

But Why: A Podcast for Curious Kids

But Why Live: Bats and Beavers

May 8, 2020

[Jane] This is But Why: a Broadcast for Curious Kids from Vermont Public Radio. I'm Jane Lindholm. Usually we're a Podcast for curious kids, but from now until the end of the school year, we're going to be putting out live radio shows.

Vermont's Agency of Education came to VPR a few weeks ago to see if we could do some live shows just for you, since you're not in school right now. And since But Why is already making shows just for you as a podcast, it seemed like a natural fit to bring it to the radio.

So for the next seven weeks, we hope you'll join us every Friday to talk about poetry, music, space exploration and more. These shows only work if you call in with your questions, and I should warn you, we might offer some homework for you in advance of the shows. But any homework is designed to be fun and you only have to do it if you want to.

No homework for today. Today we're going to talk about two different animals that you may be seeing in the fields and forests and ponds around you at this time of year: bats and beavers. We're going to talk about bats for the first half of the show. And if you have a question about bats, now's a good time to give us a call. And you can also send an email with your question. Our email address is questions@butwhykids.org.

Now, I find bats really interesting, but most of us don't get to get close to bats very often. They're usually pretty good at avoiding humans even in the darkness and we're gonna talk about why in a little while. But there are lots of scientists who study bats, especially right now, because there's a sickness called White-nose Syndrome that has been killing bats for more than a decade since it was first discovered in upstate New York.

Part of my job for Vermont Public Radio means I get to go out with scientists who are studying why. A few years ago, I went out with some researchers who are trying to figure out why one colony of little brown bats in Cornwall, Vermont were doing really well despite this sickness.

So I got to see the bats get tracked and studied. I want to play you a little bit of sound from that trip because you're going to get to hear what a bat sounds like and what wildlife biologist, Alyssa Bennett, thinks these bats might be thinking about when they get captured.

[Alyssa] I got three parts of them...

[[Jane] Oh, good.....

[Alyssa] You got 'em ?....

[Alyssa] I always picture them, we're like some kind of alien to them, and they describe the alien experience as these bright lights and then all these invasive body examinations happening. And then, of course, that's exactly what we're doing, we're shining bright lights in their eyes. They were just out foraging for the night. And then this very strange, bizarre,

scary thing happened. And then we take all sorts of measurements on them and then we let them go. And, you know, I think they must say to their friends, "This crazy thing happened! I was just flying around and then bright lights, and I was abducted, and all their friends are like, "Right..."

[Jane] Do you think that's what bats are thinking about, that maybe they've been abducted by aliens when they get captured by researchers? Luckily, the researchers are only there to try to help the bats and make sure that they all survive. And one of the ways to help bats is to learn more about them and care about them and find out how you can make sure the bats in your area are staying safe and healthy. So let's talk about bats now with Barry Genzlinger. Barry is a bat advocate and he and his wife Maureen founded the Vermont Bat Center, where they help educate people about bats and also they rescue bats. The last time I talked to Barry, he had some bats hibernating in a special hibernation area in his house that he and Maureen have setup. Barry, it's nice to talk with you again.

[Barry] Thank you, Jane.

[Jane] So what were you doing today? Because we're talking to you here live on the radio at 1:00. But I understand you've actually been driving around the state already to deliver a bat, to travel downstate to somewhere else.

[Barry] That's right. I left early this morning and drove down to Middlebury, where Carrie Moynahan picked up the bat from me and drove it from there all the way down to Dorset. There were actually three bats in this group and all three have now been successfully released back into the wild.

[Jane] Why did you have them to begin with?

[Barry] I had them because they came out of their hibernation cave way too soon, right in the middle of winter when it was snowy and freezing cold and there were no bugs to eat. So the biologists that were checking their hibernation area found them and brought them up from Dorset all the way up to us at the Bat Center in Milton.

[Jane] And so you keep these bats safe for the rest of the winter as long as they should be hibernating?

[Barry] That's correct. And this particular group stayed together through the winter. We kept them healthy and fat, feeding them delicious meal worms. And when it got to be spring and the bugs started coming out, we said, "OK, it's now time to turn them loose back where they came from." So to turn them loose back where they came from, they had to go all the way back down to Dorset.

[Jane] So, Barry, before we get to our callers and emailers...and we have a lot, so we're gonna get through as many questions as we can...let's establish some information so that we know a little bit about bats as we have this conversation. What are bats? They fly, but they're not birds.

[Barry] They fly and they are not birds; they are the only flying mammals. They're mammals, just like dogs and cats and humans. We are all mammals and bats are in that group of mammals. But they can fly and I can't.

