

Island Ecology with Dr. Andy Kraemer

Ologies Podcast

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Oh heey it's your sister's friend, who ate string cheese by just biting it and you think of her with disdain every time you eat a string cheese, Alie Ward, back with another episode of *Ologies*. It's June and here in the Northern Hemisphere, things are getting balmy. Short shorts are getting dusted off, mineral-based-coral-safe sunscreens are being applied, and days are getting longer. Partly because we may be stuck at a desk, counting down until we can be at a barbecue or on an island. So let's do an episode on islands! Okay? Great. We're already doing it.

Now, before we sail into the horizon, let's thank a few folks first, namely all the Patrons on Patreon.com/Ologies who contribute a dollar a month or more to submit questions. Thank you to all the folks who boost up the show by rating, and subscribing, and by telling friends and of course, by reviewing, which we all know I gingerly creep and choose a fresh one to read. Such as this one by CharlieCC4 who apparently describes me as:

... if Leslie Knope and Dr. Johnson homeschooled Anne of Green Gables until yesterday and then released her totally feral on an unsuspecting faculty lounge. Oh, and she was goth. And all of that was a compliment.

Those are facts and I appreciate them so much. Oh, and thank you Brian19577 for calling me, "The frosting on the pop tart of science," which I'm going to tattoo on my back, like a book blurb.

Okay, island ecology! Let's disembark, let's get into it. The word 'island' comes from some crackled and old proto-Germanic for 'thing on the water', but the Latin for island is *insula*. So if something is very insular, it's inaccessible, or cut off. Even 'insulation' comes from the root for island. Isn't that cool? Also *paene* in Latin means 'almost'. So a *paene-insula*, or peninsula is 'almost an island'! Thank you so much for still listening while we had that word nerd detour. Also, ecology comes from a root word for dwelling.

So island ecology, what dwells on these things in the water? This ologist was a chance meeting in the middle of the continent. I just happened to have a few hours free in Omaha on my recent Patreon-funded Midwest road trip to collect interviews. And via Twitter, I was headed to Creighton University to meet with Behavioral Ecologist Dr. Amy Worthington, to talk about crickets boning. As it turned out, also in the building was this ologist who studies how things live, and develop, and evolve on islands, and how Darwinian dramas play out on these tinier, insular stages. He is an adjunct assistant professor at Creighton University. He got his BA in Biology at University of St. Thomas, a PhD in Ecology and Evolutionary Biology from Iowa State University, and did postdoc work on Galápagos endemic snails.

So, before I headed off to North Dakota that day, I was able to sit down with him for 30 short, precious, minutes and ask him all about his research, in - where else? - the Galápagos Islands themselves, which he is still doing. We focus a lot on them as a model, and he explained to me how adaptations are different in smaller territories, how islands are impacted by invasive species, including hoomans. We talked about some pirate history, a weird disappearance of a baroness, goats throwing wrenches into things, giant animals, tiny animals, snails, volcanoes, goldilocks zones, and what we're doing to reestablish populations threatened by the advances of GPS, and ships, and planes, and... us. So brave some rocky waters and drop an anchor for Island Ecologist, Dr. Andy Kraemer.

Dr. Andy Kraemer: We're going to end up talking about islands and stuff.

Alie Ward: Okay, cool!

Andy: Because I can, and I think that the best advocates for what I study are the things I study.

Alie: So, you are an island ecologist. Does that mean you study how islands kind of keep a balance of everything?

Andy: In part. One thing that we find with a lot of island systems is that things are not in balance. So, they're just always kind of moving along at a breakneck pace and things are incredibly dynamic.

Alie: My mind is already blown because I thought, like, if you're an island and no one's come to futz with you, everything's perfect and don't touch it.

Andy: No, no, no. Everything is always in flux. So, I work in Galápagos, which is a volcanic archipelago. And because of that, there are eruptions on a regular basis. So places that look like really nice little habitats of the snails that I study, for example, you'd have a little nice system and you might go there and sample it, and then a year later it's covered in lava.

Alie: Oh my god!

Andy: So you always have to be ready for that change. And on top of it down there, the El Niño system hits it pretty heavily. And so there's incredible variation from year to year. Things are always moving around.

Alie: How long have you been studying islands?

Andy: So, let's see here... I finished my PhD in 2014, and then I moved on to the University of Idaho from Iowa State.

Alie: Okay, there are no islands in these places.

Andy: There are!

Alie: Oh, okay!

Andy: There are lots of islands, but not just the ocean archipelagos that I'm most interested in.

Aside: I stand corrected, I am humbled, I am a horse's rear end. [*child's voice: "Down here you big horse's ass."*]

Andy: So, I was Dr. Parent's first post doc and I got into that system then.

