BLOMBOS CAVE PROJECT

PROJECT PATRON – DR. NELSON MANDELA

PROGRESS REPORT

For the National Monuments Council

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South African Museum

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ABSTRACT

Excavations at Blombos Cave, South Africa have yielded artefacts not generally associated with the Middle Stone Age (MSA), notably pressure flaked stone tools, bone tools made by shaping and grinding, ochre engraved with a cross-hatched design and a cut and drilled dolphin tooth. Additionally the use of non-local raw material in the manufacture of formal stone tools and the earliest southern African evidence for fishing suggests behaviour previously associated only with the Later Stone Age. Excellent preservation of organics and food waste and evidence of coherent spatial organisation in the MSA layers dated at ~ 90 kya suggests Blombos Cave may be a key site in understanding the development of fully modern human behaviour during the Late Pleistocene in southern Africa.

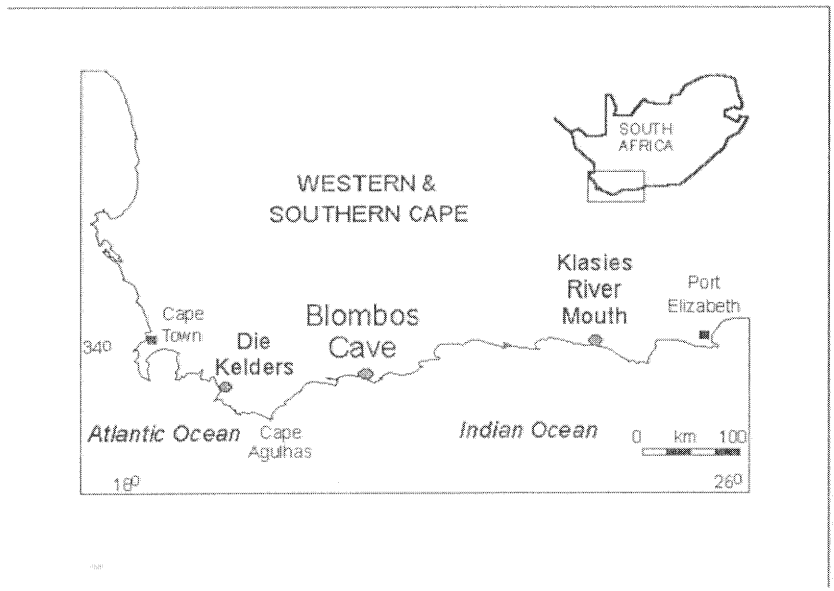

Fig. 1. Location of Blombos Cave

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BLOMBOS CAVE- PREVIOUS RESEARCH AND SITE CONTEXT

Blombos Cave (BBC), situated near Still Bay in the southern Cape (34°25'S, 21°13'E), is some 100 m from the coast and 35 m above sea level. The site was discovered and first excavated by Henshilwood in 1993, with subsequent team excavations in 1997, 1998 & 1999. The upper ~ 80 cm of Later Stone Age (LSA) deposits are dated at < 2 kyr. Sterile aeolian dune sand (~ 10-50 cm) separates the LSA from the Middle Stone Age (MSA) units. The interior of the cave contains ~ 55 sq. m of deposit with an estimated depth of ~ 4-5 m at the front and ~ 3 m toward the rear.

In part due to a rockfall near the entrance of the cave, the deposits are 'sealed' within the cave confines. There is no evidence of horizontal slippage, but due to compaction of organic elements within layers there is vertical draping especially over and around large roofspall blocks. Despite this, individual MSA layers can be relatively easily traced during excavation by following dark, compacted partings that separate major units.

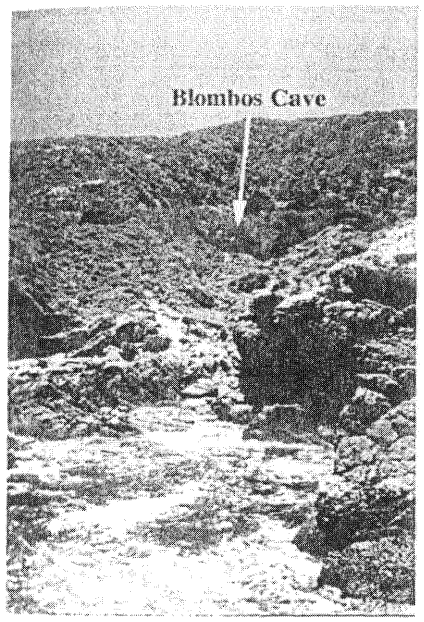

Fig 2. View of Blombos Cave

The matrix in the MSA is composed mainly of aeolian, marine-derived dune sand, blown in through the cave entrance This is intercalated with marine shell, decomposed humic materials and limestone, and wind-borne halites. Because the cave formed in a lime-rich consolidated calcarenite, and the matrix is strongly alkaline, the preservation of organic materials in the MSA levels is remarkable.

