FRED HILGEMANN FILMS

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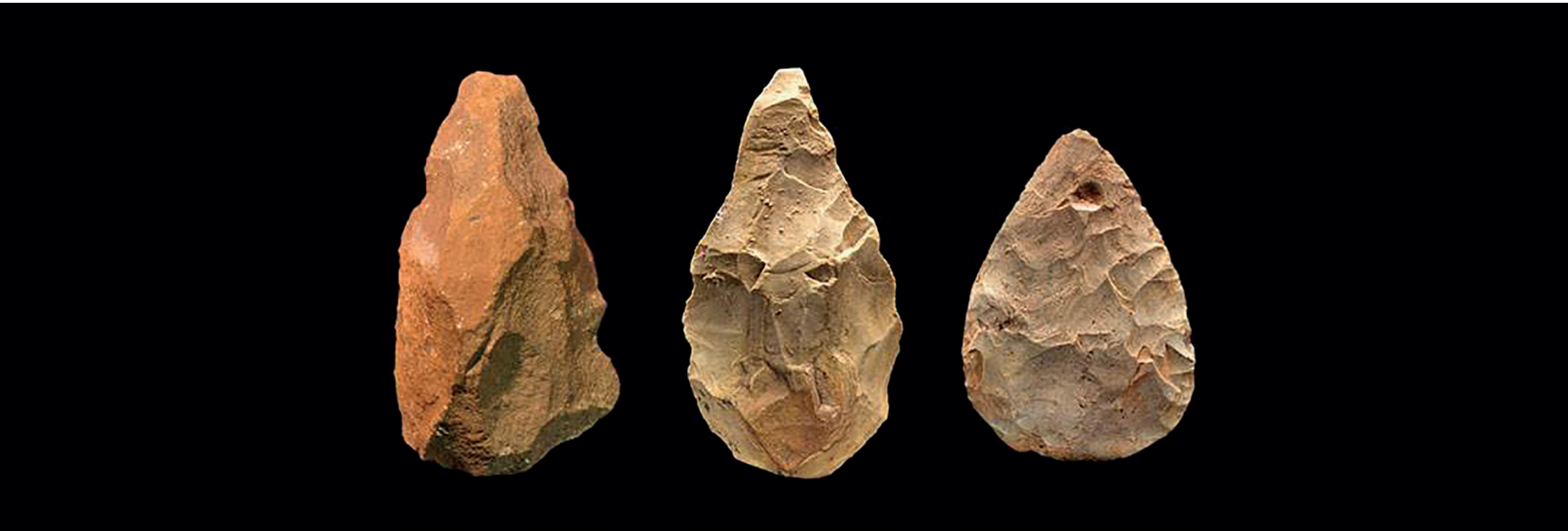
THE LAST NEANDERTHAL ?

A 52' DOCUMENTARY BY ROB HOPE



The extinction of the Neanderthals is one of our most intriguing mysteries. Why did they disappear, what was the relationship between 'them' and 'us', and how did we take over the earth?With special access to an extremely rare archaeological find - a skeleton of a very late Neanderthal - this film has the chance to explore these questions in depth. Found in 2015 in a Cave' in South East France, the bones are around 40,000 years old - which means that this male lived at the exact moment when the Neanderthals were fast dying out.

Now, an international team of scientists is using the latest technologies to better understand this man and his world, shedding new light on the prehistoric encounter between Neanderthals and Homo sapiens. Starting with the extraordinary find in the Cave by French archaeologist Ludovic Slimak, we will follow the string of scientific investigations taking place from DNA sequencing to carbon dating. Pioneering protein analysis will trace and position the tiniest pieces of the bones, a 3D scan and reconstruction will recreate what he and his cave looked like as we unravel the layers of activity in the cave as nomadic Neanderthals came and went and pioneering Homo sapiens eventually took over Neanderthal's world.

The film will be an investigative scoop and a scientific adventure, but also a potential murder mystery. How did this late Neanderthal die ? Previous archaeological finds at the same site suggested that Sapiens and Neanderthals lived peacefully side by side, but this new discovery explores new questions about how the Neanderthals disappeared and how Modern Humans took over.

THE STORY

The Cave in SE France is an archaeological treasure trove, positioned in the middle of France's Rhone River Valley and overlooking its vast plains. The Cave was only discovered 29 years ago, evading earlier archaeologists in this region, so its soil shelters undisturbed layers full of tools, artefacts, and bones, dating from 110,000 to 5,000 years ago. The whole area itself is a rich depository of Palaeolithic remains, revealing a Prehistoric narrative of nomadic Neanderthals who used the caves for 80,000 years, and waves of their incoming near relatives: Homo sapiens.

