Research Article

STONE TOOLS, BEADS AND A RIVER: TWO HOLOCENE MICROLITHIC SITES AT JAKKALSBERG IN THE NORTHWESTERN RICHTERSVELD, NORTHERN CAPE, SOUTH AFRICA

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ABSTRACT

Jakkalsberg N and Jakkalsberg L, located on the bank of the Orange River in the area of South Africa known as the Richtersveld, date to the mid- and late mid-Holocene, respectively. The former is a palimpsest revealing scattered material from other periods. Both contain large assemblages of lithics and bead-manufacturing debris. Their formal tools are diverse and include types uncommon in South Africa but more frequently found through much of the rest of Africa. In particular, these sites contain more than an incidental occurrence of denticulates and triangles, respectively. The formal tool composition indicates continuity with assemblages from both central and southern Africa and supports common origins for many African microlithic industries. The river serves as a lifeline in the hostile Richtersveld environment with fish being a key resource. Despite having been subjected to periodic flooding and siltation, spatial integrity and preservation of artefacts at these sites was sufficient to allow high research value.

Keywords: Later Stone Age, mid-Holocene, Richtersveld, stone tools, ostrich eggshell beads.

INTRODUCTION

As part of an archaeological mitigation programme on the Orange River floodplain, four Later Stone Age (LSA) open sites were recorded and excavated near Jakkalsberg in the north-western Richtersveld (Halkett 2001). Here we present the two older sites, Jakkalsberg (JKB) N and L. Both contain rich lithic assemblages and large quantities of bead-manufacturing debris but few other remains. The lithics indicate that both are part of the Holocene microlithic tradition which typically extends between approximately 8000 and 2000 BP across much of South Africa. The remaining two sites (JKB K and JKB M) both date within the last 2000 years (Table 1) and are not discussed here. There are several other sites in the immediate vicinity (Fig. 1; Halkett 1999, 2001), but only Jakkalsberg A and B, dating between about AD 650 and AD 800, have been fully documented (Miller & Webley 1994; Webley 1997; Brink & Webley 1996) with JKB K, L, M, and N only being briefly discussed (Orton 2007). Detailed analysis of the beads from the latter three sites has also been undertaken (Orton 2008). The other proximate sites are JKB P and O; both are unexcavated and undated but known to contain pottery. Younger sites are usually located along the edge of either the Orange River or its tributaries, while older sites tend to be farther away (Fig. 1).

The Richtersveld is an arid area with a mean annual rainfall of 54 mm recorded at Rosh Pinah near Sendelingsdrif (Williamson 2000). The Orange River thus forms a lifeline through what is otherwise a relatively inhospitable landscape. Most known archaeological sites are located in close proximity to the river, although some do occur well away from it (e.g. Webley *et al.* 1993). The Jakkalsberg sites are situated on the raised silt terrace on the south bank of the Orange River, between the Jakkalsberg mountain and the settlement of Sendelingsdrif, and very close to the point where a non-perennial stream debouches into the Orange (Fig. 1). All are open occurrences with JKB N having been deflated and water-washed. Since spatial integrity was likely to be variable, we elected to excavate in 0.5 by 0.5 m squares without point plotting. All excavated material was sieved through a 1.5 mm mesh to allow maximum recovery of small finds.

JAKKALSBERG N

CONTEXT AND DATING

JKB N is an extensive deflated and water-washed stone artefact and ostrich eggshell (OES) scatter located approximately 150 m from the river (28°10′50.6″S: 16°53′07.3″E; Fig. 1). Other small finds are also present in small numbers. Altogether some 320 m^2 was excavated from the surface of a well compacted layer of alluvial silt. Three dates ranging between about 2900 and 3350 BC were obtained from OES and marine shell (Table 1). Since mid-Holocene material, indigenous pottery and historical material all occur within the sampled area it is clear that some overprinting has taken place on the site. The range and types of formal tools, however, indicate that the vast majority of the lithics are mid-Holocene in nature and are consistent with the radiocarbon dates. The very small number of later items, along with their wide distribution, suggests that they have little to do with the main occupation. Although some areas have higher densities of stone than others, the relatively heavy deflation of the site has meant that little evidence of spatial patterning exists.

STONE ARTEFACTS

The assemblage consists of 44 013 flaked stone artefacts at a density of approximately 124 per square metre. Quartz is the primary raw material with cryptocrystalline silica (CCS) and quartzite comprising much of the remainder (Table 2). A small amount of fine-grained black rock was also found but this was very infrequent and was included under CCS. As expected, only two raw materials are employed for the manufacture of formal tools, with CCS being favoured over quartz (Table 2). Quartz and CCS have been selected more equally for the production of backed tools, with 63.80% being in quartz. The

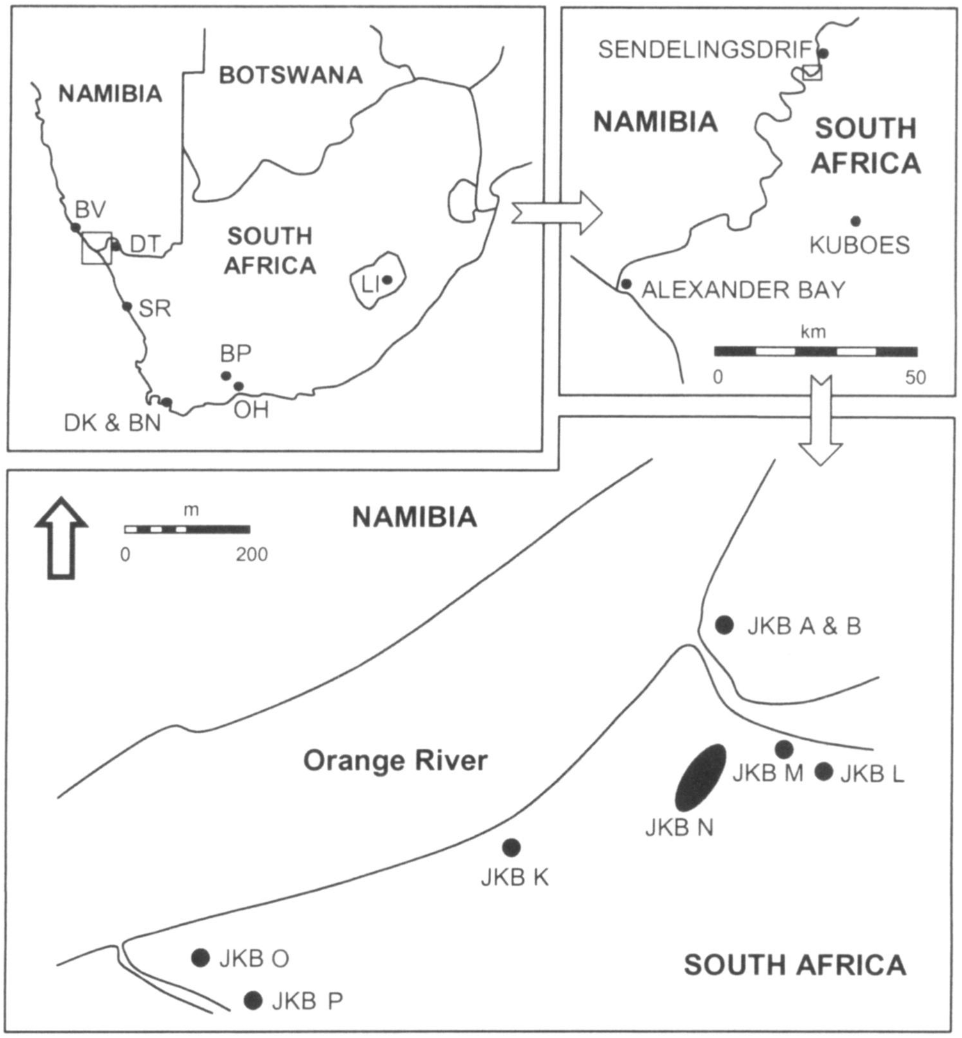

FIG. 1. *Map showing the locations of the sites discussed in the text.*

inhabitants of JKB N elected to make some quartz scrapers (4.48%), but the vast majority are still in CCS.

