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Update on the 2011 excavation at Elands Bay Cave (South Africa) and the Verlorenvlei Stone Age

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ABSTRACT

Elands Bay Cave (EBC) is one of the key sites for the analysis of the Late Pleistocene/Holocene record in southern Africa. It typifies an area of study, the West Coast of South Africa, which benefits from a long history of research, from the 1960s until today. The 2011 project of EBC was initiated within the framework of the Middle Stone Age (MSA) research at Diepkloof Rock Shelter (DRS). The objective was to build a local synthesis and a complementary picture on the basis of these two sites located 14 km apart from one another, on the left bank of the Verlorenvlei.

The excavation at EBC took place during May 2011 with the aim of clarifying the site formation processes, the chronology of the Late Pleistocene occupations as well as the nature of the technological sequence. Our excavation focused on a 1.2 m deep profile that records two main occupational phases separated by a significant hiatus: (1) the initial phase represents an early MSA technology (previously called 'MSA 1' by T. Volman 1981) within deposits that started accumulating ca. 250 ka years ago; (2) the second phase documents (late) MSA, Early Later Stone Age (ELSA) and Robberg occupations.

The present synthesis is part of a series of several papers that take a multidisciplinary perspective. In this paper, we introduce our 2011 excavation, present our main results and discuss the succession from the late MSA to the LSA at EBC. In an epilogue, we provide a comparison between the archaeological records of EBC and DRS and further explore the reasons why these two sites do not represent similar occupational sequences.

KEY WORDS: Early MSA, late MSA, Early LSA, Robberg, coastal site, Elands Bay Cave, Diepkloof, Verlorenvlei.

Elands Bay Cave (EBC) is located on the present shoreline of the West Coast of South Africa. Its (re)discovery followed the excavation in the Cederberg mountains in the late 1960s at De Hangen, where marine shells were found some 80 km away from

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the sea (Parkington & Poggenpoel 1971). The excavation conducted in the 1970s by Parkington and colleagues revealed a rich cultural and environmental record that rapidly positioned EBC as a prominent place for the study of the southern African Holocene (Parkington 1972, 1976, 1981, 1984, 1988; Parkington et al. 1988, 2014). But, EBC also documents older occupations. In the present paper we aim to give an update on the Pleistocene record of EBC and to provide a first narrative of the Verlorenvlei Stone Age on the southwestern tip of Africa.

Since the excavations at EBC in the 1970s, the area of the West Coast has benefited from intensive field activities as well as a wide scientific exposure, notably influenced by researchers from the University of Cape Town. As a consequence, the West Coast firmly represents one of the best known areas concerning the study of the Southern African Stone Age today. This assertion is certainly true for the Late Pleistocene and Holocene but much less for earlier periods. MSA and LSA sites have been discovered on the coast, in particular around the Saldanha peninsula, but also more inland such as in the Cederberg range, in shelters and in open air sites. The Stone Age of the West Coast also benefits from a fairly good mapping of the stone raw material availability (predominantly composed of quartz, quartzite and silcrete), as well as a good understanding of the palaeoenvironments (Cartwright & Parkington 1997; Cowling et al. 1999; Parkington et al. 2000; Chase & Thomas 2006; Cartwright 2013; Cartwright et al. 2014). Several publications from the 1970s onwards illustrate the progress and importance of the research conducted in this area (e.g. Parkington 1972, 1976, 1984, 1988, 2001; Klein 1974, 2001; Jerardino 1993, 2013; Orton 2006; Avery et al. 2008; Mackay 2009, 2010; Texier et al. 2010; Högberg & Larson 2011; Wurz 2012; Kandel & Conard 2012; Hallinan 2013; Jerardino et al. 2013; Porraz, Parkington et al. 2013, Will et al. 2013; Mackay et al. 2015; Parkington & Porraz 2016 this issue).

EBC relates to a wide and diversified landscape, but the position of the shelter itself, within the Verlorenvlei catchment, at the mouth of the vlei and on the present coast, defines a unique environment. The Verlorenvlei catchment can be framed as an 'enculturated landscape' (see Lovis & Whallon 2016), composed of several rock art places, burials but also living and eating places, paths and routes. This unique landscape, composed of various ecological and vegetational niches (Cartwright 2013; Cartwright et al. 2016 this issue), has favoured intense human occupation, notably during the Holocene. EBC is mostly known for its Holocene record, but the site provides older insights about the settlements of this area. EBC is one of the three sites (including Peers Cave and to a lesser extent, Bushman Rock Shelter) that led Volman (1981) to define what he considered to be the oldest stage of the MSA in South Africa, namely the 'MSA1'. In addition, EBC provides deposits associated with MIS 3 and MIS 2, generally associated with the succession from the MSA to the LSA.

EBC is a pivotal place for the Verlorenvlei Stone Age, but cannot define on its own the temporal range and behavioural diversity that characterized the occupation of this area. As Parkington (2016 this issue) points out with his metaphor of the blinking eye, the sequence of EBC is made of severe discontinuities in sedimentation and human occupations. Certainly, these discontinuities relate to an environment that was highly variable. However, these discontinuities more widely reflect the fragmentary nature of all archaeological records. From that perspective, the reconstruction of the Verlorenvlei Stone Age requires us to refer to other places as well, such as Diepkloof Rock Shelter

(DRS), actually discovered in 1973 within the framework of the 1970s EBC project (Parkington et al. 2013). Excavated from 1998 to 2013 by Rigaud, Texier, Poggenpoel and Parkington, DRS has revealed a 3 m deep sequence with (lithic) traditions being largely represented by Still Bay (SB) and Howiesons Poort (HP) occupations (Porraz, Texier et al. 2013), both of which are seemingly absent at EBC.

Within the project of DRS, questions related to the Pleistocene deposits and occupations of EBC came back into view. How could these two sites, located a few kilometers away from each other, present such differences in terms of their chrono-cultural record? How was the Verlorenvlei catchment occupied, under which circumstances and under which motivations? In 2011 and with these questions in mind, we decided to reopen EBC largely in order to clarify the nature of its Pleistocene occupations. The specific goals of our field work were threefold: 1) to understand the site formation processes, 2) to give a chronological framework for the human occupations, 3) to characterize the technical phases and successions.

This paper aims to provide a general background of our field research and to introduce results of our multidisciplinary approach. We clarify what our strategy of excavation has been, present our 2011 field data and establish correlations with the 1970s excavations. We summarize the main sedimentary phases at the site as well as their chronology and discuss the human occupations. Furthermore, we discuss the technological changes recorded from MIS 3 to MIS 2. We then compare the record of EBC with the record of DRS and explore the possible reasons why these two neighbouring sites record distinct occupational phases.

