
ARCHAEOLOGICAL EVIDENCE OF DOMESTIC SHEEP IN THE NAMIB DESERT DURING THE FIRST MILLENNIUM AD

John Kinahan



Abstract

Bones of domestic sheep dated to the early first millennium AD are described from the Dâures massif in the Namib Desert. The remains confirm earlier investigations which inferred the acquisition of livestock from indirect evidence in the rock art, suggesting a fundamental shift in ritual practice at this time. Dating of the sheep remains is in broad agreement with the dating of other finds in the same area and in southern Africa as a whole. The presence of suspected sheep bone artefacts, possibly used for ritual purposes, draws attention to the importance of livestock as more than a component of diet in the changing economy of hunter-gatherer society.

Résumé

Des os de mouton domestique datés du début du premier millénaire AD, découverts dans le Massif des Dâures (Désert du Namib), sont ici décrits. Ces vestiges confirment les premières observations effectuées sur l'art pariétal qui indiquaient de façon indirecte l'acquisition du bétail et suggéraient une transformation fondamentale des pratiques rituelles à cette époque. La datation de ces vestiges de mouton s'inscrit dans le cadre chronologique des découvertes locales et d'Afrique australe dans son ensemble. D'éventuels artefacts sur os de mouton, potentiellement attribués à des fins rituelles, sont aussi discutés. Ce fait attire notre attention sur l'importance du bétail au-delà de son utilisation comme ressource alimentaire, au sein du système économique en mutation de la société des chasseurs-cueilleurs.

Keywords: Namib Desert, hunter-gatherers, domestic sheep, nomadic pastoralism

John Kinahan  jkinahan@iafrica.com.na

 School of Geography, Archaeology and Environmental Studies, University of the Witwatersrand, South Africa

and Namib Desert Archaeological Survey, P.O. Box 22407, Windhoek, Namibia

DOI 10.3213/2191-5784-10280

© Africa Magna Verlag, Frankfurt a. M.

Received 15 Jun 2015

Revised 17 Nov 2015

Accepted 21 Nov 2015

Published online 23 Mar 2016

Journal of African Archaeology Vol. 14 (1), 2016, pp. **-**

Introduction

Domestic sheep *Ovis aries* first arrived in southern Africa approximately two thousand years ago with the spread of food production into this region. In most instances early evidence of domestic sheep has been found in rock shelter sites, associated with recent Holocene hunter-gatherer stone artefact assemblages and food remains, suggesting a nascent form of stock-keeping on the periphery of a fully developed pastoral economy (FAUVELLE-AYMAR & SADR 2008). Preservation favours such sites, and evidence from open encampments of pastoralists, as documented in the historical record, is generally scarce (ARTHUR 2008). The circumstances of livestock acquisition by hunter-gatherers and their adoption of pastoralism are disputed, however, and some consider that fundamental precepts of hunter-gatherer culture, which place value on communal access to resources, would militate against individual ownership of livestock and the establishment of breeding herds (see MCGRANAGHAN 2015). In this view, domestic sheep found among food remains on hunter-gatherer sites might evidence occasional barter or theft rather than a transition to pastoralism (SMITH 2008).

This paper presents evidence supporting an alternative hypothesis that hunter-gatherer communities in the Namib Desert adopted pastoralism through a process that involved a fundamental social transition during the last two millennia (KINAHAN 2001). The evidence, previously overlooked in faunal assemblages from Falls Rock Shelter and Snake Rock, confirms the presence of sheep among food remains dated to the early first millennium AD.

Further examination of the faunal sample also indicates that an assemblage of bone artefacts dating to the same period at Snake Rock includes slivers from the long-bones of sheep. These artefacts, found buried in a stone-lined pit, show extensive modification including perforation at the ends, allowing them to be strung together. This evidence accords with the more recent use of small-stock bones for symbolic purposes by Namib Desert pastoralists, also reported here, and casts further light on the social dimensions of the process of livestock acquisition and the adoption of a pastoralist way of life.

Possible early first millennium AD sheep remains have been reported from four sites in Namibia (**Fig. 1**). SANDELOWSKY *et al.* (1979) assigned a date of 1550 ± 40 BP to a sample of hair identified as sheep at Mirabib Shelter; SMITH & JACOBSON (1995) reported sheep bone from a context associated with a date of 1790 ± 80 BP at Geduld; PLEURDEAU *et al.* (2012) reported sheep teeth dated to 2270 ± 40 BP at Leopard Cave; and ALBRECHT *et al.* (2001) reported sheep bone from a context dated to 1306 ± 36 BP at Oruwanje. In all of these instances,

the sheep bones were from small samples of medium-sized bovid remains, showing a strong taphonomic bias against the survival of identifiable skeletal elements, especially cranial and marrow-rich long-bones (*cf.* LYMAN 1994). This tendency is also evident in the faunal remains from Falls Rock Shelter and Snake Rock, which show disproportionate representation of bones from the extremities of the limbs (KINAHAN 2001). A further factor complicating analysis of archaeological fauna in the arid western parts of Namibia is the likelihood of confusing skeletal remains of sheep with those of similar-sized wild bovids which occur in the same area as the archaeological sites.

