

The Acheulian Site of Gesher Benot Ya'aqov Volume II: Ancient and Controlled Use of Fire

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INTRODUCTION

Excavation and research conducted at the Middle Pleistocene local of Gesher Benot Ya'aqov (GBY) has produced some pivotal insights into hominin behavior and life ways (ontogeny). This publication is no different. Combined with the locale's large lithic assemblage (Goren-Inbar and Sharon 2006; Goren-Inbar et al. 2008); subsistence based data (Goren-Inbar et al. 2002b) and paleoenvironmental data (Goren-Inbar et al. 2002a), evidence presented here of controlled use of fire within deposits dating to shortly after the Brunhes-Matuyama boundary highlights GBY as a key site for Paleolithic research. The evidence presented comes from investigations into 'invisible' or 'phantom' hearths whereby evidence for anthropogenic fire is located using burnt microartifact distributions; in this case, lithic debitage. Here this evidence can be discussed in relation to out-of-Africa theories and investigations of hominin movements and behavior during the later Early Pleistocene and the early Middle Pleistocene, as well as:

- discuss the innovative methodology used to investigate fire use and to comprehensively signal *controlled* fire in Pleistocene deposits;
- discuss the evidence presented for fire and its significance both at a site specific scale and a more global scale; and,
- ask why this locale stands out with the only convincing controlled use of fire before the onset of climate intensities and the Milankovic cycle later in the Middle Pleistocene.

'INVISIBLE' HEARTHES

The investigation into indicators of pyrotechnologies and their uses to investigate the existence of controlled fire is by no means a new idea (Forward by Villa and references therein). However it has not been widely employed for Pleistocene deposits, possibly due to the intensity required to identify burnt micro-artefacts. The painstaking process undertaken at GBY shows how this intensity of research can produce insightful results. Excavations included a 34m composite section of deposits compiled from various archaeological exposures and geological investigations. The archaeological excavations consisted of 0.5m x 0.5m spits of 5cm depth. The sequence has then been dated using magnetostratigraphy to an approximately 100 kyr period of deposition between c. 0.8-0.7 mya (p. 13). 'Invisible' hearths were defined by highlighting significant distributions of

burned microdebitage within deposits; i.e., where an observed distribution of burned microartifacts exceeds the 'expected' level. The 'expected' level was defined using chi square tests on each excavated layer to statistically define an anticipated 'uniform distribution' of excavated lithic microartifacts, both burnt and non-burnt. This methodology then highlights clusters of burned material within the excavated lithic microdebitage across the excavated surfaces (p. 30), and is defined in Chapters 1 and 2. One of the major highlights of this publication is how the site and data are set out early and referred to constantly for ease of personal research.

Starting from Layer V-5, Chapter 3 displays the results of the authors' data interrogation—15 layers in total, all of which display evidence of burning within their deposits. A total of three of the layers were seen to contain evidence of controlled burning, that is, significant densities of burned material were found. Other layers, however, displayed more even distributions of burned and unburned material and therefore the possibility of natural fire was discussed. The idea of natural fires across the site, however, was rejected, due to a number of ecological reasons associated with the accumulation of the deposits. These arguments are discussed in depth throughout Chapter 4, which also discusses these distributions in relationship to other human behavioral indicators such as the Basalt Biface Workshop or the Elephant Butchery assemblage. A full analysis of human behavior in association with hearth activity is needed but these short studies suggest that activity was not associated with particular tasks within the locale. For this reason, it can be discussed as an integral part of behavior and ontogeny of the GBY hominins (p. 90).

GESHER BENOT YA'AQOV IN CONTEXT

Paleolithic research can now confidently suggest that controlled use of fire was a hominin capability at GBY by c. 0.7 mya. This then leads to a number of questions, most outside of the scope of this review. I wish to briefly discuss two:

- Does the existence of controlled fire shed light on the spread of hominins into high latitudes including Europe?; and,
- What are the broader implications of the development of controlled fire by at least 0.7 mya?

Both the authors (Alpers-Afil and Goren-Inbar) and the author of the insightful Forward (Villa) discuss the implication of the controlled use of fire in relation to hominin

migration and movement. The evidence from GBY certainly presents the earliest examples of anthropogenic fire across the Paleolithic world (see Gowlett 2006 and James 1989 for reviews as well as Chapter 1); indeed, it predates other convincing evidence by c. 300 kyr. Of course, absence of evidence is never evidence of absence and we must remember that the methods used and published here have not always been mainstream practice within archaeological research. This said, it remains interesting that this evidence shortly precedes the expansion of occupation or 'short chronology' of Europe c. 600–500 kya (Dennell 2003). With increasing evidence of short lived encroachments into northern latitudes such as Happisburgh (Parfitt et al. 2010), it can be suggested that the GBY behavioral data lends weight to the idea of fire as a trigger for major human migration north.

The second question highlighted above is really a discussion of the social implications of pyrotechnologies, particularly the ability to control and produce fire. This again can be linked to the overall spread of populations through the Levantine corridor from south to north. More so, we can discuss ideas of social organization within groups and subsistence capabilities within differing landscapes from a global perspective. John Gowlett (2006), for example, suggested that anthropogenic fire evidence could point to the increase in encephalization through the Pleistocene and the connected increase in immediate group size. Controlling and preserving fire does take a number of individuals to succeed, but what this number is and when the social makeup of hominin society reached this level is as yet an unachievable conundrum. What we must question is why at 0.7 mya? Or why at GBY? Is this a phenomenon related to specific preservation? Or is a certain 'innovation threshold' reached at the onset of the Middle Pleistocene? These are all questions that must be brought forward during future research into GBY and its surroundings. For now with the ever increasing evidence of Early Pleistocene occurrences in northern latitudes, such as Happisburgh, the idea of anthropogenic fire prior to GBY is not inconceivable.

CONCLUSION

This publication really brings to the fore the research potential of Gesher Benot Ya'aqov. The in-depth inter-site spatial analysis has produced pivotal results for the discussion of anthropogenic fire use and its social and subsistence implications. Alpersen-Afil and Goren-Inbar add once again to

the ever increasing interest of this Middle Pleistocene locale and its relatively detailed preservation of complex hominin activities and behaviors from Elephant Butchery to core and Large Cutting Tool (LCT) reduction sequences. This publication has managed to present a complex statistical research project in an accessible medium. Both the statistics themselves and the detailed diagrams are easily read, understood, and complemented by the text. I have briefly mentioned the future potential of this research and we can only look forward to this and the potential full publication of the lithic material from GBY.

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