Alie: So there are islands in Idaho and Iowa? I'm such a doofus.

Andy: There are islands everywhere.

Alie: I didn't know that!

Andy: Think about it biologically. An island is a patch of habitat that is isolated from other similar patches of habitat. So you could think of a pond or a lake as an island of sorts. It's an island for the fish, right?

Alie: Oh my god, you're blowing my mind! It's like everything is in reverse.

Andy: Yeah.

Aside: Quick aside: real speedy! Let's define island, shall we? The dictionary says it means a piece of land surrounded by water, or a thing resembling an island, especially in being isolated or surrounded in some way. So yes, a lake can be an island. What? What?! This world is upside down. [*clip from Ghostbusters: Dr. Venkman: "Human sacrifice! Dogs and cats living together! Mass hysteria!"*]

I looked up what the largest islands on our planet, and Greenland, friends, is the chonkiest. Though it may be three land masses connected by an ice sheet, so... we'll see what happens there.

Now, we typically think of islands as a respite from other terrible human beings who will ask us to email them back or look at pictures of their children, but islands have also historically been used as a storage heap for prisoners. Take for example Rikers Island, Alcatraz, France had Devil's Island, or just Australia. The whole thing. Which, [*Alie attempts an Australian accent*] I'm sorry mates, [*"That was... NOT good."*] doesn't even count as an island because you're technically a continent. Sucks. But let's give it up for Aussies! Your ancestors knew how to have a good time. I'm sure some of you descended from a person who was exiled for mooning a magistrate or something and we love you for it.

Now what about tiny islands? I started to wonder, what is the tiniest island? And then I went down this kind of existential wormhole about whether or not a wee pile of sand in still water counts? If just one grain above the waterline was the littlest island on earth. How many microscopic islands exist right now? How many islands are being formed and destroyed right now? Luckily, Google saved me from a Willy Wonka tunnel of thoughts because according to the British government in 1861, an island is any dot of land that is either (a) inhabited, or (b) has enough grass for, "the summer's pasturage of at least one sheep." Very 1861.

For a long time, this tiny, jagged nubbin known Bishop Rock held the record as the smallest, and in the Middle Ages, guess who inhabited it? Yes, prisoners! Wardens would row them out, toss them a few loaves of bread and a bucket of fresh water and then just peace out and let them die there. Centuries later, it was home to a lighthouse, which had a pair of keepers handy to run the lights and warn ships of the rocky shore. But then lighthouses became automated in the '90s, so those folks were like, "I'm outta here!"

They got off the rock and another island then became the world's smallest. About the size of a tennis court, in a river in between New York and Ontario, you will find Just Enough Room Island. Yes, they went with the I Can't Believe It's Not Butter self-aware naming convention here and what you see is certainly what you get. There's a tiny house, one tree, and water lapping all around the foundation of Just Enough Room Island.

Just looking at photos makes me feel like I'm drowning. I could barely breath. It looks like the final gasp of a sinking ship. But it's been there for a few generations. Just Enough Room Island, the tiniest in the world. Look it up. Really! You will feel terrified.

Can you own an island? I don't know. I don't know your bank statement. I googled 'Can you buy an island or what?' and I shit -you-not, you can. Browse around PrivateIslandsOnline.com and you could call six acres of Nova Scotia Island with otters and deer all yours for \$400,000. Six acres! A Wisconsin private island with a house? Just over \$300,000, and it appears to come with a futon and a barbecue. A few islands in Belize were also priced fairly, but that may be all in the title. Deadman Key has been on the market for a

while. And I think I know why. Either way, you can buy an island for less than a condo in Los Angeles, which is inspiring *and* sad.

Anyway, in island ecology, something that is an ecosystem of its own, is like an island.

Andy: Biologically we think of patches of habitat as the important thing there with islands. And that's how we approach it with our work down in Galápagos.

Alie: And so do you study land islands surrounded by water more than water islands surrounded by land?

Andy: Absolutely. I'm a terrestrial person. [*Jiminy Cricket: "Certainly feels good to be back on dry land!"*] I can swim, but I'm not someone to go mucking about in the water collecting data points.

Alie: And where are you from originally?

Andy: Wisconsin.

Alie: There are a lot of lakes and islands up there.

Andy: Oh, absolutely. Yep. But I am from central Wisconsin, which is a bit more landlocked than the edges of the state. So I guess, there you go.

Alie: And when did you start wanting to study ecology, or biology, or biodiversity?

Andy: I think I fall into the camp of biologists that have the standard origin story. I always was out and about in the woods and it was just kind of, I guess, fated in some way. I was pre-med in college for a long time and then I realized I really didn't want to deal with colds all day long. And at the time, I thought that that would have been what a medical professional would deal with. And I wanted to be able to start on one topic, study it for a while and then do something else if I got bored. And I think being a scientist allows you a lot of freedom to move from topic to topic, if you really want to.

