

New discovery of ancient bone tools from East Africa reveals greater complexity in the evolution of early human technology

Philip Guelpa
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New discoveries made in Olduvai Gorge, Tanzania by an international team led by Ignacio de la Torre, CSIC-Spanish National Research Council, push back the archaeological record of bone-tool manufacture and use by more than a million years.

The research is published in the scientific journal *Nature* (de La Torre et al, “Systematic bone tool production at 1.5 million years ago,” *Nature*, March 5, 2025). The earliest evidence of any form of human technology, Oldowan stone tools associated with *Homo habilis*, the first members of our genus, dates back to approximately 2.5 million years ago (mya), also from East Africa.

The newly discovered bone tools, which consist of 27 deliberately split and chipped large mammal long bones, were recovered from a buried context at the T69 Complex site that dates to about a million years later than the first tools and are thought to have also been manufactured by *H. habilis*, although no human remains were found in association.

Earlier recoveries of pieces of bone with characteristics indicating that they had been used in some fashion were all found on the surface at various sites, not in a buried, stratigraphic context and therefore could not be assign a date. Based on the dating of the context in which the newly discovered bone tools were found, the researchers suggest that this technology may have played a role in the transition from the Oldowan (2.6-1.7 mya) to the succeeding Acheulian cultural period (1.76-0.13 mya), which is characterized by a more sophisticated stone tool inventory.

Prior to the new discovery, the earliest known datable bone tools were recovered from sites associated with *Homo erectus*, hundreds of thousands of years later.

This difference in occurrence is not entirely surprising since stone tools are virtually indestructible whereas artifacts made from organic materials (e.g., wood, bone, plant fibers) are subject to relatively rapid decay except in particular environments, such as permanently water-logged or extremely arid settings. Therefore, the older an archaeological site, the less likely it is to have surviving organic artifacts. It has long been suggested that the material culture recovered from ancient archaeological contexts, consisting exclusively of stone artifacts provides an incomplete picture of human behavior in the past. These new finds give a tantalizing glimpse into what we are missing.

Perhaps the key new knowledge to be derived from these early bone tools is that humans even at this early stage had the intellectual and technological capacity to transfer manufacturing techniques between different raw material media. The bone tools found at the T69 Complex site were made out of elephant, hippopotamus and bovid long bones. These were split and then modified using a similar knapping (i.e., chipping) technique as that employed for stone tool manufacture, presumably using stone hammers. It is assumed that that this technique originated with the working of stone. However, due to the lack of evidence from early sites, the question of which came first must be left somewhat in doubt.

The researchers noted that the recovered bone tools date to a period before the time when large stone bifaces, known as handaxes, were being manufactured during the Acheulean period and used in such tasks as heavy butchering. Handaxes have a refined symmetry and complexity of production stages significantly greater than earlier Oldowan stone tools. Possibly,

therefore, the bone tools' functions were later replaced by the more effective and difficult to manufacture stone handaxes, which displayed sharper, more robust cutting edges.

Recently reported research examining the differences between human culture and that of other animals identified the former as having what is characterized as "open endedness." That is the capacity to mentally abstract components of complex behaviors and rearrange them in novel ways in order to achieve new results. A prime example of this is human language. Individual words can be mixed and rearranged in novel ways in order to express new ideas.

It would seem that *H. habilis* had, at least by 1.5 mya, the intellectual capacity to transfer an existing manufacturing technique to a new medium which had its own characteristics and challenges. A further inference is that they had at least a rudimentary basis for language.

Unfortunately, unlike most lithic materials used to make stone tools (e.g., chert, flint, obsidian), which often preserve characteristic use-wear traces, such as microflaking or abrasion along working edges, which can provide data on how a tool was used and against what materials, bone does not often retain such evidence. Therefore, it is difficult to impossible in many cases to identify how these tools were used, especially in older specimens. The researchers in the recent investigation suggest that the newly discovered bone tools were used in some tasks requiring sharp, heavy-duty actions, perhaps such as butchering animal carcasses.

This new research provides fresh insight into the complex evolution of human technology and also of human cognitive development.



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