

But Why: A Podcast For Curious Kids

Do Bumblebees Have Hearts?

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[Jane] This is But Why: A Podcast for Curious Kids. I'm Jane Lindholm. Each episode we tackle a question from a curious kid and we help find an interesting person to offer an answer.

This episode of But Why is sponsored by Seventh Generation, asking "but why?" for over 27 years. Why don't cleaning products have to list their ingredients on the label? Why are so many laundry detergents such crazy colors? Seventh Generation encourages kids of all ages to keep asking why. Learn more at sevengeneration.com.

Today's episode is all about bugs. We've gotten a lot of questions from you about insects and other kinds of creepy crawlies. So we thought we'd tackle some of them with two women based in Portland, Oregon who live for bugs.

[Honaker] My name is Jess Honaker and I am one of the Bug Chicks.

[Reddick] And my name is Kristie Reddick and I am also one of the Bug Chicks.

[Honaker] We're two wild and crazy gals who love bugs.

[Jane] Jess and Kristie are entomologists. Those are people who study insects. Jess and Kristie go around the U.S. and beyond teaching kids and adults all about the wonderful world of bugs and trying to convince bug skeptics that you shouldn't hate or fear them. You should learn all about the amazing things they do instead.

So we thought the Bug Chicks would be the perfect pair to pose your entomological questions to. Our first question comes from Lila.

[Lila] What do mosquitoes do in the winter?

[Reddick] Oh my goodness Lila that is a fantastic question.

So Lila, this is Kristie and I'm going to answer some of that question for you.

It depends on the kind of mosquito. There's not just one kind of mosquito in the world. And so there are lots of different species of mosquitoes. Some mosquitoes in the late summer and early fall will lay winter-hardy eggs. Basically these are eggs that can live and exist in their egg form over the winter and sometimes they're laid in the soil. Then when it rains or when snow melts, pools of water will form and that's where an egg for mosquito loves to hatch in the spring and early summer. So sometimes you'll get what

we call over-wintering as an egg. And then sometimes you'll get overwintering as a larva as well.

So mosquito larvae live in water. Some of them like really dirty water, like really icky gross water, and some of them prefer cleaner water. And they kind of wiggle and squiggle and kind of flop around in the water and they will do that over the winter in warmer areas where the water doesn't freeze. So that's what mosquitoes do over the winter you just don't see them as often because it's cold and you're not out poking around in the dirt when it's so-cold out.

[Jane] Now something I have heard that if you are around mosquitoes and you live in a place where there are a lot of mosquitoes it's only the females that will bite you. Is that true?

[Honaker] That is true. The females take blood meals for the protein in them so that they can nourish their eggs that they have. The male mosquitoes are often pollinators.

[Reddick] Yeah, some of the most rare orchids in the world are pollinated exclusively by male mosquitoes. So sometimes people say if I could snap my fingers and get rid of all of the mosquitoes in the world that would be awesome. But then we would lose some very rare, very special flowers. So that wouldn't be so awesome.

[Jane] That actually answers another mosquito question we got on the show.

[Lydia] Hi my name is Lydia, I live in Burlington, VT. My age is six. Why do we have to mosquitoes?

[Jane] So Lydia, one of the reasons we have mosquitoes is because they're pollinators, at least the males sometimes are. They're also a big food source for some birds, bats, fish, frogs and other small animals. There are something like 3,500 different kinds of mosquitoes in the world and a couple of hundred of them bite humans. They also often carry different diseases that they can give to humans or other animals when they bite us. So there are certainly a lot of people who question why we need mosquitoes around at all. And some scientists who work on ways to eradicate or get rid of the most problematic species around the world.

Let's move on to another insect question that the Bug Chicks helped us tackle.

[Lucy] Hi my name is Lucy and I'm from Longwood, Florida. I am seven years old. And my question is why most insects so small?

[Reddick] The insects that we have here on our planet now a days are smaller than the insects that used to live on the planet.

