

# But Why: A Podcast for Curious Kids

## Why do crickets chirp?

**July 15, 2022**

**Jane 00:21**

This is But Why: a Podcast for Curious Kids from Vermont Public. I'm Jane Lindholm. On this show, we take the questions you tell us to find answers to and we? Well, we find answers. Here in the northern hemisphere where we're based, it's the middle of summer. And let me tell you, it is noisy. Even out here in the countryside where I live, there are a lot of creatures making a lot of noise, particularly that one insect you just heard making a racket. Some of you also live with noisy neighbors, that kind of bug you. Get it? And today we're going to learn more about them.

**Karim 01:01**

I'm Professor Karim Vahed and I basically study insects. I'm an entomologist.

**Jane 01:08**

Karim Vahead is a bug professor at the University of Derby in England. And he's joining us today to answer some questions you've sent us about one particular type of insect - crickets! Professor Vahed is an expert in crickets and bush crickets. Did you know you could have a career specializing in crickets? Well, Karim Vahed is living proof that you can. Before we get into why they make so much noise and some other really cool things about crickets, we'd better start at the beginning. What is a cricket?

**Karim 01:40**

Crickets are a kind of orthoptera. So, the insects are divided into numerous different kinds, called orders. So one major order of insects are, for example, the beetles and other major order of the butterflies and moths, but the order to which crickets belong is the order orthoptera. Now the orthoptera contains the grasshoppers and locusts and also the crickets, katydids and bush cricket. Crickets are in a sub grouping which contains the crickets, the katydids or bush crickets and other groups like the wetas of New Zealand, for example.

**Jane 02:17**

Oh, I don't, I'm not familiar with them. But we do have a lot of listeners in New Zealand.

**Karim 02:21**

Yeah, the wetas are amazing. They're like, a really weird sort of primitive offshoot from the from the cricket line and includes some of the world's heaviest insects, the giant weta of New Zealand, for example, which is absolutely huge.

**Jane 02:35**

And when Karim says huge, he means huge, at least by insect standards. Giant wetas look like crickets, but bigger. Imagine a cricket the size of hamster, it would cover the palm of your hand if you were holding it. There are several species of giant weta and they all live in New Zealand and most of them are protected because they're quite rare. Okay, but back to crickets. They're insects, they like to hop. There are more than 900 species of them. And they live all over the world, but particularly around the equator. And they're not the same thing as grasshoppers.

**Karim 03:10**

One noticeable difference is in the feelers, the antennae. In crickets and bush crickets, katydids, these are generally very long, often longer than the body and quite threadlike. In the grasshoppers and the locusts they're generally a lot shorter in the body and much more stubby. There's differences in the way females lay eggs as well, the crickets and katydids, the female has a special egg laying organ called the ovipositor, sort of like an egg tube, and this sticks out to the back of the abdomen, right at the other end of the head. Whereas in the grasshoppers and the locusts, the females don't have a noticeable ovipositor it's just a few short vowels that really don't stick out from the end of the abdomen. We also see some difference in the way that they produce sound. The sound production mechanism is quite varied in both groups. But generally speaking, in the cricket, it involves the forewings, whereas in some of the grasshoppers it can involve a leg rubbing against the wing instead.

**Jane 04:11**

So grasshoppers generally make sounds by rubbing a leg up against one of their wings. But crickets usually make sounds by rubbing two wings together, specifically, their front wings.

**Karim 04:24**

Crickets and katydids, they raise the forewings up, and then they basically rub one against the other. And by rubbing one against the other, it's a bit like running your fingernail across a comb to produce that sort of zipping sound. The little row of teeth are actually on the veins of one of the forewings. And the little scraper that rubs across the row of teeth is on a vein on another forewing so it's basically moving one forewing against the other to produce the sound and of course the speed with which it's done the number of teeth on the scraper and the number of chirps over time all make the song quite species specific and distinct. And they have songs of different frequency, different timings, different numbers of so called syllables to the chirp. That's the number of times that the wings actually close against each other per sort of set of chirps. So the songs are hugely varied across species.