There are 27 classes of formal tools with scrapers and backed tools equally well represented (Table 3). Side- and backed scrapers are the dominant types. Backed bladelets occur more frequently than at JKB L supporting the older date. They are made on both quartz and CCS, but more commonly on the former. Segments are also slightly more common, although only two triangles are present. An interesting inclusion in the formal tool assemblage is the selection of denticulates, of which all but one are made on CCS. These have been described in detail elsewhere (Orton & Halkett 2001).

Although few bladelets are present, four CCS single platform bladelet cores show more intent to manufacture them, presumably for backing, than was the case at JKB L. In both quartz and CCS a greater variety of flaking techniques was employed for flake production. The relatively high frequency of quartz bipolar cores is difficult to explain. Crystal facets occur quite commonly on the quartz flakes, suggesting that most quartz was likely to have been collected in the mountains rather than as pebbles from the river gravels.

A variety of ground stone artefacts was also recovered. These include numerous grindstone fragments, a few hammer stones and whole upper grindstones, four grooved stones and nine fragments with ground edges. All of the latter and three of the grooved stones are made on rocks classified as 'other', with the remaining grooved stone being on sandstone. Unfortunately, the ground-edged pieces were too broken to enable any reconstruction of form.

It should be noted that there seem to be at least two compo-

TABLE 1. *Radiocarbon dates from Jakkalsberg. Calibrations on Pretoria Radiocarbon Calibration Programme.*

Site	Square	Lab. No.	Radiocarbon date	Material	Calibrated age (with 1 S.D.)
JKB K	alongside Hearth A1	GX-32761	660 ± 100 BP	charcoal	AD 1284 (1317, 1347, 1388) 1422
JKB M	L32, L33, M33	GX-32760	1740 ± 75 BP	OES	AD 444 (562) 631*
JKB L	F16	GX-32065	3330 ± 70 BP	charcoal	1643 (1528) 1491 BC
JKB N	random collection	Pta-8496	4500 ± 50 BP	OES	2912 (2896) 2882 BC*
JKB N	X256	GX-32754[A]	4860 ± 40 BP	engraved OES	3496 – 3443, 3379 (3367) 3355 BC*
JKB N	J259	GX-32755[A]	4960 ± 40 BP	marine shell	3176 (3093) 3046 BC

*180 years subtracted prior to calibration following Vogel *et al.* (2001).
[A]AMS dates on single fragments.

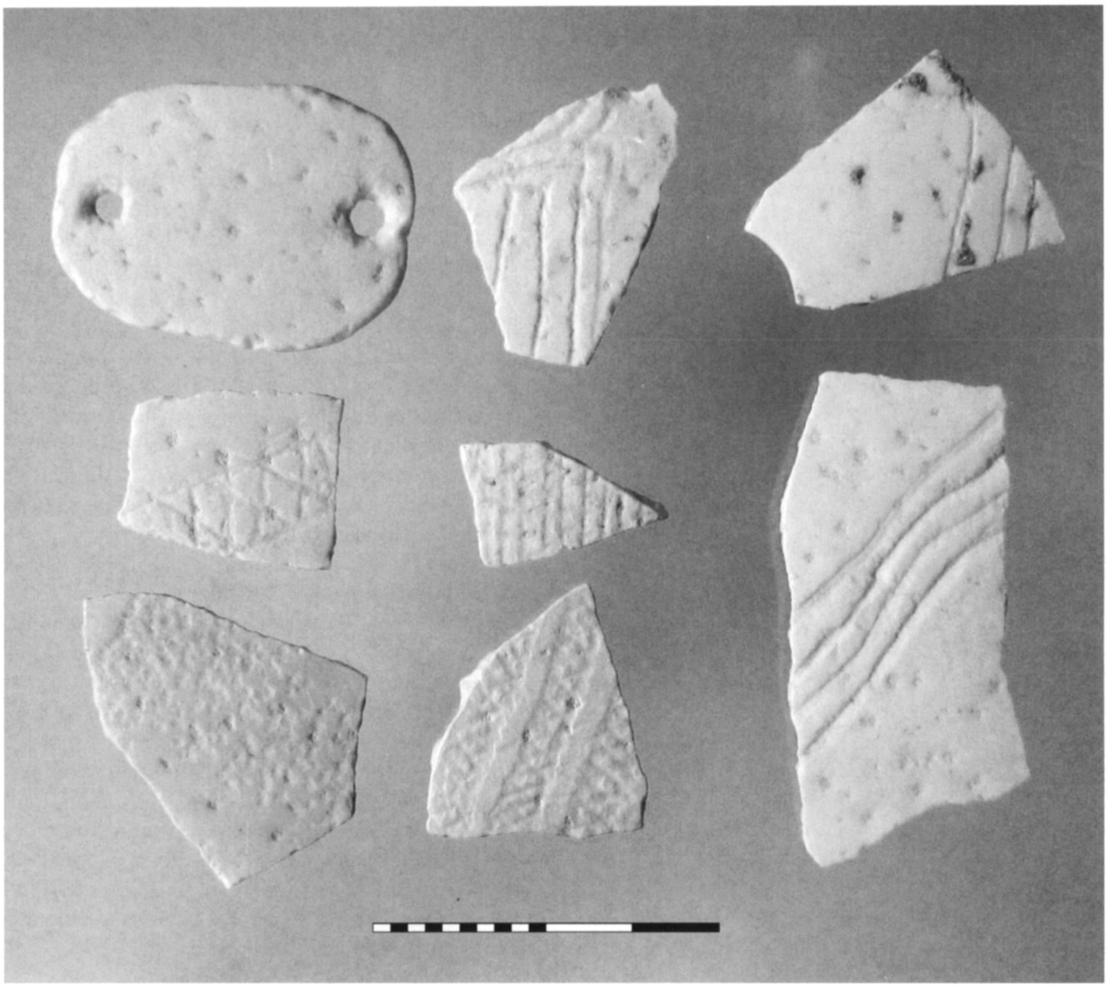

FIG. 2. *Engraved OES, flask mouth and pendent from JKB N. Upper right fragment is a flask mouth. Scale bar: 20 mm.*

nents to the lithic assemblage. Although they cannot be reliably separated, what is assumed to be the most recent component is quite clearly represented by the many large quartzite and quartz flakes present on the site. The mid-Holocene age indicated by the three dates is supported by high frequencies of backed tools and scrapers, especially side- and backed scrapers, and, despite the reasonable agreement between the three dates, it is not possible to say whether this earlier material reflects multiple occupations or not.

WORKED BONE AND OSTRICH EGGSHELL

Two bone beads were found near the southwestern end of the site. The larger is made on a sidewall fragment of a long bone and the hole seems to have been drilled from the inside of the bone. Its diameter varies between 11.30 and 11.85 mm and it has an aperture diameter of 2.50 mm and a thickness of 4.50 mm. The other is far smaller, measuring 4.24 mm and with an aperture of 1.75 mm and thickness of 1.52 mm. We cannot tell whether it is made on a sidewall fragment or not. Several potsherds were found in the same area (see below) and it is impossible to tell whether the beads date to the mid-Holocene or if they were introduced at a later stage. Given their good preservation though, it seems likely that they are more recent. Most LSA bone beads are tubular, but occasionally flat beads are found (e.g. Walker 1995: fig. 66).

TABLE 2. *Raw material percentage frequencies at JKB N.*

	Total assemblage	Formal tools
Quartz	69.21	26.55
CCS*	20.90	73.45
Quartzite	8.66	–
Sandstone	0.43	–
Other	0.81	–

*Rare fine-grained black rocks included in CCS.