Conventionally, archaeological investigation of nomadic pastoralism in southern Africa has privileged direct evidence of domestic livestock, even though much of the evidence is ambiguous in its context and provides no clear attribution to hunter-gatherer or pastoralist (*cf.* SADR 2008a). One part of this dilemma refers to taphonomy, and the other to the defining characteristics of livestock ownership. The extent to which sheep-sized bovids are represented in archaeological

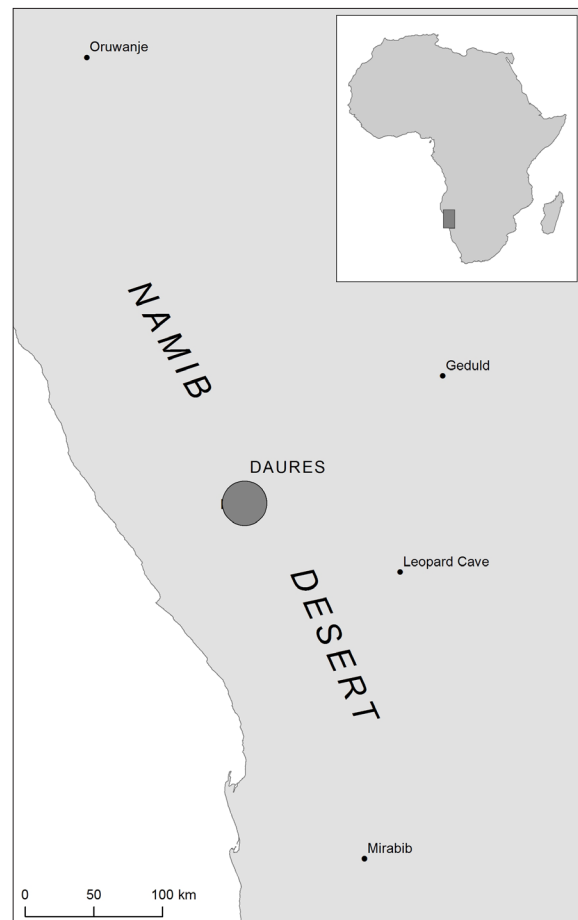


Figure 1. The distribution of early first millennium AD domestic sheep finds in the Namib Desert.

contexts is clearly affected by butchery practices and discard patterns, but as this paper will argue, it may also be influenced by the use of particular skeletal elements for symbolic purposes. Far from depicting livestock-keeping as a simply utilitarian pursuit and a point of technological distinction from a purely hunter-gatherer existence, the historical ethnographic record shows that pastoral society was structured around the social relations of ownership and that this was expressed in many cultural practices (BARNARD 1992).

Livestock, including both sheep and cattle, are relatively common and widespread in the rock art of southern African hunter-gatherers, intimating the importance of ritual and belief in the relationship between people and domestic animals (*cf.* MANHIRE *et al.* 1986; LEWIS-WILLIAMS & DOWSON 1989; HOLLMANN 2015; RUSSEL & LANDER 2015). The regional distribution of domestic animals in the rock art is thought to reflect the expansion of pastoralism into southern Africa (COOKE 1965; SMITH & OUZMAN 2004) and a number of such paintings reported from the Namib Desert (KINAHAN 1990; PAGER 1993) are considered as evidence of dispersal along the western margin of the subcontinent (MITCHELL 2002). Although such paintings confirm that the animals were integral to ritual iconography, none are dated, and no other material cultural evidence has been reported until now showing a direct link between the animals themselves and ritual practice during the earliest phase of their introduction.

The Dâures environment

Also known as Brandberg, the Dâures massif is a circular, dome-like *inselberg*, rising approximately 1650 metres above the surrounding Namib Desert (MILLER 2000). The mountain top is difficult of access, and the Hungorob ravine, like all of the twelve major ravines draining the higher parts of the mountain, is a boulder-choked defile. The ravines present an effective physical barrier to desert antelope in search of water and grazing. They seldom have running water, but the mountain ravines have numerous reliable seepages in their upper reaches, and there is abundant archaeological evidence that these steep and arduous routes of ascent were used by successive hunter-gatherer and later pastoral groups who made regular use of the mountain resources (KINAHAN 2000).

Although few reliable rainfall figures exist (*cf.* BREUNIG 1990), a marked contrast in vegetation (NORDENSTAM 1974) clearly indicates that the Dâures massif receives more rainfall than the average of 100 mm precipitation per year provided by occasional isolated

showers over the surrounding desert (GAMBLE 1980; OLSZEWSKI 2000; MENDELSON *et al.* 2002). Rainfall on the mountain usually results from orographic conditions created by warm rising air currents, creating a localized mantle of heavy cloud around the mountain summit during the summer months. The combined effect of higher rainfall and altitude is to compress the longitudinal vegetation gradient of the desert (JÜRGENS *et al.* 1997) such that the summit of the mountain exhibits the same vegetation density as the thorn-bush savannah 150 km to the east. It is germane to a discussion of early livestock-keeping in this environment that the stocking rate of the upper Hungorob, based on grassland standing crop estimates, is more than sixty times greater than that of the lower-lying desert plains, less than 10 km away (KINAHAN 1986).

These conditions, in which relatively abundant water and grazing on the mountain are beyond reach of the antelope and other large mammals of the desert plains, provide a unique ecological setting for the keeping of small numbers of livestock by hunter-gatherers in the early stages of a transition to pastoralism. Only one antelope, the agile klipspringer *Oreotragus oreotragus* occurs on the mountain top. There are fickle seepages around the foot of the mountain, fed by gradual percolation from the heights, and to reach these, mountain zebra *Equus hartmanni* and antelope including the springbok *Antidorcas marsupialis* traverse large distances. Two other medium-sized antelope species, the impala *Aepyceros melampus* and the red hartebeest *Alcelaphus buselaphus*, were once occasional visitors during periods of exceptional rain (JOUBERT & MOSTERT 1975). However, none of these species can penetrate beyond the lower slopes of the mountain.

