

TRAVELS THROUGH TIME

Rebecca Wragg Sykes: Neanderthals (Eemian)

Hello and welcome to *Travels Through Time*, the podcast made in partnership with Jordan Lloyd and ColorGraph.

[Intro music]

Artemis Irvine: Hello, I'm Artemis Irvine and in today's episode, we're travelling back further in time than we've ever gone before on this podcast: to be precise, around 126,000 years ago to meet our long-extinct kindred, the Neanderthals.

[Music]

For many of us, casting the mind back as far as even the early medieval period can sometimes prove a conceptual challenge. When reading about ancient civilisations, the Greeks, Romans and Egyptians sometimes seem more like distant historical subjects than actual human beings and yet, in comparison to the historical period that we'll be looking at today, these subjects are practically modern. Between about 400,000 to 40,000 years ago, Neanderthals walked the earth. They hunted and crafted tools with skill. They loved and buried their fellow man and they even made art.

Introducing us to these enigmatic figures is the archaeologist and writer, Dr Rebecca Wragg Sykes. Rebecca studied archaeology through to PhD level before completing a prestigious Marie Curie postdoctoral fellowship at the University of Bordeaux. Her first book, *Kindred: Neanderthal Life, Love, Death and Art*, brings together 21st century scientific understanding of Neanderthals to challenge the stereotype that these were knuckle-dragging, inferior predecessors to the enlightened Homo sapien. Since its publication last month, *Kindred* has already been selected as one of the best books of 2020 by the *Sunday Times* and Professor Brian Cox has described it as 'beautiful, evocative and authoritative'. So you can imagine it was such a pleasure that last week, Rebecca took me on a travel into very deep time indeed.

Thank you so much for joining us on *Travels Through Time*, Rebecca, and congratulations on publishing your book. That must be really exciting. I have to say, I found it not only an incredibly informative book, where every single page is full of so much information that I'm sure most people would have absolutely no idea about, but I also have to admit that I found it very moving. A couple of times, it brought me literally to tears *[laughter]*.

Rebecca Wragg Sykes: Oh, that's so nice. I'm so pleased. As specialists, we know that there's just vast amounts of really cool stuff that never gets beyond the scientific journals which I was trying to infuse it with. Even though Neanderthals grab the headlines, a lot of really fascinating stuff just doesn't really get out to the public and I wanted to give people a real, deep experience of that but also connect people to that human past that Neanderthals clearly represent for so many people. So I'm so glad that you had that reaction. That's exactly what I was hoping *[laughter]*.

Artemis Irvine: Yeah, exactly. There is something very emotive about being brought face-to-face, in the way that you do, in such detail and with the humanity of these people who are no longer with us. They're a totally extinct people but they really come alive on the page. There's obviously never not a good time to reflect on our humanity because it makes you think about

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Homo sapiens' humanity as well, obviously, but I was wondering if there was a moment which first sparked your inspiration for writing the book and you thought, 'Yes, now is a good time to write this.'

Rebecca Wragg Sykes: Oh gosh! Honestly, I kind of feel like this book has been waiting for me to write it for a long time. I was always really interested in the past, even as a child. When my family went on holidays, we would go to all the National Trust places around and I was always imagining myself in the past in those places. However, on some of the holidays we went to on the Continent, like to France and some of the caves and the museums, those places really blew me away. I can remember watching, in the museums, a video of somebody knapping (making stone tools) and I virtually had to be dragged away back into the car park to go because I was so fascinated by it. This interest has been there for a long time.

Artemis Irvine: Like you say, each chapter looks at a different theme and each chapter adds another layer to your understanding of who they were and what their lives looked like. I was wondering if you had a particular favourite area of interest or a chapter that you enjoyed writing the most.

Rebecca Wragg Sykes: Oh, that's really tricky. I know which ones were hard *[laughter]*. My training, through my Masters and my PhD, was in stone tools and so Chapter Six of the book was all about their stone tool technology. That's a difficult thing for most people to engage with because it's hard to just read about that and understand it. Actually, that's quite a visual thing really and so that one was tricky to do. Especially because it is my specific area, I was tempted to go far too much into detail. Probably, people think that chapter is already too detailed *[laughter]* but I really tried to simplify things right down to concepts that are not going to be confusing and to use no jargon.

Artemis Irvine: I think one of my favourite ones that I really enjoyed was about the skeleton of the baby...

Rebecca Wragg Sykes: Oh yeah.