The MSA Still Bay sequence has been dated by the TL (Vogel et al 1999) , ESR and AAR methods at ~ 90 - 100 kyr. Limited excavations at the site in 1993, 1997, 1998 & 1999 by the author and team have produced evidence of 'formal' bone working (Henshilwood & Sealy 1997), the production of 'standardised' pressure-flaked bifoliate points, evidence for fishing, decorating of ochre and drilling of a tooth possibly for 'symbolic' use. Resource utilisation in the MSA here is comparable, and in some cases measurably exceeds that during the LSA occupation including intensive exploitation of marine resources, such as shellfish, transporting desirable lithic raw materials over long distances and hunting/foraging for a wide size range of animals.

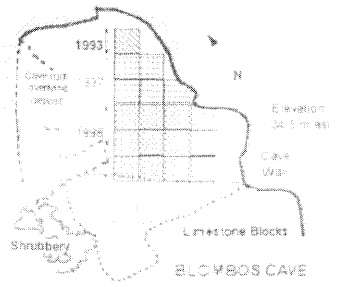

Fig 3. Blombos ... end year of

Seven human teeth have been recovered from the Still Bay levels (Grine et al. in press). In line with the Klasies River Mouth human remains (Rightmire & Deacon 1991; Pfeiffer pers. comm.), the hominids at BBC appear to have been anatomically modern (Grine pers. comm.). We believe that further excavations at BBC have an excellent chance of producing human skeletal material that will help resolve this debate.

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RESULTS OF EXCAVATED AND ANALYZED MATERIALS FROM BBC

Material excavated during the 1999 excavations is currently being analysed and results are expected by November 1999. Analyses of the Blombos Cave material for the period 1993-1999 will be collated and submitted for publication in early 2000.

Evidence from BBC collected during field seasons in 1993, 1997 & 1998 is presented here under the headings Technology, Subsistence, Social and Human Remains and is essentially similar to that contained in the 1998 report. Comparisons are made here between the African Middle Stone Age (MSA) and the European Middle/Upper Palaeolithic (MP/UP) transition, but this does not imply, in our view, that the MSA and MP are directly comparable. However, if preliminary arguments are to be made concerning the behavioural modernity of the Blombos material then the UP/MP transition provides a useful comparison, at present. We believe that the issue of behavioural modernity in Africa will ultimately only be settled by developing a model based around the African evidence and not by comparison with eurocentric models.

TECHNOLOGY

Stone Tools

Standardised, *pressure-flaked,* bifacial foliate points are the predominant retouched artefacts (>50 %) in the Still Bay Industry at BBC and range in size from 3 - >15 cm. The pressure flaking technique, used to finish these stone tools, is comparable to the earliest known use of this technique in the Upper Palaeolithic (UP) at ~19 kyr (Mellars pers.comm.; Rigaud pers.comm.).

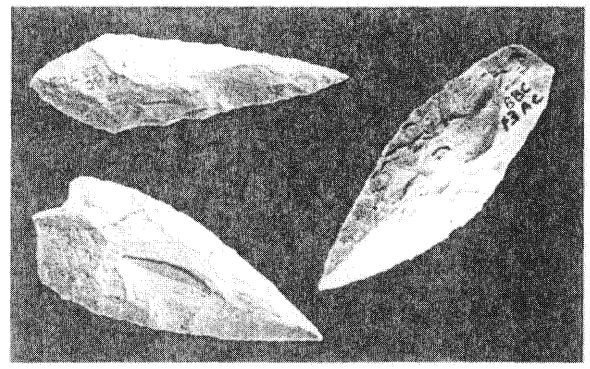


Fig 4. Bifacial points from the Still Bay levels

The Still Bay bifacials fit Mellar's (1989) description of morphologically 'new', standardised, visually highly distinctive 'type' fossils that in Europe characterise the Middle/Upper Palaeolithic transition.

