

Forest Entomology with Dr. Kristen Wickert

Ologies Podcast

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Oh heeey, it's the lady you see walking around the reservoir, and you think she keeps lapping you, then one day you realize she's TWINS! She has a twin sister and they both jog at the same time but like a half a mile apart and it shakes you to your core – PS, this really happened to me – Alie Ward, back with another spooooooky episode of *Ologies*. So, this episode is technically creepy crawlies in the woods, but really, it's about trees, and caterpillars, and butterflies, and moths, and solitude, and fresh air, and hiking.

Before we set off on that trail, let's thank the folks who got us here. Big thanks to the crew at Patreon.com/Ologies for supporting the show and allowing me to donate and support other causes and hire some folks to make the show better. Thank you to everyone making sure you're subscribed, who's rated this show in the Apple app which keeps it up in the charts for others to discover. And of course, thank you to the review writers out there who know that I read them all, because I pluck a fresh one like a li'l daisy to present back to you, such as this one from Oolij, who says:

Greatness! Much the same way seeing Laura Linney introduce Downton Abbey gave me the feeling that I'm about to experience something truly great, I get a similar feeling when I hear Alie Ward's voice and her Ologies intro music. Also I'm a super cheap person and I still signed up on Patreon.

Oolij, thank you. Okay! Forest Entomology. We are talking about things that live in the woods. Entomology coming from the Greek word for sectioned or notched at the waist. Isn't that neat? So this episode is all about creepy crawlies underneath a canopy of trees, and about finding solitude among billions of other inhabitants.

Now, this scientist chatted with me from Appalachia – and I think I say 'App'lacha', like throw an "apple-at'cha," because someone once told me that, but I think you can say it however you want. Anyway, she studied Forest Biology at Penn State and then Plant Pathology at West Virginia University and has published papers on all sorts of tree and bug interactions, on native and invasive species, but also does incredible work in scicomm with her brand, KayDubs the Hiking Scientist. So, follow her Instagram immediately - there's a link in the show notes - you can scroll through all her foresty photos.

We finally hopped on to a chat and she spoke from her attic office in a creaky chair, her cat Tabitha on her lap, and we gabbed all about forests, and bugs, and cryptids, and creatures, and hiking, and things that fall from the sky, and how to get mosquitos out of your backyard, and what to do about ticks, and the curse of the spotted lantern fly, and trees of heaven, and machetes, and things that buzz, and bloom, and bite, and hide, and inspire. So are the woods scaaaary? What lurks in them?

Should you go there? In a word; yes. So, get pumped to walk softly and look closely with woods dweller and Kay Dubs the Hiking Scientist, Forest Entomologist Dr. Kristen Wickert.

Dr. Kristen Wickert: My name is Kristen Wickert. Pronouns she/her.

Alie: Cool, awesome!

Kristen: That's nice that you ask that.

Alie: You know, I just started asking that recently, because I have some listeners who are non-binary and who are trans and they're like, "You know, that just helps to normalize it. If you ask."

Kristen: Yeah, it feels good. It's just nice. We're all people.

Alie: Exactly! And so where are you right now? Both geographically and situationally?

Kristen: Uhhh.

Alie: *[laughs]* And mentally?

Kristen: Yeah, I was going to say, I don't think you want to know mentally! No one wants to talk about that anymore! So, I'm in West Virginia, the heart of Appalachia full of pepperoni rolls and cryptic creatures such as Mothman!

Alie: *[cringes]* Ugh! Did they ever figure out what the deal was with Mothman? Is it an owl?

Kristen: No, it's a mystery. Well, he's part moth, part man. There's a beautiful statue. He has a very shiny butt in the statue, and he is supposed to come before something bad is happening. So it's not sure if he's like, warning us, like, "Get away! The bridge is going to collapse!" Or if he's *causing* the bridge to collapse.

Alie: Okay!

Kristen: Cryptic, cryptic...

Alie: It is cryptic.

Aside: Now, I had only very recently heard about Mothman from an episode of *Expedition Unknown*, featuring none other than *Ologies* guest Phil Torres, of the Lepidopterology episode on moths and butterflies. Not the other Phil Torres, from the Apocalypse episode, although that would also track!

But quick overview- Mothman: It's November 1966, a handful of people digging a grave at night (what?) see a very large winged being with glowing red eyes. They shrug it off and go about their creepier activity of digging a grave. And weeks later a couple on a double date describes seeing the same ominous creature near an old TNT bunker. A bunch of other people see him. *[clip of a man recounting his sighting: "I saw, you know, this big... bird-looking thing go over the top of my car."]*

Then, just over a year later, tragedy befalls the small town as a bridge collapses into the river. Is Mothman an omen? A warning? A bird? A hoax? A hallucination? I don't know. But Mothman sightings continue for decades nearby, and then in other American cities. But all I can think about it, wouldn't that be fucking nuts if Mothman was once Mothboy, and was, like, a sleeping bag with a bunch of arms and just ate so many cheeseburgers to bulk up because after it pupated adult Mothman lacked a mouth? What a back story! Anyway, West Virginia, where KayDubs is at.

Kristen: It sounds so silly, but when I'm in the woods, I actually feel, I don't know, like I belong, because I know everything that's around me! *[laughs]* But there's always something new to discover which I don't know. And then, that afternoon I'll go home and feverishly figure out what it is. I'm actually... when we're done talking, I'm going to drive to the mountains, and sleep in my car, and work outside all day tomorrow, which is pretty exciting.

Alie: How long have you been into forest creatures and when did it start for you?

Kristen: You know, it's funny because I went home to see my mom this past weekend. I grew up in Eastern PA and I have a really... like, it's hard for me to pinpoint when all this love happened. And we found some old comics that I drew when I was, like, eight years old and it's a picture of me crying because my brother's pouring a bunch of soda on a tree I just planted. And I was like, "Oh, I guess I really liked plants back then still!?" [laughs] [*"Brawndo's got what plants crave." "It's got electrolytes!"*]

So I think when I was a little kid, it was very serenity for me to be outside, adventures. I read a lot of books back then when I had time so it was, easy for me to have a very active imagination when I was in the forest, you know, *Lord of the Rings* kind of stuff.

Alie: Mmhmm. And when did you decide to do that as your career? You got a PhD in woodsy, foresty, planty buggy things, yes?

Kristen: Yeah. [giggles] So, I have a PhD in Plant Pathology, as well as a master's, and then my undergrad is kind of where all this started. My undergrad is in forest science. I went to undergrad... it's kind of a long, strange story, but it took me five-and-a-half years to get my undergraduate degree because three years of those were wasted thinking I would be like, I don't know, a business woman?! [scoff laughs] Because I didn't know that you could have a job outside!

Alie: Right!

Kristen: Yeah! I ended up doing really bad in college. I was failing. Like, I didn't go to finals. It was that bad. And my mom, she told me to go to community college, just to stop throwing money out the window and to try to find a really general topic I liked. And I ended up having a Biology 101 class where we looked at an onion cell underneath a microscope slide and I was like, "Whoa!" [laughing]

And then I started getting As and everything. And I got an offer letter from Penn State just to go there. And they said, "If you keep getting whatever GPA and doing well in class, you can come here." And I looked at their available majors and I was like, "Well, I want to be outside! What's outside?" And the only thing I knew was a park ranger. I was like, "I'm going to go to be a park ranger!"

Alie: [laughing] Oh that's so sweet!

Kristen: And they did have a degree where you could go to be a park ranger. I met a really good friend of mine and she's now a park ranger in Zion, but I went and really liked the science part of it. We did conservation biology with genetics and stuff. And that's what led me to get the forest science to be a forester degree. And from there it just kind of all, step by step by step, a lot of good luck, and being in the right place, I am where I am today.

Alie: Mmhmm. That right place being, outside, I imagine?