RESEARCH HISTORY AT ELANDS BAY CAVE

The shelter and its context (Fig. 1)

The West Coast region of South Africa, as we define it, extends from Cape Town to the Olifants River mouth, from the Atlantic coast to the Cederberg Mountains. It falls within the Winter Rainfall Zone and experiences precipitation that accumulates mostly from April to September, with an average of ca. 270 mm/year (Robertson 1980; Sinclair et al. 1986). The landscape of the West Coast is part of the larger Cape Floristic Region, with dominant fynbos vegetation and a sandveld landscape along the coastal plains. It includes a range of geological formations that are drained by several rivers flowing westward, including the Verlorenvlei.

The Verlorenvlei River catchment begins 40 km to the east of the Atlantic coast, nearby the town of Piketberg on the east of the Piketberg moutains. The river, fed by tributaries from the Piketberg, Olifantsrivier, Swartberg and Mannberg mountain ranges, turns progressively into a semi-estuarine and marshy coastal lake or vlei. It defines a wetland ecosystem of ca. 10 km^2 that provides rich resources within the semi-arid West Coast (Baxter 1997). This unusual ecological configuration finds its origin in the presence of a quartzitic sill that obstructs the river's mouth near the village of Elandsbaai.

The late Precambrian Malmesbury Formation and the Siluro-Devonian Table Mountain Group (TMG) dominate the bedrock of the area (Baxter 1997). The TMG bedrock forms buttes and ridges that run northwest-southeast and rise above the extensive surficial sands of the Sandveld. The left bank of the Verlorenvlei is marked

Fig. 1. Location of Elands Bay Cave on the West Coast of South Africa and below view of the Verlorenvlei mouth.

by a 120 m high ridge (Tankard 1976; Rogers 1987) that continues to the coast at Elands Bay and terminates at Baboon Point at the Atlantic Ocean, where the shelter of Elands Bay Cave is situated.

Elands Bay Cave is located at Cape Deseada, ca. 180 km north of Cape Town. The cave (or rock shelter) is ca. 18 m wide and 10 m long. It presents a rectilinear morphology that is defined by the bedding and jointing of the TMG bedrock. The site faces the ocean to the southwest at an altitude of ca. 42 m above sea level. This area has of course undergone significant change throughout the Quaternary as a result of fluctuating sea levels. During phases of maximum marine regression, sea levels at Elands Bay dropped more than 100 m below modern levels exposing 20–30 km of coastal plains and leading to significant down-cutting by the Verlorenvlei river.

A short introduction to the 1970s excavation

The first excavations carried out at EBC began in November 1970 by a team headed by John E. Parkington, Cedric Poggenpoel and Peter Robertshaw from the University of Cape Town. The excavation continued until December 1978 for a total of 20 weeks of fieldwork (Parkington 2016 this issue). In parallel, a large survey was conducted around the Verlorenvlei area and many new sites were discovered, including Tortoise Cave, Dunefield Midden as well as Diepkloof Rock Shelter (see Parkington 2016 this issue).

The team started to excavate the eroding, disturbed sediments in the southwestern area of the chamber and expanded the excavation area to 96 m^2. The excavators extensively unearthed the Holocene and terminal Pleistocene deposits but only explored the lower part in the form of two successive test-pits over an area of ca. 5 m^2. They reached the smooth undulating bedrock circa 3 m below the original surface of the deposits.

Parkington et al. excavated pursuant to depositional units that were distinguished on the grounds of composition, such as relative amounts of shell, bedding grasses, twigs, ash, roof spall, loamy matrix and gypsum. According to the local archaeological tradition, the excavated units were given arbitrary names, which have been reduced to a set of four letter acronyms afterwards. All features such as pits, post holes, disturbances as well as hearths and the boundaries of depositional units were mapped. Identifiable artefacts and bones were also recorded by square and depth. The excavated sediments were dry sieved with 12 mm and 3 mm mesh sieves. All of the recovered archaeological material is currently stored in the Iziko South African Museum.

Except for the lowermost part that lies beyond the range of radiocarbon dating, the large number of radiocarbon dates (> 60) showed that the sequence was clearly characterized by episodes of non-deposition and non-occupation. Thus, Parkington developed a classification of the sequence into so-called pulses (Parkington 2016 this issue), listed here from oldest to youngest:

> **Pulse H** lies directly on bedrock. It corresponds to a 300 to 400 mm thick deposit that represents homogenous quartzite rubble composed of quartzite artefacts and geofacts. It contains relatively little fine interstitial material and lacks plant and faunal remains (Miller 1987). This lithic assemblage was assigned to the MSA 1 by Thomas P. Volman (Volman 1981, 1984; Schmid et al. 2016 this issue).
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> **Pulses G, F and E** consist of 1.3 m of sandy loams rich in charcoal, ash and occasional roof spall. The sands are coarse and exhibit a poor sorting with a high contribution of localised cave wall weathering. The pulses contain no shells, but do contain faunal remains, mostly terrestrial animals. Pulses G and F have been separated by the presence of the depositional unit PATT (a horizon associated with the presence of disintegrated quartzite blocks) while pulses F and E have been separated by the depositional unit SPAL characterized by an increase in roof spalls. Pulses G and F have C14 dates that fall beyond the range of radiocarbon dating (> 40 ka BP); pulse E has been dated between 21 ka to 17 ka uncal BP. These lithic assemblages have been classified as MSA and ELSA (Parkington 1992).

Pulse D reflects occupations across the terminal Pleistocene to the early Holocene boundary. Three sedimentary phases have been recognized within this pulse: (1) the lowermost part is composed of sandy loams from the terminal Pleistocene with ash and charcoal, high densities of artefacts as well as terrestrial faunal remains; (2) the middle part contains loams with shell from the terminal Pleistocene with a very high density of terrestrial and marine animal bones; (3) the uppermost part represents shell middens with a high loam content to finally shell middens without any substantial fine-grained components other than ash from the early Holocene. One striking element of pulse D is the presence of a burial from depositional unit ALBA dated to 10.86 ± 0.18 ka uncal BP (OxA478).

Pulse C dates between 4.3 and 3.2 ka uncal BP. The deposits are deep, loose and homogeneous shell middens with a substantial windblown component. Some of the thick depositional units contain dispersed remains of estuarine grass bedding or ash that have encouraged the excavators to conclude that these materials were originally deposited in basins in the rear of the site and later covered or repositioned by the cave occupants. Other depositional units of this period are *in situ* filling of a basin in the rear centre of the cave with shelly material and presumed estuarine bedding grass.

Pulses B and A are separated by only a short time interval. Pulse B has an age of 1.8 to 1.5 ka uncal BP and is associated with the appearance of ceramics; pulse A dates between 1.4 ka and 0.3 ka uncal BP. The densities of marine materials such as crayfish, seals and birds exceed those of the terminal Pleistocene in some depositional units. This assemblage of plant remains, such as twigs, grasses, corms and seeds, terrestrial bedding grasses and inorganic as well as organic artefacts, such as string, seed beads, brass and ceramics, resembles those of other coastal and, interestingly, inland sites.

