This is a transcript of The Conversation Weekly podcast ‘Neanderthals: what their extinction could tell us about Homo Sapiens,’ published on October 12, 2023.

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Mend Mariwany: For generations, Neanderthals have been a source of fascination for scientists. Now, new research is uncovering how they lived, why they went extinct roughly 40,000 years ago, and what their story reveals about us, Homo sapiens. I'm Mend Mariwany and this is The Conversation Weekly, the world explained by experts.

Today we've got with us Benoît Tonson, head of the science and technology section at The Conversation in France. Benoît has been working with Ludovic Slimak, an archaeologist at the University of Toulouse III, Paul Sabatier in France. Ludovic has been studying the history of Neanderthals and their extinction around 40,000 years ago. Hello, Benoît. Thanks for joining us.

Benoît Tonson: Hello Mend, thanks for having me.

Mend Mariwany: Benoît, you've been working with Ludovic since early 2022. Can you tell us a little bit about him and his work?

Benoît Tonson: Yes, of course. We work together to publish a few different articles about a very interesting discoveries he made about the early migration of Homo sapiens in Europe. So he wants to change our visions about how Homo sapiens came to Europe. And maybe how the different relationships we could have with our cousin Neanderthals.

Mend Mariwany: Okay, and what exactly drew you to this work?

Benoît Tonson: In fact, my own background is biology. So I'm very interested about all the life sciences research and especially human origins. I found this topic quite fascinating, answering the question: where do we come from? So when we first talked and he told me about his research, I thought it was a really good topic for The Conversation.

Mend Mariwany: Benoît, you've been working with Ludovic over the past few months, and he's also just released a new book in which he's made some very bold and provocative claims that really challenge some of the existing
assumptions by archaeologists about the history of Neanderthals. Can you tell us what he's been arguing?

**Benoît Tonson:** Yes, actually, he's convinced that our visions of how the *Homo sapiens* arrived in Europe are not true. Before his work, we thought that *Homo sapiens* arrived in Europe about 40,000 years ago, approximately the same time Neanderthals went extinct. And from his work, he brought some evidence that *Homo sapiens* actually was in Europe 10,000 years before. So around 50,000 years ago. So it's quite a game changer in that story because for about 10,000 years, *Homo sapiens* lived with Neanderthal. But we don't really know exactly how they lived together. But this research, it can change a lot about our own history.

**Mend Mariwany:** Thanks so much for speaking with us Benoît. Now, I reached out to Ludovic and I spoke to him.

**Ludovic Slimak:** I dig caves for something like 30 years. And I've been trying to understand who was Neanderthal, how he could have suddenly disappear some 40 to 42,000 years ago.

**Mend Mariwany:** Ludovic says, up to now our understanding of Neanderthals has been distorted. And he wants to correct that in the hope that we might be able to learn something. Not just about Neanderthals, but ourselves, *Homo sapiens* too.

**Ludovic Slimak:** As in the past, Neanderthals were perceived like a brute caveman, you know? And then they said, okay, we have to, after the Second World War, we have to make this rehabilitation and we have to understand and put different words.

**Mend Mariwany:** The renewed interest in the study of Neanderthals was down to the discovery of new fossil remains in Germany in 1997 and advances in technology, which allowed for more detailed analyses. Ludovic suggests that scientists at the time were wary of being sort of racist towards Neanderthals, and so they ended up projecting too much of *Homo sapiens* onto them. Rather than seeing Neanderthals as they really were, a species which saw, thought, and interacted with the world in an entirely different way altogether.

**Ludovic Slimak:** The deep definition of racism is: to be human, you have to be what I am. And this is precisely what we are doing since 20 years with Neanderthals. He has to be human, and so he has to be what we are, and doing so, the problem, we are killing him a second time. He died first 40,000 years
ago, and now he dies for a second time, because we are not able to have a very direct and concrete look on what he was. We are not able to understand the diversity. We are not able, us in our society, to understand the difference, us sapiens. We have rules, and these rules define our way to understand the world.

**Mend Mariwany:** So, to understand Neanderthals better, who and what they were like, Ludovic has dedicated part of his work to finding out what happened to Neanderthals and the diversity of humans that once populated our planet. And just to be clear, when he speaks about humans and their diversity, he's not talking about different types of cultures we find today. He's referring to the many species of humans, or *Hominin*, that existed thousands of years ago. Two of these types of humans we'll talk about today. *Homo neanderthalensis* and *Homo sapiens*.

**Ludovic Slimak:** We have a common ancestor something like half a million years ago, so that means somewhere in Africa there were some *Hominins* that were the ancestors of both *Homo sapiens* and Neanderthals, but then these two humanities had their own lives in Eurasia for the Neanderthals and the other in Africa.

