KEYWORDS: ***Pleistocene – Palaeoart – Sub-Saharan Africa – Rock art – Mobiliary 'art'***

# TRACING THE EMERGENCE OF PALAEOART IN SUB-SAHARAN AFRICA

Peter B. Beaumont and Robert G. Bednarik

**Abstract.** A comprehensive review of the pre-Holocene palaeoart evidence from sub-Saharan Africa is presented. The scant figurative component appears to be entirely confined to the Later Stone Age. Beads and pendants range back further, to the latter half of the Middle Stone Age. The same applies to the notched items that are invariably based on either bone or red ochre. Incised lines have been reported from both of those periods, and extend into the preceding Early Middle Stone Age. Preliminary data would suggest that a comparable timespan is probably covered by cupules and grooves. Pigment manuports, sometimes with use damage, are traceable to late in the Earlier Stone Age. And lastly are occasional exotic manuports, the collection of which could have spanned the entire Stone Age.

## Introduction

Africa south of the Sahara has a present surface area of over 18 million km$^2$, spans some 50° of latitude and 65° of longitude, and is, on the basis of relief, divisible into two distinct portions (Fig. 1), the Congo basin and western Africa at mostly +150–500 m, and the high ground of eastern and southern Africa at mainly over 1000 m (Grove 1978; White 1983), with better drainage in the latter region resulting in a relatively low incidence of zoonotic diseases there (Bar-Yosef and Belfer-Cohen 2011). Global temperature shifts to cooler and drier climates, beginning in the Eocene, but particularly since late Pliocene times, ~3 million years ago (Kennett 1995), led contracting forests to be increasingly ringed by an aridity-adapted belt of $C_4$ grasslands (e.g. Schefuβ et al. 2003; Plummer et al. 2009) in which woody plants form a lesser part, the savannas sensu lato (Davis 1962). This new biome, particularly its southern sector (Kingdon 1971; Bigalke 1978), supports (or supported) a large mammal fauna of exceptional abundance and diversity, with ungulate biomass counts per unit area ~5–>100 times higher than any other studied Old World ecosystem (Bourlière 1963), thereby leading that author to conclude that the African savannas 'must have constituted an ideal terrain for early man'.

Precisely matching that inference is an unbroken sub-Saharan hominin record commencing c. 8 million years (Ma) ago (Brunet et al. 2002; Lebatard et al. 2008), in which the advent of *Homo* and of the Oldowan/Mode 1 (Clark 1969; Foley and Lahr 1997) may be placed in the 2.6–2.8 Ma range (Semaw et al. 2003; Beaumont 2011), whereas the earliest human presence in Eurasia postdates 1.8 Ma (Larick et al. 2001; Vekua et al. 2002; Zhu et al. 2004). Mode 2, the Acheulian, distinguished by bifaces, appeared in the southern savannas (Pit 1, Windsorton) by ~1.9 Ma ago (Gibbon et al. 2009), but at ~650 thousand years (ka) BP in western Europe (Santonya and Villa 2006), and at before 1.5 Ma in southern Asia (Paddayya et al. 2002; Pappu et al. 2011), while Mode 3, the Middle Palaeolithic/Middle Stone Age, typified (see further) by prepared cores and convergent points (Goodwin 1928), arose before 0.54 Ma (by c. 0.7 Ma) in South Africa (Beaumont 2011), but after ~0.3 Ma ago in the Levant and Europe (e.g. Mercier et al. 1995). Mode 4, the Upper Palaeolithic, which emerged in Eurasia subsequent to a hominin dispersal out of Africa at c. 60 ka ago (Beaumont et al. 1978; Forster 2004), is absent from sub-Saharan Africa, where a transition to Mode 5, the Later Stone Age, characterised by microliths, took place in the southern savannas between c. 60 and 43 ka BP (e.g. Gliganic et al. 2012; Villa et al. 2012), with those differing Old World trajectories precluding further Mode advent comparisons. Nevertheless, what the lithic data up to that date indicate is that the high savannas of sub-Saharan Africa were a focal region of cultural innovation for the earlier ~98% of the archaeological record, thereby making it the most likely place where the initial phases of palaeoart evolution are manifested.

That model is here evaluated further, beginning with an overview, in southwards order, of the following securely documented Pliocene and Pleistocene-aged sub-Saharan occurrences of palaeoart, a collective term describing all physical evidence bearing on


***Figure 1.*** *Map, showing a red line running south from Suez, which separates Low Africa from High Africa, based on Grove (1978) and White (1983). Its extension to the south and east, to fully define High Africa, roughly follows the 500 m contour. The main biotic zones south of the Sahara are in shades of yellow, according to Davis (1962) and Bigalke (1987). Deeper yellows are confined to the portions falling within High Africa. Cited palaeoart locality numbering is from the north.*

non-utilitarian human practices in the distant past (Bednarik 2007). Categories comprise iconic and non-iconic paintings; beads and pendants; incised notches and lines, grouped together in the initial lists, but discussed separately after that in view of differing known timespans; cupules and grooves; and, finally, pigment and exotic manuports, so identified when find context supported their retrieval by human agency. Culture-stratigraphic abbreviations here used (Beaumont 2011) are IA for Iron Age, LSA for Later Stone Age, MSA for conventional Middle Stone Age (prepared cores, convergent points, bifaces absent), EMSA for Early Middle Stone Age (prepared cores, convergent points, bifaces present), and ESA for Earlier Stone Age, comprising the Acheulian (bifaces present, convergent points absent) and Oldowan. Bracketed names sometimes following them in the text refer to the particular technocomplex to which the associated lithic assemblage is best referred, based, traditionally, on the site or region where its presence

was first firmly established. All cited $^{14}$C dates have been calibrated to calendrical years by way of CalPal 2007 Hulu (Weninger and Jöris 2008); acronyms for other dating methods are AAR for amino acid racemisation/epimerisation, CNB for cosmogenic nuclide burial, E for microerosion analysis, ESR for electron spin resonance, OSL for optically stimulated luminescence, TL for thermoluminescence, and U-series for the uranium/thorium method (e.g. Wintle 1996). Localities not stated to be caves or shelters in the following lists are open sites.

**Iconic paintings: LSA**

Cave of Bees, south-western Zimbabwe (Fig 1, 16). A trench situated below an exfoliated area on the walls of this cave with representational art (Walker 1980) produced 16 spalls with clear traces of pigment, in levels $^{14}$C dated to between 12.5 and >15 ka ago (Walker 1987), thereby providing a minimum age for the destroyed panel those painted spalls came from.

Pomongwe Cave, south-western Zimbabwe (Fig. 1, 17). A 1979 dig (Walker 1987) produced, from just above an undoubted MSA sequence, an up to 10-cm-long slab that features a painted patch with well-defined outlines, the upper edge of which resembles the back-line and rump of an ungulate (Walker 1987: Fig. 4; Watts 1998). Problematical $^{14}$C results, partly due to mixing from below (Beaumont and Vogel 1972; Mitchell 1987), preclude a firm age for this item, that probably dates to between ~20 ka BP (Walker 1987) and the regional onset of the LSA by ~40 ka ago, at sites such as White Paintings Shelter and Depression Shelter (Robbins et al. 2000a; Brook et al. 2003)

Apollo 11 Cave, southern Namibia (Fig. 1, 31). Excavations located a cluster of seven plaques with colour drawings, that include a therianthrope, in a level with 'indeterminate' lithics (Wendt 1972), later subdivided into an early LSA (Layer D) and a MSA one (Layer E) (Wendt 1974, 1976; Vogelsang 1998) that have $^{14}$C and OSL timespans of ~15–22 and 30–43 ka ago, respectively, with the mobiliary art referred to the upper reaches (~32 ka BP) of the latter (Jacobs et al. 2008; Vogelsang et al. 2010). However, another study (Miller et al. 1992, 1999) on samples from those same two strata, at the outer end of the dig, produced $^{14}$C and AAR ages of up to ~43 ka for Layer D, and of ~56 ka for Layer E, with those quite different findings here taken to indicate that the early LSA at this site ranges from ~15–43 ka ago, that Layer E further back has a basal zone of MSA (post-Howieson's Poort) (Vogelsang 2010: 208), and that the plaques refer to the LSA (Beaumont and Bednarik 2012).

**Non-iconic paintings**

Apollo 11 Cave, southern Namibia (Fig.1, 31). A re-examination of the non-lithic items from a portion of Layer E (Watts 1998) identified 14 ostrich eggshell fragments that had well-defined areas of ochre application, including three with parallel red lines joined, in one case, by a perpendicular line, that are likely all associated with an early LSA occupation (see above), which $^{14}$C and OSL place at between ~30 and 43 ka BP (Vogelsang 2010: 208), but precisely where within that timespan they fall remains to be established by direct $^{14}$C dating.

**Beads and pendants: LSA**

Specimens falling into this category become rather common in sub-Saharan Africa after 20 ka ago (e.g. Deacon 1984; Mitchell 1996), and this listing has thus, to constrain its length, been confined to those occurrences that are (or appear to be) earlier than that date.

