

## **But Why: A Podcast for Curious Kids**

Why Do Geese Fly In The Shape Of A 'V'?

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[Jane] This is *But Why: A Podcast for Curious Kids*. On this show, you get to ask the questions and we help find the answers. I'm Jane Lindholm. And today we're going to put on our windbreakers and our hats with the ear flaps go outside. This show is going to the birds!

You've been sending us lots of questions about bird migration and physics. So we found one of our favorite friends to offer up some answers.

Bridget Butler is known as the 'Bird Diva' around these parts. She loves birds and she loves to teach people about different birds. So she and I met up on a windy, chilly fall day in Vermont on the shores of Lake Champlain in front of a flock of Canada geese floating on the windy surface.

And our first question that Bridget helped us answer was from 9-year-old Jack.

[Jack] Why do geese fly in the shape of a 'V'?

[Bridget] You have to fly a really long distance when you're migrating, and you want to conserve as much energy as possible. If you stood there right now and you flapped your arms, and you just keep flapping and flapping and flapping you get tired pretty quickly. But if you work as a team together you can decrease the amount of energy you have to use.

So when you fly in a 'V' what the geese are doing is they're drafting each other. So they're kind of providing a wind-break for the bird in front of them. So they stack up just right a little bit above each other, and next to each other, in order to take advantage of breaking the wind and then the wind that's coming off of the goose's back in front of them, which we call it up-wash, an updraft and they flap together and they fly together.

And Jane, they take turns which is really awesome. So that goose that's out front leading the way and breaking the wind will drop back and someone else will take that place in order to give that goose a little bit a break and a chance at taking advantage of the updraft.

[Jane] But Bridget, sometimes I see geese and it's like kind of a 'V', I guess, but it's like a 'V' if you were writing with the hand that you don't usually write with. You know it's not really a real 'V,' and sometimes they're just flying in a line as are they still doing the same thing.

[Bridget] Yes, so they're still doing the same thing, there are a couple of different formations. It's kind of like a check mark formation right, that you might flip on the side. The other one is called an echelon which is just that diagonal line, but that's that same pattern, again, of flying a little bit off of the bird's wing in front of you and we can't see it from the ground, but they're also flying a little bit above the bird as well.

[Jane] And if you're a human, we know humans, use this kind of technique too. Often it's called drafting. You might see cyclists doing it, like one bicyclist will be right behind another one.

[Bridget] Exactly. And the other way that you can think about it is, if you live in a spot where we get lots of snow, like we do here in Vermont, when you go out and you walk or hike in the wintertime you want someone to break trail in front of you. And so that person gets really tired after a while and people trade out in order to break the trail and stop the snow down in front of them, so it makes it easy for everybody else behind.

[Jane] I hear a lot of geese right now, what's going on?

[Bridget] Well, so we're kind of in a spot that you might call a staging area. So these geese are resting for the day. The other cool thing that we don't really think about as much because we do see the birds flying during the day, is the primary time that these birds are going to migrate is at night, when the air is cool, it's easier on your body. And then during the day you're going to rest hang out, feed, socialize with your buddies which it sounds like that's what they're doing right now, and then get ready for the next leg of the journey.

[Jane] All right speaking of journeys we have another question.

[Zaelen] My name is Zaelen and I live in Burlington, Vermont and I'm four and a half years old. How do geese know how to migrate all the way south for the winter?

[Bridget] Yes. Each bird, and this is true for all of our migratory songbirds, we get to this stage either in the spring or the fall, right, because their migration on both ends of the season, where they start to get restless, and this thing kind of takes over their body and they just know that they've got to move. It's called '*zugunruhe*.'

[Jane] What?

[Bridget] I know, that it's a mouthful but it's a really fun word. Zugunruhe is a German word for that restless kind of feeling that you might get. I think about it being similar to like if you're getting ready to play a big game like at you've got a soccer game coming up and you just can't wait. You're prepared. You've got all your stuff, you're ready to go.

It's that kind of feeling and birds start to feel that as the seasons change. So if you think about it gets dark earlier in the evening, it's dark when we get up in the morning so we have this light change that's really different. And those are some of the seasonal cues that tell birds that it's time to move. And also that it's time to eat. So these birds have to eat a lot of food in order to provide their body with enough energy to be able to fly. If you're a kiddo weighing about maybe 70 pounds which is that's pretty average for a 10 year old. You have to double your body weight before you get ready to migrate.

