But Why: A Podcast for Curious Kids

How do bees make honey and why do they sting?

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Jane 00:03
This is But Why: a Podcast for Curious Kids from Vermont Public. I'm Jane Lindholm

Song 00:10
Hello little pollinator. Hello little honey bee. Do you like the taste of flowers early in the morning? Goodbye little pollinator, Goodbye little honey bee I didn't get your name faster than you came. Quick away you flew, you've got a job to do, don't you?

Jane 00:29
We're going to talk all about pollinators and yes we will get to stingers!

Song 00:35
The colors are profoundly beautiful honey bee, where would I be without you?

Jane 00:55
Those are the sounds of thousands and thousands of bees right outside my house. I am a beekeeper. Have you ever seen a beekeeper? We look pretty silly when we're wearing our bee suits to protect our faces and bodies from getting stung, big white suits with a screen over our heads. Beekeepers help keep a colony of honeybees healthy and safe. And we sort of farm them for their honey. Here in Vermont, right now the fields are full of bright yellow goldenrod one of the honey bees favorite foods, and I'll be harvesting the honey for my beehives in the next few weeks. So we thought this was a good time to answer some of the questions you've been sending us about bees. To help me out, I paid a visit to a beekeeper who has a lot more experience and a lot more bees than I do.

John 01:48
Hi, I'm John Hayden and I'm an organic fruit farmer at the farm between in Jeffersonville, Vermont. I am putting on my bee suit so that if the bees get angry, I'm dressed in white so they don't see me as well. I won't think I'm a bear and they will sting me through my clothes. So that zipped up. Taking my hat off. Putting on my hood, veil here. We're getting our smoker ready. So we just lit this, and now I'm puffing some air through it to get the smoke on.

Jane 02:25
What is the smoke do?

John 02:26
The smoke makes the bees think that there's a forest fire. And if you're a bee hive in a forest, and the forest fire's coming, you need to move. So what they started doing is eating honey, they're filling up on honey in case they have to move and when they eat honey they get more docile so it keeps them calm.

Jane 02:43
Yeah, docile means calm, less likely to sting you.

John 02:47
We like docile bees.

Jane 02:49
Well, we have a lot of bee questions. Our young listeners are big bee fans and very curious about bees. So I'm excited to talk with you.

John 02:59
Yeah, this is gonna be great.

Jane 03:02
Where do you keep your bees, John?

John 03:03
We keep them in our yard right here pretty close to all our fruit and berry bushes, fruit trees and berry bushes. And I also have some in another location that we put up at another vegetable farmer's who wanted to bees for pollination. So but you can see, I'm counting my hives I don't even know how many I have right now. 1 2 3 4 5 6 7 8 9 here right now what?

Jane 03:27
How many bees do you think you have?

John 03:29
I have approximately 450,000 bees.

John 03:33
You know, you mentioned that your bees are pretty near your fruit trees and fruits and berries and flowers. And of course, that's what bees love. So maybe this would be a good time to answer our questions about pollination.

Kyler 03:46
My name is Kyler. I am six year old, Meridian, Idaho. And my question is how does pollinating happen?

Anita 03:56
My name is Anita. I am six years old. I live in Calais, Vermont. My question is why do bees pollinate?

John 04:05
Pollination is kind of a deal that flowers have made with bees. So bees, they're vegetarians, right? So they eat pollen and they feed pollen to their babies. They're young, the brood and they drink nectar for energy. And then they use the nectar just to make honey too. So the flowers are producing both pollen and nectar for the bees to entice the bees to lure the bees in to come and spread pollen around. So for a flower to reproduce, the plant wants to make babies and make seeds and those are the babies. For that to happen, the plants have to pollinate. So the bees are the ones who spread the pollen, which are the boy part of the flower and to the female part of the flower. So and it's all to deal with the bees get the food and the flowers get to reproduce.

Jane 04:59
And the bees aren't doing this thinking they're doing a good thing for the flowers, the bees are just trying to get their food. But as they go from one flower to the next, they're leaving some of that previous flower at the next flower. So, you know, it's kind of a tricky deal. Neither one really knows what they're doing.