This combination of exceptional pasture resources with an effective exclusion of competing wild bovid species is in direct contrast to the environmental setting of the other Namibian sites where domestic sheep have been reported, all four sites being located in areas where antelope comparable in size and ecological niche to the domestic sheep are found in the same environment. Thus, the identification of sheep at Oruwanje is treated as provisional due to the likely presence of impala (R. Vogelsang, pers. comm.). At Leopard Cave, the identification of sheep (PLEURDEAU *et al.* 2012) relies on relative dental crown height, a non-diagnostic character which cannot definitively exclude impala, a common local species also represented in the archaeofauna at the site. The situation at Geduld is equally problematic, the faunal analysis claiming to identify sheep (SMITH & JACOBSON 1995) without considering species such as the locally common impala, which could be expected to occur in the faunal assemblage.

The archaeological setting

Detailed surveys of the Dâures massif, including the Hungorob ravine (*cf.* PAGER 1980, 1993), have revealed rock art site densities of more than three sites per square kilometre, with strongly clustered distribution patterns. Large painted shelters, invariably situated within reach of reliable water, probably served as dry season aggregation sites. Excavations at a number of these sites, including Falls Rock Shelter and Snake Rock, confirm a recent sequence commencing in the mid-Holocene and continuing intermittently to the early colonial period (KINAHAN 2001). The chrono-stratigraphy of the two sites is based on a series of well-defined, dated occupation units grouped into a Pre-pottery phase associated with dates falling between 4510±70 BP and 2590±60 BP, a Pottery phase between 2100±50 BP and 1640±70 BP, and a Pastoral phase associated with a series of second millennium AD dates (KINAHAN 2001: Appendix 1, table 2). The medium-sized bovid remains discussed in this paper are associated with the Pottery phase at Falls Rock Shelter and Snake Rock.

There are three outstanding characteristics of the Hungorob sequence: the appearance of pottery about two thousand years ago; a clear but undated shift to complex and highly individualized human figures in the rock art; and the eventual abandonment of rock shelter sites in favour of open encampments, some with livestock enclosures, by the middle of the second millennium AD. On this basis I proposed that pottery evidenced the arrival of stock-owning communities somewhere on the cultural landscape, and that the ensuing interaction was reflected in ritual practice, leading to the rise of specialist shamans who acquired livestock and led a local transition to a fully pastoral economy based on transhumant occupation of open, hutted settlements (KINAHAN 2001). Radiocarbon dates for Pottery phase units at Falls Rock Shelter and Snake Rock associated with medium-sized bovid remains are presented in **Table 1** and **Figure 2**, calibrated using OxCal Version 4.2.2 (BRONK RAMSEY 2013). Calibration is based on the SHCAL13 curve (HOGG *et al.* 2013).

The analysis presented here evaluates what at first appeared to be an absence of livestock at these sites, where a cautious position was adopted on the basis that pottery and livestock are not equivalent and interchangeable as evidence of pastoralism (*cf.* SADR & SAMPSON 2006; SADR 2008b). In the Hungorob, the archaeological evidence in the form of stone tool assemblages, faunal remains and the general characteristics of settlement ecology all pointed to a high degree of continuity in the archaeological sequence. In this regard the evidence from the Hungorob agrees with the wider regional evidence (DEACON 1984). The suggestion that rock art might re-

flect social transition towards powerful shamans, while novel at the time, was corroborated elsewhere (DOWSON 1994). The proposal that such individuals might have become the nucleus of stock-ownership in the pastoral economy was based on analogy with ethnographic observations of recent Kalahari hunter-gatherers (*cf.* GUENTHER 1975; WIESSNER 1982; BARNARD 2008). Criticisms of this analysis (SMITH *et al.* 1996) have been addressed elsewhere (KINAHAN 1996).

There is abundant and diverse evidence of pastoralism in the Hungorob during the second millennium AD, with well-preserved remains of large seasonal encampments, stock enclosures, wells and other features including a pathway constructed to facilitate the movement of livestock through the most difficult part of the ascent. From this evidence it is possible to infer the layout and organization of settlement, and to gain some insights into patterns of movement as well as basic range management practices (KINAHAN 1986, 2001). Evidence of livestock in the second millennium AD is also reported from Oruwanje (ALBRECHT *et al.* 2001) and Leopard Cave (PLEURDEAU *et al.* 2012), confirming widespread pastoral settlement. The context of sheep remains reported for the first millennium AD at Geduld (SMITH & JACOBSON 1995) is not dated, although pastoral occupation during the second millennium AD is likely considering the evidence from other sites. Falls Rock Shelter remained in use during the first part of the second millennium AD, but initial evaluation of the faunal remains did not identify any unequivocal evidence of ovicaprids there. In the absence of this evidence there was no direct confirmation that livestock had been acquired by hunter-gatherers in the Hungorob.

Re-analysis of faunal remains

Medium-sized bovids (terminology following BRAIN 1974) comprise a minor part of the faunal remains at Falls Rock Shelter where they represent 3.5 % of total MNI (Minimum Number of Individuals, $n=168$). The medium-sized bovids are mainly associated with Unit 6, a discontinuous layer that forms part of the Pottery phase dated to between 1880±50 BP and 2100±50 BP (**Table 1**; **Figure 2**). Units 8 and 9 comprised bedding hollows and a hearth feature also relating to the same occupation phase and yielded further medium-sized bovid remains. Unit 10 is associated with the subsequent and final occupation phase dated to 730±70 BP and considered as coeval with the fully pastoral component of the sequence. This phase is associated with represented by the remains of hutted encampments and stock enclosures in the near vicinity of the rock shelter. At Snake Rock, medium-sized bovid remains were associated only with the Pottery phase, dated to 1640±70 BP and 1840±50 BP (KINAHAN 2001).

