Who Run the World? Ants! With Aaron Fairweather

Nerdin' About Podcast Transcript, Season 3 Episode 8

Michael
Hey, everyone welcome to Nerdin About, I'm Space Michael. With me as always, is someone who if she was starring in her own rat version of Don't Look Up, I think she'd be played by Kristen Bell, and that is Dr. Kaylee Byers.

Kaylee
Thank you. I think I'm flattered. I don't know if I should fully be... I think I'm flattered.

Michael
I love Kristen Bell, just so you know.

Kaylee
Yeah, she'd make a good rat. She's kind of all over the place. That makes sense for me. That's really good characterization. Who do you think would play you? I suppose you would be a planet in the movie, you would be the thing crashing into Earth.

Michael
Exactly. Well, I was thinking about it because in the last podcast, I did say that it was everyone's homework to watch Don't Look Up. That is close to my field, so I guess for all science communicators, you can think about what would happen to your job if something catastrophic was associated with it. What would happen if rats became sentient, and started taking over cities, and then all of a sudden you were the go-to-person that everyone was like, "Kaylee, what is going on with these rats? How would you deal with it?"

Kaylee
Oh, I see what you're saying. Kristen Bell isn't a rat. Kristen Bell is playing me in the rats take over the world movie. Okay. I'm on board now. Well, you know what? I like that you're thinking about that. I don't know if rats would take over the world, but you know, what might? Ants! Today we are going to be joined by Aaron Fairweather, who is a PhD candidate and lecturer at the University of Guelph where they investigate ants' role in agricultural systems. They're also active in LGBTQ2SIA+ issues working to support the community in friendly spaces. Hi, Aaron, how are you?

Aaron
Hello, I'm doing good. Thank you for having me.

Michael
So, Aaron, who would play you in the movie if ants were taking over the world in the Don't Look Up version?

Aaron
I don't know honestly.

Michael
Kristen Bell probably! Well, let's talk about ants, because of course they could take over the world. I've had encounters with ants invading my apartment, I've seen them everywhere. Let's talk about you. Where did your fascination with ants come from? How did you start to love these tiny little creatures?

Aaron
Honestly, I kind of fell into it. I've always been passionate about insects. In general, I was always the kid on the playground, hands on my knees and looking at an anthill or looking at the next bug walking around. People always thought it was weird. I loved just talking about them and sharing about them and learning as much as I could. I even had little journals when I was a kid, drawing them and writing about them. I really nerded out about insects growing up. So, I just kind of learned generally all I could about insects. When I got into high school, I started working at the local museum. There was a huge knowledge gap in the local area with regards to ants. It was this perfect storm at the same time, there was a course nearby in taxonomy and diversity in ecology. So, the curator was like, we're just going to send you on this, you're going to become an expert, and you're going to start doing this and I was like, okay, I'm happy to learn anything I can about insects. I just fell in love with them. I thought it was really cool crossover between complex behaviors that usually associated with large mammals or things with bigger brains, but with these small tiny organisms. I've just been passionate about them ever since.

Kaylee
I'm sorry, I can't believe you kept a lab notebook at such an early age. (Laughs) Was it more thorough than a lab notebook you would keep now would be?

Aaron
Yeah, exactly. So, I have multiple iterations and gross of lab notebooks from when I was like a child. So, my earliest one was legitimately when I was two years old. I had a little notebook that I would go to and color caterpillars that I saw with lines with different colorations. Then my parents let me keep them in the house and we watched them grow up into butterflies and stuff like that. Then as I got into elementary school, it started to be like, what are their common names? Middle school was like, now I know what their common names are, let's learn a little bit more about them. Let's learn about animals in general, and how they relate, and it has come to become a little bit more general. Then when I graduated from middle school, I went to the local bookstore, and my parents were like, “you can pick out any book that you want for graduating”. I found the most expensive insect textbook I could find. It was legitimately the insect textbook that I was learning from in third year university later on. So, I read that probably four or five times when I was in High School. That was the point where I was taking photos of insects, I was documenting all of the structures, and I was drawing them out in a little bit more detail. Then I was taking notes about location, time of day, the temperature, humidity, and anything else that I

could note about where they were and what they were doing. So, when it got to the museum, and then I started taking entomology courses, and they're like, oh, you need location, and who caught it, and that's pretty much it for when you first collect it. I was like, but I have this template of all these notes I can be taking about these things.

