CHAPTER 3

BLOMBOS CAVE

3.1 Introduction

The Middle and Later Stone Age site of Blombos Cave is located on the South African southern Cape coast. It was first excavated in 1992 within the ambit of Christopher Henshilwood's doctoral studies on nine sites in the Garcia State Forest (GSF) and Blombosfontein area (Henshilwood 1995, 2008a). Archaeological discoveries from Blombos Cave have provided crucial insight into the contentious issue of the origins of behavioural modernity (*e.g.* Klein 1995, 2000; McBrearty & Brooks 2000; Henshilwood & Marean 2003; Mellars 2006). Excavations at the site are ongoing and focus specifically on the Middle Stone Age deposits.

Since a primary objective of this study (see Chapter 1) is to link the speleothem data (discussed in Chapter 4) and existing palaeoclimate data (presented in Chapter 2) with the periods of human occupation at Blombos Cave an introduction to the site is essential. Henshilwood (2008a) provides a comprehensive review of the Blombos (Blombosfontein) material and this chapter aims to present only a brief background to the site and focuses on the Middle Stone Age deposits. The chapter consists of three sections. The first describes the location and local environment of Blombos Cave. The second part presents the excavation history and dating techniques used to establish the antiquity of the archaeological deposits. The third part of the chapter focuses on the material found within the MSA levels at the site and also addresses the importance of these artefacts within the context of the MSA in southern Africa.

Figure 3.1 View of Blombos Cave (image reproduced with permission from C. Henshilwood)

3.2 Location, local climate & geology

Blombos Cave (hereafter referred to as BBC) on the southern Cape coast contains Later and Middle Stone Age occupation units. This karstic cave is elevated at 34.5 m asl and was likely formed through groundwater corrosion and weathering in calcarenite. A possible marine abrasion influence is also likely. The latter has however had a prominent influence on cave formation within the De Hoop Nature Reserve (see Chapter 4). The site is *c.* 100 m from the Indian Ocean and approximately 300 km east of Cape Town, 100 km west of Pinnacle Point and 30 km west of De Hoop Nature Reserve (Figs 3.1 & 3.2).

The site falls within the South African year-round rainfall zone where the climate is affected by westerly wind generated cold fronts and local changes in land and sea temperatures (see Chapter 2). The local vegetation is characterised by the endemic fynbos, which is a sclerophyllous, nutrient-poor, fire adapted scrub. The coastal vegetation also consists of grassy Renosterveld, Afromontane forest and thicket elements, as well as dune *Asteraceous* type fynbos (Cowling *et al.* 1986; Henshilwood 2008a; see Chapter 2 for more detail).

Figure 3.2 Map showing the location of Blombos Cave and other sites mentioned in the text

The lithology of the area is primarily quartzite and related to the underlying geology. The main geological formations are the basal Table Mountain Group (TMG) quartzitic sandstone, which are overlain by Bokkeveld shales that are capped by Witteberg group sediments (Fig. 3.3). Various coastal deposits that form the Bredasdorp Group of sediments cover the latter sediments. These coastal sediments comprise five distinctive types of Holocene, Pliocene and Pleistocene age - the Witsand, Waenhuiskrans, Rooikrans and Wankoe and De Hoop Vlei formations. The limestone caves in the De Hoop region are formed from the lithified aeolian sands of the Waenhuiskrans and Wankoe formations (see Chapters 2 & 4).

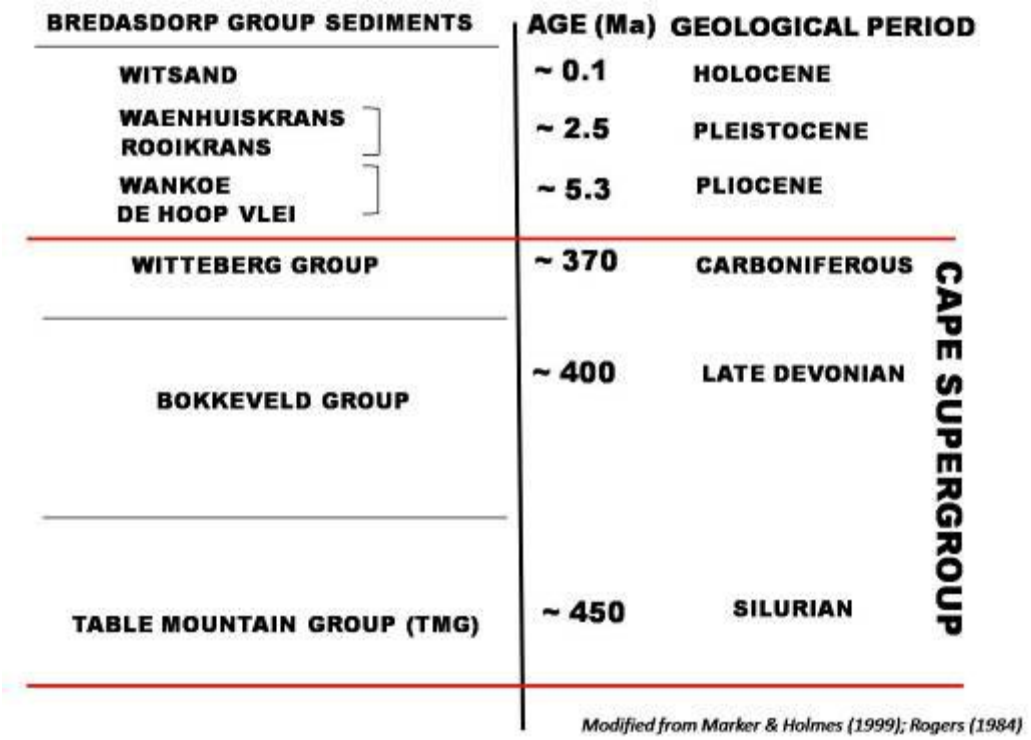

Figure 3.3 Simplified stratigraphy of the main geological formations at Blombos Cave

3.3 Excavation history, stratigraphy and dating

The first excavations in the Later Stone Age (hereafter LSA) levels commenced in 1992 with follow-up excavations initiated from 1997 to 1999 (Henshilwood 2008a; Henshilwood *et al.* 2001a). The excavations undertaken in 1992 also revealed the Middle Stone Age (hereafter MSA) deposits some 70 cm below the LSA layers (Henshilwood *et al.* 2001a). Research focusing on these MSA deposits has been ongoing since 1997.

The cave floor extends over *c.* 55 m^2 with an estimated height between 1 to 1.5 m measured from the final upper aeolian deposits to the roof (Henshilwood 2008a; Henshilwood *et al.* 2001a). The full depth of the cave is unknown but is likely to exceed 3 m. Prior to the 1997 excavation a 3 m^2 test trench was dug near the back of the cave (Henshilwood 2008a; Henshilwood *et al.* 2001a). Before this preliminary excavation the archaeological deposit was largely undisturbed as the entrance to the cave was almost closed off by aeolian dune sand (Henshilwood 2008a; Henshilwood *et al.* 2001a). A 10-60 cm thick sandy layer named DUN

separates the oldest LSA levels from the underlying MSA deposits across most of the excavated area (Henshilwood *et al.* 2001a). The MSA layers, some of which are more than 5 cm thick variously consist of dune sand, shell, bone, limestone, ash, decomposed plant matter and cultural materials such as bone and stone tools. The LSA deposits contain ash, carbonised material, shell, bone and cultural materials (Henshilwood *et al.* 2001a). Figure 3.4 provides a diagrammatic representation of the cave layout and excavated areas.