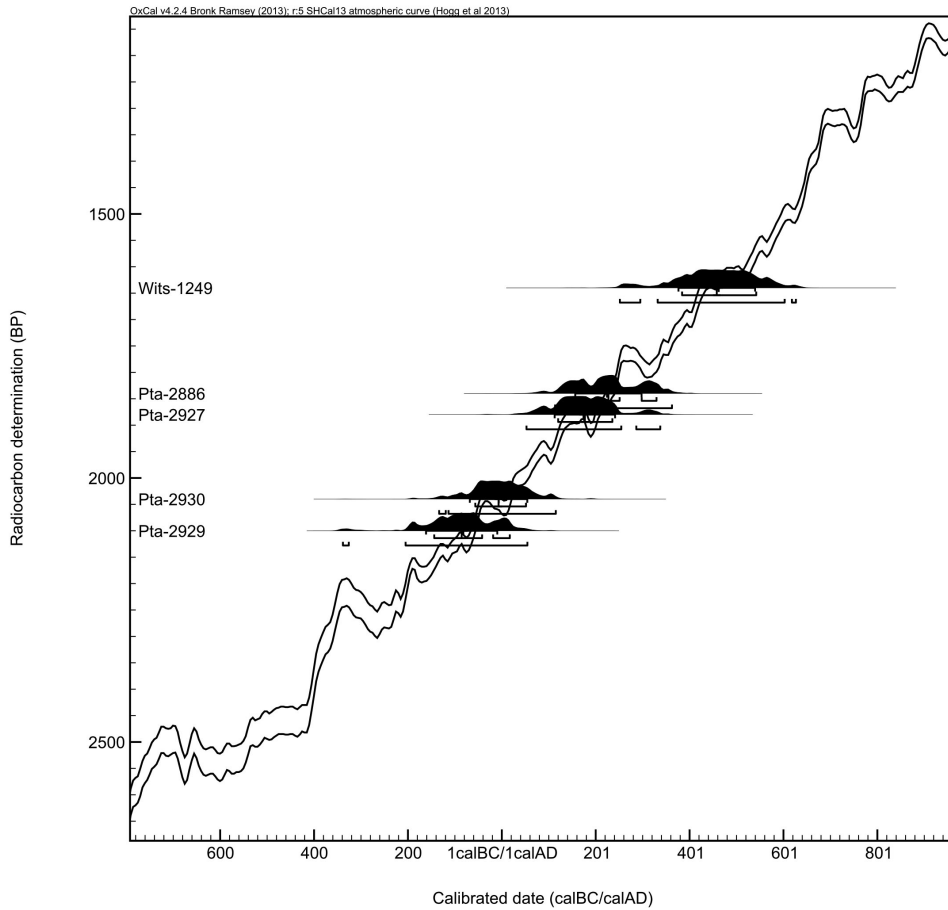


Figure 2. Calibrated early first millennium AD radiocarbon dates for domestic sheep finds in the Hungorob Ravine.

Site	Lab. No.	Radiocarbon age years BP	Calibrated dates BC/AD (68.2% and 95.4% probabilities*)	Median age BC/AD
Snake Rock	Wits-1249	1640±70	AD 336–535 (68.2%) AD 244–565 (95.4%)	AD 412
	Pta-2886	1840±50	AD 92–239 (68.2%) AD 65–326 (95.4%)	AD 176
Falls Rock Shelter	Pta-2927	1880±50	AD 72–212 (68.2%) AD 19–246 (95.4%)	AD 130
	Pta-2930	2040±50	111 BC – AD 21 (68.2%) 179 BC – AD 63 (95.4%)	53 BC
	Pta-2929	2100±50	182–51 BC (68.2%) 353 BC – AD 5 (95.4%)	126 BC

Table 1. Calibrated radiocarbon dates for stratigraphic units with medium-sized bovid remains from the Hungorob Ravine (*using OxCal Version 4.2.2; BRONK RAMSEY 2013).

Several of the medium-sized bovid bones presented in **Table 2** are considered on the basis of re-examination and comparison with reference material to be sheep *Ovis aries*. The following analysis considers both morphological similarity and size, with multiple measurements wherever possible. Bearing in mind the fragmentary state of the remains, some specimens could provide only one measureable dimension and such identifications are treated as secondary to those based on more complete skeletal elements. In the analysis below, some elements previously identified as medium-sized bovids (KINAHAN 2001) are rejected on the basis of measurement. This approach, combining measurement and direct comparison with other likely species as well as photographic records, is adopted in response to the difficulties of assessing published identifications of early sheep remains which are unsupported by measurements, explicit comparison or photographic record (cf. PLEURDEAU *et al.* 2012).

A proximal femoral epiphysis from Unit 10 at Falls Rock Shelter has a maximum diameter of 19.4 mm, compared to 19.3 mm for a modern comparative sheep specimen from the same part of Namibia. This diameter is substantially greater than that of the klipspringer at 15.5 mm and substantially less than that of the springbok at 22 mm and that of impala at 23 mm. While these measurements do not reflect natural variation within the different taxa, they strongly suggest that the specimen in question is from a sheep. Similar comparative observations can be made on a number of other skeletal parts, with greater or less certainty of identification.

