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Direct evidence for human exploitation of birds in the Middle Stone Age of South Africa: The example of Sibudu Cave, KwaZulu-Natal

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ABSTRACT

Here, we present direct taphonomic evidence for the exploitation of birds by hunter-gatherers in the Middle Stone Age of South Africa as far as ~77 ka. The bird assemblage from Sibudu Cave, KwaZulu-Natal, was analysed for bone surface modifications. Cut-marks associated with skinning, defleshing, and disarticulation, perforations on distal humeri produced during disarticulation of the forewing, peeling, and human tooth marks were observed on bird bones (i.e., mostly pigeons, doves, Galliformes, waders, and raptors) recovered from pre-Still Bay, Still Bay, Howiesons Poort, and post-Howiesons Poort techno-complexes. We conducted experiments to butcher, disarticulate, cook, and consume pigeon and dove carcasses, in order to create a comparative collection of bone surface modifications associated with human consumption of these birds. Human/bird interactions can now be demonstrated outside of Europe and prior to 50 ka. The evidence sheds new light on Middle Stone Age subsistence strategies in South Africa and introduces a fresh argument to the debate regarding the early emergence of behaviours usually associated with Later Stone Age hunter-gatherers.

1. Introduction

The capture of fast, small game such as flying birds requires innovative acquisition techniques (e.g., blunt-tipped projectile or bow and arrow technologies, use of bolas, nets and snares, or bird lime) and has, therefore, been traditionally associated with *Homo sapiens* and sophisticated hunting skills (see for instance: Kent, 1993; Stiner et al., 1995, 2000; Laroulandie, 2000; Biesele and Barclay, 2001; Bocheński et al., 2009; Wadley, 2010; Moss and Erlandson, 2013). Although a few cut-marked bones illustrate the sporadic use of birds by early hominins as long ago as the Lower Pleistocene (Table 1), regular bird exploitation in Europe and the Levant only starts to be well documented from the beginning of the Upper Palaeolithic onwards and is commonly regarded as a behavioural trait associated with *H. sapiens*, after about 50 ka ago (Finlayson et al., 2012). Besides nutritional resources such as skin, meat, fat, blood, crop contents, and guts, birds can offer a large range of secondary products that include feathers, claws, skins, beaks, eggs, and bones (e.g., Avery, 1985; Laroulandie, 2000, 2009; Low, 2009). Species of birds exploited for their meat during the Upper Palaeolithic comprise waterfowls, partridges, grouses, ptarmigans, choughs, snowy owls, and to a lesser degree bustards, quails, corvids, and doves (Cassoli and Tagliacozzo, 1997; Laroulandie, 2000, 2003, 2009; Stiner et al., 2000; Richards et al., 2001; Tagliacozzo and Gala, 2002; Bocheński et al., 2009). For these periods, birds are also thought to be linked to material and symbolic spheres. Traces of removal and use of feathers and certain bones, such as terminal phalanges or beaks, of raptors and other large birds (e.g., swans) have been recorded at multiple sites. These are interpreted as evidence for the creation of personal ornaments, tools, and/or symbolic objects (Pichon, 1983; Laroulandie, 2000, 2003, 2009; Bocheński et al., 2009). Long bones of large birds have also sometimes been used as a raw material to make musical instruments, in particular, bone flutes (Laroulandie, 2003; Conard et al., 2009).

Recent studies question the chronologically late emergence of bird exploitation by *H. sapiens* (Table 1). For instance, at Bolomor Cave in Spain, birds were consumed regularly for their meat by Neanderthals around 152 ka (Blasco and Fernández Peris, 2009, 2012). At Fumane Cave in Italy, stone tool marks on wing bones of raptors are interpreted as evidence of removal and use of feathers for symbolic purposes (Peresani et al., 2011). This work is supported by similar discoveries at Les Fieux, Combe Grenal (Morin and Laroulandie, 2012), and Mandrin Cave in France and at Rio

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Table 1
Direct evidence of bird exploitation (occurrence of cut-marked bones inside archaeological assemblage) prior to 50 ka in Europe and associated with predecessors of modern humans (*Homo* sp., *Homo heidelbergensis*, and Neanderthals).

Chronology/Techno-complex	Hominin	Site	Birds exploited	Interpretation of use	References
Lower Pleistocene (900 ka–1 Ma)	*Homo* sp.	Dursunlu, Turkey	One tarsometatarsus of a large bird	?	Güleç et al., 2009
>780 ka		Sima del Elefante, (Level TE9a), Spain	One radius of a large bird	?	Huguet, 2007
Acheulean	*Homo heidelbergensis*	Lazaret Cave (UA 25), France	One humerus of a pigeon	Food	Roger, 2004
Middle Pleistocene (152 ± 23 ka)	*Homo neanderthalensis*	Bolomor Cave (Level XI), Spain	Anatidae remains	Food	Blasco and Fernández Peris, 2009, 2012
Middle Pleistocene		Baume de Gigny (Level XV), France	One swan distal phalanx		Mourer-Chauviré, 1989
~100 ka		Pech de l'Azé IV (Level 8), France	Raptor terminal phalanges	Symbolic purposes	Dibble et al., 2009
~90 ka		Combe Grenal	Terminal phalanges of diurnal raptors	Symbolic purposes	Morin and Laroulandie, 2012
60–40 ka		Les Fieux			
MIS 3		Pech de l'Azé I	Golden eagle phalanges	Symbolic purposes	Soressi et al., 2008
67.9–28 ka		Gorham's Cave, Gibraltar	Rock Doves	Food	Blasco et al., 2014
44 ka		Grotta di Fumane (Level A), Italy	Wing bones of raptors, Corvids and wood pigeon	Symbolic purposes	Fiore et al., 2004; Peresani et al., 2011