A strong argument can also be made that Still Bay points were made according to a clear mental template and conform to a preconceived form, as argued for some bifacial foliate points in the Late Mousterian in Central Europe (*cf.* Mellars 1996 *contra* Dibble 1989; Chase 1991). If 'imposed' form is the discriminant between MP/UP tools in Europe, and if 'imposed form in tool manufacture has some clear symbolic significance' (Mellars 1989a,b, 1996:25; Byers 1994) then Still Bay points must represent some of the earliest known symbolic expressions.

There is a predominance of end scrapers relative to side scrapers (7:3) made mainly on blades in the Still Bay. A key technological difference between the MP and UP is the switch in the UP from side scrapers made on flakes to end scrapers made on blades (Mellars 1989a,b, 1991, 1996; Klein 1989b, 1995) although interestingly the switch to end scrapers at BBC is not accompanied by an increase in blade production.

There is a low proportion of blades (~ 5- 8 %) in the Still Bay at BBC compared to 27.1% in the HP at KRM (Wurz 1998). A shift to blade production is cited as a critical change during the MP/UP transition (Mellars 1989a,b,1991,1996; Klein 1989b,1995) and serves as one marker in distinguishing Mousterian non-modern behaviour from UP modern behaviour (*e.g.*

Mellars 1989a). However, blade production is common in MSA assemblages from ~ 100 kya in Africa (Sampson 1974; Volman 1984; Clark 1989), suggesting blades were probably not globally important in the transition to modern human behaviour (Mellars 1989a; Foley & Lahr 1997).

Despite an abundance of quartz and quartzite in the vicinity of BBC, 75% of bifacial points and 79% of all retouched tools in the Still Bay are made on a non-local raw material, silcrete, that was transported to the site from ~ 30 km away. Large numbers of flakes in silcrete, concentrated mostly around hearths, indicate extensive knapping within the cave. Mellars (1989a, 1996) and Klein (1995) argue that in the UP high proportions of exotic raw materials are transported long distances in nodule or core form and worked into finished tools at the living site, whereas in the MP exotic raw materials are only occasionally transported (also *cf.* Roebrooks *et al* 1988) and then mainly as finished tools.

Bone Tools

Bone tools are perhaps the most surprising technological innovation in the Still Bay. Extensive reference is made to the near absence of bone tools in the MP/MSA and to the presence of bone tools being a distinctive marker in the Eurasian transition to modern cognitive behaviour (*e.g.* Clark 1989; Deacon 1989 Klein 1989a,b,1995; Mellars 1989a,b,1991,1996; Thackeray 1992).

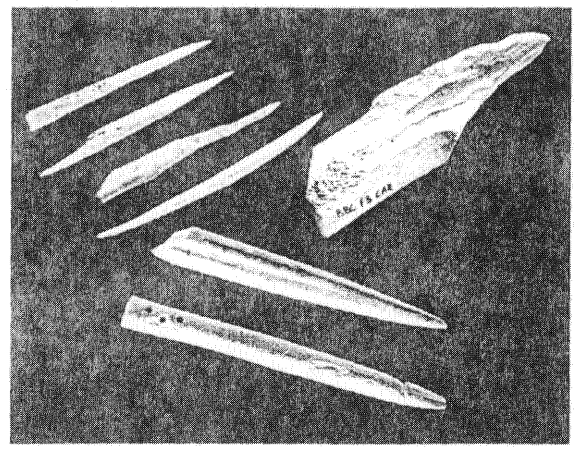
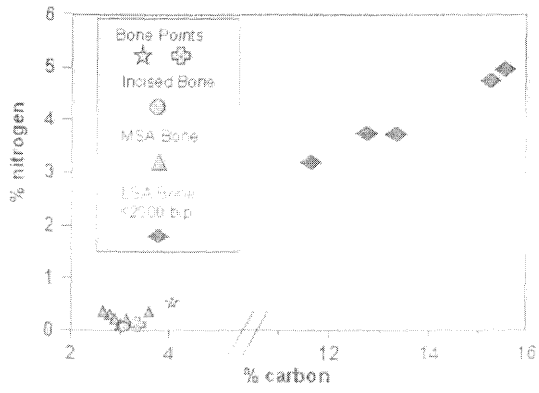


Fig 5. Bone tools from the Still Bay levels

Although some bone tools are recorded in the African MSA *e.g.* a bone point in the lowest HP levels at KRM (Singer & Wymer 1982), a bone point and utilised ivory pieces from Kabwe (Clark *et al* 1950), notched bone pieces from Apollo 11 (Volman 1984) and KRM (Singer & Wymer 1982) and bone harpoons from the Semliki Valley (Yellen *et al* 1995; Brooks *et al* 1995) none have yet been securely dated and most are single occurrences. Bone tools dating to the MP are recently reported from a German site (Gaudzinski 1999).