So that means you need to weigh a hundred and forty pounds before you take off.

[Jane] That's a lot of mac and cheese.

[Bridget] That's so much mac and cheese, with a lot of hotdogs thrown in too.

[Lily] My name is Lily and I live in Vergennes, Vermont. I want to know where birds fly to in the winter.

[Bridget] They need to move from a place where they're not finding the resources they need: food, to a place where they're going to find more resources. So as plants start to die off for the winter time, and lakes and bodies of water freeze over, birds have to move. So there are all kinds of cues that kind of tell them to move and then this or internal anxiety that sets in and then they follow pathways that have been established by other birds. And it's kind of built into their genetic code. They know where to go. They get this restless feeling and they follow their buddies. These guys are going to kind of follow each other, the geese out here that we're seeing and they follow common pathways. No matter where you are in the United States, you probably have a migratory pathway, kind of this magical thing over your head, whether...

[Jane] So it's sort of like a highway, like a superhighway in the sky.

[Bridget] Yeah. And highways have signs, right? And we have spots that are signs to birds so they take cues off of the landscape. So here, Lake Champlain is long from like north to south and that's a great kind of highway to follow to move north to south. Same thing with rivers. So we have the Mississippi Flyway right in the middle of the country, so that birds can follow for resources, as they fly south fly out the line too.

[Tallulah] Why do birds fly in groups all the time?

[Jane] Remember what Bridget, the bird Diva said about geese? The 'V' formation helps them fly farther using less energy because they get a break from the wind by flying behind one another and they take turns being the leader. But there are other benefits to flying in a large flock. Some birds just look like swarms. They may not fly in a 'V' but they're getting a big benefit from sticking together. One of those benefits is that with more eyes on the ground, they're more likely to find food. The bird diva says you should

think of this like if you've lost a toy if you're looking for it, it might be hard to find but if you have all of your friends helping you look you're probably going to find it faster. The other benefit is for safety. Have you ever heard the expression safety in numbers. Well that definitely applies to flocks of birds. Think of small songbirds that are hunted by bigger birds like hawks or owls. If all the little songbirds fly together they're safer from those predators than if they're off flying by themselves. Sometimes the flocks can change direction all at once and everybody flying together. That surprises the unsuspecting predator or sometimes they can confuse that predator with a changing flight pattern.

Did you know that groups of birds have lots of different things they're called? Try using these the next time you see a flock: a bevy of quail, a bouquet of pheasants, an exaltation of larks, a murder of crows. Or how about this: an unkindness of ravens. But wait there's more: a murmuration of starlings, a kettle of hawks, a host of sparrows. I love those names. Have you ever seen birds, maybe a charm of finches, sitting on a telephone wire and maybe you've wondered how can they do that when you've probably been told never to touch a live electrical wire.

[Rowan] My name is Rowan. I'm four years old.

[Maeda] My name is Maeda and I'm seven years old and we would like to know how birds can sit on electrical wires and not get electric shocked?

[Jane] Rowan and Maeda live in Durham, North Carolina. Good question, guys. The answer has to do with how electricity flows, or is conducted through different materials. There are two reasons the birds are safe. One is that they're not very good conductors of electricity. Electricity basically wants to move as easily as possible from one spot to the next. Those telephone wires are designed to do that, feathers and muscle that the birds have, they're not designed to conduct electricity, so the electricity stays in the wire and doesn't go into the bird because the electrical wire is the path of least resistance.

The other reason is that the birds are only touching one wire, if the bird had one foot on one wire and one foot on the ground or on another wire that had a different voltage or electric potential, the electricity would move through the bird the wire to the ground. Or from one wire through the bird to the other wire and that would electrocute the bird. So as long as the bird is just on one wire it's basically safe. Let's go back now to the edge of the water on Lake Champlain in Vermont for one more bird question.

[Mira] My name is Mira and I live in Oakland, California and I'm six years old and my question is how did birds fly?

[Bridget] How do birds fly? POh, Mira, that is a tough one.

