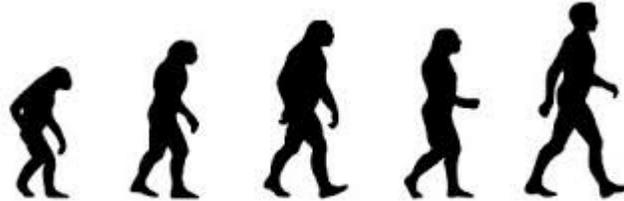


THE LEAKEY FOUNDATION Origin Stories Episode 1 On Two Feet



THE LEAKEY FOUNDATION

Origin Stories Episode 1: On Two Feet

Meredith Johnson

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This is Origin Stories, the Leakey Foundation podcast. I'm Meredith Johnson.

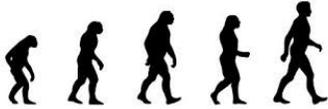
Carol Ward

I remember walking in and my professor, who was a man named [Dr. Milford Wolpoff](#), he said, "I'm a [paleoanthropologist](#)," and he wrote that word on the board. And he turned to us, and he said, "The earth is a disc riding on the back of a giant turtle and the stars are painted in a canopy high above us." And he just looked at us. And we argued about it for two days: "No, it's a sphere. We know that." And he would say, "How do you know? How do you know?" And it took me about twenty years or so to realize he was talking about how science works and testing hypotheses and trying to falsify ideas and how it all worked. How can you learn things? How do we know? And how do we know about human evolution? I got excited in the process of learning, as much as I got excited about the actual fossils themselves. And I was hooked.

Meredith Johnson

That's Carol Ward. She teaches anatomy to medical students at the University of Missouri and she's a paleoanthropologist.

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Carol Ward

What does that mean? I'm interested in how humans evolved and I want to find out how we got to be the amazing species we are today. And the best way to do that is to look back at the fossil record, which shows us how and when all the different features that make us unique first appeared.

Meredith Johnson

And one especially unique feature: the way we move around, on two feet.

Carol Ward

There are not many animals that do that. Birds do that, but they also fly. Some dinosaurs did that, but they're not here now. Kangaroos do that, but they do it in a very unusual way, hopping around. But nobody walks around like we do. And we know from the fossil record that one of the first things that distinguished our ancestors from apes and our forebearers was standing upright and walking on two feet, on two legs on the ground. So, if we can figure out how and why that happened, that is going to give us a really important clue into why our entire lineage began.

Meredith Johnson

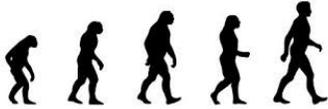
How we started walking around on two feet is one of the big questions in the study of human origins. Scientists since Darwin have been trying to figure out why our ancestors first stood up.

Carol Ward

Darwin, pretty good evolutionary thinker, thought that we stood upright on two feet to free our hands for making and using tools, and that's why we had big brains. Well, that was a pretty good idea, but the fossil record shows us that our ancestors stood upright on two feet maybe as early as four or six million years ago; we didn't probably start using tools regularly or stone tools until around three million years ago or even more recently; and our brains didn't get very big until two million years ago. So, knowing that standing upright set the stage for all of these things that happened later means that we can start understanding how it happened and then asking the important and interesting questions, which is why it happened. Which are hard, but that's what we really want to know.

Meredith Johnson

To get to why our ancestors first stood up, Carol did what she always does. She looked at bones, modern bones and the bones of our fossil relatives. If you look at modern human bones, you'll see



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we're shaped for upright walking. You have your head on top of your spine, on top of a wide, stable pelvis and long, strong legs. And then there's your feet.

Carol Ward

Well, what's special about the human foot is if you take off your shoes, and you look at your feet, you see you've got a really big, big toe, and it's lined up right with your other digits and you have an arch in your foot. And when we walk, you push off on the big toe with every step you take. When you lift up your heel, the whole bottom of your foot comes off the ground, and you push off on that big toe.

Meredith Johnson

An ape's foot looks more like a hand.