Kaylee
I love that so much. I wonder if all the people around you were like, “I wonder what they're going to be when they grow up?”

Aaron
Immediately, everybody knew me as the bug kid. I would walk into class and everybody's like, "Oh, bug kid, what's this?"

Michael
So, in the Hitchcock version of The Birds, birds took over the world. Lots of people talk about ants, perhaps being the dominant species in the world. Are they actually all connected? What is this thing when we talk about ants potentially being the dominant species in the world? Are they really? What's going on there?

Aaron
I mean, I would certainly argue, yes, like, there's just such a huge layer to ants in ecosystems, and just like every terrestrial ecosystem, except Antarctica, but like, everywhere you go. Ants are building bigger cities than we could ever imagine. There was a tweet going around a while ago, of a big aluminum excavation, so they poured aluminum into this leaf cutter nest. They spent the next year excavating this thing out, and it spanned about a kilometer in width, and then in depth a couple of stories, it was huge. The nest itself was made up of at least 10 million ants or something like that. That's one nest from an individual of this species that is hugely widespread all across South America. Those giant subterranean cities exist everywhere on the planet, like you go into your front lawn, and the most common ant, at least for where I am in Ontario, is this species called *Lasius neoniger*. There are dozens of nests on every front lawn, and there the same thing. One single nest can span probably about seven meters in width, and maybe like two meters in depth. We were excavating live colonies during part of my research, and they can be absolutely massive, and they're just everywhere.

Kaylee
Sorry? To excavate one of these, you pour in some stuff, and then you start picking away at it? Is that what happens?

Aaron
Yeah, it's the same kind of idea in archaeology where you're slowly excavating out some bigger city that's old and then they swath away in the sand, you would slowly pick away at it in the same kind of way. It's really just excavating an old city.

Kaylee
That's super cool. I certainly didn't learn anything like that when I learned about ants in school, I think one of the things that we do tend to learn is about their social structures. That tends to be something that comes up. But for folks who may have forgotten, what does their social structure look like?

Aaron
Yeah, they're eusocial, so the social structure of these ants can vary a little bit, there's different forms of how they communicate and how they organize. The most common thing that we know is that there's a single queen, which is monogyne. Then you have a whole bunch of workers from various different castes, or different sub types of workers, that helped her kind of create a bigger city and protect her because she is the reproductive unit. So, she is laying all the eggs and supplying all the bodies for this bigger city. There are multiple different types of polygyne, where you have multiple queens in cohesion with one another. You can have multiple colonies that are actually in conjunction with one another. These are sometimes referred to as super colonies. These are genetically related queens that have their own colony, but they cooperate with one another, and those can sometimes span countries.

Kaylee
What!?

Aaron
Yeah. There is one super colony that's known from the US and I think it spans over half of the continent now, it's the yellow crazy ants, or the Argentine ant, and they're cooperating with one another. They're defined by the fact that they won't compete with one another for resources. They always share resources, and they extirpate other species from the area, if they're ever in contact with something they don't like.

Kaylee
This is wild. I have a couple of questions. What does eusocial mean?

Aaron
Eusocial is a couple of steps. You have a queen or a single reproductive unit that is helping for the care of a colony of multiple generations. So, you have overlapping generations. Then it's cooperation. So, they are fending for food together, and looking after young together and cooperating in that way.

Kaylee
Amazing. So, you've talked about building cities, and now you've talked about all this cooperation. How do these ants communicate with each other? How is it that they're able to collaborate? You sometimes see them, following each other in a little line. Like, how does all this happen? Is it magic?