Artemis Irvine: ...and imagining the mother giving birth to this child, and nursing it, and then it dying, and then having to eventually abandon the child but wanting to bury it and protect it from any harm still, and it lying under the surface for thousands of years and then being found. I think it placed a really good connection between where we are now and showing that line and connection. Because it's such a long time ago, it's really difficult to get a grip on what that means for something to have been 200,000 or 400,000 years ago but, for me, that immediately brought a connection between then and now which was really powerful.

Rebecca Wragg Sykes: I think that's the interesting thing about being an archaeologist and Neanderthals. It's true for myself and other colleagues as well. To some extent, you have to remove yourself emotionally. Neanderthal babies are fascinating because of what they can tell us about growth, development and the species.

Artemis Irvine: The subject is incredibly interdisciplinary, as you were describing earlier. It's not just, like you say, about the archaeology, the geology or the science of it. It's also about those more philosophical questions about what their psychology might have been, or how it might have felt, or what would motivate someone to bury something in the ground and all of those kinds of things. Only when you combine all of those different disciplines together can you get as full a picture of what you convey in the book.

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Rebecca Wragg Sykes: Yeah, I mean it's tricky because the question about burial has always been something that people have debated for a long time. People bring to that debate their own assumptions and beliefs about what is meaningful in human interactions with bodies around what we do with the dead and what is a permitted level of meaningful treatment of a body and things like that. However, we're often coming from a particular modern, Western understanding of what you do with a body; what you should do with it and what you shouldn't do with it. Therefore, expectations that if we're not going to find Neanderthals laid out straight in a square pit, then what they did doesn't mean anything. I don't accept that at all. You only have to look back at the past thousand years of Christian tradition to see how much it's changed in terms of what people believed was a respectful, meaningful way of dealing with the dead. It's totally transformed today even.

Artemis Irvine: Absolutely, yeah. The usual format of this podcast is obviously that our guest chooses one year in history but that's not really quite so easy *[laughter]* with this subject. If you could travel back in time, perhaps it's better to ask you what period would you travel back in time to?

Rebecca Wragg Sykes: Although we have fantastic dating methods and a whole range of dating methods, they don't give you one year *[laughter]*. In Neanderthal archaeology, it doesn't happen. So I will choose a particular, roughly, 10,000 year period in the middle part of Neanderthal's existence starting around 126,000 years ago. Obviously, from the perspective of the other guests that you have on this podcast, that sounds a bit bonkers and saying ten millennia *[laughter]*.

Artemis Irvine: They're probably jealous *[laughter]*.

Rebecca Wragg Sykes: That's about 500 generations but if you're looking at the overall span of the time that Neanderthals were in existence, that's only about 3% of their whole chronological realm. This period is known as the Eemian and in Britain, we call it the Ipswichian which are basically climate terms based on sites where you had particular pollen sequences which identify this as a particular climate period. The reason why I've chosen this period is the opposite of what most people will be picturing the world that Neanderthals lived in. This is a warm climate period and it's what we call an interglacial rather than a glacial or a cold ice age. A lot of people will be thinking 'the Ice Age' but there was more than one ice age. There were many cycles. The last ice age we had ended about 11-10,000 years ago. It was slightly warmer and then it was colder. It goes right back and so there are multiple phases. This was the warmest interglacial that the Neanderthals lived in. It's actually the warmest interglacial that any hominin species encountered and survived. It's nearly tropical *[laughter]* rather than tundra. The reason it was warmer was basically because of subtle differences in the Earth's orbital position which meant that more sunlight fell on the Earth during the summer which was enough to really dramatically shift average temperatures up to somewhere between 2-4° warmer than today. That doesn't sound like much but, actually, it's a lot. It's enough that we can see, for example, in alpine caves up in the mountains now, the snowline had moved well up and the stalagmite growth in those caves starts to begin because it suddenly got warm and moist. Also, the melting glaciers and ice sheets all meant that the oceans were rising quite rapidly at the beginning and certainly reached somewhere between five to eight metres above where the shoreline is today which is dramatic. That's a vast amount of difference. Unlike when the sea levels go down a lot because it gets super cold, the coastline itself doesn't change that much in terms of huge amounts of land being flooded but in particular regions, it was quite dramatic.

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The big change in terms of the landscape and the world that they were living in was not only warm but as the last ice age before that ended, the vegetation was really, really shifting as well. Instead of primarily open landscapes with tundra and grassy steppe, what you see straightaway at the beginning of the Eemian is a huge growth in trees and forests, essentially, which begin to spread all over Eurasia. It's a warm, woodland world. It's so different to people's general understanding of Neanderthals as hyper-Arctic adapted creatures. That's why I wanted to choose this in order to explore this other aspect of their life.

Artemis Irvine: In this period, where would you like to go for your first scene?