**Mend Mariwany:** With advancements in molecular biology in the 21st century and the first sequencing of Neanderthal DNA in the early 2000s, scientists were able to prove that *Homo sapiens* and Neanderthals originally shared a common ancestor, when both species were still limited to the African continent. Then, around 400,000 years ago, Neanderthals set out to migrate into parts of Europe and Asia, or Eurasia for short, and their genetic lineage began to diverge and evolve separately from *Homo sapiens*.

**Ludovic Slimak:** And the fascinating story began that after half a million years of separated evolution in completely different environments, at the end, we see that these two populations, that are now deeply divergent in terms of genetic and evolution and traditions, suddenly they met again. At this time, they were no longer at all the same humanity, but they shared for a time the same spaces, the same environment, and maybe sometimes the same caves.

**Mend Mariwany:** You’re making me think of these images where we see the evolution of *Homo sapiens*, and in those images we often see one of the stages being represented by a Neanderthal. So what you're saying essentially is that Neanderthals’ evolution is entirely separate to sapiens evolution, right?

**Ludovic Slimak:** Yes, both Sapiens and Neanderthals have a common ancestors, but then after half a million or 2-300,000 years, these two populations
are were on path of evolution, and they evolved on distinct continents. So, they were very different from one another, and these two populations met again. And their exchange is very likely ideas and genes.

**Mend Mariwany:** So, when sapiens began migrating out of the African continent into Eurasia, between 50,000 and 100,000 years ago, they likely crossed paths again with Neanderthals, who had already migrated into Eurasia around 400,000 years ago. But just how the two populations related to each other and interacted isn't fully understood yet.

**Ludovic Slimak:** We even don't know if the genetic contact occurred in Europe or in the near East. And after this period of contact and cohabitation in Europe, suddenly, all Neanderthals disappear on planet Earth. And we don't know why. And that's a very deep enigma because this is the last extinction of humanity.

**Mend Mariwany:** To understand what led to the extinction of Neanderthals 42,000 years ago and how *Homo sapiens* came to be the only species of humans to survive, Ludovic says we have to dig a little deeper and study artifacts from the period before Neanderthals became extinct. It was in 2022, while working in the Mandarin Grotte in the Rhone Valley in southern France, that Ludovic came across a surprising discovery that would challenge some of the scientific assumptions about *Homo sapiens*’ migratory history from Africa into Europe.

**Ludovic Slimak:** And the Rhone Valley is something very important because it's the main natural corridor between Mediterranean Europe and continental Europe. And there we realized some years ago that we have 12 Neanderthal layers that go from 42,000, so the moment of the extinction, to 120,000.

**Mend Mariwany:** The 12 layers of rock and sediment correspond to major archaeological periods in the site that range from a climatically very warm period, 120,000 years ago, to the extinction of Neanderthal 42,000 years ago.

**Ludovic Slimak:** We began to work in the middle of that sequence, in layers that were dated at 54,000 years, and then we begin to find incredibly modern material. And that was very modern technologies in sandwich between very classic Neanderthal technologies.

**Mend Mariwany:** The technologies Ludovic refers to are hunting tools and weapons, like spears, bows, and arrows. So when he says modern technologies, he's referring to those crafted by *Homo sapiens*. While classic technologies refer to those crafted by Neanderthals.
Ludovic and his team found evidence of these modern tools in the archaeological records at a time when Europe was thought to be exclusively occupied by Neanderthals. The discovery, according to the team, is what proves that *Homo sapiens* arrived in Europe about 10,000 years earlier than scientists had previously thought. This is important because, if true, it proves a theory that other scientists had already been proposing, that *Homo sapiens* really did overlap with Neanderthals in Eurasia.

But not only that, at the Mandrin Grotte, Ludovic and his team found teeth belonging to *Homo sapiens* in sediment layers corresponding with a period that's associated with Neanderthals. Remember, *Homo sapiens* were thought to have made it to Europe in one migratory wave 42,000 years ago, so around 400,000 years after Neanderthals arrived.

**Ludovic Slimak:** So, after 40 years in grotte Mandrin, we find something like nine teeth, which you can say, “well, it's not a lot”, but in fact, that was a pretty nice discovery.

**Mend Mariwany:** All nine teeth should have only been from Neanderthals. But when Ludovic sent them to his colleague for analysis, he found that this wasn't the case.