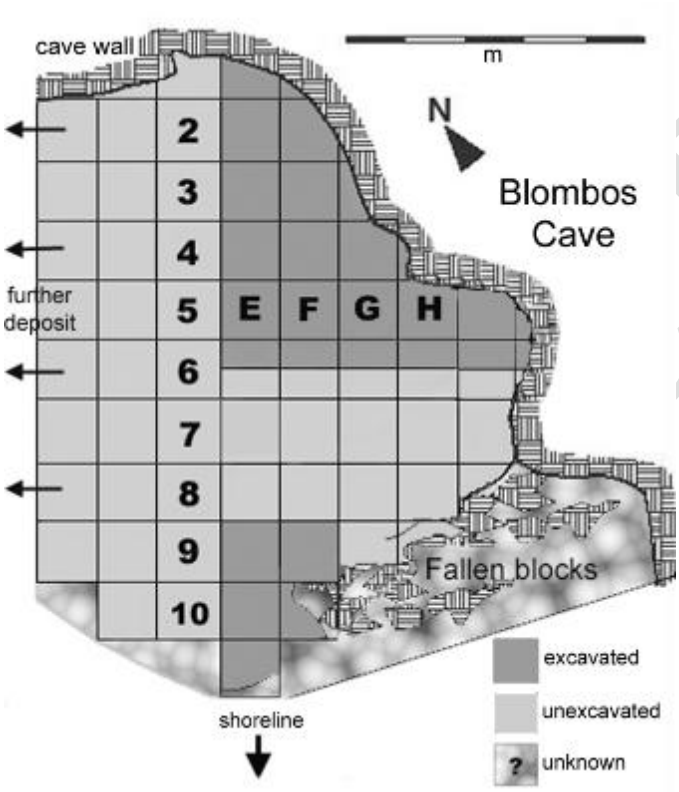

Figure 3.4 Blombos Cave layout (image reproduced with permission from C. Henshilwood)

Approximately 18 m^2 of deposit is thought to be obscured by fallen boulders in the eastern and western chambers of the cave (Henshilwood *et al.* 2001a). In contrast to the level LSA levels the MSA deposits are slumped in places, particularly near the rear of the cave (Henshilwood *et al.* 2001a). The excavated MSA depositional units are designated as BBC M1, M2 and M3 (Henshilwood 2008a; Henshilwood *et al.* 2001a).

The stratigraphic context of the excavated layers (LSA & MSA) and their sub-divisions are illustrated in Figure 3.5.

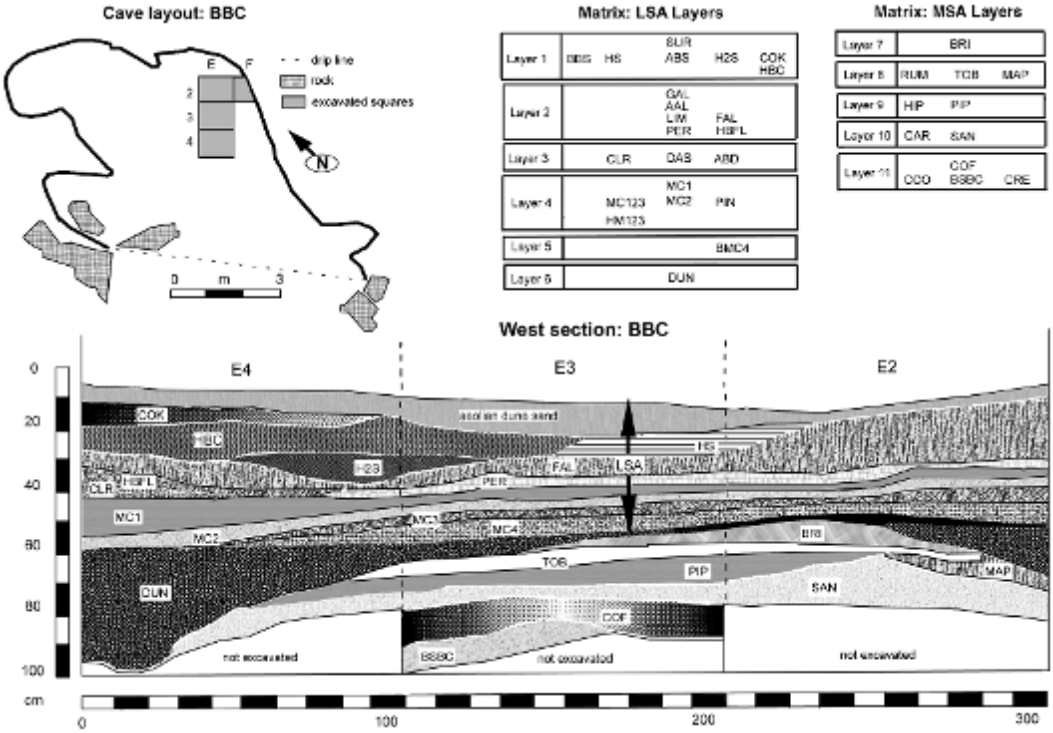

Figure 3.5 Stratigraphic levels based on excavations conducted from 1997 to 1999 (image reproduced with permission from C. Henshilwood)

A brief summary of the faunal material, lithics and 'special' finds recovered from the BBC deposit is presented in subsequent sections.

Since the discoveries associated with the MSA levels were thought to provide the earliest evidence related to human cognitive behaviour (see section 3.4) it was important to establish a high- resolution chronology for this deposit. Additionally, because the MSA occupation units appeared to be beyond the 40 ka range of radiocarbon alternative radiometric techniques were used including the optically stimulated luminescence and thermoluminescence methods. The OSL technique, which has a range from *c.* 100 years to 350 kyr, was applied to the sediments from the DUN hiatus level (*e.g.* Jacobs *et al.* 2003a, b, 2006). This hiatus level separates the MSA and LSA deposits at BBC and to the lower MSA levels. The first OSL ages for the hiatus level were 69.2 ± 3.9 ka (Jacobs *et al.* 2003a) with estimates obtained during a follow-up study ranging from 65.6 ± 2.8 ka to 67.3 ± 3.8 ka and 68.8 ± 3.0 ka (Jacobs *et al.* 2003b). These samples were re-dated using

a single grain approach since it was thought that all the quartz grains might not have been exposed to light during deposition. These estimates were however not significantly different from the earlier reported ages and placed the deposition of the dune sand level *c.* 70 ka.

