



Episode 45: Detective of the Dead

Link to audio file: <https://radiopublic.com/origin-stories-6VPVbG/s1!8bddb>

**Meredith Johnson:**

This is Origin Stories, the Leakey Foundation podcast. I'm Meredith Johnson. On the last episode, we traveled to Ethiopia. Today, we're taking another trip. This time, to northern Spain, to a place called Atapuerca. A place that can tell the entire story of human evolution in Europe with a complete cast of characters and twists and turns that are more dramatic and mysterious than an Agatha Christie novel. Before we get into it, a content note. This episode contains descriptions of prehistoric violence, including cannibalism.

**María Martín-Torres:**

Atapuerca, it's a unique place, because when we are talking about Atapuerca, we are not talking about only one site. Indeed, we are talking about a hill that hides the mystery of all the hominin species that inhabited the Europe from the last 1.2 million years to present times. So, it's not only one site. It's not only one hominin species. We are talking about seven localities that are providing us the biological evidence, the cultural evidence, the fauna, the landscape of the hominins that inhabited it for such a long period in the European continent.

**Meredith Johnson:**

This is Leakey Foundation grantee María Martín-Torres. She's a paleoanthropologist who's been a member of the Atapuerca research team since 1998. And she's director of the National Research Center on Human Evolution in Burgos, Spain, just 15 kilometers away from the fossil sites of Atapuerca. She says this collection of sites is a magic place, like a book that holds the entirety of human history in Europe.

**María Martín-Torres:**

We have the oldest hominin that has been found so far in Europe, that is dated to 1.2 million years old at Sima del Elefante site. We have another locality, which is Gran Dolina, at the TD6 level. We have found a hominin sample of at least nine individuals that have been assigned to a new hominin species, *Homo antecessor*. We have then another locality which is Sima de los Huesos, that has one of the largest accumulations ever found from the same locality that belongs to a population that lived about 430,000 years ago. It's at least 28 individuals that belong to a group that probably are ancestors of Neanderthals.

**María Martínón-Torres:**

And then we have many different localities that are providing the archeological, cultural evidence of these hominins. Only very recently we have the only hominin we were sort of missing in Atapuerca, which were Neanderthals by themselves. Just a few years ago, we started working in a new locality, and we found the parietal bone. It's a fragment of a head of possibly a Neanderthal, so we really have all the hominin species that were living in the European continent in the same physical locality.

**Meredith Johnson:**

María sometimes describes herself as a detective of the dead because she uses her experience in medicine and forensic anthropology to ask questions and piece together the stories of our ancestors from the clues they left behind.

**María Martínón-Torres:**

I always like questions. I love questions. I love mystery novels. I always say scientists like more of the questions than the answers. I think that's the way we should be moving, posing new questions. So, I always like human origins, and I always like fossils and trying to understand what we were. Well, the funny part is that my degree is in medicine because I thought, "Okay, if I really want to go back in time and understand how humans were and we should understand better how humans now we work, how we are made of, how we change the insides of the machine. I really want to understand humans now, and then is when I can really go backwards in time and try to understand how we changed."

**María Martínón-Torres:**

So, I studied medicine, then I jumped into the world of human evolution with a master's in paleoanthropology, and here I am with the type of patients that do not complain. It's also true that they don't collaborate, and they don't tell you what happened, but, well, they have a lot of stories, so it's our challenge to make them speak.

**Meredith Johnson:**

The place where María works to make these ancient people speak is the Center of Human Evolution Research Facility in Burgos. This center is equipped with state of the art imaging and microscopy equipment that makes it possible for María and her colleagues to make sense of the thousands and thousands of hominin and animal fossils and stone tools they've recovered. Last year, we asked local producer, Lucia Benavides, to visit María Martínón-Torres and take us on a behind-the-scenes tour, starting with the lab.

**María Martínón-Torres:**

This is the microscopy lab, so we really have here a wide variety of different microscopy techniques, the Micro CT. As I told you, we have electron microscopes. We have confocal microscopes. So, all ways of getting images, images from outside and images from inside. These types of techniques have a wide range of applications in many, many different fields. In particular for us, for anthropology, it's very important for the study of fossils.