Secco Cave in Italy (Romandini et al., 2014), as well as by a survey conducted by Finlayson et al. (2012) that confirms the regular exploitation of raptors and corvids by Neanderthals. At Gorham's Cave, in Gibraltar, there was frequent rock pigeon exploitation by Neanderthals for food at around 68 ka (Blasco et al., 2014).

In South Africa, faunal assemblages from coastal Middle Stone Age (MSA)/Later Stone Age (LSA) sites from the Western Cape, as well as inland sites (e.g., Bushman Rock Shelter and Rose Cottage Cave; Avery, 1987, 1990, 2011; Plug and Engela, 1992; Conard et al., 2008; Dewar, 2008; Thompson, 2010; Badenhorst and Plug, 2012; Steele and Klein, 2013), generally contain bird bones (Table 2, Fig. 1).

Although *H. sapiens*, associated with MSA technology, is present in southern Africa since at least ~160 ka (McBrearty and Brooks, 2000; Marean et al., 2007, 2010), but probably even earlier (Wadley, 2015), the ability to capture airborne birds on a regular basis is generally regarded as a relatively recent development, associated with LSA hunter-gatherers (Klein, 1976, 1979, 2001; Klein et al., 2004; Steele and Klein, 2009). The prevailing interpretation concerning the role of birds in subsistence strategies is that, prior to the LSA, humans did not possess the technological skills that allowed them to catch flying prey routinely. This view, challenged by some (see, for instance, Avery, 1990, 2011), has been mostly defended by Klein (1976, 1979, 1992, 2001, 2008; Klein et al., 2004; Steele and Klein, 2009). Klein's arguments for a shift in the modalities of bird exploitation between the MSA and the LSA are based on the composition of avifaunal assemblages recovered from coastal sites in the Western Cape, particularly Klasies River Mouth, Die Kelders Cave 1, and Ysterfontein 1. In these fossil assemblages, the MSA archaeological layers are characterised by higher frequencies of non-flying birds (i.e., African penguins) than flying ones (e.g., Cape gannets and cormorants). The opposite situation is observed in the LSA units and in coastal sites, including Elands Bay Cave and Nelson Bay Cave, where remains of flying seabirds are abundant in the LSA layers (Klein, 1972; Avery, 1987, 1990).

A recent taphonomic study of the avifauna from the MSA units of Sibudu Cave, an inland site in KwaZulu-Natal, demonstrates that bird exploitation was practiced by the inhabitants of the shelter, from the pre-Still Bay through to the post-Howiesons Poort (Val, 2015). Bone surface modifications attributed to human butchery were identified, mostly on remains of Columbiformes (i.e., pigeons and doves) and, to a lesser degree, waders, Galliformes, and raptors. Here, we provide a detailed analysis of these modifications, in order to reconstruct patterns of bird exploitation at Sibudu. As actualistic data on damage caused to Columbiforme skeletons by human consumption are not available in the literature, we conducted butchery and cooking experiments on dove and pigeon carcasses. The comparative sample thus created was used to interpret bone surface modifications observed on the archaeological material.

Table 2
Size of bird samples (given in number of identified specimens [NISP] and in minimum number of individuals [MNI]) recovered from various South African MSA and LSA fossil assemblages.[a]

Site	Location	Unit	NISP	MNI	Sieving	References
Ysterfontein 1	Coastal	MSA	326	62	1.5 mm	Avery et al., 2008
Klasies River Mouth	Coastal	MSA/LSA	n.d.	n.d.	n.d.	Klein, 1976
Pinnacle Point Cave 13B	Coastal	MSA	57	n.d.	3 mm	Thompson, 2010
Die Kelders 1	Coastal	MSA	1047	338	1.5 mm	Schweitzer, 1979; Avery, 1990, 2011; Avery et al., 1997
		LSA	852	117		
Elands Bay Cave	Coastal	LSA	4085	535	3 mm	Avery, 1990, 2011
Nelson Bay Cave	Coastal	LSA	4834	722	3 mm	Avery, 1987, 1990, 2011
Diepkloof Rock Shelter	14 km inland	MSA	8	n.d.	5 mm	Steele and Klein 2013
Sibudu Cave	15 km inland	MSA	1835	249	1 mm	Plug and Clark, 2008; Val, 2015; this study
Bushman Rock Shelter	Inland	MSA	110	n.d.	3 mm	Plug, 1982; Badenhorst and Plug, 2012
		LSA	n.d.	28	3 mm	
Rose Cottage Cave	Inland	LSA	42	23	2 mm	Plug and Engela, 1992

[a] n.d. = no data available.