] It was nighttime, but there was a whale and her calf parked in this channel and I was trying to go out. When it's dark you don't really see the black shape of a whale in

the water. It's difficult. I did not hit the whale! Let me be clear. I did not hit the whale or the whale calf, but... It's a federal crime to touch a whale so...

Aside: Is it illegal to touch a whale? It appears to be an affirmative. It's illegal to feed or attempt to feed any species of marine mammal. Now, in some states, it's illegal to even approach whales within a few hundred meters. So essentially, operate as though all whales have restraining orders against you. It's not illegal, however, to look at pictures of them; and dream about them; and wonder if they're thinking of you, too. But, whales aren't fish. So, back to fish.

Alie: Were you always into fish?

Chris: I was and as I said, I was working on this fish called schindleria and it turned out, at the time, it was so weird it wasn't known what kind of fish it was. No one knew. There were some theories but it was like, "What is this weird thing?" And I was like, "Everything's fine as long as it's not a goby," because gobies are so complicated; there are so many; there's thousands of species; it's a huge group; they're all tiny. And when I finished my master's degree, that same year it was determined that it was a goby. So, I went away to grad school for a PhD. I ended up working on gobies the whole time and I'm still doing it.

Alie: So, you were like, "Please don't be a goby." And then it was a goby.

Chris: The universe was like, "Psych! You're going to work on the hardest group of fishes there is. Suck it up."

Alie: Maybe the world needed you. Fish needed you.

Chris: It's one of those things that was absolutely terrifying and turned out to be the best possible answer because gobies are so fascinating and variable. They do anything. Any evolutionary thing you want to study, a goby is doing it, pretty much.

Alie: Did you have fish growing up as pets?

Chris: I did! I think that's what started this madness. Because I remember when I was just a little kid, maybe five years old, just staring into a fish tank; we had some little rasboras or little darter fish in the tank and just staring at it and being sort of frightened. Because I couldn't understand how this little tiny thing could be alive and breathing water. I remember just tripping balls on the idea that there were animals that were breathing water. And, it was a fear that turned into a fascination. So, that's how it happened.

Alie: Did you study biology in high school as well?

Chris: I studied biology in high school, yes. I went away to college and I've always been very analytical. I love math, I love physics, chemistry. I was going to study chemistry, and I remember that I had taken natural history classes in college, and taken ichthyology, and I was into it, and I started learning about fish. And then when I decided to go to get a masters in Hawaii that the deal was pretty sealed. I sort of remember this as a college time conversion. But I recently had found my high school yearbook and there were people who signed my yearbook, "Good luck with the fish."

Alie: What?!

Chris: Yes! There were like three different people who had said, “Hope you have a good time learning about fish!” One said, “Enjoy it! I’m sure someday you’ll be ichthyologist to the stars!”

Alie: And here you are in Los Angeles, an ichthyologist! [*gasp!*]

Chris: I was like, “Goal achieved!”

Aside: I wanted to fact check and see if there were any celebrity ichthyologists, or fish people to the stars. And the closest competition I found were these two guys who run an aquarium business in Las Vegas and have a reality show. Which took me to a surreal clip of Tracy Morgan appreciating biodiversity [*clip of Tracy Morgan: “I love exotic animals and there are some people that don’t even know that these animals live with us here on our planet. It keeps me from watching TV. I like to watch the animals sometimes.”*]

Alie: Let’s back up and can you tell me what a fish is?

Chris: Okay, a fish is a vertebrate, which means it has a bony skeleton with a backbone. It’s a vertebrate that lives in the water. That’s about it, although, it obviously doesn’t include some water-living vertebrates like whales. Fishes breathe water; they don’t have lungs. The bony fishes are part of a clade called Actinopterygii. [*screechy back-up vinyl record sound*]

Aside: Okay, what was that word? Actinopterygii, which means ray-finned fishes. It kind of sounds like the first line of a camp song, like the sequel to John Jacob Jingleheimer Schmidt, right? Okay, back to it.

Chris: Which describes some characteristics like the way the fins are arranged, some details of the bones, but basically they’re a vertebrate animal in the water.

Alie: That’s not a whale.

Chris: That’s not a whale or a dolphin, right. Or a seal. Or a snake.

Alie: Right. Or a human being with a scuba.

Chris: [*laughs*] Exactly. You know what I mean.

Alie: Or your dog at the beach.

Chris: Exactly.

Alie: As soon as you have a backbone and are in the water, you become a fish.

Chris: I would like to think so.

Alie: So, going back to when you were a kid and you were marveling at the tank. This is such a basic question, but how do fish breathe?

Chris: That’s not a basic question. That’s complicated! So, they need oxygen, they’re like us. They need oxygen to run their cells. They absorb oxygen from the water, but that’s more

difficult than absorbing oxygen from the air. Although, remember our lungs are wet. We also absorb oxygen from water, it's just a thin scrim of water inside a lung.

Aside: Hey, heads up. You got moist as hell lungs. Now you know.

Chris: But fishes have a very frilly, complicated, blood-enriched gill. It's sort of filament that looks like feathers. You've seen them on an axolotl, right? Just inside the head. And the purpose of that is to have a lot of surface area exchange with water, and oxygen diffuses from the water into the blood.

Alie: So, then what is the deal with a fish bladder?

Chris: You mean a swim bladder. Fishes have swim bladders, not all but most of them. And those are for regulating buoyancy because remember fishes live in 3D. They move side to side, they move forward and back, but they also move up and down. Compared to fishes, we're just in flat land. We move just in a few directions, but fish are basically always flying...

Aside: Underwater. Never wearing pants. Flying without ever falling. I'm like, "Oh, I get it. Fish have the best lives. They have the best lives." They also have swim bladders, which fill with gas and floats them up and down, kind of like a functional whoopie cushion.

Chris: ...most of the time. There are also some types of fishes that can actually gulp air and put it into their swim bladders, but obviously that's not going to work for a fish that lives a hundred feet below the surface. So, there's two different kinds.

Alie: Do you have a favorite strata of fish, and I will have to look up again what the zones are, but in terms of ocean zones?

Aside: Quick rundown of ocean zones just in case you're ever at a bar trivia night and you need to impress your coworkers or your new significant other's siblings.

The ocean zones are roughly epipelagic at the top. These parts get sunlight, so plants grow there. The majority of ocean life lives in this zone. It goes down about 200 meters, or around 600 feet for us non-metric Americans. Below that are the mesopelagic, bathypelagic, abyssopelagic, and finally the very, very bottom which are the hadal zones. That's like the deep dark. There you go.

If anyone ever wins Jeopardy or a bet, you owe me exactly one American dollar, payable in coins if need be, for this information. You are welcome. Okay, so what is her favorite?

Chris: I am super basic. I like the near-shore stuff. I like the shallow water stuff. I like the coral reef stuff. I like the in-shore, up into the streams. I'm getting into river fishes more. And it's interesting because most of life on the planet is right around the air/water interface, right? Near coasts, close to the ocean, and right around there is most of the air or terrestrial life and bird life. If you start to get too high, there's nothing. Same thing when you start to get too deep, there's not as much. It's all right around that band is where most things are.