**María Martín-Torres:**

For us it was particularly useful, for example, to study the internal structure of the teeth, for example, that we found in Sima del Elefante, as you can see here. In this case, we have a tooth that belonged to an individual, the one from Sima del Elefante, the oldest hominin we have so far in Europe.

**Lucia Benavides:**

Is that the tooth that you found?

**María Martín-Torres:**

Yes, exactly, the tooth.

**Lucia Benavides:**

That tooth.

**María Martín-Torres:**

Yeah, so we really are in love with him. We know him from outside and from inside. Somehow, I say that with this type of techniques, we undress the teeth. We really see them. We remove everything outside and we see everything in the inside.

**Meredith Johnson:**

In addition to the microscopy and imaging labs where they undress the fossils and teeth, they have labs with equipment for all kinds of dating techniques used to place the former inhabitants of Atapuerca in time. They also have spaces for fossil preparation and conservation.

**María Martín-Torres:**

This is a very beautiful fossil of a kid. At the beginning, you could not see anything. This came as a block, as a block of sand, of soil, and this is like, as I said, bringing alive something slowly, slowly. So, [Pilaar 00:06:53] was really working here cleaning and a lot of things are coming out, so we can really see here the little mandible that we are really discovering the fossil of a kid. Yeah?

**Meredith Johnson:**

Their comparative collections contain a vast array of animal bones and fossil casts that help them identify the new fossils they find.

**María Martín-Torres:**

This is the comparative anatomy lab. Here, as you can see, well, we have all these guys looking at us from the past.

**Lucia Benavides:**

They're skulls of humans...

**María Martín-Torres:**

Yeah, and different animals. So, it's so important to contextualize what you have. If not, you don't have a story. You don't have plots. You don't have a beginning. You don't have

an end. You don't have a temporal sequence, yeah? Here, we have a good representation of all the key hominins, which are very important for us to compare with our fossil, with our original fossil samples. But we have these for hominins, and we also have this for animals.

**María Martín-Torres:**

There's a bit of a detective work. It's like what's this little bone belong to? Not always that easy. It's like seeing, as I say like if you fly to another planet, you go to Mars and you find, for the first time, intelligent or a human, let's call it, from Mars. Here's a bit the same. You're, for the first time, meeting someone from a period you don't know how they look like. Like an UFO you know that one is coming from another planet. In a way, this is the same for us.

**Lucia Benavides:**

You have nothing to compare it [crosstalk 00:08:25].

**María Martín-Torres:**

No, exactly. So then you just with the detective work. Okay, looks more like us, looks more like *Australopithecus*, looks more like *Homo habilis*, you know then all the researchers starts. First, the finding, and then questions.

**Meredith Johnson:**

The place where they do the finding is only a short drive from the research center.

**Lucia Benavides:**

Okay, so explain to me where we are and where we're going.

**María Martín-Torres:**

We're in the car, now our way to Atapuerca, Atapuerca site. It's all about 15, 16 kilometers away from the historical city of Burgos. That's where we were within the research center. Here, to your left, you can see already the beautiful magic hill. This is the Sierra de Atapuerca, the landscape. As you see, it's completely different. So, we're really entering a new world. Yes, you really leave the city behind.

**Meredith Johnson:**

The landscape is a spreading patchwork of fields that glow green or deep brilliant gold depending on the season, the Sierra de Atapuerca rising gently above the plane. The mountain isn't very tall. It's only around 1,000 meters above sea level. Along the road, you see hikers and pilgrims who're walking the Comuna de Santiago, a network of trails that connect Christian religious sites throughout Spain. The earliest record of Comuna de Santiago dates to the 9th century. The Sierra de Atapuerca sites have been known since the end of the 19th century, and modern systematic excavations began there in 1978. María spends her summers working there as part of a large multidisciplinary and international team.

**María Martín-Torres:**

We come to this landscape. I love this landscape. I love this place. I love this sound, even the sound of the gravel, because this is part of it. We are entering now the tunnel of time.

**Meredith Johnson:**

In the distant past, connected caverns were buried inside the hill, and animals like lions, saber-toothed cats, rhinos, and hippos roamed the area, hunted by the ancient humans who lived here. Now, it's a UNESCO World Heritage site open to tour groups.

**María Martín-Torres:**

Here we are just arriving to the entrance, and then I will show you here. This is the entrance to the main railway trench sites. So, we're going to-

**Lucia Benavides:**

And this is-

**María Martín-Torres:**

So, we're going to park here. Yeah.

