But Why: A Podcast for Curious Kids

Who was the first person?

April 28, 2017

[Margo] Who was the first person to ever live on Earth?

[Aiden] How did human beings become human beings?

[Jane] This *But Why: A Podcast for Curious Kids* from Vermont Public Radio. I'm Jane Lindholm. On this show, you send us the questions that rattle around in your brain and pop out of your mouth at the strangest moments. And then it's our job on this show to find interesting and knowledgeable people to help answer them. Here's our special guest for today's show.

[Sam] Hi I'm Sam. I'm 12 years old. My mom says I'm pretty special. She says I'm a little bit different from everyone else that I'm the first human. I think that's where she said anyways. I don't know, I don't feel special. I like to run around, eat. My friends seems pretty normal to me.

[Jane] Wow! Did you hear that. Our guest today is the first human! All right. That's not true. But we have gotten a lot of questions from you guys about who that first human might have been.

[Aaron] How did the first person on earth come alive?

[Norah] How did the first people on earth get made?

[Natalie] Who was the first person born?

[Charlotte] How did the first people that lived on earth come?

[Elizabeth] Who was the first person in the world?

[Finn] Who was the first person to live on earth?

[Jane] Wow. you guys really want to know about that first person. Those voices were: Aaron from Shoreham, Vermont; Norah from Harvard, Massachusetts; Natalie from Longmont, Colorado; Charlotte in Longwood Florida; Elizabeth from Concord, Massachusetts; and Finn in Beverly, Massachusetts. We also heard from Margo in Amherst, Massachusetts and Aiden in Hampden, Maine at the very start of the show.

So to help us get to the bottom of thi,s we reached out to a guy who studies the evolution of humans. His name is Adam Van Arsdale and he's a paleoanthropologist.

That means he studies what makes us human and how those earliest humans behaved. He studies evolution.

[Adam] Evolution is all about change over time.

[Jane] Sometimes the change makes an animal better-suited to its environment. Like by giving it a tail that can grip trees, or in the case of humans we changed from animals that walked on all four limbs, our hands and feet, to animals that walk upright like we do today.

[Umesh] My name is Umesh. I'm seven years old. I'm from Lima, Peru. My question is how does evolution work?

[Ezra] My name is Ezra. I'm five years old. I'm from Montpelier, Vermont. My question is how does evolution work?

[Adam] The way that evolution happens is that certain things get passed on from one generation to the next and when they get passed on they're not exactly the same.

So small changes accumulate over time and over long periods of time we can see very big differences then, including new kinds of things altogether. Now to give an example of this, I have two older brothers, so I'm the youngest in my family and when I was a kid I often got hand-me-down clothes, so clothes that my brothers had gone through that my parents hung around and they gave to me. So if you look at pictures of us growing up, you'll see my brothers wearing a particular pair of jeans, or a shirt, and then a few years later, you'll see me in that same pair of jeans or that same shirt. And what's interesting is they're not quite identical. By the time those clothes got to me, there was a little scratch here, or a torn pocket here, or a stain there. And that's kind of how evolution works. We pass on heritable material from one generation to the next. And when we do that, just like the pair of jeans that I inherited from my brother, they're not entirely identical. Small changes accumulate over time and those changes help make us all a little bit different. That's why I'm a little bit different than my parents and my parents are a little bit different from their parents. And stretched that over across a million years, and that's why we're different than other kinds of animals that live on the planet today.

[Jane] That's right. He said a million years. So when Adam said:

[Adam] evolution is all about change over time.

[Jane] He meant a long time. Evolution is not fast. It's not like your grandfather was a monkey but your dad is a human. Like Adam said each new animal being born is

slightly different from its mom and dad. And over time those differences get passed down from generation to generation and we're always changing just a little bit.

Have you ever heard of Charles Darwin? He's famous for his theory of evolution. He was born in England almost 200 years ago and he got really interested in how the natural world works. He traveled all over the world looking at fossils and observing animals in different places. I could talk for a long time about Charles Darwin but I won't, so let me get to the point.

