

15 June 2012 Last updated at 00:32 GMT

Red dot becomes 'oldest cave art'

By Jonathan Amos Science correspondent, BBC News



The El Castillo Cave in Spain. The refined dating shows these paintings to be far older than anyone thought

Red dots, hand stencils and animal figures represent the oldest examples yet found of cave art in Europe.

The symbols on the walls at 11 Spanish locations, including the World Heritage sites of Altamira, El Castillo and Tito Bustillo have long been recognised for their antiquity.

But researchers have now used refined dating techniques to get a more accurate determination of their ages.

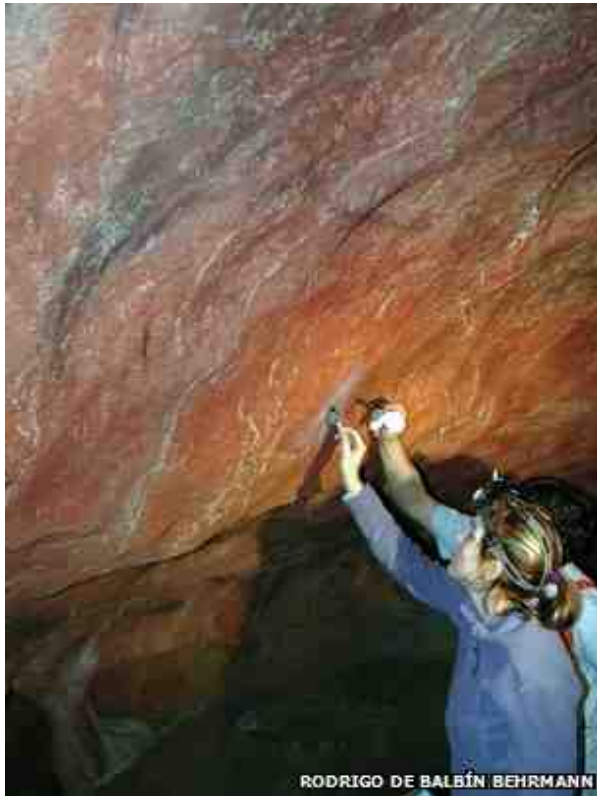
One motif - a faint red dot - is said to be more than 40,000 years old.

"In Cantabria, [in] El Castillo, we find hand stencils that are formed by blowing paint against the hands pressed against the wall of a cave," explained Dr Alistair Pike from Bristol University, UK, and the lead author on a scholarly paper [published in the journal Science](#).

"We find one of these to date older than 37,300 years on 'The Panel of Hands', and very nearby there is a red disc made by a very similar technique that dates to older than 40,800 years.

"This now currently is Europe's oldest dated art by at least 4,000 years," he told reporters. It is arguably also the oldest reliably dated cave art anywhere in the world.

The team arrived at the ages by examining the calcium carbonate (calcite) crusts that had formed on top of the paintings.



Bristol researchers removing samples for dating from Tito Bustillo Cave

This material builds up in the exact same way that stalagmites and stalactites form in a cave.

In the process, the calcite incorporates small numbers of naturally occurring radioactive uranium atoms. These atoms decay into thorium at a very precise rate through the ages, and the ratio of the two different elements in any sample can therefore be used as a kind of clock to time the moment when the calcite crust first formed.

Uranium-thorium dating has been around for decades, but the technique has now been so refined that only a tiny sample is required to get a good result.

This enabled the team to take very thin films of deposits from just above the paint pigments; and because the films were on top, the dates they gave were minimum ages - that is, the paintings had to be at least as old as the calcite deposits, and very probably quite a bit older.

The oldest dates coincide with the first known immigration into Europe of modern humans (*Homo sapiens*). Before about 41,000 years ago, it is their evolutionary cousins, the Neanderthals (*Homo neanderthalensis*), who dominate the continent.

Dr Pike's and colleagues' work therefore raises some intriguing questions about who might have authored the markings.

If anatomically modern humans were responsible then it means they engaged in the activity almost immediately on their arrival in Europe.

If Neanderthals were the artisans, it adds another layer to our understanding of their capabilities

and sophistication.



The Panel of Hands: Produced by blowing paint over a hand pressed against the wall

The great antiquity of the paintings leads co-author Joao Zilhao, a research professor at ICREA, University of Barcelona, to think the Neanderthals produced the motifs. Finding even older paintings than the red dot at El Castillo might confirm that "gut feeling", he said.

"There is a strong chance that these results imply Neanderthal authorship," Prof Zilhao explained.

"But I will not say we have proven it because we haven't, and it cannot be proven at this time.

"What we have to do now is go back, sample more and find out whether we can indeed get dates older than 42, 43, 44,000.

"There is already a sampling programme going on. We have samples from more sites in Spain, from sites in Portugal and from other caves in Western Europe and so eventually we will be able to sort it out."

Tracing the origins of abstract thought and behaviours, and the rate at which they developed, are critical to understanding the human story.

The use of symbolism - the ability to let one thing represent another in the mind - is one of those traits that set our animal species apart from all others.

It is what underpins artistic endeavour and also the use of language.



The El Castillo Cave has numerous red discs on its walls. One was dated to 40,800 years ago