Rebecca Wragg Sykes: I want to go to Britain around 123,000 years ago, so a little bit into the Eemian, and explore what's going on. When the Eemian started about 126,000 years ago, it was quite dry and hot straightaway. It was really quite a rapid change. It must have been a real shock [*laughter*] to the environment; not only to Neanderthals but to all the animals as well. However, it took a few millennia for the forests to really start to grow. By about 123,000 years ago, you start to see real largescale woodland but it was not a single, static entity. In the earlier phases, if we try and fly through time - we know from the pollen data and if you put a core down through ancient lakebed deposits, you can see how the pollen changes through time going up through that core.

Artemis Irvine: Wow!

Rebecca Wragg Sykes: That shows you what the landscape was like. We can literally see this woodland mutating from cooler species after that previous ice age, like birch, juniper and pine. The pine forest starts to get established but then quite quickly, it begins to look like an oak forest which is something that you would see, pretty much, in Britain today. You can also see elm, hazel, yew, linden, ivy and boxwood. Eventually, through those few thousand years, it matures into a hornbeam and beech forest. If you go to 123,000 years ago, that's when it was at its warmest and the forest is very dense. If you'd been walking around the forests in Britain at that time, rather than hearing these pine forest birds for your dawn chorus, like crossbills or crested tits, by the time you get to 123,000 years ago, you'd be listening to something that is pretty much what our woodlands now should sound like. For example, we've got jays and beautiful roller birds as well. The richness of the dawn chorus would have been immense. As it gets cooler as well, you then see the changes to capercaillie, black grouse and those kinds of species. The point in time when it's warmest, it actually would be quite recognisable to people today.

Artemis Irvine: Would there be Neanderthal communities living in Britain at that time? Yeah? They would have been living in the forests?

Rebecca Wragg Sykes: Well, that's the strange thing. We know, from the Continent, that Neanderthals were living in this full-on forest environment. They were walking around through the trees. They were living underneath dappled light and it was hot. They would have been, pretty much, tree people. They would have grown up surrounded by gigantic trees; maybe bigger even than we see in forests today. With the lost medieval forests, for example, those trees were all cut down for naval timber and it does make you wonder what those trees looked like. I wonder what these trees looked like that were just undisturbed at all for thousands of years, these ancient, deciduous forests. However, although we know Neanderthals were definitely on the Continent, it doesn't look like there was anybody in Britain at all. Researchers have looked at this question [*laughter*] for a long time because it seemed a bit strange but as far as we can tell, in this warm Eemian period, there was nobody here but the animals. That's quite a strange idea. If you were a traveller through time, you would be walking around and hearing all the birdsong. You'd see the light, the streams and all the insects buzzing around. You'd see animal trails

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everywhere but no people and no traces of people at all. Across the whole of the British Isles, we don't think there was anyone here.

Artemis Irvine: Wow!

Rebecca Wragg Sykes: The reason for that is probably two things. One is that at the end of the ice age before that, the ice sheets had come down quite low towards northern Europe and in front of ice sheets, when they start to melt, you get what's called a proglacial lake. Basically, that means it's a huge lake in front of the ice sheets as all that meltwater starts to accumulate. We know that there was one of these massive lakes running across where the North Sea is now but, at that time, there was a chalk ridge that used to run between the Continent and Britain. That lake burst through that in a catastrophic flood. It was absolutely immense. It was so monstrously violent that the scouring that it left on the bottom of the Channel looks more like what you see on Mars today. There are just these gigantic valleys battered out by this cataclysm.

Artemis Irvine: Really? They're still visible today?

Rebecca Wragg Sykes: Yes. You only see it with sonar though because it's under the Channel now. They're underneath an overburden of other sediment but you can see what happened to the bedrock. That event probably left that whole landscape, which was dry after the lake had gone, completely trashed. It was just like a wasteland with no vegetation and bare ground. It's not really a very promising area for hunter-gatherers to want to cross in the first place. That may well have been difficult to cross. It looks like the climate change, at the beginning of the Eemian, was so rapid that the sea level may have come back very fast and cut Britain off before Neanderthals actually started thinking about going over there. Some animals got over and it may be that the species that made it were ones that could easily cross either boggy ground, or relatively open water, or rivers. It's a very strange concept. We know that Neanderthals were little smoke trails coming up from the forest on the Continent and across the Channel, which was a little bit larger. People often say, 'Oh, there were lions and hippos under Trafalgar Square.' We know from old excavations underneath London, for example, that these animals were all there but not people.

Artemis Irvine: Wow! Do we know when the first humans came to Britain?