His theory of evolution is that as animals change, or evolve, some of those changes will help an animal survive and reproduce or make other little animal babies and some of those changes are not so helpful. The animals that are better at surviving are going to be more likely to pass those changes on to their offspring, their babies. And so over thousands of years animals evolve or change and become better suited to their environments.

But wait, we have a question about that from Natalie who's five and lives in Phoenix, Arizona.

[Natalie] Why do animals evolve?

[Adam] So evolution doesn't happen for a specific reason. It happens because the biological systems that help make us the way we are, aren't perfect and they create new variation each generation. And what we see when we see the evolution of different kinds of organisms is the result of those processes occurring for hundreds and thousands and millions of years.

[Jane] And when something changes, or is tweaked from one generation to the next it's not always a good thing, but over time the things that are good tend to emerge and keep going because those are stronger for people who are reproducing to the next generation?

[Adam] Exactly. So the new variation that's created by processes like mutation and evolution aren't necessarily better, but over time processes that we refer to as natural selection will make those new variations that are beneficial, that do help organisms survive that do help them to fit into their environment better, will make those more frequent. Those individuals will be more likely to pass those variations on to future generations. So over time if we look across animals today we see that a lot of animals seem to fit their environment very well. So birds have the right kind of beak to feed on the kinds of plants and flowers that they're feeding on. Animals have the right kind of color to blend into the environment around them. And the reason they fit their environment, what we call adaptation, is that those variants made them more successful

and therefore they were more likely to be passed on from one generation to the next and survive.

[Manya] My name is Manya. I'm seven years old. I live in Fairfield, Vermont. And my question is how did the first animal come alive?

[Adam] That is a wonderful question and a very in some ways difficult question to answer. There's a lot of different theories for when the first life came to exist and what the processes are around that. And that gets pretty complicated because it turns out when we're looking at sort of very simple kinds of organisms it's sometimes hard to even decide whether this is a living thing or not, or just sort of a combination of chemicals and molecules there. When we think about animals though, things like dogs and cats and us, there we have a little bit more of evidence, because we have a fossil record for the earliest animals and we have some evidence, even in our genes within us, about how long ago that process might have happened.

So the first animals came about because just like what we were talking about earlier in terms of natural selection making those traits that are more beneficial more common at some point in our past, there is an advantageous change that created more complex organisms that we might think of as animals.

So those single-celled kind of things that we find in the ponds around us gave rise to more complex multicellular kinds of things and eventually they developed other kinds of attributes that are the sort of combination of characters that we think of today as animals. But that was a long time ago, long before any humans were on the world.

[Jane] Manya, you may have noticed that Adam didn't say what the first animal was that appeared on Earth and you know scientists have devoted their whole lifetimes to finding the answer to that question. Right now, from what I can find, it looks like paleontologists think a sea sponge was the first animal. Not a very exciting animal. It's not quite the same thing as the sponge you use to wash dishes, but it's pretty close. But this sea sponge was alive, 640 million years ago, way before humans way before dinosaurs, way before anything. Maybe someday you will become a paleontologist, a scientist who studies fossils, and you'll find out new information about the earliest living animals.

OK. Here's Mira. She's five and lives in Philadelphia, Pennsylvania.

[Mira] Was there a first of every living thing?

[Adam] That's another great question. And oftentimes for those of us who study evolution, the first of something is something we're very interested in. But one of the important things to keep in mind about how evolution works is that individuals don't evolve. For the most part, especially if we're thinking about animals, populations evolve.

I have a teenage daughter and there might be times when I think that she she's a different species altogether that she doesn't understand me and I don't understand her. But that's not actually how something new comes about in evolution. Instead we think about populations evolving.

