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# Small mammal utilization by Middle Stone Age humans at Die Kelders Cave 1 and Pinnacle Point Site 5-6, Western Cape Province, South Africa

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ABSTRACT

Reported here are the results of a taphonomic analysis of the small mammals (between 0.75 kg and 4.5 kg adult body weight) and size 1 bovids (≤20 kg adult body weight) from the Middle Stone Age (MSA) sites of Die Kelders Cave 1 (DK1) and Pinnacle Point Site 5-6 (PP5-6), Western Cape Province, South Africa. This study provides a comprehensive taphonomic analysis of MSA small mammals with a focus on discerning the role of humans in their accumulation and the implications for human behavioral adaptations. Based on comparisons with control assemblages of known accumulation, it is evident that humans accumulated many of the Cape dune mole-rats, hares, and size 1 bovids at DK1. The patterning of cut-marked and burned mole-rat remains at DK1 provides evidence in the MSA for the systematic utilization of small mammals for their skins and as a protein source. Unlike DK1, small mammals and size 1 bovids constitute only a small portion of the PP5-6 mammals and they exhibit little evidence of human accumulation. Nocturnal and diurnal raptors accumulated most of the small fauna at PP5-6. The nominal presence of small mammals in the PP5-6 fauna is atypical of MSA sites in the Cape Floristic Region, where they are abundant and often constitute large portions of MSA archaeofaunas. DK1 humans maximized the environmental yield by exploiting low-quality resources, a strategy employed possibly in response to localized environmental conditions and to greater human population densities. In comparison, the MIS5-4 humans at PP5-6 did not exploit small mammals and instead focused on higher-quality resources like shellfish and large ungulates. Humans and predators accumulated few small mammals at PP5-6, suggesting that these taxa may have been less abundant near the site and/or that humans could afford to concentrate on high-quality resources, perhaps because of a higher-yield local environment. This study suggests that an adaptive response to the environmental conditions of MIS4 was to maximize the resource yield of local habitats to include lower-quality resources when necessary. The incorporation of these resources in the face of changing environmental and perhaps population pressures is a subsistence adaptation that played a crucial role in the population stability and expansion evidenced by the number of sites in the Cape dating to MIS4.



## 1. Introduction

There is general agreement that the African Middle Stone Age (MSA) began by ca. 285,000 years ago (Tryon and McBrearty, 2002, 2006) and persisted until ca. 30,000 years ago (Deacon and Deacon, 1999; McBrearty and Tryon, 2005; Tryon and McBrearty, 2006). Paleoanthropological and archaeological investigations of this time period are frequently rooted in questions concerning the origins of modern human behavior. Throughout Africa, archaeological sequences dating to the last half of the MSA have produced evidence for behavioral characteristics thought to be central to the expansion of modern humans out of Africa. There is consensus that these behaviors include the creation and use of symbols (Henshilwood et al., 2002, 2009, 2011; d'Errico et al., 2005, 2012; Texier et al., 2010), technological and social complexity (Yellen and Brooks, 1995; Wurz, 1999, 2012, 2013; Brown et al., 2009, 2012; Wilkins et al., 2012), and adaptable foraging strategies and use of landscapes (Marean et al., 2007; McCall and Thomas, 2012; Nash et al., 2013; Marean, 2014; Thompson and Henshilwood, 2014a).

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Recently, foraging strategies and landscape use in relation to modern human origins in southern Africa have received attention (Steele and Klein, 2009; Dusseldorp, 2010, 2012; Thompson, 2010a; Clark, 2011; Clark and Kendel, 2013; Henshilwood et al., 2014; Marean, 2014; Marean et al., 2014). The emphasis of this research has been the assessment (temporally and geographically) of purported changes in foraging strategies and landscape use as well as the analysis of subsistence adaptations that may have been driven by – or exhibited in – human behavioral changes during the MSA. While some research has considered time-saving technologies such as snares and traps in relation to small ungulates (Wadley, 2010) and flying birds (Avery, 1990), much of the research has focused on the ability (Milo, 1998; Marean et al., 2000a; Faith, 2008, 2011; Thompson, 2010b; Thompson and Henshilwood, 2011) or inability (Binford, 1984; Klein, 1994, 1995, 1998, 2000; Klein and Cruz-Uribe, 1996; Weaver et al., 2011) of MSA humans to effectively and efficiently exploit large and sometimes dangerous ungulates.

In addition to the focus on large ungulate research, sessile and slow moving organisms have received increased attention. Along the western and southern coasts of South Africa, shellfish (Parkington, 2003; Klein et al., 2004; Steele and Klein, 2005/6, 2008; Marean et al., 2007; Avery et al., 2008; Jerardino and Marean, 2010; Langejans et al., 2012; Klein and Steele, 2013; Wurz, 2013; Jerardino et al., 2014; Marean, 2014; Kyriacou and Parkington, 2015) and tortoises (Klein and Cruz-Uribe, 1983, 2000; Henshilwood et al., 2001a; Klein et al., 2004; Steele and Klein, 2005/6; Avery et al., 2008; Thompson, 2010b; Thompson and Henshilwood, 2014a, b) are often abundant at MSA sites and, along with Klein's (1979) original observations on shellfish and tortoise size in relation to human paleodemography, the study of these remains have addressed questions concerning human mobility patterns, prey choice, subsistence adaptations and foraging strategies.