THE 2011 EXCAVATION

Excavation strategy

In May 2011, we started a new excavation at EBC with the objective to clarify the nature of the pulses H to E: the Pleistocene occupations at the site. We achieved our research goals in a campaign of four weeks that focused on the 1970s test-pit area. Our 1 x 1 m excavation grid, which we established by using a total station, conformed to the one set up in the 1970s; however, we employed a different nomenclature to avoid confusion (Fig. 2). The squares were numbered serially and each square was subdivided into four quadrants (a–d).

The opening of the 1970s test pit revealed the strong impact of post-depositional processes on the stratigraphy. These post-depositional processes mostly take the form of secondary minerals, including large nodules of gypsum. Water actively percolates through the bedrock of the site and its effects are visible on the wall of the shelter and within the remaining deposits, causing some lateral variation within the stratigraphy (Miller et al. 2016 this issue). Based on these direct observations, we oriented our excavation towards the eastern profile that was the least affected by post-depositional agents. The east section had also the advantage of being well

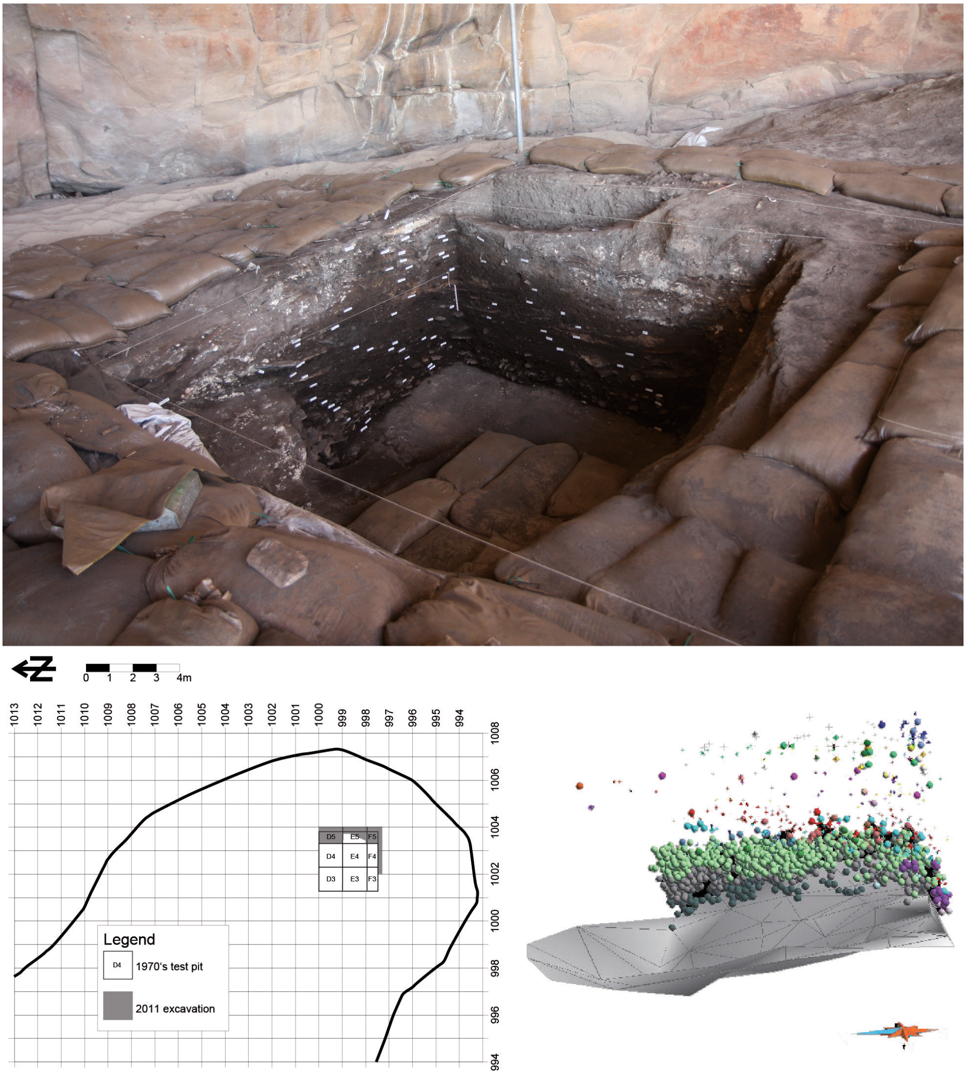

Fig. 2. View of the 2011 excavation area and projection of the plotted lithic artefacts per SUs.

exposed to the natural sunlight and in connection with the north section, for which we had field notes from the 1970s.

Before starting the excavation, we cleaned the eastern profile and individualized the main stratigraphic phases in order to provide an initial organisation of the deposits. We labelled each of these stratigraphic phases with a capital letter from L to C. Within each stratigraphic phase, we distinguished stratigraphic units (SUs) by giving informal names, but maintaining an internal alphabetical order. The SUs relate to the smallest identifiable sedimentary events that spread over an area larger than a quarter square meter. If a SU reached a depth over 25 mm, it was subsequently subdivided into successively numbered *décapages* ('spits') following concentrations of artefacts.

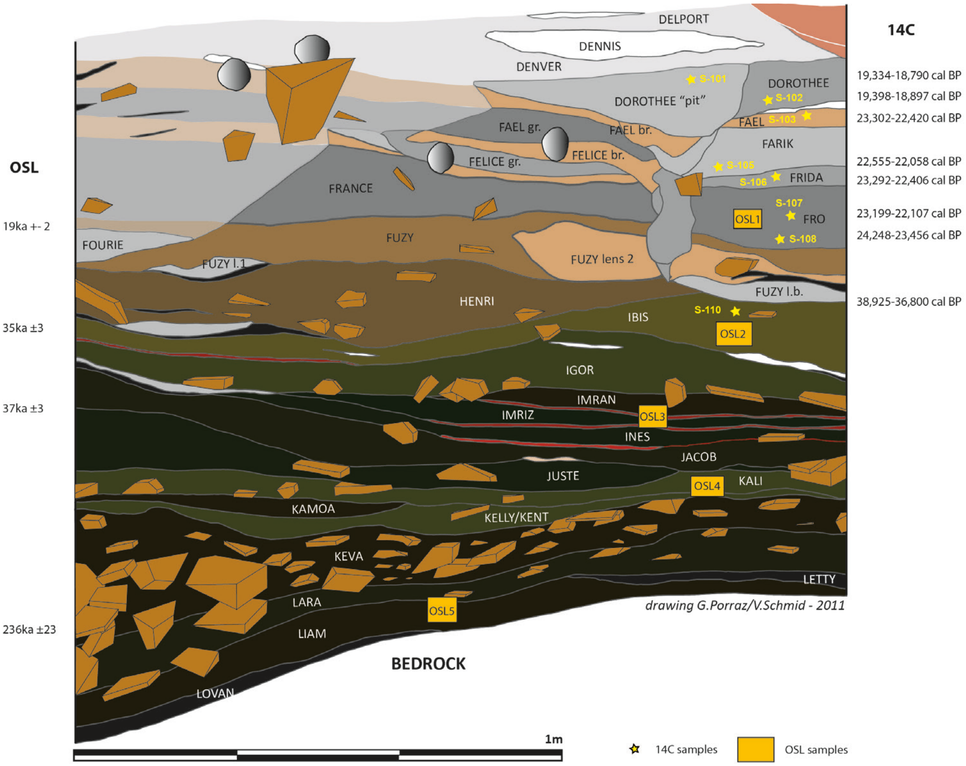

Fig. 3. 2011 eastern stratigraphic profile of Elands Bay Cave with the location of 14C and OSL samples.