There are 127 fragments of engraved OES (Fig. 2) and 10 OES flask mouth fragments in the assemblage. The engraving is largely similar to that seen at JKB L and consists primarily of combinations of parallel and cross-hatched lines, although one piece appears to have been pecked. One complete OES pendant, with holes at both ends and a pendant fragment were also recovered (Fig. 2). Neither is decorated. Two small, circular OES flakes, essentially percussion cones with minute platforms, were also found. These may indicate the manner in which the holes were made in OES flasks with the original hole being punched out and then enlarged by careful flaking around its perimeter. Although Kandel (2004) describes only the holes and not the fragments that were removed from them, one cannot discount the possibility that the flakes were the result of puncture by a carnivore tooth.

JKB N also contains evidence of OES bead manufacture, although in far smaller quantities than is the case at JKB L. Due to the deflation of the site, no obvious concentrations indicating manufacturing areas are evident. The same system of manufacture was evident at both sites. Here, however, a far higher frequency of breakage took place during drilling. No less than 83% of unfinished and broken fragments resulted from the drilling process while just less than 16.5% resulted from breakage during the trimming stage. In terms of finished beads,

TABLE 3. *Lithic inventory at JKB N. Note that edge-damaged pieces were not separated into types and that FGBR were incorporated into 'Other'.*

	Quartz	CCS	Quartzite	Sandstone	Other
Bipolar	74	27	1		
Irregular	94	62	5		
Single platform	37	44	8		
Single platform bladelet		4			
Subtotal cores	**205**	**138**	**14**	–	–
Blade	28	20	7	2	
Bladelet	188	179	10		
Flake	9142	3933	2157	110	209
Chunk	5815	1552	977	51	113
Chip	14 845	2857	643	27	27
Subtotal debitage	**30 018**	**8541**	**3794**	**190**	**349**
Subtotal edge-damaged	**104**	**150**	**3**	–	**6**
Scraper fragment	2	14			
Misc. scraper	2	17			
Thumbnail scraper		3			
Endscraper	2	1			
Sidescraper	1	90			
Boat-shaped scraper		3			
Double-sided scraper	1	5			
Side-endscraper		1			
Backed scraper	1	42			
Misc. backed scraper		15			
Core scraper		1			
Subtotal scrapers	**9**	**192**	–	–	–
Backed piece fragment	12	9			
Backed flake	19	7			
Backed blade		3			
Backed bladelet	20	9			
Truncated bladelet	1				
Backed point	9	4			
Backed bladelet fragment	8	3			
Segment	22	4			
Truncated segment	1				
Triangle	1	1			
Trapezium		1			
MBP	12	16			
Subtotal backed	**104**	**59**	–	–	–
Denticulate	1	23			
Notched piece	5	7			
MRP	14	82			
Subtotal formal retouch	**133**	**368**	–	–	–
Grand total	**30 460**	**9197**	**3811**	**190**	**355**

135 unbroken and 10 broken ones were found. Measurement of the external and aperture diameters yielded means of 4.09 ± 0.59 and 1.59 ± 0.34 mm, respectively. Only four beads are bigger than 5 mm with the largest being 6.5 mm across (Fig. 3). The biggest beads were almost certainly dropped by later people walking over the site as their sizes are comparable with the beads from the nearby sites of Jakkalsberg A, B (Webley 1997) and K (Orton 2007) and are believed to have been made by herders.

POTTERY

The pottery at JKB N consists of 37 adiagnostic fragments. A high degree of fragmentation and weathering is evident and the sherds are scattered widely across the site. They do not relate to the primary occupation of the site.

VERTEBRATE FAUNA

The bone sample from JKB N is heavily weathered with few diagnostic elements present. Although the bones are too fragmentary for even basic analysis, fish, tortoise, bovid, snake and micromammal were noted.

MARINE AND FRESHWATER MOLLUSC SHELL

Tiny fragments of shellfish were ubiquitous on the site and several species could be identified. These include the freshwater species *Unio caffer* and *Corbicula fluminalis* (Appleton 2002; J. Day, pers. comm. 2005); marine species include *C. granatina, S. granularis, S. argenvillei, D. serra* and *C. meridionalis.*

HISTORICAL MATERIAL

A number of historical items are obviously later introductions. Numerous fragments of green bottle glass were found across the site. Most are loosely clustered in the northeastern part of the site and, being of similar thickness, probably represent a single bottle. A few fragments of thinner glass indicate the presence of a second bottle. Several brass percussion caps from a 19th century muzzle-loading rifle and a shoe eyelet were also found. A similar percussion cap was recovered at nearby Jakkalsberg A & B (Miller & Webley 1994).

A single spatulate iron artefact, approximately 40 mm long was found on the site. It is thought to be historical. Shadreck Chirikure (pers. comm. 2006) notes that its manufacturing technique differs from that typically used by precolonial metal-workers. It was made from a flat sheet with one end folded and hammered to create the tang, whereas precolonial people usually used a thicker piece of metal, hammering the blade flat and leaving the tang untouched. By comparison, a very similar object, but made from copper, was found at Bloeddrift 23, a recent site some 30 km downstream of Jakkalsberg. It appears to have been made via the latter technique (see Smith *et al.* 2001: fig. 4).

JAKKALSBERG L

CONTEXT AND DATING

Jakkalsberg L (JKB L) is located in a small deflation hollow formed in Orange River silts some 250 m from the river (28°10′51.3″S, 16° 53′13.0″E; Fig. 1). Most of the site was collected in the 51 m² excavation. A hearth was found in squares G/H 16/17 and the distribution of finds shows spatial patterning to have been well preserved, particularly around the hearth (Fig. 4). Around the southeastern perimeter of the site the deflation forms an embankment with the hearth located fairly centrally in front of it. The distribution of artefacts suggests that the embankment was in place during occupation of the site and that the occupants may have sat at the base of it around the fire performing their tasks. Further discussion on the spatial patterning follows below. A single radiocarbon date on a small concentration of charcoal collected from square F16 beside the hearth indicates an age of about 1500 BC (Table 1).

STONE ARTEFACTS

There are on average approximately 64 flaked artefacts per square metre at JKB L. Overall, quartz is the dominant raw material and, although most formal tools are made from the higher quality cryptocrystalline silica (CCS; Tables 4 & 5), certain tools are preferentially made on quartz, despite its poorer fracturing qualities. Wendt (1972) proposed that crystal quartz was intentionally selected for the manufacture of the minutest tools at some Namibian sites. Our observations along the west coast of South Africa support this contention, and also show backed tools to be more common in quartz and scrapers in CCS (Orton & Halkett 2005, 2006). At JKB L the smaller backed tools, specifically backed flakes and triangles, are more