Alie: I've never really thought about that.

Chris: I just thought of that yesterday, isn't that cool?

Alie: That's crazy!

Chris: You know why I was thinking that? I was driving down the Pacific Coast Highway and I was looking at one thing I never tire of, which is the glint of the sunlight off the water. It looks like a skin, and I was thinking of the skin of the water and how it looks like a solid thing and how everything lives... you know, the closer to that the better.

Alie: Do you go to the ocean a lot, living in LA? Because I know that we're near downtown and I get to the ocean, like, once a year. Do you surf every morning?

Chris: No, no. I don't. Usually if I'm going into the ocean, I'm working.

Alie: What is a day like for you?

Chris: Right now, I'm just in the office, so some of it is lab work, some of it's spreadsheets, some of it's email, sometimes I have to photograph things. I've been writing a lot lately which is really nice. A lot of times I will travel to visit museum collections or to visit colleagues, and in that case I will go into someone else's collection and look at the jars of fish, and take fish out, and examine them, and look at them in certain ways. And if I'm in the field it's work, work, work, dive, dive, dive, fish, fish, fish.

Alie: I've never been diving but what does it feel like down there? Does it feel like freedom? Does it feel like cozy?

Chris: It feels like you're flying. It's cold, I'll say that, it's cold. And you have to wear a wetsuit, wear a dry suit, and be careful. But the thing that people often don't realize is that when you're in the water completely submerged for a long time, the water really sucks the heat out of your body, so you've got to be thermally insulated. That's why you often see divers wearing big suits.

Alie: Is it true that divers and surfers do pee in them?

Chris: I get asked this a lot.

Alie: I'm sorry.

Chris: No, it's okay. This is what I always say. I say it's like peeing in the shower. You can't honestly say that it never happens. I couldn't look you in the eye and swear to you that I've never done it, but I try to keep it to a minimum.

Alie: *[laughing]* I would do it. I mean, the fish are doing it.

Chris: The fish are doing it, yeah, but it doesn't get trapped in the fish's body. And when you're in the field, and you're in hell-and-gone New Guinea, and you're going to be there for a month, and you've got one or two wet suits, and you're wearing them every day...

Alie: You try not to.

Chris: You try not to.

Alie: Okay. Good to know. I appreciate the candor. That is a question that would have plagued me. I would have been driving home being like, "I wish I would have asked that." That makes me feel better. Okay. Saltwater fish, freshwater fish. I think we don't think about it until it comes time to have perhaps one as a pet, and you're like, "Oh, if you have a saltwater aquarium you are a millionaire."

Chris: It's like a whole different thing.

Alie: Yeah, versus if you have a bowl with a fish in it that costs a dollar. What is the difference in how they live and how they how they breathe and exist?

Chris: The difference has to do with what's called osmoregulation, which is the regulation of salt, basically, in your body and outside your body. So, the kidney pumps salt one way or the other. Freshwater fishes live in a situation where they've got too much salt relative to the freshwater around them. Saltwater fishes have less salt than the water around them. So they just have to be careful with their kidneys. Some of them go back and forth!

Alie: What?!

Chris: Oh, yeah! Well salmon, right? Salmon go up the river, they have their babies, they wash back down, they live some time in the ocean, they switch back. Lots of gobies do this, too.

Alie: Really? How do they do that?

Chris: They have badass kidneys, that's how.

Alie: Wow! You know, I never knew. I always thought once they got to a brackish zone they'd be like, "I'm outta here."

Chris: Some do.

Alie: I've seen salmon spawning in a stream and I've always wondered, clearly that makes them so vulnerable to predation. If you wanted sashimi, it's just like any of them. How screwed are they when they do that?

Chris: You've seen the bears just scooping them up, just watching them go by and grabbing them one by one. There's a lot of them, and some of them make it and some of them don't. But a lot of them make it. And also, the ones that do make it, they'll have hundreds and thousands of eggs. That's how fishes deal most of the time with the lottery of having children, is that they have a whole bunch and hope that some survive.

Alie: Right, they're like, "Byyyyyyyyyyyyy... Good luck. See ya. You're on your own."

Chris: "Have fun! Mokay, bye!"

Aside: See also the enormous Catholic broods on either side of my family lineage. So many. It's like, "Eh. Some of them will probably be fine."

Alie: When it comes to the little guys, you study a lot of little guys. You showed me some cool specimens. Is that also a numbers game? I mean, are they kind of lower on the food chain?

Chris: It's a value-laden term.

Alie: Sorry!

Chris: Yes! Yes they are. They're food for a lot of other things, it's true. And, there's a lot of them. The larger group that they're a part of is maybe 2,500 species and the total number of bony fishes is like 25,000. So, a little more. That's 10% of fishes right there.

Alie: How many fish species have been identified?

Chris: Like I said, 25,000-26,000 in that ballpark. There's more all the time. People are finding more all the time. And, there's more out there we don't know about. There may be 50,000 out there and we just haven't gotten them yet.

Alie: You just walked me through the collections. You have 5 million specimens here; in jars.

Chris: Yep.

Alie: Where do you get the jars?

Chris: Well you know, that's a very good question. If you're talking about a straight eight, a squat eight, you want a gallon, you want a big hinge one with a lid, that's different, different places. But General Bottle here in Los Angeles sells jars.

Aside: Okay, curiosity and procrastination got the better of me and I Googled, "General Bottle Supply." Why not? It's legit. Now, if you ever get lost in catalog of jars, whew! Short. Tall. Amber. Cobalt blue. Lidded. Narrow. Boy howdy, whew! Jar heaven. This will change at least one of your lives out there, I'm convinced.

Alie: Do you ever have to take donations? Like, "Hey, if anyone's got any big pickle jugs, drop 'em off?"

Chris: [*laughs*] That's exactly what we don't like to do only because the problem is not the jar; it's the lid. A glass jar is a glass jar. You've got to think about your closure. It's some serious collection management. Gotta get that lid nice and tight. You want it to have a nice liner. It's important.

Alie: Oh, or else you've got all kinds of evaporation happening?

Chris: Exactly!

Alie: Now, what happens when say, an oarfish washes up...

Aside: Side note: An oarfish is this long, long, loooooonng – like sometimes up to 11 meters or over 30 feet (that's like a three-story building) long – bony, snaky looking fish that lives in temperate or tropical waters. Now, when they're sick or dying, they tend to come up to the surface just to be like, "[*Alie gasping for breath*] It's the end!" So, they're at the surface and they've fueled all these old, piratey rumors of sea serpents. They also have these two long fins on their bellies which look kind of like canoe oars. Google Image search them and then tell me if you emitted a scream like Homer Simpson. [*Homer Simpson screaming in terror*]

Alie: ... and, it's a specimen that everyone is just crazy for. What do you do?