The 2011 excavation focused on a narrow band of 2.5 m length and 0.5 m width. However, the eastern section also demonstrated lateral variations owing to post-depositional factors, most particularly towards its northern part, where gypsum formation was active. We therefore focused on the southern part of the east profile, which represents our main section. In addition, we straightened the south profile to get a better overview of the geometry of the deposits.

In the following, we describe the main stratigraphic phases as observed within our main section (Fig. 3) and as individualized during the excavation (see Miller et al. 2016 this issue):

Phase L (Letty to Lovan) has a maximum thickness of ca. 100 mm and consists of black and moist lenses within dark brown sediment. While a few archaeological finds occur, their origin is questioned and presently interpreted as a likely intrusion from the overlying unit.

Phase Keva/Lara exhibits a maximum thickness of ca. 350 mm. Keva and Lara contain a large accumulation of quartzite artefacts and roof spall with almost no interstitial matrix.

Phase K (Kent to Kali) is up to 150 mm thick. This comprises fine laminations visible in the southern section. Phosphatic lenses and nodules are present.

Phase J (Juste to Jacob) presents a maximum thickness of ca. 200 mm. The phase J is lighter than the phase K and laminations are not visible. Phosphatic lenses and nodules are also present.

Phase I (Ines to Igor) has a maximum thickness of approximately 250 mm. The phase I is darker than phase J and finely laminated with a succession of reddish laminations. Igor corresponds to yellowish sediment and its base is marked by a concentration of roof spall and small quartzite blocs between 50 to 150 mm of maximum dimension. The base of Ines corresponds to an accumulation of roof spalls, which are disintegrated. Phosphatic lenses, possibly related to ash, are present.

Phase H (Ibis to Harry) conforms to a phase of ca. 200 mm maximum in thickness. The phase H resembles phase I, but is lighter in colour. It is composed of homogeneous greyish to brownish sediment with occasional lenses. Quartz grains partly related to the alteration of roof spall occur abundantly within the sediments. All SUs show an inclination towards the south.

Phase F and D (Fuzy to Delport) has a maximum thickness of ca. 550 mm. It corresponds to a succession of units related to combustion activities indicated by the presence of ashes, charcoals and rubefied sediments, although post-depositional agents have modified their structures. Unlike phase D, phase F contains multiple interstratified depressions.

Phase C corresponds to a large pit composed of yellow brown sand that extends and slopes towards the southern wall of the shelter. The archaeological material is not abundant and mostly comprises shells. We observed no horizontal or vertical organization. This phase is a remnant of the Holocene deposits.

During the excavation of 2011, we used classic excavation methods and standards. All objects larger than 2 cm were recorded three-dimensionally with the total station using EDM software and field videos were taken on a daily basis. Cores, core fragments, tools and tools fragments regardless of their size were always recorded. Afterwards, the finds were put into bags with their individual find labels including their unique find number, square, sub-square and SU provenience. All of these single finds were washed and labelled with ink. Additionally, the sediments belonging to determined SUs of a sub-square were collected in buckets and recorded. These buckets were given unique find numbers starting with the letter T, referring to the French word for screen '*tamis*'. They were dry sieved with a superimposed screen of a 3 mm and a 1 mm mesh sieve to retrieve all the smaller pieces as well as the larger objects that were not detected in the field. The residues of the 3 mm screen were sorted and all the lithic finds were bagged by sub-square and SU. All lithic artefacts larger than 2 cm were analysed.

The material unearthed during the 2011 excavation is largely dominated by lithic artefacts made from rocks such as quartz, quartzite and silcrete, including a few iron-rich pieces ('ochre'). The fauna preservation in our excavated area has been strongly impacted by post-depositional processes; bones were identified during excavation but largely in the form of yellowish imprints. However, charcoal of a size generally smaller than 10 mm were numerous (Cartwright et al. 2016 this issue). To these categories of finds, we should add the discovery of two hearths that were structured by the presence of quartzite stones. These two combustion features were found in the SUs Jacob and Furb respectively. Stones from the SU Furb were sampled and used for thermoluminescence dating (Tribolo et al. 2016 this issue).

We implemented the dating strategy by sampling a set of charcoal fragments that were directly collected from the profile at the end of the excavation. The radiocarbon dating has been complemented by five OSL samples that were collected by night in 2011, while dosimeters were removed a year later in 2012. During this second campaign of one week in 2012 we collected micromorphological samples and performed ground penetrating radar (GPR) at the site to evaluate the morphology of the bedrock.

The deposits and their chronology

In the excavated area, the bedrock presents an irregular topography with a strong inclination down towards the north. The GPR data (Miller et al. 2016 this issue) allows us to elaborate on the topography of the bedrock and to have a better understanding of the geometry of the deposits at the site. The GPR shows the presence of a topographic depression (*cuvette*) at the centre of the shelter and confirms that the excavations focused on the deepest part of the deposits.

The site formation processes are characterized by important post-depositional processes taking the form of rodent burrows as well as the formation of secondary minerals. These minerals benefited from the moist environment provided by the nearby Atlantic Ocean and from the presence of water percolating from the joints in the bedrock of the shelter.