At BBC more than 25 bone artefacts have been recovered, including formal standardised 'points'. These have been shown, by chemical analysis, to unequivocally belong to the MSA levels (*cf.* Henshilwood & Sealy 1997).



...nitrogen ...mpared ...some.

One of the bone points shows clear evidence of hafting (*cf.* Henshilwood & Sealy 1997), a technique distinctly associated with modern behaviour in the UP and to a lesser extent with the MP (Mellars 1989a). If bone tools were hafted in the MSA, a range of other tools may have also been hafted including bifacial points. Recent evidence for hunting and butchering techniques in the MSA at KRM point to the production of hafted weapons (Milo 1998).

SUBSISTENCE

Mammals excavated from 6 sq. m of MSA deposits, and some LSA layers, have been identified by Prof. Richard Klein and Dr. Kathy Cruz-Uribe. 31 species occur in the MSA and 19 in the LSA. These range from hyraxes and dune mole rats to elephant, hippo and Cape buffalo. The small sample size precludes a comprehensive MSA/LSA comparison at this stage but preliminary data suggest a greater diversity of species may have been taken in the MSA.

Scientific Name	Common Name	LSA TOTAL NISPS	LSA TOTAL MNI	MSA TOTAL NISPS	MSA TOTAL MNI
Erinaceus frontalis	hedgehog	2	1	17	7
Lepus capensis	Cape hare	3	1	2	2
Lepus saxatilis	scrub hare	33	6	62	14
Bathyergus suillus	dune molerat	966	65	746	87
Papio ursinus	Chacma baboon	0	0	1	1
Homo sapiens	people	0	0	2	2
Canis sp.	jackal/dog	4	1	1	1
Ictonyx striatus	striped polecat	0	0	7	4
Mellivora capensis	honey badger	20	5	2	2
Genetta sp.	genet	0	0	7	3
Herpestes pulverulentus	grey mongoose	1	1	6	4
Felis libyca	wildcat	7	4	6	6
Arctocephalus pusillus	Cape fur seal	284	10	166	25
Procavia capensis	dassie	304	17	483	51
Elephantid	elephant	1	0	0	0
Equus capensis	Cape zebra	0	0	4	2
Diceros bicornis	black rhinoceros	0	0	2	2
Rhinocerotid, Diceros bicornis	rhino (incl. black rhinoceros)	0	0	14	6
Hippopotamus amphibius	hippopotamus	13	4	2	1
Taurotragus oryx	Eland	12	5	27	10
Hippotragus leucophaeus	blue antelope	0	0	9	4
Redunca arundinum	southern reedbuck	0	0	11	7
Connochaetes/Alcelaphus	wildebeest/hartebeest	0	0	1	1
Antidorcas sp.	Springbok	0	0	2	2
Sylvicapra grimmia	grey duiker	0	0	1	1
Oreotragus oreotragus	Klipspringer	2	2	0	0
Raphicerus campestris	Steenbok	22	8	4	4
Raphicerus melanotis	Grysbok	23	9	14	10
Raphicerus spp.	steenbok and/or grysbok	160	22	121	23
Pelea capreolus	Vaalribbok	2	1	6	3
Ovis aries	Sheep	18	7		
Syncerus/Bos	Cape buffalo/cattle	11	2	1	1
Syncerus caffer	Cape buffalo	0	0	1	1
Small bovids	SMALL BOVIDS	1334	33	766	86
Small Medium bovids	SMALL MEDIUM BOVIDS	165	12	133	20
Large Medium bovids	LARGE MEDIUM BOVIDS	172	11	143	18
Large Bovids	LARGE BOVIDS	286	12	177	16
Delphinidae gen. et sp. indet.	dolphin(s)	0	0	3	3
TOTAL			19		29

Table 2: Large mammals from the 1993, 1997 & 1999 SHC excavations information supplied by Richard Klein & Kathy Cruz-Uribe