In a related study, the OSL technique was applied directly to the sediments corresponding to the M1, M2 and M3 MSA levels. An age of 72.7 ± 3.1 ka was derived for layer CC of the M1 level. Additional thermoluminescence dates of 74 ± 5 ka and 78 ± 6 ka were also obtained for burnt lithics from the M1 level (Tribolo *et al.* 2006). Samples from the M2 levels taken from layers CFD, CGAA and CGAB/CGAC with OSL derived ages from 76.8 ± 3.1 to 84.6 ± 5.8 ka respectively (Jacobs *et al.* 2006). Layer CFD is considered part of the Still Bay occupations (see section 3.4). The CH/CI layer of the M3 level was dated to 98.9 ± 4.5 ka. These dates placed the MSA deposits at BBC firmly within MIS 4 and MIS 5 and provided irrefutable evidence for the antiquity of the finds, which are presented in section 3.4 of this chapter. The main artefacts and their corresponding ages are illustrated in Figure 3.6.

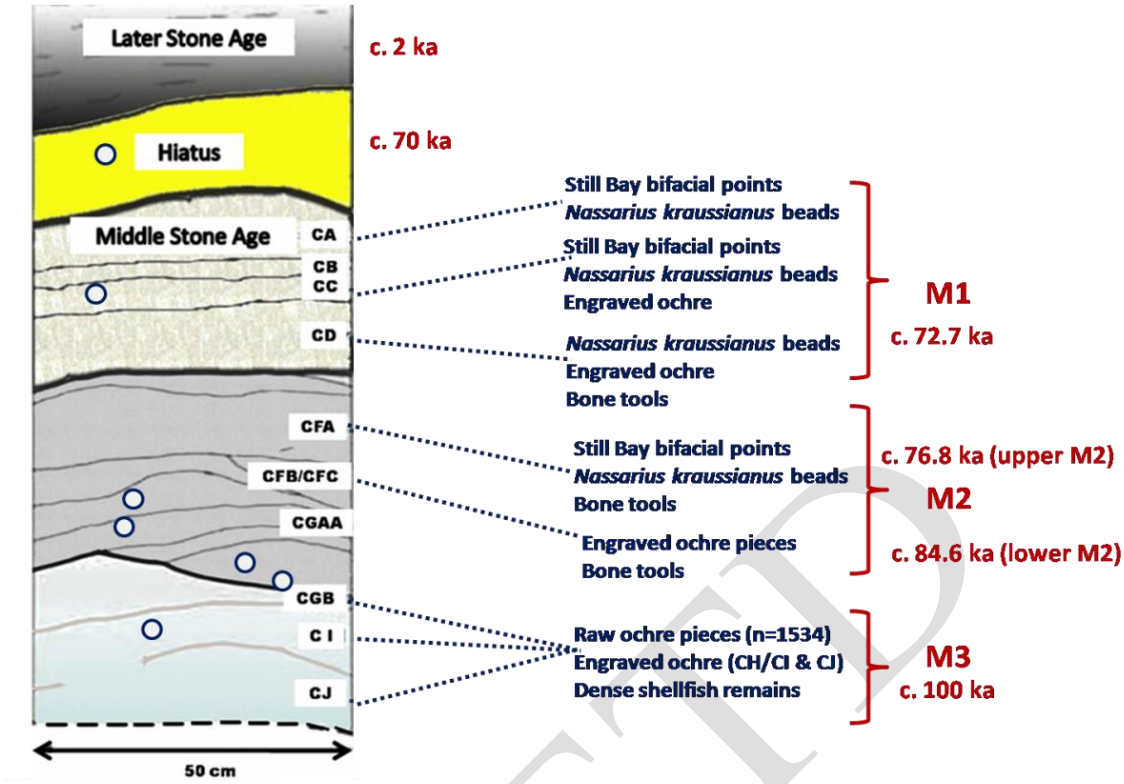

Figure 3.6 Dated Middle Stone Age stratigraphic units at Blombos Cave and corresponding finds. The circles indicated the position of the OSL samples (Jacobs *et al.* 2006)

3.4 The importance of Blombos Cave in the Middle Stone Age context of southern Africa

3.4.1 Blombos Cave and the Still Bay techno-tradition of the MSA

In South Africa, evidence considered indicative of complex cognition during the MSA comes from sites such as Blombos Cave (*e.g.* Henshilwood *et al.* 2002), Diepkloof Rock Shelter (*e.g.* Texier *et al.* 2010), Rose Cottage Cave (*e.g.* Wadley 2001) and Sibudu (*e.g.* Lombard 2006; Wadley *et al.* 2009) (Fig. 3.7).

The South African evidence is associated with two distinct periods of innovative technological development named the Still Bay and Howiesons Poort techno-traditions. The Still Bay is characterised by bifacial, foliate points and the Howiesons Poort is associated with bladelet lithic technology. Technological innovations associated with these techno-traditions have been used by many researchers as an analogue for identifying behavioural developments in MSA populations (*e.g.* Wurz 1999; Lombard 2007; Wadley *et al.* 2009).

Aspects of behavioural development are also inferred from finds such as bone tools (Henshilwood & Sealy 1997; Backwell *et al.* 2008), shell beads (Henshilwood *et al.* 2004; d'Errico *et al.* 2005) and engraved ochre pieces (*e.g.* Henshilwood *et al.* 2002, 2009; Mackay & Welz 2008). Additional evidence comes from experimental studies demonstrating the intricacies associated with the production of Howiesons Poort hafting mastics (*e.g.* Wadley *et al.* 2009).

The extent to which environmental change influenced the makers of the Still Bay and Howiesons Poort is the subject of ongoing research. Some researchers think that the Still Bay and Howiesons Poort may have developed as an adaptive response to extreme climate change and social pressure (*e.g.* Deacon 1989; Ambrose 2002; Henshilwood & Marean 2003; McCall 2007; Henshilwood 2008b). There is however, some disagreement regarding the role that climate change events may have had (*e.g.* Henshilwood & Marean 2003; McCall 2007; Henshilwood 2008b; Jacobs & Roberts 2008; Jacobs *et al.* 2008; Thackeray 2009; Bar-Matthews *et al.* 2010). Issues regarding the need for high resolution chronologies and the paucity of sites containing suitable material for dating are

central to the debate (see Chase 2010 for a review of the current palaeoenvironmental evidence pertaining to the Still Bay & Howiesons Poort).

Since Blombos Cave does not contain any Howiesons Poort material, this techno-tradition will not be discussed further in subsequent sections of this chapter.