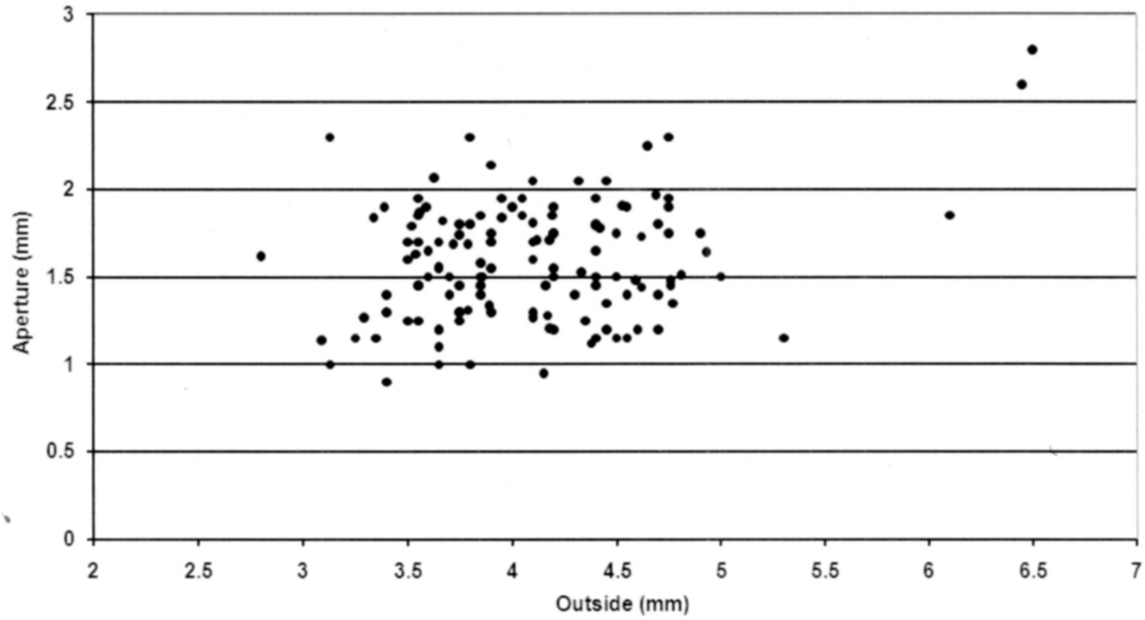

FIG. 3. *JKB N OES bead sizes.*

frequently made of quartz (Table 5). Altogether 69.7% of backed tools, including all the triangles, are of quartz. In contrast, all 20 scrapers in the assemblage are made from CCS. Miscellaneous retouched pieces are also more frequent in CCS. In common with most Namaqualand sites (e.g. Orton *et al.* 2005; Orton & Halkett 2005, 2006; Dewar 2008), no formal tools are made in any materials other than quartz and CCS.

Retouched artefacts at JKB L are diverse with a total of 65 tools in 18 classes. The most unusual feature of the assemblage is the presence of seven triangles and two trapezia (Fig. 5), types virtually unknown in South Africa. At JKB L these tools are very small with some having maximum dimensions of less than 10 mm (Fig. 6). Unlike most trapezia that have two opposing backed edges, those at JKB L have three backed edges with just the longest side remaining unretouched. The third backed edge in each case is extremely short possibly suggesting these to be variations on the triangles rather than entirely separate tool types. Triangles have two backed edges that meet opposite an unretouched edge. Interestingly, despite limited variation in size, all these tools have a length:breadth ratio of

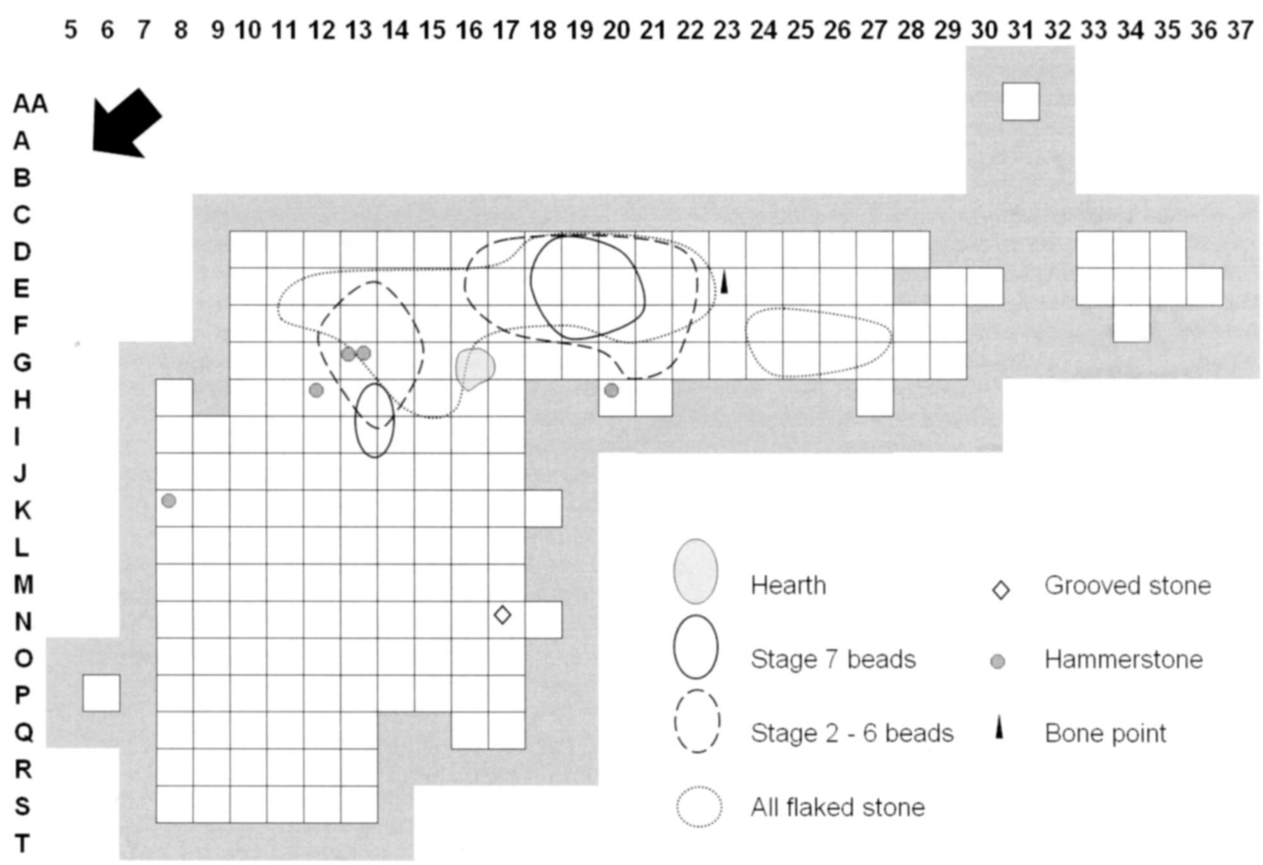

FIG. 4. *Map of JKB L showing spatial arrangement of activity areas. Squares are 0.5 m across.*

TABLE 4. *Raw material percentage frequencies at JKB L. (CCS: cryptocrystalline silica, FGBR: fine-grained black rocks).*

	Total assemblage	Formal tools
Quartz	79.25	40.00
CCS	17.55	60.00
Quartzite	1.94	–
Sandstone	0.77	–
FGBR	0.25	–
Other	0.25	–

close to 1.5. Curve-backed artefacts that have a backed edge that curves to meet the unretoched edge at one end are also unusual, but are sometimes found in South African sites. Backed scrapers, also prominent at JKB L, are common on west coast sites dating between 4500 and 3000 BP (Orton & Compton 2006). The two quartz segments are between 10 mm and 11 mm long, and one in CCS is 18.9 mm long. The fourth segment, made in CCS, is far larger measuring 29.6 by 15.5 mm. The single denticulate is similar to those present at JKB N (Orton & Halkett 2001). The low frequency of backed bladelets and points supports the late mid-Holocene date for the site.

Although only a small number of cores are present, it is clear that bipolar flaking was uncommon. This is in stark contrast with sites at Elands Bay (Orton 2006) and must reflect access to better quality and larger quartz crystals at Jakkalsberg. Although a vein quartz quarry is located just a few hundred metres from the site, this material was apparently not used. Pebbles of CCS are readily available in the Orange River gravels and the low frequency of CCS cores may be due to flaking having taken place at the river and with flakes carried back to the site. The far lower proportion of CCS chips than quartz chips supports the case for less primary flaking of CCS at the site. The low incidence of bladelets and lack of bladelet cores clearly shows that there was no emphasis on bladelet production.

In addition to the flaked artefacts, five hammerstones, two grindstone fragments, several manuports, one grooved stone and a small quantity of red and black pigment were also found. The grooved stone is approximately 50 mm long and has two grooves placed back-to-back (see Orton 2008: fig. 5). Each groove has a diameter of just more than five millimetres.