Chris: What happens is usually we get a phone call and they'll say, "There's this great fish, do you want to come get it? Do you want it?" We've had stuff wash up, you know, oarfish, sharks, various things. Sometimes fisherman will catch some weird thing, and they'll call us, and, we'll go get it! I have an Instagram account, @thackfish, that I post behind-the-scenes fishes stuff. And, one of the pictures on there is of us prepping the oarfish. So, a great big fish; we had to have a tank specially built; we fixed it and we put it up on display upstairs.

Alie: I love that fish.

Chris: It's a great fish!

Alie: I mean, I used to be a volunteer and I would get stationed there a lot.

Chris: Did you really?

Alie: Yeah.

Chris: You know how it has those long oars? Did you notice that one of them is broken and our collection manager had to plastic surgery fix it with a piece of a drinking straw?

Alie: *[laughing]* Nooooooo! I did not know that!

Chris: It was a little bit of mortuary body preparation for display.

Alie: I just heard that there's an ology for that. It's like cosmetology and thanatology combined.

Chris: Combined! There must be.

Alie: I forget what it's called, but I didn't know anyone did that for oarfish.

Aside: By the by, that ology is deserology and I just want to give props to Megan Rosenbloom of Death Salon for the heads up on that. Also, I used to volunteer at the museum talking to kids about this oarfish and I never ever noticed the drinking straw. But, after this interview at the museum, I went upstairs and I looked for it, and I saw it, and I loved it. So, a photo will be up on the Ologies Instagram because you gotta see this. You would never notice.

Man, I love that dead fish. This one time, a little girl looked at it, and then she looked at me and she asked, "Is it dead?" And I told her, "Yes, and it died naturally." And then she asked me, "Is the fish in heaven with my grandpa?" And I said, "Man, I hope so, because that sounds like a real party, little dude." I love the idea of her grandpa listening to disco, drinking a Seagram's and 7, just with a dead-ass sea serpent.

Alie: What's the craziest fish you've ever seen in real life?

Chris: Something called a hula fish.

Alie: What is it?

Chris: Okay, a hula fish is a small reef fish that lives in Australia and it is only found in Australia. I'd never heard of it; I'd never seen it. This was just a couple years ago. I've

been studying fish all this time, and, I'm down at the aquarium in Sydney and I saw this fish in a tank and I had *no idea* what it was! Like, *no idea*. That's a weird feeling given what I do. And I just stared, and stared, and stared, and it was like I was five again looking at this tank going, "How is this possible? What is this alien thing?" Yeah, hula fish. Freaky looking thing. And, it looks like nothing. It's got blue and white stripes, but it moves in a very sinuous way, like a hula dancer. Hence the name.

Aside: I saw a video and a hula fish does have moves.

Alie: Have you ever gotten to name a fish?

Chris: Oh, yeah. I've named several fish.

Alie: How do you do it? Where do you come up with it?

Chris: Let's see, one of them I named for the color. One of them I named for the locality. There's one that I'm naming right now that I just showed you, that I'm naming for the guy who worked on it: Midgely.

Alie: Do you get to name anything after yourself?

Chris: That's considered poor form.

Alie: Okay.

Chris: Yeah, that's considered poor form. I have three species after me by other people.

Alie: Oh my god! So, if you have a fish named after you, it's because someone else is like, "Ding! You deserve this." But, if you do it yourself...

Chris: If you do it yourself, you're a douche!

Alie: I never knew that!

Chris: [*laughing*]

Alie: Oh my god, that's so great!

Chris: If you really care about such things, you just make a deal with your buddy, but people don't even really do that. Again, that's pretty tacky.

Alie: I had no idea. Are there any that have been named recently where, you know, they'll name one after David Bowie?

Chris: I don't know, there's a genus of goby called Zappa.

Alie: Oh, really?

Chris: That's from a while ago.

Alie: I wonder, why did he get a...

Chris: Because they guy who studied him loved Frank Zappa.

Alie: Boom.

Chris: And, the awesome thing is that it's a mudskipper. Do you know what that is?

Alie: No.

Chris: It's this crazy amphibious fish. They have these googly eyes on top of their head that they can suck back down and these little water cups in their faces. They come out of the water. They live in the mud, they live on land most of the time. And just kind of *bloop, bloop, bloop* around, and they fight each other, and they have these crazy little fin displays and they're like, *this* big.

Alie: Just little guys?

Chris: They're tiny, yeah.

Alie: That's half the size of a candy bar.

Chris: They're itty-bitty and they're ferocious. *Ferocious!*

Alie: Do you have a favorite fish?

Chris: I have several favorite fish. Have you ever seen a wahoo? It's beautiful. A wahoo is kind of like a tuna. It's a great big silvery, pelagic fish and it's just spectacular. It looks like a torpedo.

Alie: Oooooooh!

Chris: It looks like a silvery torpedo. I really like mudskippers. I like shrimp gobies. Some of the shrimp gobies I work on are just beautiful. Very delicate, colorful fishes and they do all kinds of weird things.

Alie: What's their relationship with shrimp?

Chris: Shrimp gobies live with shrimp in burrows. The shrimp builds the burrow and the goby lives with the shrimp, so it's a symbiotic relationship; a mutualistic relationship. They help each other!

Alie: Oh my god! They're like Burt and Ernie!

Chris: They are! Gobies actually do this a lot. There are gobies that live in sponges and sea urchins and all kinds of different places. They're friendly. They like to participate in mutualisms. The goby is actually the watchdog. The shrimp is blind.

Alie: [*gasps!*]

Chris: Isn't this a great story? This is nature! This is evolution! This is our world we live in! This is the planet we live on, with these things, which just blows my mind. I think about fishes every day with that sort of tone. This is on our planet with us, are these creatures. So, shrimps and gobies. The shrimp is blind, the goby sits on the bottom and watches and is a guard dog. The little shrimp builds the burrow and takes care of the burrow, and, they are in touch with each other. They communicate via a tactile communication system, a touch system.

Alie: What?

Chris: The antennae of the shrimp are very long and the antennae of the shrimp, as the shrimp scrumples around and works, it keeps in contact with the goby's body. And the goby will flick its tail, or move, or start back and forth to let the shrimp know what's going on: if there's danger, if he can come out.

Alie: No! Way!

Chris: 100% true.

Alie: Have you guys been able to figure out what different flicks mean?

Chris: Well, not exactly, but you can see them if you watch them - which I have spent many, many hours doing - you'll see the goby, like, one hard flick is basically that there's danger. And oftentimes the goby and shrimp when they're sitting together, the goby will move a little bit and the shrimp will keep in touch but it's real gentle. Like, they'll almost kind of say, "Yeah, it's okay. It's okay. It's okay. It's okay." Little, gentle movements.

Alie: I just got goosebumps, like, full body goosebumps. That's crazy! That's bananas. Is that language?

Chris: Yeah!

Alie: Yeah, that's language.

Chris: Oh, yeah. For sure it's language, of course. They're communicating.