**Lucia Benavides:**

Perfect. Perfect. So, we'll go. We'll go out.

**Meredith Johnson:**

Past the tourist parking area, and through a place where a railway once run, you enter the archeological sites. There are no longer underground coverings. Most are now open to the sky, and they're lined with scaffolding to make them safe and accessible for the scientists and the tourists.

**María Martín-Torres:**

As you can see here, we have to the left, this is already rock part of the wall of the cave. You can see you have wall and rocks to your side. This is limestone, and to your right. This is like a little corridor. So, we are indeed crossing the cave. Yeah.

**Lucia Benavides:**

What did this look like back in the day?

**María Martín-Torres:**

Well, probably this part of the cave was like this. So, this is the place where things somehow remain intact. Yeah, that's the magic of excavating. You are touching something that was not touched until you arrived. In front of you is the Sima de Elefante site, something that was not touched for one million years. I will think that is something like frozen. There is something that became permanent but wasn't meant to be. So, if you leave a room and you leave a rock just behind you, well, it was not a special moment. You just left something there maybe thinking of coming back in a while, but you never do.

**María Martín-Torres:**

And that remains in that such position for one million years. So, when you come here and you take that stone out of the place, I think there's something magic in this mixture

of the time, and this is what you have here. So, we're working through a place that it was like this one million years ago when everything was buried. If you look at the wall here, you see what we call the stratigraphic layers. You have the different layers of sediment that are being laid time over time. It's a bit like a cake.

**María Martín-Torres:**

You see that the wall is not uniform. You have different changes in color and the thickness of the different materials that are in the wall that are reflecting different episodes. Each layer is a different moment in time and a different story.

**Meredith Johnson:**

Within these layers they found thousands of artifacts and fossils, all of them were stories to tell. Some of the stories are sweeping dramas that explore big questions about human evolution, and some of them are grizzly mysteries, more like a CSI crime scene. We're going to hear three of those stories today. The first is a happy one that takes place at Sima de Elefante, a site that's been dated to around 1.2 million years old.

**María Martín-Torres:**

And there is this place that is 1.2 to 1.4 million years. As you can see the floor of the cave had a strong inclination. In that level, T9, this is the level we have found the earliest hominin ever found in Europe, 1.2, 1.4 million years.

**Meredith Johnson:**

That discovery in Sima de Elefante happened in 2007. It was a huge surprise. The site had already given lots of important clues about the ancient environment through the many animal fossils found there. They'd even picked up the trail of possible hominin presence, because some of the bones had what appeared to be cut marks on them. Who could make cut marks? Humans.

**María Martín-Torres:**

We were also having some stone tools, but those were very basic, very primitive. So, well, scientific community is skeptical because they will say, "Well, maybe this is just a rock that broke naturally in a funny shape and looks like a tool but it's not a tool."

**Meredith Johnson:**

María was excavating nearby when someone called her over to show her something. And since her specialty is teeth, teeth are usually what people want to show her. She went over not expecting much.

**María Martín-Torres:**

And I will never ever forget this moment, this emotion, because I really saw it and I just jumped, and I say, "Yes, it is human. This is unbelievable. We're talking about, again, having the oldest hominin remains in Europe. This is 1.2. This is more than we ever thought that we could get in this place. We have never expected that we could find hominin remains in Sima de Elefante." So, we're celebrating and so happy and toasting and calling politicians that were coming to celebrate to the site the discovery of the oldest human in Atapuerca.

**María Martín-Torres:**

Well, at that time after a while people come and say, "Are you sure? This is unbelievable." I was like, "Yeah. Yeah, of course. Yes, it's human." And then he says, "But are you sure? It's so strange that you have found humans in this site." And then I start feeling sick thinking, "Oh, my goodness. Just imagine this was not human and everybody is celebrating now already. I'm going to have to change career. I'm going to leave the country. I really have to start doing something else." At that time I'd just finished my PhD indeed. I was like, "All these years for nothing? What a big mistake."