Kristen: Yeah, yeah. I just can't be pent up inside. It doesn't go very well for my brain.

Alie: So your work as it is, what is a typical day like for you?

Kristen: Ohh... [laughs] lots of emails, lots of plan making. And then usually around like noon there's action. I do a lot of outreach. So normally, if coronavirus wasn't happening I would be going and teaching kids about how to look for bugs. And kids are a great avenue to look for invasive species because they're the ones that are outside and they're the ones that aren't afraid yet to touch things. I would do things with master gardeners. I would do things where I would speak at seminars with colleges and stuff on more in-depth topics.

Now I do a lot of surveying for invasive species. We do a lot of field work now. We're trying to allocate the time in a very appropriate way. Because we can't do these outreach opportunities we're getting our boots on the ground and trying to solve any problems we can, because we have time now! So I go outside, and I scout for insects and plant diseases. I help out farmers to get them certified. It's fun. It's wild. It's different every day.

Alie: What is a bug in the forest that you've seen that was like a celebrity spotting for you? Was there anyone that you're like, "Ohh! Hi!"?

Kristen: Oh man! See, I sounded snarky probably when I was like, "Oh, I know everything in the woods!" But now it's like, every couple of months, I'm like, "Man, I didn't know that whole genus existed!" And then they're everywhere! It's just this whole thing of your eyes open up once you notice something or learn that something exists. But lately it's been the really huge, chunky Saturniid caterpillars.

Alie: Ohhhh! Li'l chunkies!

Kristen: Yeah, they are. They're huge! They're like, almost the size of a hot dog!

Alie: Oh my god! [*"So, if I eat this entire, fat, gross hot dog..."*]

Kristen: Like a little Jimmy Dean sausage. And they're just hanging out on the underside of leaves, like, just hanging out and munchin'. Normally as a forester, I'm looking at logs and stems and then I'm looking for mushrooms on the ground and it's just like, there's so many different levels in the forest that you have to train your eyes to look for, and right now I'm looking for Jimmy Dean hot dogs.

Aside: So Kristen has pictures on her Instagram of these imperial moth chunkies, and they do very much look like a turkey link from a hotel breakfast buffet, but with more legs.

Alie: Do people ever eat them?

Kristen: Oh my god. I don't know.

Alie: I don't know! I imagine!

Kristen: I mean, every time I see one actually... like, the imperial moth has a pretty big, like, filled-to-the-brim-with-goo, caterpillar. And I always think of that scene in *Lion King*, when the meerkat is slurping down. [*laughing*] Every time I see one, I think of that.

Alie: [*disgusted shivers*] Ugh! I imagine they must taste very buttery. Just goo! Or maybe like a raw tomato... I don't know, I'll look it up!

Kristen: I have eaten insects before. And they're usually pretty bland or acidic. [*disgusted laugh*] They're not very good on their own. [*from Lion King: "Oooh the little green-filled kind!"*]

Alie: What does a professional, woods trampler, bug hunter... What is essential in your kit? Do you have a butterfly net, and a hand lens, a pickle jar with a rubber band over it? What's happening?

Kristen: So my title is, I'm a forest entomologist and forest plant pathologist. I do a lot, and there's a lot of intersections between those careers, but my Jeep always has some kind of educational content. I'm trying to think of what's in it right now. I have two butterfly nets. I have something called a beat sheet.

Alie: What's that?

Kristen: It's like, two feet long. It's a square, it's a white sheet and you hold it underneath the branch, and you hit the branch really hard with another stick and then it's extended so it's flattened and the insects fall on it. So then you can see who's hanging out that you would normally ignore. It's really good for caterpillars.

Alie: Oh my god. I've never even heard of that before!

Kristen: Yeah, it's really helpful to do insect surveys when it's raining, because the insects use the leaves as, like, little umbrellas. And so you can go out there and you can see who's hiding. When you do that, it's kind of concentrated, and it's easier to check out diversity that way.

Alie: And then what about one of those sheets with a black light?

Kristen: I have one of those too! It's actually right behind me. I was debating on taking it with me tonight. I'm going to get where I'm going at like, 9:30, and I was like, do I really want to pull up and be like, "Hey guys, let's look for bugs!" [laughs] So my really good friend Damon, he sent me a sheet, it's literally a white shower sheet, and you can build this on your own for like 30 bucks online. It has a UV lamp with an external battery that you would use for camping or hiking. It's plugged in by USB and then you just clip it to the top or the bottom and they'll fly and check it out.

But I have learned that different insects – and I've learned this the hard way, the disappointing way, that nothing came the one night - different insects depending on the time of the year and what's going on and the moon, they will care about if it's a mercury lamp or if it's a UV. And it's, like, their processing of the wavelengths of light is just a whole 'nother science! So I have a little UV lamp and I'm looking at getting a mercury one, but they don't attach to batteries, so that's a puzzle for me to figure out.

Alie: You found that out by using one lamp and throwing a party and no one shows up to?

Kristen: Yeah. Actually, it was my mom. My mom is kind of grossed out by bugs. She doesn't like it when I bring things home. She doesn't like to eat the mushrooms I find. [laughs]

Alie: [sadly] Ohhh.

Kristen: She has tried Morrells. They obvious enough that she tried them. But I was like, "Hey, let's go look for bugs in the back yard." I kept telling her, "These big things are going to come. They're going to be beautiful!" and I showed her pictures on the internet. And she's like, "Okay, I'll look for those." Then none of them showed up. [Price is Right loser horns] It's because I had the wrong wavelength light. Yeah, something on the to-do list: get more lamps for bugs.

Alie: So disappointing. Mothman ambles up, he's like, "Hey, what's up? I saw your light out there."

Kristen: I really hope... You gotta look up the statue.

Alie: Oh, I will.

Kristen: Mothman statue Point Pleasant.

Alie: I'll look it up. I want to see its shinny butt.

Aside: Uh... Okay, I was very compelled to google the statue and I found the following video by YouTube user Hoosier Boo, who journeyed to West Virginia to pay this statue a visit. [clip from YouTube video: "Apparently Mothman is ripped. But he's also a moth with a human's body and moth wings."]

It has giant, red glassy eyes, and it resides in the median strip of an otherwise sleepy town, right in front of a Mothman museum. But you head around back, and its firm, metallic buttocks are clenched in a position of muscular power. Mothman definitely does squats. When you're naked on 4th Street in West Virginia, around the corner from a Little Caesars Pizza, you might as well play up your assets, especially since he has no genitals to speak of.

Now, if only he was equipped with male moth scent glands called coremata, which are like long feather dusters that sprout from your crotch like a wheezy birthday party horn. Wouldn't that be something? [*party horn*]

Alie: Okay, because this is a Spooktober episode, we're kind of talking about creepy-crawlies. Do you ever walk through the woods at night and feel like maybe you're about to run into a spider web, or there's, like, a scorpion in your underpants? Do you ever get an extrasensory thing about little creepy-crawlies?

Kristen: No, not extrasensory. I mean, I'm usually already covered by 30 million spider webs. So, it's fine, throw another one on. I'm actually not very scared of a lot of things outside. I'm more scared when I'm interacting with people. [*laughs*]

I did actually... I think it was two years ago, like to the day, *to the day!* I had a caterpillar fall from the sky; it fell out of a tree and landed on my hand. It caused such a crazy reaction.

Aside: The spines she said, have a coagulant as well as a vasoconstrictor. So, what does that do?

Kristen: So, my veins got really tight, and then my blood got really thick, so it felt like my entire arm... from it just falling on my hand, my entire arm felt like it was getting a tattoo the entire day.

Alie: Oh god!

Kristen: If you sat down, your thick blood wasn't going through your thin veins, so I had to forcibly keep walking to pump it. So, I *am* scared of those.

Alie: What kind was it?

Kristen: Oh, it was a... I want to say a flannel moth caterpillar. Yeah, I don't remember the exact one. It wasn't the hag moth, but it was a tiny, wispy, hairy little dude.