Aaron
It's hugely complicated. It seems like magic because it's invisible, right? We can't see these trails that they're following. They just kind of know how to do it. But mostly, it's through chemical signals, these things called pheromones. They lay them down when they're walking, it's like putting their own smell onto the ground, and then the rest of their sisters can smell that smell and know where to go or what to do. They use multiple different kinds of these smells to dictate what exactly they're doing. So, it can be identification of who you're talking to, it can be identification of different roles in the nest, it can be identification of a trail, like this is where we go to find food, sometimes it can even be an alarm pheromone, so marking something else as an enemy. These are all different kinds of words that they're putting onto the ground in chemical form. That's one of the ways that they communicate. But that can be difficult in environments that either gets washed away really quickly, or moving gravel, like sand. You can't leave something that stays very permanently in those cases. In other situations, you sometimes have a vocal communication, they can make different sounds. There's a really cool example of that getting discovered. There's this genera of ants in the southern tropics called Paraponera. They're these massive ants, and the most well-known member of that group is the bullet ant that is the strongest thing in the world. The differentiation between the species in this group was wildly just visual, based on morphological characters, what they looked like. There is this one big group of species that was known from all across North America and it was weird because typically in South America, there's a lot of separate specific areas that different species occupy because of how diverse it is. So, we started looking at it more specifically and more closely, and scientists, I think it was in the 2010s, got really close to a colony recording it with their phone. They noticed that when they listened back to the audio, they could hear these squeaks coming from the colony, and they're like, what is that and they amplified, and it sounded like the ants were squeaking. So, they went to a bunch of different colonies all across the continent, and they found out that there's actually dozens of species within this one large group, we used to call a species, and they can all be separated by the different sound that they make. They have very specific striations on their gaster, or their abdomen, and they can move them back and forth and make a very specific sound, and that varies between species. But they use different frequencies of that and different frequencies of calling to communicate with one another instead of pheromones in a case where you have flooding or extreme rainfall where they can't use chemical signals.

Kaylee
This is incredible. I really want to get technical and scientific here for a second. So, they're not making sounds with their mouths. They're making sounds with what is essentially their butts?

Aaron
Yes, exactly. (Laughs)

Kaylee
Great, just to be clear.

Aaron
Yeah, they have two rigid segments on their butt that they rub back and forth.

Kaylee
I love this. It's like they're playing a fiddle with their butt. This is incredible. Thank you for bringing so much joy to my day.

Michael
I think you have a recording of some of these ants making noises. If we were to play some of that, what would we hear?

Aaron
You would hear different peaks and valleys of the striations. So certain species would have like a very consistent tone, and some of them would be more varied. So, there would be more time between the different peaks and valleys, it varies depending on the species that you're dealing with. It's very much like a cricket or a grasshopper, you can kind of tell by ear, what's playing that particular night because of those different sounds and melodies.

Kaylee
We reached out to the lead author of this work Dr. Ronara de Souza Ferreira-Châline, who very graciously allowed us to include the audio from this research. So, we're going to play you two recordings which come from different morphs of these ants. Now, as Aaron mentioned, these sounds can actually be used to differentiate among species when they otherwise look very, very similar. We call these cryptic species. By combining these sounds with other information like genetics, we can actually reveal several species in a group that only looks like one. So, here's a sound produced by one morph of the species *Pachycondyla apicalis*.

(Ant Sounds)

Kaylee
You can find the link to the paper and other sounds and pictures of these butt fiddles or what is more technically called the stridulatory file here.

Michael
So, Aaron, I think a lot of people associate ants and I certainly have felt this at times being very pest like. Invading our homes, getting into our picnics, but what are some of the benefits of ants to not only our ecosystem, but to our agricultural systems?

Aaron
Oh, so much. This is one of my favorite questions, because I talked to farmers on almost a daily basis about these benefits. One of the most surprising things I found when I started my own research was, I would go out to farms and say, I'm looking for ants for my farm. Some of the farmers would be like, "Oh, no, we kill all of the ants. We don't want any ants on our property",

because they have been traditionally seen as pests. But more and more, we're learning through our studies that ants provide just so much benefit. They aerate the soil, so they actually move the soil around and create pockets where roots can move into, and plants actually need quite a bit of aerated space in order to thrive in these soil ecosystems. They also supply nutrients, so they bring in organic matter from the surface, move it in, and these nutrients help the plant to grow. There's been a bunch of really cool research on things like phosphorus and nitrogen in the soil, and found that around ant nests, the phosphorus and nitrogen is about two to three times higher than without an ant nest present. That's huge because especially for agricultural groups and farmers, they often apply fertilizers that contain phosphorus and nitrogen. There are also predators, so they feed on a lot of pest species, and then subsequently bring them into their nest, and some of that waste matter is nutrients that the plants can then use. So, it's kind of like a duo support. Even some of the things that have traditionally been seen as pest pressures, like aphid tending. Ants actually tend to some pest species, like aphids, which feed on plants and cause damage to them, and protect them. But it's actually been seen that when ants protect them or culture them, they keep them at a number that's lower than the damage that would cause the plant to die. Whereas if the aphids were allowed to grow on their own, they often exceed that limit and kill off the plant. So, some benefits there. There are even some ants that look like they're pollinators. This has come from some of my research and a little bit that has come out from blueberry fields in Maine. So, any low lying crop, like blueberries or strawberries, things like squash, ants can easily get into those flowers. They often drink up the nectar but then they get covered in pollen, and they'll walk flower to flower just like a bee would. So huge, huge benefits. We're just learning more and more as we go on with his research.