Aside: Lesson: don't be afraid to change course. If something feels like not the right thing, GTFO and do what you love because there are a lot of people who would not love it as much as you do! It's your life. Enjoy the snails.

Alie: And so you went to Idaho, and you did a post doc, and they were studying snails in the Galápagos. Had you ever been to the Galápagos before?

Andy: No, I had not. It was quite an experience. It's really special down there. When you think of Galápagos, you think of, like, blue footed boobies.

Aside: Let's allow Sir David Frederick Attenborough, historian and naturalist, to address these goofy, dancy boobies, shall we? [*David Attenborough: "Yes, well, I think they're called boobies, because in spite of what you are inferring, which is one meaning of the word boobie. Boobie also means something that is foolish. 'Don't be a big boobie!' Is also a perfectly respectful thing to say to somebody."*]

These legendary seafowl have beautiful, powder blue, webbed feet which they flash during very, very sexy courtship dancing. They have these sensual slow high kicks. They're kinda like ducks, a bit odd. And of course the Galápagos also has marine iguanas, equatorial penguins, sea lions, a whole menagerie of island critters.

Alie: And the finches and the tortoises.

Andy: Yes, and the finches, and the tortoises, and all the things that the tourists get to see. You often don't think about the fact that there's like 30,000 people in the Galápagos.

Alie: Are there?!

Andy: There are tons of people down there in some places. They are concentrated in the cities of course, but their effects are felt throughout the archipelago. To grow food for that many people, you need to open up some parts of it for agriculture. And so like on a couple of the islands, the humid zone, which is kind of the high elevation portion of the island, it's completely converted. It's not native habitat anymore. And so that was a real surprise for me going down there the first time. It's very different in some ways than what you would expect, at least in some of the parts.

Alie: How long have those 30,000 people lived there? How many people lived there when Darwin came ashore?

Andy: When Darwin came ashore there, I don't think there was anyone living there at the time, at all.

Aside: Historical side note: This was in the fall of 1835 with the arrival of the *HMS Beagle*. For more on Darwin's history and how his dad was kind of a dick but bankrolled his adventures, which lead to the Theory of Evolution, but also how Alfred Wallace got a little boned by fate, listen to the Evolutionary Biology episode, in which we also talk about birds.

But anyway, the Galápagos Islands means 'Islands of the Tortoises', because of its many species of absolute *unit* huge turtles, which means that Galápagos Tortoise means... Tortoise Tortoise! So the oldest artifacts on the Galápagos they've dated are pre-Inca. And then a Bishop of Panama stumbled upon the islands in the 1500s, letting Spain know, and then a bunch of surly pirates inhabited them inconsistently for a few centuries, until 1832. The new republic of Ecuador took them from the Spanish and tossed some convicts, some farmers, and a few artists out there, mere years before Charles Darwin came by to collect some specimens and come up with his theories that would enrage some deeply religious people for hundreds of years to come.

Andy: They were first colonized by people who really stayed there for their lives. I'd say a little over a hundred years ago. It hasn't been very long. The population really took off around 1970 or so.

Alie: And who are those people? Are they from Ecuador or are they from people who are like, [*snobby rich voice*] "I'm from Britain and I want to just retire here."?

Andy: You tend to have two groups, mostly those folks. Most of the people that live there are from mainland Ecuador. And Galápagos is part of Ecuador. It's one of the provinces. But then you have another set of people that have come from further afield. Expats from name-your-Western-country. People that come there from further away tend to be eccentric and, one could say, quite interesting backgrounds. [*"You're an odd duck, aren't you?"*] And the first inhabitants of Galápagos were actually Westerners from Europe. I think Belgian and French or something along those lines. Some of the first colonists were very weird people. There are some really strange stories.

Alie: Any names that I should google?

Andy: Well, in Floreana. Floreana was the first island that was colonized, and there was a family that settled there, and they're just really weird folks. There's this whole murder mystery story involved with that.

Aside: Okay yes, I got you. I will look this up. One of the first things that comes up when you google “La Baronessa Galápagos” is a highly-lauded 2013 documentary titled: *The Galápagos Affair: Satan Came to Eden*. [clip from *The Galápagos Affair*: “Fredrich and I have been made to look like a pair of eccentrics escaped some psychological zoo.”]

Now, I don’t know if I should spoil anything. I’m just going to give you a brief overview because you’ll be frustrated if I don’t. Okay, a German couple moves to Floreana. They love to be naked, and rip out their own teeth for health reasons, and they share one pair of metal dentures. Totally normal. Nothing to see here.