But, it was awful, so now I'm scared of them because I wasn't really messing with it or anything. Usually I respect animals, unless I have to unfortunately kill them because they're an invasive species. But I was minding my own business looking at a flower and it got me. So now, sometimes in fall I'm like, "Oh, don't wear shorts. Oh, don't do this." So there's the extra creepy, creepy bit. There are caterpillars that you shouldn't touch.

Alie: That's good to know.

Aside: Tiny, hairy, wispy little dudes. These have also been said to look like itty bity little toupees with stubby leg nubbins. If you like, you can call them a puss caterpillar and they won't even be mad. Their victims describe the pain as similar to having a shattered bone or blunt-force trauma, sometimes also as white hot. Which is probably why the date is burned into her mind.

Okay, but don't be scared because very few caterpillars will make you say the F-word. Unless that F-word is forest, am I right? I gotcha.

Alie: What about a way to get people comfortable with the forest and with, maybe, some happy, little friendly, little creepy little crawlies? Is there a good ambassador species to go out looking for to get people into it?

Kristen: Well, the first thing that I thought of when you asked that question was to check out your local universities, because they often have a Bug Night. A lot of universities have an insect zoo, but they usually have the stick bugs, which are exotic, but we have native ones here. So, that would be a good fun adventure one because they're kind of slow, and they're easy to watch their legs moving on you. It's not really a big jumpy creepy thing.

But yeah, if you have, like, a pretty big state school or even smaller community colleges, they have an insect zoo. You can go in and learn that a tarantula isn't really that scary, that you can pet them, and that they're soft and velvety, and they kind of like it, I think.

Alie: Do you have a favorite bug?

Kristen: It changes all the time. Just like I was saying, I learn about something new and I'm like, "What?? You're able to do that?" But one of my favorite ones that I think of right away, just because it's purely fascinating, is that there's this Artic woolly bear caterpillar in Greenland. I did some entomological stuff, insect collection, up in Greenland a couple years ago. There's this caterpillar that can live up to seven years as a caterpillar.

Alie: What?!

Kristen: Yeah, it waits until that point that it eats enough. So, if it doesn't eat enough the first two years, it's like, [*deep voice*] "I'm just going to go underneath this rock and take a nap."

It waits out the crazy Greenlandic winter. Then it comes out again and eats, and maybe in the third or fourth year it'll be able to pupate, but it can go up to seven years as a caterpillar. It's pretty nuts.

Alie: What are they eating up in Greenland?

Kristen: So, in Greenland there's not a lot of trees like what we have down here in North America. But there's these little, tiny birch trees and little, tiny willow, and there are some grasses, and some mosses and some flowers too. But I think they mostly eat the small birch and the gray willow.

Alie: Oooh...

Kristen: Yeah, they're trees but they're little shrubs because they're very oppressed.

Alie: Have you gotten to check out a lot of global forests? And are you more of a pine forest, or a rain forest, or a moss? What's your vibe?

Kristen: I have always wanted to go to Costa Rica and see the beautiful butterflies flying around. Globally, I've been bunch of places, but might have not had the developed scientist mind yet. But I will say, last year I went to China and I was all amped up. I was like, "Yes, I'm gonna go see this crazy new forest, and it's gonna be really exciting with things that I have no idea what they even are!" And where I was, the forest was just, like, our invasive species. [*Alie: "Oh no!"*] It was all the trees that I work with here on a daily basis, but they were just en masse. So it was all tree of heaven, golden rain trees. It was an interesting realization, but I did have the forester scientist mind on that visit.

Aside: So yes, this tree of heaven is so called because it grows fast as hell, and it can reach up to nine stories tall. It's also the titular character in Betty Smith's 1943 semi-autobiographical novel *A Tree Grows in Brooklyn*. She wrote,

No matter where its seed falls it makes a tree which struggles to reach the sky. It grows in boarded up lots, and out of neglected rubbish heaps. It grows up out of cellar gratings. It's the only tree that grows out of cement. It would be considered beautiful except there are too many of it.

Hey, as long as we're talking tenacity, Smith's novel was rejected by several publishers before somebody finally said yes, and then she ended up selling millions of copies. Enough to maybe even afford a place in Brooklyn now.

Now, on the topic of trees, and rents, reaching skyward:

Alie: I was just thinking, let's just say that you walk into a forest. you walk into a trail. I imagine that there's got to be a lot of different strata like layers in the ocean. What types of bugs live in what layers? I'm sure grubs in the soil, if you go up do you have butterflies? Who lives where?

Kristen: So, when I think about the forest floor, I think about a lot of grubs which are usually associated with beetles. Then you have the adult beetle which are, like, predators. So, they are like, running around. A very common beetle that you'll see, I think even on the west coast, are these little carabid beetles, which are the ground beetles. They're voracious predators. We also have... As you move up, you can go up a couple of inches and think about the mushroom caps. On almost every mushroom cap you'll find full of fly larvae.

Alie: Really?

Kristen: Yeah. So, when I go mushroom picking, I peak open in the cap to see if it's got these little holes in it. If it does have the little holes, that's because it's, like, a little tunnel that a fly larva has eaten out.

Alie: Oh my god.

Kristen: Yeah. Then if you jump up... You have special insects that are on tree trunks, you have specialist insects that are only on the grasses around. You have a lot of predators that will utilize the wide-open area of a rock, higher up, in order to be able to see.

Something that's really cool are the tiger beetles. They're one of the fastest animals proportionate to their size. They're this beautiful green shimmering insect. They'll jump on the trail, which is open, because they're looking for prey. We've created this nice little runway for them.

So yeah, there are layers like the ocean of where you can find things. When I go out looking for something, like an invasive insect, I know where to look. Even within their different life stages they'll be, "Okay they're babies inside of the mushroom, but then as adults they hang out and they are pollinators."

Alie: Now, you work with invasive species, which I'm sure differ in different parts of the country. I know that out in California we've got some pine borer beetles that are really on our shitlists, right?

Kristen: Mhmm, Yes. So, they're native.

Alie: Oh okay!

Kristen: I'm not going to go into it because I am an east coast specialist. They're kind of responsible, along with other cascading effects of climate change, for massive die back of our pine trees on the west coast. Usually they'll associate with stressed out trees, because

trees, when they get stressed out, they really put out a lot of smells. Then beetles can fly to that smell.

They're not very good at smelling, so they aren't able to pinpoint that 'this tree is the stressed one versus this one'. So, they might go to the one next to it. Then they end up stressing that one out. It is just kind of a chain reaction of infestation.

Aside: More on those critters later in the episode. But closer to her neck of the woods, there is a scarlet winged, polka-dotted little darling that just looks like a little moth but in a fancy outfit. I was in Philly last month and they were everywhere. Including taking the top spot on local shitlists.

Alie: Now, you are from eastern Pennsylvania, but Pennsylvania, damn this lanternfly. This spotted lanternfly. I was in Philadelphia, and I was like, "Oh, what is this cute little strawberry moth?" Then I realized they were everywhere... EVERYWHERE! So, this has only been a problem the last couple of years, right? How much does your work deal with these spotted, adorable little cuties?

Kristen: So much.

Alie: They're so cute and they're such assholes, right?

Kristen: I mean, that is actually the scary part of your Spooktober podcast. They've been around since 2014. They arrived on a shipment and they kind of proliferated at a very rapid rate. They're now in more than 26 counties in Pennsylvania. They're showing up in a lot of different states. They're in Maryland, West Virginia. They just found some in New Hampshire on a shipment.

Alie: A shipment of what?

Kristen: Trees. Nursery trees. Yeah. So some greenhouse/warehouse kind of places are shipping ornamental trees and the spotted lanternflies are laying eggs on it. And then they get shipped to a nearby state, and then someone buys it from another state. So we're really focusing on teaching people how to identify it, because if you buy a tree at a greenhouse, you say, "Oh, there are those eggs," you can kill them and then the problem's over.