Enkapune Ya Muto Shelter, central Kenya (Fig. 1, 4). The 1982 and 1987 investigation of this 5.6-m-deep IA–MSA sequence (Ambrose 1998) revealed two early LSA industries, of which the younger, $^{14}$C dated to between ~41 and 44 ka ago, is associated with ostrich eggshell bead-making, as evidenced by 13 complete specimens and 12 preforms (op. cit.: Fig. 3).

Mumba Shelter, central Tanzania (Fig. 1, 5). This up to 10.5-m-deep IA–MSA succession, examined in the 1930s, in 1977 and 1981, and again in 2005 (e.g. Mehlman 1979; Prendergast et al. 2007), includes lower Bed III with LSA (Nasera) lithics and many ostrich eggshell beads (Ambrose 1998), that $^{14}$C, AAR and OSL date to ~34–37 ka ago (McBrearty and Brooks 2000; Weiß 2000, cited in Conard 2005; Gliganic et al. 2012). Lower down is Bed V, divisible into three levels, all with LSA (Mumba) assemblages (Diez-Martín et al. 2009) that are OSL dated to ~49–57 ka ago (Gliganic et al. 2012). Recovered from the uppermost of those units in 1977–81 were three ostrich eggshell beads, of which one produced a concordant AAR age of c. 52 ka (McBrearty and Brooks 2000). Another three, from differing depths in an area where no bioturbation was evident, were found in it during the 2005 excavation (Diez-Martín et al. 2009: Fig. 17).

Kisese II Shelter, central Tanzania (Fig. 1, 6). This 6.5-m-deep deposit, excavated in 1951 and 1956 (Inskeep 1962), produced only LSA lithics, divisible into an upper grouping rich in formal microliths and a more amorphous lower one (op. cit.: 296), that straight-line extrapolation from two $^{14}$C dates (Beaumont and Vogel 1972) places at c. 10–~22 and ~22 to c. 44 ka ago, respectively, with ostrich eggshell beads being recorded in all levels subsequent to spit 20 at ~35 ka BP.

White Paintings Shelter, north-western Botswana (Fig. 1, 12). Investigation of a 7-m-deep IA–MSA sequence between 1988 and 1993 (Robbins et al. 2000) established that the low density LSA level, with somewhat discordant $^{14}$C and OSL dates in the c. 30–37 ka range, was associated with two finished ostrich eggshell beads and 4–5 preforms, two of which have been directly dated to 35 and 42 ka BP.

Heuningneskrans Shelter, north-eastern South Africa (Fig. 1, 22). A trial trench sunk in 1968 to bedrock at 6.4 m documented superficial IA followed downwards by three LSA strata (Beaumont 1978: App.

***Figure 2.*** *An ostrich eggshell bead, ~0.8 cm in diameter, showing a conical perforation and hand-smoothed periphery, from square Q24 of ~43-ka-old stratum 1WA at Border Cave.*

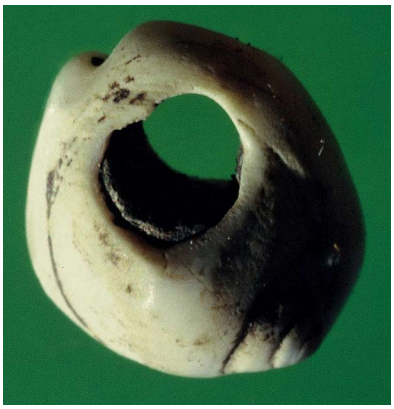

***Figure 3.*** *A ~0.8-cm-long* Nassarius kraussianus *seashell bead, with two lateral perforations, from square R18 of ~43-ka-old stratum 1WA at Border Cave.*

***Figure 4.*** *A ~1.6-cm-long* Conus bairstowi *seashell bead, found with the BC3 infant burial, from squares F and G12 of ~70-ka-old stratum 1RGBS at Border Cave.*

61) that extrapolation from three sets of $^{14}$C assays (Beaumont 1981; Miller et al. 1992) suggest were formed between ~8 and c. 43 ka ago, with one ostrich eggshell bead being found in ~23-ka-old Stratum 3c and four others in Stratum 3h at c. 43 ka BP.

Border Cave, eastern South Africa (Fig. 1, 24). Fieldwork in 1970–71 (e.g. Beaumont et al. 1978) probed three LSA (Ngwavuma) levels, in the lower two of which, placed at ~41–43 ka ago by 40 $^{14}$C and ESR readings (Beaumont et al. 1992; Grün and Beaumont 2001), were found 17 incomplete and complete ostrich eggshell beads (Fig. 2), one directly dated to ~42 ka (d'Errico et al. 2012), and three perforated *Nassarius krausianus* seashells (Fig. 3).

Kathu Pan 5, central South Africa (Fig. 1, 28). Investigations in 1982–85 established that Stratum 2b, with a $^{14}$C timespan of ~24–>36 ka ago, contained a low density of early LSA artefacts and ostrich eggshell beads throughout its ~0.8 m thickness (Beaumont 1990a).

Sehonghong Shelter, eastern Lesotho (Fig. 1, 39). Excavations in 1971 and 1992 exposed a LSA–MSA succession (Carter and Vogel 1974; Mitchell 1995), in the lowest LSA level of which, $^{14}$C dated to ~21–24 ka ago, were two complete ostrich eggshell beads (Mitchell 1996: Table III).

***Figure 5.*** *Another like-sized* Conus bairstowi *seashell bead, found during fieldwork in 1987, from square C11 of the same ~70-ka-old 1RGBS stratum at Border Cave.*

**Beads and pendants: MSA**

Zombepata Cave, northern Zimbabwe (Fig. 1, 11). Fieldwork in 1968 exposed a 2.5-m-deep compressed IA–EMSA sequence (Cooke 1971), in which the MSA (Bambata) levels (at ~1.0–1.3 m), with a likely minimum $^{14}$C age of 44 ka BP, contained three partial bored stones of schist. Two of these are possibly pendants (d'Errico et al. 2005), the one oval, with a ~3–5 cm outside diameter and a ~1.5-cm-wide incised aperture, the other with an outside diameter of ~3.5 cm and an aperture width of ~2 cm (Cooke 1971: Fig. 5).

Cave of Hearths, north-eastern South Africa (Fig. 1, 19). Excavations in 1953–54 (Mason 1962, 1988) revealed that the upper reaches of the youngest MSA level (Bed 9) contained four quartz segments, suggesting an age near the regional Howiesons Poort onset at ~70 ka ago (Miller et al. 1999; Jacobs et al. 2008), plus a broken 3-cm-wide ostrich eggshell disc with a central perforation that is best taken to be a pendant (Mason 1988: 321).

Bushman Rock Shelter, north-eastern South Africa (Fig. 1, 21). Studies in 1965 (Louw 1969) and 1967–1975 (Eloff 1969; Badenhorst and Plug 2012) of the ~7.5-m-deep deposits at this site (Plug 1981), situated within 10 km of Heuningneskrans (see above), exposed an IA–EMSA? succession, in which ostrich eggshell beads were found in MSA (Pietersburg) Levels 19/20, 22 and 28 (Plug 1982: 62), with the second of those strata thus immediately below Level 21, which is $^{14}$C dated to >57 ka BP (Vogel 1969; Plug 1981).

Border Cave, eastern South Africa (Fig. 1, 24). In 1941 a 4–6-month-old *Homo sapiens* skeleton (BC3) and an associated *Conus* seashell (Fig. 4) were recovered from an up to 26-cm-deep grave, the lip of which, c. 5 cm below an unbroken ash lens, lay at the base of the MSA (Howieson's Poort) levels (Cooke et al. 1945; de

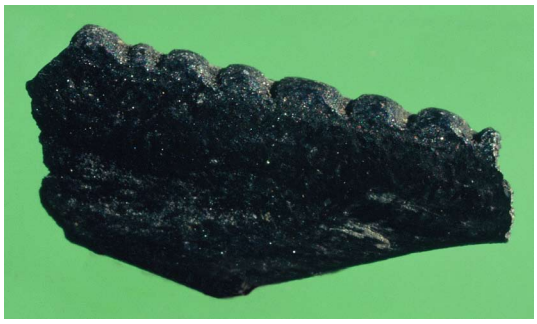

***Figure 6.*** *A 1.2-cm-long charred rib fragment with seven notches, and highly polished elevations between them from square W16 of ~43 ka old stratum 1WA at Border Cave.*

Villiers 1973; Beaumont et al. 1978; Beaumont 1980). AAR, $^{14}$C and ESR readings of >69 ka, >62 ka and ~74 ka, respectively (Miller et al. 1999; Bird et al 2003; Grün et al 2003), provide age estimates for that stratum, from which a further *Conus* pendant was recovered during fieldwork in 1987–88 (Fig. 5).

Kathu Pan 1 and 5, central South Africa (Fig. 1, 28). Directly underlying Stratum 2 at both sites is Stratum 3 with MSA lithics, OSL dated at the former to ~290 ka ago (Porat et al. 2010), in which a few ostrich eggshell beads occur throughout its upper ~20 cm (Beaumont 1990a).