Another family moves in, the Wittmers, and they’re living off the land. But then a lady calling herself a Baroness moves to the island with her two lovers and a manservant, who may also be her lover, and this Baroness runs around with guns and terrorizes everyone. The naked couple and the other family do not like her much. Then she and a lover go missing in the night. Then the other lover flees, but ends up shipwrecked and dead on a nearby island.

Then the toothless nudes eat a rotting chicken, and one of them dies, but curses his wife on his deathbed, so the chicken may have actually been poisoned. The two remaining wives each write memoirs accusing the other of homicide. It’s just a bunch of white people on an island they shouldn’t be on, making a damn mess, which is colonialism in a nutshell.

Alie: What does this kind of foot traffic and this kind of colonization do to island ecology? If you’re doing research down there to see how the native flora and fauna are doing, I feel like that’s a little bit of a different reason to go, but what are people doing to the islands?

Andy: They’re throwing a wrench in it in some ways. They really are changing the ecosystems, and the dynamics of those places. It’s really hard to know exactly how. Research down there, in some ways, is straightforward, and in others is really difficult.

Aside: Andy said that there’s a lot of variation year to year because of El Niño weather systems and other Earthy hiccups. The wet season might be all over the place, months-wise. So given that unpredictability, it’s hard to directly correlate some ecological effects just to humans, buuuuut...

Andy: You can look at the islands where people are present and those that are not there, and you do see some pretty clear differences.

Alie: What are some of the differences?

Andy: Population sizes in a lot of them. I study the snails, these really cool land snails, lots of different colors.

Aside: I love how you can just hear him smiling, talking about snails!

Andy: They are arranged across the islands in a somewhat predictable way. The youngest islands, there aren’t that many yet. They haven’t gotten there. They haven’t diversified. On the oldest islands, there are relatively fewer species because those islands have worn down. They’re smaller and the diversity has been stripped away in some ways. But kind of the goldilocks zone of the islands, you see the most diversity. Unfortunately, that’s where the people are. [“*You’ve got quite a crowd out there.*”]

For example, on Santa Cruz that had the highest diversity of these snails – two dozen species, pretty cool – they have also exhibited the greatest population growth and the number of species there is way less than it used to be 40, 50 years ago. We just can’t find

them anymore. The problem is a lot of them were limited to the humid zone and because it's now mostly farming, their habitat is gone.

It's kind of weird though because, like I said, it's really hard to understand those dynamics of how people impact species. For example, the humid, agricultural zone doesn't cover the entire humid zone. The highest elevations are off limits. They haven't really been touched by people. They're just too steep and, I guess, not really fit for farming. The snails have disappeared from those places, too.

Alie: How come?

Andy: We don't know. We have no idea why.

Aside: So another murder mystery, but with snails.

Andy: And so there's just a big question. Like it seems like humans are at least in part responsible, but we just don't understand the system well enough. And I think that's the case for a lot of the Galápagos species that are changing around.

Alie: So what does your research look at? I mean, are you trying to figure out where did they go? When do they go? And what is influencing that?

Andy: Well, my research looks at those dynamics with a deeper lens on, not as much the human impacts, as the evolutionary dynamics of the species. And so people like the Grants have been working on the finches for years and they've learned a lot about adaptive radiation.

Aside: Quick refresher course: adaptive radiation sounds like getting comfy with nuclear waste, but adaptive radiation is actually an evolutionary biology term. It means organisms diversify pretty quickly from an ancestor species. So, taking on a bunch of new forms having adapted to different conditions, like a change in the environment, hello new volcanic land, or some new challenges. So think, Darwin's finches – which apparently aren't true finches! They're passerines! Why don't we talk about that more?!

Anyway, Darwin's "finches" succeeded in becoming adapted to each island's environment and food sources, as evidenced through specialized beak shapes. Some beaks are great at cracking nuts, others adapted to munch fruits. Drs. B. Rosemary and Peter Grant of Princeton have been living and researching on the Galápagos Islands for decades, and last year one of their studies revealed that a new species of bird can emerge after just two generations. So, islands: things can change quickly.

Andy: The more species you have at your disposal, the easier it is to understand the factors that are driving the patterns that we see. We have 70 species of snails, and so we have more power to ask those same questions in some ways. So, I look at mostly color evolution, because they're incredibly diverse in color. One of the things that is kind of neat about that is that you have some species that are, like, brilliant white, others are jet black, every shade of brown in between. And it doesn't really seem like there's a rhyme or reason for that on the surface, but we found that when you really dig into it, one of the things that is apparent is that there are predators that are, potentially, really important.

Aside: At this point, Andy pulled up a video on his laptop. It featured this spry, kinda long-legged brown and white bird thrashing an object to the ground with the intensity of drunk guy in a hair metal band destroying a hotel room in the 1980s.