Alie: God, that's nuts.

Chris: They're rare in collections because they're very, very difficult to catch.

Alie: Are they just too quick?

Chris: They're *very* quick.

Alie: So then, do you have to have certain nets like you were saying? Plankton nets? Or set up traps?

Chris: That doesn't work, actually. You have to use a spear gun.

Alie: A spear gun?!

Chris: You have to use a spear gun. It's this crazy complicated way. You have to go down there with a spear gun, you fit the spear gun out with a blade or a pentadent, like, prongs. So, it's almost like a shovel. And the sand is very loose, and the goby is very fast and very good at its job. And what you do is you wait. You have to wait and let them calm down til the shrimp and goby are both out of the burrow and then you shoot the burrow. You shoot the burrow, the fish and shrimp run, and then you chase them and you catch them one by one.

Alie: Oh my god! So, you might be doing that all day.

Chris: Oh my gosh, yeah. It's very difficult.

Alie: I have the dumbest question.

Chris: Please!

Alie: Dinosaurs, right? We've got a meteor. Boom! Dinosaurs, goodbye. Fish? Underwater the whole time. So, they were just chillin' fine?

Chris: There were losses.

Alie: Okay.

Chris: But not to the extent that the terrestrial animals suffered in the Cretaceous Tertiary extinction. The meteor that killed the dinosaurs did affect fishes. In fact, it killed a lot of the bigger predatory fishes, the larger, sort of top-of-the-food-chain fishes. There was an event a lot earlier, the End-Permian extinction, that was much worse for oceans. It was just a different type of extinction, different causes. There were volcanoes, and sulphur, and climate change. The ocean got acidic and it was very bad. That's kind of what we're watching out for now because those things are very, very bad and it kills a lot of the ocean life.

Alie: Okay, so there's the End-Permian and then there's the K-T.

Chris: Yeah, exactly.

Alie: I didn't know the difference between them. Thank you very much for that. I'm sure people ask you this day in and day out. Do you eat fish?

Chris: Yes, I do eat fish. For fish I always recommend, and this is serious again, this is one of the things we gotta watch out for with the ocean. Don't eat most kinds of wild caught tuna. Do not eat orange roughy. For your convenience, you can go to SeafoodWatch.org, and the Monterey Bay Aquarium has a list. And, it's always changing, they're always updating it. But a lot of farmed fish is fine to eat. It's done responsibly, ecologically conscious. You can also check and see if the seafood that you're buying is MSC certified, Marine Stewardship Council.

Alie: Okay, I didn't know about that. What about fishes getting it on? There's some weird, weird behavior. Any that you tell people at cocktail parties?

Chris: Well, a lot of the gobies that I study are sex changers.

Alie: Whaaaaat?

Chris: Yes! Some of the ones that live off of our coast, they're all born as females and then the biggest one turns into a male.

Alie: [*gasp!*] No way.

Chris: He kind of runs the harem. And then if he dies, the next biggest female turns into a male. And there's ones that go the other way, too, that they're all male except for a big female.

Alie: How do they do that?

Chris: It's just like the freshwater/saltwater thing. They have a really good kidney. Male to female, they have a really flexible gonad and it just changes.

Alie: Do they have an X and Y chromosome?

Chris: They do. They have a system that's similar to ours, but remember, being female is the ground state. Being male is kind of like an extra little birth defect that gets hammered on there at the end. So, a female gonad turning into a male gonad is what happens to all human males.

Aside: Oh hey, misogynists? Booyah.

Chris: Right? You can switch it. Gonads come from the same tissues, you can switch them back and forth.

Alie: That's true. I forget that the biggest one... I wonder if they do it by will? Are they like, "Boop! Okay, here I go!"

Chris: Yeah. *[laughs]* They start to feel it... Boom!

Alie: Unbelievable! And you know, everyone always talks about the angler fish.

Chris: Yeah!

Alie: The male just kind of grows into the female. Is that a good one for cocktail parties?

Chris: The only problem is that people know that one now. That's kind of old news.

Aside: Okay, to sum up the lore of the anglerfish in a few seconds, here we go. A very unsightly but majestic deep-sea lady anglerfish has this glowing dingle-dangle on her head and a vicious underbite with these jagged-ass teeth. And the male is tiny. He can barely feed himself with his little baby mouth. So, he finds a lady anglerfish and he gnaws into her side, thus dissolving his lips and her flesh and fuses them into one. Then he just kind of feeds off nutrients in her blood, gets absorbed into her body, and then supplies her with sperm when she needs it. He's kind of like that sad guy at last call, but it's dark and you feel ugly. So you go with it. Forever.

Chris: I'm trying to think about what is a cool fish fact? I talk about mudskippers, which are crazy, that they're fish.

Alie: I read one story about how... Oh, god, now I can't remember. There's some fish who holds her eggs in her mouth?

Chris: Oh yeah! Cardinalfish! Cardinalfish do it. Jawfish do it. It's fantastic. Cichlids. Cichlid fish, which you might know from aquaria, will sometimes do it. It's just a way to keep the eggs safe.

Alie: And then sometimes I've heard that a male fish will trick a female fish into thinking there's food. She opens her mouth and then he just is like, "Surprise! Jizz surprise! I've fertilized your mouth!" Does that happen?

Chris: Yeah. Well, usually what happens is the eggs get fertilized right away either because she'll lay the eggs, he'll fertilize them, and then she'll scoop them up. Or she'll scoop them up and then he'll fertilize them in her mouth. You can picture that.

Alie: Right. Sure can.

Chris: It's biology. It's not bad. We don't judge.

Alie: But the main thing with fish is you've got to make a lot of babies and hope they survive.

Chris: Exactly. And the idea is that the lower the amount of care that you put into your babies, the more you've gotta have. So, if you're just going to blow them out to the wind like a seed or a fish egg into the water, you gotta have a bunch of them. If you're going to take care of them, you might have fewer, and a mouth brooder is just going to have a couple hundred, whereas a spawner, a broadcaster spawner, might have a couple thousand.

Alie: A broadcast spawner?

Chris: A broadcast spawner! Broadcasting to you! Yes.

Alie: Is that just like holding eggs out of a moving car?

Chris: [Pssshhhh!] It's like, you salt the fields, just everywhere!

Alie: Although sharks have those cool sacs.

Chris: Yeah, some sharks lay eggs like that and some actually have live young. And some fish have live young, too. They have a few live young, but it's rare.

Alie: And sharks *are* fish.

Chris: Sharks are fish.

Alie: Does that ever trip people up? I always feel like sharks are in their own category because they have such a different place in society than the rest of the fish.

Chris: Yeah. And they are different. They are a different evolutionary group than fishes, that's true. For most people, the general term fish, they just think it's a vertebrate animal that lives in the water. And they're maybe not even thinking vertebrate, but an animal like us with heads, and a back, and limbs, and eyes. So, yeah, sharks fall into that category in that case.

Alie: I have so many questions from listeners.