Boomplaas Cave, southern South Africa (Fig. 1, 44). Investigation of ~5.5 m depth of deposit between 1972 and 1982 exposed a LSA–MSA sequence (Deacon 1979, 1995), in the second-youngest MSA (post-Howieson's Poort) member (OLP) of which, $^{14}$C, AAR and U-series dated to ~42–44 ka ago (Fairhall et al 1976; Miller et al. 1999; Vogel 2001), were found an incomplete and a complete ostrich eggshell bead that still require direct dating to confirm their in situ status (Deacon 1984, 1995: 123).

Klasies River Mouth Caves, southern South Africa (Fig.1, 46). Main Site excavations since 1966 (e.g. Singer and Wymer 1982; Deacon and Geleijnse 1988) produced a single *Patella oculus* specimen, with a perforation from the ventral surface of its broader end, that is presumed to be ornamental (Voigt 1982: 165; Watts 1998), from Layer 13 of Cave 1, associated with MSA (post-Howieson's Poort) artefacts with inferred $^{14}$C and OSL ages of between ~22 and 58 ka BP (Deacon 1995; Jacobs et al. 2008).

Blombos Cave, southern South Africa (Fig. 1, 48). Fieldwork since 1992 has probed MSA strata containing a Still Bay industry overlying earlier (Mossel Bay) lithics, OSL and TL dated to ~72–77 ka and ~82–100 ka ago, respectively (Henshilwood et al. 2001, 2004, 2009; Jacobs et al 2006; Tribolo et al. 2006), with, in the former, being 41 perforated *Nassarius kraussianus* seashells (Henshilwood et al. 2004; d'Errico et al 2005).

**Incised notches and lines: LSA**

Matupi Cave, north-eastern Democratic Republic of Congo (Fig. 1, 1). Excavation of four LSA levels, $^{14}$C dated from ~2–44 ka BP (van Noten 1977), yielded a ~24-ka-old small (6 cm across) broken bored stone with incised lines radiating out from both sides of the perforation (op. cit.: Fig. 2).

Ishango, far eastern Democratic Republic of Congo (Fig. 1, 2). The niveaux tufacés stratum, $^{14}$C and AAR dated to ~20 ka ago, produced undiagnostic LSA lithics and uniserial bone harpoons, of which one has notches on one edge (Brooks and Smith 1987), while from the ~2 ka older underlying niveaux fossilifere principal level came similar lithics, biserial bone harpoons, and a flake set at the end of a 10-cm-long bone handle covered by sets of parallel ~1-cm-long incised lines (Clark 1970: 289).

White Paintings Shelter, north-western Botswana (Fig. 1, 12). The succession there (see above) includes four LSA levels, of which the lowest, with TL and OSL ages of ~35–37 ka ago, produced a ~1.5-cm-long bone point base with two incisions, and a ~7-cm-long partial bone point, largely covered by closely spaced short transverse engraved lines (Robbins et al. 2000a, 2012: Fig. 7).

Border Cave, eastern South Africa (Fig. 1, 24). Investigations (e.g. Beaumont et al. 1978; Grün and Beaumont 2001) resulted in the finding of four pieces of an incomplete wooden stick (~0.6 cm thick; combined length ~32 cm) covered by short incised lines set at right angles to their length (Marshack 1990: Fig. 17.10) that are directly $^{14}$C dated to ~24 ka ago (d'Errico et al. 2012a). From earlier LSA (Ngwavuma) strata came two notched rib fragments, 4.3 and 1.2 cm long, the latter burnt (Fig. 6), a broken baboon fibula with 29 notches along an edge (Fig. 7), a bone point (tip missing) with a red pigment- filled incised spiral along its length (d'Errico et al. 2012a), and a small (~5 cm across) partial bored stone with 8 incised lines extending out from one side of its orifice (Fig. 8), all placed by $^{14}$C and ESR at ~41–43 ka BP.

***Figure 7.*** *A 7.6-cm-long broken baboon fibula with 29 notches, made with four different tools (d'Errico et al. 2012), from square T18 of ~41-ka-old stratum 1BS Lower B and C at Border Cave.*

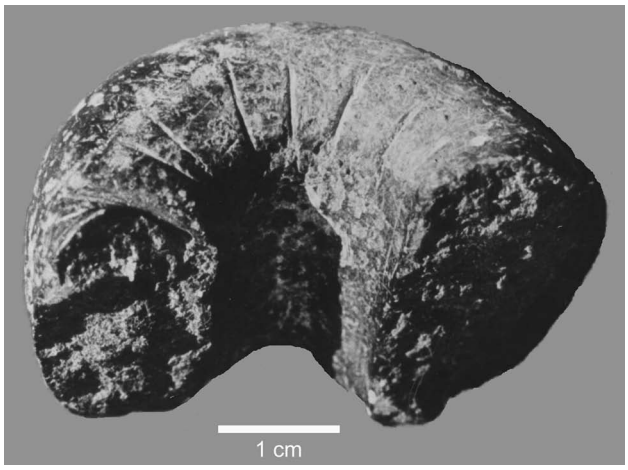


***Figure 8.*** *A partial bored stone of talcose schist with a diameter of ~5 cm, showing eight radiating lines on one side of its orifice, from square R16 of ~43-ka-old stratum 1WA at Border Cave.*

**Incised notches and lines: MSA**

Caimbunji, north-eastern Angola (Fig. 1, 7). A collected MSA (Lupembo-Tshitolian) sample from this open hillcrest site (Clark 1963) included a sub-oval (~20 cm across) sandstone slab with evenly spaced ~2-cm-long incised lines around much of its periphery (op. cit.: Pl. 57), and, although such assemblages still await firm chronometric dating, they probably predate the >44 ka BP onset of the LSA in tropical Africa, as at Matupi Cave (van Noten 1977).

Palmenhorst/Rössing, central Namibia (Fig. 1, 18). This ~8.0-cm-long cobble bears an engraved pattern (Fig. 9) conspicuously resembling that of Blombos marking SAMAA 8938, i.e. a band of cross-hatched lines bordered by two enclosing ones (Henshilwood et. al 2009). It was found with MSA artefacts amongst granite tors in 1963 (Wendt 1975: 180), but the absence of chronometric data, and no description of the lithics, means that the specimen could fall anywhere within the ~230-ka-long regional timespan of that period.

Border Cave, eastern South Africa (Fig. 1, 24). Also found in 1970–71 (Beaumont 1978) was a 3.8-cm-long broken rib fragment with 12 notches on an edge (Fig. 10), from a MSA (post-Howieson's Poort) level dated by $^{14}$C, ESR and AAR to ~55–69 ka BP (Miller et al. 1999; Grün and Beaumont 2001; Bird et al. 2003).

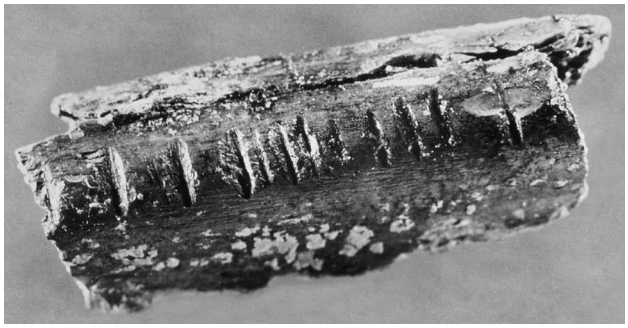

***Figure 10.*** *A 3.8-cm-long rib fragment with 12 notches, produced in a single session with the same tool (d'Errico et al. 2012), from square T19 of c. 60-ka-old stratum 2WA at Border Cave.*


***Figure 9.*** *Engraved face of small cobble from Palmenhorst/Rössing in Namibia, found with numerous MSA artefacts. Photograph courtesy W. Sydow.*

Wonderwerk Cave, central South Africa (Fig. 1, 30). Investigations between 1978 and 1996 produced, in Major Unit 2 of Excavation 5 (Beaumont and Vogel 2006), an undiagnostic MSA assemblage that included an engraved haematite chunk (Fig. 11) with six surfaces

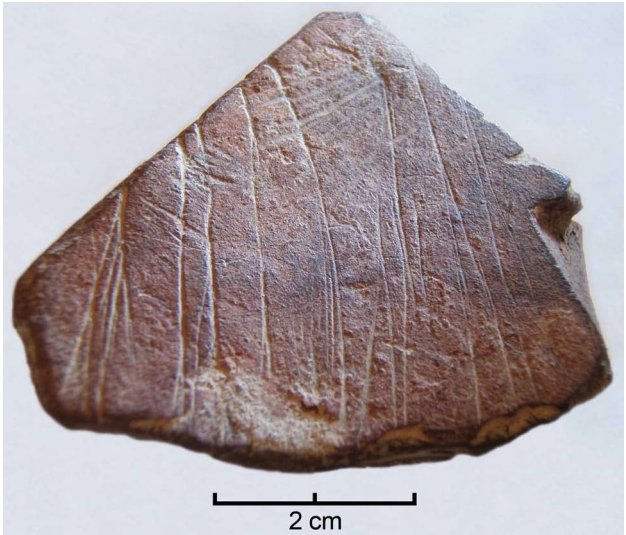


***Figure 11.*** *The major one of six engraved surfaces on a 4.9-cm-long haematite fragment, from square D120 of ~70-ka-old Major Unit 2 in Excavation 5 at Wonderwerk Cave.*

covered by incised lines (Bednarik and Beaumont 2011), from a level which a close-by U-series assay dates to ~70 ka BP.