So when we're talking about the first humans, for example, we're not talking about one individual who is suddenly very different. We're talking about a population that maybe became isolated and over time became very different from the other kinds of populations that existed. And eventually we might be able to identify that it became so different we think of it as a different kind of species or a different kind of animal all together. So there's not a first of things but every kind of different thing that we see in the world today when it comes to living kinds of things, there was a first population that we might identify at some point in the past.

[Jane] But there must be a first of everything in some way, right, because how could you get a second of something if you don't have a first of something?

[Mac] Because somebody has to have a baby and that person has to have a mother that borned that person. I am six and my name is Mac.

[Adam] All of us have parents. So that first human however we want to define that person, or place that person in time, had parents just like we do. And so was born, had a mother, came alive the same basic way that we do. But that first is part of a whole group of organisms typically and to pinpoint it as one single creature within a population of organisms that are all similar and evolving together is really challenging.

[Jane] So remember at the beginning of the show when we met Sam?

[Sam] I'm 12 years old. My mom says I'm pretty special. She says I'm a little bit different from everyone else but I'm the first human I think that's what she said anyway, I don't know.

[Jane] So what Adam is saying is that that's not exactly how it works. There is no Sam. No first person who we can point to by name or look at the fossilized bones of say Eureka! that person is the first human. Adam is saying that scientists look at a whole population of people over several generations that share the same characteristics and when they see those characteristics, like hands that can hold tools, or bodies that allow us to walk on two feet instead of using our arms and hands to help us walk, when the scientists see those traits appearing over and over they can start to see a new species.

[Adam] A lot of the question has to do with what do we mean when we say human? As biologists or anthropologists, we have a formal system by which we name different kinds of living things and we group them together as species, which are basically things

that are the same thing. And for humans we're part of the species Homo sapiens. So one of the ways in which we can answer that question of when did the first human come to be, is to look at the origin of our species. When did our species first appear? We can look at that through both fossil evidence so looking at fossilized remains of ancient humans on the planet, and we can also look at it by looking at genetic variation and we look at humans that way, as our species, most scientists seem to think that our species is pretty recent, that we probably first appeared as a unique population in Africa about 150,000 to 250,000 years ago.

But we can also think about that question of the first human or how did we become who we are by looking at our closest relatives and thinking about when did we start becoming different from them.

[Oena] Hi my name is Oena. I am nine years old. I live in New Jersey and my question today is how did monkeys turn into people?

[Adam] So our closest relatives on the planet today are chimpanzees and bonobos, two apes that live in Africa today. And we can ask the question of when did we start becoming something other than an ape? And the current consensus for scientists is that we share a common ancestor with chimpanzees and bonobos about five to seven million years ago. So sometime around five to seven million years ago a population of this organism started being a little bit different and isolated from the group that went on to eventually become chimpanzees or bonobos. Now this population might have been not the first human in terms of a Homo sapien, it had been something quite a bit different than us but it would have been the first step to having some of the traits that we associate with being human today. For example one of the things that distinguishes humans today from chimpanzees or bonobos is that we walk on two feet. We spend the vast majority of our, at least adult lives, when we're moving around walking on two feet. Chimpanzees and bonobos can both walk on two feet but they actually can do a lot of other things: they're really good climbers, they can walk on all four feet, their hands and feet, something called knuckle walking. And we think actually this movement to what we call bipedality, or walking on two feet, was one of the first things that distinguish this early fossil human population five million years ago. And we might not think of them as humans so much but the scientific term we have for these earliest things that were on the way to becoming human are hominins. So the first hominins appeared as a population about five to seven million years ago, also within Africa most likely. But that's when we first started to appear on the world.

[Jane] Did you hear Adam say that we started to separate from apes, chimpanzees and bonobos around seven to five million years ago? Our ancestors started walking on two feet around then. So one group of animals became chimpanzees and bonobos and

another population, the one that started walking upright more often, are called hominins, not hominids, hominin, and those early hominins eventually became us.

Over time these populations started doing things like using tools and technology and moving outside of Africa, and having bigger brains. And those things happened about two million years ago.