With the increased scrutiny of MSA hunting and foraging adaptations demonstrated by these and other studies, faunal analysts have redoubled their attention towards comprehensive taphonomic assessments of faunal remains, testing assumptions regarding the agents of faunal accumulation at southern African MSA archaeological sites and allowing for more comprehensive assessment of human foraging behaviors (Marean et al., 2000a,b; Thompson, 2010a,b; Thompson and Henshilwood, 2011; Faith, 2013). By building on the extensive body of zooarchaeological studies from the MSA of southern Africa – where the focus has largely been on taxonomic counts and individual body size comparisons – this line of investigation has proven fruitful regarding the attribution of agency and modes of human processing of large mammals, tortoises, and shellfish. However, with little exception (Badenhorst et al., 2014), small mammals from MSA archaeofaunas have not received the same level of attention as other faunas in spite of the fact that the Cape Floristic Region (CFR) has currently and historically supported a range of small-bodied mammals (mole-rats, leporids, porcupine, rock hyrax, small carnivores, and others) and small-bodied ungulates (klipspringer, steenbok, and grysbok). Many of these mammals regularly occur in MSA assemblages, some in large numbers (Blombos Cave [Henshilwood et al., 2001a], Die Kelders Cave 1 [Klein and Cruz-Uribe, 2000], Diepkloof Rock Shelter [Steele and Klein, 2013], Ysterfontein 1 [Avery et al., 2008], among others) in the Cape.

This paper considers the small mammal (>0.75 kg to <4.5 kg adult body weight, e.g., hares, rock hyrax, and Cape dune mole-rat) and size class 1 bovid (≤20 kg adult body weight [Brain, 1974], e.g., klipspringer, steenbok, and grysbok) archaeofaunas from Die Kelders Cave 1 (DK1) and Pinnacle Point site 5-6 (PP5-6) and provides taphonomic analyses of their remains in order to evaluate the degree to which humans, raptors, and mammalian carnivores were involved in the accumulation of small mammals and size 1 bovids at these sites. Included is a detailed evaluation of bone surface modification frequencies, bone breakage patterns, and comparisons of the DK1 and PP5-6 small mammal archaeofaunas with control assemblages of known human, raptor (diurnal and nocturnal), and mammalian carnivore accumulation. Based on the taphonomic assessment, the role of small mammals in the resource base of humans at these sites will be evaluated and combined with the observations on large mammals, tortoises, and shellfish with a view to establishing a more complete understanding of the range of human subsistence strategies and foraging adaptations employed during the MSA.

## 2. Site description – Die Kelders Cave 1 (aka Klipgat)

The Die Kelders Cave complex (34°32′S, 19°02′E) is located in the Walker Bay Nature Reserve ~120 km southeast of Cape Town and ~250 km west of Pinnacle Point site 5-6 (Fig. 1). DK1 and the adjacent unexcavated site of DK2 form a complex situated >10 m above mean sea level at the eroded contact between the Paleozoic quartzites of the Table Mountain Sandstone Group and the Cenozoic Bredasdorp Limestone Group (Tankard and Schweitzer, 1974; Roberts et al., 2006). The site was originally excavated between 1969 and 1973 by Schweitzer and colleagues (Schweitzer, 1970, 1974, 1979; Schweitzer and Scott, 1973; Tankard and Schweitzer, 1974, 1976; Butzer, 1979), where the published focus was on the Later Stone Age (LSA) component. The excavation was extended between 1992 and 1995 by Avery, Grine, Klein, and Marean (Avery et al., 1997; Goldberg, 2000; Marean et al., 2000b) with emphasis on the expansion of the Middle Stone Age deposit. A descriptive and comparative summary table for DK1 and PP5-6 can be found in Table 1.

DK1 is divided into 14 distinct stratigraphic layers; layers 1–3 were deposited during the LSA and layers 4/5-15 are recognized as MSA in origin (Schweitzer, 1979; Marean et al., 2000b), though layer 15 contained few MSA stone artifacts in comparison to the younger layers (Thackeray, 2000). The sequence tends to alternate between layers of intense (even layers) and weak (odd layers) anthropogenic input (Goldberg, 2000; Marean et al., 2000b). For a complete description of the stratigraphy see Marean et al. (2000b). The LSA occupation has been radiocarbon dated to between 2000 and 1500 years BP (Schweitzer, 1974, 1979). The MSA sequence was dated with electron spin resonance and optically stimulated luminescence when these techniques were in the early stages of their application to cave sediments and therefore the dates may not be as precise as those estimated using more recent versions of these techniques (Roberts et al., 2015). Based on both original dating studies, age estimates for the MSA layers all fall within the error range of each other, making distinction of individual stratum ages unreliable. The consensus age estimate of the entire MSA sequence is ~70 ± 10 ka BP (Feathers and Bush, 2000; Schwarcz and Rink, 2000). Further, luminescence dates obtained from throughout the MSA sequence suggest that the deposits accumulated fairly rapidly (Feathers and Bush, 2000) and the large faunal and sedimentological evidence further suggests that the entire MSA sequence was accumulated during a cool phase in Earth's climate, likely during marine isotope stage (MIS) 4 (71–57 ka BP) (Grine et al., 1991; Avery et al., 1997; Goldberg, 2000; Klein and Cruz-Uribe, 2000). Given the cave's low elevation, deposits accumulated prior to MIS5e would surely have been washed away by the sea level high stand of the period. Based on consensus of dating techniques, large fauna, sedimentology, and sea level, it seems that the MSA occupation of DK1 occurred during MIS4. However, it is necessary to note that the micromammal species diversity from throughout the