This insect is really bad. It's not just annoying, like you saw, they're jumping everywhere, and they'll kind of fly into you, and they're just kinda gross. But they have a preference for our grapevines and our orchards. They really like apple trees. And their favorite tree is from their home native range of Asia and India and Vietnam. They like that tree so much, tree of heaven, and it's everywhere here.

So they're just proliferating like crazy. And then when they're done with their main course of tree of heaven, they move onto dessert, which is the grapevines and the apples, [*"Don't mind if I do."*] which, the east coast... we don't have Sonoma, or Napa Valley, or whatever, but southern Pennsylvania has a lot of wine and so do West Virginia and Maryland. It's a big problem.

Alie: And then what are they doing? I understand that they're just shitting sugar out? [*Kristen laughs*] What's happening?

Kristen: That's an interesting feeding strategy that hemipteran insects have. And I know you like bugs, so I'm going to use some bug words with you.

Alie: I love bugs.

Kristen: Yes. So the hemipteran insects are classified by their wings, of course, like all insects are, but they also have a mouthpart that's a lot like a straw. And so, they stab this really strong straw-like mouthpart into the tree, and they suck out the sugar that is normally used for functions within the tree. It's used for making fruit, it's used for keeping the leaves alive. And so maybe if you had one or two of these insects sucking out the sugar with their straw-like mouth part, it wouldn't be that bad. But when you have millions of them, you can really deplete the tree's energy, and it dies.

But the way that the hemipteran feeds with that straw-like mouthpart, it's going against the pressure gradient of the tree. So it *really* has to suck. It does suck, but it really has to physically suck. And that's what forces... they're continuously peeing out that honeydew because they have to suck so much. And their gut actually has a specialized feeding area for processing of that sugar. So it just rapidly goes back out because of that pressure gradient.

And then fungus really loves to grow on that sugar source, so the trees, and the shrubs, and plants underneath the spotted lanternfly in the canopy will just get covered with this sooty mold, and then they'll die because the black sooty mold blocks the sunlight to the shrub's leaves.

Alie: Oh my gosh.

Kristen: Yeah. It's really nuts. It's a double whammy.

Aside: The first whammy, of course, being the schnoznozzles sucking out plant juices, and the second whammy being the dark sooty mold that grows in their sugar pee and blacks out the leaves. Now, scientists in Pennsylvania are like, "That is two whammies too many!"

Alie: And I know that there are campaigns on the east coast, like, "If you see it, kill it. Just kill it. Trust us, kill it." What are you having to do as a forest entomologist and a plant pathologist to try to control these, on a bigger scale that's more than just a flyswatter?

Kristen: So I will say how important it is for outreach. That whole thing of the campaigns is kind of the number one thing. Because me as one person, I could spend literally all day at one tree trying to kill them all. But if you all see it and try to kill it, that's awesome. There's millions of you killing millions of them. *[both laugh]* It's a really scary murder mystery for your podcast.

But what I physically go out and do is I map it and I report it to different agencies, and then we'll collaboratively work together to either use these physical traps, which we call circle traps, or sticky bands. And that's a whole science in its own, that we're trying to find the best to use which doesn't hurt birds and snakes that get stuck on it. So there's these physical traps that people can put around their trees and then there's also pesticides.

And this goes back to that whole integrated pest management concept where, yes, pesticides are bad, and I'm scared of them like I should be. You should have a healthy fear of chemical pesticides, but they work. And when you have this threshold of a hundred insects on a tree and you know they're laying eggs, and you can't necessarily get all of them just by reaching for them, even if you have a really long butterfly net, you have to use pesticides. So we use what's called a systemic pesticide and it goes inside the tree. So when they're using that straw like mouthpart, no matter where they are in the tree, they suck it out and then they die. And it's also not so dangerous for little kids playing in the yard. Because it's not *on* the tree, it's *in* the tree.

Alie: And what's happening from an ecological standpoint, where they're feeding on the same tree of heaven, but they obviously are in check somehow in Asia. So why are they so unchecked here?

Kristen: Well, it's interesting. We kind of have a big sister story to go off of a little bit. The spotted lanternfly is not native to South Korea, and South Korea had an invasive problem with this, and they kind of wondered the same thing. And it goes directly to what you're saying. In China, there's pathogens, predators, and other climactic events that control them, because it's coevolution. And so when they get out of this very narrow coevolved region that they're in, they become problematic.

We have seen a couple of them here in North America – and when I say a couple, I mean a handful – that have a fungus on them, which is killing them, or maybe it's actually living on their already dead body. [*“Spooky!”*] There's researchers studying that. But it's mostly because it's been removed from an area where it's in checks and balances.

Aside: So ecology is all about how organisms work and live together, and with millions of years to evolve the balance should have been met to keep things in check. Unless, of course, you suddenly start building giant ships and railroads and are like, “Surprise! New species! We're just mixing it up!”

Alie: When it comes to what you do also as a scientist, a lot of your work too, is science communication. You have a big following on Instagram and on YouTube and you're known as KayDubs the Hiking Scientist. How much of that was your mission in becoming a scientist, trying to communicate things that you're bringing out of the deep woods?

Kristen: Well, it didn't start that way. I mean, it really was just me being goofy with my friends. That's kind of why everybody starts an Instagram. And my Instagram is not associated with my work at all. Not that I do anything crazy on there. But I really enjoy distributing knowledge to the masses, and I do feel that knowledge is power, so why should I hoard all this information in my little head?

And I should get people to care about nature because there is kind of a big lapse or a separation in our society now, that nature is separate than our daily lives, and it's not really. It needs us to care and love for it like a little baby, and because it has benefits to our water supply in the city or our food supply, just like the spotted lanternfly and grapes and apples. If we don't care for our environment, we could potentially lose wine.

Alie: Which is a big thing to have at stake in the middle of a pandemic.

Kristen: Oh my gosh, yeah. [*both laugh*]

Alie: And I got so many questions from patrons for you, specifically. Can I ask you, like lightning round?

Kristen: [*hesitantly*] Okay. [*Alie makes a faux-nervous “Ahh!”*] I'm just shy. Like I said, the whole Instagram thing, it looks like I put myself out there all the time, but when you asked that I started sweating, because I'm a very secretive person still, even though my face is on your little rectangle of doom.

Alie: [*laughing*] I know. But it must be nice to hear back from people too that enjoy the forest more, and enjoy bugs, and get out of their comfort zone to understand how beautiful the world is because of you, right?

Kristen: Oh, yeah, and I get messages like that very often. And I'm not trying to brag, but I'm so stressed out at work all the time and I'm so stressed out about other things in my life, and then sometimes I'll open up my phone and I'll see a message that's so nice from people who are like, "I take my daughter out for walks now because you go out for walks by yourself, and nature isn't scary." And I'm like, "Yes! Yes!" So yeah, that's awesome, and it makes me feel really good and hopeful, and I thank everybody who's ever sent me one of those. I am just a normal person though, with a lot of normal people problems.

Alie: 2020. So many.

Kristen: But yeah, let's hear those questions.

Alie: Okay. You ready? I'm just gonna run through 'em.

Aside: Ooh, but before we do, a few words about some things I like, which make it possible for *Ologies* to donate to a cause of the guest's choice. And this week KayDubs chose Black Outside Inc, which was founded with one simple mission: reconnecting Black and African American youth to the outdoors through culturally relevant programming, inspired volunteers, and a passion for connecting youth to the powerful history of Black people in the outdoors. They seek to move the needle on diversity in the outdoors and ensure our youth have safe and equitable spaces outside. For more on them, you can see BlackOutside.org. And that donation was made possible by sponsors of the show such as...

[Ad Break]

Okay, your questions.