**Jane 05:21**

Let's really get in the mood and see if we can make our own cricket music. Grab a comb, the kind you use for your hair, and run your fingernail across the top of those teeth. See if you can make a sound. If you have more than one comb, see if they make different sounds depending on how far apart the teeth are, or how big they are. Now hand the comb over to one of your adults. Does your adult's bigger fingernail make a different sound? All right, let's get to your cricket questions.

**Jack 05:58**

Hi, my name is Jack. I'm four years old. And I live in Seattle. And my question is, why do crickets chirp?

**Karim 06:37**

That's a really good question. It's essentially mate attraction. So we see mating displays of various different kinds in the animal kingdom. I mean, some birds like peacocks, have elaborate tail feathers, where they use visual displays to attract mates. Some animals, like fireflies, use another visual kind of display, bioluminescence. The males glow to make themselves noticeable to the females. If you're a small insect in a complex landscape, how do males and females find each other to produce the next generation? It means that one of them has to advertise their presence and the other has to go and find them. Now in the case of most crickets, it's the males that sing, and the females that then follow the male song in order to find the male. It's not always that way round. I mean, for example, in many moths, it's the female that releases a special smell, or signal, a pheromone signal. And the male has really feathery antennae to detect that pheromone signal and hones in on the female. So it's not always the males that do the signaling, the females that do the following. There are some species of cricket where the male sings, and the female gives a little response song. So she'll actually say, I've heard you, here I am. And so then they both homed in on each other. But generally speaking in crickets, it's the male that does the singing, and the female that follows the male song in order to find a mate.

**Annelise 06:44**

Hi, my name is Annelise. And I live in Menominee, Wisconsin. I'm six years old. And I want to know why crickets chirp?

**Natalie 07:17**

Hi, my name is Natalie. I'm seven years old. I live in Rutherford, New Jersey. And my question is why do crickets chirp so loud at night?

**Jane 07:58**

And do they sing more at night?

**Karim 08:00**

There are some species of day-active cricket, but generally, and probably to avoid predators, the majority of species of cricket and katydid are indeed nocturnal. So singing at night, probably means that it's less easy for predators that rely on sight to actually hone in on the singing cricket and eat them. And there have been anecdotal observations for example of cats listening to cricket sound and then homing in on them and, and attacking them. So nighttime probably at least give some safety from visual predators.

**Jane 08:36**

Wow. So there, there is evidence that some predators will also listen to that sound just like the females might and figure out where that cricket is and try to eat it.

**Karim 08:45**

Absolutely. And that's one problem with this sort of signalling system. So it is a costly process actually producing any kind of mating signal.

**Jane 08:55**

And other than mating they don't make any noises? So you don't have crickets just calling to each other to say hey, 'you want to hang out tonight or to say watch out there's a cat in the neighborhood,' the way some birds might signal to other birds there's a hawk overhead?

**Karim 09:10**

Well actually, that's really interesting, because there are in fact a range of different functions for sound. So in field crickets, sound is also used in aggression between males, the male field crickets are very aggressive towards one another. They become territorial, and they defend little burrows from each other. And when two males fight each other, they produce aggressive chirps. And what's really amazing is that when one of them has won, he does a little victory song, he celebrates the fact that he's won by doing this special kind of victory display chirp and that seems to settle it. Basically, the one that performs the victory display chirp is deemed the winner and the one that doesn't is the loser who then backs down, retreats and doesn't bother engaging him in another contest. And a few species have a sort of warning song as well when you pick them up. Not many, but there are a few species in the tropics where there's sort of a startle tribulation, they make a chirp when they're disturbed by predators.

**Jane 10:09**

And for crickets, baby crickets don't hang out with their parents. So there isn't a lot of calling between parent and baby the way there are for some animal species.

**Karim 10:18**

No generally speaking, the eggs are laid and then the parents show them no further interest. And then by the time the eggs have hatched the tiny crickets which hatch out looking like little miniature adults, because they have this gradual metamorphosis, unlike butterflies. They don't have sort of caterpillar-like stage and a chrysalis they hatch out from the eggs looking like little tiny adults just not having the wings fully developed. And by the time they hatch out, generally, the adults have either died off or no way around. There are a few exceptions, though there are one or two species of cricket, where the eggs are actually laid in a burrow and where the mother will, is known to associate with the little tiny babies when they hatch. But that's quite rare, that sort of parental care type social system is very rare in crickets, but it does happen in a few species.