Apollo 11 Cave, southern Namibia (Fig. 1, 31). Other finds during the initial fieldwork (see above) were two ostrich eggshell fragments with incised lines and traces of red ochre on their outside surfaces, from a MSA (Howieson's Poort) level OSL dated to ~63 ka ago, and two rib pieces (one 7.2 cm long with 26 notches; the other ~6 cm long with 12 notches) from a MSA (Still Bay) stratum OSL and AAR dated to ~71–>83 ka BP (Miller et al. 1999; Watts 1998; Vogelsang et al. 2010).

Muden, eastern South Africa (Fig.1, 35). A subsurface artefact collection from erosion gullies (dongas) in that vicinity included a brown patinated ~8.5-cm-long hornfels flake with a faceted butt (Malan 1956), which, given the utilised raw material, is likely of MSA or EMSA derivation. Covering its ventral and dorsal surfaces were reticulate patterns (Fig. 12), apparently engraved subsequent to the weathering zone forming (op. cit. 64), with the overall evidence suggesting that patination and marking of the specimen both fell within the MSA.

Sibudu Cave, eastern South Africa (Fig. 1, 37). Excavations since 1998 have produced a number of marked artefacts of MSA (post-Howieson's Poort) age, of which the youngest is a 3.5-cm-long stone flake with a series of five notches along a portion of its periphery, and six curved incised lines on the dorsal surface (Wadley 2005: Fig 4), from a layer dated by OSL to ~33–35 ka and by $^{14}$C to ~42 ka ago (op. cit.: 51; Wadley and Jacobs 2004). Lower down, there is a 2.3-cm-long limb shaft fragment with five flaked notches along an edge, from a layer OSL dated to ~48 ka ago (Cain 2004; Wadley 2005; Jacobs and Roberts 2008), as also a ~1.5-cm-long bone piece with a single notch, and a 2.2-cm-long rib fragment with ten notches, from a stratum directly below an OSL assay of ~57 ka (Wadley and Jacobs 2004; Cain 2004, 2006).

Mkomanzi River, eastern South Africa (Fig. 1, 38). In the gravels of that stream, near where it is crossed by the Loteni – Himeville road, was found a ~7.0-cm-long hornfels flake with a trellis pattern on its major dorsal face and extending onto the striking platform (Beater 1967). The brief published description does not permit a firm period placement, but typological considerations, and the fine-grained raw material used, may be tentatively taken to be most consistent with a MSA ascription.

Hollow Rock Shelter, south-western South Africa (Fig. 1, 40). In the retrieved MSA (Still Bay) assemblage (Evans 1994), with preliminary ages of 72–80 ka ago (Högberg and Larsson 2011), were two haematite pieces, one with a series of small notches on a concave ground surface, the other thin and roughly rectangular with notches around much of its periphery.

Klein Kliphuis Shelter, south-western South Africa (Fig. 1, 41). Lithics from a test pit sunk in 1984 (van Rijssen 1992) were later found to include two conjoining ochre fragments with cross-hatched incised lines (Mackay and Welz 2008), which further excavations

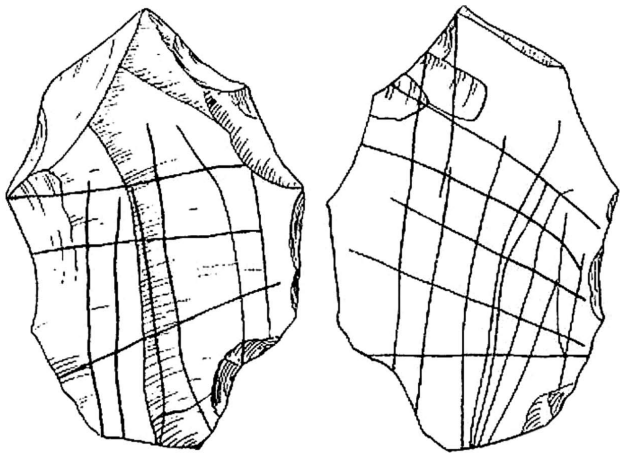

***Figure 12**. Lydianite MSA flake with engraved trellis patterns on both sides, from Muden in KwaZulu-Natal. After Malan (1956).*

in 2006 linked to 55–66-ka-old MSA levels (Mackay 2006, 2010). It has been suggested that the specimen was deliberately broken (Mackay and Welz 2008: 1526), which is pertinent given evidence for the deliberate breakage of stone plaques at Wonderwerk Cave.

Diepkloof Cave, south-western South Africa (Fig. 1, 42). Fieldwork since 1973 (Parkington et al. 2005; Rigaud et al. 2006) has yielded some 270 engraved ostrich eggshell pieces from a MSA (Howieson's Poort) level, TL and OSL dated to ~55–65 ka BP (Tribolo et al. 2005; Jacobs et al. 2008). Dominant patterns are a hatched band motif and another with sub-parallel lines, with the latter entirely replacing the former over time within a tradition of decorating liquid containers that likely spanned several millennia (Texier et al. 2010).

Howieson's Poort Shelter, southern South Africa (Fig. 1, 45). Investigations in the 1920s (Stapleton and Hewitt 1927, 1928) probed a 0.3-m-deep black earth stratum with abundant MSA (Howieson's Poort), with an estimated age of ~60–65 ka BP (Jacobs et al. 2008), that includes a trihedral fragment of red ochre with 18 notches along its three edges.

Klasies River Mouth Caves, southern South Africa (Fig. 1, 46). Other finds from this site (see above) comprise a bone shaft piece with four parallel incised lines on one face, and two rib fragments with notches along edges (Singer and Wymer 1982: Fig. 8.1), a broken ochre pebble with a series of sub-parallel incised lines and another piece with a single deep groove (d'Errico et al. 2012b), as also a sandstone slab with one surface largely covered by an engraved lattice pattern (Watts 1998), all from MSA (Mossel Bay) levels (Wurz 2002) dated by U-series to between ~77 and 101 ka ago (Vogel 2001).

Pinnacle Point, southern South Africa (Fig 1. 47). An ongoing investigation of sediments in coastal Cave 13B (Marean et al. 2007, 2010; Jacobs 2010) has produced 380 foreign ochre fragments, including one ground piece with an engraved 'chevron' and another with three


***Figure 13.*** *A banded ironstone plaque with seven incised grooves on its 8.5-cm-wide surface, from square BB149 of c. 300-ka-old upper Major Unit 3 in Excavation 6 at Wonderwerk Cave.*

notches on an edge, both from a level (DBS3) OSL dated to ~100 ka BP (Watts 2010).

Blombos Cave, southern South Africa (Fig. 1, 48). The MSA strata, with ~72–77-ka-old Still Bay overlying an earlier industry in the ~82–100 ka range (e.g. Jacobs et al. 2006), also produced, from the former, a 2.8-cm-long bone fragment with subparallel incised lines on it (Henshilwood and Sealy 1997); and, from both, a total of 15 engraved ochre plaques, which feature parallel lines, right-angled juxtapositions, dendritic forms, and cross-hatched designs that reflect a palaeoart tradition spanning some 25 millennia (Henshilwood et al. 2009).

**Incised notches and lines: EMSA**

Twin Rivers Kopje, central Zambia (Fig. 1, 7). Investigations in the 1950s and in 1999 (Clark 1971; Clark and Brown 2001; Barham 2000, 2002) on this hill produced a number of mainly smoothed EMSA (Lower Lupemban) assemblages that had been washed (with sediments) into a zone of solution cavities, where they were subjected to repeated cycles of solution and calcification (Flint 1959), with accompanying lateral and vertical displacements. U-series dates on intercalated speleothems are here taken to provide only minimum ages for the associated lithics, with an assay on one from low down in the A Block sequence (Barham 2002) indicating an age of >400 ka for the Lower Lupemban at this site, which included a tabular lower grindstone with incised lines on it (Clark and Brown 2001: Fig. 20).

Bushman Rock Shelter, north-eastern South Africa (Fig. 1, 21). The MSA (Pietersburg) levels (see above) were underlain by ~4–5 m of sediments (Levels ~28–105) with an unpublished lithic industry, similar to that from Bed 4 at Cave of Hearths (Mason 1969), which has been referred to the EMSA (Fauresmith) on the basis of associated handaxes (Beaumont and Vogel 2006) of which one is recorded from about Level 23 at Bushman Rock Shelter (Louw 1969). A subsequent palaeoart-linked study of this EMSA? material (Watts 1998), which may predate ~276 ka ago (Beaumont and Vogel 2006), located several very weathered engraved dolomite fragments in Level 36, of which the best preserved and most densely marked piece had one surface covered by many parallel incised lines with V-shaped profiles that rarely touched or overlapped each other.

Wonderwerk Cave, central South Africa (Fig. 1, 30). Recovered in Excavation 6, from the upper reaches of Major Unit 3 with EMSA (Late Fauresmith) that is U-series dated to >276 (c. 300) ka (Beaumont and Vogel 2006), was a banded ironstone plaque (Fig. 13), on one surface of which there are seven engraved lines (Bednarik and Beaumont 2011), and a haematite slab with sub-parallel lines incised on a smoothed surface.

