

But Why: A Podcast for Curious Kids

How Do You Make Ice Cream?

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[Jane] This is *But Why: A Podcast for Curious Kids*. I'm the host of the show, Jane Lindholm.

I make this show with Melody Bodette at Vermont Public Radio. And we put out a new episode every two weeks. On *But Why* you get to ask the questions and decide what we cover.

And Melody and I find the answers. We have so, so many questions from you. And I'm so impressed by all the ways you are curious about the world around you. And here's something cool: Even when your questions are about, oh, say, ice cream – which is what we're going to be talking about today – exploring the answers, teach us things about chemistry and food science, about culture and history, and about how people choose their careers and become adults. How do we get all of that out of an episode about the sweet treat of ice cream? You're going to have to stay tuned.

Rabia Kamara is the chef and co-owner of an ice cream shop called Ruby Scoops, which is planning on opening up in a new location in Richmond, Virginia – here in the United States – later this year. Rabia is our guest for this episode.

And she says she decided to make a career in ice cream when she started to think about being an adult who needed to have a job – and how to have a job that feels like fun, at least most of the time.

[Rabia] I realized that I was going to spend my life working and I wanted it to be something that I enjoyed doing. So, I went to culinary school and we learned how to make ice cream like in a machine there – small machine – but I really enjoyed the process and the different things that you could add to it. And, fell in love with it and just decided that if I was going to do something for myself long term, I wanted it to be ice cream because I – from my childhood, even now into an adult – have a lot of fond memories that include ice cream. And I wanted to be a part of that for families and friends and people that I know and don't know and, you know, hold a special place in their heart through ice cream.

[Jane] What makes your ice cream special?

[Rabia] Well, first thing's first. It's delicious, although most ice cream is. But, we make it all by hand. Since it's all small batch. We can't make more than like four gallons at a time because of the machine that we have.

We do vegetarian, gluten free, vegan. We're beginning to work on some sugar free. So, we're doing our best to make sure that we can accommodate everybody's lifestyles or

dietary restrictions and still provide you with a nice, cool, sweet treat. And then ownership wise, we are black woman- and queer-owned.

[Jane] What kind of edge does that give you that another shop might not have?

[Rabia] For us, it's very important that we make people feel safe and inclusive and accepted because these are things that we've both had issues with throughout our own lives. We want everybody to be able to come into the shop no matter what they look like, identify as. . . who they. . . whatever they're going through. We want them to feel safe to come in and enjoy.

You know. ice cream, cookie with themselves or whomever they desire and feel like that space is theirs – while they're there.

[Jane] Well, that's cool because everybody should be able to enjoy ice cream.

[Rabia] Absolutely. Absolutely. That's exactly how we feel.

[Jane] It's also the way a lot of our young listeners feel. So, let's hear some of your questions.

[Charlotte] Hi, I'm Charlotte. I live in Australia, Newcastle. And I'm 5 years old, and I want to learn how to make ice cream.

[Yula] My name's Yula. I'm 8 years old, and I'm from Nova Scotia, Canada. And I'm wondering: How does milk turn into ice cream?

[May] Hi, my name is May, and I'm 4 years old. And my question is: How is ice cream made?

[Jane] Ice and cream sounds like it's just cold cream. But there's a little more to it. So, what is ice cream?

[Rabia] So, ice cream is defined as a frozen, dairy dessert that basically has air, like, incorporated into it while it's freezing. Because while the air. . .so the base of it is usually heavy cream, milk, sometimes egg yolks - not always egg yolks - sugar, and then whatever your flavorings are going to be.

So, we basically heat all those things up together, bring them to a point where all of our raw ingredients become safe to eat. Cool it down and then put it into a machine - which we refer to as a batch freezer – that when we turn on, there's a cylinder on the inside so that the ice cream is spinning as it's getting cold. So, while we incorporate that air, that ice, into the cream, if you will, you get basically this fluffy, creamy product. Because when you mix cold and air and milk, you get that texture that we all know as ice cream.

