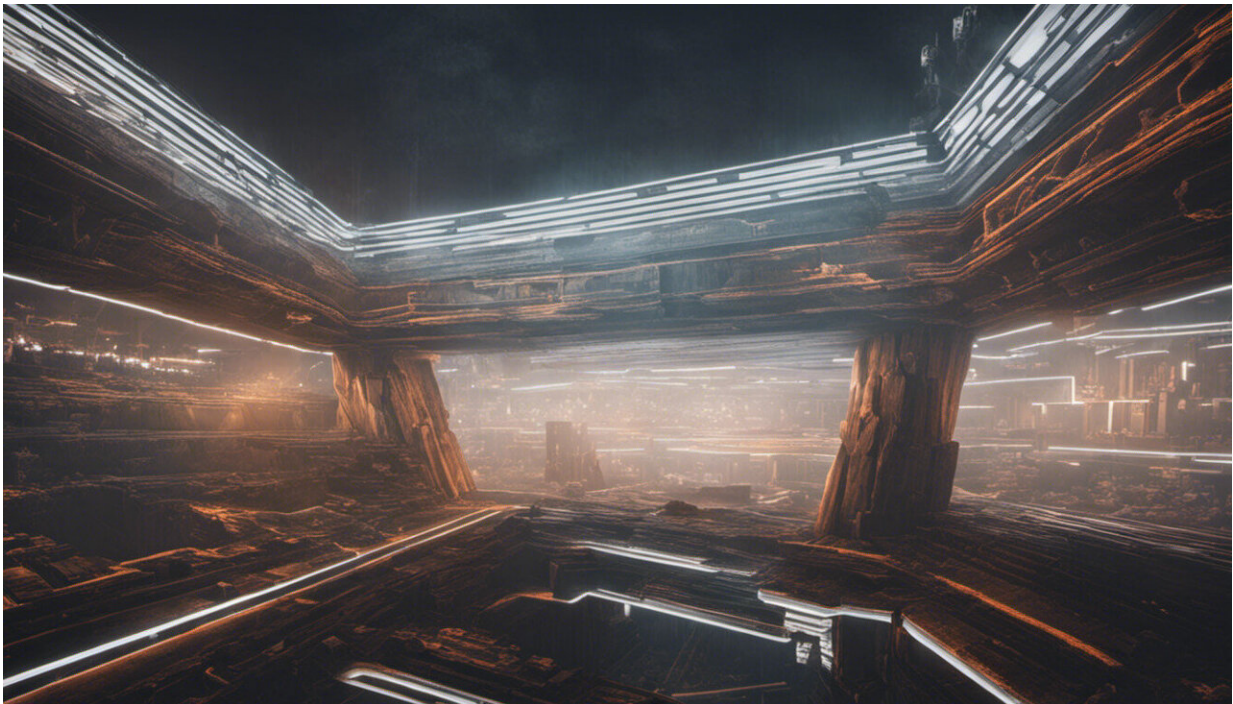


Humans were using fire in Europe 50,000 years earlier than previously thought

May 20 2023, by Clayton Magill



Credit: AI-generated image ([disclaimer](#))

Human history is intimately entwined with the use and control of fire. However, working out when our relationship with fire began and how it subsequently evolved has been notoriously difficult.

This is partly due to the incomplete nature of archaeological records, and

also because fire use was fleeting, making burnt remains difficult to detect.

But our team has found evidence of the controlled use of fire by direct human ancestors—or hominins—at a site in Spain dating to 250,000 years ago. This pushes the earliest evidence of fire control in Europe back by 50,000 years. The findings have been published in [Nature Scientific Reports](#). It is truly special to find the remains of human ancestors and fire at the same location.

There is much earlier evidence of hominins exploiting fire, but this could have taken the form of hominins taking advantage of the burning embers from a natural wildfire to cook their food. The controlled use of fire is where humans intentionally start it and then manage, say, its extent or temperature. This is what we have evidence for at the site in Spain.

Much older evidence from outside Europe, which could be from humans making use of natural blazes, comes from [Swartkrans cave in South Africa](#), where hominin remains were found with hundreds of burnt animal bones dating to between 1 and 1.5 million years ago. Burnt animal bone fragments were also identified at the 1.5 million-year-old site known as [FxJj 20AB at Koobi Fora, Kenya](#).

Yet finding hominin artefacts and burnt bones at the same site does not in itself indicate that they coincided in time, let alone that humans were controlling fire. The path to its controlled use, is likely to have been gradual.