**Jane 11:12**

That's so interesting, though, that even within crickets, which are one very small subsection of insects, which are already a subsection of all the animals, that even within crickets, there's so much variation, so much difference in how they use sound and how they behave and whether they're territorial or not, and even whether they raise their offspring or not. That's very cool.

**Karim 11:36**

Absolutely. And that's one of the reasons why I've enjoyed studying crickets so much over the years, because, like you say, like any animal group you look at, the more you look at it, the more variation you realize there is.

**Jane 11:48**

Coming up, we'll learn a little more about insects in general, including why insects don't have bones or skeletons like humans do. And we'll find out what baby bugs like to do.

**Jane 12:01**

This is But Why. I'm Jane Lindholm and today we're talking with an entomologist, someone who studies insects. Karim Vahed is a professor of entomology who specializes in crickets and their close relatives, katydids. And he's been telling us some fascinating facts about crickets based on the questions you've sent us. But let's talk more generally now about bugs. Here's a question from Lily.

**Lily 12:25**

I live in Silver Spring, Maryland. And my question is, why do insects not have bones?

**Karim 12:33**

Insects and relatives, which we call the arthropods. Now the arthropods contain the insects but also things like the crustaceans, which includes things like crabs, and lobsters. Also things like the millipedes and centipedes. And of course, the spiders, scorpions and relatives, the arthropods have their skeleton on the outside of their body. And that's the thing that defines them, the muscles are actually attached to the sort of, the inside of this external skeleton. Now, there are some advantages to that in, obviously, in terms of protection. So some groups of insects are hugely successful things like the beetles that have a really rigid external skeleton. And beetles even have a rigid pair of wing covers, which means that they can, as adults, they can burrow into moist environments. They can, they can still fly, they occupy virtually every habitat. And their external skeleton has a lot of advantages. But one disadvantage of an external skeleton is it limits how big you can get because the muscles are pulling really quite strongly on the inside of this hollow skeleton, it would buckle and crumble under gravity if the insects got too big. So it does put an upper size limit on how big insects and other arthropods can get. In the aquatic environment, it's not quite so bad because the water is there to support the weight of this external skeleton. So you do get some giant arthropods in the water. Like for example, the Japanese spider crab, which I think is one of our largest living arthropods.

**Jane 14:13**

So another question that sort of general about insects is from Lucy, who lives in Australia.

**Lucy 14:18**

And my question is, how many different species of insect are there in the world?

**Karim 14:24**

Well, this is another amazing thing about studying insects. We've been talking about diversity already. But in terms of numbers of species, insects are the most diverse group of animals on the planet. We've actually given scientific names to about a million of them, which makes them something like 80 percent of animal life. But we think that there could be anything between another 10 million or even some estimates say another 80 million species that haven't been given scientific names yet that are awaiting discovery in places like tropical rainforests.

**Jane 14:56**

Wow. So this follows up then what Anna is asking about.

**Anna** 15:00

I'm three years old. I live in Albuquerque and I want to know why bugs are so important?

**Jane** 15:05

Anna wonders why are bugs so important?

**Karim** 15:08

That is a very good point bugs are exceptionally important. Many insects perform vital ecosystem services. In other words, they help the way the whole planet functions. So one thing that many insects do is pollinate flowers. So they go to feed on the nectar and they transfer pollen from one flower to another. Many crop species actually rely on insect pollination. So a lot of the food we eat is pollinated by insects, just as an example. But beyond this vital role in pollination, there's a whole load of ways in which insects are vital for the functioning of the earth. So many of them, for example, are decomposers. They help break down dead animals. If you think about things like the flies, with maggots breaking down corpses, dung beetles feeding on dung. In fact, how important this is, was shown in Australia. When cattle were introduced to Australia, there are no native dung beetles that could cope with cattle dung. So the dung started to pile up on the Australian grasslands, and started to actually interfere with the grazing. So they actually had to import African species of dung beetles to eat the dung of the cows especially, which shows that without those dung beetles, we just couldn't exist. Beyond that insects themselves are a vital food source for so many different animals. People love the sound of songbirds singing in the spring, but many of those songbirds even if they're seed eating as adults, feed chicks on insects. So insects are a vital source of all ecosystems, whether it's because they feed on things or because they form food for things or because of the ecosystem services they provide, which actually helps with the whole running of of ecosystems.