Michael
Maybe elaborate a little bit more on specifically what your research is focusing on as you're just finishing up your PhD. What are some of the things that you're delving into recently?

Aaron
So, there's this huge knowledge gap on looking at ants in agricultural systems as a focus. There's been a huge pressure into looking at non-bee pollinators or pollinators in general, especially over the past 50 years or so. We're starting to learn more and more about these other beneficial insects and then complex systems that include insects are very beneficial for really strong agricultural practices and long term agricultural practices. In my research, I really wanted to connect my passion for ants that I've brought forward through my high school career and undergraduate career into my research. It's really broad in scope, I initially looked at what ants are found in agricultural systems in my area specific to Ontario, Canada, all kinds of agricultural systems, from annual crops to orchards in all kinds of varieties. Then identifying all those ant species, I then looked at what are they doing, and what are the most important players in that system? So, looking at them ecologically and behaviorally, and how they're interacting with the plants, what kind of detriments they're causing, and what kind of benefits are they providing? Further from that, based on the most common species, which is this *Lasius neoniger*, I then decided to culture it in lab, see how easy that was to do, and try to make it as a model organism. So, we can then take that and look at other systems because it's found ubiquitously.

How is it impacting other agricultural systems? Then how are we impacting those agricultural systems by testing things like pesticides, and things like tilling on these ants in a controlled setting and in labs. The last bit of that is now I have successfully cultured them, I have hundreds of colonies in the lab right now, and we're testing wide swaths of pesticides that are commonly used in agricultural settings, and how are they impacting them? Not just whether they're killing them, but if they're changing their behavior. How are they interacting with other organisms? How are they moving things like the soil and that kind of thing?

Kaylee
I like that they're called *Lasius*. Are they the laziest ant? (Laughs)

Aaron
No, I would argue that they're opposite, they're super common and abundant everywhere. They're also gorgeous, and they're the best farmers and stuff. I don't know where *Lasius* actually comes from, or what its origin is.

Kaylee
Yeah, there's so much that goes on behind scientific etymology. So, you just mentioned, *Lasius* are the best farmers. Ants can be farmers too, right? So, there are some species, you already mentioned some that will actually tend to things like aphids like they're cattle. Can you tell us a little bit about that relationship between that tending of other insects, like they're cute little six-legged cattle?

Aaron
Ants actually have the most intense relationships with so many different kinds of species. Animal husbandry, farming, and agriculture is just one aspect of that. So, when we're talking about aphids, specifically, they tend to aphids like we do cattle. Aphids will feed on plants, and as they feed on the plants, they secrete this substance called honeydew. It's this extremely sugary liquid, because they can't drink everything that's coming from the plant at one time. The ants covet that, they really enjoy it.

Kaylee
Like a Slurpee? (Laughs)

Aaron
Yeah! It's more like a sweet milk. They tend to these aphids, they culture, and they control their populations, and then in return for the protection that the ants give them, the aphids are free to give the honeydew, and that kind of thing. There's also a variety of different other hemipterans. Aphids are part of this bigger group, the true bugs or the hemipterans. There's a whole bunch of them that ants will farm, and they do this in a variety of different places to some aphids in trees. Some of them are in grasses or more low lying stuff, but there's also aphids that feed on root systems. Some ants will culture them underneath the ground and actually move them from

place to place. Sometimes if you have a subterranean ant species, one queen will have the next generation of queens, and then as she's on her way out, the queen will gift her some of the ant cattle that she's been tending, and they can move on and culture the next plant next to them and produce her own colony. This kind of behavior has been seen in a variety of different ways. We also have some ants that culture things like fungi, the leaf cutting ants are the best example of this. Their relationship with fungi is millions of years old. They grow it and they feed on the mushrooms, and some of the varieties have been isolated from colonies in South America that are legitimately the same genetic strain from 2 million years ago, because one queen will pass it on to the next and keep passing it on. Which is just incredible to think about.

Kaylee
Yeah, kind of sounds a little bit hipstery. It's like the sourdough that I buy across the across the water that comes from 100 year old starter.

