Researchers claim evidence that humans were in the Americas 130,000 years ago

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A new archaeological claim being put forth by a group of researchers in southern California is stirring up tremendous amounts of controversy within the discipline. Last week, *Nature* published their article which purports to show evidence that humans were in the New World 130,000 years before the present (BP). This claim is receiving wide attention because the earliest evidence archaeologists have agreed upon for the peopling of the western hemisphere to date is approximately 15,000 BP, and even that is still debated.

It is important to note that finding a new date for the peopling of the Americas is the holy grail of New World archaeology. It is akin to finding a new hominin specimen in Africa that sheds more light on the evolution of humans. Similar to the situation in Africa, there is fierce competition between researchers to determine who has the earliest find and what types of technology are associated with it. It is therefore not a surprise that a new claim in *Nature*, which is one of the most highly respected research journals, that pushes back the movement of humans into the New World by a factor of more than eight, would be strongly contested.

The evidence presented in *Nature* by Steven R. Holen and colleagues comes from a museum collection that was excavated more than 25 years ago. The authors were not the excavators of the material but have made observations about materials stored in their museum. The materials in question come from the Cerutti mastodon site, which has been adequately dated to the Pleistocene epoch (2 million to 11,000 BP). Mastodons are extinct elephant-like animals that lived in North and Central America until the end of the Pleistocene.

Uranium dating on the specimens in question has returned an approximate date of 130,000 BP, which is significant not only for the peopling of the Americas but for the dispersal of hominins prior to *Homo sapiens*. It is generally agreed that *Homo sapiens* did not leave Africa until approximately 50,000 BP, but *Homo erectus* and other contemporary hominins such as the Denisovans and Neanderthals had already moved into Asia by this time, so it is plausible that some of these did make their way into the western hemisphere.

The materials used as evidence include mastodon bone and molar fragments that the researchers suggest were broken when they were “fresh,” meaning before or soon after the animal died. Holen and colleagues argue that the distribution of bone, molar, and stone recovered from the site suggests that the bones were broken at the site of a burial. They present as evidence of human interaction five large cobbles, which they describe as hammerstones and anvils—two types of stone tools that archaeologists associate with human activity—which they claim show signs of “use-wear” that could only have resulted from human activities.

The basis for these claims is a set of experiments performed by the researchers to show that human use indeed resulted in the way the bone was broken, in addition to the use-wear that they argue is present on the associated stones. For the experiment, they took a modern elephant femur and positioned it on top of a stone that would serve as an anvil and used another stone as a hammer to show that the way the bone was broken could have resulted from this type of human activity.

There are a number of problems that have been raised by other archaeologists that are valid and worth considering when reading these arguments.

First is the issue of bone marrow extraction. One argument made by Holen and colleagues is that these femurs were being broken so that bone marrow could be removed for use by humans. We would presume that

a group of human foragers would have extensive knowledge about the anatomy of their target species, and if the mastodon skeleton is like a modern elephant skeleton, they would have known that bone marrow is concentrated in the pelvis. Long bones like the femur have virtually no marrow to extract. We would not, therefore, expect experienced foragers to spend time breaking open femurs for this purpose.

A second issue is whether the stones in question are actually tools used by humans. One of the problems with use-wear analysis is that there are many other processes that can lead to stone looking like it has been used, and some of these are indistinguishable from human activity. There are other ways that rocks can be pushed together by other natural forces without any interactions from humans. The same goes for the bones in question. Once these materials were in the ground, anything heavy moving over the top—say, another mastodon—could have pushed these objects into each other or crushed them in other ways.

Third is the use of experimentation as evidence. While the authors showed that human activity could create the type of break that is apparent on the mastodon femur, the experiment should also show that the same break could not have been made by some natural process. The authors did not test this in their experiments—they only showed one way that the breaks could have occurred.

A fourth concern is the uranium-dating technique, which is typically used to date samples that contain uranium as their primary substance. These include inorganic cave carbonates or corals, which take in uranium as they remove calcium from seawater. Holen and colleagues are applying this theoretical process to bone, which is problematic since bones do not contain significant amounts of primary uranium. The uranium does not get taken into the bone until after it is buried and water in the soil interacts with it.

A final issue is the excavation context. The materials were excavated in the early 1990s as part of a salvage project that took place during highway expansion in the area. This meant that detailed information was not collected on the context or positioning of the bones and stones in the ground together. The only information available shows that the materials were found somewhat near each other, but there are too many post-deposit processes at work that could have brought together materials that entered the ground during different millennia.

These concerns need to be addressed, because the claims of hominin entrance to the Americas more than 100,000 years earlier than currently believed are of utmost importance. It is not implausible that earlier hominins entered the Americas. It could even be the case that American archaeologists have not previously found evidence of this because they do not expect to find material remains that date back to earlier hominin dispersals. There could have been evidence that was passed over or explained using other assumptions. If anything, this case should result in more caution used by archaeologists when applying what is “already known” to the archaeological record.

However, one should also reasonably expect extraordinary claims such as these to come with very strong evidence, and this has not been made available by the authors or the journal. A lot more evidence will be necessary for the claim of much-earlier hominins dwelling in the New World to be accepted in the future. This controversy is a good example of how science should be done. There have been other instances where the dating of the first arrival of humans in the New World have been debated. Some were accepted and others were not. This is a dialectical process normal to scientific inquiry.