Intentional use?

Fast forward almost a million years to the earliest-known clear evidence of fire made by humans: an open-air site called Gesher Benot Ya'aqov in

Israel, [dated to about 790,000 years ago](#). The evidence found at this location includes charred plants and burnt stone tools lying alongside one another.

Other sites in Israel, such as Quesem Cave, with finds dating to between [420,000 and 200,000 years ago](#) and Tabun Cave, where the [archaeological discoveries are around 340,000 years old](#), feature similar fire evidence.

While early evidence such as this is suggestive of fire control, a direct link between resources such as [wood fuel](#), activities, such as the preparation of fire, and intention -- arguably a prerequisite for controlled fire -- can be difficult to establish. In Europe, it is generally accepted that fire was routinely exploited by hominins at least 350,000 years ago, with some suggestion of fire control being linked to the [expansion of a particular stone tool technology](#) known as [the Acheulean](#).

Indeed, there is a concurrent rise in apparent prehistoric "fireplaces", or hearths, and burnt Acheulean artefacts, such as hand-axes made from flint and a sedimentary rock called chert, at lots of European sites dated between 450,000 and 250,000. Many of these also contain charred plant materials and bones.



Credit: AI-generated image ([disclaimer](#))

Yet there is some reason to believe that these associations are of natural origin—for example, from wildfires or lightning strikes. Before the new evidence, the oldest clear evidence of fire control in Europe came from Menez-Dregan in France and Bolomor Cave in Spain, which are both dated to about 200,000 years ago. Another early site with clear evidence of domestic fire use is Abrigo de la Quebrada in Spain, dated to around 100,000 years ago.

New benchmark

The new evidence from the Valdocarros II site in Spain, dated to about 250,000 years ago, serves as a new benchmark for understanding our ancient relationship with fire.

Lipid biomarkers are the remains of molecules that have come from specific sources, such as particular types of wood, and have been left by processes such as fire. Recently published data on [lipid biomarkers](#) from various archaeological sites reveals details of the unique resources—for example, the types of wood—used to create isolated campfires associated with Acheulean artefacts.

Lipid biomarker evidence from Valdocarros shows diagnostic signatures indicating that decaying pine was used as fuel. Intriguingly, records of pollen and of the relationship between water and climate from the surrounding region suggest that decaying pine would have been an uncommon resource.

Corroborative evidence comes in the form of molecules called polyaromatic hydrocarbons, or PAHs, which are products of incomplete combustion. Analysis of these reveals that decaying pine at Valdocarros II was burned at low temperatures of around 350°C for relatively short periods.

Fires that are too hot tend to char and burn foods on the outside before the inside of the item has reached a useful temperature. Lower temperatures are needed to break down biological tissue, so that it's easier to digest—[one of the key reasons for cooking food](#). Conversely, it's unlikely that low-temperature fires would have been used purely for warmth, given much more commonplace wood burns at hotter temperatures. Another perk of using decaying pine is that it's easy to ignite.

Choice of fuel

Thus the fires at Valdocarros II look to have been used for activities such as cooking. The intriguing record of fire use at this Spanish site begins to emerge upon combining all of the available evidence. For

instance, there is a rich fossil record of mammals at Valdocarros II that includes abundant butchered [red deer \(*Cervus elaphus*\)](#) and the wild ancestors of domestic cattle, known as [aurochs \(*Bos primigenius*\)](#). The aurochs could each have weighed up to 1,500kg or more.

Therefore, hominins at this site show all the necessary prerequisites for controlling fire: the use of specific resources such as decaying pine wood; specific activities, such as the low-temperature fires used for cooking; and intention, which can be implied by the need to transport large carcasses to a single location where fire was being used.

By any standard, hominins at Valdocarros II were controlling fire. The site is not the oldest, nor the first instance of controlled [fire](#). Rather, it is a significant benchmark in the course of human evolution because it sets a clear time limit on the emergence of a defining human characteristic.

The work at Valdocarros II also creates the opportunity for a wider discussion about how to establish intention and foresight from archaeological evidence, as well as from the wider breadth of human evolution and prehistory.

More information: Lavinia M. Stancampiano et al, Organic geochemical evidence of human-controlled fires at Acheulean site of Valdocarros II (Spain, 245 kya), *Scientific Reports* (2023). [DOI: 10.1038/s41598-023-32673-7](#)

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