

Oldowan Stone Tool Technology Lasted One Million Years

Recent discoveries in Ethiopia have pushed the development of the Oldowan stone tool technology back a further 1 million years than previously determined. A team of palaeoanthropologists from Rutgers University discovered a 2.5–2.6 million year (Ma) old assemblage of 2,970 stone artifacts within the strata of an ancient riverbed in the Gona River drainage area. These artifacts are of a typology known as the Oldowan stone tool industry, named after the 1.8-Ma-old assemblage discovered by Mary Leakey at the Olduvai Gorge in Tanzania.

The collection consists of simple cores (i.e., rock fragments called clasts from which blades are struck), whole flakes, and assorted flaking debris. Pieces detached during the flaking process comprise 75–90% of the assemblage. A few hammerstones were discovered, along with pitted and bruised cores that were used as pounding tools.

Most of the intact flakes have one end rounded and bulbous. This configuration occurs when a blade is detached using a basic flint-knapping technique known as the percussion method. These blades are manufactured by striking the face of a core at an oblique angle with a smaller hammerstone, which produces a conchoidal fracture just below the surface of the core and detaches a flake. Although the technique may sound simple, it requires an extensive knowledge of the microstructure and mechanical properties of the rock. The rock must be brittle, and the microstructure must be either extremely fine or amorphous to permit the induction and propagation of a conchoidal fracture. Too oblique a striking angle will produce useless chips, while too straight a blow will simply split or shatter the clast.

Successive layers of flakes have been detached from some of the cores. An experienced flint-knapper will repeatedly strike blades off a core from different faces, until it is too small to continue, maximizing the number of blades produced from a single core.

A volcanic rock known as trachyte was the preferred material for the assemblage at Gona River as it comprised more than 70% of the artifacts discovered whereas it made up only 50% of the material from a nearby stream conglomerate. The remaining artifacts were made from other volcanic materials, such as rhyolite and basalt.

The only distinctions between the Gona River collection of tools and those discovered by Leakey are that at Olduvai Gorge more flakes were detached per core of the Olduvai clasts and that more of the flakes show signs of repeated retouching and reuse. Because the source materials for the Olduvai Gorge tools were further afield, the makers of these tools may have had more incentive to conserve and recycle

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Unfortunately, the fabricators of the Gona River tools are unknown. No physical remains were found with the artifacts to permit the identification of the tool makers. Palaeoanthropologists generally believe that stone tools were invented by the larger-brained *Homo* genus of the hominids (i.e., members of the human family). These groups walked fully upright, possessed brain cases measuring approximately 650–1000 cubic centimeters depending on the species, and had small molars indicative of meat-eaters. Because of the very early date of the Gona

River tools, however, palaeoanthropologists have not ruled out the possibility that these assemblages could have been made by the *Australopithecus* genus of hominids. They also walked fully upright but possessed brain cases measuring only 450–500 cubic centimeters depending on the species and had very large molars and smaller front teeth indicative of vegetarians. Unlike any member of the *Homo* genus, certain members of the *Australopithecus* genus coincided over the same 2.5–1.5 Ma time period as the Oldowan industry, existed in the Omo region of Ethiopia where the Gona site is located, and went through a similar degree of morphological stasis. The true identity of the developers of the tools will be debatable until more substantive evidence is discovered, however.

The prevalence of the Oldowan stone-tool industry diminished with the development of the more advanced Acheulean assemblage in 1.6–1.5 Ma. Whereas Oldowan tool kits predominantly consisted of various-sized flakes that were retouched to make them suitable for particular tasks, the Acheulean assemblages contained tools such as hand-axes that were manufactured in standardized shapes for specific applications. The manufacture of a hand-ax required the careful removal of numerous flakes from a clast in order to produce a shape that was efficient for butchering animals or cutting plants. The manufacture of such tools required that the flint-knapper have a definite idea of the desired shape of the final tool before beginning.

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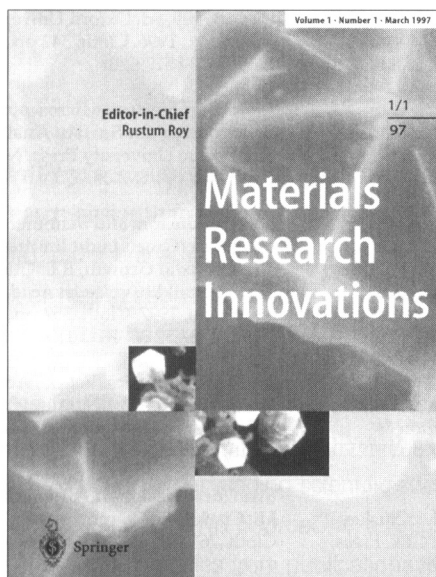
FOR FURTHER READING: J.E. Pfeiffer, *The Emergence of Humankind*, 4th ed. (New York, Harper & Row, 1985); S. Semaw, P. Renne, J.W.K. Harris, C.S. Feibel, R.L. Bernor, N. Fesseha, and K. Mowbray, "2.5-Million-Year-Old Stone Tools from Gona, Ethiopia," *Nature* 385 (January 23) (1997), 333–36; B. Wood, "The Oldest Whodunit in the World," *Nature* 385 (January 23) (1997) 292–93.

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