[Adam] And that might be the beginning of our genus homo , that homo part of homo sapiens, maybe about 2 million years ago with a species like Homo erectus that for the first time was a fully upright bipedal human, that made tools and used technology in creative kinds of ways to interact with the environment. It was the first time that we started finding populations of fossil humans outside of Africa moving into different and new kinds of environments. And it's also the beginning of when we start seeing larger brains in fossil humans. One of the things that we like to point out about ourselves today is we're really smart. We have kids who are really smart and ask really wonderful questions and that really started about two million years ago.

So that's when we took sort of the unique turn to really on the path to where we are today in our evolutionary history. So depending on how we define that, what we mean by human our origin might have been 250,000 years ago it might have been two million years ago or it could have been as old as five to seven million years ago.

[Jane] Then you're blowing my mind because we don't even necessarily know that we're all talking about the same thing when we talk about who the first human was. You know, if we're talking about five million years, or two million years, or 250,000 years we've got a lot of different ideas about what actually makes a human a human

[Adam] So we have these technical definitions like a genus, species. So our genus and species is Homo sapiens but that doesn't necessarily encompass what we necessarily mean when we just say human. What we're talking about human we're usually talking about us as something unique and different than everything else that exists in the world today. But we've gone through a number of different stages in our own evolutionary history where we've been unique and we've added gradually those properties which make us the way we are today.

[Jane] If I walked up to whatever we're deciding is the first human and I shook the held out my hand to shake a hand and say, ‘hi I'm Jane.’ How would that person staring back at me look different than I do?

[Adam] They'd probably be pretty confused. If you were doing that five million years ago with some of the earliest hominins there would it looked very different. It would have probably been a lot like you were shaking hands with an ape, only an ape that maybe is a little bit different than any ape that we have on the planet today. It probably would

have been smaller than you, had longer arms than you did, you would probably have been in a pretty dense forest environment. The hands would have been different the jaws and teeth would have been different. So in that case that organism would have been a lot different than you.

If we're talking about the earliest Homo, like Homo erectus two million years ago, it would have still been quite a different organism and the whole idea that you were talking to it in a language might have been more than it was capable of doing for you. But it would have looked a lot more like you than that organism five million years ago, it would have been about your size, from the neck down, it would have looked a lot like you, maybe it had more hair but it would have been very similar.

If we're talking about that human 250,000 years ago, then it gets really interesting because it would have been an awful lot like you. Maybe even capable of some kind of symbolic communication the way that we engage with regularly today. And if we go back 250,000 years ago to that first Homo sapiens, there would have been other populations around the world at the same time that weren't maybe homo sapiens in terms of our direct ancestors, but were similar enough to us that even still today we have part of them in us today.

So we have some of the genetic variation or ancestry from these other populations that weren't quite Homo Sapiens the way we think about them today. And so there would have been other things that were very similar to us at the time as well. So depending on where you are that encounter would have been very different I think.

[Jane] But probably no matter which one we're talking about, they wouldn't have been wearing jeans right.

[Adam] Nope. You know, that's another way of thinking about what it means to be human, to be human the way that we are today, is really in many ways something that's only come about in the last 10,000 years. So most of the world's population today lives in cities or urban environments. Almost all of us, more than 99 percent of the population, get most of our food from farming and livestock production. So farms that have grow corn and wheat and barley and have cows and sheep. And that all only started in the last ten to fifteen thousand years. So the kind of ways in which we live today, interact with a huge number of people today, use technology in extraordinarily complex ways, that all is very recent. So the kind of things that we associate with human civilization today have all come about only in the last ten to fifteen thousand years.

[Jane] Well that brings us to our last question on this topic and let me play it for you.

[Jasper] I'm Jasper and I live in Jacksonville, Florida and I'm six. I want to know what foods did cavemen eat that we eat?

