An early date for cattle from Namaqualand, South Africa: implications for the origins of herding in southern Africa

Jayson Orton[1], Peter Mitchell[2], Richard Klein[3], Teresa Steele[4] & K. Ann Horsburgh[5]

When did cattle come to South Africa? Radiocarbon dates on a newly found cow horn indicates a time in the early first millennium AD. In a study of the likely context for the advent of cattle herding, the authors favour immigrants moving along a western route through Namibia.

Keywords: South Africa, Namaqualand, cattle, early herding, dispersal routes

Supplementary material is provided online at http://antiquity.ac.uk/projgall/mitchell335/

Introduction

On first reaching southern Africa in 1488, Europeans encountered pastoralist populations (the Khoekhoen) who possessed numerous sheep and cattle, access to which was a key

[1] *Archaeology Contracts Office, University of Cape Town, Rondebosch 7701, South Africa; School of Archaeology & St Hugh's College, University of Oxford, Oxford OX2 6LE, UK (Email: jayson.orton@uct.ac.za; jayson.orton@aco-associates.com)*

[2] *School of Archaeology, University of Oxford, St Hugh's College, Oxford OX2 6LE, UK; School of Geography, Archaeology and Environmental Studies, University of the Witwatersrand, Wits 2050, South Africa (Email: peter.mitchell@st-hughs.ox.ac.uk)*

[3] *Program in Human Biology, Stanford University, Stanford, CA 94305, USA (Email: RKlein@stanford.edu)*

[4] *Department of Anthropology, University of California, Davis, CA 95616-8522, USA (Email: testeele@ucdavis.edu)*

[5] *Department of Anatomy and the Allan Wilson Centre for Molecular Ecology and Evolution, PO Box 913, University of Otago, Dunedin 9054, New Zealand (Email: horsburgh@otago.ac.nz); School of Geography, Archaeology and Environmental Studies, University of the Witwatersrand, Wits 2050, South Africa*

motivation in the eventual establishment of a Dutch East India Company (VOC) outpost at Cape Town in 1652. The origin of these domesticates, as well as the dogs and goats that some Khoekhoen also owned, has been debated for over a century, although always recognising that they must have come from north of the Equator (Smith 2005). Sourcing the domesticates has also often been linked to their frequent—though not universal—co-occurrence with pottery and with the history of the Khoe language family, one variant of which the Khoekhoen themselves spoke (Güldemann 2008).

The debate is complex. One view envisages a spread west from Botswana then south through Namibia into the Cape of South Africa (Cooke 1965). The alternative sees a more complex set of movements along the eastern margins of the Kalahari, south toward the Orange/Vaal confluence and then downstream into Namibia and Namaqualand, as well as southward via the Karoo into the Cape (Figure 1) (Elphick 1985; Ehret 2008). Related to this is the question of process: did livestock, pottery and the Khoe language spread as an integrated package around 2000 years ago—perhaps combined with a distinctive style of geometric rock art (Smith & Ouzman 2004)? And was this spread the result of migration from the far north of Botswana (Westphal 1963), but possibly with ultimate origins in East Africa (Smith 2006, 2008; see also Henn *et al.* 2008 for a genetic perspective on this)? Or was the appearance of the Khoekhoen as an ethno-linguistic community a more recent, late first/early second-millennium AD development in the Cape, preceded by many centuries in which sheep were exchanged among indigenous hunter-gatherer populations in Namibia and western South Africa to produce a situation of 'hunters-with-sheep' who only rarely developed a greater commitment to livestock rearing (Sadr 1998, 2008)?