Blind River Mouth, south-eastern South Africa (Fig. 1, 40). Trenching in the early 1930s cut through a 'Minor Emergence' raised beach level (Pickford 1998), over 11 m above present sea-level (Laidler 1933, 1934), in the boulder-sealed uppermost sands of which was found an EMSA (Late Fauresmith) assemblage with characteristic large convergent or nosed scrapers (Beaumont and Vogel 2006). The collected sample included a big (~50 cm across) lower grindstone with natural sedimentation lines 'very definitely crossed at right-angles by incised or chipped lines' (Laidler 1933), and a human femur fragment (Wells 1935). Constraining ages of ~270 ka for end-EMSA (Beaumont and Vogel 2006), and of ~540 ka for Middle Fauresmith (Porat et al. 2010), suggest that this specimen probably dates to peak Holsteinian interglacial times at ~405 ka BP (Imbrie et al. 1984; Rohling et al. 1998).

**Cupules and grooves**

*Cupules and grooves: LSA*

Chifubwa Stream Shelter, north-western Zambia (Fig. 1, 8). Fieldwork (Clark 1958) exposed superficial Iron Age, ~2 m of sterile sand, and ~0.7 m of red earth on bedrock containing a LSA (Nachikufan 1) industry, $^{14}C$ dated elsewhere to ~13–25 ka BP (Miller 1971; Sampson 1974). On the then-exposed shelter wall, down to 3 cm above the LSA level, were petroglyphs, some still coated by red and black pigment, that included cupules, long and short vertical lines, and inverted Us, often with a central vertical line (Clark 1958: Pl. 4).

*Cupules and grooves: MSA*

Rhino Cave, north-western Botswana (Fig. 1, 13).

Further excavation of an over 2 m depth of brown sand and rubble (base not yet reached) with (below ~0.6–0.9 m) abundant MSA (Coulson et. al. 2011), similar to a 65–85-ka-old assemblage from the regional Gi site (Helgren and Brooks 1983; Brookes et al. 1990), yielded, from that level, a fragment of carved rock that had probably spalled off from the site's south wall, which has a lower 1.4 m covered by over 300 fresh to heavily weathered cupules and grooves (Robbins et al. 2000b; Walker 2010; Coulson et al. 2011).

***Figure 14.*** *Portion of a horizontal Phase 2 cupule panel, located next to a hillcrest rock pool at Klipbak 1, in the southern Kalahari.*

Corner Cave, north-western Botswana (Fig. 1, 14). At this nearby locality (Walker 2010), LSA is also underlain by a rich MSA assemblage predating c. 50 ka ago (Brook et al. 2008) that is dominated by quartz debitage, interpreted to likely result from the shaping of stone balls/spheroids by grinding in associated cupules (Walker 2008).

Potholes Hoek, central South Africa (Fig. 1, 25). This locality, on the lower western side of a southern Kalahari hill, comprises a smoothed quartzite surface pocked by potholes that hold water briefly, next to which erosion of flanking aeolian sands has exposed an underlying rubble-rich stratum with EMSA or ESA artefacts, while further upslope sparse fresh MSA and lightly smoothed ESA scatters occur. A microerosion study in 2009 indicated two discrete episodes of petroglyph production there, the younger (Phase 2), tentatively linked to the MSA, with hammered cupules and outline circles weathered far beyond the ~50 ka lower limit of that technique (Beaumont and Bednarik 2012b), when calibrated via values for the climatically comparable Spear Hill site in Western Australia (Bednarik 2002a, 2002b).

Klipbak 1, central South Africa (Fig. 1, 26). Near the crest of another nearby hill is a rock pool with near-permanent water in a hole created by glacial plucking, and an adjacent smoothed quartzite surface that is heavily weathered, with searches revealing sparse adjacent Ceramic LSA, some LSA and EMSA on surfaces further upslope, and ESA material in eroded areas downhill of the rock sheet. Mapping in 2001 showed the support to be covered by ~570 cupules, 40 outline circles, 30 rubbing areas, and five meandering lines (Fig. 14) of Phase 2 ascription, bar one or two reworked forms, while on nearby slabs are fresh Holocene-aged Phase 3 hammered animal and human outlines (Rifkin 2009), one with a microerosion age of E1600 BP (Beaumont and Bednarik 2012b).

Nchwaneng, central South Africa (Fig. 1, 27). At this previously recorded Kalahari site (Rogers 1908; Fock and Fock 1984), the northern slopes of an inselberg run down to a smoothed quartzite surface with flanking pools, where recording in 2001 identified ~1500 percussion-produced images that are dominated by cupules (over 640), with the balance being non-iconic forms, outline anthropomorphs and semi-naturalistic zoomorphs. A small 1986–87 excavation on its western margin exposed a succession of LSA industries dating between 0.3 and c. 8 ka ago (Beaumont and Vogel 1989), with sparse underlying MSA, while immediately to the north is an eroded area with ~540-ka-old EMSA (Middle Fauresmith), based on a similar U-series and ESR-dated assemblage at nearby Kathu Pan 1 (Beaumont 1990a; Porat et al. 2010). Microerosion study indicated three seemingly concordant intervals of petroglyph production, of which the youngest (Phase 3) is Holocene, with petroglyph ages of E1900–E6060, while older are MSA-linked Phase 2 cupules and outline circles that predate ~50 ka BP (Beaumont and Bednarik 2012b).

*Cupules: EMSA*

Potholes Hoek, central South Africa (Fig. 1, 25). On the same support, but much more worn than Phase 2 petroglyphs there, are larger Phase 1 cupules, that long predate the ~50 ka lower dating limit of the microerosion technique (Beaumont and Bednarik 2012b), and which are tentatively associated with the abutting EMSA or ESA occurrence (see above).

Nchwaneng, central South Africa (Fig. 1, 27). Confined to the north-western side of the largest and


***Figure 15.*** *Part of a horizontal panel of extremely weathered Phase 1 cupules, adjacent to the main waterhole on the northern flank of Nchwaneng, in the southern Kalahari.*

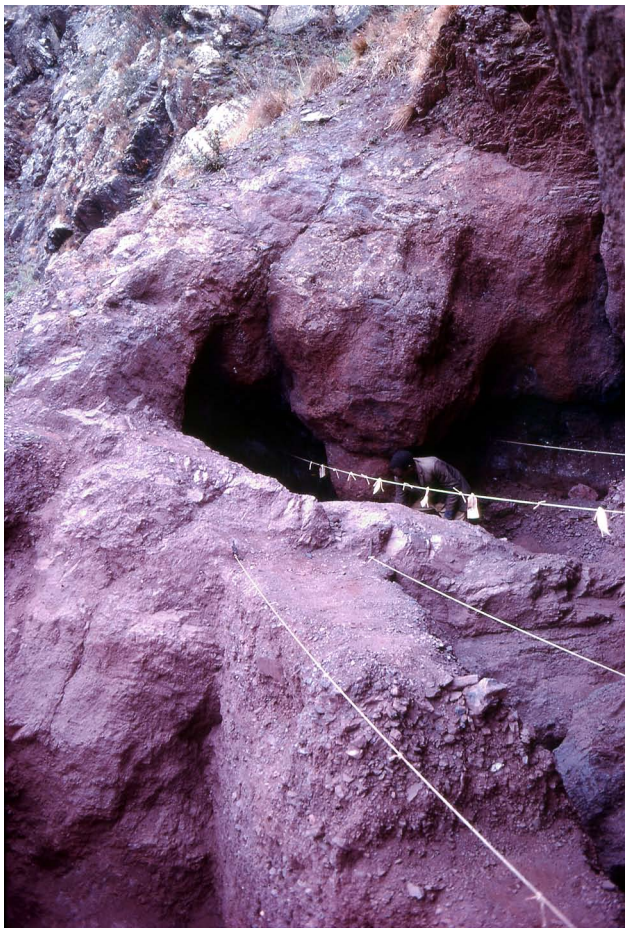

***Figure 16.*** *Worked outer side-wall at Lion Cavern, where over 1200 metric tonnes of specular haematite was mined away, mainly during MSA times before 46 (c. 90–100) ka ago.*

deepest rock pool there, and markedly more weathered than close-by Phase 2 petroglyphs, are extremely worn Phase 1 cupules (Fig. 15), that are provisionally linked to an adjacent ~540-ka-old EMSA (Middle Fauresmith) scatter (Beaumont and Bednarik 2012b).

**Pigment manuports**

African occurrences of LSA and MSA ascription are ubiquitous, and we therefore confine this listing to two localities that typify that data-set, before proceeding, again in southwards order, to earlier occurrences.

*Pigment manuports: MSA*

Lion Cavern, western Swaziland (Fig. 1, 23). The 1965–67 rescue excavations in an ancient working (Fig. 16), centred on a specularite-rich hydrothermal zone, at the base of a haematite cliff on Lion Peak, Ngwenya Range, revealed that over 1200 metric tonnes of pigment had been hacked away to form its 7.5 × 9 m floor (Dart 1969), on which were thousands of MSA lithics, including mining tools, with a $^{14}$C minimum age of ~46 ka BP, but perhaps twice that old on typological grounds, as also a few Iron Age and LSA artefacts that reflect later reworking (Dart and Beaumont 1967, 1968 1971; Beaumont 1973).

