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The first evidence of cut marks and usewear traces from the Plio-Pleistocene locality of El-Kherba (Ain Hanech), Algeria: implications for early hominin subsistence activities circa 1.8 Ma

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ABSTRACT

The current archaeological data on early hominin subsistence activities in Africa are derived chiefly from Sub-Saharan Plio-Pleistocene sites. The recent studies at El-Kherba (Ain Hanech) in northeastern Algeria expand the geographic range of evidence of hominin subsistence patterns to include the earliest known archaeological sites documented in North Africa. Dated to 1.78 million years ago (Ma), excavations from El-Kherba yielded an Oldowan industry associated with a savanna-like fauna contained in floodplain deposits. The faunal assemblage is dominated by large and medium-sized animals (mainly adults), especially equids, which are represented by at least 11 individuals. The mammalian archaeofauna preserves numerous cut-marked and hammerstone-percussed bones. Made of primarily limestone and flint, the stone assemblage consists of core forms, *débitage*, and retouched pieces. Evidence of usewear traces is found on several of the flint artifacts, indicating meat processing by early hominins. Overall, our subsistence analysis indicates that early hominins were largely responsible for bone modification at the site, which is also corroborated by other relevant taphonomic evidence. Moreover, at 1.78 Ma, the cut-marked bones recovered from El-Kherba represent the earliest known evidence for ancestral hominin butchery activities and large animal foraging capabilities in northern Africa.

Introduction

The current archaeological data on early hominin subsistence activities in Africa are derived chiefly from Sub-Saharan Plio-Pleistocene sites, such as Bouri (de Heinzelin et al., 1999) and Gona (Semaw et al., 2003; Domínguez-Rodrigo et al., 2005) in Ethiopia, FLK Zinj in Tanzania (Bunn, 1981), FxJj50 in Kenya (Bunn et al., 1980), and Sterkfontein Member 5 and Swartkrans Member 3 in South Africa (Pickering and Domínguez-Rodriguez, 2007). Recently, McPherron et al. (2010) announced two butchered fossil bones dated to approximately 3.4 Ma from the Dikika research area in the Lower Middle Awash (Ethiopia), yet some zooarchaeologists cast doubt on the authenticity and the antiquity of these marks (Shipman, 2010; Domínguez-Rodrigo et al., 2010b). The 2.5 Ma site from Bouri in the Middle Awash has yielded animal fossil bones with evidence of stone tool cut marks and hammerstone impact scars but lacks associated stone tools (de Heinzelin et al., 1999). The contemporary sites of OGS-6 and OGS-7 at Gona have yielded broken bones associated with stone tools, notably a surface find of an equid calcaneum with cut marks (Semaw et al., 2003; Domínguez-Rodrigo et al., 2005). Thus, the current evidence from Bouri and Gona clearly shows that the first stone tools were used for cutting soft animal tissue and for extracting bone marrow and that by 2.55 Ma hominins incorporated some amount of meat in their diet. Similar patterns of animal carcass processing are also

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documented in the younger sites at FLK Zinj at Olduvai Gorge (Bunn, 1981; Bunn and Kroll, 1986; Blumenschine, 1995; Domínguez-Rodrigo and Barba, 2007; Domínguez-Rodrigo et al., 2010a) and FxJj50 at Koobi Fora (Bunn et al., 1980; Domínguez-Rodrigo and Pickering, 2003) dated to 1.75 Ma and 1.6 Ma, respectively. The presence at these sites of cut marks on some bones of even very large animals and breakage patterns of hammerstone-percussed limb bones indicates that by 2.0 Ma hominins played a major role in modifying bone at these sites and were systematically processing selected parts of carcasses for meat and marrow (Bunn, 1997). The number of stone-tool-modified bones from Sterkfontein and Swartkrans are relatively fewer, but the archaeofauna recovered at these sites has established the causal link between the faunas and the Oldowan stone tools in Plio-Pleistocene southern Africa (Pickering and Domínguez-Rodriguez, 2007).

The recent studies at El-Kherba (Ain Hanech) in northeastern Algeria expand the geographic range of evidence of hominin subsistence patterns to include North Africa. Ain Hanech was discovered in 1947 by Arambourg (1970) and yielded the earliest Pleistocene fauna associated with the Oldowan industry. Renewed investigations at this major site by Sahnouni et al. (1996, 2002) and Sahnouni and de Heinzelin (1998) have yielded additional materials from the newly discovered rich locality of El-Kherba, which is situated 400 m south of Ain Hanech. The new studies involved investigations bearing on stratigraphy and dating, the nature of the association of fragmented bones and stone artifacts, lithic assemblages, and overall behavioral implications of the archaeological occurrences. We carried out preliminary analyses of bone surface modifications of the excavated faunal assemblages from El-Kherba and microwear traces on a selection of associated flint artifacts. Here, we report evidence of cut marks and usewear traces showing that early hominins used stone tools to process large animal carcasses in North Africa 1.78 Ma.