During the seasonal dig of summer 2015, the archaeological team led by Ludovic Slimak found something extraordinary - a set of teeth and jaw bones that looked human. The bones from both hands were then discovered, alongside sections of the skull. A story started to emerge of a male, thrown into the pit at the cave's mouth, and possibly crushed to death. But who was he? At first sight he seemed to be of Neanderthal origin. An analysis of the soil in which he was found indicated that he lived around 40,000 years ago, when his species was dying out across the globe, and he is among the last Neanderthals to be found in Eurasia. Carbon dates of the bones are backing this up.

Now, in 2018, a European collaboration between scientists and archaeologists will bring this Neanderthal back to life to help illuminate one of the greatest mysteries of human evolution– what was the relationship between Neanderthals and Sapiens?
Was it a subsistance competition between them and us, or a gradual cultural, technological and genetic take over?

THE SCIENCE

Ludovic Slimak will publish his results very soon in an international scientific journal. For now his research is embargoed and ARTE has the exclusivity.
The questions that the film will aim to resolve are: Who (and what) was this man? How old was he when he died, when and how did he die? How did the Sapiens and Neanderthals live side by side, and what happened in that seminal moment of prehistoric encounter?

The Whole Story

The body was found complete, but broken up in a multitude of pieces, some smaller than a fingernail. The archaeologists aim to retrieve all of his body from the ground, and samples of his bones will travel to a series of research labs across Europe. At the end of this string of investigations scientists will piece together the puzzle that is this man.

What sort of 'human' was he? What could be its origins? DNA and protein analysis.

Researchers will carry out DNA sequencing to understand if the man was a pure Neanderthal or whether by that point in time he already had a significant proportion of Sapiens. The University of Manchester are using their innovative protein analysis technology in order to trace each tiny bit of the bones and place it in its proper position.

Manchester University have developed a method to investigate ancient protein that is now heavily used in bimolecular archaeology. Protein analysis is also a more stable inquiry than DNA because of the lack of contamination.

When did this happen? Radiocarbon Dating.

The Radiocarbon Accelerator Unit at the University of Oxford, led by world expert Tom Higham, will carbon date the bones in order to give Thorin's life a very precise time-frame.

What did eat and where did he come from? Teeth and Isotopes.

Isotopic analysis on teeth will reveal what the man ate, and how far he would have travelled. We may even be able to trace the perimeter of his existence. Analysis of the tartar in his teeth will give an even clearer view of his diet and habitat.

What was happening between Neanderthals and Homo sapiens here? Timeline, tools and interaction.

Two areas of research are enabling the team to create a clear timeline of what happened in the Cave over thousands of years. The fires of nomadic group created layers of soot and calcite in the cave roof – using a ground-breaking new technique, known as 'Fulginochronology', these layers can be read like tree rings, showing seasonal groups coming to the cave.

These groups also left behind broken tools that can clearly be told apart – Neanderthals used flint shaping techniques that were very different to those of Homo sapiens. Combining these with the sooty timeline tells a story of Neanderthals using the cave consistently for 80,000 years, then staying away as the first humans (Neronian Homo sapiens) took over the cave.

In time Neanderthals returned, only to abruptly disappear, 40,000 years ago – replaced forever by Homo sapiens. The Cave is a time capsule, telling the unfolding story of this pivotal era. There is also one remarkable tool, found with the body and possibly part of a burial rite – an flint knife clearly made by Homo sapiens, but then reshaped using Neanderthal techniques.

Is this a cherished object they stole or were given by the new arrivals, reshaped to make it suit the Neanderthals?

Another intriguing clue that proves cohabitation in the area is the provenance of the stone that both types of tools were made of. The Neanderthals at this time made tools out of flint found in a steep ravine on the banks of the Ardeche River. It is likely that the exact location of this place was passed from generation to generation. The tools made by the Sapiens newcomers was made from flint from the same place.

A Three Dimensional Story

Finally, 3D imaging will reveal the man himself, including the position of his body after death, and what he would have looked like. We will produce a 3D laser scan of the cave that will enable us to build up the story of its prehistoric habitation, including millennia of nomadic Neanderthals, the arrival of the first Sapiens, the reappearance of Neanderthals and their final disappearance coinciding with the universal domination by Homo sapiens. The cave scan will create a graphic tool that enables us to piece together the evidence and place the life and the death of this man within it. This is a unique opportunity to forensically investigate one of the most important and mysterious moments in human history – when Thorin's world came to an end, when we stopped cohabiting with our older ancestors and the age of Homo sapiens began.

