

Habitual use of fire as told from cave near Haifa

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Credit: Junior Libby/public domain

Scientists have not been content with the exercise of dating when man first used fire. While the earliest evidence for hominin use of fire dates to more than a million years ago, scientists have been keen to explore an expanded timeline as to when we transitioned from occasional use to habitual, planned use of fire. A research effort by a team of scientists

has turned up evidence and they have written what they understand about a time frame of a 'technological mutation.' That in turn can help explain our evolution and "encephalization."

Their study, 'Fire at will': The emergence of habitual [fire](#) use 350,000 years ago," is published in this month's *Journal of Evolution*. Their study suggests, as stated in a publication of the Archeological Institute of America, *Archaeology*, that human ancestors regularly began using fire some 350,000 years ago. The six authors studied [flint tools](#) recovered from Israel's Tabun Cave. The authors are from the Zinman Institute of Archaeology, University of Haifa, and School of Anthropology, University of Arizona.

They uncovered burnt flint material from a 16-m-deep sequence of archaeological deposits at Tabun Cave, near Haifa, Israel. According to a report in *Science*, the Tabun Cave is a site with a long sequence. In turn, said Ron Shimelmitz, archaeologist at the University of Haifa and study co-author, they were able to explore, step by step, how the use of fire changed in the cave. Shimelmitz also said in the *Science* report that the findings were [consistent](#) with data from several nearby sites.

The authors wrote that "burnt artifacts are found not only within hearths but also scattered throughout the general area of excavations, a result of processes such as cleaning out of fireplaces, trampling and earth moving." They said that "the frequency of burnt flints should be a suitable proxy for the frequency of fires within the cave." Since the stone is so durable, burnt flints are not expected to suffer from the same degree of post-depositional alteration and destruction as are hearth features, heated sediments, charcoal and ash or even burnt bones, they added.

Two factors, the flint discoveries along with data from a Levantine archaeological record, demonstrated that "regular or habitual fire use

developed in the region between 350,000–320,000 years ago. While hominins may have used fire occasionally, perhaps opportunistically, for some million years, we argue here that it only became a consistent element in behavioral adaptations during the second part of the Middle Pleistocene." They concluded that "Fire became a regular part of hominin behavior during the second half of the Middle Pleistocene."

The value of their research is in its contribution to reconstructing features of evolutionary history, including changes in anatomy and dispersal of hominins into temperate regions. Ilan Ben Zion, news editor at *The Times of Israel*, explained that examination of the strata in the cave found that, before roughly 350,000 years ago, "few of the stones showed [signs](#) of exposure to intense heat. After that point, an increasing number show signs of red or black coloration, cracking, and small round depressions typical of exposure to fire."

In their study, the authors said that, "We suggest that the changes in burning frequency at Tabun and Qesem not only signal the point in time where the use of fire became habitual, but also indicate that humans had mastered the art of kindling fire. Unfortunately there are no means currently available to directly determine how ancient fires were started, so the latter remains simply a hypothesis for the time being."

More information: 'Fire at will': The emergence of habitual fire use 350,000 years ago, *Journal of Human Evolution*, Volume 77, December 2014, Pages 196–203. www.sciencedirect.com/science/.../S0047248414001778

Abstract

The use of fire is central to human survival and to the processes of becoming human. The earliest evidence for hominin use of fire dates to more than a million years ago. However, only when fire use became a regular part of human behavioral adaptations could its benefits be fully

realized and its evolutionary consequences fully expressed. It remains an open question when the use of fire shifted from occasional and opportunistic to habitual and planned. Understanding the time frame of this 'technological mutation' will help explain aspects of our anatomical evolution and encephalization over the last million years. It will also provide an important perspective on hominin dispersals out of Africa and the colonization of temperate environments, as well as the origins of social developments such as the formation of provisioned base camps. Frequencies of burnt flints from a 16-m-deep sequence of archaeological deposits at Tabun Cave, Israel, together with data from the broader Levantine archaeological record, demonstrate that regular or habitual fire use developed in the region between 350,000–320,000 years ago. While hominins may have used fire occasionally, perhaps opportunistically, for some million years, we argue here that it only became a consistent element in behavioral adaptations during the second part of the Middle Pleistocene.

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