Alie: I got so many questions. I'm just going to lightning round fire away. Is that cool?

Kristen: Okay. Yeah.

Alie: Boom, boom, boom. Okay. Ava Schaefer wants to know: Why do you think so many people are afraid of bugs?

Kristen: Oh, it's because we have our nerve senses in our skin. The literal creeping of insects makes our skin twitch and I think people don't like that. And we were also raised for so long to say, "Those have diseases," and then you kill 'em. So now we're realizing, because we do have this naturalist revival, that not all of them have diseases and we don't need to be scared of all of them.

Aside: Okay. I looked this up and there is a word for when you feel like the creepy crawlies are upon you. It's called 'formication' and it comes from the Latin root for ants. So if you get the creepy crawlies, you're a fornicator.

Now, if you're worried about being in the forest because of that which wiggles in it, just consider that your house, the house you're sitting in right now – if you're sitting in a house – has about 100 species of bugs in it. I mean, you have mites in your eyebrows. You got critters in your gut. Yes, you may have walls or a toilet, but there is no real separation between humans and nature. We're part of nature, and that's wild, and it's cool. We just gotta keep our eyes open is all.

Alie: Giannina Rokvic though, on that note, does ask: Should I worry about when my dogs wander in the brush and the denser areas during hikes? They love it so much and I don't want to stop them. Do you have any strategies for ticks other than just check your crevices?

Kristen: That's probably the number one question I get from people on my Instagram. I've never had a problem with ticks. And I guess I just got used to checking myself that I don't even make it a thing, but I do. If I go and do field work all day, I shower. So, I think just being diligent about the inspection, because we can use Frontline on pets, but we can't use it on us because it's a poison. So I think diligence and physical inspection is appropriate. We're all listening to Brad Paisley. [clip from Brad Paisley song "Ticks": "And I'd liiiike to check you for ticks."]

Aside: For more on ticks and Lyme disease, you can check out the Acarology and Disease Ecology episodes and then just check those crevices. Onward.

Alie: [laughing] That's good to know. AJ Lichty wants to know: What percentage of insect species do you think have been identified? How many do we not know about?

Kristen: So many we don't know about. Now that I have been going out in the woods and really focusing on these Asiatic invaders, I often see things that I don't know. And I'm like, "I wonder if anybody else knows what that is. Should I care?" And I usually just walk away because I don't have time. So I think that there's a lot of insects that we haven't identified yet.

And some things are very cryptic; the things that are living inside of a mushroom. There's not many people who are going to peel apart that mushroom cap to try to find what species or rear the fly larvae to figure out what they are. But also there's so many places we can't get. There's insects that can live in really extreme temperatures or environments, like that Greenlandic Arctic woolly bear. That's crazy.

I think there's a really big unknown. And also there's things we take for granted, and I'm going to go to another topic. So, lichens. You know what a lichen is?

Alie: Yeah.

Kristen: So the lichen is the symbiosis between fungi and algae, and they make another organism, and they exchange stuff. Well, for the longest time we thought it was one species of fungus. And not until like 2016, I think, they found out that there's another organism. It's either an ascomycotan or a basidiomycotan yeast. So it's three players and sometimes more, but we just took it for granted for so many years. We were like, "Oh yeah, that's what that is," and you walk by it. So I think there's a lot of things in the forest that are like that.

Alie: Oh! I had no idea.

Kristen: I know. Isn't that so exciting, though?

Alie: Yes, it is! There's so much we don't know.

Kristen: Yeah! Just something to live for. You could study lichens.

Alie: Someone out there, they're a lichenologist. Hit me up. There's gotta be some out there.

Okay. Roxanne Parker wants to know: Could certain species help reduce the risk of wildfires, especially in California, Oregon and/or Washington? Is that a good idea to introduce something? Or is it... is that a no?

Kristen: Mmm. That's a whole several individuals' Ph.D. dissertations in one question. If I were to think about it... because the main thing that's killing those are the *Dendroctonus ponderosae*, the bark beetles, you could introduce... If you do like seven years of studying and vetting that a predator or parasitoid isn't going to kill something else, you could do

that. But I think with that specific question, different forest management practices might be a better avenue to seek.

Aside: And just a sidenote, I looked it up to see what kind of critter fixes are on the table. And these beetles, which can be about the size of a cooked grain of rice, thrive on trees that are already weak from drought. And fire officials think that 80-90% of the recent Creek Fire's fuel were beetle-affected trees, and they estimate that 150 million trees or so in California were killed by these local beetles just getting out of balance. So the best fix? Eh. I read one site that said to try to water your trees during droughts, or you know, just work to reverse climate change.

Also, while lovingly snooping through Kristen's Instagram, I saw a beautiful picture of a tattoo on her forearm of a different bark beetle's gallery. And a gallery is the pattern of tracks they leave in wood while they're munching along. So somewhere a European elm bark beetle was just eating away, having no idea that its lunch path would be a gallery inked on this cool chick's skin. And as long as there are three to four hundred thousand species of beetle in the world, let's discuss another.

Alie: Taniya Heuchert wants to know... first off, they say: Boy howdy, this episode excites me. They live up in Canada and they want to know: What is up with SPRUCE BEETLES!? They're so loud when they fly. They sound like helicopters and you can hear them gnaw through wood. Their bites are known to be painful. Do you know anything about these things?

Kristen: The longhorn beetles, when they are chewing, usually they're chewing the bark away a little bit in order to lay an egg. Usually as an adult they're a foliage feeder, but they lay their egg inside the wood because the larva actually eats inside of the hardwood of the tree. I'm not an expert on this either, but they do chew. I have heard the sawyer beetles chewing before and gnawing on wood in order to lay their eggs.

Aside: PS, I looked this up and beetles eating decaying trees kinda sounds like eating a squeaky cracker, which I guess is just a rice cake. So just imagine the noise of me eating a rice cake in your ear. You're welcome.

Alie: Sikwani Dana wants to know if insects sleep or if they have an equivalent? Do you ever catch anyone snoozing?

Kristen: No. They don't sleep like we do. I guess you can say they rest, but they don't actually turn off like we do. A lot of it has to do with usage of oxygen. A really good way to catch a butterfly is to keep chasing it because it needs to stop moving in order to diffusely have air go into its body. A lot of insects will stop, and they'll need to rest. Insects aren't active all the time. They are resting, but I'm not actually sure if they physically sleep like we do. But a pollinator that flies around during the day will usually be found resting underneath a leaf in a tree during the nighttime. I think that's to do with temperature. Their activity level is also very dependent on the temperature.

Aside: Essentially, yes! They do rest, and during that rest phase they are much harder to arouse. They're like [*objecting to being woken up, "Nnn"*] yawn. If they don't rest enough, they'll be a little groggy the next day. I found all of this information in a 2000 paper, published in the journal *Science* called "Correlates of sleep and waking in *Drosophila melanogaster*," which is a fruit fly. The paper notes that, "As in mammals, rest is abundant in young flies, is reduced in older flies, and is modulated by stimulants and

hypnotics.” So yes, somewhere, someone in a lab coat two decades ago drank some coffee in order to be alert enough to feed some fruit flies coffee. “There’s a coffee in my fly!”

Alie: Max Aubry has a question for you: Entomologist question: What are side skills that make someone a good forest entomologist specifically?

Kristen: Being observant, definitely. Sometimes people are like, “How do you see that?” And I’m like, “I dunno, I just know what to look for now.” So getting a friend that can teach you “This is where you find this,” then you won’t be able to turn it off and you’ll be like, “Okay, that’s where I look for that.” Sometimes my mushroom hunting friends and I will joke about this. You need to turn off all your other eyes and only have your mushroom eyes on. I’ll have a really hard time and always be like “Oh god, look at that flower, look at that flower!” Like, “No! Turn off your plant eyes, look with your mushroom eyes.” Sometimes I do that with work where I have to turn off all the other eyes and know what to focus on. So being able to be observant and focus is very good.