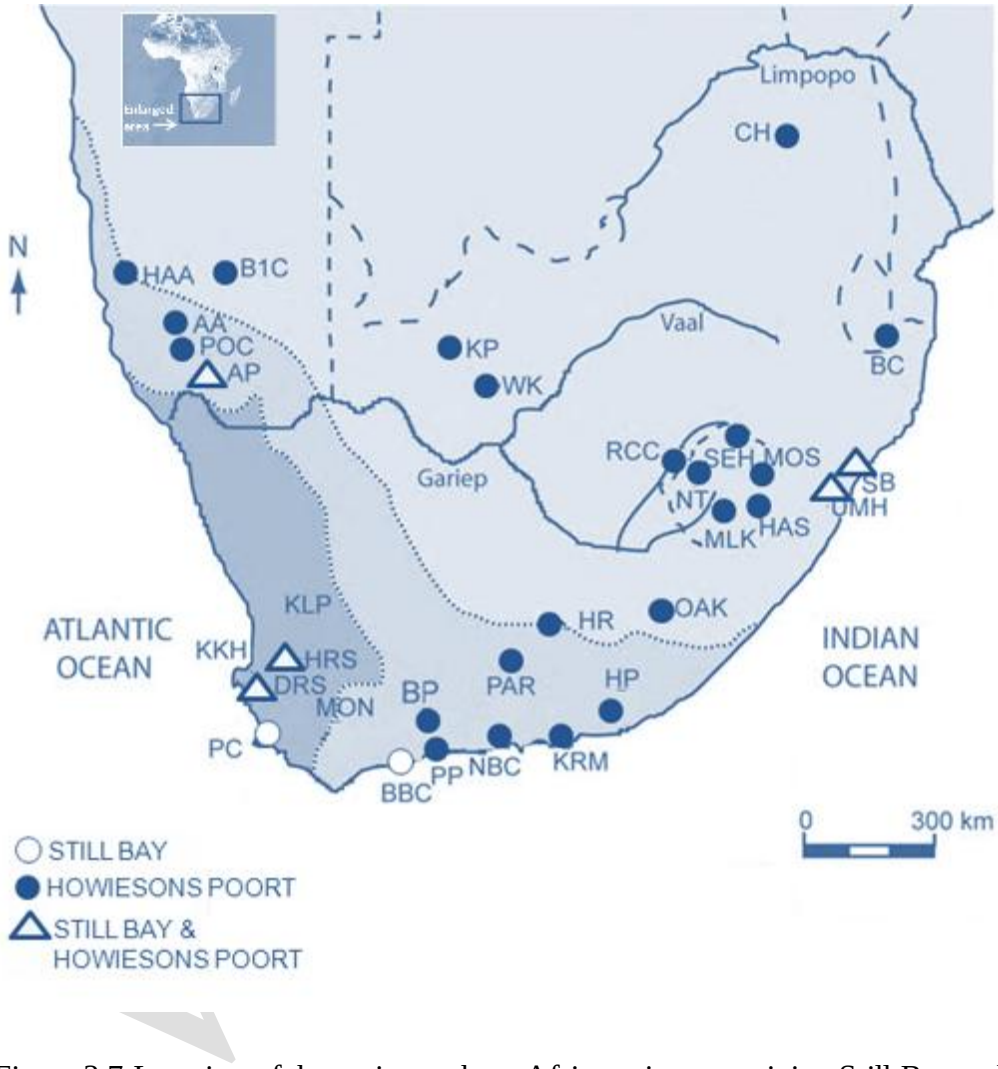

Figure 3.7 Location of the main southern African sites containing Still Bay and Howiesons Poort artefacts. Key: AA: Aar 1, AP: Apollo 11, BBC: Blombos Cave, BP: Boomplaas, BC: Border Cave, B1C: Bremen 1C, CH: Cave of Hearths, DRS: Diepkloof Rock Shelter, HAA: Haalenberg, HAS: Ha Soloja, HR: Highlands, HRS: Hollow Rock Shelter, HP: Howiesons Poort; KP: Kathu Pan, KRM: Klasies River Mouth, KKH: Klein Kliphuis, KLP: Klipfontein, MLK: Melikane, MON: Montagu Cave, MOS: Moshebi's Shelter, NBC: Nelson Bay Cave, NT: Ntloana Tsoana, OAK: Oakleigh, PAR: Paardeberg, PC: Peers Cave, PP: Pinnacle Point, POC: Pockenbanck, RCC: Rose Cottage Cave, SEH: Sehonghong, SB: Sibudu, UMH: Umhlatuzana, WK: Wonderwerk Cave (Modified from Jacobs & Roberts 2008: 21

3.4.2 Dating the Still Bay

In the South African context, establishing high resolution chronologies for archaeological sites remains problematic. This is in part because of the 40 ka limit imposed by the constraints of Carbon-14 dating. A chronology for the Still Bay has only been reported from four South African sites and Apollo 11 in Namibia. The South African sites are Blombos Cave (BBC) (Jacobs *et al.* 2003a, b, 2006; Tribolo *et al.* 2006), Sibudu Cave (SC) (Wadley 2007), Umhlatuzana (UMH) (Lombard *et al.* 2010) and Diepkloof Rock Shelter (DRS) (Jacobs *et al.* 2008; Tribolo *et al.* 2009).

The most comprehensive timescale for the Still Bay has been established at BBC where the deposits have been dated by several techniques including luminescence (OSL & TL) dating. The MSA levels at the site are divided into three phases denoted as M1, M2 and M3 (Fig. 3.6). The Still Bay layers are contained within the M1 and upper M2 phases (*e.g.* Henshilwood 2008a, b; Henshilwood *et al.* 2001a, b). A combination of single and multi-grain OSL approaches has dated the upper part of the M1 to 72.7 ± 3.1 ka and the upper M2 to 76.8 ± 3.1 ka (Jacobs *et al.* 2006; see section 3.3). The age corresponding to the upper M2 (CF layer) is considered as the earliest Still Bay levels at BBC (Henshilwood 2008a, b; Henshilwood & Dubreuil in press).

Comparables ages for the upper M1 level were derived using TL methods from five burnt lithics that yielded a weighted mean age of 74 ± 5 ka and 78 ± 6 ka (Tribolo *et al.* 2005, 2006). The lower M2 layers (*viz.* CG, CGAA, CGAB & CGAC) do not contain any Still Bay artefacts and have an OSL age of 84.6 ± 5.8 ka (Jacobs *et al.* 2006; Henshilwood & Dubreuil in press). The dates for the upper Still Bay levels at BBC are congruent with the OSL determinations from Sibudu and Umhlatuzana, which are dated to 70.5 ± 2.0 ka (Jacobs & Roberts 2008; Jacobs *et al.* 2008) and 70.5± 4.7 ka (Lombard *et al.* 2010), respectively, but not the lower Still Bay levels CFB/CFC. An equivalent age of 70.7 ± 2.1 ka was also reported for the Still Bay (hereafter SB) at Apollo 11 in Namibia (Jacobs & Roberts 2008; Jacobs *et al.* 2008). At Diepkloof Rock Shelter (DRS) OSL ages place the SB complex at the site between 70.9 ± 1.8 and 73.6 ± 2.1 ka (Jacobs &

Roberts 2008; Jacobs *et al.* 2008). Thermoluminescence (TL) dates obtained from 22 heated lithics in the same SB layers at DRS (denoted as Kerry-Kate & Kim-Larry). These layers have an estimated age from *c.* 99 ± 10 ka to 118 ± 11 ka (Kerry–Kate) and 108 ± 9 to 129 ± 11 ka (Kim–Larry) (Tribolo *et al.* 2009).

Overall, the TL dates from DRS indicate that the SB may have started *c.* 25-50 ka earlier and place this techno-tradition within MIS 5 (Tribolo *et al.* 2009). The OSL age estimates by contrast indicate a range from *c.* 70 ka (Apollo 11, Sibudu & Diepkloof) to *c.* 77 ka (Blombos Cave) (Jacobs & Roberts 2008; Jacobs *et al.* 2006, 2008).

