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Later Stone Age toolstone acquisition in the Central Rift Valley of Kenya: Portable XRF of Eburran obsidian artifacts from Leakey's excavations at Gamble's Cave II

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ABSTRACT

The complexities of Later Stone Age environmental and behavioral variability in East Africa remain poorly defined, and toolstone sourcing is essential to understand the scale of the social and natural landscapes encountered by earlier human populations. The Naivasha-Nakuru Basin in Kenya's Rift Valley is a region that is not only highly sensitive to climatic changes but also one of the world's most obsidian-rich landscapes. We used portable X-ray fluorescence (pXRF) analyses of obsidian artifacts and geological specimens to understand patterns of toolstone acquisition and consumption reflected in the early/middle Holocene strata (Phases 3–4 of the Eburran industry) at Gamble's Cave II. Our analyses represent the first geochemical source identifications of obsidian artifacts from the Eburran industry and indicate the persistent selection over time for high-quality obsidian from Mt. Eburru, ~20 km distant, despite changes in site occupation intensity that apparently correlate with changes in the local environment. This result may indicate resilience of Eburran foraging strategies during environmental shifts and, potentially, a cultural preference for a specific lithic material that overcame its accessibility changes. Testing such hypotheses requires a more extensive program of obsidian artifact sourcing. Our findings demonstrate the great potential for sourcing studies in the Rift Valley as well as underscore the amount of work that remains to be done.

1. Introduction

The complex dynamics of Holocene interglacial environmental and behavioral variability in East Africa remain poorly defined. Significant and often abrupt environmental changes include the return to near-glacial conditions during the Younger Dryas event (~12.9–11.7 ka), followed by the African Humid Period (AHP, ~11–6 ka), and a return to more arid conditions (~6–4 ka; e.g., Gasse, 2000; Tierney and deMenocal, 2013). Changes during the AHP are particularly striking, including the “Green Sahara” phase of northern Africa, with a number of East African lakes expanding in size and depth, coincident with the expansion of more forested ecotones (Butzer, 1972; Hamilton, 1982; Bergner et al., 2009; Trauth et al., 2010). Archaeologically, a number of regionally distinct artifact traditions are recognized, including the Kanyore fisher-foragers of the Lake Victoria basin (Dale and Ashley, 2010), fisher-forager communities who produced the “dotted-wavy line” pottery and barbed harpoons found throughout parts of the Sahara

and the Sahel as far south as Lake Turkana (Wright et al., 2015; cf. Sutton, 1974; Holl, 2005), and the Eburran industry produced by foragers in the Central Kenyan Rift Valley (e.g., Ambrose, 1984; Wilshaw, 2016). Cattle, sheep, and goat spread southward from northern to eastern Africa by ~7 ka, resulting in a complex cultural and economic mosaic that was in place by 3 ka (di Lernia, 2013; Kusimba, 2003; Lane, 2013; Skoglund et al., 2017).

A number of unanswered questions remain about the archaeology of this timeframe. For example, do distinctive regional behavioral entities (e.g., archaeological industries like the Eburran) form because of adaptations to specific habitats, as a result of isolation from neighboring groups, or as a deliberate expression of what Wiessner (1983) referred to as emblematic style? Does the spread of pastoralism reflect the demic diffusion of groups along an expanding frontier or a series of local adaptations as stock is transferred along existing social networks among foraging groups (cf. Lane, 2004; Prendergast, 2010; Skoglund et al., 2017)? Answering these questions ultimately requires

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