Chris: Oh, absolutely!

Alie: Can I rapid fire?

Chris: Please!

Alie: I'll just rapid fire. So, as quick as you can answer, great. Although sometimes I know these are complicated questions. Greg wants to know: How has climate change affected fish species and fish populations across the world? And, how are plastic and other pollution affecting fish biology and health?

Chris: Number one: fishes are moving. We will see things off the coast of California that we never used to see because they came from warmer waters to the south. So, fishes that can move are moving in response to climate change. What is plastic? Very, very bad. The number one thing that I would say to people when they say to me, "What can I do for the

planet and for the oceans?” is: watch it with your plastic. If you’re using plastic, fine, but recycle it. Don’t let it get into the ocean. Be careful what you let into the waterways.

Alie: I went to Hawaii and I got to go for a job, and I got to see...

Chris: Nice!

Alie: I know! I was mostly in hotels and in donut shops. It’s a weird job. But, I walked by the marina and it looked like a beautiful aquarium. And then a Doritos bag just floated by and I was like, “This is a picture of dystopia. What have we done?”

Chris: Plastic is very bad and it bugs me. It bugs me emotionally. It upsets me. So yes, please, please people, be careful with your plastic. Just recycle it! It’s not even that hard! Just recycle it. That’s all I ask.

Aside: Once again, recycle it. If you’re like, “Ugh, everything is bad. What do I do??” I feel you, I feel you. So, I looked it up. According to Greenpeace, here are some other ways you can cut down on plastics: You can carry a reusable bottle (we use a bunch of bottles all the time); you can say no to plastic straws, say no to disposable cutlery; you can avoid things with microbeads; and you can carry a shopping bag. Look at that... Boom. You’re already a better person. Better than you were fifteen seconds ago. We did it! We saved the planet! Yay!

I also asked Dr. Thacker in an email later, something I forgot to address. It’s regarding flesh-colored, rope-looking slime balls, which feed on decaying matter; which I hear is spectacularly gross to witness. So, has she ever seen a hagfish eating at a whale? She said, “I have never personally seen a hagfish eating a whale, but they do scavenge those carcasses down in the deep and it’s busy, mainly. They really go at it. Lots of hagfish flailing,” she says. Right now, there’s a bunch of hagfish having a whale picnic in the dark depths of the ocean. Is that crazy? And you’re just making a sandwich and there’s just a hagfish, being like, “[*singing*] This is my life!” Anyway.

Alie: Okay. Brian Edge wants to know: Have the populations of any species changed for the better since organizations like Monterey Bay Aquarium’s Seafood Watch have come around?

Chris: Absolutely, yes. Absolutely. And, one of the beautiful things about the ocean and working with fish, and thinking about fisheries and climate change, and even horrible, scary things like coral bleaching, is that if we take action, it will help. The problem will get better. Fisheries are rebounding that have been protected. So, it’s definitely worth it.

Alie: Is there a hope for coral reefs?

Chris: Yes!

Alie: Okay.

Chris: 100% yes.

Alie: Oh, good!

Chris: Yes. It is a failure of will. It's not that we don't know what to do. What we need to do is watch it with the carbon emissions. It's just that we don't have the will to do it. But if we were to take care and cut that down, we would see some recovery in the coral reefs. I have no doubt. You never hear about the ozone hole anymore, remember that?

Alie: Word, yeah. CFCs.

Chris: That's because CFCs got banned, and it helped, and boom. Problem solved.

Alie: Good to know. Actually, that gives me a lot of hope. Michael Satumbaga asks, and he's throwing some shade here: Why does some tilapia taste like mud while others don't?

Chris: It depends on what it's eating and how it's farmed. But yeah, he's right. And some catfish you taste, taste terrible. You want to go eat an alligator? You want to get yourself a farmed alligator. Don't eat a wild alligator because they just eat garbage and pig carcasses. It's yucky.

Alie: [*gags*] I didn't know that.

Chris: [*laughs*] Same problem with tilapia.

Alie: Do the farmed ones just eat cereal and stuff?

Chris: They do, yeah. And they have alligator spa days and they eat good food.

Alie: I'm sure!

Aside: I couldn't seem to find out what farmed alligators eat, but I did manage to find some southern swamp boat captain hopping out in a muscle tank top into the bog water and feeding alligators marshmallows out of his mouth and now I know that hell exists.

Alie: Jenna Kowalczyk says: This is a, 'I once heard it when I was twelve' thing, but can fish not feel pain? Or, do they just have short memories?

Chris: This is a common misconception, and the answer is: Of course they feel pain! You have to feel pain, otherwise when a predator starts running at you, you wouldn't feel it and you'd just get eaten. So yes, they do feel pain.

Alie: How are their memories?

Chris: Well, probably not that great. [*laughs*] But I mean, let's just not hurt fish!

Alie: Right! Don't make them feel pain.

Chris: Don't make them feel pain! Why do they need to feel pain?

Alie: What kind of brains do they have?

Chris: They have brains like ours but simpler. The same basic road map. The same basic nerves, same basic vertebrate brain.

Alie: So, they can feel pain. I'm sorry fish! Joe wants to know: There are some highly weird species in the deep ocean. Do you have a favorite one you like to bring up at parties?

I think I just asked you this. Sorry, Joe!

Chris: No, it's okay! The thing about deep sea fishes that's hilarious is that most of them are small.

Alie: Oh, really??

Chris: In fact, just yesterday I was looking at a beautiful fossil of something called a hatchetfish. There's one about the size of a silver dollar in our collection. It's got these beautiful little light organs and crazy teeth. Even your average anglerfish is not going to be any bigger than your fist, for the most part. And your toothy, dragonfish-looking thing, those might be the size of a hotdog, maybe six or seven inches long. Not that big, really not. Lots of them are smaller than that.

Alie: Zoe Teplick wants to know: Aquariums: Good or Bad? Do fish suffer the same impact of captivity as mammals? And is the benefit of studying fish in captivity worth the harm it can cause the fish?

Chris: It's true, fish can get bored. It's not as bad as a polar bear.

Alie: A polar bear in a studio apartment.

Chris: You feel sad, right, for the polar bear, or something like a wolf or something that requires a big territory. It's not quite that bad, but they don't like being in captivity, it's true. The bad thing about keeping fish in captivity, as far as I'm concerned, is the pet trade. I used to keep fish and then I stopped because I found out about the terrible practices in the pet trade.

Alie: What happens?

Chris: Guys will go out and dynamite fish. They'll cyanide fish. They'll just kill tons of fish just to get a few. Just to get a few! And then they'll get shipped across the ocean, and they'll be sick, and it's just awful. It's horrible. **Alie:** So, you dynamite and you kill a bunch and then whatever is alive you take?

Chris: Yeah.

Alie: That seems like a terrible idea.

Chris: It is, but it's cheap and it's quick. And the idea is that the percussion of the explosion can stun the fish and then the fish will float up and they just swoop them up. It's terrible.

Alie: That's not very nice.