The site formation processes and the chronology enable the recognition of four main phases:

> **Phase (1) (L–Keva):** the filling of the depression of the bedrock consists of a rich accumulation of archaeological material and spall which corresponds to the phase L until Keva. The results of the micromorphological study question the preliminary interpretation of K. Butzer (1979) that this lower sedimentary phase represents a lag deposit (Miller et al. 2016 this issue). The luminescence chronology indicates that the deposits started forming at ca. 230 ka BP. However, due to the almost total absence of sand within this phase and the difficulty of sampling within the rocks, we could not collect samples directly within the archaeological units. We only have one TL age on a burnt quartzite rock coming from the SU *Keva* and dated to 83 ± 14 ka BP (but see Tribolo et al. 2016 this issue for a discussion of the ages). The archaeological occupations are therefore bracketed between 230 and 83 ka BP but comparative technological studies allow us to conclude that human occupations likely date back to MIS 6 (Schmid et al. 2016 this issue).
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> **Phase (2) (main hiatus):** the micromorphological analysis shows the presence of a hiatus on the top of SU Keva, as indicated by the presence of a thin lag deposit.
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> **Phase (3) (K–H):** this includes the SUs Kent to Fuzy and reflects both geogenic and anthropogenic sedimentation processes. Within this phase, we also notice the presence of two horizons rich in spall fragments that relate to the progressive deterioration of the shelter. The technological study

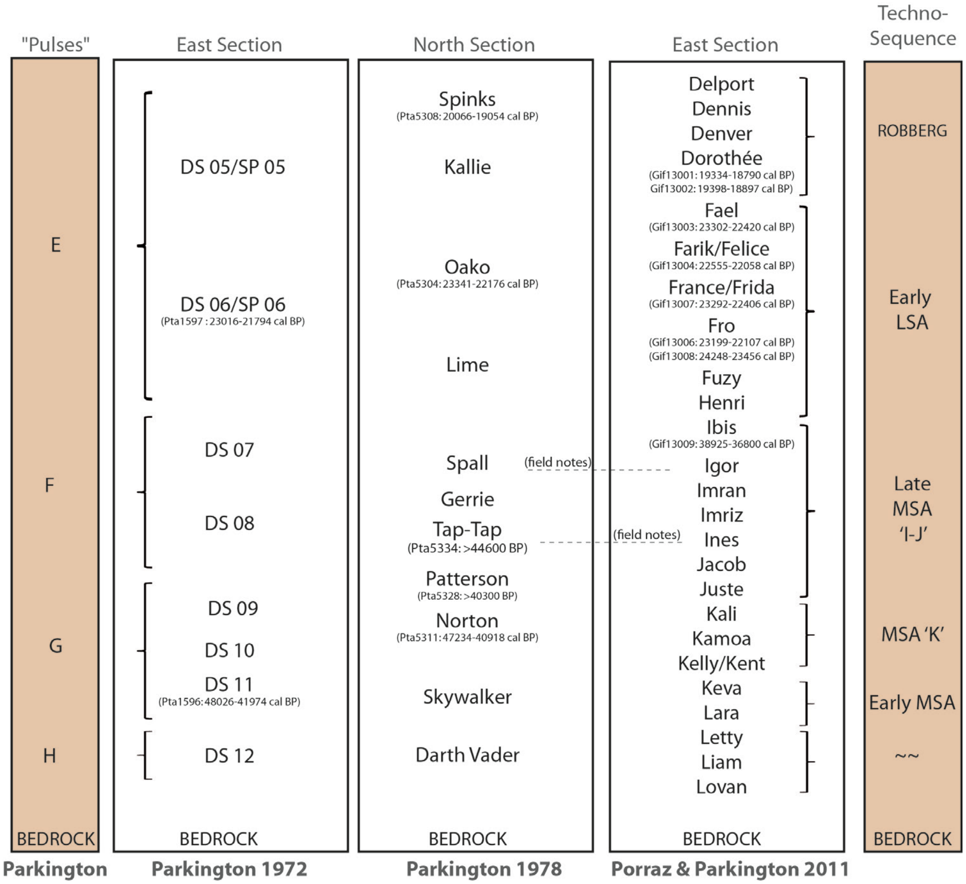

Fig. 4. Stratigraphic correlations between the 1972, the 1978 and the 2011 excavations at Elands Bay Cave.

suggests the lower lithic assemblages are reminiscent of post-HP occupations. The luminescence chronology together with the C14 dates indicates this phase (3) ends at ca. 35 ka BP.

Phase (4) (F–D): this phase of anthropogenic sedimentation comprises several combustion features and few spall fragments. This upper phase starts from SU Fro and lasts until the stratigraphic phase D which yielded a C14 date of ca. 19 ka cal. BP.

The 1970s and 2011 stratigraphic correlations (Fig. 4)

The stratigraphic correlations between the 1970s and the 2011 excavation concern the lower part of the deposits as exposed in the so-called deep sounding. This deep sounding was first excavated in squares E4 and F4 in 1972 and then enlarged towards north in 1978. In each of these two field seasons, Parkington used different names for the uncovered depositional units, as direct correlations were uncertain due to the lateral variation of the stratigraphy. In 1972, the units were called 'spits' with continuous numbers from DS 12 to DS 05, whereas in 1978, informal names were given. The 1972 and 1978 collections were subsequently grouped into pulses. For the present discussion, we establish correlations between the 1970s pulses and the 2011 excavation.

During our 2011 excavation, we focused on the east section of the deep sounding. We intended to establish direct stratigraphic correlations with the northern profile. However, direct observations of the profiles were limited and insecure due to the strong impact of secondary minerals in that part of the excavation. Our stratigraphic correlations (Fig. 4) combine and hierarchize different kinds of evidence that are based on sedimentary and field observations, C14 dating and techno-typological comparisons.

Correlations between the lower parts of the deposit have been facilitated by the presence of both sedimentary and lithic descriptions from the 1970s. The 2011 L phase (Keva included) clearly matches with the 'lag deposits' as described by Butzer (1979) and can be correlated with the pulse H and the base of the pulse G of Parkington. The main features in common are the rich accumulation of quartzite artefacts and roof spall with very little fine interstitial material, the absence of organic remains and a thickness of 400 to 500 mm. This is also supported by the technological comparison between the 1972 and 2011 lithic collections (Schmid et al. 2016 this issue).

Stratigraphic correlations regarding the intermediate part of the sequence, from phases K to H, has been more problematic due to 1) differences in sedimentation (the main section being more dilated), 2) differences in post-depositional preservation (the other sections being more degraded) and 3) a relatively low density of lithic artefacts. We focused primarily on some sedimentary markers that were independently observed during excavations. Firstly we correlate the depositional units Patterson and Norton—described as a 'Disintegrated Rock Horizon' in Parkington's field diary—with our SU Ines which represents the same processes of rock alteration occurring at a similar elevation. Secondly, we propose a stratigraphic correlation between the unit Spall and our SU Igor on the basis of a large concentration of quartzite slabs, also initially noticed by Parkington. Some specific typological markers were recovered from the 1970s such as a bifacial piece found in the unit Gerrie; one new specimen found in 2011 in SU Jacob. Based on our set of data, we correlate the 2011 phases K to H with the upper part of pulse G and with pulse F.

The upper part of our 2011 main section, phases F and D, correlates with pulse E. Finer correlations are possible due to the presence of C14 dates: our phase F is correlated with the unit Oako dated by radiocarbon from 20.5 ka uncal BP (J. Vogel 1980, unpublished); our phase D correlates with the unit Spinks dated by radiocarbon to 17.8 ka uncal BP. The technological comparisons support the present correlations.