Metapodial bones occur at both Falls Rock Shelter and Snake Rock; two distal metatarsal epiphyses from Unit 6 at Falls Rock Shelter have a maximum diameter (measured across the articulation) of 14.4 mm and 15 mm respectively. The comparative measurements are 12.7 mm for klipspringer and 18.3 mm for springbok. The same measurement for the comparative sheep specimen is 15 mm, suggesting that the archaeological specimens

are from sheep. A distal metatarsal epiphysis from Unit 10 at Snake Rock is marginally larger than the comparative klipspringer and its identification is therefore uncertain. A single calcaneus upper (posterior) half from Unit 6 at Falls Rock Shelter closely resembles the same element from the comparative sheep, both in size and general morphology, but the loss of some exterior material from the dorsal process renders measurement unreliable and the identification is rejected.

The carpal and tarsal bones from Units 6 and 9 at Falls Rock Shelter are ambiguous as to sheep or larger medium-sized bovid such as springbok. However, first phalanges from Units 6 and 8 at Falls Rock Shelter included four specimens with a mid-shaft minimum diameter of 7.7 mm, similar to that of the klipspringer at 7.2 mm and are therefore unlikely to be from sheep. In contrast, the specimen from Unit 10 at Snake Rock has a mid-shaft minimum diameter of 9.4 mm and a length of 38.3 mm, which closely compares with that of sheep at 10 mm and 37.7 mm, respectively (**Fig. 3**) (cf. ZEDER & LAPHAM 2010). The same measurements on klipspringer are 7.5 mm and 35 mm and on springbok 10 mm and 46.8 mm, respectively. In terms of diagnostic skeletal elements, sheep are represented at Falls Rock Shelter by six limb extremity bones in Unit 6, two in Unit 8, one in Unit 9, and three in Unit 10. The concentration of bones in Unit 6 (**Table 2**) is considered to represent an acquisition of sheep at approximately 2000 BP. Sheep are represented at Snake Rock by two diagnostic elements in Unit 10, associated with a younger date which however also falls within the early first millennium AD.

Additional to the diagnostic elements described above is an assemblage of bone artefacts associated with the early first millennium AD sheep specimens at Snake Rock. The assemblage includes a number of slivers of dense cortical bone suspected to be derived from the limb elements of sheep. These artefacts, shown in **Figure 4**, were found buried in a stone-lined pit,

Skeletal part	Unit	Falls Rock Shelter						Snake Rock
		5	6	7	8	9	10	10
Femur							1	
Metapodial			2				2	1
Calcaneus			1					
Carpals						1		
Tarsals			1					
Phalange 1			2		2			1
MNI			1		1	1	1	1

Table 2. Stratigraphic distribution of medium-sized bovid remains from Falls Rock Shelter and Snake Rock post-dating 2100 BP.

and show extensive modification including perforation at the ends, allowing them to be strung together. The fourteen pieces include eight with bored and counter-sunk perforations measuring approximately 2 mm in diameter. The perforations are polished as from the wear of a string, but without the elliptical shape that would result from their being worn as a pendant. This and the fact that the bones were found together suggests that they were used for some purpose other than personal

adornment, being strung mainly to keep them together. The surface of the bones shows extensive polish from repeated handling, particularly along the edges and on the ends opposite to the bore. Three pieces representing terminals have rounded points, while two have blunt tapered points. None are complete in having the bored and terminal ends on one piece or as confirmed matching fragments.

The bone slivers do not have major diagnostic features such as epiphyses, but the shape of some pieces allows them to be matched with the diaphysis or shaft portions of specific skeletal elements. Satisfactory matches were made with the shaft of a sheep tibia (right side, posterior surface), and the posterior surface of a sheep radius (right side) near the mid-point of the shaft (**Fig. 5**). A further bone sliver (not shown) is a possible match for the anterior surface of the shaft of sheep tibia (right side, anterior surface) near its mid-point. Measurements of the mean sectional thickness of the artefacts corresponded with the thickness of cortical bone from the same element in sheep, such that the fragment matching the profile of the sheep tibia had a mean thickness of 3.33 mm (SD 0.46, n=6) and the fragment matching the profile of the sheep radius had a mean thickness of 2.96 mm (SD 0.34, n=6). The same measurements on a comparative sheep tibia were 3.16 mm (SD 0.25, n=6) and on the radius 2.83 mm (SD 0.28, n=6).

Comparative measurements of mean sectional thickness at the same position on a klipspringer tibia were 2.96 mm (SD 0.38, n=6) and on the radius 2.05 mm (SD 0.28, n=6). The same measurements on a springbok tibia were 4.21 mm (SD 0.54, n=6) and on the radius



Figure 3. First phalange of sheep *Ovis aries* from Unit 10 at Snake Rock, shown with comparative specimen left.



Figure 4. Bored and shaped bone artefacts from Unit 10 at Snake Rock, suspected slivers of sheep *Ovis aries* long-bones.

3.8 mm (SD 0.32, n=6). While the bone slivers from Snake Rock cannot be conclusively matched to sheep due to the absence of diagnostic features, the sectional thickness of the pieces is close to that of a comparative sheep skeleton. The bone slivers are consistently thicker than the bone of klipspringer, and consistently thinner than that of springbok. On this basis the bone slivers from Snake Rock are tentatively attributed to sheep.