Chris: That doesn't happen everywhere all the time but it does happen, especially for species that are in the pet trade.

Alie: What about aquariums that are sanctioned, like the Monterey Bay Aquarium? How do you feel about those?

Chris: You know what? I like them! And the reason is that fishes are so alien and the undersea world is so bizarre. I want people to be able to see it. I want people to look at those

rockfish, look them in the eye, you know? Think about the planet that we share in common.

Alie: So, for being ambassadors to the public?

Chris: Exactly.

Alie: But just a fish tank in your dentist's office?

Chris: A fish tank in your dentist's office... It's kind of like fish that you eat. There are fish that are farmed, that are bred for captivity as pets such as goldfishes, all those fancy goldfishes, and things like that. There's plenty of saltwater fishes that are bred in captivity and that's fine. Again, keep a fish, keep a pet. Look at it, appreciate it, understand it, learn about it. Just don't eat a wild-caught tuna and don't care for a dynamite-hunted fish.

Alie: [*sobbing*] I never knew that was a thing. That's so mean. Casey Handmer wants to know: Why do fish have SO MANY BONES? Also, why are salmon so amazing?

Chris: Fish do have a lot of bones! I suppose that's just what works for them. It's not a value judgement one way or the other.

Alie: They have to be flexible.

Chris: They gotta be flexible. They move in a lot of different directions. They have a lot of muscle motion going on. Like I said, they live in 3D, up/down, side-to-side, back and forward. And why are salmon so awesome? You know, salmon are very old.

Alie: Oh!

Chris: Salmon, salmoniformes, are an old group. There's a lot of cool things all around the world. And again, it's kind of amazing that something can go back and forth between fresh and saltwater.

Alie: He also wants to know: Why do some fish have two codominant mating strategies: the alpha and the sneak?

Chris: That is a complicated question. What he's talking about is, a male and female fish will mate and have babies. And the male, oftentimes, has to expend energy to do that. He's got to show off. Maybe he makes a little territory, he makes a little nest, he does a little fancy dance. And the lady says, "Oh! That's beautiful!" and then lays her eggs. If you are a sneaker male, you can get away with circumventing that. And what a sneaker male does is just jumps in and sprays the semen, fertilizes the eggs, and whips out of there.

Alie: What a fuckboy.

Chris: Right? Okay, this is the fuckboy of the animal kingdom.

Alie: [*laughing*]

Chris: No effort! He's just like, "You up? It's 2am." Bam. In and out. It's a strategy usually used by smaller males that can't do a territory or do the behavior. They don't want to spend the energy, but they'll sneak in and have a mating. It's no good. No good.

Alie: Jerks. Happens in a lot of species...

Chris: Uh-huh.

Alie: Mike Melchior wants to know: Do fish sleep?

Chris: They do.

Alie: They do?

Chris: They do. Sometimes parrot fish, you'll see them at the bottom at night, they wrap themselves in this bubble of mucous. *[laughs]*

Alie: Just tuckin' in!

Chris: It's nice and cozy and just lovely! And they doze off. I wonder if they dream!

Alie: They must, right?

Chris: They must! Some big pelagic fishes, obviously they don't go down to the bottom to sleep, but they'll doze off a little bit at a time. They'll sleep in little bursts.

Alie: I bet they have so many shark nightmares.

Chris: Aww, man, I wonder, right? I wonder what that must be like.

Alie: I know. Do you ever have to talk people down from shark phobias?

Chris: Sometimes, yeah. But most people are pretty reasonable about it.

Alie: I feel like the statistics are so slim.

Chris: Yeah, exactly. And at this point everyone knows that you're more likely to fall off a curb and break your neck than get eaten by a shark.

Alie: You can stay out of the water, I suppose? But nah.

Chris: Nah.

Alie: Elspeth Hay wants to know: What kinds of fish are the most ethical to keep as pets? I love my beta fish, but whenever I'm in a pet store and see all the betas in their tiny cups I feel sad and want to take them all home. Should I contribute to that market or should I get a different kind of fish next time? Are beta raised in captivity?

Chris: Excellent question. And thank you for being so responsible! Yeah, beta fish are raised in captivity. Go ahead and have as many as you like.

Alie: Okay! She also said: Why are octopi so freaking scary? And do you think they'll take over the world? That's a question for a teuthologist, right?

Chris: Get this! Okay, that is a very good question. Here is the reason that we are not living in servitude to our cephalopod overlords: Even the biggest, giant squid only lives for five years.

Alie: What!?

Chris: Yes! I just found this out. Squids, octopuses: they have very, very short life spans. They gotta go, they gotta grow up, they gotta mate, they gotta get it done because they're not hanging around. The minute I heard that, I thought holy shit, if one of those things ever figures out and lives to be a hundred, we're effed.

Alie: We're outta here!

Chris: It's over for us.

Alie: I feel like they'd be better at computer programming than us.

Chris: Oh, it wouldn't even be computer programming, it would be telepathic controlled everything.

Alie: Do you think they're aliens?

Chris: [sighs] I feel like I'm not qualified to make that assessment.

Alie: Okay.

Chris: It could be. It *could* be.

Alie: Craig Minami wants to know: How has farmed salmon, tilapia, and catfish affected the species? I feel like we kind of addressed that, right?

Chris: Yeah, farmed fish are fine. The species is fine. It's good.

Alie: Craig also wants to know: Has the discovery that Southern California is a nursery for great white sharks increased your research into their habits?

Chris: Not me personally, but plenty of people, yeah. Oh, yeah! This is a great place to be if you want to work on sharks. Like I said, we're getting fish up in Southern California that used to be found much farther to the south, including hammerhead sharks. The sharks will follow the seals. I mean, the big fishes follow the little fishes. They follow the prey items. So, if the seals move around, the sharks will go after them, the white sharks.

Alie: Dang. John Worster wants to know: When a fisherman catches a fish, the hook usually goes in the lip of the fish. Do the fish feel pain when that happens?

That's a yes.

Chris: Yeah.

Alie: He says: I don't go fish anymore, so the answer will not affect me at all.

Chris: [laughs] Again, thank you for these. These comments, I love because they're responsible. These people are trying to do the right thing. They're caring and I encourage this.

Alie: I do feel like people are sensitive to fish because people know that they are getting boned with climate change.

Chris: Yeah. Well, good! That's great! I encourage that. Well done, people.

Alie: Jessica Chamberlain has a personal question. She asked: Do fish ever bite people? Specifically, bass or other lake-dwelling fish? I'm trying to settle a bet. I'm positive a fish

bit me while we were swimming in White Water Lake in Wisconsin last summer but my husband disagrees.

Chris: It's definitely possible that a fish bit you.

Alie: Ohhh! Suck it!

Chris: It's definitely possible.

Alie: Oh, Jessica's husband, you have been proven wrong!

Chris: They'd have to be a little confused but maybe the water's muddy, a fish bumps into you, bites you. Yeah, it could happen. I mean, they don't usually, obviously, attack things bigger than themselves. They usually eat little insects but yeah, it's possible a fish could bite you. Sure. A fish could see your finger, something, take a little bite.