These OSL ages are broadly congruent with estimates reported from other Still Bay sites whereas the TL estimates are not. Since inconsistencies between the TL and OSL derived estimates are yet to be resolved (Henshilwood & Dubreuil in press) the OSL derived dates are considered the most congruent. The OSL determinations by Jacobs *et al.* (2008) have placed the Still Bay at the transition from marine isotope stage (MIS) 5/4 *c.* 72 ka. However, the earliest age for the Still Bay techno-tradition at Blombos Cave is reported to be *c.* 78 ka (Jacobs *et al.* 2006) while the TL results from Diepkloof Rock Shelter (DRS) suggest an even earlier age of *c.* 100 ka (Tribolo *et al.* 2009).

3.4.3 MSA material from Blombos Cave

Still Bay points: M1 and Upper M2

The Still Bay points are considered multifunctional tools (Lombard 2007) and at Blombos, they are found exclusively with the M1 and upper M2 levels. A macro-fracture study has for example, confirmed that the Still Bay lithics were used as hunting weapons; possibly as spear tips and knives (Lombard 2007; Villa *et al.* 2009). Different hunting strategies during the M1, M2 and M3 phases was also proposed based on the frequency of diagnostic impact fractures (DIFs) observed on these points. More than 400 bifacial points have been found so far (Villa *et al.* 2009) (Fig. 3.8), however no Still Bay points have been recovered in the M3 layers. The Still Bay bifacials are made primarily on silcrete but also on quartzite and quartz (Henshilwood *et al.* 2001a; Villa *et al.* 2009). Silcrete for example

accounts for 72 %, 18.2 % and 24.3 % of the assemblage in the M1, M2 and M3 levels, respectively (Henshilwood 2008a; Henshilwood *et al.* 2001a). The preference for silcrete is thought to provide evidence that during the M1 and upper M2 occupation tool-makers were sourcing material from silcrete sources *c.* 30 km from Blombos (*cf.* Minichillo 2006, Villa *et al.* 2009). The Still Bay points may arguably have been used to develop and maintain social networks at the site (*e.g.* Deacon 1989; Wurz 2000; Wurz *et al.* 2003).

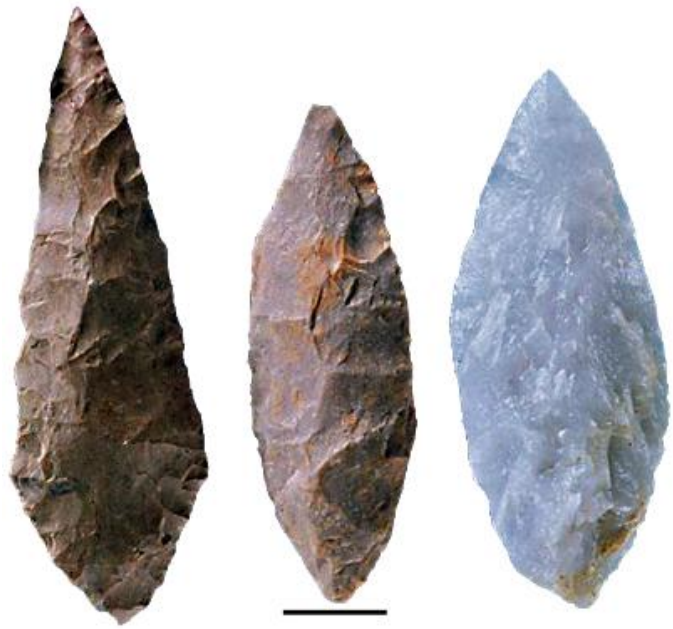

Figure 3.8 Bifacial points from Blombos Cave (image reproduced with permission from C. Henshilwood)

Bone tools: M1 and Upper M2

The identification of the bone tools provided new insights into the varied tool-kit of MSA populations since these artefacts were previously thought to have been produced almost entirely by LSA people. Approximately fifty bone tools in the form of points and awls in various stages of manufacture as well as an engraved bone fragment were also identified in the M1 and upper M2 layers (d'Errico *et al.* 2001; Henshilwood *et al.* 2001b; d'Errico & Henshilwood 2007) (Fig. 3.9). The *c.* 100 ka M3 level does not contain any bone tools and the highest frequency of awls and points comes from the upper M2 level (d'Errico & Henshilwood 2007).

These tools were made on long-bone shaft fragments and reportedly shaped by scraping (Henshilwood & Sealy 1997; Henshilwood *et al.* 2001b; d'Errico & Henshilwood 2007: 158). It is suggested that the bone tools (*viz.* sharpened points) were used to pierce soft material such as leather (Henshilwood 2008a; Henshilwood *et al.* 2001b) and to perforate shells for making beads (d'Errico *et al.* 2005). Several points also appeared to have been polished (Henshilwood *et al.* 2001b; d'Errico & Henshilwood 2007).

Figure 3.9 Blombos bone tools (image reproduced with permission from C. Henshilwood)

The development of a varied tool-kit also allowed MSA populations at BBC (& other sites) to exploit similar terrestrial animals to those targeted during the LSA. This is reflected in the MSA faunal assemblage.

MSA fauna

The overall MSA faunal assemblage comprises a number of grazing fauna, which are generally considered indicative of environmental conditions cooler and drier than at present (see Table 3.2). The class 4 bovid (Brain 1981), *Taurotragus oryx* (Eland) is represented across the MSA levels and its presence suggests that Renosterveld vegetation was present in the region throughout the MSA occupation at the site. In areas of the southern Cape coast, this vegetation occurs primarily in areas receiving a significant proportion of rain in summer with rainfall not exceeding 600 mm/pa or falling below 250 mm/pa (Cowling 1986; Low & Rebelo 1996). Renosterveld is however also found in areas of the winter rainfall zone and occurs primarily on moderately fertile, fine-grained soils (Cowling 1986).

Micromammal species such as *Bathyergus suillus* (Cape dune molerat) and *Procavia capensis* (hyrax) are found throughout the MSA levels although the former is generally found in the deep sands of the coastal sandveld vegetation. Reptiles are represented primarily by *Chersina angulata* (Angulate tortoise) and are comparatively larger in the MSA levels than those in the LSA. Although the overall micromammal species represented in the MSA deposit suggests cool and wet conditions at the site, differences in the marine and terrestrial faunal assemblage corresponding to the M1, M2 and M3 levels, suggest relatively minor changes in the environmental conditions and subsistence patterns across this time period.

M1 level

The fauna identified with the M1 level comprises a number of species with a wide environmental tolerance such as *Herpestes pulverulentus* (Cape grey mongoose), *Hystrix africaeaustralis* (Cape porcupine), *Ictonyx striatus* (Striped polecat), *M. capensis* (honey badger), *Atelerix frontalis* (southern African hedgehog) and *Papio ursinus* (Chacma baboon). Species considered indicative of dense vegetation (*e.g.* fynbos & thicket) includes *Raphicerus* (*viz.* Steenbok) *spp*. and *Lepus saxatilis* (Scrub hare). Environmental conditions with open vegetation are

suggested by the presence of *Lepus capensis* (Cape brown hare), *Canis mesomelas* (black-backed jackal) and *Ictonyx striatus* (Striped polecat). Conditions with sufficient water and grassy vegetation are inferred from *Redunca arundinum* (Southern reedbuck), *Pelea capreolus* (Grey Rhebok), *Connochaetes gnou* (black wildebeest) and *Diceros bicornis* (black rhinoceros) (Table 3.2).