[Jane] If it didn't spin around, if you didn't get the air into it, would it just be like a block of ice?

[Rabia] To a sense. So, what I was going to say, as if you don't breathe air into it, things that we also know – popsicles, if you've ever had like a fudgesicle – which is the icy but still cold, that is what would happen if you didn't pump that air into it. So that, if you want to sound fancy, we refer to that freezing as “quiescently frozen.” So, quiescently frozen basically freezes in, like, a period of inactivity. So, there's nothing going on. When we make popsicles at home, we put juice into a mold. We put sticks in it, put it in the freezer.

[Jane] Don't touch it. [Rabia] Don't touch it. But with ice cream, you got to touch the base because you have to get the air into it. And that is what really the big difference is between ice cream and like a dairy frozen dessert – or a popsicle, or like a novelty. You can also make things that are ice cream texture out of nondairy milks: cashew, coconut, almond. But you cannot legally all those things “ice cream.” [laughter] You could do the same thing, but that would be called a “nondairy, frozen dessert.”

[Jane] That's a boring. . . more boring name.

[Rabia] Such a non-exciting name. So, you know, we try to find fun names for it – to make it [take] not as long to say what you want to eat.

[Jane] So, ice cream kind of is just icy cream, plus some sugar and additional flavorings. But what makes it ice cream, instead of a popsicle or a fudgesicle, is stirring air into the mixture either before it freezes or while it's freezing. So, it's not just a block of frozen cream. All that air creates lightness and fluffiness and texture.

[Molly] Hi, my name is Molly, and I live in New York. And I'm six years old, and my *BUT WHY* question is: But why does the sun melt ice cream?

[Emily] My name is Emily. And I am six years old, and I live in New Jersey. And my question is: Why does ice cream melt in the sun?

[William] Hello, my name's William, and we live in Philadelphia, Pennsylvania. And I'm five, and my question is: Why does ice cream melt?

[Charlotte] Hi. My name is Charlotte, and I live in New York City. And I'm four and a half, and I am wondering. . .and my question is: Why does ice cream melt?

[Jane] Ice cream melts because it's frozen. In order to stay frozen, the air around the ice cream has to be really cold. If you could walk inside a freezer, like maybe if you were wearing snow pants and a jacket and gloves, you could sit there eating your ice cream and it would never melt – as long as your warm hands weren't touching it and warming it up. But, unless you like eating your ice cream in cold, winter weather, the area around you is probably warmer than the ice cream – whenever you're eating ice cream. And that warm air hits the cold ice cream, and the cold ice cream starts to get drippy.

Technically, the ice cream is absorbing the energy around it in the form of heat. Now, we've talked about this in previous episodes and how things turn from something that's frozen – to something that's liquid – and then to something that's a gas, depending on how warm it gets or how cold it gets. But basically, molecules move more slowly when they're

cold than when they're warm. So, the ice cream feels solid and cold because the molecules in that cream and sugar mixture are moving way more slowly when they're frozen. But when the ice cream starts to absorb the energy in the warm air, the molecules start to move faster, and they turn back into a liquid.

[Jane] And what that means for you is that you've got some melty ice cream on your hands.

[Julia] Hi, my name is Julia, and I'm six years old. And I want to know: How [was] ice cream kept cold before freezers?

[Jane] Most of us these days have a freezer inside our homes where we can keep ice and ice cream and frozen food. But freezers are a pretty recent invention. In fact, the modern refrigerator didn't appear until about 100 years ago, and it's been even less than a hundred years since people started having modern freezers that use chemicals and electricity in their homes. But people have been able to keep food cold for much longer than that, although not everyone had that ability to do it in their own homes.

Now, if you think about it, obviously snow and ice and cold temperatures will keep things cold. So, people who lived in cold climates have been able to use their natural surroundings to keep food cold. Even for people who didn't live in that cold environment, they were able to use ice to keep food and other things cold. So, people would take ice, say, from a frozen lake and transport it to a place that was warmer. But then they'd have to try to keep the ice from melting. So, they'd do things like bury the ice underground where it's a little bit cooler and then cover it with hay. This was done to insulate the ice from the heat – so, to try to keep the cold in and the heat out. In some cases, ice could be kept all summer that way.