[Jane] So Jasper wants to know what foods did cavemen eat that we eat. So I guess he means that we now still eat, that cavemen might have been eating.

[Adam] That is a great question. You know these days it's really common in fact when you walk around the mall or watch television, to see advertisements for paleo foods or paleo diets, attempts to try and make our what we today more similar to what we ate in our evolutionary past. But when you look at you know caveman or what we might think of as these sort of ancient human populations, they ate a lot of different things just like we eat a lot of different things today.

There was a recent study done that looked at the kind of stuff that builds up on your teeth if you don't brush your teeth. So if you don't brush your teeth, you know, you build up this sort of stuff on your teeth and the dentist has to sort of scratch it away.

But it turns out we can see some of that stuff on fossil human teeth and extraordinary researchers have gone in and used that to try and look at exactly what these organisms were eating. And looking at Neanderthals, which is an archaic human population that existed in Europe and Asia for a couple of hundred thousand years, we can see that again some populations in some places ate a lot of meat, the same way we eat meat today. So they ate deer and other kinds of things that they could have hunted in their environment that weren't quite the same deer that we eat in our environment. Not quite the same cows as say the ones that go into our hamburgers or steak. But other populations of cavemen turns out they were eating a lot of plants they were eating grass seeds just like we eat grass seeds today. They were eating mushrooms maybe just like we eat mushrooms today. So cavemen didn't eat just one diet, they eat lots of different diets. And in some environments that might have been a very extreme they might have even been forced to eat things that we wouldn't necessarily consider eating today. So we have a few fossil sites where there's some evidence at least that humans in desperate times maybe even had to eat each other a little bit, something we call cannibalism.

[Jane] Adam, are there other cool things about the first humans that you think we should know about?

[Adam] I think one of the cool things about the first humans is just imagining, understanding the world around us in a really different way. So one of the important things about being a human today is childhood. We spend a long time in childhood. Evolution has shaped it that way because childhood is really important. And as we move through childhood, we come to understand the world around us, how it works, how we fit in with it.

And it's interesting to imagine us two million years ago, or four million years ago, being an Australopithecus kid or homo erectus kid and trying to think about how that individual might have understood the world in which they were living in and how they might have thought about their parents or their friends. Did they have friends? So those kinds of questions I think are really cool and really fascinating to think about when we think about human evolution.

[Jane] Do you think they did have friends?

[Adam] I think they did. We have good evidence when we look at primates today. So things like monkeys, like baboons, that they have friends that they form long-term relationships with other individuals that they just like spending time with. They like helping them and they're being helped by them and they get comfort from being around them. So I think they definitely had friends and maybe even maintain friends over long periods of time and even across generations.

[Jane] I love thinking about that even though you might look very different from an australopithecine kid you're probably much taller and you have a much bigger brain for that matter. And I'm guessing you like to wear clothes at least some of the time, even though there are a lot of differences between you and that early human kid, there are still things that a kid three million years ago and you today would find similar. You both have families and friends and loved to play and eat a lot of different kinds of food.

Big thanks to biological anthropologist Adam Van Arsdale who teaches at Wellesley College for answering so many of our questions about the first humans.

I hope you're not disappointed that we can't tell you the exact first human being but now you understand that populations of animals changed over time until they started to resemble people. And just to recap our species Homo sapiens have only been around for about 200,000 years and we're still evolving today. I wonder what will be like in another 200,000 years or five million years! Thanks as well to all of our awesome question-askers in this episode.

If you have a question about anything having an adult record you asking it on a smartphone. Tell us your first name, how old you are and where you live. And then have your adult send it to questions@butwhykids.org.

But Why is produced by Melody Bodette, and me, Jane Lindholm, from Vermont Public Radio. Our theme music is by Luke Reynolds. We had additional music in this episode from Kai Engel and Podington Bear. Very special thanks to Henry Kinney for playing Sam, our first human. We'll be back in two weeks with an all new episode about cats and dogs.

Until then, stay curious!