Aaron
Yeah! I have a friend from India, and she has a yogurt culture from her parents, and they got it from their grandparents, it’s the same kind of thing. It's really cool seeing those similarities. Then going on another layer that I learned recently on the fungal gardens. There are not just complex relationships with these fungi, but ants have complex relationships with each other. They have grown over time to be very competitive for different resources. So, there's a group of ant species that are now specialists on trying to steal the fungal gardens from leafcutter ants. So, a whole species has speciated, just with that, as their role in life. Then on top of that, there are species that will get contracted as militia to protect the fungal gardens, from these raiders. There's just this huge complex species web of interactions, which are jobs that we would think of, for things that we see in our everyday lives too.

Kaylee
Okay, just to clarify, there's a species tending the fungi, and then another species is like, "I don't really want to do that, what I'm going to do is I'm going to get really good at going in and stealing it", and they're like, "I see you and what you're doing, we're going to hire this other species to protect the fungi."

Aaron
Yeah, and in return, they get a cut of the fungi. So, there's a mutualistic relationship against commensalism.

Kaylee
And all the pheromones that are going out there. Just directing things. Okay, we're on the same page.

Michael
So, Aaron, as a science communicator, as an ant science communication, and this is where we met you at the Beakerhead science communication workshop back in 2019. There you introduced us to Nasi, who is someone that you use as a communication tool. So, tell us about who Nasi is?

Aaron
So, Nasi is a way that I present myself online. They are my “fursona”. When I went to university, I wanted to learn as much as I could about insects, and I needed to travel away from my home for that, and I went to a place in the world where I knew nobody. At the same time as being very socially anxious and awkward, I didn't have the means to get to know people very well. I quickly found that the best way to connect with people or to find out things about myself was to do that online. Because I didn't want to do it with people face to face, that was too difficult for me at the time. So, I would be messaging on things like online image boards, identifying insects for people online. I did it through the guise of this character. Rather than putting myself out online, I made this character for myself, which was like a bird, and slowly started to connect with people. I learned how to talk with people better, and slowly became more and more comfortable. I found this community of people that was all very like-minded and queer and weird. That's how I got into connecting with people very much through the science communication and talking about insects and that kind of thing. I wanted to do that better and better and more and more. So, I embodied that character more, and started to do a lot of my science communication work through that guise, it was a safer way for me to do it. It blossomed my confidence into the scientific communication field.

Michael
You put these videos out on a YouTube channel, you've also been doing a lot of TikTok videos. How is the evolution of Nasi going, and how are you using social media and the different methods of communicating to the public?

Aaron
It's been really fun. I think the advantage of using a character like that is it gives a cartoony feel, it helps you connect with a lot of people in different ways. This is something that I've talked about with a few people from the fandom as well. It's really fun to connect your hobbies and science. So, there's been this huge stigma for a long time that science can't be fun. It has to be very professional and objective. I think that ostracizes a lot of people from learning about science and makes it scarier to learn it. When you have this ability to then bring yourself into the system and talk about things that you're passionate about, but then also connect with people on a more personal level. That becomes really interesting. I think we're seeing more of that, you can even see it in sports fandoms and other things like that. People really breaking down the sports in terms of the physics and the chemistry that's going on, the physiology. That really brings people into fields like these from different walks of life, which maybe normally wouldn't be exposed to that. Doing that through the videos I do on TikTok and YouTube, you get some

weird glances and awkward comments at times. Then there's so many people that say they love learning about bugs from birds.

Michael
Oh, we do too. (Laughs)

Kaylee
I think you highlighted something interesting there, too. There's the science communication aspect. I think it reveals that scientists are people and science, as you said, is supposed to be professional, objective, but you are a person doing science and your identity influences how you approach science as well. It's really important to remember that science is done by people with their own interests and own biases, and all this stuff that we need to we need to think about, and that's important.

Aaron
Yeah, yeah, exactly. Also bringing into it that people can make mistakes and stuff like that. That's an important part of science.

Kaylee
Yeah, we all need to learn that failure is part of the process, and to be accepting of it and kind of celebrate it a little bit.

Michael
So, speaking of groups of creatures that like fiddles and like butts, you know who is coming around Aaron?

Aaron
No!

Michael
The Nerd Herd.