[Jane] No, I wish I could, too. But being a mammal means they have fur or hair. They have their babies drink milk. They give birth to live babies. So all that's true about bats?

[Barry] All that is true about bats.

[Jane] No eggs.

[Barry] No eggs. They don't lay eggs. If you can think of a bat doing all of the same things that we humans do, except they can fly.

[Jane] That is so cool. And how many different kinds of bats are there in the world?

[Barry] Well, in the whole world, there are about 1,400 different kinds of bats. But up here in Vermont, we only have nine.

[Jane] Jeez...only nine? Can you name them all?

[Barry] We have Little Brown Bat, the Big Brown Bat, the Northern Long Eared, the Small Footed, the Tri-colored, the Hoary Bat, the Red Bat and the Silver-haired Bat.

[Jane] And the Indiana Bat.

[Barry] And the Indiana, that's the one I forgot.

[Jane] Yeah, but see, that was the only one I could remember. So we got to nine. But it took two of us.

[Barry] There we go.

[Jane] Let's go to one of our calls. Here's Max, who's calling in from Elmore, Vermont. Hi, Max.

[Max] Hi.

[Jane] Go right ahead. What's your question for Barry?

[Max] Why do some bats suck blood?

[Jane] Ooo, good question, Barry, why do some bats suck blood?

[Barry] That is a very good question. Bats actually don't suck blood. Bats find an animal that has an injury. Now, keep in mind, there are no blood-sucking or blood drinking bats anywhere except a little area in South America. So all the bats that we have up here in Vermont don't drink blood. But when they do, they look for an animal that is injured that might have a little bit of blood on it, or they might sneak up on a chicken that's sleeping in a tree and make a tiny little nip in their foot so that a little drop of blood comes out and then they lick it up, but they don't actually suck the blood.

[Jane] Well, that's good to know. And Connor from Boston also wanted to know that question. But we have other questions about what bats eat. So you've just said, Barry, that some bats do drink blood. Benjamin in Massachusetts wants to know, do all bats eat fruit?

[Barry] All bats do not eat fruit. In fact, there are about 250 different “frugivores”, fruit-eating bats, but there are over 700 insect-eating bats. So there are way more bats that eat insects than there are those that eat fruit.

[Jane] Are there any meat-eating bats?

[Barry] There are meat-eating bats. We call them “carnivores” and they eat things like mice and frogs and lizards, things that they are able to catch. Obviously, they couldn't catch a big, huge thing like a bear or a moose because they're way too big. But they can catch small animals and lizards and little frogs. So those are the carnivores. And there are others that drink the nectar from flowers.

[Jane] Well, that's important, isn't it, Barry? Because we often think of honeybees first when we think about pollinators. Maybe some people picture hummingbirds, but aren't bats also very important as pollinators?

[Barry] They are very important. Now, here in the United States, we do have some pollinating bats. And if you think of pictures that you've seen of out west in the desert and you see these great, beautiful cactus growing out in the desert, those are growing there because the bats pollinate those cactus flowers to make new cactus. And they've been doing that for millions of years.

[Jane] Kids, you're listening to But Why, a broadcast for curious kids. And we're talking with Barry Genzlinger, Barry the Bat Guy, about bats in this first half hour of the show. And then we're gonna talk about beavers. But if you have a bat question, you can send it to questions@butwhykids.org. Evie is calling in from Maplewood, New Jersey. Hi, Evie. How are you today?

[Evie] Hi.

[Jane] Hi. Do you have a bat question for Barry?

[Evie] Yeah.

[Jane] Go for it.

[Evie] Why can bats see in the dark?

[Jane] Why can't they?

[Evie] Why *can*...

[Jane] Oh good, I'm glad you said it that way. OK. So Evie wants to know, “Why can bats see in the dark?”. And Barry, we have questions about this from other kids, too, like Teddy in Maryland who says, “Yeah, how do bats see at night?”.

[Barry] Very good questions, both of you. Wow. So when you go out in the dark, all of your seeing is done with your eyes. When bats go out in the dark, they see with their ears, by doing what's called “echolocation”. They make a noise that goes out from their mouths and bounces off everything around them, and they hear that echo coming back. And they can tell the difference between the echo coming back from a house or a tree or a car and the echo coming back from a tiny little bug. And they usually don't try and eat cars or trees, but

they do try and eat bugs. So when they're flying around at night, they use they're echoing to find where their food is.

[Jane] Well, let's play another question on that that we have as well, because I want to make sure we get this in. Here's an echolocation question.