Both these models for the spread of livestock—and most overviews (e.g. Klein 1986; Deacon & Deacon 1999; Mitchell 2002)—assume that the earliest livestock were sheep, with cattle not reaching the Cape before 1300 BP, perhaps from mixed farming iron-using Bantu-speaking communities significantly further east (Smith 2006). Indeed, Sadr (1998: 124, note 5) went so far as to ask if the intensive cattle-rearing recorded for late seventeenth-century Khoekhoen at the Cape was "a response to the lucrative VOC market for beef", in which case the large numbers of cattle reported by Dutch observers would have been a very recent development, wholly uncharacteristic of the preceding 1500 years. Publication of AMS radiocarbon dates from Toteng 1, Botswana, has since shown that domesticated cattle were present in a microlithic Later Stone Age (LSA) context in the northern Kalahari some 2000 years ago (Robbins *et al.* 2005, 2008). Until now, however, comparable evidence has been lacking elsewhere in southern Africa. The only exception would be Horsburgh's (2008) identification of cattle DNA in bones from 2000-year-old deposits at Byneskranskop Shelter, south-east of Cape Town. However, she now believes that further analysis is needed for confirmation of this. Here we report a new directly dated horn core of cattle (*Bos taurus*) from KN2005/041 in Namaqualand near Koingnaas on South Africa's Atlantic coast (Figure 1). This find contradicts long-held views about the antiquity of cattle so far south and carries important implications as to how and in what circumstances livestock reached southernmost Africa.