M2 level

This level consists of two main sections named the M2 upper (Still Bay) and the M2 lower (non-Still Bay). The upper CFB/CFC layer in the M2 phase has an OSL derived age of *c.* 77 ka and the layers representing the lower M2 phase, CGAA, CGAB, CGAC are dated to *c.* 85 ka (Jacobs *et al.* 2006). The M2 faunal assemblage therefore comprises species from the *c.* 77 ka (upper) and *c.* 85 ka (lower) layers of the M2 occupation phase. Overall, the M2 faunal assemblage contains many of the species identified within the M1 (& M3) level with the exception of *P. ursinus* (Chacma baboon), *C. gnou* (black wildebeest) and *C. mesomelas* (black-backed jackal) that was only identified within the M1 phase (Table 3.2).

M3 level

The upper layers in the M3 phase, CH, CI and CJ have an age of *c.* 100 ka (Henshilwood *pers. comm. cf.* Jacobs *et al.* 2006). The lower M3 layers may be slightly older but the ages are not yet published. The terrestrial animals identified in the M3 phase consisted of similar species to those identified within the M1 and M2 levels. As an example, several species such as *C. mesomelas* (black-backed jackal), *C. gnou* (black wildebeest), *D. bicornis* (black rhinoceros) and *H. africaeaustralis* (Cape porcupine) were found only within the M1 and M3 levels. The savanna dwelling *Antidorcas marsupialis* (springbok) was only represented within the M2 and M3 levels and suggests drier conditions during part of the M2 and M3 occupation (Table 3.2). Since similar taxa were identified across the MSA levels it is likely that environmental conditions at the site remained stable enough to maintain extralimital animals such as *H. amphibius* and *D. bicornis* as well as

carnivores such as *C. mesomelas*. Based on the present data, I think that microhabitats likely existed throughout the MSA occupation at BBC.

MSA shellfish

Shellfish are exploited across the MSA levels at BBC (Henshilwood 2008a; Henshilwood *et al* 2001a). Similar species are represented in the MSA and LSA deposits and this implies a related pattern of subsistence (Henshilwood 1995).

M1 level

This level contained the lowest density (17.5 kg/m^3) of shellfish debris (Henshilwood *et al.* 2001a). Common shellfish species represented in this level are *Scutellastra argenvillei* (Argenville's limpet), *Perna perna* (brown mussel), *Cymbula (Patella) oculus* (Goat's eye limpet) and *Donax spp*. (sea snails) (Table 3.3). It was recently proposed that during the M1 occupation BBC was between 7-43 km (with an average of 15 km) from the sea (Fisher *et al.* 2010). Given the distance of the site to the coast two scenarios seem likely. The first is that terrestrial food items were utilised more frequently during the M1. An equally plausible alternative is that people may well have travelled to the coast and camped at the beach to continue eating seafood, thus any debris was discarded off-site.

M2 level

Compared to the M1 level a higher density of shellfish was found in the M2 phase (31.8 kg/m^3) (Henshilwood *et al.* 2001a). As mentioned previously, the M2 occupation phase is divided into upper and lower sections dated respectively to *c.* 77 ka and 85 ka (Jacobs *et al.* 2006). Shellfish remains were found primarily in the upper CFB/CFC layer (Henshilwood 2008a; Henshilwood *et al.* 2001a). The lower CG layers by contrast are relatively sterile and sandy (Henshilwood 2008a; Henshilwood *et al.* 2001a). This lower M2 level is thought to represent an occupation hiatus between the M2 and M3 phases which occurred between *c.* 98 and 65 ka (Jacobs *et al.* 2006; Henshilwood 2008a, b).

The main species in the upper M2 layers are *Oxystele spp*. (topshells), *Haliotis midae* (abalone) and *Perna perna* (brown mussel). *Donax spp*. (sea snails) are absent from the M2 midden in the CFB/CFC layer whereas *Oxystele spp.* and *H. midae* are more abundant than in M1. Similarly, *P. perna* occurred more frequently within the upper M2 level compared to the M1 (Table 3.3).

It is evident that during part of the M2 phase, people continued utilising coastal resources but by the onset of the M1 occupation, the marine component of the palaeodiet declined substantially.

M3 level

The highest density of shell fragments (68.4 kg/m^3) was found within the *c.* 100 ka layers of the M3 level (Henshilwood 2008a; Henshilwood *et al.* 2001a). This midden level contained a wide range of species (see Table 3.3) however, *Patella spp*. in particular features more prominently within the M3 level. *T. sarmaticus* is found across the MSA levels but is more abundant in the M3 layers than in the overlying M2 and M1 levels (Table 3.3). The presence of the west coast, cold water species *C. meridionalis* and *P. granatina* is thought to be indicative of lower sea temperatures during the M3 occupation compared to M2 and M1 (Henshilwood 2008a; Henshilwood *et al.* 2001a).

The diverse range of molluscs exploited during the M3 occupation phase is congruent with interpretations that the site was within 2 km of the sea (Fisher *et al.* 2010). The high shellfish density and diversity of species represented in the deposit suggests that coastal conditions were sufficient for the continued utilisation of marine resources. This implies that shellfish was an important component of the M3 diet although terrestrial food sources were also exploited during this phase of occupation at Blombos.

MSA fish

Fish bones are found throughout the MSA layers, albeit in lower frequencies compared to the LSA and may have been speared with bones or stone tipped projectiles (Henshilwood 2008a; Henshilwood *et al.* 2001b). It has been suggested

that all the fish species found at BBC with the exception of *Liza richardsonii*, could have been caught using a hook and line (Henshilwood 2008a: 176).

M1 level

The *Cymatoceps nasutus* (black mussel cracker) is most abundant in M1 (& M3). Other fish species found in this level are *Galeichthys feliceps* (White Sea catfish), *Dichistius capensis* (galjoen) and *Chrysoblephus gibbiceps* (red stumpnose/ Red Roman) (Table 4.3).

M2 level

This level contained very small quantities of fish bone and *C. nasutus* is the only species represented in this level (Table 3.3). Modern-day shoals of *C. nasutus* are caught almost exclusively during the winter months (June, July & August) and the presence of these fish has been used to argue for an intermittent winter occupation at the site (Henshilwood 2008a: 176).

M3 level

The M3 level contains the most abundant fish remains compared to M1 and the upper M2. Common fish species found in this level are *C. nasutus* and *Liza richardsonii* (South African mullet) which was also exploited throughout the LSA occupation at the site. *G. feliceps* is found in M1 and M3 but not in the upper M2. Similarly, *D. capensis* and *C. gibbiceps* only occurred within the M1 and M3 (Table 3.3).