Alie: That's amazing.

Andy: But this... I'm showing you right now a video of a Galápagos mockingbird predated a snail. What they do is they grab the snails by the aperture, the opening of the shell, and they find a really good rock, or a log, or root, and they just go to town on it, [*clip from A Christmas Story: the fight scene.*] until they break off the apex, or the very tip of the shell. And that's the only place where the body, the soft body of the snail is actually attached to the shell itself. So then they can flip it around, flick off the rest of the shell, and just gobble it down. I know, they're heartless. But these birds are really intelligent and they're very interesting. They follow you around all the time.

Alie: And what kind of bird is it again?

Andy: This is the Galápagos mockingbird.

Alie: A mockingbird. And so when you're there, how long are you staying there and taking footage, and taking samples, and collecting data points?

Andy: It's expensive in Galápagos, and the cost to stay down there is about the same as it is in The States, in some cases a little bit more, especially if you want to go to the uninhabited islands. Each trip is thousands of dollars. You have to charter a boat, and or a helicopter [*clip from Predator: "Get to ze choppa!!"*] if you're really lucky, and have a lot of resources, which I don't. So, it's expensive and so we try to make the most of the time we have. And so in total, typically it's just a couple or few weeks at a time.

Alie: And then how do you make certain that the work that you're doing is benefiting local communities, or Indigenous communities, and how do you incorporate local researchers?

Andy: Yup! We do. Galápagos is kind of a special case, because most of the local communities are directed towards tourism. That's where the money is in the area. But there's also a lot of researchers down there already and they have a pretty good system of scientists and local park rangers, that help coordinate those efforts with the tourist industry. One of the things that we do down there is we talk to some of the tourists down there. We organize with some of the tour guides and can walk through some of our own research. A lot of scientists do that sort of thing.

Aside: One of Andy's collaborators at the University of Idaho, Christine Parent, works with local schools teaching evolutionary and ecological ideas, involving and sharing their findings with the Galápagos community with bilingual guidebooks and workshops for Galápagos park rangers, which is awesome. More scientists should do this.

Now in the research community, there's also a term called 'parachute science'. I feel like I should touch on it. This would be a great topic for a whole episode, but essentially it means researchers just popping by a country or territory, taking samples, and then being like, "K, byyye," and sharing the science just with other academics and never acknowledging the communities they may have just learned from or disrupted.

So there's building awareness of avoiding this and I read a blog post called "The Dirty Truth: Starting a Conversation about Colonialism and Field Work" that said that a step toward correcting this is through Community Based Participatory Research (CBPR). So that means involving the community, working with local scientists, and acknowledging their contributions. Either way, this is a really fascinating and important topic and I would like to do it justice with someone who knows way more about the approach than I do in this aside, but it's something to be aware of and it's great that Andy's collaborators are getting the community so involved with their work.

Now, with a quarter-million visitors a year, Galápagos officials have to make sure there aren't any plants, or animals, or fungi, tagging along on shoes or boats. So they have these biosecurity protocols to protect against invasive species. They have to inspect every boat and turn away any that have non-native hitchhikers stuck to them. So far, scientists have detected five non-native marine species living in the island waters.

Well, until last week. Eeuugh. A fresh study just published in the *Journal of Aquatic Invasions* documented 53 non-native marine species living in coastal waters around the islands. They thought it was just 5. It's up to 53. And this includes things like mussels that bore into local corals. This is what they call, scientifically, a big "Oh No!"

Why is preserving the Galápagos so important? Why is so much research centered there? In essence, why is science so horny for these islands?

Alie: Why is the Galápagos such a, kind of, obviously a hotbed of interest in terms of research? I mean, I know that this is such a basic, stupid question, but why Galápagos?

Andy: No, no, it's awesome. The nice thing about islands, and especially work in Galápagos, is that you have these little, replicated, experimental studies of evolution. It's really hard to study the evolution of new species in real time. It can be done, but it is painstaking and some of the big macro evolutionary consequences of evolution, the evolution of a completely new structure, for example, it takes a lot of time. And so what we tried to do is we try to find places where the same tape has been played a few times.

Aside: By tapes, Andy means challenges, essentially.

Andy: We look to see whether it's happened the same way more than once, or if nature comes up with a new solution every time. And so Galápagos and other islands are really powerful in that way because you have the same closely-related species colonizing a new island. Then you let it run for a little amount of time, and then they colonize a new island, and you let it run for amount of time. And so you can actually look at the islands as snapshots of evolution through time.