**María Martín-Torres:**

So, I perfectly remember all the anguish in that moment, and I was looking forward to see José María. José María Bermúdez de Castro was my supervisor, he was my mentor, my colleague now, my friend. I was really desperate like, "Please, José María come and look at this with me. I remember he came and he saw the tooth, and he's like, "Yes, it is." So, I felt so relieved, and he say, "You did well. Come on, all these years you were working, you know what you were doing, and don't even worry because in a few days, I'm sure that we're going to find the mandible where this tooth fits."

**María Martín-Torres:**

And that's it. Only few days later, we appear the mandible which became a cover in nature. So, it was the first European, the mandible of an individual that, well, was clearly the oldest hominin in Europe. Well, it has been very interesting.

**Meredith Johnson:**

This individual was the oldest hominin in Europe by a lot. It radically shifted the timeline. A timeline that had already been significantly shifted thanks to a discovery from another site in Atapuerca called Gran Dolina where several years earlier in the '90s, they found fossils from a species that they thought at the time was the first in Europe.

**María Martín-Torres:**

You see at the back, well, I will say that's the queen so far of Atapuerca, which is the Gran Dolina site. It is very characteristic, probably you saw already that Atapuerca has this very big scaffold structures for each site. So, it's part of the landscape too. Gran Dolina is very special because all the 10 levels, I go from TD10 on top to TD1, we have some type of record. Either the animals, plants, the stone teeth or they found hominins in the different periods. So, it's very rich from the same spot in the same place. So, I think it's quite of a magic sequel stance. Yeah. So, let's go. Everybody who comes to Atapuerca should go through this scaffold.

**Lucia Benavides:**

Perfect.

**María Martín-Torres:**

Yes.

**Lucia Benavides:**

I will follow you.

**María Martín-Torres:**

Yes, we're going to walk up in time. Yes.

**María Martín-Torres:**

Before the Atapuerca sites, we thought that there was not any hominin presence in Europe until only half million years ago. When the Atapuerca sites were discovered particularly the site of Gran Dolina, that was a very big surprise because we found at the Gran Dolina site at the TD6 level hominin accumulation that was 860,000 years. So, that was really pushing back very early the first evidence of hominin presence in Europe, almost close to one million years.

That was a big surprise, and usually you say, "Who are these guys that seem to be in the wrong place at the wrong time?" What are humans doing here? Where do they come from?" So, a lot of new questions arise thanks to the Atapuerca fossils.

**Meredith Johnson:**

When the team found these fossils in Gran Dolina, they got to work trying to learn more about who these guys were. They did a detailed anatomical study of all the hominin fossils they found, about 80 of them with all the skeletal parts represented. Bones from at least nine individuals, and like I said, María's specialty is teeth, her comparative studies often focus on them.

**María Martín-Torres:**

I love teeth. I always say that people prefer to find skulls. Of course, they're easy to see, to understand, but teeth are like diamonds. It's like you have all the jewels of the crown on the teeth, because in such a small space, in such a more diminutive tiny little thing there is so much information. I always say that teeth are like landscapes in miniature. So, you can really read on those mountains and valleys and grooves and things. You really can read a lot of stories.

**María Martín-Torres:**

Every single feature we look at teeth in the shape, the cusp, the position of the cusp in regard to each other, little accessories tubercles and crest, all of them are inherited genetically, so it's very interesting, because the way these features are arranged can be very typical and even exclusive of a hominin species. We were analyzing in these hominins comparing to any other hominin species we knew before, and we got a surprise because on one hand, the Gran Dolina TD6 hominins were having very primitive teeth.

**María Martín-Torres:**

This is something that was not that surprising if you take into account the age. We're talking about hominins that were 860,000 years, so what do you expect? That they should have primitive features in their teeth. This is very robust, very large, very complicated occlusal surfaces, the root system, everything was fitting the time.



**Meredith Johnson:**

But the team was very surprised to find that these teeth were matched with a modern looking flat face like the faces we all have today. This flat face is a defining characteristic of our species.

**María Martínón-Torres:**

I think the *Homo sapiens* is the no face hominin. We are really very flat faces. The part of the face, the cheeks are vertical, even a bit depressed. So, I always say that in a way our modern faces are a bit of a retro-vintage design. We're wearing something that was a fashion already one million years ago.

**Meredith Johnson:**

This was the first time this combination of features, very [protive 00:21:45] teeth with a very modern face appear in the fossil record. It was unlike anything seen before, and that's why the Atapuerca research team decided to name a new species, a new member of our family, which they called *Homo antecessor*. So, *Homo antecessor* is a name that's playing a little bit with the word ancestor, but antecessor is also the name of the Roman legions gave to the soldier that goes ahead of the troops, finding the way the rest of the group should follow.