And your great-grandparents might have had something in their home that they called an ice box. This was kind of an early version of a fridge or a freezer. It was usually a wooden box lined on the inside with some kind of metal. The ice would be delivered in blocks to people's homes. The "ice man" or the "ice deliverer" would come to your house and drop off some ice, and you'd slide the ice inside the ice box. And then that ice could stay frozen, melting really slowly for maybe up to a week. There would be a second compartment in the ice box where you could put your food and keep the food cold as the ice melted. And then when the ice was fully melted, you'd have another block of ice delivered. And that way you could keep your food cold. So, people were able to keep ice cream cold before they had freezers by using an ice box, or storing it in a cold environment.

And you could even make ice cream without having a freezer. When I was a kid, we sometimes made ice cream using a special ice cream maker that my grandfather had. It was a really big, wooden bucket – kind of looked like a barrel. And inside the wooden barrel, you would put a lot of ice and some salt – and the salt would help lower the temperature even further. The salt and the ice surrounded a special container, a cylinder in the center of the bucket where you would put your cream and your sugar, and whatever else you were using to make your ice cream. And then you had to use a crank to spin that

container around and round to get that air into the ice cream. It seemed like it took a long time, like maybe an hour. I mean, it felt like even more to me as a kid.

But eventually that cream and sugar spinning and spinning and spinning would start to freeze and the air would be in it – and it would suddenly turn into ice cream. And then it was, oh, my gosh, so exciting to eat because you had used up so many of your muscles just trying to get it to turn into ice cream.

But, these days, you don't have to work nearly so hard to make your own ice cream. And when we come back, Rabia is going to tell us how to do it the easy way – without needing to spin or turn anything.

[Jane] This is *But Why: A Podcast for Curious Kids*. I'm Jane Lindholm. And today we're learning about ice cream: what it is and how to make it. Rabia Kamara, of Ruby Scoops Ice Cream, is teaching us the importance of air in the making of ice cream. Sometimes, that means churning or spinning the ice cream as it freezes. But, you can do it a much simpler way with just a couple of ingredients in the comfort of your own home.

[Rabia] You need three ingredients, specifically, and I make it at home all the time because I love ice cream, and sometimes I want to eat it in the house. So, we basically take two cups of heavy whipping cream, one 14-ounce can of sweetened, condensed milk, and then your flavorings. So, if you wanted to do vanilla ice cream, you could put a couple teaspoons of vanilla in there. You could put melted chocolate. You could put peanut butter, strawberry jam. You could put whatever flavor [for] ice cream you've got in mind into this.

[Jane] Here in Vermont, we have a lot of blueberry bushes coming up with fresh blueberries right now.

[Rabia] So if you are putting fruit in ice cream, you basically want to cook it down in sugar, or use it from a jam a preserve. Because if you put raw fruit into something that is going to, as we said, quiescently freeze because there's no air incorporated into it. So, it'll make your ice cream or your fold-ins icy – which isn't very good. It took me a couple of tries of making strawberry ice cream to figure out what needed to be done, actually. So, if you were doing that, you could basically just take one cup of fruit to a third cup of sugar, and you could add lemon juice if you wanted, if you like, a little brightness in your jams. Cookt that down. Let it cool. And then you could add *that* as your flavoring if you were going to be making a Vermont blueberry ice cream.

[Jane] Got it. OK. So, we have our ingredients.

[Rabia] Yes. So, we have our two cups of whipping cream and our one can of condensed milk. We're going to put those into a mixing bowl. And then we're going to use an electric hand mixer. If you don't have one, a whisk is fine – it's just gonna take a long time.

But that's how we get our muscles. That works. So, you just want to put those two ingredients into a bowl, and you want to mix it until it looks like whipped cream. You want

to be able to pull your mixer out of the bowl and the whipped cream [will] still stick to your attachment.