Historical background of research

El-Kherba is located on the edge of the eastern Algerian High Plateaus near the city of El-Eulma. It is part of the Ain Hanech site complex and represents a lateral extension of the Ain Hanech locality. Ain Hanech and El-Kherba are thus contemporary and formed within the Ain Hanech Formation. The Ain Hanech Formation is 30 m thick and is composed of several cyclothemic units (from O to T) of fluvial origin, consisting of a stratified medium energy layer in the lower part and a silty deposit somewhat weathered in the upper part (Sahnouni and de Heinzelin, 1998: Fig. 5 and Appendix 1: 1101). The stratigraphic profiles of Ain Hanech and El-Kherba are correlated with Unit T, which has a normal paleomagnetic polarity (Fig. 1). The presence of a *Dicerorhinus*-like rhino, *Anancus*, and *Kolpochoerus heseloni* (Table 1) with last appearance datums of 2.0 Ma, 1.8 Ma, and 1.65 Ma, respectively, suggests a Plio-Pleistocene

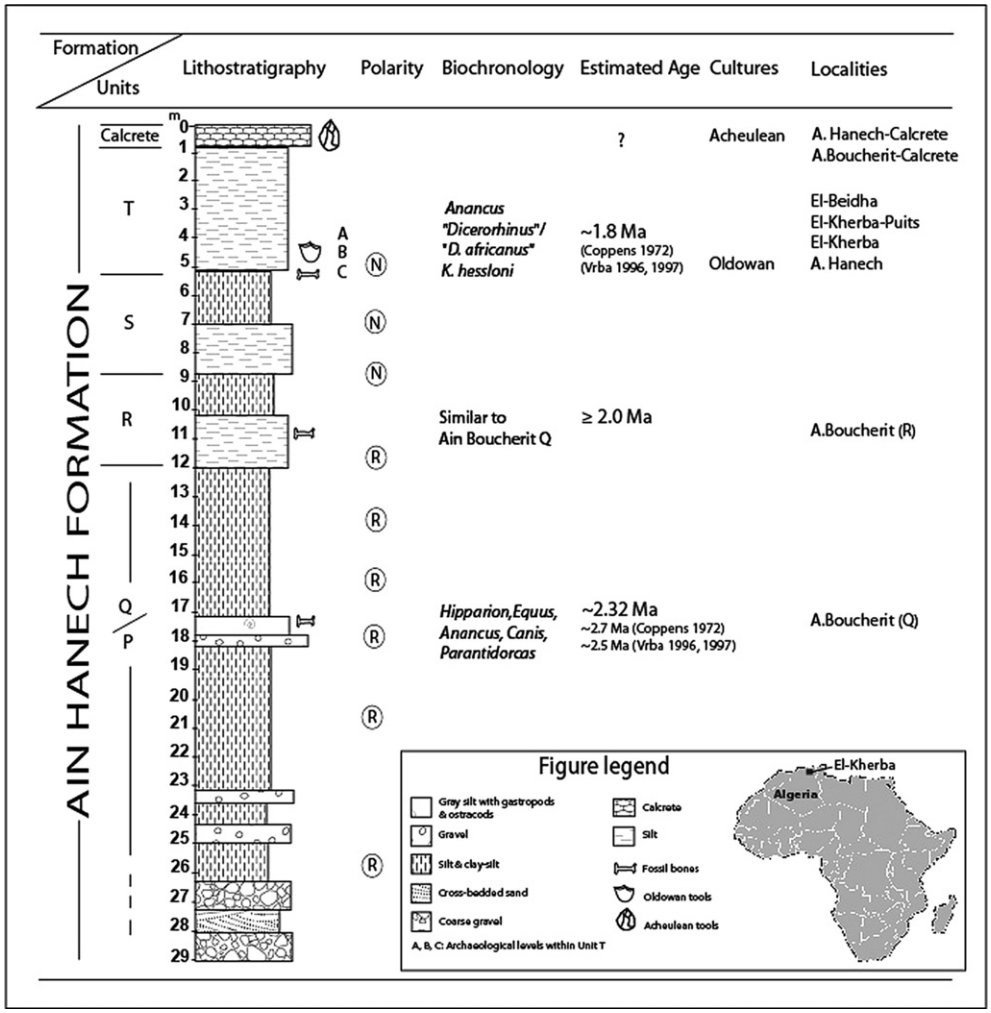

Figure 1. Stratigraphic position of El-Kherba relative to the Ain Hanech Formation. Both the Ain Hanech and El-Kherba localities with Oldowan stone tools are contained in Unit T with an estimated age of 1.78 Ma.