[Honaker] There are two reasons for this Lucy. One is there's not as much oxygen in our atmosphere as there was during say the prehistoric times when the dinosaurs roamed the earth and there were giant, like dragonflies, and things like Meganeura, which was a foot to two feet in wingspan. So you know insects as they're flying around us they're walking as they're eating, they breathe oxygen. They breathe it slightly differently than we do. They have something called spiracles which are insect nostrils. So the spiracles lined the sides of the body they go all the way from the front of the insect down, down to the back on the sides of the body. And they're attached to something called trachea which are like tubes, kind of like lung tubes that go in to the inside of the insect. And those lung tubes help to transfer oxygen and carbon dioxide just like us. So if you breathe in, you're breathing in oxygen. And when you breathe out, you're breathing out carbon dioxide. That's called respiration. So right now the insects, since we have less oxygen in our atmosphere they are a little bit smaller than they used to be. Also there's some talk about the weight of exoskeleton like they were able to carry a heavier, larger exoskeleton when there was more oxygen in the atmosphere. So that's a slightly complicated answer to your very simple question. But there's also some pretty big bugs out there, Lucy. Yeah.

[Jane] Tell us about some of the big bugs because I mean maybe we are more familiar with some of the smaller bugs but there are some pretty big bugs.

[Reddick] Yeah there's definitely big bugs.

[Honaker] Kristie and I were in Costa Rica a couple of years ago now. And we found a beetle that was literally bigger than our hands from fingers to the heel of our hands was its body and then its legs were probably six inches long or something like that. It was the biggest beetle I've ever seen in my life.

[Reddick] It was an elephant beetle from Costa Rica.

[Honaker] And it was it was a little slow and it was a little clumsy but it was it was it was the biggest insect that I've ever seen in in the wild.

[Reddick] its body was somewhere between a tennis ball and a softball. That's how big its body was. And it sounded like a helicopter when it flew.

[Jane] Did you pick it up?

[Reddick] Oh yeah had I had it on my hands. And then it flew away from us and then we ran to catch it again because we were filming with it and then we stopped because we realized we were running in the rain forest and we had sandals on and there were there were snakes. So we just stopped for a second and we let it go.

[Honaker] Yeah. And then also there's like on our wall right now we have an insect specimen called Phasmida and it's a very long walking stick and it's about a foot long. So that's 12 inches .

[Reddick] And it's fairly thick as well.

[Honaker] It's a beefy walking stick. It's not like it's not like a blade of grass. It's like a twig with legs. So there are really big walking sticks. There are very large spiders and I know we're talking about insects. You asked about insects. But there are other arthropods, an arthropod is an animal with an exoskeleton and jointed appendages, like legs and antennae and things. So spiders are arthropods and there are some really big spiders, like as big as a dinner plate with their legs span. The Goliath bird eater tarantula is one of the largest spider species in the world.

And then if you go to all arthropods, Oh.... there's the coconut crab.

[Reddick]I want to see a coconut crab.

[Honaker] They're at my top five.

[Reddick] Oh man. It's on my bucket list. They like the size of a trash can and coconut plantation owners in the tropics will use them as kind of like guard dogs for the coconut trees.

[Honaker] And then they also eat coconuts. So it's trick. It's a tricky relationship.

[Reddick] They can they can crack a coconut with one of their claws and they're the size of a trash can. Yeah. It's amazing.

[Honaker] Well that's the upper limit for how big they get. But they're big. They're like big kind of land lobsters.

[Jane] Wow, cool!

[Honaker] And they are the largest terrestrial arthropod.

[Jane] Yeah. Well and moths, too, right? I mean if we think about the wingspan on some moths they can get large.

[Honaker] Yeah about a foot long. The white witch gets very long like widthwise. And then you've got the atlas moth which is the length is ver, very long.

[Jane] Yet another question that came into this show has to do with bumblebees which sound like this.

[Dylan] The name is Dylan. I live in Jericho, Vermont. I'm 7 years old and I'm learning about bumblebees so I'm asking this question: do bumble bees have hearts?