**María Martínón-Torres:**

So, we felt that *Homo antecessor* was the first explorer in Europe, the one who was really opening the gates of Europe for the rest of the humankind to come. So, this was quite interesting because it was at the very first beginning of the Europeans' history, but also apart of the history, the one we will say the big HISTORY with capital letters, we also have some stories, human stories, which is so important. We're talking about people after all. We cannot forget these are our ancestors, and well, this is the roots of humankind.

**Meredith Johnson:**

And the story these ancient people had to tell is a strange and shocking one. One that María's background in medicine and forensics made her particularly suited to uncover. When María and the Atapuerca team were analyzing the fossils, they soon realized that all the bones were quite broken, and all of them had marks from tools, particularly the bones where the muscles and tendons attach. They all showed evidence of having been dismembered, chopped up and broken while they were still fresh. There were marks where people had scraped to get at the marrow inside. María said this was quite dramatic. These people, these very early Europeans were cannibals.

**María Martínón-Torres:**

This was quite dramatic. It's dramatic because, of course, well, it's humans eating humans. It's something that scares us, like why we should be eating humans. Of course, when we think about eating, the first thing we say is that, "Okay, we were hungry." This is what we thought at the beginning. It's true that all the hominin remains had the same pattern of breakage and marks that they found animals that were mixed where the hominins were.

**María Martín-Torres:**

We didn't identify any special treatment, so we thought that, "Okay, this is what we call gastronomic cannibalism. It's just for nutritious purposes. They were hungry, and they need to eat and they're just trying to access all meat, all the things that really gives proteins and the things they need at that time. But it was not that simple, because on one hand, when we analyze all the fauna that was recovered together with the hominins, we see that it was very rich.

**María Martín-Torres:**

So, these hominins really had access to a large amount and very diverse sample of animals at that time. As I would say, the fridge was full. There was no need to eat humans at that time. We also know by the paleoclimatic reconstruction that we're talking about a period that was quite warm, mild. So, it doesn't look like living in a period that is hard with difficult conditions. But especially what was more striking is that when we studied the fossil sample, we realized that most of the individuals were children.

**María Martín-Torres:**

And children, well, they're not particularly nutritious. They don't really have all the things we really need, and even if you say that they were tasty, come on, you know children are very expensive in the hominin species humans. We really have to invest a lot of energy to raise a child. We're a species that our offspring isn't much here for a very long time. We need to be providing a lot of food and resources to allow those big brains to grow. So, it wouldn't make sense to raise children to eat them.

**Meredith Johnson:**

The clues to this mystery didn't quite add up, and a few years later, they found more evidence. They found the area where the fossils were discovered was made up of four sub-layers with broken bones in all of them, which means this wasn't an isolated event. It was something these people did for a long time. It seemed to be part of their culture, possibly a horrifying way to attack competing groups by preying on their children.

**María Martín-Torres:**

It's interesting to think that, "Okay, maybe at that time there was big number of groups and they were competing for resources and they need to defend themselves." In a way, the most devastating way of hurting another population is by killing their offspring. It's very difficult to recover. If you really have kids and they kill them, there is no generation renewal there. So, we think that maybe this is the working hypothesis we have now is that was a type of cultural cannibal maybe to defend their territory or to defend their group in the most cruel way we could think at that time. So, I think this is aside that make us think about our nature, our behavior about competition in the early places in long time ago.

**Meredith Johnson:**

That's a pretty bleak picture, a harsh picture of early human life in Europe. Do the other sites have similar stories?

**María Martín-Torres:**

Well, the good thing is that in Atapuerca we have another site, I would say, that is the story that it's telling us is less sour. That site is Sima de los Huesos. Sima de los Huesos is an amazing place.

**Meredith Johnson:**

In English, Sima de los Huesos means pit of bones. It's a very small cavity, only six by eight square meters.

**María Martín-Torres:**

But in such a small tiny place, we have recovered about 6,500 fossils so far, and it keeps going. So, it's not finished yet, but provides evidence for a population... it's at least 28 individuals have been identified so far. Here, the story we have is radically different.