I think also patience is a very good thing because there’s a lot of these guides that will tell you, like, from July to September the adult is active. But I say this with everything, those insects don’t read the textbooks. So, it will be depending on the temperature, depending on the climate of that year, or maybe they won’t even be around at all because there was a frost. So being able to be patient and make observations of your own without only dedicating to the textbook is key for any naturalist.

Alie: So your mileage may vary depending on what kind of year you’ve had?

Kristen: Correct.

Alie: That makes sense. Jessica Janssen wants to know how they can keep mosquitoes away from their family without a bunch of toxic chemicals. Any tips for getting mosquitoes away from you? Citronella?

Kristen: Clean your gutters.

Alie: [*surprised*] Clean your gutters?? Oh man!

Kristen: Yes. 100%. Because a lot of time... They have all these fact sheets about, like, a hundred mosquitoes can come out of a cup of dirty dog water in a dog bowl in the yard you forgot about. Sometimes people have tires and stuff in their yards, and you’re providing this breeding ground. Often people don’t clean their gutters, and they get filled up with leaves, and they create this perfect habitat. And everyone’s like, [*ornery voice*] “There’s no tires in my yard, I don’t know why I’m getting mosquitos!” It’s because your gutters are dirty. So don’t provide them with the habitat. If you have a bird bath that you don’t clean, just get rid of the bird bath. That kind of deal.

Alie: You know, I was doing some research on smelly feet and found that if you have very smelly feet, you are more likely to get bitten by mosquitoes.

Kristen: I get that very often.

Alie: [*laughs*] Interesting. But there’s a lab out here, I think they’re in Riverside. They have a really good entomology lab at UC Riverside. And they’re studying mosquito olfaction and malaria, and how washing your feet can help you get fewer mosquito bites.

Kristen: I’m going to have to remember that [*laughs*] during my long fieldwork days. I’ll just have to wash my feet.

Alie: *[laughs]* Cycling Tiger wants to know if any forest bugs interact within the relationship between the trees and mycorrhizae. *[uncertain about pronunciation]* Mycorrhizae *[phonetic: my-ko-RIZ-eye]? Mycorrhizae [my-ko-RYE-zie]?*

Kristen: Mycorrhizae. *[my-ko-RYE-zee]* I say mycorrhizae. *[my-ko-RYE-zee]*

Aside: We're talking about fungus threads here. People say it different ways. I just choked, like when you see your cousin's girlfriend and you're like, *[as if whispering to oneself]* "Is it Jen or Jenny? Should I just say Jennifer? Shoot, shit. Shit!"

Alie: Okay, I'm going to take that then. *[continuing previous question]* ... the relationship between trees and mycorrhizae to help the bugs identify food or resources or predators. Are the bugs sniffing out or tapping the information between the trees and the fungus?

Kristen: Hmm, probably. There's probably so much we don't know about their specialization. And you really can't personify everything because they're not humans. They don't have the thought process we do, but they obviously have some kind of skill where they're able to distinguish things that they like, or things that they know, or habitats that they know. I think that they have some kind of learned ability.

You also have to remember many insects live for more than one year. A lot of people think that an insect lives for one year and it's done, but they do have many years on earth where they have time to learn something. If they're fungal feeders, I'm sure they're really attracted to some kind of aromatic release that the mycorrhizae is putting out. I bet that there's something crazy like that, which would be super hard to monitor now. But you know, 20 years in the future, when I'm really far away from the scientific world, there'll be someone doing that for their master's and it'll be easy.

Alie: *[laughs]* Someone will get a degree in it. Which brings me to a question. Pascal Perron, who's a first-time question-asker, wants to know: Do cicadas really spend 17 years underground maturing and are they just sleeping that whole time? And Jenn 'Squirrel' Alvarez said: Yes, all the cicada questions!

Kristen: Oh, wow. Okay, so yeah, we have the periodical cicadas here. A fun fact. There are both 13-year and 17-year of cicadas. There's many different broods, and they're not sleeping underground. They are eating.

Alie: *[very surprised]* The whole time??

Kristen: Yeah, man. They're just like that Greenlandic caterpillar, right? They've got a threshold. They have to meet a certain amount of energy consumption to meet a certain point of molting. They eat tree roots. And sometimes, you can actually see when high cicada populations are getting like ready to come out. There's some kind of associated decline. That's what some people think anyway. But the cicadas are really interesting. They come out and they pretty much just molt, they turn into adults, they pump up their wings, they mate, and then they get eaten. *[laughs]* And they're tasty. I think they taste good.

Alie: How have you eaten them prepared?

Kristen: So... boil 'em, mash 'em, stick 'em in a stew. *[laughs]* No, I've put them on cookies. When they haven't molted, when they're still the little creepy crawly things without wings, I've put them in peanut oil and stir fried them and they're really good. I guess it's sad, but I mean, it's free food and there's billions of them, if not trillions. And everything else is going to eat them. So why not live a little?

Alie: Why do they take so long to have a glow up?

Kristen: Isn't that amazing? Gosh. I mean, there's so many weird cycles that we're learning about in our native American forests where certain oak trees, they'll have mast years. Oaks don't make acorns all the time. They make them, like, every four years or something depending on resources and then all of them will make it.

Yeah, the cicadas are awesome, and I just love their sounds. We have three different species that come up that are 17-year cicadas. They all have different songs, but they sing together, and then it just sounds like a spaceship.

Aside: KayDubs says for more on this goodness, you should check out CicadaMania.com. Also, I think I just have to do a whole episode on them before 2021 when Brood 10 – which I've been calling 'Brood X' for 16 years – emerges. Yes? All those in favor, scream like you've been in a bunker for 17 years and you're horny as hell. [cicadas chirping] Okay, it's settled.

Alie: Coral Taylor, first-time question-asker, longtime listener, wants to know: Which creepy crawlies should we be advocating especially hard for? Which bugs are on the brink of extinction, but are critical to forests? Who should we get behind?

Kristen: All of them. But if you really want to be like scientific about it: flies. We should stop hating on flies. When I say I'm a part of experiments, usually I'm doing kind of dumb menial work, like counting bugs, or sorting them, or weighing them. But I was part of this project for about a year where we were looking at different insect orders associated with pollination of hardwood trees; and flies come in, man. So if you want to think about, thank you for timber, thank you for fruits, thank you for flowers – it's a lot of flies, like by a very high percentage versus the cute bees that we see.

All sorts of flies too. There were hundreds of species that we identified just from one single tree species, in one national forest, in one state. So I would advocate for the flies to not be gross maggots. Even the word maggot is something that you would see a Marine yelling in a movie. Maybe you should make it a compliment. "Oh, you're such a maggot today." I didn't mention that they're great at decomposing. So, unless you like a lot of dead raccoons on the side of the road, thank the flies.

Alie: Yeah, they eat shit and they don't complain about it.

Kristen: Just like the Marines. [*"On your feet, maggot!"*]

Alie: [laughs] I know! Well, someone had a question about hoverflies. Merg Atron, first-time question-asker, wanted to know: What's up with hoverflies? Why are they creepy? Merg lives in the woods and they're all over the place acting really weird. Are they really government drones?

Kristen: [laughs delightedly] No, they're not drones. Hoverflies, also known as flower flies or syrphid flies, they look like bees and they use it as a mimicry to be like "Please leave me alone. I'm just trying to eat flowers and not bother anybody."

Alie: They're not tiny government drones, spying on us?

Kristen: You know what, I don't know. The government does whatever it wants anymore so [laughs] who knows?

Aside: Speaking of things that go bzzzz in the n-... in the day and the night.