John 05:13
Well, I don't know, it seems like the plants are a little bit smarter and enticing the bees. They know what they're getting out of it. Yeah, but it's a but it's true. I don't know what bees think. I don't think anybody really knows what bees think. And sometimes people even think of a beehive as one whole organism, one animal, and that the bees are just little cells that are all working together, kind of like the cells in our body work together.

Jane 05:34
Why do they think that? Because bees communicate in this really interesting way.

John 05:37
They communicate in interesting ways that way our cells can communicate to each other. There's a thing called like a "hive mind" when they all decide to swarm and leave the hive or when when they're hanging out in a tree looking for a new home, they all decided to go to one place. So we don't know how they really make these decisions. And we make guesses and we tried to figure it out through science, but we haven't figured it out yet.

Jane 05:58
All right, here's a question from Lily.

Lily 06:00
I'm four years old. And I live in Plymouth, Michigan. And my question is do bees come out in spring?

Jane 06:11
Do bees come out in spring?

John 06:13
So native bees are really interesting bumblebees are out they come some come out really early in the spring. And those are the ones that are doing most of the work on our early flowering trees. Like we
have cherries and plums. We have few apricots and things like that that flower really early. Honeybees are still resting, they're still on winter vacation. When these bees are out when it's like 45-50 degrees it and little cloudy or drizzly, they're out visiting those flowers. Honey bees come out whenever the weather is warm enough for them to come out. So they like it above like 55 degrees, and you know, sunny and not too windy and rainy. And then they'll come out. So even in the wintertime sometimes you'll see bees coming out. And they it's good for them to come out. They come out they go to the bathroom, and just you know fly, it's fresh air, I think, but mostly in the spring is when they are starting to do all the build up their colony numbers. So it's when the queen really starts laying eggs. And then they really started getting to work collecting pollen and nectar. And usually pollen in the spring is really important because that's what they feed to their babies. And they want to build up their numbers really fast. So they're, they're collecting a lot of pollen in the spring.

Jane 07:19
And what did they do in the wintertime?

John 07:20
So in the wintertime, they have to keep their hive at a constant temperature, I think it's around 90 degrees. So they cluster together. And they buzz and they vibrate and they dance. They breathe on each other. So they make a cluster it's called and it's like a ball of buzziness and it keeps by creating all that energy and moving around they keep keep themselves warm. But to do that they need to have honey and honey is the energy that keeps them warm in the winter. It is the food they need to keep going. That's really interesting because the bees will be on the outside of that ball and they get a little cool then they move to the inside and the bees that are on the inside that were warm will move to the outside. They've got it figured out.

Jane 07:59
And that goes for native wild bees as well as domesticated, well semi-domesticated honeybees.

John 08:06
Well, that's the really interesting thing is honey bees are the only bees that really store honey and keep a colony going over the winter. We have other, we call them social insects that all work together where you have a queen and workers and drones, you know, different castes like that, like the bumble bee colony. But the bumble bee colony only lives one year. And that queen bumblebee, she comes out in the spring. And she gathers pollen and nectar and then she has to start from scratch. She has to find a place to make a colony. And then she has to make the wax and she has to lay the eggs. And then she keeps those eggs warm by vibrating over them. So she she incubates them like a mother hen would. And then after about a month or so then those eggs hatch and become workers. And then that queen bumblebee can stay in the hive and the workers go out. And then at the end of the summer that queen lays eggs that are going to be males and females and they go out and mate. And then the males all die. And then those new queens are the ones that are going to start colonies the next year. So they don't keep honey stores. Honey bees are the ones that are the only ones that really do that, keep a colony going year after year after year.

Jane 09:09
So our next question is from Bellamy who lives in Sharon, Vermont.

Bellamy 09:13
And I'm four years old. And I wonder how bees make a beehive?

Jane 09:19
I wonder how do bees make a beehive? So maybe we can open up and you can show me, I mean...

John 09:24
Yeah, the honey bees, they're what we call cavity nesters. So they like to live in holes or places where they can get out of the weather so they're not going to get rained on it's gonna be too windy and cold. So what they'll have to do is find an appropriate place where they can stay warm and dry. And then they start making these unbelievable wax combs that they make out of hexagonal, so six-sided figures that you've seen pictures of, honeycomb and that is like they're the best engineers going because they build these columns that hang down and they're very strong and the bees have just the right amount of space between them to go between. And then they can pack them with honey and pollen and babies and pupae and all kinds of stuff that makes the hive happen. They make their own building materials. You know, they're beating humans on that. We have to like harvest wood or make bricks, and they just make wax out of their own bodies from the honey and nectar and pollen.