Border Cave, eastern South Africa (Fig. 1, 24). At this locality, over a dozen unmodified or abraded red ochre fragments, some specular, most possibly collected from Ngwenya exposures (see Lion Cavern) ~120 km away to the west, occur throughout the lowermost (4BS. LR–6BS) strata (Beaumont 1978; Watts 2002), which TL, ESR and small mammal data place at ~175–230 ka BP (Avery 1992; Beaumont et al. 1992; Grün and Beaumont 2001; Herries 2011).

*Pigment manuports: EMSA*

Kapthurin Formation, western Kenya (Fig. 1, 3). Lithic occurrences in and just below the Bedded Tuff (K4), bracketed by $^{40}$Ar/$^{39}$Ar ages of 284 and 509 ka ago, comprise EMSA aggregates with points, blades, and often small handaxes (Tryon and McBrearty 2002) that include, at Site GnJh-15, 'red-stained earth' (Cornelissen et al. 1990), >5 kg of friable ochre fragments and ochre-stained grindstones (McBrearty and Brooks 2000; McBrearty 2001).

Twin Rivers Kopje, central Zambia (Fig. 1, 10). Excavated EMSA (Lower Lupemban) assemblages with points and handaxes (Clark and Brown 2001), here taken to predate 400 ka ago (see above), included over 400 pigment pieces, mainly specularite and haematite, a few (<4%) with striated or rubbed surfaces, that came from sources up to ~22 km away (Barham 2000, 2002: Table 2).

Zombepata Cave, northern Zimbabwe (Fig. 1, 11). The MSA (Bambata) was underlain (at below ~1.2 m) by EMSA (Lupemban?), with points, handaxes, one core-

axe and cleavers, probably predating ~200 ka in terms of the Mumbwa Caves data (Barham 2000), with which were two dozen specularite, haematite, limonite and other pigments, likely obtained from the mineralised Great Dyke ~6 km to the east (Cooke 1971).

Bambata Cave, south-western Zimbabwe (Fig. 1, 15). Excavations from 1918 to 1939 established up to 6.5 m of stratified sediments with a basal Lower Cave Earth containing discrete hearths and EMSA (Charaman) material, likely older than ~200 ka ago (Klein 1978), with points and handaxes, plus one 4-cm-long haematite fragment with two smoothed adjacent sides, one deeply scored (Armstrong 1931; Jones 1940).

Pomongwe Cave, south-western Zimbabwe (Fig. 1, 17). In a >4-m-deep sequence there, the Lower Cave Earth, with some small hearths, contained EMSA (Charaman), with points, handaxes and eight pigment pieces (Cooke 1963) that probably predate ~200 ka ago (Klein 1978).

Bushman Rock Shelter, north-eastern South Africa (Fig. 1, 21). A study by Watts (1998) of the artefact samples from EMSA?-linked Levels 29–63 at this locality (see above) established that pigment pieces were present in Levels 31, 32, 36, 41 and possibly 51.

Kathu Pan 1, central South Africa (Fig. 1, 28). A doline in calcrete with a ~11 m infill of stratified sediments, in which Stratum 4a sands, U-series and ESR dated to ~540 ka, contain an EMSA (Middle Fauresmith) assemblage, with points, blades, small handaxes, and a number of sometimes smoothed soft red haematite and scraped specularite pieces, of which the nearest such deposits are ~20 km away (Beaumont 1990a, 2004a; Porat et al. 2010).

Wonderwerk Cave, central South Africa (Fig. 1, 30). In this ~140-m-deep tunnel-like dolomitic cave, Major Units 3 and 4 of Excavations 1, 2 and 6 (in particular) produced EMSA (Late and Middle Fauresmith) assemblages, U-series dated from ~280–>350 ka ago, that include convergent points, blades, handaxes, and over a dozen haematite and specularite pieces (some smoothed or grooved), the last-mentioned from sources ~50 km to the east (Beaumont 1990b, 2004b, 2011; Beaumont and Vogel 2006).

Canteen Koppie, central South Africa (Fig. 1, 32). During 1999 fieldwork in Area 1, an isolated cluster (cache?) of three jaspilite blades and three unmodified specularite lumps (up to 5.5 cm in diameter), all from sources ≥100 km to the west, were recovered from the base of up to 5-m-deep Stratum 1, a level correlating with the lower of two c. 0.5-Ma-old EMSA (Middle Fauresmith) zones elsewhere in that layer (Beaumont 1990c, 2004c; Beaumont and McNabb 2000; McNabb and Beaumont 2011).

Pniel 6, central South Africa (Fig. 1, 33). At this site, flanking the Vaal River, two overbank silts (Strata 1and 2) overlie a colluvial gravel (Stratum 3) with abundant EMSA (Middle Fauresmith), including convergent points, blades, small handaxes, and half a dozen haematite fragments (some slightly smoothed) of unknown derivation, that associated fauna links to a glacial interval in the c. 0.5 Ma range (Beaumont 1990d, 1999a, 2004d).

Nooitgedacht 2, central South Africa (Fig. 1, 34). Locally, red Hutton Sands that thicken eastward (de Wit et al. 1997) overlie a 0.1–1.0- m-deep ancient gravel ~90 m above the present Vaal River (Butzer et al. 1973), which produced a collected sample of c. 0.5-Ma-old EMSA (Middle Fauresmith) with convergent points, blades, small handaxes, and a 4-cm-long haematite fragment with one striated face (Beaumont 1990e, 1999b).

Biesiesput 1, central South Africa (Fig. 1, 35). Collections, and a 1983 excavation of ~1.5-m-deep stratified sediments, yielded a rich c. 0.5-Ma-old EMSA (Middle Fauresmith) assemblage with convergent points, blades, one small handaxe, and largely unmodified low-grade haematite fragments of unknown derivation (Beaumont 1990f; Beaumont and Richardt 2004).

*Pigment manuports: ESA*

Kabwe (Boken Hill), central Zambia (Fig. 1, 9). Mining of a mineralised dolomitic hill resulted in the 1921 destruction of a >25-m-deep cave with ~6 m of stratified deposits, that, based on excavated nearby handaxe assemblages (Clark 1959, 1970), contained ESA (Acheulian), including a haematite fragment and a small (~6 cm across) spheroid with red staining over much of its face (Clark et al. 1947), for which the associated fauna provides an age of ~0.8–1.3 Ma (McBrearty and Brooks 2000).

Kathu Pan 1, central South Africa (Fig. 1, 28). Below Stratum 4a at ~540 ka ago (Porat et al. 2010) is Stratum 4b, with a rich ESA (Middle Acheulian) assemblage (Beaumont 1990, 2004), that includes technically superb handaxes (Fig. 17), rare cleavers, and half a dozen small and sometimes slightly rounded soft red haematite manuports, associated with *Elephas recki recki* tooth plates (Klein 1988), which a metrical study by H. B. S. Cooke (pers. comm. 1995) showed to be best matched by Olduvai material with an age of ~0.8–1.3 Ma

***Figure 17.*** *A 23-cm-long symmetrically shaped handaxe of banded brown jasper, found with many extinct elephant toothplates, in c. 0.8–1.3-Ma-old stratum 4b at Kathu Pan 1.*

***Figure 18.*** *View towards cave mouth, from an Excavation 1 level at Wonderwerk Cave that produced evidence of intentional fire-making (wood ash, burnt stone and bone) which dates to ~1.7 Ma ago (Beaumont 2011). (See front cover.)*

***Figure 19.*** *A 38.5-cm-long andesite handaxe with a mass of 4.8 kg, associated with Victoria West prepared cores (Sharon and Beaumont 2006), from c. 1.3-Ma-old stratum 2a at Canteen Koppie 1.*

BP (McBrearty and Brooks 2000).

Mashwening 1, central South Africa (Fig. 1, 29). On the eastern side of this farm is a low specularite exposure, a few 100 m$^2$ in extent and pocked by dozens of up to ~1.5 m deep pits, next to one of which a small trench revealed superficial Ceramic LSA overlying (in one square taken to bedrock) a basal specularite rubble with a few flakes and a refined cleaver (Beaumont 1990a: 81). This direct evidence for ancient pigment retrieval is best linked to the nearby, c. 0.8-Ma-old Kathu Townlands site, where ~0.7 billion ESA (Late Acheulian) artefacts, including blades and handaxes, relate to jaspilite quarrying over a ~12 ha area (Beaumont 1990a, 1999c, 2004a), and where a single in situ unmodified specularite lump was seen in an undisturbed 2009 exposure.

Wonderwerk Cave, central South Africa (Fig. 1, 30). Below Major Units 3 and 4 with EMSA (see above) are other strata (Fig. 18), of which Major Units 6 and 7 of Excavation 1 yielded very small ESA (Acheulian) assemblages, with handaxes and occasional, mainly haematite, pigment pieces, some slightly smoothed, and likely collected from local hillside outcrops, that, on the basis of palaeomagnetic data, extend back to ~1.1 Ma ago (Beaumont 1990b, 2004b, 2011; Chazan et al. 2008).

