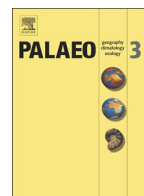




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A spatial analysis of stone tools and fossil bones at FLK Zinj 22 and PTK I (Bed I, Olduvai Gorge, Tanzania) and its bearing on the social organization of early humans

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ABSTRACT

Over the past twenty years, early hominin behavioral models have increasingly abandoned social inferences of the behaviors that created the earliest archaeological record. Behavioral reconstructions have focused mostly on the subsistence strategies that conditioned the selection of specific *loci* (i.e., central-places) and the manipulation and consumption of resources therein (i.e., raw material transport and use and carcass acquisition and processing). Part of the reason why the social component of these behaviors has been marginalized lies in the lack of proper modern analogs and also in a lack of analytical tools to link social organization to subsistence. Spatial analysis of the debris patterns generated by modern foragers (depending on their social organizations) is a potentially useful tool to understand behavior in the past. The application of statistical spatial analyses to the distribution of stone tools and bones provides an insightful approach to understand socio-economic behavior at any given site, provided a significant part of the archaeological record of a large paleo-surface has been exposed through excavation. This is the case of FLK Zinj and PTK I. A statistical spatial analysis of these sites shows a spatial interdependence between tools and bones. It also shows that the single dense cluster pattern at these sites is not a preservation issue or a sampling artifact, but the result of a socio-economic organization by early humans that differed from those currently documented among *H. sapiens* foragers.

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1. Introduction

One of the main objectives of palaeoanthropological research is the identification of the socio-reproductive organization and subsistence strategies that created human behavior. During the 1970s and 1980s several models emerged to interpret socio-economic behaviors of early hominins through the analysis of the African Early Pleistocene archaeological record. Some models emphasized socio-economic behaviors that resembled those of some modern foraging populations (e.g., Leakey's [1971] "living-floors"; Isaac's [1978] "home base" or "food-sharing" models). Subsequent revisionist models, produced during the 1980s with a concern for site formation processes, were ethologically informed and argued that hominins had social behaviors that were more similar to those of other non-human primates. These include the marginal or obligate scavenger (Binford, 1981) or the passive scavenger (Blumenschine, 1986) models, the stone-cache model (Potts, 1988), the "chimpanzee-nesting" model (Sept et al., 1992), or the "refuge" model (Blumenschine et al., 1991).

In the past 30 years, scholars have abandoned social and functional interpretations of early sites, largely due to the information gap between the reconstruction of site formation, through taphonomic analyses of archaeological materials, and the hominin socio-economic organization required to sustain any of the above models. Isaac's (1983) "central-place foraging" model de-emphasized social aspects of his previous model and Cavallo (1998) managed to reconcile it with passive scavenging models. Shick's (1987) "favored place" model did not include any significant social components and stressed that sites could simply be created by unintentional re-use of certain spaces, and may have served as secondary sources of raw material (Plummer, 2004). The "near-kill location" model (O'Connell, 1997) or the "male display" (O'Connell et al., 2002) model did not emphasize any specific social organization, despite depicting sites as carcass obtainment *loci* created through confrontational scavenging to increase male mating fitness. Even though some authors suggested a modified ethological approach to explain early sites (e.g., the "resource-defense" model (Rose and Marshall, 1996)), most models produced during the past three decades have approached Early Pleistocene hominin behavior by making it similar to those of other primates in an increasingly dehumanizing trend. One of the most recent models produced, the "obligate carnivory" model (Ferraro, 2007), intentionally avoided any interpretation of the

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social behavior of hominins or of the functionality of sites beyond their reconstruction as places where hominins ate substantial amounts of meat. Thus, we have reached a stage which enters in contradiction with the most emblematic contribution of the archaeology of the human origins during the 1980s: archaeologists no longer address early site functionality, and when doing so they detach the social component from their behavioral modeling, which has become mostly dietary. This avoidance of hominin social organization is surprising, since in ethology and behavioral ecology it is widely known that any given subsistence behavior is strongly dependent on specific types of social organizational structures (Brooks and McLennan, 1991). The application of taphonomy to the study of the Early Pleistocene record also unveiled fewer anthropogenic sites than previously thought and showed that a

substantial amount of early sites were palimpsests, where hominin behavior was either difficult to detect, marginal or non-existent (Domínguez-Rodrigo et al., 2007).