Alie: A little nibble.

Chris: A little nibble. No big deal, no thing.

Alie: Yeah, she got a fish kiss.

Chris: Exactly! You shouldn't be sad about it. Be happy.

Alie: Christa Trexler asked: Do seahorses actually mate for life and why do the males carry the babies? I'm basically wondering why are seahorses so cool?

Chris: Oh my gosh, there's so many reasons. What a great group of fish those are. They do not mate for life, they'll mate with many different females throughout their life. Why does the male carry the babies? You know, I'm actually not sure. They've got a pouch, they do carry them around. Usually something like that can be explained by the idea that the female can make more young because of it somehow. So maybe she has many clutches at a time. I'm sorry, that one you'll have to Google.

Alie: That's a great one.

Chris: Yeah, it's a good question.

Alie: I love that she's maybe outsourcing. You know what I mean?

Aside: Side note: I have long thought that fashionable, stay-at-home Dads wearing BabyBjörns, walking kiddos down the block to the cold-press juicery, while their Mom is out kicking ass should be called, colloquially, seahorses. What do you think? Like, "Melanie's husband is a total seahorse. He's the best." "Well, yeah. I quit my job at the tech firm and I'm just seahorsing for now, while Julie's at the oncology practice." Like, can we start that, please?

Alie: Billy Marino asked: Do fish develop emotional attachments to other fish, such as those they're related to, or even those they're in a school with? If so, how do those emotions manifest for us to study?

Like, do the goby and the shrimp, do they...

Chris: I feel like they would have to.

Alie: Right!?

Chris: But I think that there's no evidence of that. In fact, fish will protect their young if they know they're their young. But some fishes, the young have to exhibit a different coloration pattern or show a different behavior just so that the adult doesn't think they're an enemy or a prey item.

Alie: Oh, wow!

Chris: So, yeah. I don't know. I don't think so. I mean, fish do pair bond. They'll pair bond for sure. Like, two anemone fishes and an anemone. Those guys will pair bond. They must feel something. They can't just be dead inside! There must be something!

Alie: Exactly! I mean, they're cold-blooded but they're not cold-hearted!

Chris: That's it exactly, Alie! Perfectly put. *[laughs]*

Alie: I feel like if you pair bond, you can feel love.

Chris: You must be able to, otherwise why would you? Yeah.

Alie: Exactly! Okay. Well, we've settled that for science.

Chris: That's it. That's solidly scientifically settled.

Alie: I'm a doctor now. *[laughs]* Alicia R Scheevel asks: What's your favorite scary or weird fish? She loves, personally, the wolf eel.

Aside: Just for the visual, wolf eels are kind of this granite-colored, grey, long eel. Normal. But when it comes to the face, they have this angry countenance of Stadler and Waldorf, those two Muppets who sit in the balcony and judge everyone. They're great. Please look them up, and then tattoo one on your back.

Chris: Okay, first of all: great choice! My scariest fish is related to childhood imaginary trauma. I am terrified of stonefish. Stonefish are tropical, they live in the sand, they're camouflaged, they have big spines, and they're deadly venomous.

Alie: Whaaaat?

Chris: Yes. And I, for some reason, was terrified of stepping on a stonefish; which is kind of like being terrified of being eaten by a great white shark. That'll never...

Alie: It's not gonna happen.

Chris: When am ever going to get eaten?

Alie: Prolly never. Have you gotten over it?

Chris: Not really.

Alie: Oh no! What are their habitats?

Chris: In the Pacific reefs, mostly. So, I just be real careful when I'm walking around.

Alie: Do you wear little footsie booties?

Chris: Yeah, I wear little footsie booties if I'm walking but usually I'm swimming so I'm wearing fins.

Alie: Okay. Well, they probably can't stab you through a fin.

Chris: No.

Alie: Oh, fine!

Chris: Yeah, exactly. That's the thing! It's an irrational fear.

Alie: Stonefishes. Stonecoldfishes.

Chris: *[laughs]* That's it!

Alie: Erin Kelly says: I have a billion questions because I'm training at an aquarium.

Chris: Oh wow! Great! Thank you!

Alie: But she needs to know - NEEDS to know - about lumpfish. Why are they that color? I had never seen one until recently. She's fascinated. She said, specifically, the teal color, and why are they jelly-like? And why do they make good caviar? What is a lumpfish?

Chris: Oh, she's talking about...

Aside: Alright, so Erin's talking about a fish called *Cyclopterus lumpus*, which, come on. That name? That name wins. They're also called lumpsuckers, which is another A+ insult in a pinch when you can't swear. So, they must have healthy self-esteem to deal with the name, but can you imagine if our species was called a lump ape? How savage is that? Lumpfish are like, "Whatever." Anyway, they are lumpy, they suck things, the caviar is expensive, and not much is known about them. So, I hereby implore Erin Kelly, if you're listening, please become an ichthyologist and study them. No pressure.

Chris: She's talking about a deep-sea fish I don't know that much about, though. There's a lumpfish that lives off the coast here that's really cute and bright orange, which, in our kelp forest, that's kind of a camouflage color. But yeah, this one, lumpfish caviar, I'm not sure.

Alie: Oooh, I gotta look it up!

Chris: Yeah, look it up.

Alie: Do you have any advice for someone who is trying to be an ichthyologist? You gotta learn how to spell it.

Chris: Yeah, learn how to spell it, number one. Take a lot of biology classes, you know. Take as much organismal biology as you can, and get out into the ocean as much as you can, and swim, and learn to dive. If you want to be a professional marine biologist, learn how to dive. Get good at it.

Alie: I have never been diving but I have someone who's a listener who offered to take me diving.

Chris: It's amazing.

Alie: Okay, should I go?

Chris: Yeah, you should totally go. Yeah, oh yeah. It's amazing. But if you need to do it for work, you gotta really...

Alie: You gotta study up.

Chris: You gotta mean it. Yeah, yeah. You gotta study up. But it's wonderful. Definitely go diving.

Alie: EEEeee! What do you hate about your job? What are you like, "This part sucks!"?

Chris: [*laughing*] I have the easiest answer! Malaria!

Alie: [*laughing*] In a word... malaria.

Chris: Malaria! I got malaria in the field one time. It sucked. And in fact, I caught tropical malaria. It was the kind of malaria where you get infected and it can go in your liver and hide. And so, I didn't actually know I had malaria until ten months later.

Alie: What?

Chris: I'm, like, in my house, reading a book and all of a sudden I was spiking a 104 degree fever and shaking like I was having a seizure. Horrible! No idea what was going on. My husband spotted it right away and...

Alie: He did? Is he a scientist also?

Chris: Yeah, he travels. He's a marine biologist also. He studies snails. So, he travels with me. He was in the field with me. Yeah, we do all our fieldwork together. I went to the doctor and I tried to explain to them that I had malaria but I'm in Los Angeles. They thought I was crazy.