**Jane** 15:08

You mentioned food and how important insects are as a food source for many animals. And Yael who lives in Cambodia wants to know about humans eating insects.

**Yael** 15:53

I'm nine years old. I live in Cambodia in Southeast Asia. And my question is, will humans eat insects in the future?

**Jane** 17:17

In fact, we already do.

**Karim** 17:20

Yeah, I mean, that's a great question. Because there's a lot of research at the moment onto protein shortage in the world, and the cost of rearing things like cows and sheep, to provide humans with protein. Insects can provide high quality protein, and you can rear them up in a fairly small spaces, they convert the food you feed them into protein that we eat really efficiently. So there's a lot of research at the moment suggesting that maybe rearing insects as a protein source for humans would be a really

good thing for the environment. There are many cultures that already eat insects, and in fact, eating insects is catching on in many other countries. So for example, in England and Wales, there's quite a few specialist bug restaurants opening up. And I've tried them myself. There's a fantastic one in Wales near the city of St. Davids, that does brilliant bug burgers, for example. And they do cricket cookies made out of flour, which is made of dried crickets that's ground down. So you don't even realize you're eating crickets. But they're actually providing you with those amino acids and iron, and calcium in your cookies, which is really good. And I have to say, even though I love crickets, I also love eating them. They're very nutty. And they taste a bit like peanuts. So they've got that kind of savory, peanuty taste when you just eat these dried crickets. Of course, I wouldn't recommend you just go and eat any crickets you find in the backyard, I'd get them from a specialist food place. And we have to avoid eating any rare species. But generally speaking, if a species can be reared in large numbers, and they're not rare, I think there is a lot of potential for using them for human food.

**Jane** 19:09

I was going to ask if you eat them, my kids and I really like crispy crickets that have some, you can do all kinds of seasoning on them. We like to get one that has salt and vinegar. It's like eating chips or crisps, but they're crickets. But I was wondering if you, as someone who studies these animals, has a problem when you're popping them into your mouth?

**Karim** 19:30

Well, I do feel a bit guilty I have to admit when I'm popping them in my mouth because I've spent so many years actually observing crickets and seeing all the wonderful behaviors that they do. But at the same time, they're very tasty and they're good for you. So I am in somewhat of a moral dilemma when I'm eating but I have to say I do enjoy them.

**Jane** 19:47

One thing that we should mention though, for people who are interested in eating insects, like crickets or grasshoppers is that because of their exoskeleton, which we've been talking about their skeleton on the outside, which is the same as the skeleton on the outside that shellfish has, if you are allergic to shellfish, you should be very careful and probably not eat insects, right, because they all have chitin, which is what people are tend to be allergic to and they're allergic to shellfish. Is that correct?

**Karim** 20:13

Yeah, that's the point. So you just have to be aware of what your allergies are with any new food that you're trying out.

**Jane** 20:19

One other question that we have that I thought was kind of an interesting one comes from Gregory.

**Gregory** 20:25

I live in Portland, Oregon. I'm five years old. My question is, what do baby bugs like to do?

**Karim** 20:37

Well, that's a really great question. I mean, of course, baby bugs vary quite a lot in that some groups of insects have baby bugs that hatch out that look nothing like the adult. So things like butterflies obviously have the caterpillar stage. Flies have the maggot stage. But then other insects like crickets actually hatch out from the egg looking very much like miniature versions of the adults. But they all have one thing in common, and that is that their main mission in life is to grow. Unlike the adults whose mission in life is largely to find a mating partner to produce the next generation, the main mission of a baby bug is simply to eat as much as they can avoid predators and to grow. So they spend an awful lot of their time feeding. And so feeding is probably their favorite activity, I would say in order to grow quickly. And at the same time, try to avoid being eaten by other animals while they're doing it.