Jane 10:20
It's pretty amazing. I mean, looking at what bees can do. And these, as you said, perfectly shaped hexagons and they're not using tools, they just know how to do it.

John 10:30
Yeah.

Jane 10:31
All right, so you want to open up?

John 10:34
So we'll puff a little, just a little puff of smoke in the front there. That's where the guard bees like to hang out. So we want to let them know, okay, hey, maybe there's a forest fire go eat honey.

Jane 10:44
And we're not bears.

John 10:45
We're not bears, we're wearing white, we're good guys.

Jane 10:48
You really think the bees know that if you're in white, you're not a bear. Do you think that they can differentiate?
John 10:52
I think they are keyed in to color. So some of their natural enemies are things like bears and skunks. So things that are dark colored, that they're going to be more aggressive towards. So I think when we're wearing white, it's just gives us a signal that maybe they can't see us as well. But we're also we're not a bear or a skunk. So I'm just taking the cover off the top.

Jane 11:12
I'm going to put my microphone right next to the hive. So you can all hear these bees.

John 11:16
We don't use a lot of smoke, a little smoke in here, we can push it down, I can pull up one of these frames here and see if they've been doing so these are new frames we just put in not too long ago, maybe a couple of weeks ago.

Jane 11:33
So a frame....

John 11:34
A frame is a rectangle of wood that has a little piece of plastic in the middle with the outline of the honeycomb. And then the bees build that out they put wax on it and build it out. So what I'm looking at here is to see how well they've done building it out. And they're doing pretty good. And you can see they're already putting nectar in there. These are all girls here except for there's a there's a drone right there. That's the boy bee.

Jane 12:01
All the worker bees are female.

John 12:03
They're all females.

Jane 12:04
And just one queen per hive.

John 12:06
Just one queen per hive. Yeah, they can they can make new queens if the queen is getting old and not doing a great job laying eggs. Then the hive mind, the bee all figured out together that they are going to make a new queen and they start making a queen cell and feeding royal jelly to the to the little larva that hatches in there. And that gives it like superpowers to become a queen.

Annika 12:29
My name is Annika. And I am six years old. I live in San Diego. And my question is how to bees make honey and why?

Owen 12:39
My name is Owen. I live in Pennsylvania. My age is five. My question is how do bees collect nectar?

Jane 12:50
So the bees are collecting pollen and they're collecting nectar. But neither of those things are honey. So how do the bees take the nectar and make honey?

John 12:58
Okay, so the nectar is in the flower, right? So they're going up and they have a mouth part that's kind of like a straw, I guess you could call it they lap up the nectar. And then they got a crop inside their mouth. It's like a little sack that'll carry fluid, liquid like nectar. And then they bring that back to the hive. And they kind of pass it around, they put it in the cells, those little honeycombs. And they dry it down so they have to dry it down. So honey is really concentrated nectar. It takes so many trips from a bee going back and forth collecting nectar just to get a teaspoon of honey. It's amazing.

Jane 13:36
So nectar is basically just watered down honey. And what they're doing is concentrating, getting that liquid getting the water out of the nectar to turn it into honey. And that's what honey is that we eat.

John 13:45
Yeah. It's this it's the sweet liquid that the flower is offering as a reward for the bee for visiting. And the bees turn that, some people say it's like be puke. They're vomiting it back up. But we're trying to market honey here so we don't use that term.

Jane 14:00
And with the pollen, you can see sometimes bees are carrying pollen on the backs of their legs. They don't turn that into honey.

John 14:06
No, they use that... so pollen is like protein is the building blocks of animal body. So they use that to feed their young mostly.

Jane 14:15
All right, but a lot of kids and adults are a little bit afraid of bees. And that's mostly I think only because they worry about getting stung and getting stung hurts. It doesn't feel good. So we have a bunch of questions about stinging that maybe you can help us answer.

Mirabelle 14:29
Hi, my name is Mirabelle. I live in Colorado I'm four. Why do you bees have stingers?