Rebecca Wragg Sykes: Neanderthals had been there long before that. They had already been here and then that previous ice age was so cold that it seems that they abandoned Britain but they were there for a long time before that. The oldest Neanderthal site in Britain that's fully Neanderthal, as you would expect them, is about 270,000 years ago and that's in Pontnewydd in Wales. We then have earlier pre-Neanderthal sites as well at 400,000 years and way back. Hominins were in Britain many times but through these climatic pulses, when it got super cold, Britain was usually abandoned but when it was warmer, they would come back. The Eemian is different and it may be because, as I say, the sea level rose so fast or was just higher than normal - I don't know - that they just didn't get a chance to come over. However, horses didn't come either, which is very interesting. Neanderthals and horses only returned to Britain somewhere around 65,000 years ago and so much later as things got cooler again, the sea level drops and there is this huge area of land in between us and the Continent and horses and Neanderthals come back. As soon as it's possible, they do and so something was clearly preventing it.

Artemis Irvine: You use the word 'hominin'. That's right. Is it hominin?

Rebecca Wragg Sykes: Yeah.

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Artemis Irvine: I was wondering if we could go over what that word means and also, before we meet the Neanderthals themselves, to kind of clarify it exactly. I know there's a misconception that they're somehow a previous version of human before we get to our version of human but that's not right.

Rebecca Wragg Sykes: No, so hominin basically just means our close relatives that were, pretty much, on the same lineage as us. We are primates and we are apes and so are chimpanzees but chimpanzees are not hominins. They did their own thing. They had their own lineage that separated off from anything that was ever going to turn into us, about seven million years ago. They've been doing their own thing. They're just as evolved as us but they just went on their own path. We're Neanderthals and we come from Africa and our origin is in the Homo genus, so we're both in the Homo genus. We're Homo sapiens and Neanderthals are Homo neanderthalensis. The Homo genus, we believe, evolves in Africa somewhere between two and one million years ago. What happens after about a million years ago until about 500,000 years ago is a bit tricky because there's not actually masses and masses of fossils or there hasn't been until recently. What we do know, from the last few decades of work, is that there was no single, neat, little highway leading towards us. It's not even like a tree or a bush. The analogy that we like to use now is like a braided river where you've got rivulets coming and going; some of them meeting again; some of them going off and dissolving and not really doing anything. The impression is that populations in Africa were in different regions and they had different anatomy but then, almost like a mosaic forming, some of those groups were interacting with each other and features were being shared. Eventually, for Homo sapiens, hominins that look like us (we would call them early Homo sapiens) were about 300,000 years ago in Africa. Whereas, by that point, Neanderthals were already, themselves, evolving in Europe and western Eurasia. What we don't know really is where in the lineage we both come from and where that was but it's probably in Africa. We do know, genetically, that that is somewhere around 800,000 to 600,000 years ago. The Homo lineage split, and what would become us, went in one direction and what would become Neanderthals and the Denisovans, which is another Eurasian hominin population and contemporary with Neanderthals, split. They split again and the Neanderthals went off and that was their lineage. They're like western Eurasians and it appears, although we don't know that much, that Denisovans were more like central and eastern Eurasian hominins but living at the same time. We definitely know *[laughter]* from the genetics that we were all, on occasion, meeting, interacting and making babies. There's that as well *[laughter]*.

Artemis Irvine: Is that quite a new revelation that's come out in the last few years? I was listening to a podcast, from I think it was about ten years ago, where somebody was saying that there was no evidence to suggest that Neanderthals and Homo sapiens did interbreed. Is that not true anymore?

Rebecca Wragg Sykes: That's literally the last ten years, basically. Until that point, there was a lot of debate about whether we had ever had any direct ancestry from the Neanderthals themselves. There was a view of things which said that we basically dispersed from Africa and then encountered the Neanderthals but replaced them or they were already going extinct and then we sort of came in afterwards but that there was no actual interbreeding. However, there was another perspective that said that there were probably very ancient hominin populations across the old world and that there was some kind of gene flow, over very long time periods, between those different populations which led to Homo sapiens emerging in different regions at different times. That doesn't seem to be correct either. What does seem to have happened is slightly more like the first theory that we did emerge in Africa but as soon as we start to disperse from Africa, which is a lot earlier than we used to think, it now looks like we were humans that

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would have looked very much like present day people. We were in the Near East by 180,000 years ago and so super old, and right the way across into China by 80,000 at least, and into Australia by 65,000.

Artemis Irvine: Wow!

Rebecca Wragg Sykes: That depth of time for which we were dispersing away from Africa and interacting with these other hominins, like Neanderthals, Denisovans and probably even other more archaic species that had left Africa two million ago and had been hanging out in Eurasia all that time - the span of time during which there is potential for those interactions is so much bigger than we used to think that it's not surprising that the genetics tells us that that definitely was going on *[laughter]*.