[Georgia] I'm Georgia and I'm seven years old and I live in Fort Wayne, Indiana. And I want to know why bats use echolocation to find food.

[Jane] So, Barry, you said they do use echolocation to find food. But why? Why wouldn't they just use eyesight?

[Barry] Well, that's a good one. Eyesight works really well if you are looking for something like a piece of fruit in a great big fruit tree, because you can fly around at night and see a tree and fly up and find fruit. But if your favorite fruit is a little tiny insect that's flying around at night, it's very hard to see a tiny little insect. So bats, over millions of years, have developed this great way of finding their favorite food in the dark. And that's why they use their echoes.

[Jane] So Sagan in Denver, Colorado, wants to know what colors do bats not see? So do bats see colors?

[Barry] Bats do see a very limited number of colors. One that they do not see is red. And some experiments have been done about this to determine could we, for example, use a red light outside our house on the porch so that bats don't fly past our doorway. The bugs like the light, but the bats wouldn't be able to see the light and they wouldn't come after the bugs. So perhaps that would be a good thing to know that bats don't see red. They do see some other colors, but not nearly as many as we see.

[Jane] All right, Barry. And here is a question we get from a lot of kids, including seven year old Corinne, four year old Nate who lives in Brooklyn, and six year old Will in Kansas City. And this friend:

[Calvin] Hi, my name is Calvin and I am six years old and I live in Concord, Ohio. And my question is, "Why do bats hang upside down while they sleep?"

[Jane] What about it, Barry? Why do bats hung upside down?

[Barry] Wow. That's a neat question! So picture yourself standing on your tippy toes to get as tall, as tall, as tall as you possibly can and then look down at your feet and you'll see your feet are pointed straight off the end of your legs. And that is the way a bat's feet are made. Their feet do not bend at the end of their legs the way ours do. So, their feet come straight out and they would not be able to stand up unless they could stand on their tippy toes. So with their feet going straight out, they have developed toenails that are curved like a hook. So you have a foot coming straight off the end of your leg and toenails that are hooks. So it's really easy for a bat to turn upside down, use those toenails to hook into anything; a tree or, if they live in a bat house, they hook it into the bat house, but they use those little tiny toenails to hook into it. And now they won't fall.

[Jane] I didn't know they had little toenails that they were hooking in. That's kind of neat.

[Barry] Very sharp little toenails, too.

[Jane] So Barry, we were talking earlier about baby bats...that baby bats are born alive, as all mammals are. So how do the parents make sure that the baby bats don't fall down when they're all hanging upside down?

[Barry] Well, they have to be pretty careful where they put them. Bats that have their babies in a cave can actually tell the bat, the little baby bat, "You hang right here on this rock in the cave and don't go anywhere!". And the baby bat, then hangs there. But if they're living in a bat house, the mother would hang them up on the side of the bat house and they would stay there until mother came back. So mother would go out, get some food, come back to nurse her baby, go out again and get more food, and the baby would have to stay right there.

[Jane] Yeah, that sounds pretty familiar, I think, when you have a parent who says, "Stay here, I'll be right back!". Emmie and Rosalie are calling in from Hingham, Massachusetts.

Hi, Emmie. Hi, Rosalie.

[Emmie and Rosalie] Hi.

[Jane] You have a bat question?

[Emmie and Rosalie] Yes, yes.

[Jane] OK. What is it?

[Emmie and Rosalie] Why do bats hang upside down?

[Jane] Yeah, why do bats hang upside down? Barry, you've told us how they do it, but why would this develop, that bats would hang upside down? Why wouldn't, over time, bats develop feet that could allow them to stand up? Is there a benefit to hanging upside down?

[Barry] Well, for a bat, the benefit of hanging upside down is their entire digestive system, their blood pumping system, all works better upside down than it does right side up. So for them, right side up is upside down to us.

[Jane] It's also cool, Barry, when you see them flying out. Like that sound that we heard at the beginning of the show came from a place that... it burned down, unfortunately...but it used to have a covered bridge and the bats would hang upside down in the covered bridge during the day. And then at dusk they would fly out and you could watch them sort of drop. It's almost like they just let go, but then they are kind of immediately into a flying position. So it seems like maybe that's an adaptation, too.

[Barry] Yes. And the other interesting thing about bats is their wings are not like bird's wings. They don't have any feathers. Their wings are solid, like the wings of an airplane. So the reason they let go and drop is so that they get speed so they can fly like an airplane. So they let go and start falling down and then they start flying.

[Jane] Cool. All right. So we were talking about baby bats, too. Here's a question about baby bats which, I learned, Barry, are actually called "pups". So, very cool. Here's a question about baby bats.