Greer 14:37
Hi, my name is Greer. I am 10 years old and I live in Pittsburgh, Pennsylvania. My question is why do bees die when they sting you?
My name is Blake. I'm from Pittsburgh, Pennsylvania. I'm six years old. And my question is why do bee stings hurt?

John 14:58
Bee stings, I mean the whole idea of a bee's sting is a really cool thing. It's a way for the bees to protect their honey and their hive and their brood, you know, because those animals that come in to hunt skunks, they want to eat bees, they'll come scratch on the door at night and the bees will come out and see what's happening in the honey and the skunks'll scoop them up by the handful and eat them up. Or a bear will come in and the bear likes to eat the baby bees, the little fat, chunky larvae. And also I'm sure with a little honey dip on the side, it's pretty good. But so the bees, they got all this honey. And in nature, everything is food for something else. So bees have figured out this way to protect themselves. And because they all are in a colony, and we have like, you know, 30 to 50,000 bees in a colony, they can sting. And the sting is, it's really their egg laying device that's called an ovipositor that's adapted to being a nasty little stinger. And it's got all this stuff going on for it. It's got barbs, you know, like little hooks on it so that when it goes in you, it stays in you. And that's one of the reasons the bees die is because they fly away and they pull out, it pulls out of their abdomen, their bottom part, and it leaves a little sack that has venom in it. So it's got this poison, and it's got a muscle around it that keeps pumping. So if you think like a little bulb with a barbed point, and it's pumping poison into you, it's a really amazing adaptation. So they they sting mainly to protect their honey and their colony. But even now you can see I'm here, I don't have any gloves on, I got my hands right in with the bees and stuff. So they're not, they're not so aggressive. And then when they're out foraging for nectar and pollen and flowers, they're so busy doing that, that they're not going to go after you. If you come close to their hive, that's when you're going to maybe get into some trouble. But usually, unless you step on them with your bare foot or you brush against the flower they're on there, they're not gonna sting you so you can go out and you can get right up close and watch them and don't be afraid. Sometimes on rainy cold days, they're in a bad mood too, kind of like us, they can get grumpy to. Today is a nice, sunny, warm day and we've got them open and they don't even care. Some people believe that being stung is good for you. There's a thing called apitherapy, where the bee, the bee venom is considered to be medicinal. So for people like me who get old fingers and stuff, it might be good to get stung by bees once in a while. So I don't I really I don't mind it too much.

Lily 17:21
My name is Lily. I live in Georgia. And my question is do wasps and things that sting have to try to sting? Or is it just that they can touch their stinger to something and it just happens automatically?

Jane 17:37
Do they just sting you because they're Stinger brushes against you? Or do they have to think I'm going to sting that guy, I'm going to sting that kid I want to hurt him.

John 17:43
I don't think they're just trying to sting to hurt you. They're stinging because they're afraid of you. They think you're trying to cause them some harm. So it's just basically a misunderstanding. Unless, of course you're trying to swat the wasp or something that, it's justified.
Jane 17:56
Then they're doing it for good reason.

John 17:57
But wasps don't have barbed stingers like honey bees have. So they can they can sting you and they can see you multiple times. And they can decide how much venom to put into a sting. And but it doesn't, it's not just they have a lot more control than just you rub up against them and stuff. The interesting thing about wasps versus bees is bees are great pollinators mostly because they're searching for pollen for food. And they're so fuzzy that they carry the pollen around by accident or on purpose to so they can bring it back to the hive. But wasps don't have as much hair. So a lot of times people get stung by wasps and say they got stung by a bee. Especially like yellow jackets. They look like bees. They're black and yellow. And and they sting. And wasps are meat eaters. So they feed their babies, caterpillars and other things that they catch around. So they can be really good for us farmers because they're helping us with our pest management because caterpillars like the my apples and stuff. So we like the wasps round too. So we welcome them. But we stay we give that we stay away from them because they're a little meaner than bees.

Jane 19:02
That kind of answers a question we got just as we were putting this episode together.

James 19:08
My name is James and I live in Marion, Iowa. And I want to ask a question. What's the difference between a wasp and a bee and a mosquito?