The re-analysis of the medium-sized bovid remains from the Hungorob ravine confirms the presence of sheep early in the first millennium AD. The sample of diagnostic bones is small, with only twelve diagnostic specimens from Falls Rock Shelter and two from Snake Rock. An apparent bias in favour of skeletal elements from the limb extremities suggests that the long-bones as well as the cranial and axial elements were fragmented in the course of butchery. Similar patterns of fragmentation indicative of intensive processing are also evident in the skeletal remains of klipspringer

recovered during the excavation of the two sites. The high degree of fragmentation among marrow-rich bones is characteristic of bovid assemblages at these sites, in contrast to the non-bovid assemblages which exhibit a greater degree of skeletal completeness (KINAHAN 2001). Both sites yielded high numbers of bone artefacts, including awls, link-shafts, beads, pendants and other items, reflecting intensive utilization of bone suitable for artefact production in the higher parts of the mountain. It is therefore unsurprising that the suspected sheep bone slivers were used rather than discarded as food waste, but the fact that they were made to be strung together and that they were buried in a stone-lined pit is suggestive of ritual value.

Discussion

Although evidence for the arrival of domestic sheep in the Namib Desert is relatively scarce, the available records agree with the regional introduction of pastoralism during the early first millennium AD (MITCHELL 2002; SMITH & OUZMAN 2004). The re-analysis of the Hungorob ravine material presented here adds to the chronological record, to the distribution record, and to an understanding of the archaeological context in which this evidence occurs.

A review of previously published records of early first millennium AD sheep in the Namib indicates several problems, of which the most critical is the possible confusion of sheep and wild medium-sized bovids found in the same area as the sites. PLEURDEAU *et al.* (2012) have pointed to the need for verification of published records. In support of this I would add that identifications should be more explicit in their basis, including where possible comparative measurements of the specimens and reference material. Dating is the second issue of concern, and while direct dating is not always feasible and will usually result in the destruction of the specimen, reliable association with a dated stratigraphic context is *sine qua non*. The Geduld record (SMITH & JACOBSON 1995) is widely cited despite its undated context and unclear identification, as is that of Leopard Cave (PLEURDEAU *et al.* 2012) where the identification of sheep is not based on reliably diagnostic skeletal elements.

The Hungorob evidence exemplifies the acute taphonomic depletion of bovid skeletal elements and its effect on the survival of identifiable remains. This is exacerbated by the unusual circumstances in which bone suitable for artefact manufacture was less available in the higher parts of the mountain than on the desert plains below. It seems there was further depletion of the skeleton by the modification and use of sheep bones for possible ritual purposes. Other evidence of ritual



Figure 5. Left, bone artefact from Unit 10 at Snake Rock matched to comparative sheep *Ovis aries* tibia; right, bone artefact from Unit 10 at Snake Rock matched to comparative sheep radius.

practice, beside the abundant rock art, includes at Falls Rock Shelter a bone vessel made from the cranium of a Cape hunting dog *Lycaon pictus*, found in association with ochre-stained ostrich feathers and a number of *Lasiocampidae* insect cocoons, pierced for stringing, probably as dancing rattles (KINAHAN 2001). Also, pottery associated with the early first millennium AD sheep remains exhibits some unusual characteristics: there is a disproportionate representation of decorated rim sherds, and these are worn and glossy as if from repeated handling. I have suggested elsewhere (KINAHAN 1986, 1994) that pottery acquired in early interaction with pastoral communities may have had ritual value, an observation independently made by MITCHELL *et al.* (2008) on the basis of evidence from hunter-gatherer assemblages in the Maluti Mountains of Lesotho.

Modification and re-use of livestock bone affects the range of skeletal elements available for identification, both by the possible removal of diagnostic epiphyses and other features, and by recycling the bone into contexts other than that of food waste. This is exemplified by a mid- to late second millennium AD human burial on a Namib coast pastoral site (KINAHAN 2013) associated with a pendant made from the first phalange of a domestic sheep, bored laterally through the mid-section and close to the proximal end (Fig. 6). This skeletal element might normally remain among food waste as species diagnostic evidence, due to its robustness and the fact that it is relatively poor in marrow. The first and second phalanges of sheep and goats are also commonly used as items of adornment by traditional OvaHimba pastoralists in north-western Namibia. The example shown in Figure 7 incorporates four such bones from a domestic goat *Capra hircus*, bored laterally through the mid-section near the distal end and strung on a leather thong, interspersed with groups of iron beads. Known as *omaṭupa wondjova* in OtjiHerero, these ornaments are traditionally given to newly-wed women. The phalanges, which symbolize children, are taken from animals slaughtered for the wedding feast.

The acquisition of livestock and the adoption of pastoralism by southern African hunter-gatherers in the first millennium AD involves two complementary sets of archaeological evidence. The direct physical evidence of domestic sheep — whether obtained singly by exchange or other means, or as slaughter animals from the nucleus herds of hunter-gatherers with only partial dependence on herding — reflects a pattern of intensive processing and taphonomic depletion. It is therefore important to consider the treatment of the bone as a raw material for artefact production, and the possible removal of some skeletal elements for purposes that have to do with the symbolic value of the animals and their remains.

I have argued elsewhere that the transition to pastoralism by hunter-gatherers also involves a second, parallel, set of archaeological evidence reflecting a fundamental social change. In the Namib Desert this is manifest in the rock art, showing the emergence of specialist shamans, represented as elaborate polychrome male figures (KINAHAN 2001). This evidence refers to the symbolic and ideological component of the



Figure 6. Sheep *Ovis aries* first phalange associated with second millennium AD burial on a Namib coast pastoral site (National Museum of Namibia Accession B3010/1).