Fish

More than 150 fish bones were recovered from the MSA at BBC and the species identified are the black musselcracker, *Cymatoceps nasutus*, red stumpnose, *Chrysoblephus gibbiceps* & the catfish, *Galeichthyes feliceps*. Chemical analysis of fishbone from the LSA and MSA levels using the carbon/nitrogen method (*cf.* Henshilwood & Sealy 1997) confirm the antiquity of these specimens (Henshilwood, Sealy & Poggenpoel *in prep.*). It is possible the fish were lured close to shore by chumming and then speared, possibly with bone or stone tipped projectiles. No equipment directly associated with fishing has been recovered. The absence of large fish in other African MSA sites, and by implication the inability to exploit coastal resources effectively, is cited as one of the markers for 'non-modern' subsistence behaviour (*cf.* Klein 1989a, 1995; Thackeray 1992; Avery *et al* 1997; Milo 1998; for a *contra* view *cf.* Deacon 1989).

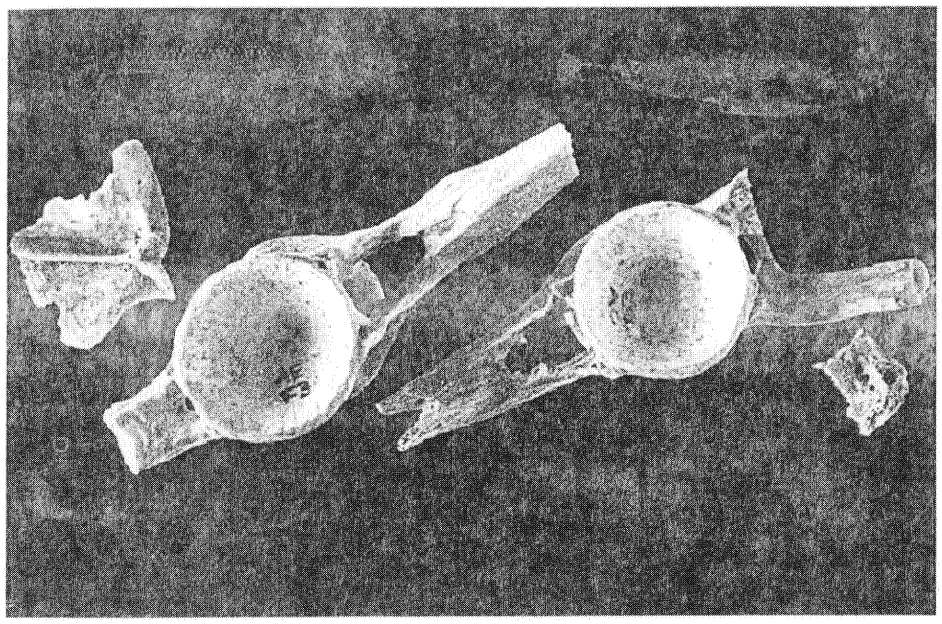


Fig. 7. Fish bones and species from the MSA levels at BBC.

Shellfish are extensively exploited in the MSA at BBC and the species represented are similar to those from the LSA levels. Species variations may, with larger sample sizes, inform us of changes in ocean palaeo-temperatures. The BBC shellfish provide some of the earliest known evidence for the use of sea foods.

The overall subsistence pattern at BBC, taking into account shellfish, mammals and reptiles suggests, at this stage, no clear distinction between LSA and MSA subsistence behaviour. There are some differences, for example the relatively smaller number of fish in the MSA. A larger faunal sample is necessary before meaningful comparisons can be made.

SOCIAL BEHAVIOR

Ochre

Worked ochre (red haematite) occurs throughout the MSA levels including pencils and large striated chunks. Unusually, more than 25 pieces have single or multiple holes that were drilled by mussels (bivalves) when the ochre beds, now ~30 km inland, were covered by sea probably during the Miocene. Ochre powder may have been used cosmetically or for more practical uses at BBC in the MSA. There is strong evidence linking ochre use and symbolic behaviour both ethnographically and in the UP (*cf.* Mellars 1989; Clark 1989; Roberts *et al* 1994; Knight *et al.* 1995; Deacon 1998; for a *contra* view *cf.* Klein 1995.