And if you've got it like that, then you can add whatever flavorings you want. In this case, your blueberry mix that you made – swirl that into your ice cream, and then you're just going to basically take your ice cream and put [it] into some freezer-safe containers. I like to use things that are rectangular or square because they freeze in a nice layer, and then they're easier to scoop out of than something that's round. So, we put that in a container, put a lid on our container, [put it] into the freezer for at least eight hours. And *viola* you've got homemade ice cream – just as easy as that.

[Jane] That's so cool. So, you're basically doing that – putting the air into it before you freeze it – when you make it at home. Whereas for you, when you're making it, it sounds like you've got a container that's spinning while it freezes. So, you're putting the air into it while it freezes. So, what's the difference in the texture – or the way the ice cream feels and tastes?

[Rabia] The texture is actually very similar. And it's the flavor that *you* want to make. So, it's, you know, it's exactly what you want. Definitely.

[Jane] So if you wanted like a gummy bear- peanut butter- chocolate chip ice cream, you could make that. [Rabia] Absolutely.

[Liam] Hi, my name is Liam. I'm four years old, and I live in California. And my question is: Why does some ice cream melt slow?

[Jane] That's Liam who's asking why do some ice creams melt faster than others.

[Rabia] Some ice cream melts faster than others based on how much air there is in the product and how much sugar there is in the product.

So in fact, so if you're eating like a super-premium ice cream, let's say Ben & Jerry's, we get a scoop of Ben & Jerry's, and then we get a scoop of Breyers. They use different fats in their dairy. So, that's one thing.

And that also helps with the perception of the cold that we get. Different levels of dairy content and different levels of sugar. So, the more air there is in your ice cream, the faster it will melt.

[Jane] I am excited to learn that because sometimes, even if you have two different kinds of ice cream from the same company, when you take them out of the freezer, one is softer than the other and one melts faster than the other, even though it's the same kind – the same brand of ice cream. So that's neat to know.

[Rabia] And even I will say chocolate ice cream always melts faster than vanilla ice cream because there's more sugar in it – because chocolate is bitter. And we'd like our chocolate

with sugar. So, the more sugar you add to something, the quicker it melts, like a popsicle will melt faster than ice cream because there's no fat. So, yeah, it would be fun to take out two flavors from the same company and get like get like one chocolate, one vanilla and something with some mix-ins – and see that your vanilla will probably melt the slowest.

[Jane] You know, it's pretty cool that your job is making ice cream, but you're actually kind of a scientist too, because you have to learn the chemistry.

[Rabia] And, it's really interesting because my whole life I thought I wasn't really into, like, chemistry and parts of science. But, being so involved in ice cream has made me realize that I'm more of a chemist than I thought. Just like knowing what needs to go into things to make sure that it comes out right.

And, oh I might be a scientist, after all.

[Jane] A scientist and a mathematician, because you got to know your measurements.

[Rabia] Exactly. All the things that when I was in school, I was like “I’m not gonna use this every day,” I genuinely use every day. So, you don't think you're going to use math all the time? Sorry to tell you, that is not true.

[Jane] All right. So, here's another kind of scientific question for you. Kind of half science, half food knowledge.

The question comes from three-and-a-half-year old Robyn in Heith, England, who wants to know: Why is lemon-flavored sorbet white and not yellow?

[Rabia] Couple of things here. And the first thing is that. . .the first thing we've been talking about most of this episode. . . is air. So, when we incorporate air into something that is frozen –not quiescently, but like an ice cream is – it changes the color of what you're making. Whatever you put into the machine will come out lighter. So, for instance, vanilla ice cream is white as we know it, but the *base* for vanilla ice cream – because it's got egg yolks in it – is yellow. So, when you put that into a machine and you add the air, it comes out lighter and paler. So, lemon juice is yellow, but it's a really pale yellow. It's not the same as like the skin that we see on the lemon, that's really bright. So, when we take that pale, yellow lemon juice and sugar and water and mix it all up, we put it in a machine that pumps air into it. What's going to come out is this basically like clean, white – whiter than vanilla – ice cream product. Because all that air going into it is going to make it lighter in color and in texture.