(Music)

Michael
If you want to get in on the Nerd Herd questions, we post them just like we did with Aaron on Twitter and on Instagram @NerdNiteYVR. Our first question comes in from Isha, "How many different types of ants are there in BC? Do any of them float on leaves over water?" Now you're from the East Coast, New Brunswick, and now in Guelph, so maybe this is an opportunity to talk about different types of ants. Are ants the same here as they are over there?

Aaron
So, there's some crossover between species across Canada. There's probably I would say about 25% or so are found all the way across Canada in various places. The one species I work with *Lasius neoniger*, is found pretty much on the entire continent. There might be different subspecies associated with it, different behaviors slightly, depending on where you are. But we generally think that that species is pretty ubiquitous, but there are a lot of unique species that are from place to place. I think there's about 100-150 species from BC. There's actually no really condensed list of ants, for most places in Canada. There is one from Alberta, and then I'm making one for New Brunswick. Otherwise, there's just small lists or reports of species, but there's not a consolidated list. In terms of leaf rafting ants…

Michael
Ant sailors!

Aaron
There are ants sailors. I don't know about using leaves specifically, but ants happen to be in general, pretty hydrophobic, which means they'll float on the water. There is one species that's found in the southern areas of BC, the South American fire ant, and when they experienced flooding, they'll all float to the surface of the water. They'll create a raft out of their bodies, and they'll actually walk over each other and direct where the rafts are going to go with the Queens usually nested on the top. They'll start their own little boat.

Kaylee
I would love to see a comic of this with the raft of ant bodies, and the Queen sitting in the middle being fanned by a leaf, saying "onward!" (Laughs)

Aaron
There was actually a huge issue with it in Texas. I think it was like in 2007 there was this massive flooding event, and people were freaking out because they would go out into their front lawns or the streets, and there were dozens of ant rafts, these islands that were pretty big, of ants floating by. These South American fire ants, they do have a stinger, so if you like happen to step on one or put a hand on it, you get pretty bad stings.

Kaylee
A follow up question, and it's three parter, and this might depend on the species of ants, so pick whichever species you would like. First question from Em asks, "How many ants would it take to lift an apple?"

Aaron
All right, I'm going to base this off of *Lasius neoniger*, which is the species that I work with. I would say to lift an apple and probably take like 150 ants or so.

Kaylee
Okay, "how many ants would it take to lift a whole sandwich?" Let's say a clubhouse?

Aaron
I would say it's not too much more, it's probably about 250.

Kaylee
Okay, and assuming that Em themselves is not an ant in disguise asking this question, "How many ants would it take to lift me?"

Aaron
That's significantly more, about like 10,000.

Kaylee
Okay, so you'd need a lot of rafts?

Aaron
Oh, yeah. Now I'm just picturing a person laying on an ant raft and floating down a river or something like that.

Kaylee
It would be magical if it weren't for those dang stingers. (Laughs)

Michael
Speaking of leaves, next question comes in from Britleaf who asks, "How come only some people can smell ants and why am I one of them?"

Aaron
So different ants smell differently? I'm not sure what you're talking about specifically. It might be just some people are better at smelling subtle smells, like everybody has a different ability to smell strong things. There are some ants, there's a really common one you'll often find in your house called the coconut ants, this species called *Tapinoma sessile*. It has a very subtle coconut smell if you pick it up stuff like that, and I think in that case, some people can smell it and some people can't, but if you had a handful of them, you would definitely smell it.

Kaylee
I have a follow up question. Other than this coconut ant, what do ants usually smell like?

Aaron
So, the most common chemical that ants use as a defense is formic acid. They have a vinegary smell. The common medium sized black and red ants that you'll see in lawns, if you ever had one of those picked up or gotten on your leg and you swatted it off, usually that spot will smell

very acrid and vinegary. There's another really common species, at least in Ontario, and it is spread out into BC, called *Lasius claviger* or this subgroup of the *Lasius* called the citronella ants. All of these ants are bright yellow, and they do smell like lemons. They are super pungently lemon smelling. They're so common in Ontario that I was making a garden last year in my backyard, and there were so many of them that I had to stop digging, because I was getting heady from how much lemon I was smelling. It's crazy.

Kaylee
Wild. Also, follow up question. Why? Why do they smell like lemons?