[Paxton] I'm a 4 year old from Los Angeles, my name is Paxton and here's my question: Why are baby bats pink?

[Jane] Barry, why are baby bats pink?

[Barry] Baby bats are pink because their skin is pink in color and they have no fur yet. So when they are born, all you see is their little pink skin. And after about a week and a half or so, seven or eight or ten days, their fur starts to grow. And once their fur starts to grow, now they go from pink to brown as the color of their fur comes out.

[Jane] Cool. Hey, Barry, a third grade teacher in Shoreham wrote to us saying her students want to know why bats are called bats. Do you know?

[Barry] Good question. The term of "bats" has been around for a very long time. Bats, by scientists, are actually called "chiroptera", not bats. The official name for all the bats of the world is "chiroptera", and it means "hand wing" because a bat, when it wants to fly.... remember, they're mammals, so they have body parts just like we do and they have an arm and a hand and fingers... and when they want to fly, they stretch their arm out, open up their fingers and their fingers make a wing. So "hand wing". Chiroptera.

[Jane] Hmm. Cool. Alright. We're talking about bats in this first half of the show today. Pretty soon we're gonna switch animals and learn about beavers. So if you have any more bat questions, you should try to call if you want to. Or you can send an email to questions@butwhykids.org. And if you have things you want to know about beavers, we're gonna be starting to talk about beavers in about 10 minutes. You're listening to But Why live on Vermont Public Radio.

[Jane] I'm Jane Lindholm, and this is But Why, a Broadcast for Curious Kids. We're talking about bats and beavers today. Bats first. And we're talking about these amazing creatures with Vermont Bat Center co-founder, Barry Genzlinger. Let's listen to the sound of some bats. [sound of bats clicking and squeaking] That's a pretty cool squeak, isn't it? And I think Eve, who's calling in from Orwell, Vermont, might have a question about what sounds bats make.

[Jane] Hi, Eve.

[Eve] Hi.

[Jane] So do you have a bat squeak question?

[Eve] Oh yes, my sister has a bat squeak question.

[Jane] Who is your sister?

[Eve] Elise.

[Jane] Elise, what's your bat squeak question?

[Elise] Why do they make that noise?

[Jane] OK. And then, Eve, did you have another question?

[Eve] Yeah. Like, why did they evolve those wings? Like, was there a danger that they had to get away from?

[Jane] So good questions from both of you. Barry, let's tackle the bat squeak. Why is it they make that noise?

[Barry] The noise that they make...they actually make a number of different kinds of sounds. The one that we were just listening to is the sound of them echolocating to find food. So those little squeaks that we hear as little squeaks are actually thousands of individual little noises that are made so fast that to us it sounds like a squeak. And that is their echolocation sound that goes out, bounces off of everything and comes back to their ears and they can tell what it bounced off of. But the other kind of noise that they make is noise that we actually can hear. It's noise of them talking to each other. Bats have a very complex language structure and they actually talk to each other. They say things like: "Hey, get away from my food! I was going to catch that bug." So, two different kinds of sounds. One, we can't hear - that's their echolocation. And the other we can hear. So they have two different things that to us sound like squeaks.

[Jane] Huh! Zoe in New Mexico wants to know, "How sharp are bats teeth?".

[Barry] Well, bats teeth are tiny and very pointy and they are very sharp. They have two different kinds of teeth, just like we do. They have molars in the back and they have sharp little incisors in the front that they use when they are catching bugs. The molars they use to grind up their food and those sharp little teeth in front they use to catch bugs.

[Jane] All right. Let's go back to Eve's question as well about wings. But let's also bring in Taos, who's calling in from Oakland, California. Taos, you have a question about wings, right?

[Taos] Ahhuh.

[Jane] Alright. What is your question about wings?

[Taos] Why do bats have wings....why are bats the only mammals that have wings?

[00:23:26] [Jane] All right. So, Barry, you got Eve and Taos who are both wondering about this wing question again.

[Barry] So bats have been around for about 30 million years. And 30 million years ago, in order for them to avoid predators, (this is what what we are thinking), in order for them to avoid predators which are running around on the ground trying to eat the bats, over time, the skin between their fingers grew into wing membranes and allowed them to take flight. So when they were able to take flight, then they figured out, "Hey, I can catch the bugs that are flying around." And they fly around, the bats chase 'em...use their echolocation to catch them...and that's why they have wings.

[00:24:17] [Barry] So, Barry, we have some questions that are topical for you as well that people may be thinking about right now because of other things they've been hearing in the news. So let's get to Oscar, who's calling in with one of those questions from Bethlehem, Pennsylvania.