Jane 19:23
Wasps and bees and mosquitoes? Oh my! Well, James, John just told us that one difference between wasps and bees is that wasps are meat eaters, some wasps you might have heard of are hornets and yellowjackets. Wasps have smooth bodies, while bees are fuzzy and wasps can sting more than once while honey bees at least can only sting once because they have a hook at the end of their stinger. So the end of their body stays stuck in whatever they stung. Bumblebees can sting more than once but they're not usually very aggressive. Now, bees build nests out of wax. Wasps chew up pulp, leaves and stuff, to make a papery nest out of their own saliva. Bees and wasps are both members of the family of insects known as Hymenoptera. Now, mosquitoes are also insects, but they're pretty different. I'm guessing you're thinking of them together because mosquitoes can cause you some itchiness or pain too. Well, while bees eat pollen and nectar, and wasps eat caterpillars and spiders and things like that, mosquitoes eat us! We are their food source because they suck our blood to get their energy. Coming up, we'll learn how beekeepers get from the hives.

Jane 19:25
This is But Why: a Podcast for Curious Kids. I'm Jane Lindholm. Today we're at The Farm Between in Jeffersonville, Vermont, talking to John Hayden. And here's a question from Charlotte.

Charlotte 20:56
Hi, my name is Charlotte. I'm five years old. And I want to know, how do people get honey out of bee hives without getting stung?

Jane 21:10
She says how do people get honey out of beehives without getting stung? Part of it is wearing these bee suits, right?

John 21:16
Yeah, these help. And sometimes you do get stung getting the honey out. So the way I do it is I pick up one of those frames that's full and is capped we know it's finished honey, it's all dried to, to the, to the right, that consistency that there's going to be good honey and be able to store for a long, long time. Once the whole frame is capped, I take it and I have to brush those bees off. So I brush them off, I have fancy little bee brush that's very soft and gentle and I knock them back into the hive. And do that so once in a while they don't like that. I'm mostly I usually get stung when I'm not paying attention where I put my fingers in my hands and I squish a bee by accident. So I tried to be very, like trying to move slowly and be very kind of meditative around the bees. Because I can tell if you're nervous and anxious to like, I'm not nervous now. So I'm gonna go like this and they might be more antsy, they're like horses like that, you know, horses are like that, be calm around, and they'll be calm around you well.

Jane 22:11
And you can tell as you said, they sound different when they're mad, when they start to get mad, they buzz in a different way. It sounds different than when they're happily just buzzing around their hive. You can tell when a bee is mad at you.

John 22:21
Yeah, and sometimes if you're working on a high for a few minutes, and you've been in any torn at all apart, looking for honey and whatever you can tell when they're starting to get fed up and then you move faster.

Jane 22:31
You mentioned apitherapy so bee sting therapy, but we got another question.

Sylvie 22:36
Hi, my name is Sylvie. I live in Brooklyn, New York, and I'm eight years old. And my question is, is it true that honey makes cuts heal and makes you feel better when you're sick?

Jane 22:44
Is it true that honey makes cuts heal and makes you feel better when you're sick?

John 22:48
Honey is awesome. Not only does it taste good, but well I know when I have a sore throat in the winter, if I start getting a sore throat. We have elderberry honey ginger syrup that we take or sometimes I'll just put honey in hot water with a little lemon. And it makes me feel better immediately. So I don't know if there's good clinical doctors having studied that. But it makes me feel better and makes a lot of people
in the world feel better. So people usually go to honey as something for a sore throat for sure. The other thing about honey that's really cool is in the olden days, they used to use it for cuts and wounds. Like during World War One when a lot of people were getting hurt and they didn't have antibiotics to get the germs away. You could put honey on it because germs can't live in honey. It's very magical material. So it kills germs. So yeah, if you get honey, get a cut, you can put some honey on it. Just don't go around the bees, they might come after you to get their honey back.

Jane 23:49
Or the bears, or the skunks. What do you like about being a beekeeper?

John 23:51
You know, one of the things so the kids are asking a lot about stinging. I like having to overcome that fear of being stung. I mean, when I first started I was afraid to get stung and now I'm sticking my hands in there and and it's like it's just like a challenge to work calmly. When you know any second you could get hurt and you wouldn't know when it was gonna happen. So that's really kind of fun. And then I just I love the honey we make elderberry ginger honey syrup that we sell. So we you know, the honey is an important part of our farm business. And I'm a biologist, so the biology is fascinating to me. I'm an entomologist by training. So I mean, I studied insects. And so I just I've always been interested in insects my whole life. So to have an insect that you can play around with and it gives you stuff that you can make a living off of is really, really fun for me.