Aaron
So, this is a really cool thing. Most insects don't like the smell of lemons. When you think about it, there is are candles you can buy from Canadian, Tire these citronella candles that you can burn that will get rid of things like mosquitoes. Yeah, they just really don't like that chemical as a set of defensive chemicals. So, a lot of soil dwelling insects are the same kind of thing and invertebrates in general. If these citronella ants spray this citronella and it's super strong, it kind of creates like a force field around them that nothing will try and bite them.

Kaylee
Okay, that's really interesting, although I am wondering if now the coconut ants are more attractive, and if they're looking at the citronella ants being what the actual hell? (Laughs)

Aaron
Yeah, maybe. Yeah, and I feel bad for the coconut ants because they really don't have anything in defense, other than just sheer numbers. They just throw numbers at things.

Kaylee
Our last question is from Telepathic Lollipop who asks, "Do ants actually make noises?" We talked a little bit about this before. Do they? What do they sound like?

Aaron
Yeah, yeah. So, we were talking about the paraponera ants, and the fact that they have striations on their gastro or their butt. When they weave them together kind of like a cricket or grasshopper would then they make this kind "ee-ee-ee-ee" sound. It varies depending on the species that we're dealing with. Different species actually can make different sounds. There are some ants that will make small noises from their mandibles or their mouth. That hasn't been recorded very frequently. I think there's some African Sahara ants that will do that, but it hasn't been confirmed as a means of communication. It's just we've noticed that they make those sounds but paraponera ones do specifically make the sounds and communicate through that.

Michael
Oh, this has been amazing. I want to have a whole album of these ant noises.

Aaron
It's all lullabies.

Michael
Well, should we nerd out folks?

(Music)

Michael
If you want to get in on the nerd outs, please send us what you've been nerding out with recently, we'll share it. But let's start with you Aaron. What have you been nerding out about recently?

Aaron
I think the biggest thing that I've been nerding out about is Talking to Strangers, a book that I read recently. It was going in depth about the different biases that we have, when we're talking to people and meeting new people and how bad we are at judging people. It's a little bit of a scary book, but at the same time, it's comforting. It's a nice idea that most often we are all truthful, and we all consider everybody else truthful, but sometimes that can get us into problems if there's somebody that is not very truthful. It just makes me think about everything that's going on in the world right now and judging people and that kind of thing.

Kaylee
Is this book by Malcolm Gladwell?

Aaron
Yes, yes.

Kaylee
Yeah, I haven't read it yet. But I've been wanting to.

Aaron
It's really, really good. Yeah, it was really interesting.

Kaylee
I will add it to my to-read-list. He has a podcast called Revisionist History, which is one of my all-time favorite podcasts. Michael, what have you been nerding out about lately? Have you been talking with strangers? Has the pandemic got you to that point, where you're just out there talking to people randomly?

Michael
Well, I have been talking to strangers randomly, talking to them about if they have done Wordle today or not. Are either of you Wordle players?

Aaron
Yes, pretty religiously. (Laughs)

Kaylee
I don't know how it works. And I refuse to look it up.

Michael
See those there's two different kinds of people, there's people that play it religiously, and people that actively refuse to know anything about it.

Kaylee
It's my own game.

Michael
It's fun. I think that there's something that I like to think about in that collective consciousness of everyone thinking about this one word. Thinking about sports, for instance, I used to have these thoughts that when everyone is really focused on one activity, everyone's seeing one thing in mass numbers, and thinking about ants, how collectively that shapes our feelings and our emotions and things like that. But specifically, that got me thinking about word games. When I was a kid, I was really into crosswords, and it reminded me that I needed to get back into the GOAT of word puzzles, and that is the New York Times crossword. Now, I used to work at a magazine stand, we would get the dailies, which is important. So, if you want to really get into crosswords, you need to do the daily crossword on New York Times because it changes. So, Monday is the easiest, and then it builds up to the Sunday, which is the monster. So, getting back into that and getting into that headspace of how the person that creates the crossword is creating this play on language, and you have to get into their head to figure out what are they thinking, because that's what they're trying to do with the puzzle. How one word can have two meanings? That's really the crux of what the crossword is, and you're like, what are they trying to get at here, then you're playing around with it in your head. Then sometimes you need to figure out what the down or the cross is with just one letter. That also gets me thinking about, about different types of learning and how some people look at a word and they just think of one or two meanings, but multiple people may have completely different meanings and how words alone aren't enough, context is really needed. You know, and as science communicators, I think we know just how important context is when we're communicating. So of course, crosswords throw a big wrench into all of that, and it makes your brain hurt, because you're trying to figure it all out. My favorite example is recently the clue was the best sci-fi franchise. Okay? The cool thing was, is that both Star Trek and Star Wars worked and that depending on up and down you could change the different clues to make it so that both of them worked. It was amazing. Really cool and fun puzzle. Love the New York Times. What about you, Kaylee? You ever done a crossword? What's occupying you these days?