Aside: I was going to list all the islands in order of age here, but y'all, there are 18 main islands and four islets, and they each have two different names. So I direct you to a site called Wikipedia.com, which has a tidy list along with the many species found on each island. I'll give two standouts:

Fernandina, aka Narborough Island, is the youngest. It's still being formed by lava. Whew! Fresh as hell. And there are hundreds of marine iguanas just kickin' it there on black lava rocks. They have flightless cormorants, Galápagos penguins, pelicans, sea lions and fur seals.

Side note: my friend Dr. Jason Goldman has a company called SciFari alongside *Ologies* Lepidopterologist, butterfly expert Phil Torres, and Jason told me that marine iguanas can shrink their skeletons when they're hungry and just need to reuse some of the minerals in them. They're the only vertebrate in the world that can do that! [*"I ate the bones!"*]

Now, the oldest island on the Galápagos is Española, or Hood Island. This is the southernmost one, and it has its own species of lava lizard, mockingbird, and Galápagos Tortoise. They have nesting, waved albatrosses, swallow-tailed gulls. They got some blue-footed boobies. They got Galápagos hawks, and *three* species of Darwin's "finches." Again, for the full list, please see the internet. [*dial up screeching*]

Andy: So the youngest island in Galápagos is 60,000 years old. It's the youngest snapshot. The oldest one is a little over 3 million years old, and then we have little slices through there.

And so we can then look at the trends and the patterns and see how those things change through time.

Alie: Do you think that the Galápagos shouldn't allow tourism or living there?

Andy: It's a difficult question. I mean, in the end, the ship has sailed.

Aside: [as if over an old phone] Specifically, the *HMS Beagle*. [ba-dum-TSH!]

Andy: You have people living there; they need to have a way to live. And a lot of the damage has already been done, in some ways. Some of the species of snails that we would love to study, they're gone. They're not coming back. Others are less certainly gone. We find populations squirreled away here and there, and that's always fun.

I think we need to think about, in conservation, what is important, what are our values and how do we want to organize them? People are going to be there. I think that you should be able to enjoy this amazing place. I've been able to, and I'm not selfish enough to think that only scientists should be allowed on those islands. That's not fair. And so you have to kind of make those decisions and then live with them, whatever those decisions are. But it's a really hard question. I don't have a good solution there.

Alie: Have you ever read *Galápagos* by Kurt Vonnegut?

Andy: No, but I've heard of it.

Alie: It's so good. You got to read it. Is there any book or movie about islands that always really stuck with you, or that maybe kind of like inspired you, or fostered a love of islands?

Andy: Well, it has to be *Jurassic Park*.

Alie: Yeah! That's a good one.

Andy: I always loved that idea that you could have... or think back to the original *Lost World*, right? [clip from *Jurassic Park: The Lost World*: "It's only a matter of time before this lost world is found and pillaged."] Sir Arthur Conan Doyle. That system is an island system. It was modeled after the sky island mountains, the tabletop mountains of South America. Those are real things. If you go there, you will find species on tops of those mountains that you won't find anywhere else. And so those are islands. I think that's a really neat idea, and the fact that you might have remarkable diversity hidden away somewhere; we just have to get there, and find it, and discover it, is... I don't know, it's really powerful as an idea for exploration.

Alie: Can I ask you some listener questions?

Andy: Sure.

Aside: Okay, now before we get to your Patreon questions, a few words from sponsors of the show. But before that, these sponsors make it possible to donate to a different charity of the ologist's choosing each episode, and this week Andy chose Island Conservation, which he says does really great work restoring island ecosystems. Island Conservation's mission is to prevent extinctions by removing invasive species from islands.

An additional donation was made to EcologyProject.org. Ecology Project International is a nonprofit, educational organization whose mission is to improve and inspire science education and conservation efforts worldwide through field-based student-scientist partnerships. They empower youth to take an active role in conservation. The majority of EPI students live adjacent to project sites, which is so cool that local students get to

participate in research. Now some words about some cool sponsors who make these donations possible.

[Ad Break]

Okay, back to your questions. This first one is about how, essentially, Galápagos turtles got so [low voice] honkin' and other species are so [high voice] teensy.

Alie: I'm going to ask a couple of questions from listeners. Anna Thompson wants to know: How is there both island gigantism and island dwarfism?

Andy: Ooh, that's a good one. I think it depends on the species, right? So you have some cases where it might be happening just kind of in a random manner. So with islands often come small population sizes and with small populations you end up with evolutionary drift, where things kind of start moving in one direction and then there's nothing stopping them. And you might not have as much selection against that sort of a change.

In other cases, there might be reasons for it. So, I think it really depends on the case. If you're a predator and your prey is getting larger to avoid being eaten, [*I've bitten off more than I can chew, ya know?*] If it's too big to fit in your mouth, then it might not be eaten. Then you have selection to become larger as well. So I think there is a mix of natural selective forces driving that change and, kind of, just random drift.