Other MSA finds

During the intermittent MSA occupation at the site people made various kinds of tools (*viz.* bifacial points & worked bone tools) and other items that include shell beads and decorated ochre pigment.

M1 & Upper M2 level

Shell beads

Nassarius kraussianus (tick shell) beads were found primarily in the M1 level of the MSA deposit as well as the upper M2. These beads are considered evidence for personal adornment (Fig. 3.10). It has been demonstrated that *Nassarius* shells can be perforated using sharpened bone points (d'Errico *et al.* 2005). Additional evidence obtained from use-wear patterns and ochre pigment stains inside the shells suggests that the perforated shells were coloured with ochre and then strung together and worn as jewellery (Henshilwood 2008a; Henshilwood *et al.* 2004; d'Errico *et al.* 2005). The implication is that people living at Blombos during the Still Bay has a sense of individual and group identity which they reflected in the choice and style of the beads (Henshilwood 2008a).

Figure 3.10 *Nassarius kraussianus* shell beads (image with permission from C. Henshilwood)

Decorated ochre pigment

M1 and Upper M2 levels

More than 2000 pieces of ochre have also been recovered from the M1 and upper M2 levels. The most famous pieces of ochre come from the Still Bay layers in the M1 phase. These are two chunks of what has been described as intentionally engraved ochre (Henshilwood *et al.* 2002) (Fig. 3.11). Additional pieces of incised ochre were recently reported from the other MSA levels as well as further finds in M1 (layers CA, CC, CD) and the upper M2 (CFB/CFC) (Henshilwood *et al.* 2009) (Fig. 3.11).

Figure 3.11 Engraved ochre from the *c.* 75 ka M1 level (image reproduced with permission from C. Henshilwood)

M3 level

Ochre is also ubiquitous in the M3 phase and more than 1500 pieces have been excavated so far (Henshilwood *et al.* 2009). These include crayons, which were formed from repeated scraping, grinding and ochre stained stone tools. Some of the incisions recognised on the recently examined pieces were related to grinding and scraping associated with the production of powdered pigment (*e.g.* M3-2, M3-5 & M3-11)(Henshilwood *et al.* 2009). Other lines identified on a number of the pieces are interpreted as representing a symmetrical pattern (*e.g.* M1-1, M1-3, M1-5, M1-6, M3-2, M3-3, M3-6 & M3-9 & M3-8) (Henshilwood *et al.* 2009) (Fig. 3.12). Eight of these notched pieces come from the *c.* 100 ka CH/CI, CIB and CJ layers in the M3 phase (Henshilwood *et al.* 2009). According to Henshilwood *et al.* (2009), there is a clear patterning in the orientation and precision of the lines scored into the ochre pieces (Fig. 3.12). This pattern supposedly comprises different motifs represented by converging lines, cross-hatched forms and ladder-like designs, of which the latter appears to be confined to the M3 phase (Henshilwood *et al.* 2009: 45). Based on the currently available data, it was suggested that the engraved ochre may have functioned as a design stamp that was used for imprinting on other objects such as skin, hide, stone and bone. Henshilwood *et al.* (2009) further inferred that a tradition of ochre engraving was established at Blombos Cave between at least *c.* 75 ka and *c.* 100 ka.

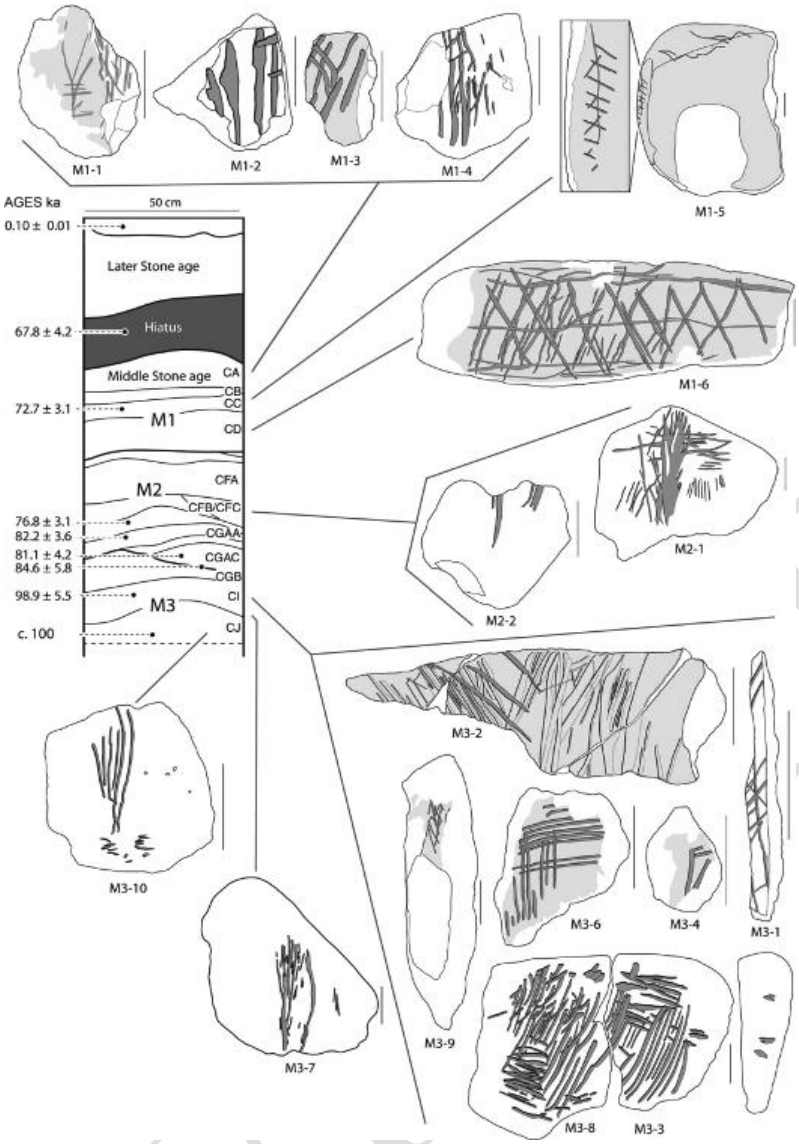

Figure 3.12 Incised ochre pieces from the *c.* 100 ka M3 level and the M1 and M2 levels (image reproduced with permission from C. Henshilwood)

3.6 Summary

Blombos Cave on the South African south coast is a karstic cave some 35 m asl and approximately 100 m from the Indian Ocean. This multi-occupation site receives all-seasons rainfall and local vegetation is characterised by fynbos macchia and pockets of forest and thicket. The underlying geology comprises basal Table Mountain Group sandstone overlain by Bokkeveld shales and coastal deposits of the Bredasdorp Group sediments.

The MSA units are divided into three levels named M1, M2 and M3. These levels have been dated by luminescence (OSL & TL) techniques from *c.* 75 ka to *c.* 100 ka. The most significant finds excavated from the MSA levels in Blombos are the shell beads of the *Nassarius kraussianus* estuarine mollusc, incised pieces of ochre, bone tools and bifacial points. These items were found primarily in the M1 and upper M2 phases and are thought to represent material evidence for symbolically mediated behaviour.