Kaylee
Great question. The crossword has never been a thing I got super into. Maybe I'm just lazy. I always really liked word searches. My grandmother tried to get me into the crossword. She was unsuccessful. Maybe you will be successful, Michael. This has been such a delightful conversation and I have had so much fun and it's in stark contrast to everything that I've been thinking about lately. It feels like things are getting worse and worse. So, it's early March, Russia has just invaded Ukraine, and over 1.7 million people have already fled. Amid all of this, the Intergovernmental Panel on Climate Change, also just released the sixth climate report, and it's not great. It was also kind of like, guys, read the room. (Laughs) Wait a little while to drop it, please. All of these issues are really urgent, and we need coordinated and immediate responses to support our collective health and safety. I've been thinking a lot about that. One thing in this new report from the IPCC that I was encouraged to see was that there was recognition of the mental health impacts of climate change on people. This is the first report that really looks at that robustly. Today, I read an article in The Conversation called "Rapidly Increasing Climate Change Poses a Rising Threat to Mental Health Says IPCC". Very straightforward title. It discusses how rapid and dramatic shifts in climate and catastrophic events like flooding and heat domes, both of which we had here in British Columbia, just this last year in 2021, can increase anxiety, PTSD, depression and ecological grief. You might be thinking, Kaylee, sad thing to nerd out about, but I'm really glad to see it taking front and center in this report, because it demonstrates our growing attention in general to the importance of our mental health. The article discusses the need for integrating climate related mental health within training for public health professionals and practitioners, such as physicians and psychologists and nurses in order to support people and our health systems, so that those people experiencing climate related health challenges get necessary care. So, I'm hopeful that we're starting to think about health more broadly, generally, and that this is being integrated within our global response to climate change. And to be honest, I'm just really trying to muster all the hope I can on all fronts right now. So that is my nerd out.

Michael
But just like everything else, we're dealing with it together. Right? And that is the hope is that we know, I think when it comes to mental health issues, sometimes we get very isolated in our thinking that, oh my god, like this is really something that you have to take on yourself. I think the one hope for me with mental health is that there are people out there that is our support network, you know. It's really important to remember that you can reach out to those people when you are dealing with mental health issues. When it comes to the bigger things like climate change, we're all dealing with it so we can all lean on each other for support.

Kaylee
Yeah, if you think about it, what we really need is a Wordle. A Wordle for climate change mental health issues. (Laughs)

Michael
Well, Aaron, thank you so much for joining us on this episode of Nerdin' About. Where can people learn about Nasi, or learn about your science communication, or anything else that you're doing?

Aaron
You can find me @Entobird, on all social media platforms, Instagram, Twitter, TikTok, and YouTube. Yeah, and that's where I'll be most of the time.

Kaylee
You should definitely get on there and follow Aaron on all of those platforms. Thank you again, for hanging out with us. I actually learned way too much about ants, and I'm very excited about it.

Aaron
There's so much more you can learn too.

Kaylee
There are other questions here like biggest ant? Smallest ant? That we didn't even get to. Well now I need to know biggest and smallest ant?

Aaron
Biggest ant is probably the dinosaur ant from Australia, and that kind of makes sense.

Michael
That's the last thing we need is to think about an ant the size of a dinosaur like come on. Australia already has like all the terrible things in the world. Don't tell me that there is an ant the size of a dinosaur?

Aaron
It's about three to five inches so like not quite dinosaur like but big. Yeah, and then smallest is really tiny. I'm not sure the exact tiniest but there is one from North America called *Brachymyrmex depilis*, that is like half a millimeter in length for a worker. So very tiny.

Kaylee
Who doesn't know *Brachymyrmex*? (Laughs) Thank you, Aaron. This was so fun. Thank you everybody so much for listening. If you want to hear more from us, you can follow us on our socials @NerdNiteYVR on Twitter, Instagram and Facebook. This episode was hosted by us edited by me and mixed by Elise Lane. We'll be back in a couple of weeks but until we meet again, get your gasters going to play that tiny violin.

Transcribed in part by otter.ai