Alie: Adam Palik, first-time question-asker, relatively established listener asks: Why do critters that buzz make my jammies jingle? I love all creatures, but when a bee/wasp is buzzing around me, I feel the naturalist in me take off and run for cover. They TERRIFY me. What is the reason for that? And do you have any fixes for that when you hear a little [*buzzing like a bee*] bzzzz bzzzz?

Kristen: No, I don't have a fix for that. I'm sorry. I can't answer that at all. I have been stung by many wasps during field work and so I have that same fear.

Alie: So it's normal, and that's okay.

Kristen: Yes, it's probably good. It's probably some ancient relative, you know, protecting you by passing on the fear gene of that vibration.

Alie: [*laughs*] That's a good call. Zoe G, first-time question-asker, has heard that if you lick a banana slug, your tongue goes numb. Why anyone would do this is beyond me, but is this true? And who figured that out?

Kristen: I have no idea. [*laughs*]

Alie: Okay. Have you ever licked a banana slug?

Kristen: No, but I have tried to make them mate.

Alie: [*laughs*] They're like "No, I'm not really feeling this one."

Aside: Sidenote: I 'licked' this up and people kiss banana slugs because their slime has a numbing agent in it, but also some slug scientists, aka limacologists, are like, "Don't lick slugs for the slug's sake." Can you imagine if you were naked in the woods and a tongue the size of your bed came and slimed you with falafel breath? You'd be like "Move along, you hairy ghoul."

Alie: Lynn and Dori, great question, want to know: Do bugs get high off magic mushrooms the same way that humans do?

Kristen: I don't know if they do. You have to remember that a lot of different animals have different reactions to the different metabolites. I mean, even people within the same species. You might be able to drink milk and I can't. So I don't know.

They might be using it as a secondary metabolite to accumulate in their body though, to act as an anti-predation technique. We do see that with a lot of insects. I'm going to go back to my classic example of the spotted lanternfly. We think it feeds on tree of heaven so much because it accumulates toxins in its body, which makes birds spit it out. So potentially they might not be actually trying to get high, but they might be trying to accumulate secondary metabolites that make them not get eaten, or they might not do anything.

Aside: Remember when we were wondering aloud if anyone is researching fungus and bug interactions? THEY ARE. In fact, I was poking around CicadaMania.com, and I found that the guy who started the website, Dan Mozgai, as well as our own too-humble guest Kristen Wickert, are both listed as the authors on the following paper: "Psychoactive plant-and mushroom-associated alkaloids from two behavior-modifying cicada pathogens." Which is like, "Ward, what's that all about?!" It's all about how certain fungal compounds make cicadas develop fluid attractions to males and females, with males doing female-type wing movements. Everyone's out there mounting same sex partners in kind of a groovy fungus dance.

But scientists think that this reaction to those mushroom alkaloids evolved to affect males more because cica-dudes congregate close together to sing their sex ballads, so this helps the fungus spread more rapidly, because they're all clustered. So now you know about fungal parasitized entomopathogens. Just 'shrooming love fests in the trees! I love it!

Except that the fungus ends up growing into a plug that replaces everyone's butts and kills them. I don't like that. "Get out of my butt, fungus! It's been seventeen years; I'm just trying to have a good time over here."

Alie: Jess Loeffler wants to know: Since you're a hiker, how do you balance sticking to the trails with getting curious and wandering off path? Because, they say, hiking can be detrimental to fragile species, but sometimes there's such cool stuff just off the path that they want to get a closer look at.

Kristen: So I'm very lucky that my job is, like, "Go here." So a lot of times I'm not on a trail and I just go, but I will say that it's that desire to seek things out then sticks with me when I am on-trail. But I have been working in the forestry realm for so long that I know that a place where hundreds of thousands of people go, it's really easy to see if even one person walks off trail and... Actually, you should look this up. There's some really crazy pictures of when the super bloom happens in California. They track when people go off trails, like the Instagrammers. And day one when the super bloom is happening, there's one designated trail. And then by like day 30, there's 50 other side trails. So, thanks to social media and seeing that I should be shameful, I don't go off trail at public places, but with my job I'm able to go into the wilderness.

Alie: That's part of your job.

Kristen: Yeah. Even then I'm trying to be respectful and I have all the plant eyes, the bug eyes, and mushroom eyes going on. I'm not going to smash on a beautiful orchid. I am actually very aware, and I try to walk where there is nothing. And then I start thinking really deep thoughts about the microbes that I'm stepping on and don't even realize it because they're so small.

Alie: Aw! Leah Pedder wants to know, first-time question-asker: Is there an insect that you've always, *always* wanted to come across in the wild but you haven't yet, that you're always on the lookout for?

Kristen: Yeah. Pretty much now it's all the saturniids. I want to see all of the saturniids moths in real life because they're huge. The only one I've really seen is the luna moth.

Alie: Ooh, I've never seen one in person. I've only seen one on that weird commercial for Lunesta, which is some sort of sleep drug that's like, [*eerily calm voice*] "You might murder someone while on Lunesta." That's what I associate it with.

Aside: [*clip from Lunesta ad, also with eerily calm voice and plinky music: "Driving or engaging in other activities while asleep without remembering it the next day have been reported. Abnormal behaviors may include aggressiveness, agitation, hallucinations, or confusion."*]

So, to any large, beautiful, sage green luna moths, I am sorry that Lunesta co-opted your fluttery nocturnal image for this. Also, if you do need help falling asleep, try the Fancy Nancy technique from the Somnology episode. While you're trying to fall asleep, pick a category like fruits, or band names, or bugs, or countries. Or makes or models of cars, let's say for example, and think of one that starts with A: Alfa Romeo, B: Bugatti, C: Corolla, D:

Datsun, and so on and so on, and it helps me drift off *every* time. Using this technique from my mom, so far, I have not driven, eaten, or acted aggressively without remembering it. Well done, Mom. Also it's my mom's birthday this week: Happy Birthday Fancy Nancy! We love you! Anyway, luna moths:

Kristen: But a lot of these saturniids are only out flying around at night and within a small window of time of the year. And even within that, they will only come out really late at night, like midnight to 2:00 AM. When you take out that shower curtain with the light, you'll start to get small, little, very tiny moths, at first. And then as the night progresses, you'll get bigger ones. And then depending on what the moon is doing; you'll get really big ones.

Of all of the moths I really want to see, there's this really crazy one. It's the oakworm moth. It's out right now, but I don't know. I just recently fell in love with caterpillars. So anything, that's what I want to see.

Aside: And if you're wanting to go explore the world and look at wienerpillars, and creepy crawlies, and fungi, what's the best way to do it? Well, safety first.

Alie: And in the mushroom foraging, get a book, go with people that know what they're doing. If you're just getting into it, don't just go out alone and be like, "Looks pretty dicey!"

Kristen: No. I'm really fortunate to have a lot of really good friends, most of them are on the west coast and I miss them a lot. We would do these really big mushroom parties and we did one last year around this time of year. We got a cabin, and we do these big forays. So if you want to get into that, look at Facebook. There's tons of groups for everything. And just be, I guess, brave enough to be like, "Does anybody want to go to a park?" Because there's mushrooms and bugs everywhere. You could go to your local park; you don't have to buy a cabin or anything. And you could just set them out on the table and learn.

With a lot of things – even the insects too, because some of them you don't want to touch – it's good to go with a friend and then learn together. When I go looking for mushrooms, I take three field guides with me. Because some are old, it might be contradictory depending on the author. It's just good to triple check yourself with something as serious as amatoxins.

Alie: [*elongated*] Foooor suuuure! Okay. You're in the woods. You're looking for creepy crawlies. You got spider webs all over you. Maybe there's a tick in your butt crack and you're like, "I'll get it later." But what is the worst thing? You're so resilient in so many ways, but what sucks?

Kristen: When the person in front of you steps on ground bees and the bees don't go after them, they go after you. The places I go, again, I'm not on trail, and it's not like these beautiful, lush places that are like *Lord of the Rings*, beautiful forest. They're like greenbrier and honeysuckle. You have to fight to get through it with a machete. And then you get stung by wasps or ground bees and you magically are able to jump over them.