Carol Ward

It's got a big toe that sticks out to the side. The middle of the foot is flexible, and they can grab branches, which is great for climbing in trees. But what our ancestors did is they took that big toe and lined it up with the rest of the digits and all the muscles and ligaments on the bottom of the foot, the soft tissues that used to be used for grasping, are now used to hold up that arch and provide you shock absorption when you walk.

Meredith Johnson

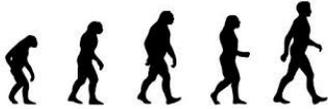
One of our most famous fossil ancestors is an [Australopithecus](#) we call Lucy. She was discovered in Ethiopia in 1974. Her skeleton was remarkably complete and she looked like she could walk upright.

Carol Ward

Well, we have known for a long time, since 1925, that the early ancestors of humans called *Australopithecus*, which are the group of animals that we probably evolved from, stood upright on two feet. And that's been known for a very long time. We have skeletons that were found in the '30s and '40s in South Africa. We have Lucy that was found in the '70s in Ethiopia. So the basic pattern was understood.

Meredith Johnson

Scientists could tell from the bones they had that Lucy and her species could walk upright, but paleoanthropologists love a good debate. They argued; Did Lucy's species mostly live in the trees like a



chimp, only walking on the ground when they had to or did Lucy walk on the ground all the time like we do?

Carol Ward

One big question we had was about their feet. We only had a few fragmentary foot bones.

Meredith Johnson

It felt like a big piece of evidence was still missing. And then one day, Carol got an invitation to come to Ethiopia, to the [National Museum](#) in Addis Ababa, to look at some new fossils, fossils some of her colleagues had discovered near the original Lucy site.

Carol Ward

Going to see the fossils for the first time is a really exciting experience. There's no picture or description that can really capture sort of the magic of seeing the actual evidence of bone—or of fossilized bone that's millions of years old that's only recently been uncovered and only recently ever been seen by people.

Meredith Johnson

Any fossil found in Ethiopia stays in Ethiopia. The people there see these fossils as national treasures. They're kept in a locked safe, in a brand new building at the National Museum.

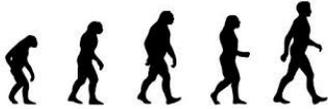
Carol Ward

The curator who works at the museum comes out and he has a big ring of keys and unlocks the safe and pulls out a drawer and pulls the box out that the fossil is kept in and takes the lid off and opens it up. And then you can handle the bones on a very padded table with lots of good light. And you can actually hold this evidence in your hand and it's really thrilling.

Meredith Johnson

In the middle of all this excitement, Carol noticed something strange among the fossils. These were pre-human species, Lucy's relatives, and one bone stood out to her. She picked it up.

Carol Ward



And I thought, shoot, that looks like a human. It's just a dead ringer for a human. And if I weren't on the radio and we could see it, if you held this thing up next to a human bone, anybody could recognize it. It looks just like a human.

Meredith Johnson

This little human-looking bone was a metatarsal, one of the small bones that build the structure of the arches of your feet. This was exciting because if Lucy had stiff arches in her feet, that means she walked like we do and she didn't have flexible feet for climbing like a chimp. So, they made a copy of the bone and Carol and her colleagues got to work.

Carol Ward

If you think you have an idea, you have to test it with data. You have to compare it to all the other fossils and all the other modern animals that you think your fossil animal might be related to, to really make sure that you're right and see if you really are making the correct observations.

Meredith Johnson

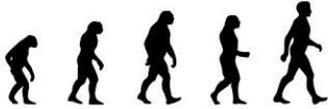
Her findings on the foot bone were published in the *Journal of Science* in 2011. This paper settled the question of whether or not Lucy and her species had flexible feet. She found the missing piece, solid evidence that *Australopithecines* evolved for walking on land. This tiny bone showed that by the time of Lucy, our ancestors had given up being good in the trees for life on the ground.

Carol Ward

Well, what's so important about being on the ground is one of the big questions that paleontologists—that we're all asking ourselves. Being good on the ground is important because you can travel distances, from patches of trees to patches of trees. And in Africa at this time, the forests were shrinking and disappearing. There was a lot of open country between forested patches. And so what our ancestors were able to do is walk from patch to patch to go find different kinds of food sources, to be able to eat things that weren't near trees, and be able to exploit not just the forest habitat, but lots of other habitats as well, which is really important.