Alie: Just rando luck.

Andy: It happens.

Alie: Anna Thompson wants to know: Can an island ever be restored after humans introduced new animals to the ecosystem that devastate wild populations?

Andy: Yes! Galápagos is a fantastic example of that.

Aside: [*slowed down deep voice*] Yay some good news!

Andy: So, Karl Campbell and some of his colleagues down in Galápagos, a number of years ago, started the project... I think it was Project Galápagos.

Alie: I'll look into it.

Andy: Or Isabella? Anyway, yeah, you'll have to look that up.

Aside: Yes, it was called the Isabela project.

Andy: What they did was they started removing the goats that have been just eating Galápagos to death. Goats have been just eating the hell out of it, and it was a huge damage to the system, and it was a problem for the tortoises. They didn't have anything to eat. So Karl Campbell, some other scientists, and the park, went through and just, they just... killed them all.

Alie: Oh, shoot!

Andy: And it was a huge, huge undertaking in a few years. They ended up killing over 100,000 goats.

Alie: Oh my god.

Andy: There were tons of them. They said on some parts of the island, it actually stank if you were there. But anyway, since then, the systems have recovered quite a lot. So right now they're working on removing the rats, which are another problem.

Alie: Introduced, right?

Aside: No word on what to do about the humans.

Alie: What are some of the most extreme examples of isolation effects?

Andy: Let's see. Isolation effect. So, I think one of the things about islands is that the farther away you get from the continent, whatever the nearest continent is, the fewer species are able to get there.

Aside: This makes heaps of sense, of course. Organisms are like, "Uhhh, that island looks cool but it's soooo faaaaar." The costs, and risks, and potential benefits, must be weighed. Kinda like going to a friend of a friend's birthday party that's a 45-minute train ride away. Will there be food and someone to mate with? Ya never know 'til you get there.

Andy: And so this was one of the biggest first steps in understanding island biogeography or the collection of species that you find on islands. That's something that you see in Hawaii, right? Hawaii is about as far away from anything as you can get, and as a result, few species have gotten there. But those that have, once they get a foothold, then they have a world open to them. And in the intervening time, they've evolved into all kinds of interesting species. You see that with these snails, you see it with Darwin's finches. In Hawaii there are some really cool insects. Some spiders have really diversified the silverswords, which are a group of plants that have diversified into, just, all kinds of different habitats.

Aside: I looked up Silver Swords, and they are one-handed weapons found in *The Elder Scrolls V: Skyrim*. I don't know what that means. But apart from nerd stabbies, silverswords are also plants endemic to Hawaii, and they are really well adapted to low-nutrient soils, aka buster soils, so they can hang out in rocky lava flows, bogs, and open forest like no big deal, which is pretty badass.

Andy: And so you see that one ancestor ends up playing lots of different roles long into the future. They evolve into just tons of different species. You see that a lot in the really isolated archipelagos that are around for a long period of time. Madagascar is another example of that. It's been its own thing forever. And so that's why you have lemurs there. There are tons of species. They're *still* finding new species of lemurs.

Alie: Oh lemurs! I love a lemur.

Andy: India was like that too, right? For a long period of time, it was on its own. And so if you go to India and compare it to other parts of Asia that are nearby, they are just completely different faunas because of that history.

Alie: If you were to wash up on an island, what would you take with you?

Andy: I think for irony, I would probably want to bring *Treasure Island* as a book. I don't know. I'm a pragmatist, so I try to think of all the things that would help me survive.

Alie: You could bring one thing to an island.

Andy: Oh, margarita mix and tequila.

Aside: Okay that's two things, but in this case, I'd let him mix them together before so it's one thing.

Alie: What's the worst thing about your job or about islands?

Andy: The worst thing is that I'm not able to get down there as much as I want to. I mean, some of the things that keep me from going down there more often, are not really bad things, right? Like, I've got a daughter that I hate spending that much time away from her, so I try to limit

my time out in the field that way. It's kind of nice to be home, too. There's a kind of some give and take there. But otherwise, things I hate, I don't know. That's what I don't love doing, answering that type of question.

Alie: I always ask the thing that you hate and the thing that you love the most.

Aside: Now you may remember from Behavioral Ecology, aka the cricket sex episode, Dr. Amy Worthington who, a little hot gossip, is also Andy's wife! WHUT!

Alie: Dr. Worthington said, "Dead cricket smell."

Andy: Oh. I don't have to worry about that. Oh, dead snail smell is the worst. The dead snail smells. Oh, that's bad.

Alie: I trust you. What do you love the most about islands or about what you do?

