

# MATTERS ARISING

## Early hominids and fire at Chesowanja, Kenya

IN addition to providing valuable new information on the important palaeo-anthropological evidence from Chesowanja, Gowlett *et al.*<sup>1</sup> state that "burnt clay found at one artefact locality dated to greater than  $1.42 \pm 0.07$  Myr is the earliest known evidence of fire associated with a hominid occupation site" and that "the new find, along with the more tentative evidence from other sites, greatly strengthens the hypothesis that by 1.4 Myr hominids were using and controlling fire".

There are various reasons why the evidence reported should be treated as a good deal less definite than the article implies.

Traces of bush fires of presumably natural origin are not uncommon in early and middle Pleistocene deposits of the East African Rift Valley. For example, the fluvial facies of the Upper Member at Koobi Fora contains numerous reddened, hardened patches that are closely analogous to places where smouldering logs and stumps from modern bush fires have burned down against or into contemporary soils. I have seen and photographed several recent examples of burned patches in East Africa, and at least one rather analogous set of circumstances has been reported in Australia<sup>2</sup>. Where these reddened patches, ancient or modern, erode, a scattering of hard red fragments results. Clasts of this natural 'terracotta' can commonly be observed in the grits and gravels formed on ancient land surfaces. I have frequently observed these clasts in excavations both at Koobi Fora and at Ologesailie and imagine them to be a widespread phenomenon.

This means that before a new record for a high antiquity of human control over fire can fairly be claimed, there must exist some objective means of distinguishing a hearth controlled by hominids from the baking effects of a bush fire. Gowlett *et al.* seem to claim that this distinction is made possible by the contrast between a determination of a 400 °C baking temperature for the burned material from site GnJi 1/6E compared with over 600 °C for "baking around a recently burned tree stump". I am sceptical that a difference between two isolated determinations can be relied on as a general criterion, and I would predict that if a series of bushfire baked samples is measured, the range of temperatures will be found to overlap with campfire temperatures.

The most convincing evidence for human control over fire in an open site would come from evidence of a localized, burned patch that was not a burned stump, inside the confines of artefactual refuse which had not been unduly distur-

bed by fluvial transport<sup>3</sup>. However, paragraph 4 and Fig. 2 of the article<sup>1</sup> make it clear that all the finds, including the burned earth fragments, were recovered from material that was swept together in the bed of a small channel. The finds can thus be regarded as provocative and suggestive, but no more.

The question of the antiquity of human control over fire is of more than curiosity value in our understanding of prehistory and human evolution. Besides the indication provided of an advance in mental capacity, fire may well have had important effects on feeding strategies and diet breadth. Control over fire also would have allowed humans to raise the frequency of bush fires and thereby to have a marked effect on vegetation patterns.

The article by Gowlett *et al.*, and others that they cite, serve the useful purpose of emphasizing that we still do not know whether humans controlled fire before ~0.5 Myr and if so, how long before. I suspect that development of suitable discriminants between traces of bush fires and controlled fire will require collaboration of physicists and archaeologists in the field during excavations.

GLYNN ISAAC

*Department of Anthropology,  
University of California,  
Berkeley, California 94720, USA*

1. Gowlett, J. A. J., Harris, J. W. K., Walton, D. & Wood, B. A. *Nature* **294**, 125-129 (1981).
2. Chapman, V. *Mankind* **11**, 480-483 (1977).
3. Laloy, J. *Cahiers du Centre de Recherches Préhistoriques* (Université de Paris I, 1980).

GOWLETT, HARRIS AND WOOD  
REPLY—Isaac provides us with an opportunity to explain further why we consider that the context of the burnt clay at site GnJi 1/6E deserves serious consideration as evidence linking fire with hominid activity.

Isaac describes a series of circumstances which would provide the least ambiguous evidence of controlled fire on a single open site, and few would dispute his general criteria. We agree, too, that circumstances where baking is not proved, or where evidence of hominid activity is tenuous, provide inadequate testimony. Where we clearly disagree with Isaac is over the idea that a site with much stronger evidence should have no effect on what can be admitted as a working hypothesis.

We emphasize again that the evidence of fire at Chesowanja is quite definite: the clay was burned, and its association with the artefacts is direct and physical. Isaac rightly points out that the apparently low baking temperature of the clay is inconclusive evidence of the nature of the fire. This we clearly acknowledged, and it is why we advocated studies of the cooling

rate of the clay. We share with Isaac the hope that future investigations of experimental fires will assist in the interpretation of such data.

Strength of association is an important point. Given the controversy surrounding the contexts of all early sites<sup>1</sup>, Isaac legitimately raises the possibility that the baked clay and artefacts may have been swept together. The evidence does not, however, support this view. On the contrary, we have good reason to believe that a reverse process has operated, and that the clay lumps, starting together, have crept apart. The presence of several large lumps together (square 82-83 E/111-112 S), including three weighing 262, 217 and 175 g respectively and which retain sharp edges and protuberances, argues very strongly against any significant water transport, as indeed does the whole context of fine-grained sediments. These finds occur close to a modern erosion gully, which prevents further exploration to the north and west, so that the scatter of smaller clay lumps to the opposite corner of the excavation is actually a vital bonus to interpretation, as it rules out any possibility of the burnt material deriving from recent superficial disturbance.

We welcome Isaac's contribution, for it is important that the cases for and against early human control of fire, at Chesowanja or elsewhere, should be fully aired. We also agree that progress in this field of research will be much facilitated by closer practical collaboration between physicists and archaeologists. Nonetheless, we stand firmly by the view that the evidence at Chesowanja greatly strengthens the hypothesis that fire was associated with hominid activities more than 1 Myr ago. We shall present additional evidence in due course.

We hope that this exchange will help to stimulate research on a wider scale, for although the evolutionary importance of controlled fire has been appreciated for over a century<sup>2</sup>, new technical means for exploring its history now provide increasingly better chances of adding to the facts.

J. A. J. GOWLETT

*Research Laboratory for Archaeology  
and the History of Art,  
Oxford University, Oxford OX1 3QJ, UK*

J. W. K. HARRIS

*Department of Anthropology,  
University of Wisconsin,  
Milwaukee, Wisconsin 53201, USA*

B. A. WOOD

*Department of Anatomy,  
The Middlesex Hospital Medical School,  
London W1P 6DP, UK*

1. Binford, L. R. *Bones: Ancient Men and Modern Myths* (Academic, New York, 1981).
2. Darwin, C. *The Descent of Man* (Murray, London, 1871).