**Jane 21:33**

But these babies have to find their own food, right, they don't have, for the most part, they don't have an adult making dinner for them.

**Karim 21:40**

Again, with that diversity of behavior in the insect world, you get some species where there is parental care and provisioning of offspring. But in many species, the eggs are just laid and pretty much abandoned. Although sometimes the females are careful in, for example, laying the eggs on a food plant, so many species of butterflies, the female will take care to lay the eggs on the right plant that the caterpillars then need to eat in order to grow. So it's not they're not quite on their own. But in at least the eggs tend to be laid in the right habitat or the right with the right food plant for them to get all the food that they need. Of course, in some social insects, things like the social bees, ants and wasps, the babies are lucky enough to get fed by the workers who will actually, you know, lovingly feed them and there are some other species with parental care. So for example, there's a group of beetles known as the burying beetles or Sexton beetles, where the adult beetles bury something like a mouse, mash it up into what they call a brood ball in a little tunnel that they've made. They lay their eggs in that and when the eggs hatch, the parents remain with the larvae, and they actually regurgitate food for them, they regurgitate some half-eaten mouse for them and provide them with loving parents will care a bit like birds feeding baby chicks.

**Jane 23:02**

I suppose we should all be glad that our parents are not burying a mouse and then chewing it up and regurgitating it for us to eat our meals.

**Karim 23:10**

Absolutely.

**Tavisha 23:13**

Hi, my name is Tavisha and I am seven years old. I am from Kathmandu, Nepal. And my question is do insects drink water?

**Jane 23:22**

Yes, insects need water to survive just like humans do. Some insects can get all or most of the water they need from the food they eat. Herbivores plant eaters can often get all their water just from chewing

leaves or plants. Blood sucking insects can get moisture from that wet blood. But some insects do sip the morning dew or other water sources to make sure they stay hydrated. And that's actually one of the things that Karim Vahed says is so fascinating about insects. There are so many different ways they do things.

**Karim 23:55**

They're so incredibly diverse that really if you want to study almost anything you can look at insects. If you're interested in how insects are important in human and animal health, you can study insects that transmit disease or if you want to study how insects are important the ecosystem you can study things like pollinators and decomposers. If you want to study behavior, there's such a variety of different behavior that goes on in the insects. It's it's absolutely staggering. So you know, I just think that whatever aspect of animals you're interested in studying and learning about insects are a really great group in which to do that. So I'd encourage anyone to just watch insects and enjoy them. Even if you're not going to make a career out of it like I have, you can still get a huge amount of pleasure from actually observing the insects in your own backyard. You don't have to go far and that's another amazing thing about insects. You don't have to go all the way to Africa and go on safari, you can go on a safari in your own backyard and see a huge variety of life going on a huge variety of battles, a bit of predator and prey interactions, all sorts of stories going on, in a really small scale just in your own backyard or out in a park. If you haven't got a backyard, it's easy enough to observe insects wherever you are.

**Jane 25:20**

So go find some bugs. If you have a magnifying glass, you can check them out up close. Do you see anything unexpected? How many eyes do they have? How many legs? Can you see the teeth those kind of bumpy bits on the back leg of a grasshopper or on the wings of a cricket? Any interesting colors you didn't expect? I bet you can find some bugs near you. And it is really cool to watch them see if you can see those battles Karim was talking about. That's it for this episode. Thanks so much to Karim Vahed from the University of Darby. If you have a question about anything, have an adult record it, be sure to include your first name, where you live and how old you are. Then your adult can email the file to [questions@ButWhyKids.org](mailto:questions@ButWhyKids.org) It always helps if your adult can also transcribe your questions just so we make sure we're saying everything right that you wanted to know. We can't answer every single one we get but we love to hear what's on your mind. But Why is produced by Melody Bodette and me Jane Lindholm at Vermont Public. Our theme music is by Luke Reynolds and our show is distributed by PRX. We'll be back in two weeks with an all new episode. Until then, stay curious.