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Handaxes in South Africa: Two case studies in the early and later Acheulean

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ABSTRACT

As a characteristic component of the Acheulean Complex that is particularly significant in understanding the technological behaviour of early hominids, handaxes have been extensively discussed for a very long time. However, the fundamental question of temporal trends in handaxe technology is still debated in current research. To contribute to the further understanding of this question, we present a quantitative study of the technology and morphology of handaxes from two sites widely separated in time—the Rietputs 15 earlier Acheulean ca 1.3 Ma, and the Cave of Hearths later Acheulean ca 0.5 Ma. Results show that the technological practice of handaxe manufacture is consistent and conservative through time in these two sites, despite significant differences in raw materials. These commonalities include the ability to detach large flakes, to shape many handaxes with bifacial flaking, and to apply both primary and secondary flaking in shaping and edge refinement. However, there is an increased investment in the time and energy devoted to flaking of the younger Acheulean handaxe sample. Temporal differences in the morphology of handaxes between the two assemblages are not shown in most metrical attributes and indices used in this study. In contrast, extensive variability is observed at the intra-assemblage level in both samples, with Cave of Hearths showing relatively more variability. We argue that the conservatism and variability shown in the handaxes from these two sites widely separated in time are a reflection of the shared and long-lasting success of the Acheulean technological tradition and its flexibility of adaptation to different subsistence niches.

1. Introduction

In the Acheulean technological complex, handaxes have attracted much attention as a diagnostic tool type that contains much information. They have been the subject of many studies for various reasons, such as: their long continuity in time (e.g., Asfaw et al., 1992; de la Torre et al., 2008, 2014; Lepre et al., 2011; Beyene et al., 2013; García-Medrano et al., 2014; Kuman, 2014; Niekus et al., in press); their widespread distribution during the Pleistocene (e.g., Bar-Yosef and Goren-Inbar, 1993; Clark, 1994; Hou et al., 2000; Sharon, 2007; Zhang et al., 2012; Pappu et al., 2011; Bae et al., 2012; Li et al., 2014; Kuman et al., 2016); their purposeful shaping beginning with even the earliest examples at ~1.76 Ma (e.g., Isaac, 1984; Semaw et al., 2009; Beyene et al., 2013; Shimelmitz et al., 2016); the associated physical evidence for hominid evolution from *Homo ergaster* (or African *Homo erectus*) to *Homo sapiens* (e.g., Asfaw et al., 1992; Kuman and Clarke, 2000; Clark et al., 2003; Corvinus, 2004; Curnoe, 2009; Hublin, 2009); their indications of cognitive development over time (e.g., Wynn, 1995, 2002; Pelegrin, 2009; Stout, 2011; Langbroek, 2012); etc. However, despite the recognized significance of the handaxe, there is still limited detail available about trends through time in technology and morphology during the Palaeolithic (Lycett and Gowlett, 2008; Sharon et al., 2011), and most 'bigger picture' information is rather general. For example, through geometric morphometric comparison of handaxes in India with several assemblages from Africa and England through time, Shipton (2013) concluded that biface morphology is most closely linked to the chronology of the

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sites, with large, narrow and thick bifaces more typical of the oldest sites and small, wide and thin bifaces more characteristic of the youngest. In contrast, McNabb et al.'s (2004) study of South African handaxes from a wider timespan of Acheulean sites indicates that there is a lack of clear chronological patterning in handaxe morphology, and shape was a variable idea in the mind of knappers, influenced largely by the differentiated skills and abilities of individuals. Some researchers, however, argue for a geometrically accurate sense of proportion in handaxe shape from 0.7 Ma (Gowlett, 1984, 2011, 2013; Pope et al., 2006). But in a re-examination of Gowlett's (1984) data, McPherron (2000) questioned this idea and suggested that typical handaxe shape is largely a byproduct of the normal reduction process.

These examples illustrate that thus far there is little consensus on technological trends in handaxe manufacture through time. Another and very interesting approach was taken by Sharon (2007, 2010) in a study that included a large number of African industries compared with Israeli and Indian assemblages. Sharon has argued that a 'Large Flake Acheulean' (LFA) technology exists in which flakes were detached in a planned way from giant cores, and when used for handaxe and cleaver blanks they required minimal flaking of the ventral face, mainly to thin the bulbar area. Such assemblages have larger numbers of cleavers and fewer broad-tipped ovate handaxes, which presumably filled the function of cleavers, and handaxes with pointed tips are common. In Israel, there are no LFA assemblages prior to about 0.78 Ma (Sharon, 2010), but in Africa this phenomenon needs closer study.