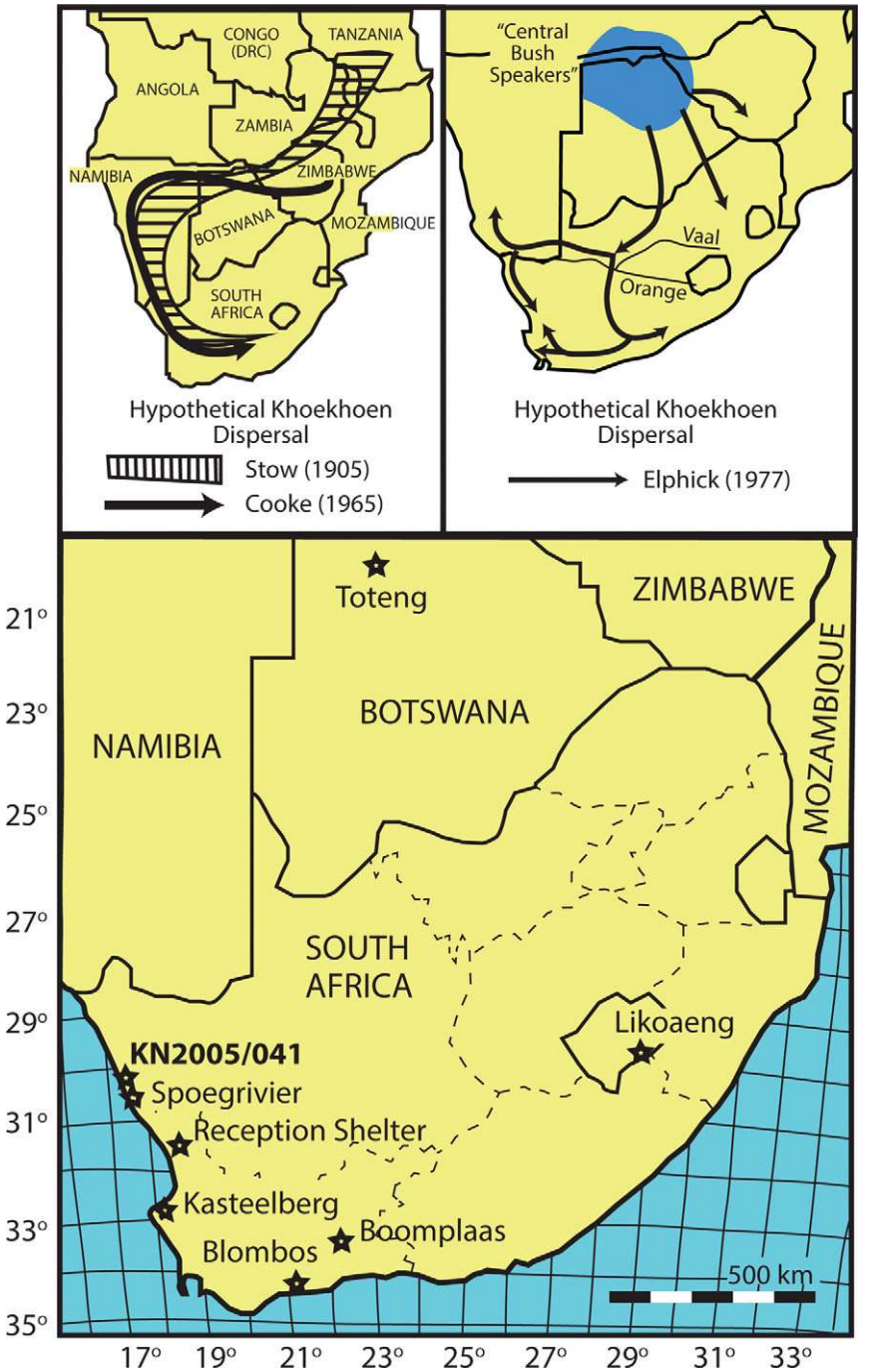

Figure 1. Southern Africa showing the putative movements of early herders according to Cooke (1965) and Elphick (1985) and the archaeological sites mentioned in the text.

KN2005/0041

KN2005/041 (30°14′06″S, 17°15′00″E) is an *in situ* shell midden located some 570m from the sea and 3.3km from the Swartlintjies River. The single archaeological layer present was excavated over an area of 10.5m^2 in mitigation of mining activities (Orton & Halkett 2006). The moderately sized lithic assemblage (N = 354) is made almost entirely in quartz (91.2% of all flaked stone artefacts and made from both crystal and vein variants), with much smaller components of crypto-crystalline silica (5.4%), silcrete (2.8%) and other rocks (0.6%). Bipolar reduction dominates the cores (76.9%). Despite having just one backed point in crystal, the assemblage conforms well to a subset of Holocene Namaqualand assemblages characterised by very frequent use of crystal quartz overall and a preponderance of backed items among the retouched component, itself usually exclusively made of crystal quartz (Orton *et al.* 2005). Other artefacts comprise three ostrich eggshell beads (mean external diameter: 4.74±0.15mm; mean aperture: 1.28±0.22mm), a few fragments of bead manufacturing debris and the rims of two limpets (*Scutellastra argenvillei*), the latter water worn and/or sandblasted and presumably collected from the beach. Pottery was absent. A single AMS charcoal date (OxA-22979) of 1631±23 BP (AD 418–552, 95.4% probability) conforms well with the AMS date for a cattle horn reported below.

The KN2005/041 horn core

At KN2005/041 the surviving bones were highly fragmented and had been impacted by carnivore chewing (see Table 1 for a complete species list). The assemblage includes a domestic cow (*Bos taurus*) horn core base (Figure 2). It has been dated directly to 1625±25 BP (OxA-22933), which calibrates to AD 421–559. This date overlaps almost entirely with that obtained on the above noted charcoal sample from the same site and reinforces the stratigraphic case for a single, brief occupation in the fifth/sixth centuries AD.

Although organic preservation was poor, we were able to recover a very small fragment of mitochondrial DNA from the horn core. In keeping with advance expectations, this matched the homologous portion of the mitochondrial genome in cow. In contrast, a more extensive segment of the mitochondrial genome recovered from a very young upper right maxilla (Figure 3) that we had previously identified as cow from Reception Shelter, approximately 200km to the south-east (Orton *et al.* 2011), turned out instead to represent gemsbok (*Oryx gazella*), a large indigenous bovid that was common nearby historically and has been identified in other regional archaeological sites (Dewar 2008). The maxilla had been directly dated to 1840±26 BP (OxA-25354) or AD 132–226 calibrated at 95.4% probability, and it thus appeared to support the early to mid-first millennium occurrence of cattle indicated by the Koingnaas horn core. The layer from which it came contained pottery and may yet provide cattle remains, but our misidentification illustrates the value of an ancient DNA check on a specimen that in retrospect was morphologically ambiguous. For specialists who may want to undertake similar checks, we provide Supplementary Material that outlines the DNA extraction and analysis protocols used.

Table 1. Faunal remains from KN2005/041, presented as the Number of Identifiable Specimens (NISP) and Minimum Number of Individuals (MNI) for each taxon. Counts for tortoises are based on humeri.