WORKED BONE AND OSTRICH EGGSHELL

A 37 mm long bone point fragment was found on the southern edge of the main activity area (Fig. 4). Its fabrication resulted in faceting and extensive diagonal striations. Thirty-eight engraved OES fragments were recovered from JKB L. The engraving consists primarily of parallel lines or combinations of these and cross-hatching (Fig. 7), while one piece has extensive scoring over a wider area. Interestingly, six unfinished beads displayed pre-existing engraving indicating the re-cycling of decorated egg shells. Two OES flask mouth fragments were found, one of which has engraving alongside the hole (Fig. 7). The second is stained with ochre.

A large assemblage of beads and bead-manufacturing debris was recovered from JKB L. The debris has allowed all the stages of production to be identified (Orton 2008). At JKB L, holes are drilled into irregular ostrich eggshell (OES) fragments prior to trimming and rounding. Nearly two-thirds of the 610 incomplete and broken bead fragments resulted from breakage during the drilling process, while just over one third broke during the trimming stage. Very few beads broke during final rounding. In addition, 34 unbroken beads had not been finished, perhaps having been lost in the sand. Of the finished

TABLE 5. *Lithic inventory at JKB L.*

	Quartz	CCS	Quartzite	Sandstone	FGBR	Other
Bipolar	1					
Irregular	11	2				
Single platform	1	1				
Subtotal cores	**13**	**3**	–	–	–	–
Blade	3	5				
Bladelet	12	4				
Flake	572	179	39	12	6	4
Chunk	304	83	16	8	1	3
Chip	1640	255	18	5	1	1
Subtotal debitage	**2531**	**526**	**63**	**25**	**8**	**8**
Edge-damaged flake	4					
Edge-damaged chunk		2				
Subtotal edge-damaged	**4**	**2**	–	–	–	–
Scraper fragment		2				
Misc. scraper		2				
Thumbnail scraper		2				
Sidescraper		3				
Backed scraper		7				
Misc. backed scraper		4				
Subtotal scrapers		**20**	–	–	–	–
Backed flake	3					
Backed point	1					
Backed bladelet fragment	3	1				
Curve-backed bladelet	1	1				
Curve-backed flake	2	3				
Segment	2	2				
Triangle	7					
Trapezium	2					
Misc. Backed Piece	2	3				
Subtotal backed	**23**	**10**	–	–	–	–
Denticulate		1				
Notched piece		1				
Misc. Retouched Piece	3	7				
Subtotal formal retouch	**26**	**39**	–	–	–	–
Grand total	**2574**	**570**	**63**	**25**	**8**	**8**

beads, 138 were complete and 164 fragments were found. When complete beads were measured they displayed mean external and aperture diameters of 4.54 ± 0.60 and 1.45 ± 0.22 mm, respectively. Although most cluster between 4 and 5 mm diameter, five very small beads of less than 3 mm external diameter and five larger beads with diameters greater than 5.5 mm are included in the sample (Fig. 8).

VERTEBRATE FAUNA

Bone is very poorly preserved and highly fragmented. Most of the tiny fragments are the remains of fish, but are too fragmentary to analyse, The species listed in Table 6 are those most economically valuable for the area (Smith & Metelerkamp 1995) and thus likely to be present in LSA sites along the Orange River (Simon Hall, pers. comm. 2008). All are known to occur in the Richtersveld (Skelton 1993; Williamson 2000). The size of the recovered fish vertebrae suggest that the fish were seldom more than 400 mm in length. Other smaller species may also have been caught and eaten, but their bones are unlikely to have survived the climatic and depositional rigours of the Richtersveld (Simon Hall, pers. comm. 2008).

Fragments of small bovid (NISP = 8), small–medium bovid (NISP = 6) and *Procavia capensis* (rock hyrax; NISP = 1) were identifiable. All have an MNI of 1 (Teresa Steele, pers. comm.

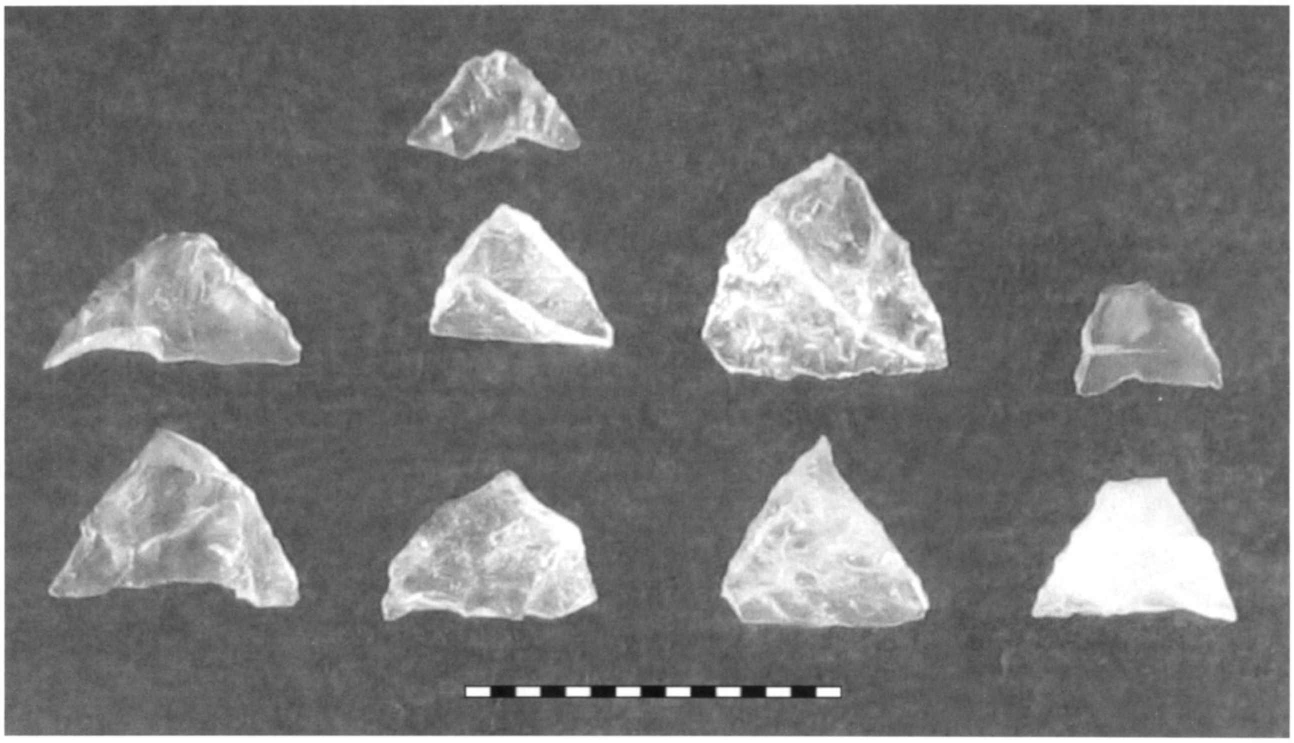

FIG. 5. *Triangles and trapezia from JKB L. The two at far right are trapezia. Scale bar: 10 mm.*

2005). The small bovid is assumed to be steenbok (*Raphicerus campestris*), since greysbok (*Raphicerus melanotis*), requiring more bush cover than these dry areas offer, do not occur north of Vanrhynsdorp (Skead 1980; Smithers 1986).

MARINE AND FRESHWATER MOLLUSC SHELL

Several fragments of shell were recovered from JKB L, but most were too small for positive identification. Two marine species, *Scutellastra granularis* and *Cymbula granatina*, are represented by one small fragment each and indicate some contact with the coast. Jakkalsberg lies approximately 65 km from the coast and marine shell is not unexpected. Wendt (1972) found marine shells as much as 180 km inland in southern Namibia and in South Africa marine shell is present at several sites in the Cederberg Mountains, at least 130 km from the coast (e.g. Anderson 1991; Halkett 1987; Orton & Mackay 2008; Parkington & Poggenpoel 1971). Other sites in the Richtersveld also contain marine shell (e.g. Webley *et al.* 1993). The small bivalve, *Corbicula fluminalis*, is the only identifiable freshwater species, although several other small fragments of shell are thought to be *Unio caffer*, a freshwater mussel commonly found in southern African rivers (Appleton 2002; Jenny Day, pers. comm. 2005).