THE PLEISTOCENE ARCHAEOSEQUENCE OF ELANDS BAY CAVE

Presentation of the 2011 lithic collection

The total collection of lithics is composed of 2592 artefacts > 20 mm. Apart from the lower units where artefacts are numerous, the Pleistocene sequence of EBC is characterized by a relatively low density of lithic artefacts (Table 1, all tables after references). Together with the limited area of our excavation and the variable extension of each SU, this has as a result some quantitative variations between SUs. To avoid important variations in counts and percentages, we therefore decided to group SUs that were adjacent and that belong to a similar stratigraphic phase. These groupings have been undertaken in order to reach an arbitrary limit of a minimum number that we fixed at 30 pieces.

The different raw materials that compose the collection are represented by the local quartzite that comes from the TMG (classified here as 'Coarse-grained quartzite'), the quartz and the fine-grained quartzite that are available within the local conglomerates, the silcrete that is of exotic origin as well as a few other petrographic occurrences (classified as 'others') such as chert and hornfels (see Porraz et al. 2016 this issue for a better description of the regional lithologic resources). With the exception of phase D, where silcrete forms almost 50 % of the lithic assemblage, the raw material spectrum of the Pleistocene inhabitants of EBC is dominated by local rocks.

For the present study, the techno-typological classification has been limited to a few attributes in order to adapt to the low number of pieces as well as to simplify diachronic observations. Our distinction between flakes, blades and bladelets follow classic definitions, blades being twice as long as wide with parallel edges and bladelets being no wider than 11 mm. Within the present collection and with regard to the data known from the current literature, we paid special attention to evidence related to bipolar-on-anvil strategies. Typologically, the list has been simplified as well with regard to the low number of formal tools and their low range of internal variability.

The archaeo-stratigraphic sequence we propose rests on the study of the 2011 artefacts, but also includes some observations based on the 1970s collection. Schematically, we suggest introducing the sequence by individualizing three main phases: 1) the Early MSA; 2) the MSA to Early LSA; 3) the Robberg. As Schmid et al. (2016 this issue) describe specifically the Early MSA of EBC and Porraz et al. (2016 this issue) deal specifically with the Robberg of EBC, the present paper will focus more on the (late) MSA and ELSA lithic technologies than the other phases.

The Early MSA(Fig. 5)

The first phase of occupation of the shelter is characterized by a rich accumulation of quartzite artefacts and geofacts. The higher density of geofacts at the base of the accumulation, as observed during excavation, supports the hypothesis that the accumulation predates human occupations. In that case, the first EBC inhabitants would have partly taken benefit of the available raw materials. The main archaeological horizon is the SU Keva, with which we associate the SU Lara. We consider that the material of these two SUs belongs to one single archaeological assemblage, the field subdivision being related to different densities of sediments in the fine fraction.

The knappers have preferentially exploited the local quartzite, which accounts for 98–99 % of the lithic collection (Table 2). In association, we find a few artefacts made from quartz as well as a few others made from fine-grained rocks that originate from the local conglomerates. The spectrum of rocks, except for a few silcrete artefacts, documents an exploitation of rocks that was strictly local.

The reduction strategies we observe document the production of flakes of different morphologies. From a techno-typological perspective, the reduction sequences are reminiscent of the Levallois and the Discoid systems. However, we recognize a specific system that was adapted to the cubic morphology of the quartzite slabs that were exploited. We termed this system 'POL-reduction strategy' (Planar-Orthogonal-Linear) and defined it as a system based on various combinations of reduction of the three

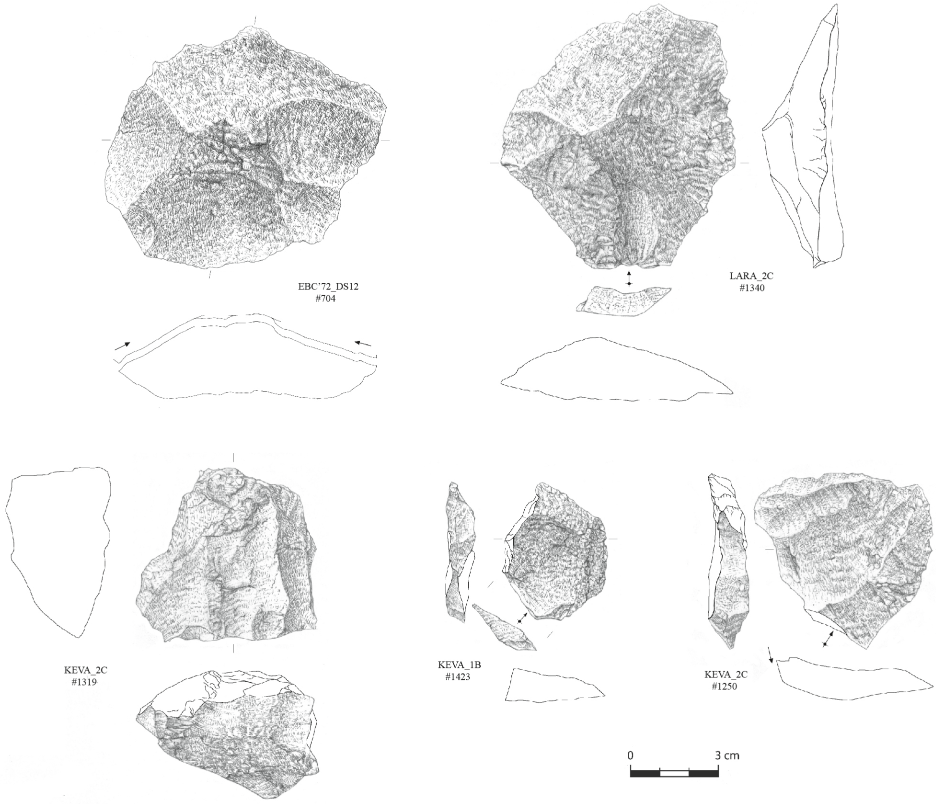

Fig. 5. Lithic artefacts from the EMSA of Elands Bay Cave (drawings by M. Grenet).

axes of the quartzite slabs that were selected (Schmid et al. 2016 this issue). In addition, we also recognized a laminar semi-prismatic reduction strategy, although it remains a small component of this lithic industry. The flakes have been rarely retouched (less than 1 % of the total collection) and are mostly transformed by notches.

Our study contests the hypothesis the site was occupied for short-term activities that were aimed at the exploitation of the local rocks and the export of end-products. We rather emphasize the fact that the reduction strategies were short and diversified and that the poor number of retouched tools is actually a consequence of a production system that was oriented toward the production of various morphologies and sizes. Apart from Peers Cave in the Western Cape, no other South African lithic collections for the moment share similarities with this assemblage from EBC. We encourage avoiding the classification as 'MSA1', but hypothesize that the lower occupations of EBC belongs to the suite of EMSA industries.