Figure 7. OvaHimba *omaṭupa wondjova* incorporating first and second phalanges of goat *Capra hircus* combined with iron beads.

transition to pastoralism, accompanied in the Hungorob ravine by the array of unusual material cultural items described above, with clearly ritual connotations. The possible extension of this assemblage to include ritual items made from the bones of sheep adds to the growing evidence for a transition to pastoralism involving more fundamental aspects of hunter-gatherer society than subsistence technology.

Acknowledgements

I am indebted to Professor Jekura Kavari, University of Namibia, for information on the use of ovicaprid bones as items of adornment; to Ina Plug and the late Elizabeth Voigt, both formerly of the Transvaal (now Ditsong) Museum for guidance with faunal analysis; to Ralf Vogelsang, University of Cologne, for advice on the identification of bovid remains from Oruwanje; and to the National Museum of Namibia for access to material housed in its archaeological collection. Final identification of the bovid remains is my own responsibility.

References

- Albrecht, M., Berke, H., Eichhorn, B., Frank, T., Kuper, R., Prill, S., Vogelsang, R. & Wenzel, S. 2001. Oruwanje 95/1: a late Holocene stratigraphy in northwestern Namibia. *Cimbebasia* 17, 1–22.
- Arthur, J. 2008. The archaeology of indigenous herders in the western Cape of South Africa. *Southern African Humanities* 20 (1), 205–220.
- Barnard, A. 1992. *Hunters and Herders of Southern Africa: A Comparative Ethnography of the Khoisan Peoples*. Cambridge University Press, Cambridge. <http://dx.doi.org/10.1017/CBO9781139166508>
- Barnard, A. 2008. Ethnographic analogy and the reconstruction of early Khoekhoe society. *Southern African Humanities* 20 (1), 61–75.
- Brain, C.K. 1974. Some suggested procedures in the analysis of bone accumulations from southern African Quaternary sites. *Annals of the Transvaal Museum* 29 (1), 1–5.
- Breunig, P. 1990. Temperaturen und Niederschläge im Hohen Brandberg. *Journal of the Namibia Scientific Society* 42, 7–23.
- Bronk Ramsey, C. 2013. OxCal Programme v4.2.2. Radiocarbon Accelerator Unit, University of Oxford.
- Cooke, C.K. 1965. Evidence of human migrations from the rock art of Southern Rhodesia. *Africa* 35 (3), 263–285. <http://dx.doi.org/10.2307/1157174>.
- Deacon, J. 1984. *The Later Stone Age of Southernmost Africa*. British Archaeological Reports, Oxford.
- Dowson, T.A. 1994. Reading art, writing history: rock art and social change in southern Africa. *World Archaeology* 25, 332–344. <http://dx.doi.org/10.1080/00438243.1994.9980249>
- Fauvelle-Aymar, F.-X. & Sadr, K. 2008. Trends and traps in the reconstruction of early herding societies in southern Africa. *Southern African Humanities* 20 (1), 1–6.
- Gamble, F.M. 1980. Rainfall in the Namib Desert Park. *Madoqua* 12, 175–180.
- Guenther, M.G. 1975. The trance dancer as an agent of social change among the farm Bushmen of the Ghanzi District. *Botswana Notes and Records* 7, 161–166.
- Hogg, A.G., Hua, Q., Blackwell, P.G., Niu, M., Buck, C.E., Guilderson, T.P., Heaton, T.J., Palmer, J.G., Reimer, P.J., Reimer, R.W., Turney, C.S.M. & Zimmerman, S.R.H. 2013. SHCal13 Southern Hemisphere Calibration, 0–50,000 years Cal BP. *Radiocarbon* 55 (4), 1889–1903. http://dx.doi.org/10.2458/azu_js_rc.55.16783
- Hollmann, J. 2015. Allusions to agricultural rituals in hunter-gatherer rock art? eMkhobeni Shelter, northern uKkhalamba-Drakensberg, Kwa-Zulu-Natal, South Africa. *African Archaeological Review* 32 (3), 505–535. <http://dx.doi.org/10.1007/s10437-015-9197-4>
- Joubert, E. & Mostert, P.K.N. 1975. Distribution patterns and status of some mammals in South West Africa. *Madoqua* 9 (1), 5–44.
- Jürgens, N., Burke, A., Seely, M.K. & Jacobson, K.M. 1997. Desert. In: Cowling, R.M., Richardson, D.M. & Pierce, S.M. (eds.), *Vegetation of Southern Africa*. Cambridge University Press, Cambridge, pp. 167–188.
- Kinahan, J. 1986. The archaeological structure of pastoral production in the central Namib Desert. In: Hall, M. & Smith, A.B. (eds.), *Prehistoric Pastoralism in Southern Africa*. Goodwin Series 5. South African Archaeological Society, pp. 69–82. <http://dx.doi.org/10.2307/3858149>
- Kinahan, J. 1990. Four thousand years at the Spitzkoppe: changes in settlement and landuse on the edge of the Namib Desert. *Cimbebasia* 12, 1–14.
- Kinahan, J. 1994. A new archaeological perspective on nomadic pastoralist expansion in south-western Africa. *Azania* 29-30 (1), 211–226. <http://dx.doi.org/10.1080/00672709409511677>
- Kinahan, J. 1996. Alternative views on the acquisition of livestock by hunter-gatherers in southern Africa: a rejoinder to Smith, Yates and Jacobson. *South African Archaeological Bulletin* 51, 106–108. <http://dx.doi.org/10.2307/3888846>
- Kinahan, J. 2000. Dâures, the burning mountain – issues of research and conservation in the Brandberg of Namibia. *National Museum of Namibia, Cimbebasia Memoir* 9, 1–16.
- Kinahan, J. 2001. *Pastoral Nomads of the Namib Desert: The People History Forgot*. (2nd edition) Namibia Archaeological Trust, Windhoek.
- Kinahan, J. 2013. The use of skeletal and complementary evidence to estimate human stature and identify the presence of women in the recent archaeological record of the Namib Desert. *South African Archaeological Bulletin* 68 (197), 72–78.