The extent to which the environment may have influenced the behaviours of people during the MSA occupations at Blombos (& other MSA sites) is still unclear. In this study, a speleothem-based stable isotope record is used to help elucidate our understanding of the MSA palaeoenvironment in the southern Cape. The methods associated with the development of this record are presented in Chapter 4.

A summary of the material culture corresponding to the MSA deposits is provided in Table 3.1. Table 3.2 lists the mammalian fauna that were mentioned in the text and identified in the MSA levels are and considered proxies for inferring the vegetation and environmental conditions at the site. Table 3.3 summarises the main shellfish and fish species identified in the MSA levels.

Table 3.1 Summary of the material culture associated with the MSA levels at BBC (Data obtained from Henshilwood 1995, 2008a; Grine *et al.* 2000; Henshilwood *et al.* 2001a, b; Grine & Henshilwood 2002)

	Age (ka)	Tools & material culture	Other finds
MSA	Dated by OSL and TL techniques to *c.* 72 and 100 ka Aeolian dune sand (DUN hiatus) separating LSA and MSA deposits dated to *c.* 70 ka	Still Bay bifacial foliate points made primarily from silcrete and quartzite Bone tools – awls and points produced from long-bone shaft fragments Several pieces of engraved ochre Some end-scrapers and blades *Nassarius* shell beads	> 2000 pieces of ochre (M1 & M2) Shellfish and fish remains found throughout the Still Bay levels Human teeth (*viz.* in the M3 level)
M1		Bone tools – awls & points Still Bay points Engraved ochre *Nassarius* shell beads	3 Human teeth (*viz.* molar crown fragments)(CB/CC, CC & CD Layers)
M2		Still Bay points Bone tools *Nassarius* shell beads	1 Deciduous tooth (CF Layer)
M3		No bone tools No Still Bay points Engraved ochre pieces & ochre 'crayons'	5 Human teeth (*viz.* permanent premolar & molar crown fragments)(Layers CK, CI & CJ)

Table 3.2 Summary of the major types of mammalian fauna recovered from the MSA levels at Blombos Cave (Data obtained from Henshilwood 1995, 2008a; Henshilwood *et al.* 2001a, b)

Species	Common name	Present-day habitat			
Micromammals			1	2	3
Bathyergus suillus	Cape dune molerat	Sandveld	✓	✓	✓
Procavia capensis	Rock hyrax/Dassie	Widespread	✓	✓	✓
Macrofauna					
Antidorcas marsupialis	Springbok	Savanna/Grassland/Nama Karoo		✓	✓
Canis mesomelas	Black-backed Jackal	Open, arid habitats *viz.* Savanna & Grassland	✓		✓
Connochaetes gnou	Black Wildebeest	Savanna/Karoo	✓		✓
Diceros bicornis	Black rhinoceros	Nutrient-rich soils with succulent and woody plant species *e.g.* Savanna & Renosterveld (Cowling & Richardson 1995)	✓		✓
Atelerix (Erinaceus) frontalis	southern African hedgehog	Widespread including Karoo & Savanna	✓	✓	✓
Equus capensis	Extinct Cape zebra (horse)	Renosterveld (Cowling & Richardson 1995)			✓
Felis libyca	African Wild Cat	Widespread excluding forested areas	✓	✓	✓
Genetta spp.	Genets	South African genet mainly in fynbos & Afromontane forest	✓	✓	✓
Herpestes pulverulentus	Cape grey mongoose	Widespread	✓	✓	✓
Hippopotamus amphibius	River Hippopotamus	Permanent fresh water source with open grassy vegetation *e.g.* Savanna	✓	✓	
Hippotragus leucophaeus	Extinct Bluebuck (Blue Antelope)	Endemic to the south coast Renosterveld (Cowling & Richardson 1995)	✓	✓	
Hystrix africaeaustralis	Cape Porcupine	Widespread excluding forests	✓		✓

Ictonyx striatus	Striped Polecat	Widespread	✓	✓	✓
Lepus saxatilis	Scrub Hare	Dense, shrubby vegetation			
Lepus capensis	Cape Brown Hare	Open areas with sparse vegetation	✓	✓	✓
Mellivora capensis	Honey badger	Widespread	✓	✓	
Papio ursinus	Chacma Baboon	Fynbos/Succulent Karoo/Savanna	✓		
Homo sapiens sapiens	Humans	Widespread	✓		✓
Pelea capreolus	Grey Rhebok (Vaalribbok)	Rocky habitats with grassy vegetation	✓	✓	✓
Raphicerus spp.	Steenbok/Grysbok	Dense vegetation *viz.* Fynbos & Thicket	✓	✓	✓
Raphicerus campestris	Steenbok	Savanna/Grasslands		✓	✓
Redunca arundinum	Southern Reedbuck	Savanna/Grasslands with sufficient water and fresh grass	✓	✓	✓
Syncerus caffer/Bos taurus	African buffalo	Forest/Grassland	✓		✓
Sylvicapra grimmia	Common Duiker	Widespread		✓	
Taurotragus oryx	Eland	Savanna environments and habitats with adequate vegetation cover (*e.g.* Fynbos)	✓	✓	✓
	Small bovid(s) (class 1)		✓	✓	✓
	Small-medium bovid(s) (class 2)		✓	✓	✓
	Medium-large bovid(s) (class 3)		✓	✓	✓
	Large bovid(s) (class 4)		✓	✓	✓

Table 3.3 The most common marine species identified in the MSA levels at BBC (Data obtained from Henshilwood 1995, 2008a; Henshilwood *et al.* 2001a, b)

		MSA occupation level		
		1	2	3
Species	Common name			
Shellfish				
Turbo sarmaticus	Turban shell	✓	✓	✓
Perna perna	Brown mussel	✓	✓	✓
Haliotis spadicea	Blood-Spotted Abalone	✓	✓	
Haliotis midae	Abalone (Infralittoral)		✓	✓
Scutellastra longicosta	True limpet			
Scutellastra argenvillei	Argenville's limpet	✓	✓	✓
Cymbula (Patella) oculus	Goat's eye limpet	✓	✓	✓
Oxystele spp.	mollusc/topshell	✓	✓	✓
Donax spp.	Clams	✓		
Choromytilus meridionalis	Black mussel (West Coast)			✓
Dinoplax gigas	Giant chiton	✓	✓	✓
Patella granatina	Granite limpet (Cold water indicator)		✓	✓
Patella spp.	limpets	✓	✓	✓
Fish				
Cymatoceps nasutus	Black mussel cracker (Cold water)	✓	✓	✓
Liza richardsonii	South African mullet	✓		✓
Spondyliosoma emarginatum	steentjies or sparids	✓		✓
Dichistius capensis	Galjoen		✓	
Galeichthys feliceps	White Sea Catfish	✓	✓	✓
Chrysoblephus gibbiceps	Red stumpnose	✓	✓	
Other				
Delphinus delphis (?)	Short-beaked common dolphin	✓	✓	✓
Arctocephalus pusillus	Cape fur seal	✓	✓	✓
Aonyx capensis	Cape Clawless Otter			✓