When you study the accumulation, we have whole bodies there. When we study the marks they have, how they have been accumulated, the geology, the stratigraphy of the site, the most plausible hypothesis we have to explain this accumulation in this case is that it was probably an intentional disposal of bodies by other hominins. So, in this case we're seeing a quite different behavior in Gran Dolina. Hominins were eating each other in this. In this case, we think that humans were putting their corpses aside, somewhere else.

Is this burial? Well, maybe we cannot talk about a burial in the sense we understand burials nowadays. We cannot say that these guys were really digging a hole and putting bodies there, but they're putting bodies aside. They're taking the bodies of those who died and put them away from their daily places of living, which I think it is quite an important difference in terms of behavior.

**Meredith Johnson:**

Another clue that led the researchers to think this was an intentional disposal of bodies comes from a very special artifact found among the thousands of bones. One tool. A single stone hand ax that had never been used. A beautiful tool made of red and green quartzite. It's entirely different from any of the tools found at any other site in Atapuerca.

**María Martín-Torres:**

This hand ax is very different. We have named this hand ax Excalibur just to highlight how special it is. We think that, "Okay, maybe this could be a hint, a clue perhaps to a type of ritual, like offering this very special tool to the group that died." The accumulation is mostly of young adults. We have men, we have women, we have children. But mostly we have young adults, so maybe there was a battle or something that happened that large number of them died, and perhaps this Excalibur was an offering to them as a special memory or ritual or who knows?

So, I think in that sense we would be looking at maybe one of the earliest evidences of some type of after death behavior. Who knows? So, I think, well, at least Atapuerca is

giving us the two extremes of the human behavior in our roots. Okay, we can tell many different stories about us in a way.

**Meredith Johnson:**

In addition to the evidence of caring for the dead, the individuals recovered so far from Sima de los Huesos have more to say about how humans behave.

**María Martín-Torres:**

Yes, the good thing is that we have about 20 individuals. We have up to 17 skulls. Each of them is a person that has a story. So, indeed, the people from Sima de los Huesos we know them by their name. We have a name for them because each of them is telling us a different story. There is one very special to us is a skull of a little girl that died which was nine years old. We call her Benjamina, which means the beloved one. This little girl has a skull that is deformed. It's not normal, and the hominin suffered what we call craniosynostosis.

**María Martín-Torres:**

Craniosynostosis means that one of the sutures that we have in the skull when they need to get fused to each other was closed before time in such a way that the head could not keep growing proportionally, all parts properly. So, there is one part of your head, it does not grow properly because it's already closed before time. So, she got a deformed head - this is what we call in her case plagiocephaly.

This is important. Why is it important? First, because she has a deformity. We're talking about a little girl half a million years ago that was having a deformity, quite obvious in the head or in the face, but it is also important at another level. If your skull is not growing properly, if there's one part of your skull that because it is closed before time, is not expanding as it should, it's giving problems to the structures in the inside to grow.

So, it means that the brain is having also come compressions and difficulties to really develop normally. Despite that, she survived until the age of nine years old. This is a beautiful indirect way of thinking that hominins at that time may have compassion. They may have feelings towards people that were disabled or were having problems. I think, well, it's good to see these very early signs of what makes us human, this type of behaviors and high feelings of taking care of the elderly and the disabled. So, Benjamina is a little girl that is telling a special story about that.

**Meredith Johnson:**

These hominins in Sima de los Huesos who lived and died 430,000 years ago have been identified as the ancestors of Neanderthals.

**María Martín-Torres:**

What we have in Sima de los Huesos is very important because we have one of the sites with the earliest clear evidence of Neanderthal morphology. We are talking about a site that is 430,000 years old. In this site, we have a population of 28 individuals. They already show all the features we would expect a Neanderthal to have. So, the Sima de los

Huesos population is really at the root of the Neanderthal lineage. So, we can really study the origin of our sister species, the one that got extinct in a place like Sima de los Huesos.

**María Martín-Torres:**

But it's very interesting because it's telling us that, yes, that Neanderthals have deep roots in Europe, at least 430,000 years ago, but probably this story was not very linear, because Sima de los Huesos population has all the traits we expect a Neanderthal to have but also has some features that are quite special. Their own, for example has very small posterior teeth. They have very small teeth that could be almost as small as the ones that modern humans have. Or for example, they have quite of a high cranial vault, which is not typically found in Neanderthals or pre-Neanderthals.