[00:24:30] Hi, Oscar.

[Oscar] Hi.

[Jane] So what's your question?

[Oscar] How and why did bats cause the Corona virus?

[Jane] Good question, Oscar. And Colin, who's 9 from Atlanta, Georgia, has the same question for you, Barry. And I don't know if you know the answer, but we keep hearing that the Covid 19 Corona virus may have originated in bats.

[Barry] That is a question that is being studied a lot right now. One of the theories is that a bat, which has a very strong immune system and is not affected by things like Corona virus or Ebola or SARS, those viruses don't affect the bats. And one theory is that they had this virus in them and the virus got onto some other little mammal in China, and that little mammal passed it to other mammals who passed it to humans.

[Jane] So it wasn't that the bat coughed on a human. And that's not how a transmission would work.

[Barry] That is correct. The bat did not pass it directly to humans. It went from the bat to something else and from the something else to the humans, just by way of transmission. But that is being studied very hard to try and make that determination, "Where did it actually come from?".

[Jane] Yeah, it's a good question. And, you know, for those who are listening, if you're interested in bats, that's one of the areas, something like that, you could study if you study bats. You could study how they use echolocation. There's still a lot to learn about bats in the world. Right, Barry?

[Barry] There is. If you think back 10 years ago, we didn't even know how many bat species there were. We thought there were only four or five hundred different kinds of bats. And then researchers started *really* studying bats and they realized, "Wow! There are a lot more different kinds of bats than we ever thought there could be!". There are more different kinds of bats than there are horses, cows, cats and dogs combined.

[Jane] I could talk bats with you all day, Barry, but we are going to tackle beavers as well in this show. So I'm going to let you go and say goodbye with our thanks for teaching us about bats.

[Barry] You are welcome, Jane, and thank you very much for having me.

[Jane] Barry Genzlinger is a bat advocate and he and his wife Maureen are the founders of the Vermont Bat Center. And if all this talk of bats has you really excited and you want to learn more about them or, if you had a question that you want the answer to, Vermont's Agency of Education has put together a list of books, videos and even a bat craft you can make. Go to butwhykids.org and click on today's show for a link to more resources.

[Jane] From bats to beavers, we're going to spend the rest of the hour talking about a different animal that you can find all over North America. I see a lot of them where I live here in Vermont, and I don't know of any other creature that can so completely change the landscape in a matter of just a year or two. I'm talking about beavers. And let's talk about

beavers with wildlife biologist Kim Royar. She works for the Vermont Department of Fish and Wildlife. And Kim, I'm so excited to talk about beavers with you.

[Kim] Me, too. Jane, it's great to be with you today.

[Jane] So we were talking about bats and that it's a little surprising maybe because they're the only mammal that flies, but bats are mammals. [00:28:11] What are beavers?

[Kim] Beavers or mammals as well. They're in the rodent family and they're a fairly large rodent, but they're also mammals. They have hair. They have live young, just like you went through with the bats.

[Jane] So beavers are really good swimmers. Do they have their babies swimming from the moment they're born?

[Kim] Well, you know, it's interesting because Barry was saying that bats are born, hairless. And beaver, it's just the opposite. The beaver, we call them "kits", the babies are called "kits".

[Jane] Just like foxes!

[Kim] Yup. And when they're born, they actually are born with hair. They're fully furred. Their eyes are open. They have their teeth. And they can swim and walk within a few minutes of birth. And they tend to stay in the lodge or the den for a couple of months, but they can actually get out and swim around in about two weeks.

[Jane] Wow, that's so cool. So the baby beavers, the kits, are swimming from an early age.

[Kim] They are. They're ready to go.

[Jane] All right. So listeners, kids, if you have questions about beavers, we've got Kim until the end of the hour and we're going to get as much information about beavers as we can. So you can call or e-mail us. Again, our e-mail is questions@butwhykids.org. And let's go to Henry and Franny, who are calling in from Maplewood, New Jersey.

Hi, Henry. Hi, Frannie.

[Henry and Franny] Hi.

[Jane] So you have a beaver question?

[Henry and Franny] Yeah.

[Jane] Go for it.

[Henry and Franny] Our question is, "Why do beavers build dams and what are they for?"

[Jane] All right. So why do beavers build dams and what are they for, Kim?