Artemis Irvine: I think in your second scene that you'd like to visit, we meet the Neanderthals and they're hunting deer. Would you like to tell us a bit about that second scene and about the animals that Neanderthals would have interacted with on the Continent?

Rebecca Wragg Sykes: Rather than staying in Britain, although the forest is very nice, there's nobody actually there *[laughter]*.

Artemis Irvine: There's nobody to hang out with.

Rebecca Wragg Sykes: Yeah *[laughter]*. This is the full Eemian when it's nice and warm but we're on the Continent this time. What I really like about the Eemian is how surprising the environment is. The woodlands themselves are familiar, like the birds, but the animals were weird *[laughter]*. Some of the animals that had lived during the colder periods were there. Aurochs were around, which are the ancestors to some of today's cattle species. They were huge, like 6 ft at the shoulder with gigantic horns.

Artemis Irvine: Oh my god!

Rebecca Wragg Sykes: You wouldn't think of them as forest species but they really were. Bison, as well. People often think of bison as grassland species because you're thinking of North American prairie bison but bison in Europe have been forest species for a long time and they still live in forests in Poland. Neanderthals ate a lot of food. That's one thing we should get straight at the beginning *[laughter]*. Basically, they would take the best of what was around them and so they were big game hunters but they also would take other stuff. In the Eemian, Neanderthals definitely hunted beavers when they could get them. The beavers' tails are full of really good fat and they're excellent nutritionally. Beavers, obviously, are these amazing environmental architects and they create their own environments and their own niches. In the south of Europe, where it was more arid during some of the arid periods of the Eemian, you get Asian species, like porcupine, coming in as well which is quite unexpected. There are some familiar species, like roe deer. People, today, will see roe deer. If you go out into the forests in Britain today, you can see them. Obviously, we have some boar now in Britain. They did used to be native. Neanderthals were also living surrounded by megafauna, true big beasts, except they weren't the woolly kind *[laughter]*. They were the warm, forest kind. You have different species like forest rhinoceros.

Artemis Irvine: Rhinoceros in Europe?

Rebecca Wragg Sykes: Oh yeah.

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Artemis Irvine: Wow!

Rebecca Wragg Sykes: We had woolly rhinos during the cold periods and Neanderthals hunted them as well but these are a different species. They're not the same as the ones in Africa and Asia today. This is an extinct species but they were associated with warmer climates and so we call them forest rhinoceros. There were water buffalo and a straight-tusked elephant species that was massive and bigger than mammoths even and also hippopotamus. There were even hippos up in Yorkshire *[laughter]*.

Artemis Irvine: A real eclectic mix.

Rebecca Wragg Sykes: Oh yeah. It's actually the native, interglacial fauna that we would have if there were no people around and it was, perhaps, a degree warmer or so. There have been some interesting discussions about rewilding and what's missing. People often focus on the big predators, like lynx or things like this, but these massive forest creatures are, in theory, also the native species *[laughter]*. We should have elephants in our forests but we don't.

Artemis Irvine: How do we know that all of these animals were living in Europe? Do we have their bones that remain?

Rebecca Wragg Sykes: Oh yeah, they are all over the place. The basic principle for archaeology is you look at the depth of things and the deeper it is, the older it is but we also now have, as I said before, a huge array of different dating methods and so we can directly date either the bones or beyond that period, where radiocarbon dating works, you can date the sediments around stuff or teeth themselves and things like this. We're quite sure that this is a real thing *[laughter]*.

Artemis Irvine: How many metres deep do you have to dig into the ground to get to the Eemian period?

Rebecca Wragg Sykes: It depends. In some places, it might be 12 metres, 40 metres or it might be much less. It depends on what's happened since. In fact, for a long time, people didn't really know if Neanderthals were that happy in a forest environment because there's not that many Eemian sites preserved. That's because after the Eemian, there was another really harsh glacial period; not the last one, before the time we live now but the one before and basically, that would remove through erosion a lot of these warm period sediments and deposits. The few places we find Eemian age deposits, sometimes they're in caves but not that much, are around lake basins where you have these natural, thick, thick build-ups. As long as they don't get scraped off by anything or eroded out, then you've got this lovely, deep archive. The same goes for warm periods before the Eemian. So the one prior to that, again, we have a similar range of animals and then the one before that... we have this deep archive showing how these pulses of animal life completely changed over tens, and tens, and tens of millennia.

Artemis Irvine: Where would you place Neanderthals in that chain of prey and predator? You said that they hunted rhinoceros but were they vulnerable to being attacked by lions and bears?