SPATIAL PATTERNING

Spatial patterning is evident and seems to be dictated by the physical confines of the deflation hollow and the position of the hearth. Although a thin scatter of lithics occurs over the

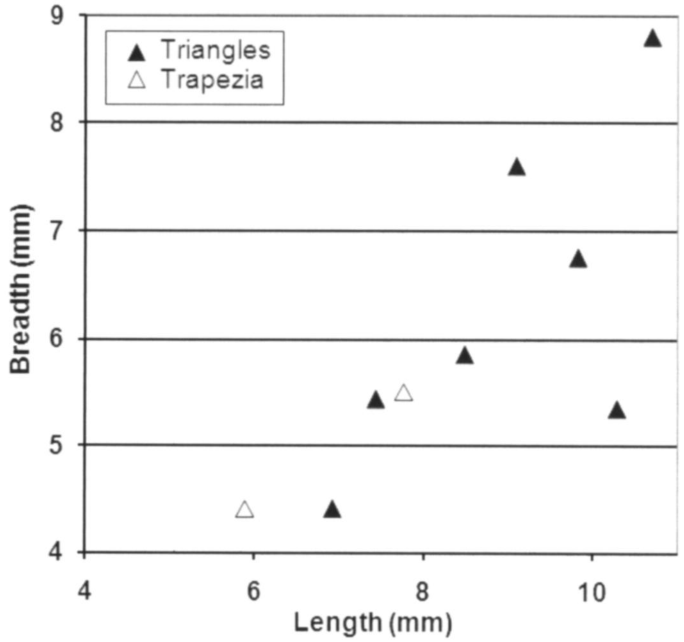

FIG. 6. *Triangle and trapezium dimensions from JKB L.*

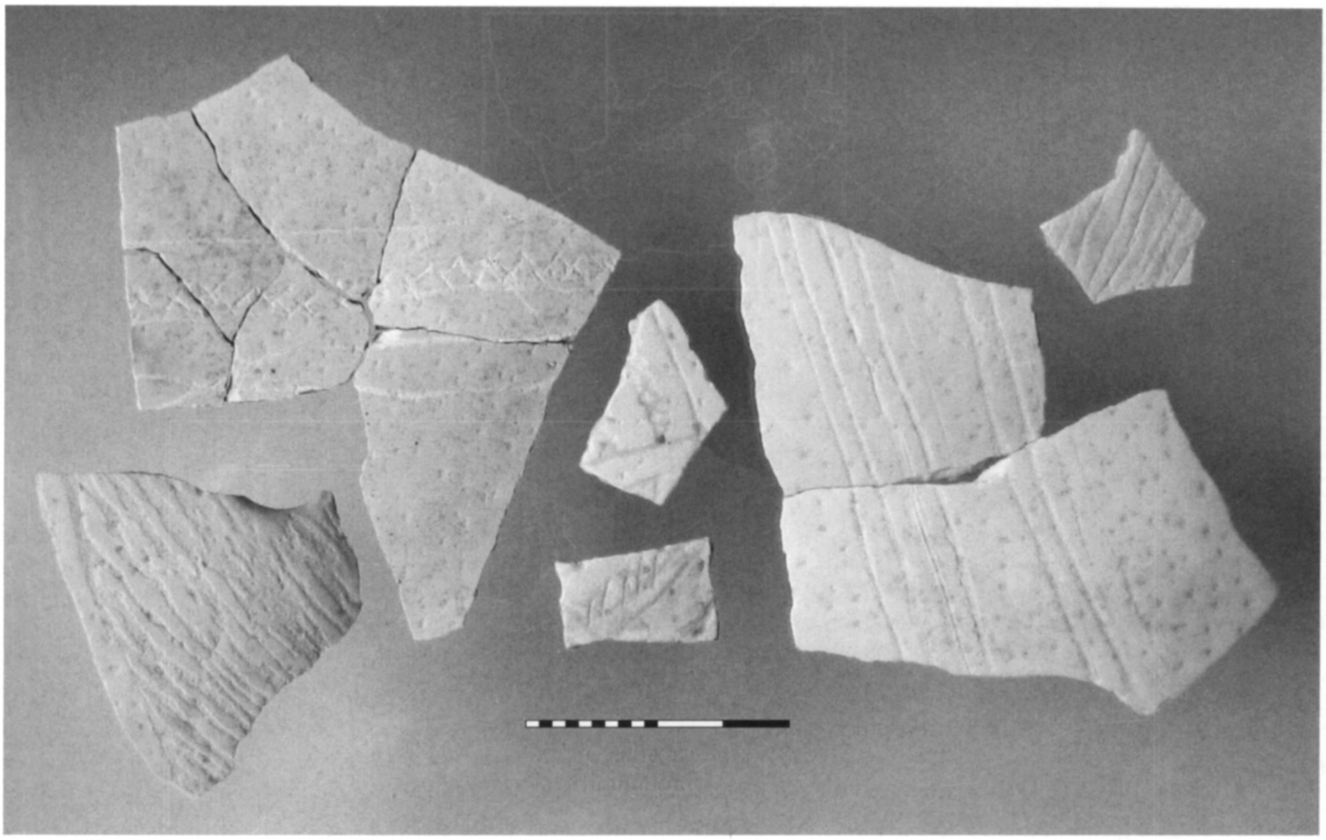

FIG. 7. *Engraved OES and flask mouth from JKB L. Lower left fragment is a flask mouth. Scale bar: 20 mm.*

entire site, most lie in an arc between the hearth and the embankment (Fig. 4). It seems clear that artefact production occurred in specific places on the site indicated by the coincidental distribution of debitage and formal tools. OES bead-manufacturing debris (unfinished whole and broken) is slightly more restricted, but on the whole follows a similar distribution. The two densest patches of debris could indicate two people making beads, but it is not possible to make a similar judgment based on the lithics. The coincidental distribution of bead and lithic debris suggests that the same people may have been responsible for the production of both. The hammer stone distribution does not match the flaked stone and similarly the grooved stone was found away from the bead debris. Red and black pigments are found in separate areas, possibly suggesting different uses for them. The red ochre is found mostly away from the hearth in the northern part of the site, while the black material follows a similar distribution to the flaked lithics to the east and south of the hearth.