[Kim] Well, that's a great question, Henry. Beaver on land, and I hate to say this, but they're rather clumsy and they're large and kind of humpbacked and they don't move around very quickly, and so they are very prone to predation. So they build a dam to

create a pond because they're very well adapted to living in water. And once they get into the water, they're rather sleek. They have this nice torpedo shape and they can really move quickly in the water and they're safe from most of the things that might get them. And so they build these dams to create these beautiful ponds so that they have a place to live. And then they also use the ponds to access their food supply, which in the summertime tends to be things like sedges and water lilies and cattails. And then in the wintertime are things like trees... bark from trees and twigs.

[Jane] And when they're building these dams, I mean, that's what I was mentioning earlier. The beavers can really change the way a landscape looks.

[Kim] That's right. They're actually called a "keystone species" for that reason, because there's no other animal, except humans, that has such a dramatic effect on the environment. And they create ponds that are so valuable to so many other species. They improve habitat for some fish species. There's often many, many different types of waterfowl that use beaver ponds. Mammals such as otter and muskrat and raccoon are all very much dependent on beaver flow. Even moose and black bear and white tailed deer use beaver flow. So they're really, really critical for a wide variety of animals. And so they're very important to have on the landscape.

[Jane] But why do they need to build all of these ponds? Why can't they just go to a pond that somebody else already built or that the landscape just naturally built?

[Kim] Well, when you think about it, historically, back in the old days before humans actually lived here or even the Europeans came to Vermont and to the north, to North America, there were nobody else building ponds. We had some natural ponds, but not enough to support the beaver population that was here. And so they build those ponds to create the habitat that they need in order to survive.

[Jane] All right. So while we're talking about how beavers create this landscape, let's go to one of our questions. And a listener sent this about beavers and being loggers.

[Grayson] Hi, my name is Grayson, I live in New York. My question is, "how do beavers cut down trees?"

[Jane] How do beavers cut down trees? And maybe Grayson was inspired by the running of the bath water or something there, Kim.

[Kim] That's a great question, Grayson. Well, beaver actually, inside their heads, they have these really massive skulls and then they have four large incisor teeth. Those are the two front teeth on the top and two front teeth on the bottom. And those teeth continually grow. And the outside surface of the teeth is orange and it's a hard enamel. The inside is a softer, whiter material. And the beaver will chew on wood in order to cut the trees down. So they'll actually come up on land and they'll get up on their hind legs and they'll actually bite into the sides of the tree and take out big chips and go all the way around the tree. And eventually that tree will come down. And they're quite good at cutting little trees under four inches. But you'll notice, if you're out at a beaver pond, that they'll try to cut some much larger trees. And sometimes they have a few problems and those trees get hung up in other trees and they don't fall all the way down, which I'm sure is a frustration after hours and days of cutting. So they're not necessarily expert loggers, but they're just persistent.

[Jane] And then do they carry those logs with their teeth?

[Kim] What they will do is, when a big tree comes down, they'll cut off the branches. They don't usually eat much of the bark off the big tree. What they do, and they do this mostly in the fall when they're building up a winter food cache, they cut off the tops of the tree and the branches and they take that down to the bottom of the pond and they stick it in the mud in the bottom of the pond. And that's what they end up living off of all winter long.

[Jane] And when you say food "cache", a food cache in that case just means storage, like a stored amount of something.

[Kim] That's right. They have to store all of the food that they're going to need through the entire winter because they tend not to come out on top of the snow in the wintertime, at least in the northern part of the country, because they're brown and the snow is white and they're not well camouflaged. And again, like I said, they're rather clumsy. And so if they come out in the winter, they are very prone to getting picked off by something else, by some predator. And so they tend to stay in their lodge. And all they do is, in the wintertime, they'll come out through a tunnel that they've built out of the lodge and down into the base of the pond, and they'll feed off that pile of sticks that they have collected all fall long.

[Jane] Let's go to Silas, who's calling in from North Hampton, Massachusetts. Silas, we're talking a little bit about beavers and what they eat and stuff and you have a question about that, right?

[Silas] Yeah.

[Jane] Yeah, what's your question, Silas?

[Silas] Do beavers eat the bark that they saw off with their teeth?

[Jane] Good question, Silas. Kim, I was wondering that, too. How much of this wood that they're chewing are they actually eating?

[Kim] Yeah, Silas, I'm glad you asked that question because what they actually eat is what's called the green cambium layer underneath the bark itself. So if you go to a beaver pond in the springtime, you'll often see lots of white sticks floating on the top of the pond or even sometimes stuck into the lodge or into the dam. And that's what's left over from their winter food supply. They actually have eaten the bark off those sticks. And what's left over in the in the spring is the stick itself. They don't eat the wood.