Meredith Johnson

Carol says, by walking on the ground, our ancestors had way more food options to choose from. So, no forest? No problem.



Carol Ward

When apes don't have forest, that's a problem.

Meredith Johnson

So, how did we change from a hunched-over, knucklewalking primate to a tall, uprightwalking primate? Knowing that by four million years ago we were already walking a lot like we do today, made Carol start to reconsider the whole question.

Carol Ward

Well, the question people always ask about human evolution is; Why did we stand up from all fours? If we look back at the fossil record and dial back the clock earlier than the earliest hominids, back into the time period where there were many, many apes, in a period called the [Miocene](#), which—so around maybe nine, ten million years ago, what we see is the fossil apes that seem to be closely related to what our ancestors might have been. Certainly hung below branches. They held themselves upright in the trees and they climbed and they swung below branches. But they weren't as specialized anatomically as chimpanzees and gorillas.

Meredith Johnson

Carol believes that when the forests began shrinking, the animals that used to spend all their time in trees started spending their time on the ground.

Carol Ward

And animals will move how they move. If they were upright in the trees, they'll tend to be upright on the ground. So probably these animals also just stayed upright and moved on the ground.

Meredith Johnson

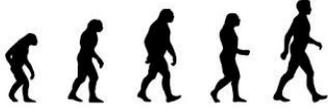
Chimps' and gorillas' bodies were specialized to move in trees. For them, standing upright didn't make sense.

Carol Ward

Whereas our ancestors just never dropped on all fours.

Meredith Johnson

They were already upright when they lived in trees.



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Carol Ward

So I think the right question to be asking now is not, “Why did we stand up from all fours?” but, “Why did we never drop down on all fours, to begin with?” Yeah, how about that, huh? That’s my new shtick.

Meredith Johnson

This discovery has caused Carol to reconsider one of the fundamental questions of anthropology. She’s no longer asking when and why we stood up from all fours.

Carol Ward

Asking the question, “Why do we stand up?” assumes that we stood up from all fours. If in fact we never were on all fours to begin with, then those questions lose a lot of their meaning.

Meredith Johnson

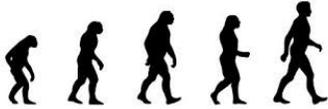
And new questions have replaced them.

Carol Ward

Questions about “Why did we maybe never drop down on all fours?” instead of “Why did we stand upright?” I think looking at more evidence from more parts of the body of more of these different species that are being discovered is giving us a real new perspective on humans and our place in nature. We always have this idea that there’s only one human species, that we’re different from any other kind of animal, but the further we go back in the past, the more we were probably just like another ape or another primate. And that’s a much more biologically real picture of how we evolved, I think, than the sort of rarified atmosphere of human evolution that we always thought in the past. And I think that’s the real change in our understanding of human evolution that’s coming to light in the last ten or twenty years.

Meredith Johnson

Thanks so much for listening to the first episode of Origin Stories, the Leakey Foundation podcast. Thanks to Carol Ward for sharing her stories and her exciting new questions about human evolution. When she’s not teaching anatomy, she’s searching for fossils in the West Turkana Basin in Africa. You can learn more about her work on her website, wtpaleo.org. We’ll have the link along with show notes, pictures, and more on our website, OriginStoriesPodcast.org.



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This show is a project of the Leakey Foundation. The Leakey Foundation’s mission is to increase public understanding of human origins, evolution, behavior, and survival. Learn more and support research like Carol Ward’s at LeakeyFoundation.org. That’s LeakeyFoundation.org. You can also find and follow the Leakey Foundation on Facebook and Twitter.

This episode was produced by me, Meredith Johnson, with help from Lisa Morehouse. Origin Stories is edited by Audrey Quinn. Original music and sound engineering by Henry Nagel.

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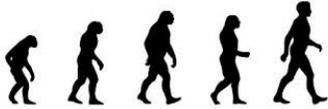
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