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Experimental study of cut marks made with rocks unmodified by human flaking and its bearing on claims of ~3.4-million-year-old butchery evidence from Dikika, Ethiopia

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ABSTRACT

In order to assess further the recent claims of ~3.4 Ma butchery marks on two fossil bones from the site of Dikika (Ethiopia), we broadened the actualistic-interpretive zooarchaeological framework by conducting butchery experiments that utilized naïve butchers and rocks unmodified by human flaking to deflesh chicken and sheep long limb bones. It is claimed that the purported Dikika cut marks present their unexpectedly atypical morphologies because they were produced by early hominins utilizing just such rocks. The composition of the cut mark sample produced in our experiments is quite dissimilar to the sample of linear bone surface modifications preserved on the Dikika fossils. This finding substantiates and expands our earlier conclusion that—considering the morphologies and patterns of the Dikika bone surface modifications and the inferred coarse-grained depositional context of the fossils on which they occur—the Dikika bone damage was caused incidentally by the movement of the fossils on and/or within their depositional substrate(s), and not by early hominin butchery. Thus, contrary to initial claims, the Dikika evidence does not warrant a major shift in our understanding of early hominin behavioral evolution with regard to carcass foraging and meat-eating.

1. Introduction

If correct, the recent interpretation of two ~3.4 Ma, surficially marked, ungulate fossils from the site of Dikika (Ethiopia) as evidence of Pliocene (presumably pre-*Homo*) hominin butchery (McPherron et al., 2010) would have a major impact on our understanding of human evolution. The finding would: (1) demonstrate meat-eating almost one million years earlier than previously inferred; (2) imply that large carcass foraging and meat-eating was unrelated to the invention of flaked stone tool technology; (3) imply that the behavior(s) responsible for concentrating certain hominin activities in discrete spots in the landscape was not related to meat-eating; (4) imply that development of skills necessary to acquire large animal carcass resources was not linked to encephalization; (5) and imply that dietary and adaptive reconstructions based on morphological and wear analyses of hominin dentition are incomplete and/or inaccurate. Given the potential of the Dikika claims for instituting these important conceptual shifts in our understanding of human evolution, the data underpinning them deserve very close scrutiny.

We did subject the Dikika data to this close scrutiny and produced a critique of the claims for hominin butchery, concluding that the published evidence did not, in fact, support the identification of bone surface marks on the two published Dikika fossils as unequivocal stone tool butchery damage (Domínguez-Rodrigo et al., 2010). We further asserted that any equivocation surrounding butchery claims of this great antiquity (i.e., ~800 ka older than oldest known butchery marks from Gona [Ethiopia], where marked animal bones are derived from fine-grained sediments and in spatial association with hominin-flaked stone tools [Semaw et al., 2003; Domínguez-Rodrigo et al., 2005]) should lead to rejection of such claims. This assertion is not equivalent to contending the impossibility of >2.6 Ma butchery by hominins. We simply raised two straightforward contentions: (1) that the Dikika fossils derived from a potentially abrasive sedimentary context, and (2) that the Dikika fossils show surface damage that is indistinguishable from that imparted on bone surfaces randomly (by trampling and/or other incidental movement) in such deposits.

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Fig. 1. Some examples of the rocks used for butchery (left) and the morphology of their edges (right). Every piece was selected taking into account that no flaking feature (platform, impact point, overlapping flaking scars, bulb, sinuous ventral profile, concave scars) was present. Frequently other features, such as irregular ragged ventral surface, acute stepping on ventral and dorsal surfaces, and flat ventral profiles, suggestive of natural breakage when present together, were used to document a natural non-anthropogenic origin of the pieces.