Rebecca Wragg Sykes: Yeah, they would have always been vulnerable if they let their guard down, for sure. We do have a few sites here and there across Europe, through time, where we can see Neanderthal bones, like the odd bit of leg or something that has been gnawed by

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animals. I think there's even a site in Poland where a child's tooth or a fingertip has been through the digestive system of a large raptor, a large bird of prey, like probably an eagle or a vulture.

Artemis Irvine: Oh my god. Terrifying.

Rebecca Wragg Sykes: Yeah, now and then, they were the prey [*laughter*] but most of the time, they were the top, top hunters in their environment. We know this because of the ordering of damage on the bones of the animals. The gnawing and the biting marks from hyena teeth are always underneath the cut marks from Neanderthal stone tools. Not always but 90% of the time, you can tell that it's Neanderthals who had those carcasses first. The scene that we're in right now 123,000 years ago, in this hornbeam forest, we're in Germany. This is a deer hunt that was going on and we know this because we have these fantastic preserved sites, like a German site called Neumark-Nord which is a lake basin. It makes sense that Neanderthals are going to be attracted to water, just like other animals are. They need that water, especially if it's a warm, hot world, but also it's the place where game is going to be reliably found. It's difficult to hunt animals, even big animals like elephants. You'd be surprised that they can really just disappear into forests. You know that all animals are going to be coming to find water and so at this site in Neumark-Nord, there's actually the remains of hundreds and hundreds of animals that have been excavated from around this huge lake basin. Amongst a lot of fallow deer, there are two big stags. They're almost complete skeletons but they were definitely hunted and they come with Neanderthal style bullet holes. It's the holes from the spears. We can actually see that.

Artemis Irvine: Wow! They have a different anatomy to us in many ways. They're not exactly the same. Are there particular aspects of how they were made up that made them better hunters than we would be?

Rebecca Wragg Sykes: It's funny. Not many people say, 'Were they better than us?' Usually, they say, 'Were they more rubbish than us?' [*Laughter*]. Their bodies don't seem to have been built for long-distance running. We can tell from the thickness of the bone. Although part of the thickness of their bone is genetic, it's probably also to do with massive amounts of activity but we can also see that, on the bones where the muscles were attaching, they were definitely hugely active, even from childhood. They were probably walking either long distances, or around a lot, or both but they don't seem to have been especially well-adapted to the kind of long-distance running that our bodies are more obviously built for. They were probably still quite fast just over short bursts [*laughter*]. They may have been very good at ambush hunting where you've got to wait and then suddenly explode and really go for it. As far as we can tell, they were definitely stronger than and so they may have had a much more devastating spear thrust than we might have done. With regard to their actual grip around the shaft of a spear, it seems like they were just as dextrous most of the time but they were very strong. That's an interesting combination for control of your weapons at the same time as having real brute force that would be necessary if you're trying to take down animals without using ranged weapons, like thrown spears. It's really quite something.

Peter Moore: Hello, I'm Peter. What we try and do in this podcast is not just to analyse the history of the year we're exploring but also to evoke it in a visual way. Someone who aims to do the exact same thing is Jordan Lloyd. Jordan is a superb visual historian and one of the world's leading photocolourists. You might know a little bit about colourisation already. The process involves finding old black and white imagery and transforming the image so the vivid reality of the actual moment is recovered. If you've looked on our website recently, you'll have seen some brilliant examples of Jordan's work; striking portraits of Abraham Lincoln and Mark Twain and the streets of Chinatown in San Francisco in 1896. All of these are transformed by revolutionary,

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new, digital processes. *Travels Through Time* is very proud to be partnering with Jordan. You can buy prints of his work at ColorGraph.co and if you enter the code 'TTT' at the checkout, you'll get 10% off everything. They make wonderful presents, so do check out ColorGraph.co.

Artemis Irvine: Those differences in technology, I guess, are really vital and maybe that's a good place to move on to your final scene that you'd like to talk to us about because that's focused very much on tools and materials that Neanderthals were using.