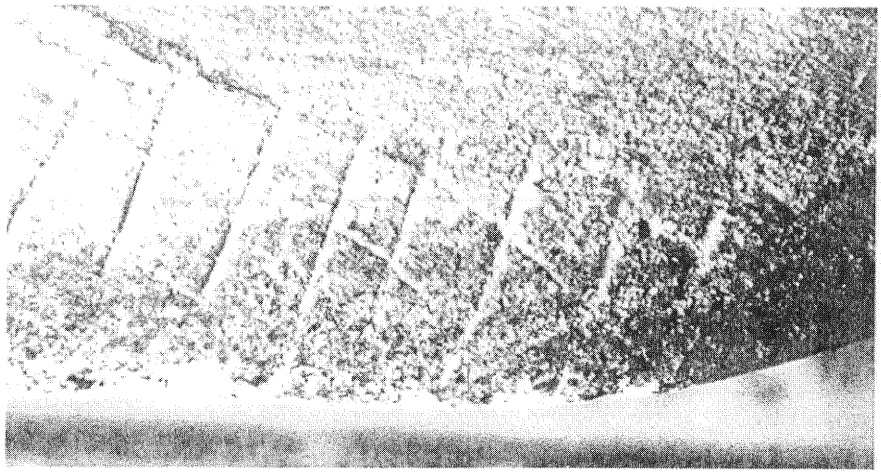


Fig. 8. Ochre with cross-hatched engraving

A chunk of ochre from the MSA levels has been deliberately engraved with a cross-hatched pattern on one facet. Evenly spaced strokes were made in one direction and then, using the same tool, were repeated diagonal to the first to create cross-hatching. Deliberate engraving and/or the production of 'art' is universally equated with symbolic behaviour (D'Errico pers.comm.).

Dolphin Tooth

A single tooth from a dolphin, *Tursiops truncatus*, has been cut and rounded at the root end and a hole then drilled into the root end of the tooth. The reason for the drilling is unclear but possibly bone or wood was inserted into the hole and the object used as a tool or decorative item.

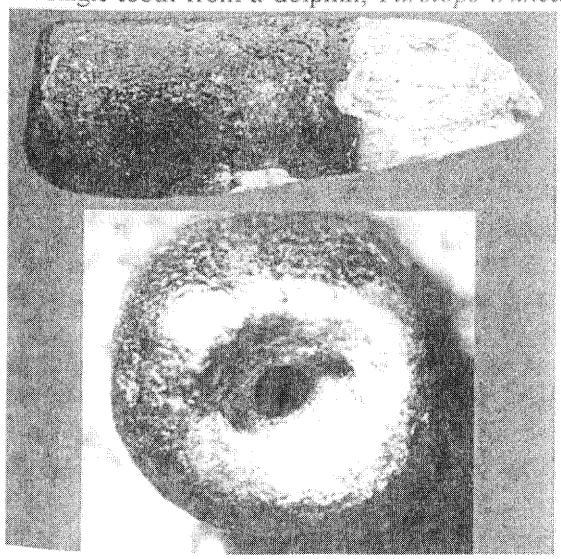


Fig. 9. Two views of the dolphin tooth

A flat piece of bone with parallel incisions from the Still Bay layers may represent a decorative image (d'Errico pers. comm.; Henshilwood & Sealy 1997).

Spatial Patterning

Preliminary insights into the spatial patterning in the MSA at BBC show discrete hearths associated with stone knapping areas, bone tool concentrations, and separate shellfish-, and possibly bone dumps. Specific activity areas appear to be a feature of the MSA, as they are of the LSA.

Choice of Raw Material

The predominant use of a non-local raw material, silcrete, for the manufacture of the majority of retouched lithic tools in the Still Bay layers may relate to adding exchange value to those tools (*cf.* Wiessner 1983) and promoting social relations (Mellars 1996), rather than having functional significance (*cf.* Deacon & Wurz 1998).

DATING THE STILL BAY

1. CHEMICAL DATING

Preliminary dates using the luminescence dating techniques TL & IRSL place the Still Bay at ~ 100 kyr (Vogel *et al* 1999) and by the electron spin resonance (ESR) and amino acid racemisation (AAR) methods at ~ 80-100 kya (Schwarcz pers. comm; Brooks pers.comm). In 1999 dating specialists Dr. Jack Rink (ESR), Dr. Helene Valladas (TL), Dr. Alison Brooks (AAR) and Dr. Stephan Woodborne(TL, IRSL) visited the site and in collaboration with them a comprehensive dating programme is in place for 2000 – 2002.