[Reddick] Oh that is an excellent question. So arthropods, and bumble bees are arthropods, they have a different kind of circulatory system than we have. Their heart, they do have a heart, but it's a long tube and it runs along the top of their back, it's on the dorsal side, and instead of having veins like we have, that hold the blood that flows through our bodies, they actually have an open circulatory system. So their blood bathes their organs.

And if you have ever been in the car with your folks or with friends, parents, and you run through like a swarm of insects or something and you sort of see that yellow-green splatter on the car, that is bug blood that's called hemolymph.

[Honaker] It's really cool. And then the heart. It's like an open tube. Kind of imagine a straw, right. If you can imagine a straw, it goes from the head of the insect down to the abdomen on the back along the back side. And then imagine if you poked holes in the side of the straw all the way down the side. Those holes are called ostia and they help pump the blood in and around the insect body.

[Jane] Now in case what Dylan is really asking is something more like do bumblebees have feelings. You know we can we know that our emotions in humans come from our brains but often we say, oh my heart hurts, i miss you, or I'm sad because my heart feels bad. So do bumblebees have feelings?

[Reddick] They don't have feelings in the same way that humans do.

[Reddick] And also we attach an idea of a feeling to a feeling that we have. So like when you say my heart hurts, i miss you, We're putting words to that feeling to try and describe what it is. So obviously bumblebees don't try to describe to their friends what they're feeling in the same language that we do. Now, that does not mean... there's a lot of discussion about whether or not insects feel pain.

So Jessica mentioned the dorsal heart, if you go down the belly that's where their nerve cord is but it's not like in a spine like us. They're invertebrates so they don't have the vertebra bones but they do have a nerve cord that runs down from their head down their belly all the way to the end of their abdomen. And they have what's called a ganglia which are like nerve center, it is kind of like mini brains. So they've got a ganglia for their first pair of legs and second pair of legs and third pair of legs and then they've got little abdominal ganglia and they've got two ganglia in their head. One that kind of operates their mouth parts and one that operates their kind of brain center, what we would think

of as a brain center. So there's a lot of discussion about whether or not insects feel pain because they do have these nerve cells. Some people believe that they do feel pain. Some who believe that they don't.

But we at the Bug Chicks teach respect of all living thing.

[Reddick] And especially of insects and spiders because some people love to smash them. So I'm going to say to Dylan that since we don't have a really clear answer on whether or not they feel pain in the same way we do, Jessica and I like to teach people that if we're respectful and not smashing them and hurting them, then that's a good way to prevent possibly feeling guilty in the future if we caused another animal pain.

And also we don't want to cause them pain anyway. But also I want to say this: insects, we are learning so many cool things about insects, like we're learning that some wasps have facial recognition. So they can recognize the people who live in the home where their nest is and they can recognize strangers.

So as we learn more and more about the abilities of insects and their sensory abilities, I think in the next couple of years that question about pain will be answered.

[Honaker] And about emotion as well.

[Reddick] Even if they're simple emotions I mean the beautiful thing about science is that you're always learning something new and right even the things that, you know, you think that you know or think that you know that's a common theorem can be disproved later. Sure. So it's it's possible. I don't I don't know if it's probable but I will say anything's possible.

Science is crazy.

[Honaker] Science is crazy. Yeah.

[Jane] Well and in my family we have some beehives. We keep honey bees and you can watch them communicating with one another in really interesting ways. And they have really interesting ways of communicating.

[Honaker] They have relationships with each other and they have very interesting ways of communicating. So who are we to say that just because we don't speak Bumblebee we don't know what they're communicating with each other exactly.

[Jane] So they could be saying that kid looks friendly.

[Honaker] Yeah, well, it's funny. I was going to I was going to tell a little story. I was studying wasps down in Florida at the Archbold biological station and I was out with the director and he studies ants and we were walking along this path and this male

carpenter bee came and flew right in front of us and we kind of stopped and looked at it, because we're bug dorks. And so we acknowledged the carpenter bee and then the carpenter bee came and zoomed up to my face and then zoomed over to Mark's face and then zoomed out and kind of took in the both of us at the same time and Mark told me, they can kind of see facial recognition and that he was checking us out and decided we weren't a threat.