NOTES: THE SCIENCE OF THE LIFE AND TIMES OF NEANDERTHAL

Head group archaeologist, Ludovic Slimak is over-seeing all science work.
Nothing has been published at the moment, so the documentary can coincide with the scientific publication of the findings later in 2018 or in the beginning of 2019

Archaeologies.

The archaeological excavation of the skeleton in the Cave is to resume and accelerate in July and August.
So far, the upper part of the corpse has been revealed : the skull fragments, teeth and jaw. Also, an entire hand, and the lower part of the arm have been excavated.
During this archaeological summer season, other parts of the skeleton will come to light.

'Proteomic' machine identi ication of the numerous, many thousands of tiny, mixed and fragmented bone fragments around and upon the skeleton. The skeletal remains are placed within a chaotic array of small bison, horse, bear, rhino and wild goat fossil bones. The man seems to have been thrown, discarded into a pile of animal bones in the cave: why ?). Mike Buckley at Manchester University has devised a system of sorting the various small fossil fragments into specific species groups: filming with him for this bone-sorting in his lab.

Microscopic analysis of the fossil bone isotopes of the skeleton enabling insight into the different regional environments this Neanderthal lived in during his lifetime. For example, the coastal areas of the Med sea to the south, the Alpine regions to the east? And where did he 'grow up'?The analysis of these details could show the nomadic seasonal cycle of this Neanderthal group.
Science for this study is commencing soon with the Hervé Bocherons team at Tübingen University, Germany.
Thorin's bones will be compared with fossil bone isotopes from non-migratory mammal remains (for instance, wild goat) found in the cave, depicting the local environment and climate of the area during the lifetime of the man.

A scanning of the fragmentary bones is also to be done, potentially revealing 'exostosis': a genetic pathology.

Microscopic investigation of the teeth (17 remain fully intact), to determine the precise diet from the accumulated tartar (dental calculus). The various fibres and atoms of everything that he ate are still preserved, microscopically, on his fossil teeth! What animal species did he (hunt) eat? What plants did he consume? Did he eat any medicinal plants? He had a chronic abscess.

DNA interpretations are carried out by the Eske Willerslec team at the Geogenetic Lab in Copenhagen and by Ludovic Orlando

Mitochondrial DNA has been found in the fossil. But so too has **the much rarer Y chromosome! This is in itself a remarkable discovery.** Through these combined sequences it should be possible to demonstrate the precise Neanderthal lineage of this specimen. Emerging results appear to show a Siberian genetic 'echo'... the ramifications of this are multi-fold, and infer a Neanderthal group displacement – groups of Neanderthals moving into Western Europe from Siberia. Was this caused by in-coming pioneering modern Human groups pushing the Neanderthals further-afield, into distant landscapes?

‘Fulginochronology’ studies.

This new and extraordinary cutting edge science technique interprets the chronology of the prehistoric soot build-up (from ancient fires) within the cave. The fossil soot build-up shows looks like microscopic barcode printed on the walls of the cave. Each single bar line represents one specific moment of burning, around a hearth in the cave. These timelines can be read to create a chronology of events within the cave as different groups of Neanderthals and Homo sapiens came and went.

Ségolène Vandevelde in Paris, is in the process of actually demonstrating just when the group of Neanderthals were in the cave : at what season, and for what duration of time, due to the analysis of fossil soot build-up from the Neanderthal fires. Ségolène has discovered a regular, seasonal visit to the cave by the Neanderthal group, and also the differing seasonal occupation by the pioneering Humans who followed very soon after – so close together were the two groups that it appears probable that both groups actually encountered each other within the vicinity of the cave area. Filming with Ségolène in her Paris lab.

Dating the context.

This work is being carried out by the innovating Radiocarbon Unit at Oxford, led by Tom Higham. The team are able to date just one single amino-acid from the fossil floor (**a world first!**). Emerging multi-cross dating has shown the Neanderthal specimen to centre around 40,000 years ago (further dating will bring yet further precision)…this is one of the very last Neanderthals of southern Europe. Further dating has demonstrated that these lingering Neanderthals were living at a time when pioneering Modern Peoples were already in the cave vicinity : is this in some way connected to the death of the man ?

3D Scanning of the recovered skeleton is programmed as well as 3D Printing and reconstitution of various aspects of the Neanderthal specimen, such as the skull remains, jaw, hand etc.

Lithic studies

Laure Metz at the University of Aix-Marseille is in the process of studying the technological differences of the Neanderthal flint tools with the Modern Human flint tools.
Laure can show the tasks that specific flints were actually used for, such as cutting meat or wood, but moreover, can argue whether the traditional flint work of the Neanderthal group had become in anyway technologically influenced by the more sophisticated manufacture of flint tools by the Modern People.

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