2. DATING BY SERIATION

Examining the occurrence of bifacial points in excavated sequences is one approach to predicting where to place the Still Bay within the southern African MSA. Clearly, we gain no particular insight if bifacial points occur through all phases of the MSA. Well excavated and reported MSA stone artefact assemblages from the southern Cape have relatively few bifacials. At Klasies River Mouth (Singer & Wymer 1982) the few bifacial points that do occur come from below the level of the Howiesons Poort (HP) as do a larger sample of bifacials at Nelson Bay Cave. Evidence for bifacial points from post-HP assemblages is absent, for example at Boomplaas, Die Kelders (Grine et. al 1991) and Montagu Cave (Keller 1973).

The view that bifacials are a component of the HP, accepted by Volman (1981, 1984a), may well be mistaken. Recently excavated HP assemblages contain very low frequencies of bifacial points (Singer & Wymer 1982; Yates pers. comm.; Deacon pers. comm.). HP assemblages with high numbers of bifacials were all excavated over 50 years ago to less than exacting standards and are probably admixtures. Many of the artefacts previously described as 'bifacial' are not true foliate points (Volman 1981:148). Re-examination of the Peers Cave material and unpublished excavation notes (Yates & Henshilwood *in prep.*) clearly shows that a 'finer Still Bay with bifacial foliate points' lies stratified below the HP levels. Reviewing the region as a whole, Volman (1981, 1984) concluded that bifacial points are most characteristic of the MSA preceding the HP phase. As the generally accepted date for the HP is ~ 70 kya (*e.g.* Klein 1989a Ambrose & Lorenz 1990; Deacon 1993; Deacon & Wurz 1996; Milo 1998) we are confident that the dates for the Still Bay are in the region of ~ 100-80 kyr.

FUTURE AIMS OF THE SOUTHERN CAPE MSA PROJECT – 2000-2002

Excavations at BBC have been limited both horizontally and vertically. Much more extensive investigations are required if we are to make a substantial contribution to the debates outlined above. Further excavations at BBC, each of 6 weeks duration, are planned for 2000, 2001 & 2002.

1. INCREASING SAMPLE SIZE

Our primary purpose is to enlarge threefold the existing MSA sample from BBC to attain an adequate sample size that will contribute substantially to the debate on the origins of modern humans.

2. INVESTIGATING SOPHISTICATED BEHAVIOUR

We will further investigate the occurrence of sophisticated behaviours in the Still Bay units at BBC (*inter alia*: fishing, the manufacture of bone tools, pressure-flaked lithics, engraving and drilling techniques).

3. LARGER FAUNAL SAMPLES

Obtaining a larger MSA faunal sample will enable us to determine whether or not MSA people were less effective at exploiting resources than their LSA counterparts. The existing fauna collected from the BBC LSA levels will provide a useful benchmark and is currently being analysed.

4. MSA HUMAN REMAINS

Given the excellent bone preservation, and the depth and volume of the MSA deposits, we believe that BBC offers excellent potential for the recovery of further human remains.

5. SPATIAL PLOTTING

We will spatially plot and remove artefacts and features in the Still Bay layers. 12 sq. m of the surface of the Still Bay deposits have already been exposed and await excavation, and a further 6 sq. m will be added. Finding possible 'modern' patterns in the use of space will include identifying activity areas (*e.g* bone and stone tool manufacturing and/or use zones); locating and analysing processing and dump areas for fauna, and assessing the location and possible role of hearths.

6. CHRONOLOGICAL INVESTIGATION

A vertical excavation located in 2 sq. m at the front of the cave was carried out in 1999 to a depth of 2.7 m. The purpose is to obtain a chronological sequence for the MSA units at BBC, specifically what phase or phases of the MSA lie below the Still Bay. Based on visible geomorphological features at the cave entrance we believe the basal layers to be 4-5 m below the MSA surface. During the 2000, 2001 & 2002 field seasons excavation at the front of the cave will be expanded to 4 sq.m and bedrock reached.