Alie: What did they think it was?

Chris: They thought I was nuts. They thought I had the flu, they thought maybe I had meningitis.

Alie: Oi!

Chris: And then, to diagnose malaria they have to take a blood sample while the parasite's active, while you're having the fever, while you're having the shaking, and that happened at night. I had to go to the emergency room. They didn't believe me. They were like, "You're insane." I said, "Please, please, please just take a blood sample." I finally got them to take the blood sample and then I just bounced because I was pissed. And the next day, early in the morning, phone rings. It's county health.

Alie: So, do they have to put you in a registry and stuff?

Chris: They wanted to know what the what. They wanted to know what I was doing turning up in Los Angeles with malaria. I said I was in New Guinea, but it was ten months ago, eleven months ago.

Alie: Did you get, just the shit bitten out of you when you were there?

Chris: Yeah. It's horrible. There's so much malaria in New Guinea, and I was taking anti-malarials, but I wasn't taking strong enough ones. There are some really strong ones that also tend to cause psychosis.

Alie: Whoops.

Chris: And yeah. You can't be being psychotic when you're diving. You'll get killed. You'll get killed or you'll kill someone else.

Alie: Oh my god! Oh, that's not a good pair.

Chris: So, I took a chance, rolled the dice. Lost! Ended up with malaria. There it is: worst thing about my job. Malaria.

Alie: How long were you out with malaria?

Chris: Once you take the meds it goes away right away. It's easy to treat.

Alie: You don't get to binge on a season of anything?

Chris: Oh my god, no.

Alie: All for the love of fish?

Chris: [*whispers*] Worth it! [*laughs*]

Alie: What do you love about your job? What's the best, best, best, best?

Chris: The best, best, best, best part – and there are so many, it is a great job – is just figuring these things out. I love learning about the fish. I love figuring out their evolution. I love figuring out how the evolution of fishes corresponds to the evolution of the planet through geologic time. I love the work I do popularizing science. I love doing *The Curiosity Show* on our YouTube channel. I love posting all the behind-the-scenes stuff on Instagram. I love the people I work with. It's a blast.

Alie: Where are you off to next?

Chris: Well, next I'm going to London, which is just for collections work and then in the fall I'll be going back to Australia to work on some of the Australian stream fishes that are there.

Alie: Oh my god. How long are you in Australia when you're working there?

Chris: Usually a month or two.

Alie: Do you come back with an accent?

Chris: No...no. [*laughs*] Let's see, what did I come back with? I came back with an appreciation for friands and meat pies and totally blasé about kangaroos.

Alie: What is blasé about them?

Chris: Whatever. There're so many. They're everywhere.

Alie: What's friand?

Chris: A friand is a kind of muffin. It's a little baked muffin, it's made out of almonds, it's really good.

Alie: Why don't we have them here?

Chris: [*indignant stuttering*]

Alie: Get on it!

Chris: Search me! Yeah, I don't know. Cooking show people: pick this up! Friands. They're so good.

Aside: You guys. You guys. Come on. Why aren't we all eating friands? They're derived from French financier cookies and they're almond meal and egg whites. But they're also kind of like a muffin and they come in raspberry and lemon and often times they're gluten-free in case you live on the West Coast where gluten is illegal. And bonus? I highly suggest you look up recipes on YouTube, because everyone making them has Australian accents, and they say things like, [*with Australian accent*] "This recipe is super easy to make, so give it a go." [*clip from Australian female hosting cooking show, "And if you haven't tried making friands before, we should give it a go because it's so simple to do."*]

Alie: Alright, that's my new mission. If I find myself at a donut shop somewhere, working, I'll ask for a friand. Which happens. And how can people find you?

Chris: Well I'm on our website, nhm.org. I do a little behind-the-scenes show called *The Curiosity Show*. I'm on Instagram and Twitter as Thackfish. And yeah, come visit the museum! Come look at our exhibits. Come look around. Take a behind-the-scenes tour. Maybe I'll show you our collection.

Alie: Oh my gosh! Yeah, seriously. If anyone has a love of fish, I took a tour at the NHM and ended up volunteering here and I can't tell you. It was a life-changer. So, if there's a museum nearby, sign up to volunteer. It's one of the best things I've ever done.

Chris: Oh, that's wonderful. Yes, I agree completely, absolutely. Come on down.

Alie: Totally changed my life. Thank you so much for doing this!

Chris: Oh, you're so welcome. My pleasure, my pleasure, a joy.

Alie: Yay, gobies!

How obsessed with her are you? Right? I'm like, fully. So, follow her on the platforms. Catch [The Curiosity Show](#) on YouTube. To follow Ologies, we're @ologies on [Instagram](#) and [Twitter](#). I'm @AlieWard on [Twitter](#) and [Instagram](#). You can join the [Ologies Facebook group](#) where we all talk about the episode, we share weird links and gross pictures. It's a wonderful group of folks. No one in there is a clotwad, which I love. To support *Ologies*, you can head to [OlogiesMerch.com](#), and get yourself an item or two. Or, you can make a donation if you want at [Patreon.com/Ologies](#). Also, honestly, just tweeting, instagramming, telling friends about the show helps it grow *so* much. It's crazy to me to see the numbers go up every month. Do spread the word.

Thank you, as always, to Steven Ray Morris for editing, Erin Talbert and Hannah Lipow for running the Ologies Facebook group, Shannon Feltus and Boni Dutch for running OlogiesMerch.com. Nick Thorburn wrote and performed the Ologies theme song. He's in a band called Islands. It's a very good band.

You stuck it out through the credits, thank you. Congratulations. So, here's my secret of the week. Right now, I have a blanket over my head because this room is really echoey. So, I've been recording this entire thing with just a full blanket over my head. And, I can hear the people in the room next to me. I think one of them has the flu because she's been coughing a lot and she stopped coughing. I don't know if she just straight-up died. I also don't know if they can hear me. But, I'm really nervous that they can. I'm also not wearing pants because I just forgot to pack pajamas, so, I'm just, no pants. So what. Also, I turn the heat up in hotels to, like, 80 degrees. I don't really know why I do it, it's just so cozy. But, I am sweating. Okay.

Thanks so much for listening. Remember, go out, ask smart people all the dumb questions you want. They love it. And, do join us next week where I will maybe be wearing pants. I'm not gonna make any guarantees. Berbye.

Transcribed by Amary Bliss Taylor.

Some potentially useful links:

[Tracy Morgan's appreciation of biodiversity](#) on Animal Planet's "Tanked"

[Actinopterygii](#)

[General Bottle Supply](#)

[Hula fish moves](#)

[Angler fish](#)

[Lumpfish](#)

[Hagfish](#)

[Desaiology](#)

[Shrimps and gobis](#)

[Mudskipper videos](#)

[Monterey Bay seafood watch](#)

[Great White sharks in Los Angeles](#)

[Friands on YouTube via Everyday Gourmet TV](#)

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