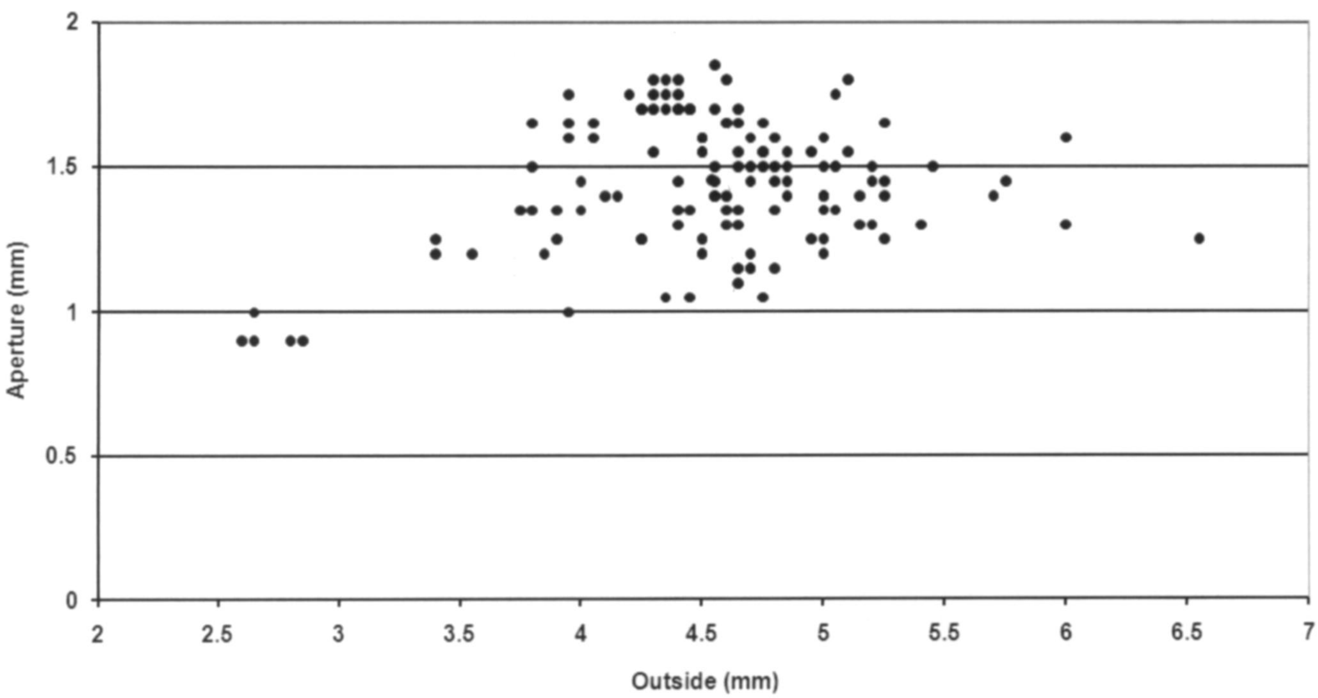

FIG. 8. *JKB L OES bead sizes.*

TABLE 6. *Fish species likely to be found in LSA sites along the lower Orange River.*

Species	Common name
Labeobarbus aeneus	small-mouth yellowfish
Labeo capensis	Orange River mudfish
Clarias gariepinus	sharptooth catfish
Labeobarbus kimberleyensis	largemouth yellowfish
Labeo umbratus	mud mullet

DISCUSSION

JKB N & L have contributed to our growing database of mid- to late mid-Holocene material from the Northern Cape Province and, along with Die Toon (Webley *et al.* 1993), are the only sites of this age to have been excavated in the Richtersveld. Both the Jakkalsberg sites have impressive lithic assemblages and, while other categories of finds are also discussed, we focus primarily on the lithics.

The dating of coastal sites from Namaqualand, to the south of the Richtersveld (Dewar 2008), indicates the slight dominance of backed tools and the presence of segments and backed scrapers as typical features of mid- to late mid-Holocene assemblages from the area. Only after about 3000 BP do scrapers tend to dominate more strongly. JKB L and N largely fit this pattern, both having many scrapers and backed tools, although at JKB N scrapers are, in fact, slightly more common. Die Toon, dating between about 3800 and 3100 BP, is strongly dominated by backed artefacts (Webley *et al.* 1993), while the coastal site of Spoeg River Cave seems to have scrapers and backed tools well distributed throughout its excavated depth (Webley 2002).

Of interest among the formal tools is the presence of certain types seldom seen in South Africa but common elsewhere in Africa (e.g. Ambrose 2002: 10). East and Central African archaeological sites show a relatively continuous microlithic industrial sequence with similar artefacts being manufactured throughout the LSA (Barham & Mitchell 2008; Mitchell 2002; Sampson 1974). Backed tools generally dominate and, notably, triangles, trapezia and denticulates are often present. However, with the exception of parts of northern Zimbabwe, the LSA sequence in Africa south of the Zambezi includes a major industrial change to the terminal Pleistocene/early Holocene non-microlithic tradition between approximately 12 000 and 8000 BP (J. Deacon 1978, 1984a,b; Mitchell 2002; Orton 2006; Wadley 1993; Walker 1995). The subsequent Holocene microlithic tradition has more backed artefacts but scrapers still dominate. Triangles and trapezia are virtually absent and denticulates are very rarely encountered. Given this major discontinuity, the surprising inclusion of reasonable numbers of denticulates and triangles at Jakkalsberg may hint at affinities with sites outside of southernmost Africa.

Denticulates have been recognized in very small numbers from several South African LSA sites. Since the first comprehensive description of these artefacts at JKB N (Orton & Halkett 2001), we have identified a few other southern African sites containing them. In earlier reports they were most often called "saws" and, as not all are illustrated, we cannot fully understand what, if any, variation there may be. With few exceptions, denticulates are rare and when recognized, often do not follow the same method of fabrication as those from JKB N. At Oakhurst, for example, the denticulation is applied to straight edges (Schrire 1962), while at Byneskranskop 1 two segments were found to have denticulate retouch on their chords (Schweitzer & Wilson 1982). These examples invariably have the notches applied to sharp, unretouched edges whereas those at JKBN were usually applied to edges with pre-existing scraper retouch. The illustrated examples from Buntveldschuh Midden on the Namibian coast, some 140 km northwest of Jakkalsberg (Rudner & Grattan-Bellew 1964: fig. 6, nos 9 & 10), closely resemble the Jakkalsberg examples. At JKB N, the unusually high frequency of denticulates (24) make up 4.8% of the formal tools and, despite some variation in shape, have a fairly regular and consistent pattern of retouch (Orton & Halkett 2001: fig. 3).

Other southern African examples mentioned in the literature seem to be most frequent during the mid-Holocene, a time when formal tools are at their most diverse. A single small example from the late Pleistocene at Boomplaas is the exception (J. Deacon (1984b: fig. 132:1). Tixier (1963: fig. 44) illustrates and describes a number of denticulates from North Africa and they are also recorded in Tanzania (Masao 1979) and Zimbabwe (Cooke 1963). These observations suggest a wide distribution in Africa. Their apparent rarity in South Africa is therefore of significance. Interestingly, in North Africa, Tixier (1963) comments that they are more frequently made on blades than flakes, but the Jakkalsberg denticulates are all of flake proportions.

The Jakkalsberg triangles have strongly equilateral shapes and similar artefacts have yet to be reported from any other South African site. The occasional triangular pieces that are found are usually elongated and more likely to be malformed segments than deliberately made triangles. At Jakkalsberg the difference between the two shapes is clear, but at Die Kelders Schweitzer (1979: 184) reported that his segments came in a range of shapes from "the 'regular' segment shape to pieces that are more triangular". He illustrated two examples (Schweitzer 1979: fig. 43, f & g) that, in terms of both size and shape, are very similar to the Jakkalsberg triangles and are probably best classified as such. It is unclear when these tools were made as a unique class and when they represented items within a prehistorically accepted range of variation within the segment class. Their consistency throughout Africa, however, seems to argue for their uniqueness. Triangles have been identified as a separate class from several sites in Namibia (Richter 1984; Wendt 1972) and Zimbabwe (Robinson 1952; Sampson 1974; Walker 1995). They tend to become more common further north and are recorded in Zambia (Bond & Clark 1954; Clark 1950a,b, 1974; Sampson 1974), Rwanda (Van Noten & Hiernaux 1967), Uganda (Clark 1957), Tanzania (Masao 1979; Willoughby 2001), the Horn of Africa (Clark 1954), Nigeria (Shaw & Daniels 1984); Ghana (Casey 1993) and north of the Sahara (Midant-Reynes 2000; Tixier 1963). They also occur in Europe (Gracie 1945) and Australia, with the majority of Australian examples being found in the arid parts (Hiscock & O'Connor 2005). At many central and north African sites triangles form a modest but consistent component of the assemblages. Most authors consider the equilateral form to be less common than the isosceles form. Sampson (1974) reports that, in Zambia, triangles occur throughout the LSA (there termed the Nachikufan Industry with four phases) but are more common during the last 7000 years (Phases"IIB and III). With the Nachikufan being broadly similar to the Holocene microlithic, this may lend further support to a southward diffusion of technology as proposed by J. Deacon (1984a: 249). The question of why triangles and trapezia failed to become a regular part of the Holocene microlithic toolkit in South Africa, however, remains unanswered.