Andy: Oh, what I love most about what I do, is being able to move on to a new question when I want to. And with islands there are always new questions. The thing that we are working on right now is, we're actually kind of getting away from the islands and we're looking at the continent. We're trying to find the closest living relatives of those snails on the mainland. We get to road trip around Ecuador, and in a couple of weeks I'll be going down to Peru and we'll be running around there looking for more snails in the desert valleys. And here's hoping we find some cousins.

Alie: Pile in! Snail trip!

Andy: Oh it's fantastic. Except when you get stuck. That's the worst.

Alie: In mud? Ooh, see. There's something you hate.

Andy: Okay. That's true. The isolation of the fieldwork sometimes leads to some harrowing drives.

Alie: Oh god, I bet. I bet there's definitely not, like, Quickie Marts along the way.

Andy: No.

Alie: No, no, no. Okay. Thank you so much for doing this.

Andy: Oh, thank you, Alie. This was a lot of fun.

Alie: Oh good!

Andy: I did not expect to have an interview today when I got up.

Alie: I know! Well, thank you so much for doing this. This was great.

Andy: Thank you.

Alie: Yay, Nebraska!

So tap on the shoulder of a nearby ologist and ask a smart person a stupid question because old land is crumbling, new land is being burped up from lava all the time, nothing is permanent. What do you have to lose?

You can follow Andy on Twitter [@AndyKraemer](#). There's a link in the show notes and it's up at [AlieWard.com/Ologies/IslandEcology](#). *Ologies* is @Ologies on [Twitter](#) and [Instagram](#), you can say hello there. I'm @AlieWard on [Twitter](#) and [Instagram](#).

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If you post a photo to Instagram tagged with #OlogiesMerch, I repost you on Mondays. Thank you, Shannon Feltus and Boni Dutch for helping manage that. They are two sisters who have a brand new, wonderfully fun podcast called *You Are That*, and it's out now wherever you get podcasts. Their first episodes dropped June 10th, so show them some love and subscribe. They are witty, amazing ear candy. I love them.

Assistant editing was done by Jarrett Sleeper of Mindjam Media and of the mental health podcast *My Good Bad Brain*. Thank you to Steven Ray Morris of *The Purrrrcast* and *See Jurassic Right* for being an island on the storm and helping assemble the show each and every week. I'd be just lost at sea without you.

And if you stay until the end of the episode, you know I tell you a secret, and this week's secret is... I guess just more of a pro-tip. But I recently moved and instead of cardboard boxes that you have to tape up and then throw away, I rented these bins made out of recycled plastic. The company delivered them and then I get to keep them for two weeks. So I have time to unpack them but it's also *making* me unpack them because there is a deadline. And then the company will come back and pick them up. And you can stack them four on top of the others on a dolly, so they were fast to move, easy to reopen if you want to toss more in one. Anyway: 10/10, would move with again.

I used the company Leafy, but PiggyBoxes is another one. You can just google plastic moving boxes or moving bins. Not having to tape up box bottoms and then hope they didn't fall apart saved so much time and so much stress. So, pro tip from old DadWard. Also, *my* DadWard advised numbering the boxes and keeping a master list of what's in each numbered box, and I totally did not do that, and I should have. So there's some good advice from GrandadWard VonPodcast.

Okay, if you go to an island and you're not from that island, please try to respect the inhabitants and the culture, and use as little single-use plastic as possible, and don't litter, and make sure your sunscreen is beach safe. Okay, it's almost summer. Yay. Berbye.

Transcribed by Kelli Brockington

Final touches by Kaydee Coast, who reminds you to check your cervices, don't lick toads, milk your thumbs, and never apologize for asking stupid questions. Kthxbi.

Some links which may be of use:

Donations went to: islandconservation.org and ecologyproject.org

[Andrew Kraemer CV](#)

[I guess buy an island?](#)

[Chucky D \(Charles Darwin\) sets sail for the Galapagos](#)

[Some dark history of the Galapagos](#)

[The Galapagos Affair: Satan Came to Eden](#)

[Smithsonian footage of Galapagos folks](#)

[Wittmer Lodge: not the best place to stay](#)

[Bishop Island](#)

[Just Enough Room island](#)

[Boobies cheat on each other??](#)

[Adaptive radiation](#)

[New bird species in two generations?!](#)

[Deadman Caye, sounds quaint!](#)

[6 acres in Nova Scotia with deer and otters, FYI](#)

[Invasive Galapagos critters](#)

[Australian convicts: most petty theft](#)

[Another kind of silversword](#)

[Late the bones](#)

[Shrinking iguanas](#)

[Prison islands](#)

[All of the Galapagos Islands in a lit via Wikipedia](#)

[Christine Parent's CAREER grant](#)

[More than 50 non-native aquatic species in the Galapagos waters](#)

[Moving boxes!](#)

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