So, they are unique in some aspects. They are very Neanderthal seeing some others, and when you compare Sima de los Huesos to other populations of similar age, we see that the degree of Neanderthalization or how Neanderthal they are is not uniform. So, we cannot see a progression from less Neanderthal to more Neanderthal across time. We really see like a [bouquet 00:35:31] of different Neanderthal populations but some of them are more Neanderthal in their face. Some of them are more Neanderthal in the teeth. So, I think it's very interesting because it's telling us that evolution of Neanderthals was not lineal.

Sima de los Huesos is unique because we were quite certain about this relationship with Neanderthals because it's more following, but we were able of recovering a type of evidence that okay, we never thought we could. I always said that when they tell, "Okay, if one day what would you love to ask or to get from a fossil sample like Sima?" I will say DNA. Okay, that was not science. I always thought that was science shown and that happened.

Sima de los Huesos has provided the earliest DNA ever recovered from a non-permafrost context. So, we have nuclear and mitochondrial DNA fro 430,000 years ago. So, also in that aspect, Atapuerca is unique. This DNA has rectified what we knew is that Sima de los Huesos hominins are very closely related to Neanderthals, but there is still - we have some questions open. Does it mean that they are already Neanderthals? Can we call them early Neanderthals? Are they just sister species of Neanderthals and they should deserve their own species or subspecies name?

**María Martín-Torres:**

So, there's still a lot of questions to answer especially from a taxonomical point of view, but we are very clear that we are looking really at the roots of the regions of Neanderthals. When we say that the fossils in Sima are very well preserved, in all means, because it's not only that they are very complete, and they have a lot of information in terms of morphology, but they also preserve the DNA, which is something, even the age that is very, very impressive.

**Meredith Johnson:**

Do you ever think it will be possible to get DNA from some of the older sites? Do you have hope for that?

**María Martín-Torres:**

I think that if there is a place that makes me think that dreams can come true is Atapuerca. So, we did that with the Gran Dolina to the six fossils that we were bidding the age of the earliest hominin fossils. We did that with the Sima de Elefante site which we were providing, again, the earliest hominin fossil evidence that exist in Europe 1.2 million years ago. We made it with the DNA. So, now, well, I'm ready to keep dreaming. Why not? We don't lose. We have to keep searching our dreams, and Atapuerca is definitely our magic place.

**Meredith Johnson:**

Since the time we conducted these interviews, that dream of getting DNA from older sites has come true. Just a few months ago, Leakey Foundation grantee Frido Welker and colleagues were able to pull ancient proteins from an 860,000-year-old tooth from Gran Dolina. These proteins have provided the oldest genetic information ever retrieved. Their results published in the journal *Nature* in April 2020 provide evidence that *Homo antecessor* is a close sister species to us, Neanderthals and Denisovans. This implies that the modern-like face of *Homo antecessor* may have a very deep ancestor in our genus, *Homo*.

Research continues at Atapuerca, and when people are able to travel again, María invites you to visit and experience Atapuerca for yourself. Thanks to María Martín-Torres for sharing her work. There are links in your show notes to learn more.

Big thanks as well to Dub and Ginny Crook for generously sponsoring this episode and for their constant support of The Leakey Foundation and Dr. María Martín-Torres's work.

**Meredith Johnson:**

If you'd like to support this show and the science we talk about, make a donation to the Leakey Foundation today. All donations will be matched, so your impact will be doubled. Visit [leakeyfoundation.org/donate](https://leakeyfoundation.org/donate). That's L-E-A-K-E-Y, [leakeyfoundation.org/donate](https://leakeyfoundation.org/donate). This episode was produced by me and Lucia Benavides, and Shuka Kalantari. Our editor is Audrey Quinn. Theme music by Henry Nagle. Additional music by Blue Dot Sessions and Lee Rosevere.

**Meredith Johnson:**

We'll have another episode about María in Spanish coming soon, so watch your feeds. Thanks to all of your donations, we're rolling out lesson plans that go along with every episode of *Origin Stories*. The first batch will be posted in early September. You'll be able to find them at [leakeyfoundation.org/lessons](https://leakeyfoundation.org/lessons). As always, thanks for listening.