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Press release

The Art of Neanderthals

A study published today in *Science Advances* changes the way in which we see human prehistory and casts a new perspective on our ‘primitive’ ancestors: Neanderthals were capable of symbolic behaviour 115,000 years ago, well before meeting with *Homo Sapiens*. Diego Angelucci, geoarchaeologist from the University of Trento, who for ten years has been studying marine shells decorated by Neanderthals found in Spanish caves, expressed his satisfaction that “thanks to the radiometric dating technique, prehistory took a giant step forward today”

Trento, 22 February 2018 – (a.s.) Artistic objects and artefacts from our past tell us a lot more than we imagine. We are moved by these findings, of course, but they also provide us with information on the people who designed and created them. They tell us of the ability of these people to express themselves and to show symbolic behaviour: this is a defining trait of the human species which, according to scientists, only *Homo Sapiens* possessed, the ancestor of modern humans who prevailed on the ‘less evolved’ Neanderthals. Now, a study published today in *Science Advances* ([http://advances.sciencemag.org/](http://advances.sciencemag.org/)) breaks new ground in history by suggesting that Neanderthals were not as primitive and intellectually inferior as we believed: their cognitive abilities were similar to those of anatomically modern humans well before Homo Sapiens spread in the European continent.

The new study indeed proves that groups of Neanderthals in the Iberian peninsula were able to create objects of symbolic significance 115,000 years ago. The article presents the results of archaeological research carried out in Spain by an international collaboration which also includes professor Diego Ercole Angelucci of the Department of Humanities of the University of Trento, who has been digging in Spanish caves for ten years as geoarchaeologist. The discovery was made thanks to radiometric dating, in particular the uranium-thorium dating technique used by Dirk Hoffmann (*Max Planck Institute for Evolutionary Anthropology*, Leipzig, Germany), who confirmed that Iberic Neanderthals could create objects of symbolic meaning.

Scientists have long believed that only Homo Sapiens were capable of symbolic thought, based on the fact that they established that personal ornaments from perforated shells and colouring substances were used in Africa 70,000 years ago, and art and cave art was created in Europe some 40,000 years ago. The new study instead proves that also Iberian Neanderthals could do this, and long before.
In 2010, an article authored by the same international team of which Diego Angelucci was part presented particularly valuable findings, which were not important because of their function, but rather for their symbolic significance for those who had created and used them. There were various artistic objects in which pigments were used but which had not been precisely dated. Through the technique of uranium-thorium dating, for the first time researchers were able to date these objects more accurately.

“The appearance of symbolic thought is considered one of the fundamental stages of human evolution”, explained Angelucci. “We can see it in the archaeological traces thanks to the discovery of objects that belong to the so-called ‘material culture’, which is transmitted from generation to generation, like the objects found in the Spanish excavations or in the burials. Until a few years ago researchers believed that only Homo Sapiens, who lived between 70,000 years ago in Africa and 40,000 years ago in Europe, could express symbolic behaviour. A new chapter of prehistory was written today: now we know that Neanderthals had cognitive abilities with which they could create objects of symbolic meaning, and that this occurred over 100,000 years ago. This means that ‘advanced’ cognitive abilities were not only the prerogative of Homo sapiens, but that they date back to an older time and are also shared with Neanderthals, and that in order to establish when they appeared research must go back in time and focus on the early Neanderthals, or maybe even on the common ancestor from which both Neanderthals and anatomically modern humans come from”.

This study is also connected to the conviction, which is shared by researchers from different discipline areas, that Neanderthals did not go extinct: “Archaeology and anthropology confirm today what genetics has recently demonstrated: that in our DNA and in our way of thinking remain traces of the merging of both species, Homo sapiens and Neanderthal. Now we can also be proud of our smart Neanderthal heritage”.

The article in *Science Advances*

The article published in *Science Advances* starts from research conducted in the region of Murcia (Spain) by a group led by João Zilhão (University of Barcellona, Catalunia, Spain), Valentín Villaverde (University of Valencia, Spain), Josefina Zapata (University of Murcia, Spain) and Diego E. Angelucci (University of Trento, Italy), with significant help for the dating part from Dirk L. Hoffmann (Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany).

Previous radiocarbon dating – The research project, which started in 2006, included new Palaeolithic sites (Finca Doña Martina and Abrigo de la Boja) and further studies in already known sites (Cueva Antón and Cueva de los Aviones). The first results were published in national and international journals. In particular, in a 2010 paper, the researchers provided archaeological evidence of the symbolic behaviour of Neanderthals who settled in the caves of Cueva Antón and Cueva de los Aviones. These archaeological finds were, for the most part, perforated marine shells, red or yellow pigments, and shells containing residues of new colorants from...
the same pigments. The stratigraphic context of the excavations in Cueva de los Aviones (a cave near Cartagena, Murcia) corresponded to the Middle Palaeolithic: the Neanderthal era. However, dating technology of 2010 only managed to provide the general minimum age of the findings, that is at least 45,000 years old. Uncertainties are due to the fact that with Radiocarbon dating it is possible to date samples up to 40-50,000 years old, therefore for more ancient times it can only provide a “minimum” value (i.e. determine that something is “older than”).

**The discoveries made with the new uranium-thorium dating technique.** In this new study, uranium-thorium dating has been used, thanks to which researchers were able to establish that the stalagmitic crust (which covers the layers that formed over the surface of from Middle Paleolithic) in Cueva de los Aviones is 115,000 years old. Given that these layers rest on a beach deposit from the last interglacial era that dates back to some 120,000 years ago, we can say that the Middle Palaeolithic layers in Cueva de los Aviones and the objects found therein are between 115,000 and 120,000 years old.

This technique is based on the radioactive decay of the uranium isotope and, in more detail, on the uranium-thorium (U-Th) decay: since uranium is present in calcium carbonate as a calcium substitute, with this technique we can date crust portions in caves, which are made up of calcium carbonate, usually in the form of crystal calcite.

In this research project, Angelucci studied the layering in the cave and processed the data to understand the sequence with which the layers accumulated and to verify that they were not confused or twisted after they deposited. Hoffman performed the dating in Leipzig.

The same dating technique has been used also in another parallel study (published today in Science, on the cover), coordinated by Hoffmann and Zilhão, on the calcite crusts that cover the Palaeolithic paintings in three Spanish caves: La Pasiega in Cantabria, Maltravieso in Extremadura, and Ardales in Andalusia. The dating showed that the paintings are older than previously believed: they are 64,000 years old, that is 20,000 years before Homo Sapiens arrived in Europe. According to these findings, the authors of the paintings on the walls of these caves are Neanderthals, not the anatomically modern humans Homo Sapiens.