Where do we stand now? Although there is a substantial amount of information available about the subsistence of hominins at a small number of Early Pleistocene sites, it is fair to state that we know very little about early site functionality and about hominins' general behavior or social organization. In addition, there is potential confusion among the large diversity of interpretations of hominin subsistence, as observed in the array of behavioral models produced. How can their heuristics be empirically tested? This diversity of interpretations may actually be due to the controversial nature of an insufficient archaeological record and/or to flawed theoretical framing of these models.

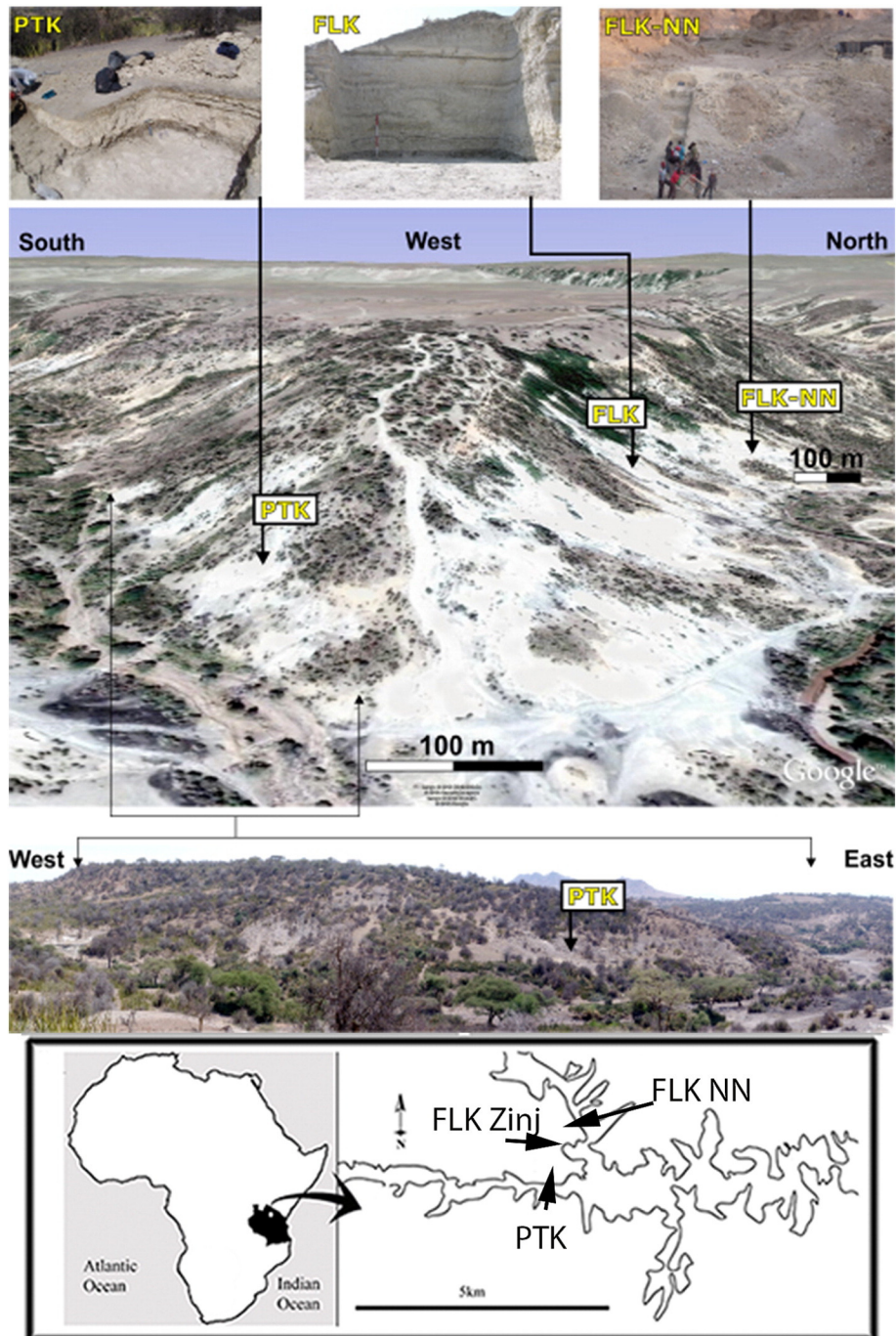


Fig. 1. Location of Olduvai Gorge (inset map) and the Bed I sites underlying Tuff IC.

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