Linnaean names	Vernacular names	NISP/MNI
Leporidae gen. et sp. indet.	rabbits and hares	10/2
Felis libyca	wildcat	1/1
Mellivora capensis	honey badger	1/1
Arctocephalus pusillus	Cape fur seal	3/1
Raphicerus campestris	steenbok	1/1
Bos taurus	cattle	1/1
	small bovid(s)	9/1
	large–medium bovid(s)	1/1
	large bovid(s)	3/1
Chersina angulata	angulate tortoise	4
Spheniscus demersus	African penguin	1/1
	other birds	1/1
	fish	4/1

Figure 2. The directly dated and genetically identified cow (Bos taurus) *horn core from KN2005/041. (Scale in 10 mm intervals.)*

Implications for the origins and spread of domestic livestock

Table 2 summarises the direct dates for early domestic livestock from Namaqualand and elsewhere in southern Africa. Sites associated with Early Farming Communities are excluded, but cattle were certainly present in such contexts in the eastern half of southern Africa from at least the sixth century AD (Huffman 1998), and in at least one instance were apparently kept there by hunter-gatherers (Mitchell *et al.* 2008).

In the sub-continent's semi-arid western third, the directly dated KN2005/041 horn core pushes back the antiquity of cattle in South Africa by roughly 300 years. It is significantly older than the cattle previously reported in a Western Cape LSA context from Layer 14

*Figure 3. The gemsbok (*Oryx gazella*) right maxilla from Level 24 (Layer 9A) Reception Shelter. (Scale in 10mm intervals.)*

at Kasteelberg B (Klein & Cruz-Uribe 1989; Smith 2006), which postdate 1310±50 BP (Pta-4373). The bones in question have never been directly dated but represent the oldest positively identified cattle from this site, which seems to have functioned principally as a sealing and sheep-kraaling station where cattle were, at all times, only rarely or episodically kept or slaughtered (Klein & Cruz-Uribe 1989: 85–86; Cruz-Uribe & Klein 1994: 36). The importance of directly dating faunal remains is nevertheless well established from previous work on the antiquity of sheep in southern Africa (Sealy & Yates 1994, 1996), which showed that in several cases putatively early sheep bones and teeth had, in fact, migrated down through archaeological stratigraphies into older contexts. Previously, direct dating of cattle has only been undertaken at Toteng 1 in northern Botswana. There, a second/third carpal, identified as *Bos taurus* on a combination of qualitative and metric criteria, is dated to the first/second centuries BC (Beta-1904888, 2070±40 BP). Any residual ambiguity that might pertain to this identification certainly does not apply to an overlying upper molar, dated to the mid-first millennium AD (Beta-186670, 1480±40 BP) (Robbins *et al.* 2005, 2008). Our findings confirm the importance of directly dating archaeologically important faunal remains wherever this is possible and also, given our experience at Reception Shelter, of confirming any ambiguous identifications with DNA analyses. We now discuss their implications for the history and development of livestock keeping in southern Africa.

For over a decade Sadr (1998, 2003, 2008) has argued that livestock (in the form of sheep) were introduced to south-western southern Africa via diffusion or exchange among resident hunter-gatherer communities. These groups are postulated to have added the keeping of small numbers of sheep to a mobile hunter-gatherer lifestyle without otherwise significantly transforming their mode of subsistence or social relations. An explicit parallel is drawn with some central Kalahari Bushman groups, who have recently added goat-herding to their economy without, apparently, altering their social relations to any great degree (Ikeya 1993). Pottery may have spread along with sheep, but its dispersal (or innovation; Sadr & Sampson 2006) is not germane to our discussion here. More relevant is Sadr's (1998) rejection of migration as the vehicle for introducing ceramics and sheep to the Cape and his argument that the ancestors of the historic Khoekhoen only arrived there late in the first

millennium AD. For him, this is indicated by the presence at that point—among several other changes in material culture and faunal assemblages—of lugged ceramics in the key Kasteelberg sequence, paralleled by other instances of pottery with lugs at sites further north.