- Lewis-Williams, J.D. & Dowson, T. 1989. *Images of Power: Understanding Bushman Rock Art*. Southern, Johannesburg.
- Lyman, R. 1994. *Vertebrate Taphonomy*. Cambridge University Press, Cambridge. <http://dx.doi.org/10.1017/CBO9781139878302>
- Manhire, A.H., Parkington, J.E., Mazel, A.D. & Maggs, T.M. O’C. 1986. Cattle, sheep and horses: a review of domestic animals in the rock art of southern Africa. *South African Archaeological Society Goodwin Series* 5, 22–30. <http://dx.doi.org/10.2307/3858142>
- McGranaghan, M. 2015. ‘Hunters with sheep’: the |Xam Bushman of South Africa between pastoralism and foraging. *Africa* 85 (3), 521–545. <http://dx.doi.org/10.1017/S0001972015000297>
- Mendelsohn, J., Jarvis, A., Roberts, C. & Robertson, T. (eds.) 2002. *Atlas of Namibia: A Portrait of the Land and its People*. David Philip, Cape Town.
- Miller, R. McG. 2000. Geology of the Brandberg Massif, Namibia, and its environs. *National Museum of Namibia, Cimbebasia Memoir* 9, 17–38.
- Mitchell, P. 2002. *The Archaeology of Southern Africa*. Cambridge University Press, Cambridge.
- Mitchell, P., Plug, I., Bailey, G. & Woodborne, S. 2008. Bringing the Kalahari debate to the mountains: late first millennium AD hunter-gatherer/farmer interaction in highland Lesotho. *Before Farming* 2008 (2), article 4, 1–22.
- Nordenstam, B. 1974. The flora of the Brandberg. *Dinteria* 11, 3–67.
- Olszewski, J. 2000. Brandberg climatic considerations. *National Museum of Namibia, Cimbebasia Memoir* 9, 39–48.
- Pager, H. 1980. Felsbildforschung am Brandberg in Namibia. *Beiträge zur Allgemeinen und Vergleichenden Archäologie* 2, 351–357.
- Pager, H. 1993. *The Rock Paintings of the Upper Brandberg. Part 2: Hungorob Gorge*. Heinrich Barth Institute, Cologne.
- Pleurdeau, D., Imalwa, E., Detroit, F., Lesur, J., Veldman, A., Bahain, J.-J. & Marais E. 2012. Of sheep and men: earliest direct evidence of caprine domestication in southern Africa at Leopard Cave (Erongo, Namibia). *PLoS ONE* 7 (7), e40340. <http://dx.doi.org/10.1371/journal.pone.0040340>
- Russel, T. & Lander, F. 2015. ‘The bees are our sheep’: the role of honey and fat in the transition to livestock keeping during the last two thousand years in southernmost Africa. *Azania* 50 (3), 318–342. <http://dx.doi.org/10.1080/0067270X.2015.1051793>
- Sadr, K. 2008a. Invisible herders? The archaeology of Khoekhoe pastoralists. *Southern African Humanities* 20 (1), 179–203.
- Sadr, K. 2008b. An ageless view of first millennium AD southern African ceramics. *Journal of African Archaeology* 6 (1), 103–129. <http://dx.doi.org/10.3213/1612-1651-10105>
- Sadr, K. & Sampson, G. 2006. Through thick and thin: early pottery in southern Africa. *Journal of African Archaeology* 4 (2), 235–252. <http://dx.doi.org/10.3213/1612-1651-10074>
- Sandelowsky, B., Van Rooyen, J. & Vogel, J.C. 1979. Early evidence for herders in the Namib. *South African Archaeological Bulletin* 34, 50–51. <http://dx.doi.org/10.2307/3888170>
- Smith, A.B. 2008. Pastoral origins at the Cape, South Africa: influences and arguments. *Southern African Humanities* 20 (1), 49–60.
- Smith, A.B. & Jacobson, L. 1995. Excavations at Geduld and the appearance of early domestic stock in Namibia. *South African Archaeological Bulletin* 50, 3–14. <http://dx.doi.org/10.2307/3889270>
- Smith, A.B., Yates, R. & Jacobson, L. 1996. Geduld contra Kinahan. *South African Archaeological Bulletin* 51, 36–39. <http://dx.doi.org/10.2307/3888932>
- Smith, B.W. & Ouzman, S. 2004. Taking stock: identifying Khoekhoen herder rock art in southern Africa. *Current Anthropology* 45 (4), 499–526. <http://dx.doi.org/10.1086/422081>
- Wiessner, P. 1982. Risk, reciprocity and social influences on !Kung San economics. In: Leacock, E. & Lee, R. (eds.), *Politics and History in Band Societies*. Cambridge University Press, Cambridge, pp. 61–84.
- Zeder, M. & Lapham, H. 2010. Assessing the reliability of criteria used to identify postcranial bones in sheep, Ovis, and goats, Capra. *Journal of Archaeological Science* 37 (11), 2887–2905. <http://dx.doi.org/10.1016/j.jas.2010.06.032>