[Jane] Let's talk about beaver tails, Kim, we have lots of questions about this. So Gabriel in Pelham, New Hampshire wants to know why beavers have a flat tail. Juniper, who's eight and lives in Essex, Vermont says, "Do beavers' tails really have a waffle pattern like they do in books?". And Lucas in Hinesburg, Vermont says, "Why do beavers have big wide tails and what are they for?". And let's get one more in here.

[Theo] I'm Theo from Seattle, Washington, I'm five and a half. I want to know, "Why do beavers have big tails?".

[Jane] So Kim Royar, give us the skinny on beavers' tails.

[Kim] Sure. So beaver actually use their tails in many different ways. And when they're on land and when they're cutting those trees down and they're up kind of standing on their

back legs, they use the tail for balance. It actually provides them like a little kickstand to keep them from falling over. They often, if anybody's ever been down to the edge of a beaver pond, they may have seen a beaver slapping its tail on the surface of the water. And this is a signal of alarm. And they're either warning the other beaver in their family that there's some danger out there or maybe that there's even another beaver around. The tail also stores fat in it. So in the wintertime, if that food cache we talked about...that pile of sticks that they've put away for the winter...runs low, they can actually live off the fat reserves that are in their tail.

So it's a very, very important organ for the beaver. It also helps them maneuver in the water. It acts kind of like a rudder for the beaver and helps them swim much better in the water.

[Jane] And is it waffle-patterned like you see in cartoons?

[Kim] You know, it is like scales. And in fact, back in the medieval days, people actually used to eat beaver tail for Lent because they thought it was the equivalent of a fish because it does have a scaled pattern. It's a kind of a leathery tail, but with that kind of scalloped pattern on it.

[Jane] And you say for Lent because some people, depending on what religion they follow, during certain times of the year in particular, you might have some restrictions on what you can or can't eat if you're following a religion.

[Kim] That's right.

[Jane] Theo in Omaha, Nebraska also wants to know about beaver tails and asks, "How do beavers leave tracks with their tails?"

[Kim] Well, the beaver tail is about nine inches to thirteen inches long and maybe four to eight inches wide. So it can be pretty large. That's an adult tail. And when it walks in sand or even in mud, and if it drags the tail, you'll kind of see this little serpentine or squiggly movement and you'll see maybe a four to eight inch... just like a trough in the mud or in the sand where the beaver has dragged its tail. And unfortunately, sometimes you will miss the beaver, the tracks of the beaver itself, because the tail actually wipes them out as it walks along.

[Jane] A lot of the places where I like to walk have beavers and you can see they've created trails with their tails and their feet along the paths from one pond to another or where they like to go a lot of the time and you can just see these beaver trails. It's really neat to watch them form.

[Kim] It is. And the other thing you can look for around a beaver pond is they will build these little scent mounds. So they create these little mounds of mud and they will disperse castor. They have castoreum in glands in the back, right in front of the tail. And they'll disperse those on these mounds. And those are like signals to other beaver that this territory is taken and "We don't want any outsiders here."

[Jane] Are beavers one of the smelliest animals? I've heard that.

[Kim] I actually think that the castoreum, it doesn't smell bad at all. It's actually kind of a... maybe even a licorice smelling type smell.

[Jane] Huh! I guess it's in the eye of the smeller.

[Kim] Well, that's true. Everything is.

[Jane] Let's go to Percy, who's calling in from London, England. Hi, Percy. Nice to talk with you.

[Percy] Hi.

[Jane] What's your question about beavers?

[Percy] My name is Percy, I'm five years old, I live in London and my question is "Why is the door to a beaver's home underwater?"

[Jane] Good question, Percy. Why is the door to a beaver's home underwater, Kim?

[Kim] That is a good question, Percy. Wow, all the way from London. This is great. It's underwater so that they actually don't have to come out on land in order to get to their food or to the water itself, which is the environment that they feel the most comfortable in. Beaver have to go on land to get the food that they need for the winter time. But if they had their druthers, I think they would stay in the water as much as they possibly could.

[Jane] In terms of the beaver homes, [00:41:36] I've read, Kim, that the beaver dens, they actually kind of have a mudroom area where they can dry off.

[Kim] That's right. They actually have like two platforms. The first one is a little lower. And when they come out of the water, they can dry off there. And then they have sort of their nesting platform where the family lives. And before the kits are born, the family will actually spread hay or sedges up on that platform and prepare it like a little birthing center for the mom.

[Jane] Let's go to Arthur who's waiting on the line from Wellesley, Massachusetts. Hi, Arthur.

[Arthur] Hello.

[Jane] What's your beaver question?