Curve-backed bladelets are generally uncommon in South African LSA assemblages, but have been reported from more recent contexts in the central Karoo (Sampson 1972; Sampson

& Sampson 1967; Close & Sampson 1998). While some may relate to the production sequence described by H. Deacon (1976) at Highlands rock shelter on the southeastern edge of the Karoo, others are certainly an independent artefact class, since they are found without the other types identified at Highlands. Although they may be a stylistic variant of the straight-backed bladelets so commonly found across the region, this seems unlikely given their prominence elsewhere in Africa (e.g. Zambia (Clark 1974), East Africa (Clark 1954; Mehlman 1989) and North Africa (P. Smith 1982; Tixier 1963)).

Large segments are unusual in the LSA and just one is present here, at JKB L. They have also been noted elsewhere in southern Africa with examples described in northwestern South Africa (Rudner & Rudner 1969), Namibia (Richter 1984; Wendt 1972), Zimbabwe (Cooke 1963) and Zambia (Gabel 1963, 1965; Clark 1950b). Wendt (1972) notes that these larger segments tend to be between about 30 and 40 mm long and Gabel (1965) records them as being between 31 and 45 mm. Rudner and Rudner (1969) considered the size range of their Northern Cape and Namibian segments to be between 12 and 30 mm. Ambrose (2002) considers bimodality in backed microlith size to be very uncommon and, with so few large segments reported, little data exist on these artefacts. It is unknown whether larger segments were a stylistic variation or whether they may have had their own specific purpose. Measurements of Howieson's Poort (HP) backed pieces from Western Cape sites (Mackay 2009; Wurz 2002) suggest that the segments discussed here would fit comfortably within a MSA assemblage; Mackay's (2009) range of variation for 37 complete segments specifically was 36.2 ± 8.2 mm. This raises the possibility that at least some may have been collected from HP sites, although it seems unlikely.

Grooved stones with ground depressions less than 10 mm in diameter are thought to have been used either for arrow straightening or for the rounding of OES beads (J. Deacon 1984b). The latter function has been observed recently in Botswana (Wingfield 2003; Women's Work 2006). The grooves on the JKB L example average just more than 5 mm in diameter and, with the mean diameter of ostrich eggshell beads at the site being 4.55 mm, a use in bead production is supported. Modern bead-makers in Botswana have been observed to hold strings of trimmed beads on a piece of wood and then to rub a stone over them to smooth their edges. Some of the stones developed distinct bead-shaped grooves (Wingfield 2003). Although the JKB N grooves are generally too small to accommodate beads, it seems likely that this mode of production may have been employed at JKB L. The small size of the JKB grooved stones suggests that they were used in the hand.

The presence of bead debris on engraved OES fragments presumably indicates recycling of OES. The total weight of all OES on JKB L, modified and plain, is 339.8 g, equivalent to less than 1.5 whole egg shells (Orton 2008). With so little present, the recycling may be due to a scarcity of ostrich eggs in this harsh environment. It thus probably just shows a natural inclination to not waste anything when living in an environment where resources generally are not that easy to obtain. The mean bead diameters, at approximately 4.09 mm (JKB N) and 4.54 mm (JKB L), are consistent with those from Die Toon, dated to around 2200 to 1350 BC, which average in the region of 4.1 mm (Webley *et al.* 1993: table 3). These sizes are expected for sites of this age.

The geometric patterns engraved on ostrich eggshells are remarkably similar from sites across western South Africa. Fragments from the Western Cape (Rudner 1953; Orton 2009) and Namaqualand coasts (Orton & Halkett 2005, 2006; Dewar 2008) as well as the Northern Cape interior (Humphreys & Thackeray 1983; Rudner 1953) all show designs similar to those from Jakkalsberg. A wider variety is present at Northern Cape interior sites (Humphreys & Thackeray 1983: figs 42, 54, 80), which include all the Jakkalsberg styles. Although decorated OES occurs throughout the latter half of the Holocene, it appears from dated examples to be more common in the earlier millennia; the six sites so far (including JKBL & N) containing these items have been dated ranging between 1100 BC and 4000 BC (Dewar 2008; unpublished data).

Unfortunately, the lack of organic material means that little can be said of the subsistence behaviour of the inhabitants of the sites. However, one consistent feature of excavated sites in the Richtersveld is the presence of fish remains (Brink & Webley 1996; Orton 2007; Robertshaw 1979; Webley *et al.* 1993). Fish are still eaten by local herders today. Die Toon is located some 15 km from the Orange River (Webley *et al.* 1993) and its fish remains show that the Orange River was a critical source of protein at encampments both adjacent to the river and on those farther away. Although preservation does not allow objective judgement, it is likely that the relatively reliable food source presented by fish was key to survival in the hostile Richtersveld environment. Unlike sites in Lesotho (Plug & Mitchell 2008), no bone hooks or other recognizable fishing implements were recovered from the Jakkalsberg sites. Although we do not know which fishing methods were used at the Jakkalsberg sites, several methods have been observed historically along the Orange River and thus provide some analogies. Hobart (2003) reviews these in some detail, but they include baskets and/or fence traps (Barrow 1801; Mossop 1935; Schapera 1930; Stow 1905), stone traps (Lichtenstein 1812), hooks (Mossop 1935); spears and bows and arrows (Stow 1905) and "harpoons of wood, some pointed with bone, and fixed to ropes made apparently of some sort of grass" (Barrow 1801: 300). Hall (1990) notes that *L. umbratus* can at times be collected by hand in shallow pools and channels. Andersson (1857) described spears tipped with a gemsbok horn used for spearing fish stranded on the mud flats at Walvis Bay. Fish are also sometimes driven by people into bays and backwaters where they are more easily caught (Skelton 1993). The Orange River channel morphology adjacent to the Jakkalsberg sites is conducive to these methods. A tributary stream has deposited gravel out into the Orange, constricting its channel and resulting in a large pool of slow-flowing water. Interestingly, the same scenario exists at Likoaeng in Lesotho (JO, personal observation) where painted imagery suggesting fence-type traps is present (Challis *et al.* 2008) and fish are super-abundant in the fauna (Mitchell *et al.* 2006). Hobart (2003) reviewed the incidences of fishing depicted in Lesotho rock art and found most of the historically observed techniques to have been painted.

A record of Orange River flood events from the last 1000 years is preserved in slack water sediment columns that accumulated in gulleys along its course. This includes the largest recorded flood which occurred after about AD 1450 (Zawada 2000). Other major floods occurred about 800 and 300 years ago (Herbert & Compton 2007) and, more recently, four occurred during the 20th century (Swart *et al.* 1988). Despite these major flood events, archaeological sites on the river terraces have experienced only light but variable impacts to their integrity. JKB N lies on the lowest part of the silt terrace where the evidence of flooding is obvious. The distribution of its artefacts indicates some movement, while JKB K and JKB L have been so little affected as to have even retained ashy features. The former, lying among the trees on the higher ground of the levee, may well have remained dry during major flood events but JKBL appears to have experienced at least minor flooding indicated by the depth of silt in which artefacts were found. In fact, we believe that a low basal water velocity across the floodplain led to deposition of silt which preserved the sites and maintained their high research value. In Lesotho, Likoeng demonstrates a similar situation where protecting layers of flood-deposited silts have enhanced preservation and spatial integrity (Mitchell *et al.* 2006). The artificial reduction in flooding events and silt load, due to construction of dams, has meant that sites exposed now through a variety of erosional mechanisms are at greater risk than ever, since new silts are no longer accumulating to protect them.

CONCLUSION

While sites in the Richtersveld dating within the last 2000 years have been well documented, we can now confidently demonstrate occupation going back well into the mid-Holocene period. The formal tool types at JKBL and JKB N show that, despite strong connections with the Namaqualand coastal area, certain aspects of these sites more closely resemble Holocene microlithic occurrences outside of South Africa. Given the changing trajectories of LSA development either side of the Zambezi, as discussed above, this is surprising and may well reveal cultural affinities between climatically different areas traditionally considered to have had somewhat dissimilar cultures (e.g. H. Deacon & J. Deacon 1980).

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