Canteen Koppie, central South Africa (Fig. 1, 32). A 9-m-deep trench through Stratum 2a and 2b in Area1 produced many tens of thousands of ESA (Early and Middle Acheulian) artefacts, including handaxes (Fig. 19) and cleavers (e.g. Beaumont 2004c; McNabb and Beaumont 2011) that CNB dating of coeval Rietputs sediments (Helgren 1978) at nearby Windsorton place at ~1.25–1.9 Ma (Gibbon et al. 2009; Beaumont 2011; Herries 2011). Amongst them is not a single pigment piece, despite their presence in the adjacent minute EMSA sample (see above), thereby suggesting that this practice largely or entirely postdates the Middle Acheulian.

**Exotic manuports**

Sometimes recorded at Stone Age sites in sub-Saharan Africa are foreign, non-utilitarian minerals, usually in crystal form, and natural stones with surfaces that mimic human body or facial features (e.g. Barham 2000:140), concerning which this listing is limited to the only two known occurrences predating the MSA.

*Exotic manuports: EMSA*

Wonderwerk Cave, central South Africa (Fig.1, 30). Fieldwork from 1978 to 1996 included the removal of EMSA (Fauresmith) strata falling in the ~276–500 ka interval, from which were recovered single-clusters of small water-worn pebbles and quartz crystals (Figs 20 to 22), with the nearest known source of the latter being a 0.3 ha surface scatter some 20 km to the north-west, and, in the case of the former, the Kuruman River, ~45 km to the north (Beaumont and Vogel 2006).

*Exotic manuport: ESA*

Makapansgat Limeworks, north-eastern South Africa (Fig.1, 20). At this locality, the Grey Breccia/ Member 3 (Partridge 1979) has produced extinct suids that compare closest with Ethiopian (Omo) specimens dating to ~2.95 Ma (Cooke 2005), in accordance with a conservative (Option b) palaeomagnetic placement at ~3.0 Ma (McFadden 1980: Fig. 2). From overlying Member 4, then falling between ~2.4 and 2.9 Ma, came


***Figure 20.*** *A localised sample of 'pretty pebble' occurrences, all manuports likely found in riverside settings ~50 km to the north, from ~0.5-Ma-old Major Unit 4 of Excavation 1 at Wonderwerk Cave.*

stone artefacts, including a chert discard and flake (Maguire 1980) of ESA (Oldowan) age, plus a reddish oval jaspilite cobble, from at least 11 km away, with naturally weathered 'eyes' and a 'mouth' on its one face (Dart 1974; Bednarik 1998, 1999).

**Discussion**

Figure 1 depicts the present distribution of the savannas, but palaeoclimatic data indicate a ≥6° contraction towards the equator during cold dry intervals, and, conversely, an expansion of similar magnitude away from it when conditions were even warmer and wetter than now (e.g. Deacon and Thackeray 1984; Iriondo 1999), as was the case during much of the Early Pleistocene (Shackleton 1995). Nevertheless, whatever its previous position, a major portion of that most hospitable sub-Saharan habitat for early hunter-gatherers, the area where healthier high ground and the game-rich southern savannas overlap, would always have been situated south of the equator, thereby providing an environmental basis for the precocious bio-cultural developments there, as set forth in the Introduction and Figure 23. In the latter, EMSA refers to prepared core-based and flake tool-dominated industries with a variable complement of often small bifaces, such as the Fauresmith, which are considered to compare closest with the Middle Palaeolithic of Eurasia (e.g. Burkitt 1928; Bordes 1968; Beaumont 1990e), whereas the MSA, which entirely lacks bifaces, is here postulated to be exclusively linked to *Homo sapiens*, and to record later lithic developments (e.g. regular blade production) confined to sub-Saharan Africa, and, at times, abutting regions.

Turning now to the palaeoart, beginning with the exotic items, the graphite, malachite and galena specimens from LSA contexts at Heuningneskrans (Beaumont 1981), the quartz and fluorite crystals from

***Figure 21.*** *A 2-cm-long rounded chert pebble with natural markings, a manuport probably found in river sediments 50 km to the north, from ~0.5-Ma-old Major Unit 4 of Excavation 1 at Wonderwerk Cave.*

MSA levels (Beds 6–9) at the Cave of Hearths (Mason 1988), and, as listed, the pebbles and quartz crystals from EMSA strata at Wonderwerk, produce a more or less continuous record for the past ~0.5 Ma. The ~2.0 Ma hiatus separating those occurrences from the Makapansgat cobble 'face' may therefore be real, but it can, conversely, be argued that the quartz crystals found at Zhoukoudian, China (Pei 1931), Singi Talav, India (d'Errico et al. 1989), Gesher Benot Ya'aqov, Israel (Goren-Inbar et al. 1991), and Gudenushöhle, Austria (Bednarik 1988), were not expressions of independent behaviours, but rather part of cultural repertoires (e.g. Goren-Inbar and Saragusti 1996) brought by successive dispersals from sub-Saharan Africa at ~1.8, 1.4, and 0.8 Ma ago (Bar-Yosef and Belfer-Cohen 2001; but see Bednarik 1992a, 2003). In the latter case the retrieval of exotic items would constitute a primal palaeoart manifestation that commenced near the very onset of the genus *Homo*, but conclusive proof of this will require corroboration by way of pre-0.5-Ma-old finds at sub-Saharan sites where their introduction by fluvial


***Figure 22.*** *This quartz crystal aggregate, almost certainly from a c. 0.5 ha natural scatter of such items some 20 km away, was found in ~0.3-Ma-old Major Unit 3 of Excavation 6 at Wonderwerk Cave.*

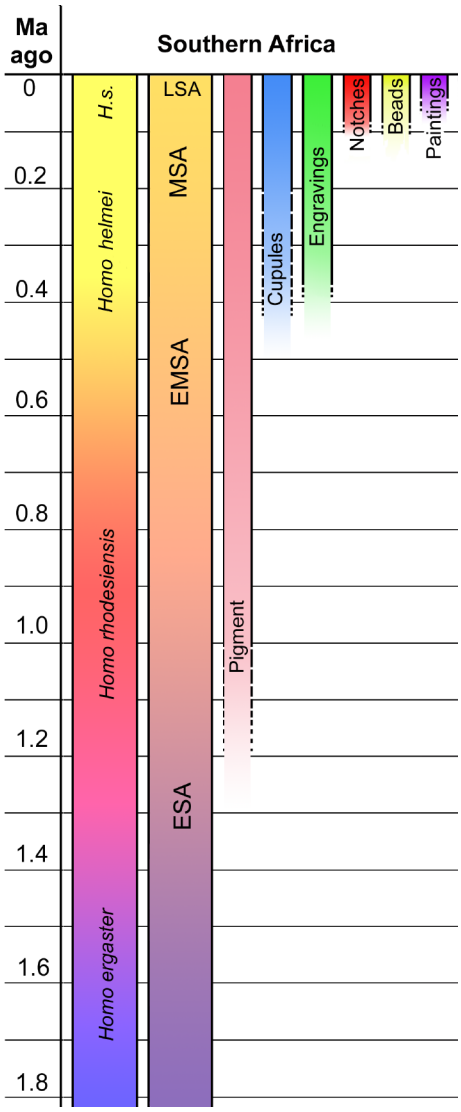


***Figure 23.*** *Diagram, with the two columns to the left providing the cultural, stratigraphic and hominin successions in southern Africa, beginning with the Acheulian. The final six columns record the timespans covered by various palaeoart groupings in sub-Saharan Africa.*

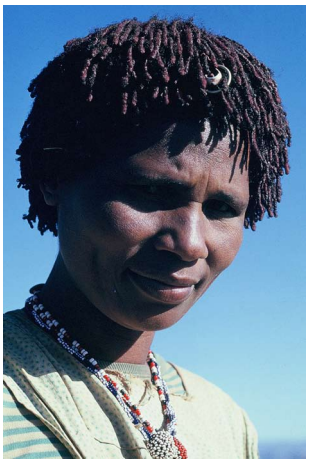

***Figure 24.*** *A late 1960s photograph by PB of a Swazi woman with red-ochred hair, signifying (J. Masson, pers. comm.) that she was a sangoma, a diviner who throws bones or consults with ancestral spirits to identify the cause of a patient's physical or mental problem.*

***Figure 25.*** *The Border Cave 5 adult mandible, from a shallow grave in square T20 of 3WA, falls well within the* Homo sapiens *range (de Villiers 1976), has been directly dated by ESR to 74 ka ago (Grün et al. 2003), and may thus be taken to imply that all subsequent subcontinental palaeoart was produced by 'modern' humans.*

transport and similar processes can be firmly excluded, as is the case at two recently found Acheulian localities along the lower Vaal River, at one possibly associated with a damaged quartz crystal.