Alie: Oh my god.

Kristen: That's the worst thing about being out in the field. And like I had a spider bite me one time on the Appalachian trail, and I rolled up and looked at my friend and I was like, "My face feels funny," and she's like, "We need to go to town." There are very serious things to be aware of.

Also, this is another funny story. I don't remember the exact species but on the east coast, there's these millipedes – and I know they're not insects – they're called *Narceus*

americanus. They're the really big, long ones that could be as long as a pencil, they're about that thick. They're dark purple. They're on the trails a lot. You can pick them up and you can do stuff with them and whatever, check them out. They're cute. But there is a very close look alike on the west coast.

Aside: She was hiking along the Pacific Crest Trail, which, side note, runs over 2,600 miles from Mexico to Canada, which I did not know. And then I got distracted for 10 minutes on the Pacific Crest Trail website looking at gorgeous wilderness photos, and reading about how trail workers will "curse you for eternity" if you go potty on the trail and leave it for them to find without burying it 7 inches. Anyway, hiking!

Kristen: I was hiking on the PCT, and I'm really lucky, that it was the last day. I picked up this millipede, that looked a lot like the *Narceus americanus*. And I went to my car, and the thing had thrown up on my hand. And I didn't really think about it because, like, the ones on the east coast throw up on your hands. It's not a big deal. [*disingenuous "Sorry!"*]

But this one released an acid on my hand. I was driving and I was like, "Man, it really kind of hurts." And I looked at it, I had these like big stains, big red bloody stains on my hand. And I frantically pulled over and was like, "What's going on?" Trying to find a scientific paper about it. And it said if you touched your eyes, it could blind you. And I was like, "Thank god." So I went to a truck stop and washed my hands for, like, seven minutes.

Alie: [*screaming*] Oh god. Aaahh! Oh my god. Okay. Also, you've hiked so many trails. Any advice on buying boots?

Kristen: Oh no. God, no. No boots.

Alie: Okay. No boots?

Kristen: What I wear when I go hiking long distance are trail runners, because they dry out fast, they have a really good grip. They aren't heavy, and I just feel like they don't give as many blisters. That's the number one bad thing. But, if you're fighting fires, there's fire boots. And like, if you're kicking over, greenbrier to get into a forest plot, then I wear muck boots. But I never ever wear those hiking boots that are on commercials.

Aside: So don't let a lack of fancy boots or a fear of creepy crawlies hinder you, because there is so much beauty out there. I promise.

Alie: What about your favorite thing about being a forest entomologist?

Kristen: I love it when I get to be all alone in the woods and I actually feel like I'm part of something, because it's just, like, all around me, and it's just so familiar. It's overpowering sometimes the levels of sight and sound and smell. It's just, I don't know. It's just nice. I feel like I'm part of it.

Alie: It must really be a happy place to get away from the world.

Kristen: Yeah. I can actually kind of get lost in my thoughts because a lot of times, man, I got like 30 things going on and it always works out. Literally, before I called you, I was working, and now, as soon as we hang up, I'm going to put my backpack on and I'm going to drive to the woods.

Alie: Yes!

Kristen: So like I'm always thinking, so it's nice to kind of turn that off.

Alie: You're going to wake up and the birds are gonna be singing in the misty dawn. Gah!! So nice. This is making me want to go camping on my porch or something.

So ask smart hiking scientists creepy, crawly, spooky questions and you just might find yourself lacing up your whatevers to hit the trail. I know you want to follow her ASAP, so please do on Instagram [@KayDubstheHikingScientist](#). You can support her scicomm at [Patreon.com/KayDubstheHikingScientist](#). She also has [merch](#) that says "I'm a hiking scientist" which is wonderful and many of you need.

You can find links to all that, and links to her socials, and to the nonprofit [BlackOutside.org](#), as well as more links up at [AlieWard.com/Ologies/ForestEntomology](#). We are @Ologies on [Twitter](#) and on [Instagram](#). And all Spooktober, folks are making daily drawings along different episode themes, so check out the *Ologies* Instagram for more info on that or look up [#Drawlogies2020](#). It's SO good.

I'm @Alie Ward on [Twitter](#) and [Instagram](#), you can get *Ologies* merch, including brand news masks and cozy fall blankets at [OlogiesMerch.com](#). Thank you, Shannon Feltus, and Boni Dutch of the comedy podcast *You Are That* for managing it. Also, listen to their podcast this week because they have Dominic Monaghan from *Lost* and *Lord of the Rings* on, who is amazing. Erin Talbert admins the [Facebook](#) group of smart cool Ologites. Emily White is amazing, and her crew of transcribers make these episode transcripts available for free for our deaf and hard-of-hearing ologites, or anyone who wants transcripts at [AlieWard.com/Ologies-Extras](#). Thanks, Caleb Patton, for adding the bleeps where needed. There are kid-friendly episodes up at the same link, which is in the show notes.

Thank you, Noel Dilworth, who helps schedule all the guests, and to assistant editor Jarrett Sleeper, and the *Purrrcast's* Steven Ray Morris, both now collectors of Face Caterpillars, the majestic mustache. SRM also has another podcast, *See Jurassic Right* about dinos, and his back to school series going on right now has some great ologists on it. Nick Thorburn of the band Islands wrote the *Ologies* theme music.

And if you stick around to the end of the episode, you get a secret. Sometimes that's a treat, sometimes it's a burden. This secret is a follow up to Condorology's foot confession. Here's the deal. My feet finally started peeling. I did this acid foot mask, last week I was like, "Nothing." Four days in, I think my feet were just rhinos, and nothing could penetrate them. And now, what? Ten, eleven days in? Wispy sheets of my own flesh are ribboning off, drying in curls, and making my socks feel like they are stuffed with feathers. It's so gross.

Also, if you need to dip right now, I understand. But for those of you who can weather it, I don't even want to tell you, but I feel compelled to. As I was examining my peeling, post-foot mask feet, skin shedding like ghostly fallen leaves, [*whispering ashamedly*] my dog licked one up from the bathroom floor in a moment that was disgusting and powerful. And I realized that she ate my foot, and now she is made, if only for a few molecules, of me. Which I'm feeling very nauseous and parental about it. Maybe the grossest secret I've ever told? Maybe next week I'll just give you a life hack. Okay? Berbye.

Transcribed by:
Ruby-Leigh Tonks
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Hana Snook, Wellington, New Zealand 😊
Aska Djikia

Edits by Kaydee Coast, who reminds you don't lick toads or slugs, check your crevices, and milk your thumbs. Kthxbi.

Some additional linkage:

[Her URLs](#)

[KayDubs' YouTube channel:](#)

A donation went to [BlackOutside.org](#)

[Dr. Wickert on ResearchGate](#)

[Her advice on what to take on a long-distance hike](#)

[Expedition Unknown about Moth Man](#) with Phil Torres

[Moth Man's Butt](#)

[Saturniid moths](#)

[Do moths have dicks?](#)

[Formication a.k.a. the creepy crawlies](#)

Eacles imperialis: the [Jimmy Dean sausage of caterpillars](#)

[The Lion King](#) grub-eating

[Brad Paisley would like to check you for ticks](#)

[Psychoactive plant-and mushroom-associated alkaloids from two behavior modifying cicada pathogens](#)

[Lunesta commercial](#)

[Fungus zombies!](#)

[Cicadas on shrooms](#)

[How to poop on the PCT](#)

Sleeping fruit fly study a.k.a. "[Correlates of sleep and waking in *Drosophila melanogaster*.](#)"

[Forest Service's bark beetle guides](#)

[Creek Fire and bark beetles](#)

For comments and inquiries on this or other transcripts, please contact OlogiteEmily@gmail.com