Countering these arguments, Smith (2006, 2008) has resolutely maintained the case for an immigrant ancestral Khoe population having introduced both pottery and sheep to the Cape some 2000 years ago. One key element of his argument is the identification of distinct archaeological assemblages on the landscape of the Vredenburg peninsula around Kasteelberg over the past 2000 years (interpreted as produced by hunters and herders respectively; Smith *et al.* 1991). A second mainstay is the difficulty that egalitarian foragers are supposed to have had in acquiring the technical knowledge to keep livestock or in retaining privately owned live animals in defiance of sharing obligations (although this must have happened at some point, presumably at the origin of the Khoe migration through close contact with an already existing pastoralist society; Smith 1990; cf. Barnard 2008). Both points are debatable. For example, alternative readings of the Vredenburg peninsula's archaeology are possible (Schrire 1992; Sadr *et al.* 2003), while the criteria suggested as differentiating herders from hunter-gatherers are not readily applicable to other areas where the two are thought to have co-existed (Wilson 1996; Webley 1997; but cf. Parsons 2007). Moreover, the assumption that late first-millennium BC/early first-millennium AD Cape foragers were organised socially along the same lines as twentieth-century Bushmen is merely that; Jerardino (1996), for instance, postulates a more delayed return economy (Woodburn 1982), while Wilmsen (1989) suggests that today's egalitarianism is a function of encapsulation by herders and agropastoralists (Woodburn 1988).

Also relevant, however, is Smith's argument that to allow for predation, disease and other losses and to provide meat and milk, people would have had to keep sheep in flocks of 60–100 (Smith 2006: 69–70). While these numbers derive from East African and Middle Eastern comparisons (Dahl & Hjört 1976) that may not be appropriate in a southern African setting two millennia ago, the spatially extensive dung-rich horizons within Boomplaas Cave (Deacon *et al.* 1978) suggest that at least some people kept sheep in large numbers, or over a long time, in the Cape. By the time that those deposits formed in the mid-first millennium AD, cattle, as well as sheep, were present in Namaqualand (Table 2). As with sheep, the presence of a single identifiable *Bos taurus* element surely implies that many more cattle were on the landscape (Huffman 1998). Moreover, we now have not just one, but two sets of skills and technical knowledge to consider, one to care for flocks of sheep, the other for maintaining herds of cattle.

Does this mean that sheep and cattle spread together? The co-occurrence of both species at Toteng 1 and the overlap of the dates we report here with some of those for directly dated sheep in the Cape certainly allows for this possibility. On the other hand, we know from Spoegrivier Cave, only a few kilometres south of KN2005/041, that sheep were present in Namaqualand as early as the late first millennium BC/very early first millennium AD (2105±65 BP, OXA-3862; Sealy & Yates 1994). Sheep *may* therefore have been kept in Namaqualand before cattle, although the fact that epizootic disease barriers, such as trypanosomiasis, will not have prevailed in the western half of southern Africa south of the Okavango (Gifford-Gonzalez 2000) means that, so long as sufficient grazing and water

Table 2. Early dates for cattle and sheep in Namaqualand and other parts of southern Africa discussed in the text. All dates are calibrated on OxCal (Bronk-Ramsey 1995, 2009) using the SHCal04 curve (McCormac *et al.* 2004).