Rebecca Wragg Sykes: Yeah, we can be back in this Eemian world. We've gone back again [*laughter*] into this warm world full of oak trees. We're actually back at the Neumark lakeshore again but in another season and, very likely, not exactly the same century and probably not the same millennium even but across the lake basin. I wanted us to come to this scene because it's another way to open our minds up to how the forest world changed what Neanderthals did and offered them new opportunities. Obviously, it was challenging but also there were new opportunities there. They hunted differently, like we've just been talking about, but also the forest itself is a hugely rich resource in terms of the plants and the vegetation. We know from loads of sites, through different periods with Neanderthals, that they definitely were using plant foods but what they would eat would vary depending on when and, geographically, where they lived. In the Near East, you get things like olives and stuff like that. In Northern Europe during the Eemian, it's the kind of things that you would find in forests today; nuts, hazelnuts and berries, like sloes maybe. There are sites where we see charred remains of these things which may be indicating that those were actually eaten but it's not that easy to just collect plant food. If you've ever done any bushcraft in a British forest, it's quite tricky because a lot of the things that you think you might eat, like acorns, they need a lot of processing to take away the toxins and so it takes time and effort to actually eat and survive in a deciduous forest. It does seem that Neanderthals were using plants more in previous periods. On their teeth, we don't see patterns of polish and wear that really look like they were either processing plant materials with their mouths or eating a lot of plant stuff. For example, from the Eemian, it looks a bit more like they're actually doing that and, in some cases, it almost looks like prehistoric agricultural communities. They're doing something with their teeth that involves a lot of abrasive materials which are probably plants. We can't see exactly what that is from the teeth but we do get hints. It's probably going to be quite diverse because, as I say, in other settings, we know that they were eating grass seeds and probably charring them. There's also really cool evidence that they were eating water lily roots. If there was this lush vegetated environment during the Eemian, we can be sure that they were curious and they would have been exploring what was available. One thing that's really nice, from this site at Neumark-Nord, is a tiny little window into the level of interaction with plants that was going on. First of all, we know that they were making spears with wood. From these sites, in the Eemian, they were using yew wood. In other periods, they were selecting woods for their wooden artefacts that always make sense from where they are. They're choosing the best of what's there. The absolutely amazing object from Neumark looks like nothing and doesn't look very interesting when you first see it but what it is is really jaw-dropping. It's a flint flake with this tiny, little, brown scrap stuck on it and it's organic. When it was analysed, it was found to be full of oak tannins and incredibly concentrated. This is not some kind of natural blob of stuff that's stuck on it. What it seems to be is that this is a remnant of probably some kind of binding that was around this flake. It may have been part of a composite tool made of more than one part and then bound together, which we know they were doing from other places. It's been preserved because of being soaked in oak tannins. That's exactly the reason that we find bog bodies, these Celtic and Iron Age bog bodies that we find across Europe. Those have this incredible preservation because of the tannins from the peats. These are natural plant extracts that come out into the water and something similar has preserved this little scrap on the tool. To get oak tannins, you have to macerate and really

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process bark and so what we're probably looking at is that this is Neanderthals doing some kind of tanning using oak bark and probably for working animal hides.

Armetis Irvine: Oh wow! Okay.

Rebecca Wragg Sykes: We have abundant evidence from many different settings that they definitely were processing animal skins; fresh animal skins and, in some cases, dried ones. That suggests that they were making leather. To actually use tannins and go this extra stage of tanning the leather to preserve it, give it colour and to help keep it waterproof, this is all shown by this one tiny little thing on a flake. If nobody had bothered to analyse that, we wouldn't know it. By itself, it just seems anomalous but just this year, at a French site, there was found a tiny little twist of fibres that were preserved underneath a natural, mineral film on a stone flake from this rock shelter. We know that this mineral preservation process is all over lots of different artefacts. This particular one has got this little twist of fibres and when they were looked at, at super-magnification, it really looks like it is a three-ply thread.

Artemis Irvine: Wow!

Rebecca Wragg Sykes: That's where you have three little threads that are all twisted in one direction and then you twist the three of them together in the other direction so it's an 'S' twist versus a 'Z' twist, which is exactly what you have in how we make modern clothing. If you have a linen scarf, you're going to have this kind of production. When they analysed that chemically, it comes out as matching conifer bark or maybe conifer root. Although it's really small - it's not even a cord but more like a thread - it really does suggest that Neanderthals were doing quite complex things with plants. This French site is not as old as the Eemian. It's later but it's another tiny window into what we know is missing. Among hunter-gatherers, most of their stuff is perishable. It's made from plants or bits of animal and that's the stuff that just very rarely survives in the record. Although, when we get these little one-offs, like this twist of bark or this little blob of tanned stuff at Neumark in the Eemian, they are one-offs but they still are revealing something to us about the complexity of Neanderthals' understanding of the materials all around them and what those forests could actually offer them. That's my little final scene.

Artemis Irvine: Even though it's such a tiny amount that's survived, we can assume that even if that has survived over such a long period of time, that when it was originally made, it would be part of some quite long thread.