The MSA to the Early LSA

The second phase of occupations groups together the sedimentary phases K to F, from the SU Kent to the SU Fael. In the following description, we aim first at introducing the overall characteristics and then, to elaborate on some of the differences we recognize throughout the sequence.

These lithic assemblages are relatively homogeneous regarding the raw material procurement, which is dominated by quartz (Table 2). There is one exception documented in phase 'K', where the local quartzite seems to play a more substantial role than in the overlying deposits. Non-local occurrences are firstly represented by silcrete artefacts, present in small numbers but throughout all deposits, and secondly by hornfels and chert. Our excavation area has been restricted and thus limits our interpretation with regard to the raw material provisioning strategies. However, together with our observations based on the 1970s collections, we see a significant difference between the local rocks knapped *in situ* and the non-local rocks that were predominantly introduced in the form of finished pieces.

Since its first recognition, the identification of silcrete heat treatment has attracted increasing attention in southern African archaeological assemblages (mostly from the Western Cape where silcrete plays an important part as raw material). Its identification and the quantitative evaluation of its prevalence has also been improved by a set of new laboratory techniques, analysis protocols and experimental approaches that help define the characteristic attributes on artifacts (Brown et al. 2009; Schmidt et al. 2015; Delagnes et al 2016; Schmidt & Mackay 2016). In the context of EBC, evidence of silcrete heat treatment is identified from SU Juste onwards and is present throughout the subsequent sequence. As silcrete is represented only by a handful of pieces, it is difficult to further elaborate on its technological context. However, it is worth noting that in this context silcrete was heat-treated even though the rock only accounts for a small part of the raw material spectrum. This finding illustrates the necessity to extend the current research on lithic heat treatment from the MSA to the LSA.

There are several technological attributes that contribute to the conformity of the phases K to F. The first one relates to the overall domination of flakes over blades and bladelets (Table 3). One common element is the use of bipolar-on-anvil knapping (Fig. 6), as deduced from the cores as well as from the flakes themselves that can compose up to 50 % of the total of the flakes. This bipolar reduction is associated with different raw materials, although there is stronger association with quartz. This reduction strategy takes different forms: cores and products can document a polyhedral exploitation but the dominant form is the one favoring one main surface of removals. In this last case, some of the pieces overlap with the so-called category of the *pièces esquillées*.

Apart from the bipolar reduction strategies, we recognized a discoidal reduction strategy *sensu* Boëda (1993). This takes the form of typical thick *dos limité* flakes as well as a few cores with unifacial exploitation (Fig. 7). While this reduction strategy is identified throughout the sequence, the proportion of discoidal flakes is more important in the lower SUs of this archaeological phase (Table 3) and typical discoidal cores have only been identified within the K phase.

Blades and bladelets represent two minor technological components within the studied assemblages. Interestingly, they document two separate reduction sequences: the bladelets are mostly produced by bipolar flaking, while the blades are strictly associated with free-hand percussion (no clear evidence support the hypotheses that the bipolar bladelets come from later in the reduction chain than the freehand blades). We notice some diachronic changes within the blades. The ones of the lower SUs, especially phases K and I, are more regular and more numerous (Fig. 8). The blade

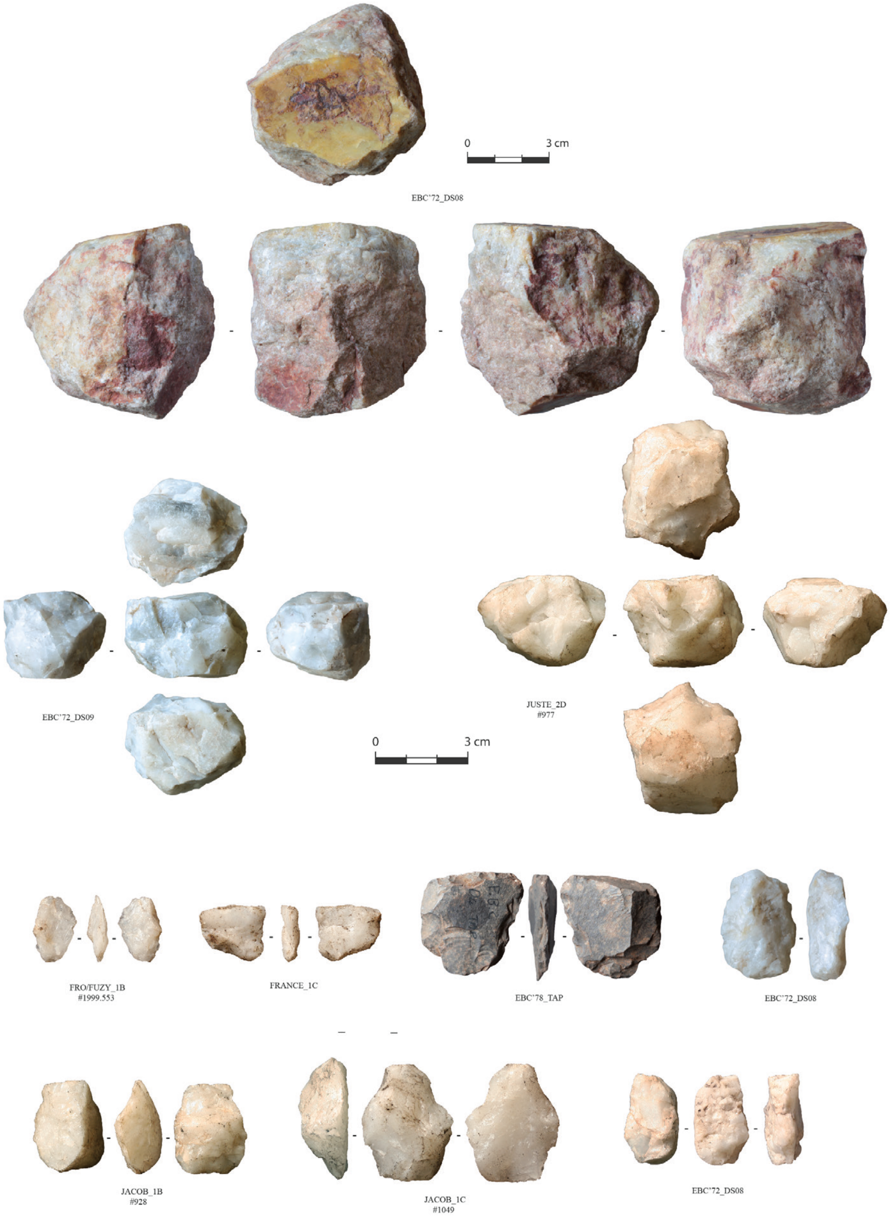

Fig. 6. Bipolar cores from the late MSA and ELSA of Elands Bay Cave.