Site	Location	Lab. no.	Date BP	Calibrated date (95.4% probability)	Comment	Reference
Toteng 1	Northern Botswana	Beta-1904888	2070±40	162 BC–AD 75	Cattle, second/third right carpal	Robbins *et al.* 2005, 2008
KN2005/041	Northern Namaqualand	OxA-22933	1625±25	AD 421–559	Cattle, horn core	This paper
Toteng 1	Northern Botswana	Beta-186670	1480±40	AD 556–667	Cattle, upper molar	Robbins *et al.* 2005, 2008
Kasteelberg B	Western Cape	Pta-4373	1310±50	AD 665–885	*Terminus post quem* for cattle at this site	Klein & Cruz-Uribe 1989
Spoegrivier Cave	Northern Namaqualand	OxA-3862	2105±65	350 BC–AD 115	Sheep, third phalange	Sealy & Yates 1994
Toteng 1	Northern Botswana	Beta-186669	2020±40	83 BC–AD 131	Sheep, right astragalus	Robbins *et al.* 2005, 2008
Blombos Cave	Southern Cape	OxA-4543	1960±50	34 BC–AD 237	Sheep, left mandible	Henshilwood 1996
Blombos Cave	Southern Cape	OxA-4544	1880±55	AD 62–344	Sheep, calcaneum	Henshilwood 1996
Boomplaas	Southern Cape	UW-338	1700±55	AD 255–543	Charcoal from hearth at base of BLD2	Deacon *et al.* 1978
Boomplaas	Southern Cape	UW-337	1630±50	AD 384–604	Top of DGL below historic dung	Deacon *et al.* 1978
Boomplaas	Southern Cape	UW-307	1510±75	AD 420–760	Charcoal from stone-lined hearth at top of BLD2	Deacon *et al.* 1978

were consistently available to allow both sheep and cattle to be maintained, there were fewer serious ecological barriers to their paired southward movement. Sustaining large numbers of livestock, on the other hand, will have demanded strategies to deal with locally prevalent nutritional deficiencies, poisonous plants (such as gifblaar, *Dichapetalum cymosum*) and diseases (such as botulism (*lamsiekte*)).

Parsimony would also favour a single, paired introduction of both cattle and sheep, though the complete absence of cattle (but not sheep) in the fine-line rock art tradition of the Cape has been cited as evidence for a later introduction of cattle there (Yates *et al.* 1994). Stable isotope analyses of human skeletons from the southern Cape (Cape Town to the Tsitsikamma coast) may back this by suggesting a dietary shift toward C_4-based foods (most probably cattle-derived dairy products) only from the early second millennium AD (Sealy 2010), but earlier skeletons are few and comparable studies from Atlantic South Africa have yet to be undertaken. Isotopic analyses of sheep (and one cow) from Kasteelberg (Balasse *et al.* 2002) nevertheless suggest that precolonial herders were not as mobile as those encountered by the Dutch in the mid/late seventeenth century, perhaps indicating that they did not manage large numbers of cattle, which would have required greater mobility than sheep.

There is then the question of the route or routes by which livestock moved. As we have seen, opinion has historically been split between a more westerly direction and a more complicated dispersal pattern passing through the central interior of South Africa. Smith & Ouzman (2004) recently emphasised the latter by reference to the distribution of a geometric rock art style that they attribute to the Khoekhoen, but the oldest known examples of domestic sheep from South Africa come exclusively from the south-western part of the country. These are at Spoegrivier (Sealy & Yates 1994), Blombos on the south coast near Mossel Bay (Henshilwood 1996) and Boomplaas (Deacon *et al.* 1978). Fieldwork and dating are, of course, much patchier than we should like, but the continuing failure of archaeological excavations to deliver early first-millennium AD/late first-millennium BC directly dated livestock from the Karoo, the Free State or areas further north within South Africa counsels against a dispersal route through the areas envisaged by Elphick (1985), Smith & Ouzman (2004) and Ehret (2008). That we now have early first-millennium AD instances of cattle, as well as sheep, near South Africa's Atlantic shoreline dating to the fifth/sixth centuries AD, only a few hundred years after both species occur in northern Botswana, leads us instead to favour, at least south of the Orange River, a southward movement along that coast. In support, the Spoegrivier mammalian microfauna indicates a milder climate and greater grass cover around 2000 years ago that may have facilitated the introduction of sheep to the area (Avery 1992). Moreover, where water running along bedrock emerges above the high tide level along Namaqualand's coast, seeps attract animals today and could have provided fresh water to migratory livestock in the past.