Jane 24:45
We left the beehives and took off our bee suits because we were really sweaty, and we walked over to John's raspberry patch.

John 24:53
So here we're in my raspberry hoophouse, which is a big plastic greenhouse.

Jane 25:00
Hang on. All right, so here we are in your raspberry hoophouse.

John 25:08
So this is a raspberry hoop house. So we grow raspberries under these big plastic hoops, mainly to keep the rain off them. But also, in the springtime, if we if it gets really cold and we're gonna get a frost, we can lower the sides and keep keep it warmer in here and in the same thing in the fall. So we can extend our season, we can have raspberries longer that way. And you can see they really like it here. They're about seven or eight feet tall, and beautiful, loaded with berries, and they're flowering. And you can hear maybe you can hear the bees buzzing, and you can see all the different species that are helping us out. So these are our partners, all these different bees, the honey bees are our partners. So we take care of them. The bumblebees are our partners, so we take care of them. And we give them lots of food, we plant special flowers and bushes and trees that they're gonna like. And we find, we provide nesting habitat for these bees too. We make lots of nooks and crannies and piles of wood and bales of hay and things for them to nest in. Because without them we wouldn't you know, no bees, no fruit, no fruit, no fruit farmers, no pie. So we really need these bees.
Jane 26:13
But if we have honey bees, and we've learned how to kind of farm them sort of, they're still wild, but we help them along. And they can pollinate our fruits and flowers. And you said sometimes these other bees are better at it and in bad weather. But why do we need 275 species? I mean, bee sting us, shouldn't we just kill all the rest of them all?

John 26:34
This all like Well, why do we need them? You should ask the bees, individual bees. They could, they'd probably say why do we need people? You know the honeybees think they need us, but the other bees. So we need we need ecological diversity of bees. We need lots of different things because everything's connected to everything else. So if we lose the bees that pollinate wildflowers, then our wildflowers die. And then, you know, all natural systems going to be weaker because of that. So we need all those bees, and we should protect them. And they're in trouble too. I mean, you've probably heard that honeybees are having difficulties these days because of things like pesticides and mites and diseases and loss of flowering habitat and climate change even, so, but honeybees have beekeepers, they got people like you and me who take care of them. But nobody's taking care of those native bees. So should we should be really worried about that. So when you say save the bees, we should be thinking about saving those native bees.

Jane 27:33
That was beekeeper John Hayden. When we first talked with John five years ago, he was at the farm between in Jeffersonville, Vermont. He now owns Northwind Gardens in Maine. Let's take a minute for some musical celebration of pollinators and especially honey bees. Get up and dance if you can.

Song 27:55
Have a little pollinator, Hello little honey bee. Do you like to taste the flowers early in the morning? Goodbye little pollinator? Goodbye little honey bee didn't get your name faster than you came quick away you flew. You got a job to do, don't you? I know you do it well they tell you I can tell you just by looking around the colors are profoundly beautiful honey bee where would I be without you? hello hello little honey bee. Do you like the taste of sunshine early in the morning? Goodbye little pollinator goodbye honey bee I didn't get your name you're faster than then you came quick away you flew you got a job to do don't you? I know you do it well when I tell you I can tell just by going round the colors are profoundly beautiful. Honey bee where would I be without you? Oh honey bee. Where would I be? Tell me honey? Tell me where would I be? Oh honey bee? Where would I be without you?

Jane 30:24
That was Vermont musician Mr. Chris singing his song Honey Bee. Well, that's it for today. If you have a question about anything, have an adult record an audio file and send it to questions@ButWhyKids.org It's easy to do on a smartphone. But by the way, if speaking is difficult for you or you feel really shy, you can email your question instead. That's fine. We'll do our best to get an answer for all of you. But Why is produced by Melody Bodette and meet Jane Lindholm at Vermont Public and distributed by PRX. Our theme music is by Luke Reynolds. We'll be back in two weeks with an all new episode. Until then, stay curious!