7. DATING THE BBC MSA

Dating the MSA layers at BBC, in particular the Still Bay, is a crucial part of the study. We are using thermoluminescence (TL & IRSL), electron spin resonance (ESR), amino acid racemisation (AAR) and uranium series dating. Thus far, we have preliminary results from TL/IRSL (Vogel *et al* 1999), ESR and AAR. All indicate that the top of the Middle Stone Age is ~ 80 – 100 kya We expect final dates for the initial set of samples by the end of 1999. Given the uncertainties and difficulties associated with these dating techniques, however, we anticipate that obtaining dates in which we have confidence will be a process, rather than an event. Working with specialists in the various techniques, we are designing a dating strategy for the site which incorporates checks and balances, as far as possible. Thus ESR dates on tooth enamel (signal dependent mainly on external dose) and TL dates on burnt lithics (signal derived mainly from internal dose) complement one another, and help control for possible variations in radioactive dose - a major source of error in luminescence dating. Luminescence dates of bulk sediment samples will be backed up by single-grain dating, to ensure that we do not obtain falsely old ages from sediments which may have derived from the fabric of the cave.

9. GEOMORPHOLOGY, OFFSHORE BATHYMETRY AND PALAEOENVIRONMENTAL RECONSTRUCTION

A comprehensive programme in these three fields, led by specialists, is in place. Work has commenced on understanding the past environmental and geological processes that have impacted on site formation and its former occupants. Participants in this programme include Dr. Nick Shackleton,, Dr. Paul Goldberg, Prof Tjeerd Van Andel, Dr. John Rogers and Prof. Hilary Deacon.

10. INCREASING THE LSA SAMPLE

About 12 sq.m of LSA deposits have been recovered. As the excavation moves forward towards the mouth of the cave further LSA material will be recovered. This, together, with the previously excavated material, will provide a useful comparative sample for assessing differences in subsistence behaviour between the LSA and MSA and in the use of space within the cave. Sheep bones from the LSA layers have been directly dated by AMS to 2000 B.P. and provide the earliest evidence for pastoralism in the southern Cape (Henshilwood 1997). Cattle, or possibly Cape buffalo, were recently identified in the layer directly above the sheep (Klein pers. comm.). A larger 'cattle' sample should resolve the identification issue and may provide the earliest evidence for cattle in the region.

DISCUSSION

BBC has potential to provide the evidence for the range of skills presently cited by many archaeologists as distinguishing features of 'modern' human behaviour. Over the past years the project has developed into a multidisciplinary undertaking drawing on a wide range of specialist skills. Yet excavations at BBC have only just commenced – less than 10 % of the Middle Stone Age deposits have been investigated.. Horizontal and vertical excavations, planned for the next 3 years will provide not only vital spatial information but increase the current sample size at least threefold.

The origin of 'modern' behaviour is one of the most hotly-contested issues in archaeology today, world-wide. With the on-board assistance of a wide range of experts, we believe that Blombos Cave Project will provide a firm foundation for assessing whether some southern African hominids were behaviourally modern by ~100 kya.

SPECIALIST ANALYSTS

The complexities involved in the analysis of the many aspects that comprise Blombos Cave requires specialist knowledge. Over the past three years we have built up an international team, listed below, who will continue to be involved in the project in the future.

CATEGORY	ANALYSTS	INSTITUTION
FAUNA		
Large mammalian fauna (identification)	Prof. R. Klein & Dr. K. Cruz Uribe	Stanford Univ. & N. Arizona Univ.
Bone artefacts	Dr. R. Milo	Chicago State Univ.
Micromammals	Dr. D.M. Avery	S.A. Museum
Birds	Dr. G. Avery	S.A. Museum
Fish	Mr. C. Poggenpoel	Univ. Cape Town
Homo sapiens	Prof. F. Grine	Stony Brook Univ.
PALAEOENVIRONMENTAL		
Charcoal	Dr. C. Cartwright	British Museum, UK
GEOLOGY		
Sediments	Dr. J. Pether	De Beers Marine
Offshore bathymetry/palaeoshores	Prof. T. Van Andel	Univ. Cambridge,
Oxygen isotopes programme	Prof. N. Shackleton	Univ. Cambridge,
Micromorphology	Dr. P. Goldberg & Jennifer Cole	Boston Univ. & SUNY,
LITHICS		
Analysis	Dr. T. Volman	Cornell Univ.
Analysis	Mr. R. Yates	S.A.Museum
DATING		
ESR	Dr. J.Rink	McMaster Univ.
OSL (single grain)	Dr. G. Duller/ Dr. A. Wintle	Univ. of Wales, Aberystwyth
TL (burnt lithics)	Dr. H. Valladas	CNRS, France
TL & IRSL	Dr. S. Woodborne & Dr. J.Vogel	CSIR, Pretoria
AAR (ostrich eggshell)	Prof. A. Brooks	G. Washington Univ.

Table 4. Specialists involved in the Blombos Cave Project

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