Rebecca Wragg Sykes: Yeah, who knows what that was for. It's so small. It's not like rope. It's not like strong even. It is very small. Not everybody is totally happy with that because it seems so outlandish but, for me, because we have this other thing from Neumark, even though it's much older, it still is really pointing at complex understanding of how you process plant materials, basically. We can see it in how they make their wood artefacts, like the spears. They're not just pointed sticks. They know how to use the stump end for the tip of the spear because that's the hardest part of the wood. More than that, where they're carving the spear, they take it offset through the grain of the wood because that makes it more robust. If we can see that level of craftsmanship in woodworking, why would we not expect something similar with other kinds of plant materials? We just don't see it. If they were tanning hides to do that, that takes quite a long time. It can take weeks. So that might be telling us something about how their wider lives were organised in the Eemian. Maybe they were not moving around as much in a forest world as they would have been in an open world. If people were moving around less, perhaps the groups were a little bit smaller. I don't know but it all ties together that the hunting is different, the animals are different and the kinds of plants are different. Maybe the seasonality is different as well.

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Everything comes together to show you a completely unexpected, totally different world that the Neanderthals were actually still completely at home in and we don't expect that.

Artemis Irvine: That's a much more complex picture than the stereotypical caveman that people might think of.

Rebecca Wragg Sykes: Definitely. With composite tool technology where you have a piece of stone and you make an adhesive, maybe just as a handle or to stick another wooden handle onto it, that's also very skilled. We can see that there were different ways that they did that. Some Neanderthals used bitumen, natural asphalt that you can just find sometimes in geological deposits but not everywhere. That's in the Near East. There's a Romanian site too but there's also a hint that that might have been going on from a Spanish site where can see, in the tartar on a Neanderthal's tooth, there's a hint of bitumen in there and so that might have been going on in Spain. Other adhesives we know they were making was birch tar, which you have to cook that out of the bark and pay attention to the fire. You can't just stick it in a fire because it will burn. You have to make sure that it's got a low oxygen atmosphere, so it's damped down and you have to watch it for a long time. That's quite complex. In Italy, there was a recent find suggesting that they were using plant resins mixed with beeswax.

Artemis Irvine: Wow!

Rebecca Wragg Sykes: Those are all quite complex production systems and the question is did all Neanderthals know how to do those things? Maybe they did all know. Maybe they did all observe and learn through an informal process but perhaps some of them were just better at it and so they did it more. That's a possibility. I don't see why we wouldn't be looking at some level of individual craftsmanship and individuals being better at something and doing it a bit more often.

Artemis Irvine: It sounds absolutely fascinating. I love the idea of being able to take such a tiny, tiny remain, like a grain of sand, from the massive, human historical evidence and being able to find out so much about a people just from something so tiny. I think it's quite exciting.

Rebecca Wragg Sykes: Yeah, definitely.

Artemis Irvine: I'm going to ask you now a final question before we have to come back to the present from the Eemian period. I'm kind of jealous because it sounds quite warm and lush [*laughter*] and it's gone a bit cold in London at the moment. If you could bring back one Neanderthal memento with you into the present, what would you like to bring?

Rebecca Wragg Sykes: If I'm restricting myself to the Eemian only, this 10,000 year period roughly beginning around 126,000 years ago, then I think I would probably try and bring back one of the spears that killed those deer at Neumark-Nord. We don't have hardly any spears from the Neanderthal world. The ones we have are all amazing and they each have given us massive insights into their technology and that spins out into insights about the society. So I would like one of those spears. I would like to know what it was made of, how it was made, whether it was repaired and what other animals it killed. I'd just like to know anything. I want one of those spears [*laughter*].

Artemis Irvine: So you wouldn't use it yourself and it would be for research purposes only?

Rebecca Wragg Sykes: I might caress it a bit and then do some research on it [*laughter*].

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Artemis Irvine: Nice. I love that. Well, thank you so much for joining us on the podcast, Rebecca. It's so exciting to try something new and to go so far back into the past. It's really different and I've really enjoyed speaking to you.

Rebecca Wragg Sykes: Thank you so much and I really hope the listeners enjoy it. I hope they like having their minds blown chronologically *[laughter]*

Artemis Irvine: I'm sure they will.

That was me, Artemis Irvine, talking to Dr Rebecca Wragg Sykes about the Neanderthals who lived 126,000 years ago. I hope our conversation persuaded you that you should go and read her brilliant book, *Kindred*. It's published by Bloomsbury and is available to buy now but if you are of the podcast persuasion, as I suspect many of you are, you can also listen to *Kindred* as an audiobook on Audible and it's being read by Rebecca herself. Check out our website for more information and resources about this episode and many others at tttpodcast.com. Until next week, thanks so much for listening. Goodbye.

[Sound of ticking clock]

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