It is evident that details of technology and morphology, their change through time, and any influence related to raw materials need closer documentation to address such questions and to reach a better overall picture of trends within the Acheulean technological complex, whether they be chronological or regional. In this paper, we present a quantitative study of the technological and morphological characteristics of handaxes in two South African sites as case studies widely separated in time—the Early Acheulean from Rietputs 15 and the later Acheulean from Cave of Hearths. These two sites both have large handaxe assemblages, clearly belong to two separate phases of the Acheulean, and are well representative of the earlier and later African Acheulean. Our aim is to develop a methodology that can facilitate the comparative analysis of Acheulean handaxes through time. While few conclusions can be reached based on only two assemblages, our larger goal is to build the comparative database that can address questions of conservatism and variability in this long-lived industrial complex.

Technological considerations will mainly relate to raw material usage, blank types, flaking pattern and the intensity of handaxe reduction. For the morphological analysis, we will focus on the attributes and indices for size and shape of handaxes. The 3D scanning technique is used to enhance the accuracy of our measurements and particularly to analyse reduction intensity and symmetry (Shipton, 2011, 2013; Shipton et al., 2013; Clarkson, 2013; Clarkson et al., 2014; Shipton and Clarkson, 2015; Li et al., 2015, 2016). The immediate purpose of this paper is to examine the nature of differences in handaxes in two case studies, with attention to those differences that are probably not time-related. From such a database, we hope in the longer run to address interpretations of change or stability through time in handaxes as one informative aspect of hominid behavioural evolution.

2. Materials

Rietputs 15 is a farm located in the Vaal River basin, near Windsorton in the Northern Cape Province, where gravels have been mined for diamonds in deeply buried deposits and artefacts collected from the excavated gravels (Fig. 1). Using the cosmogenic nuclide burial method in ideal conditions for such deeply buried deposits, Gibbon et al. (2009) dated samples from multiple pits and found the gravels had an average burial age of 1.6 Ma. This technique calculates the decay of ^{26}Al and ^{10}Be in quartz produced by cosmic rays at the surface once the deposits have been deeply buried by overlying sediments and shielded from further nuclide production. Burial dates thus provide a minimum age for the stone tools captured within these gravels. The handaxes in this study are limited to those collected from Pit 5 by Leader (2009). The specific date for this pit has a maximum age of 1.31 ± 0.21 Ma and a minimum age of 1.27 ± 0.20 Ma. However, the maximum age is considered to be more accurate due to the time taken for burial by overlying deposits to occur and decay of the elements to begin (Gibbon et al., 2009; Leader et al., in review). The Rietputs 15 artefacts are thus ca 1.3 Ma and belong to an earlier phase of the Acheulean industrial complex. We excluded all handaxes in the collection from study if they had lost their tips or were too highly

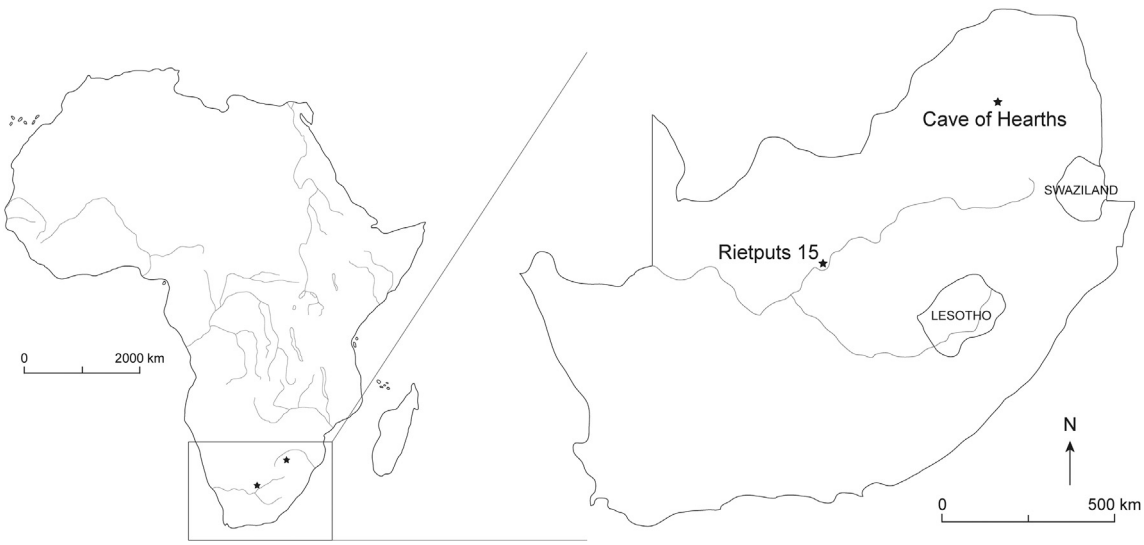

Fig. 1. Geographic locations for Rietputs 15 and the Cave of Hearths in South Africa.

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