Finally, we briefly address those studies that have considered these issues from the standpoint of historical linguistics. Ehret (2008) has long maintained that ancestral Khoe-speakers acquired sheep before cattle and at a time when Proto-Khoekhoe was already diverging from early forms of the Khoe languages spoken today by hunter-gatherers in the Kalahari. He has further sourced those livestock to a putative Central Sudanic- (more recently) 'Eastern Sahelian'-speaking population of East African origin said to have moved

south into the mid-Zambezi region. However, the linguistic basis of these claims is weak (Haacke 2008) and other assessments emphasise that the immediate ancestors of both Proto-Kalahari Khoe and Proto-Khoekhoe may have been familiar with cattle, as well as sheep (Güldemann 2008: 107), consistent with the presence of both species at Toteng 1 around 2000 years ago. Furthermore, while Khoekhoe does indeed seem less than two millennia old, perhaps supporting Sadr's (1998) hypothesis about a late first-millennium AD Khoekhoe arrival in the Cape, such a young linguistic age "does not exclude the earlier presence of other Khoe speakers" (Güldemann 2008: 106) and thus a migrationist scenario for the introduction of both cattle and sheep through western southern Africa some 2000 years ago.

Conclusions

The AMS date on domestic cattle from KN2005/041 significantly pushes back the antiquity of cattle in South Africa, raising the possibility that cattle and sheep arrived at the Cape together around 2000 years ago. While residual doubt may attach to identifications of postcrania (Sadr 2008: 182), no such queries pertain to the identity of the KN2005/041 horn core reported here which is supported by ancient DNA. Key findings of our study are that: (1) cattle were present in western South Africa early in the first millennium AD; (2) early cattle are thus unlikely to have been obtained from Bantu-speaking agropastoralists in eastern South Africa, because the date presented here pre-dates (or only minimally overlaps with the start of) the Bantu-expansion into that region (Huffman 2007); (3) migration may be a more tenable hypothesis than diffusion for the spread of early pastoralism (although whether early migrants spoke Khoekhoe remains moot); and (4) livestock are more likely to have spread along a western route to the Cape than one through the central interior of southern Africa.

Notwithstanding the importance of the date discussed here, debate on southern Africa's earliest herders still emphasises what species they kept and in what numbers rather than how they *managed* their livestock on the regional landscape as part of a mixed economy that also included substantial components of gathering and hunting (though, for an exception to this generalisation, see Smith 1983, 2006). It is toward that goal that further work must be directed and we expect that further stable isotope analyses (cf. Balasse *et al.* 2002) and more detailed palaeoenvironmental studies (cf. Avery 1992) will help meet it. Identification and excavation of additional sites at which livestock were kept and killed is also critical. In the Cape some progress is now being made in finding such locales, often in the open and with low densities of archaeological remains (Fauvelle-Aymar *et al.* 2006; Jerardino & Maggs 2007). The fact that the horn core we discuss here comes from a small open-air shell midden reiterates this point, as well as the likelihood that high-density sites such as those at Kasteelberg may be the exception, not the norm (Arthur 2008). Direct dating and DNA extraction from relevant faunal remains is nevertheless essential since only if we know for certain which species were present when can we begin to frame questions about the social and economic impacts of herding, let alone the identities of those keeping livestock. Longstanding debates about the early history of pastoralism in East Africa (summarised by Ambrose 1998 and Gifford-Gonzalez 1998) would undoubtedly benefit from a comparable programme of targeted AMS dating (Gifford-Gonzalez 2005) and genetic sequencing.

Returning south, we predict that future research in Namibia will find cattle as early as, or earlier than, in Namaqualand. Nor shall we be surprised if the date reported here is eventually matched by others from sites located still further south within the Fynbos Biome of the Cape.

Acknowledgements

The dates were obtained through NERC grants NF/2010/2/4 and NF/2009/2/4 to Peter Mitchell and we thank Professor Tom Higham for his help in the submission and processing of the samples. Ancient DNA analyses were funded by a Royal Society of New Zealand Marsden Grant to K.A. Horsburgh. Mr Petro Visser (Reception Shelter) and De Beers Namaqualand Mines (KN2005/041) are thanked for access to the sites and two referees and Professor Martin Carver for their helpful comments on the original manuscript.

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Received: 8 February 2012; Accepted: 30 March 2012; Revised: 26 April 2012