I got it OK OK OK OK here we go.

[Jane] See even the experts need to think about these things.

[Bridget] Here we go, Mira.

Birds can fly because they are designed in a way to do so. I mean and that's the kind of the most basic way to think about it, right? Their bodies are shaped in a way to be able to fly. They have special features that allow them to fly and allow them to be able to take advantage of places that other animals can't and that allows them to feed differently and to escape predators too. So I think over time, birds evolved in response to those things avoiding predators, be able to live in different parts of a habitat in a way that no other animal can. So having wings, having feathers, having a tail and having feet that can help kind of provide all of those features that allow you to take off, to stay aloft in the air to land to stop to turn. That's a great question, Mira. And you're going to have me thinking about that for a long time.

[Jane] You know what I wish I was today? It's really windy which you can probably hear in my microphone. So right now, I wish I was a hawk because you see hawks and other birds that are kind of the same shape riding the drafts and the wind. And it seems sometimes Bridget like they're almost playing. If I were a bird today I would want to be playing in this wind.

[Bridget] In the wind. And you know you bring up a really good point we were talking about how Canada Geese migrate at night, and hawks migrate during the day because they need to take advantage of the wind, the thermals, the warm air that rises up from the ground and kind of pushes up into the air. Hot air rises. So that's a really great way to conserve energy. And that's what hawks do.

[Jane] I agree. I'm very swallow-centric. On days like this I would love to be able to be designed to dip and swirl and dive and like catch bugs right out of the air with open mouth.

[Jane] Thanks to the bird diva Bridget Butler for answering questions about our feathered friends.

Speaking of birds if you're lucky enough to own your own chickens you'll recognize the sound of them pecking away at some food, giving them the fuel they need to lay their eggs. A lot of people get their eggs at the store and the choices there are usually just brown or white. But chickens actually lay eggs in a lot of different colors. Well one of you was curious about that.

[Marina] Hi I'm Marina from Palm Beach Gardens, Florida. I'm eight years old and my question is, why do chickens lay different colored eggs?

[Jane] Our producer, Melody Bodette, went to find an answer.

[Kat] Hi I'm Kat Wright, and I'm the family program coordinator and a farm based educator at Shelburne farms, a 1,400 acre working farm, national historic landmark and most importantly, a non-profit with a mission to educate for sustainability. Well, there is a very easy answer, but it's not a very long answer. So the first thing I would say it just depends on what breed the chicken is. Different kinds of chickens lay different colored eggs, just like different kinds of chickens, which there are 100 different kinds of different chickens, so different chickens have different colored feathers, different patterns on their feathers. Some have extra toes. They have different colored skin. And just like all of these other differences chickens lay different colored eggs as well.

[Melody] And so let's talk about some of these chickens that we have in front of us. What kind of breeds do we have here, and what kind of eggs do they lay?

[Kat] That is a white leghorn and they're a super popular chicken breed for laying white eggs. So all of the chickens that are surrounding us are breeds that are for egg laying as opposed to chickens that are very meaty for things like chicken nuggets and fried chicken. And there's also some ornamental breeds that were bred more for their fun appearance such as our Polish crusted that have a really fancy feather do on the top of their head. They tend to be a favorite among children. That is Tina. Tina Turner.

[Melody] And what color eggs does Tina lay?

[Kat] She lays a smaller cream-colored egg. Now a big chicken like the Barred Rock we're looking at is going to lay a larger-sized egg typically. And they're going to be a brown color.

And so you know we're kind that one is you got one in front of us

[Kat] We've got a brown Americana.

[Melody] OK.

[Kat] And that is one of those chickens that's going to lay those beautiful bluish green eggs.

[Melody] And so I bet a lot of people didn't know that you get blue eggs because that's not really something you can find in the store, right?

[Kat] Yes. Typically you would find a white egg or maybe a light brown egg in the grocery store the co-op.

[Melody] So other than blue or any other fancy color eggs that you can get?

[Kat] There's a whole spectrum, but typically they're going to be a version of blue, a version of white as in cream or white, or bluish or greenish, or a brown egg that can tend to be a light brown dark brown or more reddish brown.

[Melody] And so what's behind that difference in color, brown versus blue.