Concerning the listed pigment finds (Fig. 23), current evidence indicates that *Homo rhodesiensis/heidelbergensis*, with a cranial capacity of ~1250 cc (Parenti 1973), which is close to the living human mean of ~1350 cc (Ruff et al. 1997), first appeared, at Saldanha/Elandsfontein, the Cave of Hearths, and Broken Hill/ Kabwe, all in the southern sector of the southern savannas, about 1.0–1.3 Ma ago (e.g. Hendey and Cooke 1985; McBrearty and Brooks 2000; Herries 2011). In terms of this perspective, the close temporal concordance in south-central Africa between the Late Acheulian onset of habitual pigment retrieval and the regional appearance of *Homo rhodesiensis/heidelbergensis* (Figs. 23) is unlikely to be coincidental, but rather points to that taxon as having arisen with an inherent capacity for symbolically-mediated behaviour (Beaumont 1992), perhaps as a result of selective pressures initiated by the subcontinental advent of fire-making ~1.7 Ma ago (Beaumont 2011). Concerning what purpose the pigment served, worldwide ethnographic evidence shows that ochres were sometimes employed for a variety of secular purposes, but that their preponderant use in historical times was as a ritual body decoration (e.g. Bednarik 1992a; Sagona 1994), in which red varieties (Fig. 24) served as a surrogate for blood, seen as a sign of fertility, potency and rejuvenation (e.g. Dart 1968; Watts 2002).

As for the cupules (Fig. 23), Holocene-aged specimens in central South Africa are usually small, shallow and in patterned multiples, whereas the earlier ones at Chifubwa Stream Shelter and Rhino Cave tend to be markedly larger, 3–4 cm across, and to co-occur with other forms, like linear grooves — except at Corner Cave, where cupules are associated with spheroid preforms and derived lithic waste. In the arid Kalahari three widely separated episodes of cupule production are likely linked to warmer/wetter than present interglacial conditions, with the Nchwaneng lithics suggesting that Phase 1 refers to the Middle Fauresmith material in the 500 ka range, and Phase 2 to undiagnostic MSA, while Phase 3 is certainly ascribable to various LSA occupations during the Holocene (Beaumont and Bednarik 2010b). The next step in ongoing research would be to test this most parsimonious interpretation of the evidence by the OSL dating of quartz grain samples from the MSA stratum at Nchwaneng, at ~1.0 –1.2 m/bedrock, which, provided that dose rates are sufficiently low, as at nearby Kathu Pan 1 with similar sediments (Porat et al 2010), should provide a c. 60–130 ka BP date for the small (~290 specimens) retrieved assemblage.

Incised line finds (Fig. 23) have ages that span the early LSA, cluster markedly between ~42 and 100 ka in the MSA, presumably because of a research focus on that timespan during the past three and more decades in southern Africa, and have a balance of four EMSA occurrences that range between ~270 and >400 ka BP. A major overall finding is that the EMSA samples are dominated by specimens with incised parallel lines, whereas the *Homo sapiens*-linked (Fig. 25) Late Pleistocene MSA and LSA occurrences show a far greater variety of patterns, of which the banded line motif is taken to be the most sophisticated. However, the present dearth of incised line items in the ~100–270 ka range, bar a few poorly-dated Wonderwerk specimens, means that it remains to be seen if that temporal shift was gradual or punctuated, and whether or not it coincides with the MSA–EMSA interface, should eventual evidence support the latter case.

Proceeding to the notched items (Fig. 23), these are almost as widespread as incised line occurrences, are confined to LSA and MSA contexts postdating ~100 ka ago, are entirely based on red ochre or bone edges, and show great variability, even from a single stratum, with some notched items being very fine and evenly spaced, whereas others show irregular spacings/incision depths, in addition to which some specimens show marked differences in use-wear extent and intensity. Related findings are as ambiguous: ethnographic enquiry indicates that tally sticks were still being used in southern Africa up to the 1960s for recording payments etc. (e.g. Mason 1988: 404); a recent re-analysis of the Border Cave baboon fibula (Fig. 7), which identified four sets of non-sequential markings, is taken to suggest 'accumulation over time and a notational function' (d'Errico et al. 2012); whereas other notched items, seemingly made during a single session and with one tool (e.g. Cain 2004), may or may not have had such a purpose. Those with highly polished elevations could have served as musical instruments (scraped idiophone or rasp; cf. Huyge 1990; Mason 1988). What is certain is that notching continued up until quite recent times, as shown by a ~20-cm-long reed with four sets of up to 42 notches down its length, from a level at Collingham Shelter, South Africa, $^{14}$C dated to ~1300 years ago (Mazel 1992), and a ~17-cm-long wooden stick with 41 notches (Mason 1988: Fig. 94), from an IA level (Bed 11) at the Cave of Hearths, South Africa, which is estimated to span a few centuries prior to 1850 CE (op. cit.: 397).

Regarding the beads and pendants (Fig. 23), stratigraphic displacement would seem a most likely explanation for the finding of ostrich eggshell beads in MSA contexts. Evidence from Mumba Shelter in Tanzania supports their presence in c. 50–54-ka-old LSA levels there, while direct $^{14}$C dates suggest that they extend back to ~43 ka ago in southern Africa. Typical of most or all of the samples from that latter region are rather variable sizes, often uneven circumferences, and sections that invariably show rounded rims (Fig. 2), thereby indicating that these beads were smoothed by hand rather than with a grooved stone, a later development, of which the earliest known example dates to ~23 ka ago (Wendt 1976; but see Bednarik 1997). As for sub-Saharan perforated seashells, these first appear at ~75 ka ago, but the possible stone pendants from Zombepata could be older still, given lithics similar to those from the ~100–130-ka-old Last Interglacial unit at Mumbwa Caves, and evidence from that site of low regional population densities during subsequent MSA times (Barham 2000), in which case it would be of an age comparable to the Skhul shell beads, placed by ESR and U-series dating at between 100 and 135 ka BP (Vanhaeren et al. 2006).

And lastly are iconic depictions (Fig. 23), limited to the enigmatic form on a slab found in 1979 at Pomongwe (Walker 1987), and the Apollo 11 plaques from composite Layer E (Vogelsang et al. 2010), both of which are best taken to be associated with the early LSA (Beaumont and Bednarik 2012a). Pertinent then are ages for the early LSA onset, which extend back to ~57 (c. 60) ka ago in eastern Africa (Diaz-Martín et al. 2009; Gliganic et al. 2012), to ~43 ka ago in the northern half of South Africa (e.g. Villa et al. 2012), and to ~25 ka ago at sites such as Boomplaas and Buffelskloof in the Southern Cape (Wadley 1993; Lombard et al. 2012). These estimates thus show that the early LSA spread slowly southwards from the northern edge of the southern savannas (Ambrose 2002), most probably by way of stimulus diffusion, modulated no doubt by en route adaptations and additions, and with minimum hypothesis suggesting a lower limit of ~60 ka for representational art in sub-Saharan Africa.

**Conclusions**

The following points summarise the present evidence:

- That the high southern savannas of sub-Saharan Africa, with its relative paucity of zoonotic diseases, vast number and variety of game animals, plus abundant plant foods, can be confidently identified as the region where hominin population densities would have been highest during much of archaeological time, given that, within constraints set by the prevailing technology, human numbers will tend to rise to a limit dictated by the available food resources (Malthus 1970).
- That the southern sector of the southern savanna uplands was a key region of biocultural evolution for all but the final ~70 ka of human history, after which the focus shifted northwards to Eurasia, where the domestication of cereal crops and pulses in the Fertile Crescent about 10 ka ago provided food energy values per unit area (and consequent human numbers) that far eclipsed those that could ever be generated by savanna foraging (Diamond 2005), with those and related innovations, like animal domestication, then spreading outwards (op. cit.: Fig. 10.2), to only reach South Africa by ~2.2 ka BP (e.g. Dart and Beaumont 1969; Webley 1992).

- That *Homo rhodesiensis/heidelbergensis* arose within the southern savannas some 1.2–1.3 Ma ago (McBrearty and Brooks 2000), together with a new behaviour, the collection of red ochre and specularite, taken to mean that this progenitor species had enhanced aesthetic and symbolic capabilities (Beaumont 1992).
- That later members of that taxon, referred by some to a separate species, *Homo helmei* (e.g. McBrearty and Brooks 2000), were, on present evidence, the first southern savanna population to incise a simple pattern (parallel lines) onto stone surfaces, by at least 400 ka ago, with a reliably dated (>280, c. 300 ka) plaque from Wonderwerk (Bednarik and Beaumont 2010) taken to provide clear evidence that sub-Saharan mobiliary engravings predate the first subcontinental appearance of modern humans.
- That *Homo sapiens*-linked palaeoart of MSA age, although, at present, largely confined to the past 100 ka, has produced a substantial number of notched items and sometimes complex incised patterns on ochre plaques or ostrich eggshell liquid containers (e.g. Texier et al. 2010).
- That the LSA, marked by an increased emphasis on the production of bone and composite tools, originated on the northern edge of the southern savannas, perhaps as early as an arid interval at about 60 ka ago, with minimum hypothesis suggesting that iconic art south of the Sahara arose subsequent to that date.

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Peter B. Beaumont
McGregor Museum
P.O. Box 316
Kimberley 8300
South Africa
*beaumontpb@gmail.com*

Robert G. Bednarik
IFRAO
P.O. Box 216
Caulfield South, VIC 3162
Australia
*auraweb@hotmail.com*

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