**Ludovic Slimak:** He analyzed them by micro CT scans so very high resolution. And then he told me, “well, Ludovic, there's one tooth here which is different. It's an *Homo sapiens*, and in fact, it's an archaic *Homo sapiens*”. And so, in this major corridor, we had a demonstration, we published that in 2022, that we had a very early *Homo sapiens* migration. And a year after that, in May 2023, I published another paper in PLUS ONE explaining that what we thought were the first migration of *Homo sapiens* in continental Europe between 40 to 45,000 years ago, were in fact the last wave of three wave migrations that affected the continent between 55,000 and 42,000 years ago.

**Mend Mariwany:** So what you found is that, sandwiched in between the different layers of sediment that included teeth of Neanderthals, you also found *Homo sapiens* teeth. And that is what suggested to you that *Homo sapiens* migrated earlier and in various different waves.

**Ludovic Slimak:** Precisely what we had were an *Homo sapiens* migration in Neanderthal territories.

**Mend Mariwany:** Ludovic's work is provocative. His claims are considered controversial by other archaeologists in the field. The site where the tooth was
found has been linked to a technological industry which is notable for some of the oldest and most sophisticated stone tools and artifacts, such as flint knives, blades, and scrapers. Many archaeologists have argued that these tools were produced by populations of Neanderthals, not *Homo sapiens*, as Ludovic now believes. Ludovic dismisses this. He says Clément Zanolli, his colleague at the University of Bordeaux, who analyzed the tooth, was 100% sure that the tooth belonged to an archaic *Homo sapiens*, not Neanderthals. Meaning, it's more likely it was sapiens who produced these tools.

In May 2023, Ludovic and his team published the remainder of their findings in a paper, arguing that what scientists originally thought of as the first wave of colonization of sapiens from West Asia to Europe, was in fact the last of three waves. And each migratory wave yielded its own distinct culture. The first taking place 54,000 years ago, followed by the second wave 45,000 years ago, and culminating with the third wave around 42,000 years ago. This was happening while populations of *Homo sapiens* elsewhere were expanding into other regions of the world, including Oceania.

**Ludovic Slimak:** We have at the eastern end another major historical event, which is the colonization of Australia. And so by 55-60,000 years ago, precisely at the same moment, we have another migration of *Homo sapiens*, but conquer a new continent where there were no Neanderthals, but only huge mammals like kangaroos. And so you have huge expansion of this *Homo sapiens* population, that conquer all the eastern end of Eurasia and all the western end of Europe. And all that is at the same precise moment. And it's very likely that we have here, a major event and a major at the scale of the human history.

**Mend Mariwany:** So, the expansion of human beings happened at a very fast pace and across huge territories. And at the same time, Neanderthals were also following their own migration paths, parallel.

**Ludovic Slimak:** Well, that's the moment where we have this *Homo sapiens* expansion. That also, this expansion occurred on all the territories of Eurasia, and in all these territories, there were a large diversity of humans, and they, very likely they met.

**Mend Mariwany:** At the same time, other human populations existed too, such as *Denisovans* around Siberia, *Homo floresiensis* in what's Indonesia today, and *Homo naledi* in modern day South Africa, for example. As populations of sapiens migrated and expanded to different parts of the world 40 to 50,000 years
ago, all other human species disappeared, leaving sapiens behind as the only human species to survive.

**Ludovic Slimak:** All these humans disappear very quickly. So something happened, and this is very likely one of the most intriguing questions in our whole history. Populations that live on these huge territories for 300,000 years, in any kind of climate, in very warm climates, in huge forests, and in arctic conditions when you, during the ice age. They're super well adapted to any kind of environments and climates. They're super smart. And suddenly, bam, nothing. How is this possible?

There were a lot of theories, and all these theories were making bim-bam-boom. Like for the dinosaurs. So we are... the question of huge volcanoes, explosions, the question of climatic changes, the question of epidemic, the question of radiation from the sun, and et cetera, et cetera. But if that affects all the planet, you must explain me why Neanderthals vanished and not *Homo sapiens*. So there's something very strange here that happened, which can't be an event. If it's not an event, what is it? If it's not an event, because it's on a too large scale, then it's a process, and we must interrogate this process.

**Mend Mariwany:** To try to find any clues about what that process might have looked like, Ludovic set out to study the tools Neanderthals and *Homo sapiens* had crafted more closely. His hunch was that by examining the tools and tracking their development over the course of Neanderthals and sapiens migratory evolution, this could perhaps tell us something about why one species survived while the other didn't.