It was one of those moments in my life where I had a real encounter with another species and that was when I realized that there was so much I didn't know about insects and I was it was very early on in my education and that has stuck with me. We've all had a special encounter with an arthropod whether it's a ladybug landing on us or a dragon fly resting on us to clean its wings or even a bee that stops at our picnic table to just take a moment and slurp up some sugary liquid and clean itself and then fly off again. So if we can look for those moments as special encounters I think that that we can help people see these animals in a different light.

[Jane] Thanks to the bug chicks Jess Honaker and Kristie Reddick for giving us such awesome answers to our nagging bug questions. You can find out more about them on the But Why Facebook page. We've got another question recently from Ian that we also wanted to tackle in this episode. He's 7 and he lives in Cedar Rapids Iowa.

[Ian] My question is why do I feel itchy all over when I think about ticks?

[Jane] I don't blame you Ian. Ticks are arachnids like spiders so they have eight legs. They can be as small as the head of a pin depending on what part of their lifecycle they're in and what species of tick it is. And to move from one stage in that life cycle to another, ticks usually need to have a blood meal. They need to find another animal and bite that animal and suck out its blood, like the female mosquitoes we heard about earlier.

Just thinking about that is probably enough to make your skin crawl. But in many parts of the U.S. ticks are responsible for transmitting illnesses like Lyme disease, Rocky Mountain spotted fever and anaplasmosis. Some of the illnesses caused by ticks can be really serious. So it's a good idea to try to prevent tick bites. The best way to do that is to wear long clothing when you're out in the woods and fields. You can even tuck your pants into your socks and wear long sleeves and you should always do a tick check when you come back inside from a place where ticks live. Check the places ticks like to hide like the backs of your knees or your hairline and get someone to help you check the places that you can't reach or see.

But Ian, I also love your question because it gives me a chance to share one of my all time favorite words from when I was a kid: formication. I'll say it again, formication. It's defined as the sensation of having insects crawling all over your skin. And the word

comes from the Latin word for ant: formica. There can be some medical conditions that lead people to have this feeling. But my guess is that for you, Ian, thinking about ticks makes you kind of imagine them crawling on you and your brain tricks your body into feeling that sensation.

One time I spent a whole afternoon creating an obstacle course for ants that had built an ant hill near my house. I made ramps and bridges out of sticks and mudslides and all other kinds of cool things for these ants to crawl around on. And of course, a lot of ants crawled all over my sneakers and my legs that day. So when I went to bed that night I couldn't stop feeling like I still had ants crawling all over my skin even though I had taken a bath and there were definitely no ants on me. So I sympathize with you, Ian. It is not a nice sensation. My only advice to you is to arm yourself with that knowledge about how to prevent tick bites and it might help keep that feeling at bay.

That's it for But Why for today. Our show is produced by Melody Bodette and me, JaneLindholm for Vermont Public Radio. Our theme music is by Luke Reynolds.

If you have a question for us on any topic, have an adult in your life record it and send it to us and maybe we'll be able to feature you on the show. You can use a smartphone memo app. Just be sure to include your first name and where you live and how old you are. And then the adult can send the audio file to questions@butwhykids.org

And if you want to see some videos of interesting bugs go to the But Why Facebook page. I took a neat video of a honeybee from one of the beehives at my house. When the hive gets too hot, the honey bees actually fanned the hive with their wings to drop cooler air up into the hive and keep the colony from overheating.

We'll be back in two weeks with an all new episode. Until then, Stay Curious!

[Liam] This episode of But Why was sponsored by Seventh Generation which believes clean it should be truly clean. Making products with plant-based ingredients and asking "but why?" for over 27 years. Why can't all companies be both sustainable and successful while supporting their local communities? Why don't cleaning products have to list their ingredients on the label? Why should diaper smell like artificial fragrances and why are so many laundry detergent such crazy colors? Let's all keep asking but why caring today for people and the planet for the next seven generations of tomorrows. Learn more at [Seventh Generation dot com](http://SeventhGeneration.com)