[Kat] So in order to understand how an egg comes to be a color other than white, let's talk about how the egg forms in the chicken.

So the ovary in the chicken which is where the tiny little egg yolks that you might be familiar with if you crack open an egg to bake a cake or to make pancakes an ovary releases a little teeny, teeny tiny egg yolk and egg yolk for the next nearly 26 hours is going to travel through a tube called an oviduct.

But we'll think of it simply as a tunnel that connects the chicken's ovary where she's releasing this little tiny egg yolk all the way, twenty-six hours later, to her vent, which is where she not only uses the bathroom, but where she will lay the egg with the shell like what we see when we go searching for eggs in the nest boxes. So during that 26 hour journey that egg yolk will continue to grow into the big yellow egg yolk that you find when you crack open an egg.

And during that time of the egg whites, that clear, kind of jelly like substance that surrounds the egg, will start to form around the egg and eventually the shell will start to form. So as the shell is forming, maybe it will stay white, but some chickens like the ones we talked about, the Ameraucanas, while traveling through the oviduct little pigments of color will start to color the egg. So pigment is just a natural dye that's formed in an animal's body or in a plant as well. In a chicken like a Welsummer, that lays dark, dark chocolatey-looking brown eggs, they have a lot of the brown pigment that will start to cover the egg and turn it brown. And then in a chicken like the Ameraucana that lays bluish green eggs, they have a blue pigment, that will coat and permeate, which just means to absorb into the egg shell, to turn that egg blue.

One chicken can also lay different shades of that same color depending on a lot of reasons. So a chicken that lays dark brown eggs depending on how fast the egg's traveling through her body and through the little pigment painting zone of her body, it could, if it travels through really fast, it might be a lighter color brown. Let's say she's laying as many eggs as her body will allow her, then they might be lighter in color.

But if she's laying, if it's the fall, or the winter, when chickens are laying fewer eggs than those eggs will have more pigment. There will be more pigment to go around to the eggs will be laid a darker color.

And so what about these little chickens that are over there, do they lay little eggs because they're littler chickens.

[Kat] So we have many Bantam breeds of chicken. And those are usually chickens that are under three pounds or so. And I often get the question, 'oh, is it a baby? Is it a chick?' And it's always a surprise to find out that these tiny, you know, one, two pound chickens are all grown up and yes they do lay eggs just like any grown up hen in a female chicken and they lay smaller eggs.

[Melody] And so how many eggs does a chicken lay in a day?

[Kat] A chicken will lay an egg almost every twenty-six hours which is just longer than one day. So a chicken if she's laying as many eggs as she can, the chickens that lay the most eggs are going to lay about one every day but every day it'll be a little bit later.

[Melody] And so if you have chickens do they lay all year around or do they stop?

[Kat] Oh, that's a good question. So a lot of chickens will stop laying eggs or lay very few eggs for the winter as the days get shorter and the nights get longer and darker. But there are special breeds that like a cross-breed called Golden Comet that we raise here on the farm that tend to lay throughout the entire winter. So they're a great breed to have if you really have to have those scrambled eggs for breakfast through the cold Vermont winter.

This is Pearl a favorite among many. She's a porcelain-colored Belgian D'Uccle.

[Melody] And she's a little bantam she's a little tiny chicken.

[Kat] She's one of the smallest chickens in the coop. She also has a feathery feet.

[Melody] And what's that called when they have feathery feet?

[Kat] Cochin. So she has cochin feet, feathery feet, also a difference among chickens: different-colored eggs, feathers on the feet, or no feathers on the feet. All different ways we can tell breeds of chickens apart from each other.

[Melody] That was just a chicken poking my microphone.

[Jane] Thanks so much to Kat Wright at Shelburne Farms for explaining the mystery behind chicken egg colors.

That's it for today.

If you have a question about chickens, geese or anything else, have an adult record it and send us the file to [questions@butwhykids.org](mailto:questions@butwhykids.org). If you have already sent us a

question we really hope we can have an answer for you soon. And we love hearing from all of you.

*But Why* is produced by me, Jane Lindholm, along with Melody Bodette for Vermont Public Radio. Our theme music is by Luke Reynolds. We'll be back in two weeks with an all new episode.

Until then, stay curious!