[Arthur] I heard that beavers, they have teeth and the front part is hard and the back is soft. Why is the back part soft?

[Jane] Oh, interesting. Kim, why is the back part of a beaver's tooth soft?

[Kim] Yeah, that's a great question. They actually can sharpen their teeth by grinding the lower teeth against the upper teeth and they grind it against that soft part in the back. And it creates a chisel, a sharp cutting surface so that they can always keep their teeth sharp enough to be able to cut down a tree.

[Jane] Iris lives in Montpelier and is seven and wants to know, "Why are beaver teeth orange?"

[Kim] The orange part is the hard enamel part and that's got iron in it. And that's just what makes it have that color.

[Jane] Four year old Lucille in Winooski wants to know, "Do beavers make noise?" We talked about the fact that they slap their tail...

[Kim] Right.

[Jane] ...but do they actually vocalize?

[Kim] They vocalize with each other, but not so that we normally can hear them. They're not like bats where they make those loud chirping noises that are something that humans usually hear, but they may vocalize to each other in the lodge itself.

[Jane] Let's go to Maggie, who's calling in from Fletcher, Vermont. Hi, Maggie.

[Maggie] Hi. I was wondering if beavers are predators to any other animals.

[Kim] Oh, Maggie, I'm so glad you asked that question, because I wanted to make sure everybody understood that beavers are...we talked about bats being carnivores....beavers are herbivores and they only eat plant material. So like I said, in the summertime they eat things like water lilies and maybe cattails and sedges. And then in the wintertime, they eat the bark of sticks. So they do not eat fish and they don't eat any other animals.

[Jane] Amelie is with us from Quechee, Vermont. Hi, Amelie.

[Amelie] Hello.

[Jane] Hi.

[Amelie] I'm Ameloe and I have a question and it's, "How large do beavers grow and how long do their teeth grow?"

[Jane] Did you hear that, Kim? How big can beavers grow and how long do their teeth grow?

[Kim] Sure. So they can get to be, a large beaver can get to be, up to 60 pounds. And it's amazing because if the beaver were the size of us, of a human, their brain would actually be 15 times smaller than ours. So they have a pretty tiny brain. It's amazing that they can build these incredible dams and lodges with a brain that size, because I know I couldn't do it with my brain. So they can grow anywhere from, you know, from 20 to 60 pounds. And the other question was...?

[Jane] How long do their teeth get?

[Kim] Their teeth will keep growing for the rest of their life. And that's why they have to keep chewing on wood because, if they stopped, their teeth could grow right around and and go right into their their lower jaw or their throat. So it's very important that they keep chewing all the time. That's what keeps their teeth from growing too long.

[Jane] Kim, you mentioned earlier when European settlers came to North America, they changed the landscape in many ways. They also changed the landscape for beavers in that they hunted beavers a lot. How are beaver populations now?

[Kim] They're actually growing. And when you think about it, Jane, the two major predators of beaver prior to European settlement were wolves and Native Americans. And wolves are no longer on the landscape. Coyotes and a few other species will take beaver, but we basically have a growing beaver population today.

[Jane] Is that good? Because sometimes humans don't like what beavers do to their own land.

[Kim] Well, it's good from an ecological standpoint. Beaver create amazing habitat and we have a program to try to help people live with beaver so that we can tolerate as many as possible on the landscape.

[Jane] So you want people to enjoy beavers and like them and find a way to live together.

[Kim] As much as possible, although sometimes we do have to control the population in places where the program that we have, the materials that we use, don't work.

[00:47:03] [Jane] Well, we have more information about beavers. Again, go to butwhykids.org and click on today's show and you're going to find some more resources from Vermont's Agency of Education and more resources about bats, which we talked about earlier. Kim Royar is a wildlife biologist with Vermont Fish and Wildlife. Kim, it was such a pleasure to talk beavers with you.

[Kim] Oh, it was so great to be here. And I really enjoyed the questions.

[00:47:26] [Jane] Good! Kids, I hope you enjoyed this show, too. We're going to be making these programs every week until the end of the school year in Vermont, which is in the middle of June.

[00:47:35] And we have so many fun topics planned, including one with the chief scientist at NASA. But you're definitely going to want to tune in first next Friday. We'll be learning about poetry with Ted Scheu, who's known as The Poetry Guy. And this one does have some homework, if you want it. We want you to write a short poem. It can be any form: haiku, acrostic, slam poetry, whatever you like. And if you don't know what a form of poetry might be, just write whatever comes to your head and then save it and call in next week to read it on air. Send questions to questions@butwhykids.org. I'm Jane Lindholm. Until then, stay curious.