In 2016, Ludovic got on a plane to Harvard University's Peabody Museum in the U.S. The museum holds a range of tools and artifacts belonging to Neanderthals and sapiens that were uncovered in the Ksar Akil Cave on the outskirts of Lebanon's capital, Beirut. Over the course of three years, while comparing the flint stones that had been found in Lebanon with those found in France, he noticed something about the way the flint points at the top of the spears were crafted. The flint points *Homo sapiens* had crafted during their evolution, in the course of their migration to Europe, all looked strikingly similar to each other, despite the fact that some of them had been made tens of thousands of years apart.

**Ludovic Slimak:** There's a million ways to produce a flint point, and suddenly... I realized there was the same technology to make the same point. If you measure them at one millimeter, there's no statistic difference. We are 3,000 kilometers from the Rhone Valley in the east Mediterranean coast. That was
stupefying. But there, in that site, we knew that this technology were made by early *Homo sapiens*.

At a point, I realized something that my colleagues never precisely understood before that. I realized that if you take *Homo sapiens* tools, or weapons, technology, whatever they are, 100,000 years old or 55,000 years old. After you saw 100 of these tools, the 10,000 after that are precisely the same. So, we have a process of standardization, of production in series, that is very specific to our species.

But now if you take Neanderthal tools, they are nice also, they are also impressive, some of them. I think nobody is able to reproduce them today. But there's something else, because this tool, it's something unique. That means even if you see a million flint tools after that, each of them will be different from the others. That’s something crazy that is systematic among all Neanderthal societies, all Neanderthal technologies, that we never see in *Homo sapiens*.

**Mend Mariwany:** What he's arguing is that *Homo sapiens* standardized their method of producing these tools to make them more efficient. But Neanderthals didn't. Their tools were all made in different ways, with seemingly no standard method.

So you don't see the standardization of tools in Neanderthals in the same way *Homo sapiens* were standardizing their tools, right?

**Ludovic Slimak:** It's not simply that each Neanderthal tool is unique, it's also that when you take a Neanderthal tool and you have a look on it, and you see that the craftsman, when he was making his tool, is going to play with the morphology of the boulder, with its texture, with the color of the flint. Sometimes he just follows the colors like that. When it makes a transformation, he creates his tools. And so, Neanderthal is in dialectic with the raw materials, with the element is transforming. While when we are dealing with the *Homo sapiens* technology, *Homo sapiens* has an idea and he's going to force all the raw materials to be transformed to his own idea of what is the good thing, what is the reality of the world, and that give a result of hyperstandardization.

**Mend Mariwany:** For Ludovic, it's this discovery in which might lie the clue for why *Homo sapiens* have survived and Neanderthals didn't. He says the Flintstones suggest Neanderthals were far more creative than *Homo sapiens*. *Homo sapiens*, on the other hand, he says, are efficient. They think the same, and dislike divergence. He argues it's not that *Homo sapiens* wiped out other humans, but rather our tendency to categorize, systematize, and standardize
everything we do and encounter, might've placed us at an evolutionary advantage over fellow human species at that time in history.

**Ludovic Slimak:** What I say here is not that *Homo sapiens* is superior to Neanderthals. I said, *Homo sapiens* is hyper standardized and this standardization provided him a hyper efficacy and a hyper ability to conquer all the planet. Why? On Neanderthal, what we see, it's an incredible creativity. So now we have an incredible paradox. If the definition of human, of humanity is the freedom of mind and the creativity, then maybe that the humans disappeared 40,000 years ago, and it remained only a very specific variant of humanity, us *Homo sapiens* which is super efficient.

**Mend Mariwany:** While it may seem positive to be efficient, Ludovic says there is something deeply unnerving about our hyper efficient ways as *Homo sapiens*.

**Ludovic Slimak:** Doing all the same time, in the same way, all together. That’s the definition of martial arts, you work all together in the same way. You must wear the same clothes and you don't have, must have one millimeter of difference. All our armies on the planet worked on that process to be efficient and to be superior to the others. If I want to be superior to my enemies, we must all behave exactly the same way. That's something super scary. I think that the waves of sapiens through the planet induced the disappearance of any other humanity on the planet. Simply because we are what we are and we are super efficient. And in our way to be efficient, we are not able to understand a different way to be in the world, so we have to learn to beware of ourselves.

**Mend Mariwany:** That’s it for this episode of The Conversation Weekly. It was written and produced by me, Mend Mariwany, with assistance from our producer Katie Flood. Gemma Ware is the executive producer. Sound design was by Eloise Stevens, and our theme music is by Neeta Sarl. Stephen Khan is our global executive editor. Alice Mason runs our social media. Thank you also to our colleagues in France, Benoît Tonson, and to Nathalie Sauer, who worked with Ludovic on the original story for The Conversation.

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