[Jane] And sorbet is different from ice cream. Technically, right?

[Rabia] Sorbet has no dairy or fat in it, whatsoever. It's typically blended fruit, sometimes some lemon or lime or orange juice, water and sugar.

[Jane] Do you freeze it? Oh, yeah. Tell me about sherbert.

[Rabia] Sherbet is kind if ice cream and sorbet had a baby. So, sherbert usually has two to five percent dairy, which is either going to be milk, cream or buttermilk. I personally like to use buttermilk in my sherbets because it adds a nice tanginess to, usually, whatever we're making. But all three of them are frozen the same way – where they're put into a machine, into the hopper, and a cylinder moves [in] a certain direction, typically clockwise, and pumps in air as it freezes.

[Jane] So even sorbet is frozen like ice cream with air pumped into it.

[Rabia] Yes, it is. All three: ice cream, sherbet and sorbet are all made the same way. It is not – I won't say it's impossible – but it is a little harder to make sorbet at home because there isn't any dairy. You can't add the air first. So, it's something that basically you have to, like, freeze cubes of fruit mix and put it into a food processor. Excuse me, food processor or blender to add the air. Or you have to go in and, like, scrape it constantly to add the air by hand.

[Jane] You mentioned that you can't call it ice cream, but you can make something similar with similar texture and flavors without dairy. So, if people want to make stuff at home that doesn't have dairy. Is it the same process?

[Rabia] It would be similar. You would have to use, like, a coconut whipping cream, which I know they sell in most grocery stores now, nondairy whipping cream. And you could use condensed, coconut milk or you could use cream of coconut. Or, if you can find like the vegan, or excuse me, a nondairy evaporated type of milk, like a shelf stable milk, you could add your own sugar to it and create your own condensed milk to use.

[Jane] So even people with dietary restrictions can make good treats at home.

[Rubia] And they can still make “cookies and cream” because Oreos are vegan.

[Jane] So, Rubia. Is there anything else that you think we should know about ice cream that you think is super cool?

[Rabia] I think it's super cool that you can make any flavor your heart desires. And I don't feel like you can always play those games with other food. You could make a savory ice cream if you really wanted to make, you know, like, a blue cheese ice cream or. Yeah, I'm with you. I'm with you, Jane.

[Jane] You can't see me, but I just made a face like: “Oooo. I'm not sure I want that.”

[Rabia] I've seen people make, like, savory ice cream. So, you could even, you know, you could do like a like a cheddar-cornbread ice cream. You know, you could you could make, like you said earlier, your gummy worms and chocolate chips and peanut butter. You could. It's such a blank slate that you can add any flavor to. And because it's so easy to make at home, it's a really fun way to experiment and see what kind of flavor combinations

you like. So, I think that that's super exciting. And I think that ice cream connects us all because every country, every culture has their type of ice cream or frozen dessert. And I think we all come to love it from such a young age that it's exciting. It's exciting to talk to people about ice cream and know that we're all eating it all over the world.

[Jane] That's Rabia Kamara of Ruby Scoops Ice Cream. Thanks, Rubia, for giving us such a great taste of what it's like to be an ice cream entrepreneur, a business owner. And for teaching us how to make our own ice cream. My kids and I tried it for ourselves the day after I talked to Rabia, and we were so impressed with ourselves. One of my kids chose cookies and cream as a flavor and the other one a mint chocolate chip. So, we even got to use our own garden mint to flavor our ice cream.

And I have to say, it was great. It tasted like ice cream. Send us a picture or a note and tell us about what kind of flavor you decide to make if you make your own ice cream. We will post the recipe at: ButWhyKids.org.

But Why is produced by Melody Bodette and me, Jane Lindholm, at Vermont Public Radio. And we're now very excited to be 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.