technology of K and I can only partially be described as there are neither laminar cores nor technical products (or identified as such) present in the collections. The blades are represented by isolated products, some of them being very regular and suggesting a well-controlled execution and production. Based on our current set of information, we hypothesize a disjointed production of blades and flakes and are tempted to recognize two blade reduction sequences, one on the surface with an internal percussion and the

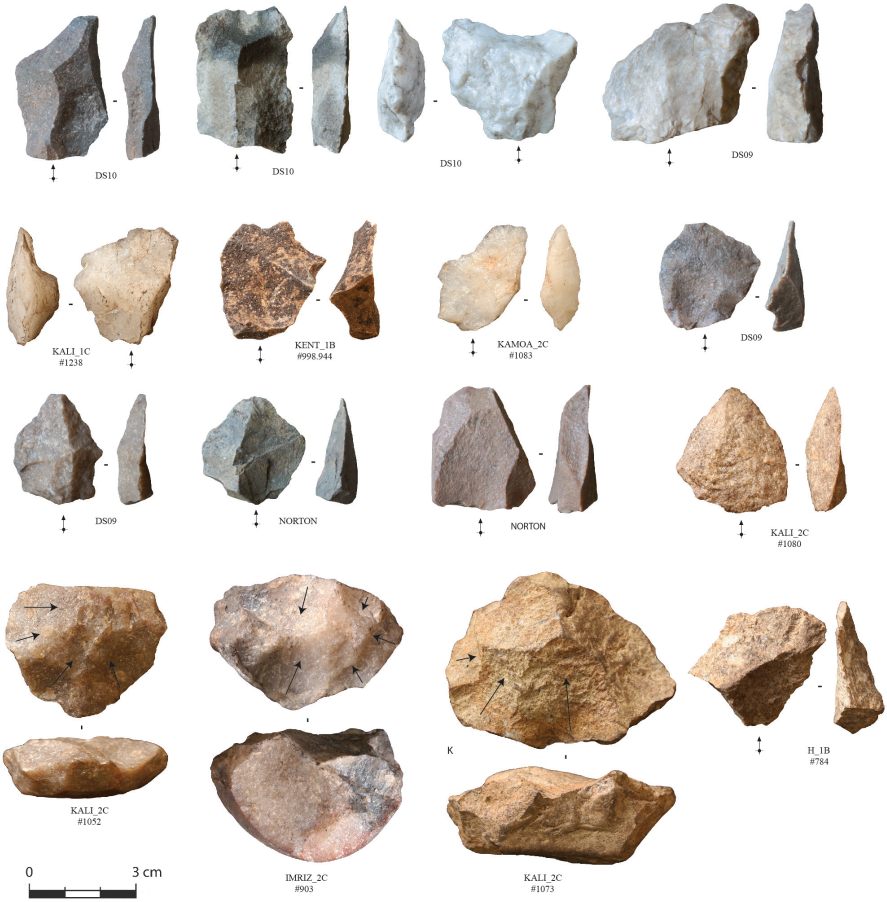

Fig. 7. Discoid blanks and cores from the MSA of Elands Bay Cave.

other being prismatic with a more tangential percussion. Strikingly, one regular blade exhibits a polish that shows use in a longitudinal motion together with other evidence that suggests that the blank was hafted (Fig. 9).

Regarding the typological corpus, the denticulates largely dominate the formal tools with more than 70 % of the total population (Table 4). These denticulates display a great degree of variability in terms of raw materials, blanks, morphologies, dimensions as well as manufacture (Fig. 10). With respect to this last attribute, the denticulates vary in the number of notches, their location (on the ventral or dorsal face) as well as their regularity, extension and depth; some denticulates having very marginal notches while others are much more invasive. As a general statement, the denticulates seem to represent a relatively expedient tool, as illustrated by their low degree of standardization. One good example is typified by a denticulate made on a silcrete heat shatter.

Apart from the denticulates, we also point out the discovery of one quartz bifacial piece in SU Jacob. A previous specimen in silcrete was found during the 1978 excavation. These two pieces show that bifacial technology was part of the technological repertoire of these populations and confirm that such technology was actually widely distributed

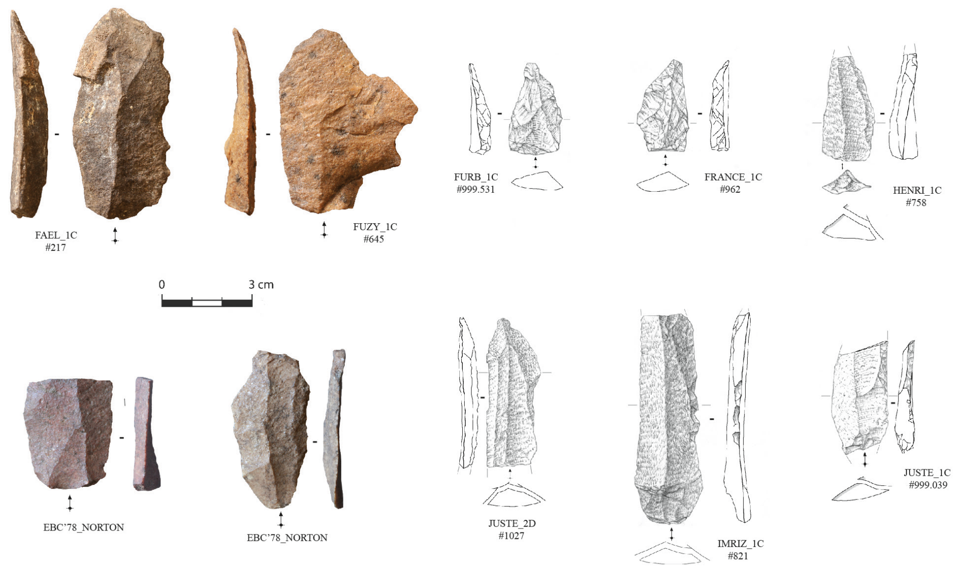

Fig. 8. Blades and elongated blanks from the MSA and ELSA of Elands Bay Cave (drawings by M. Grenet).

throughout the Late Pleistocene in southern Africa (de la Pena et al. 2013; Porraz, Texier et al. 2013; Soriano et al. 2015; Archer 2016; Will & Conard 2016).

In addition to our 2011 assemblage of formal tools, we should refer to the presence of a few typological pieces from the 1970s excavations that contribute to providing nuance to the present overview (Fig. 10). Additional to the two bifacial pieces, we may add the discovery of a single unifacial point (with a broken tip) that has been found in depositional unit DS10, which correlates with our phase K. Moreover, three 'truncated knives', falling into the category of the Asymmetric Convergent Tools (ACTs), have been found in depositional unit DS09, which correlates with our phase I. These tools, all on non-local rocks, have been made on regular blades and represent a distal retouch that backs the opposite edge into the straight and regular cutting edge. The functional analysis of one of these blades show a polish related to a longitudinal use (Fig. 9). Finally based on the 1970s collection, it appears that the *pièces esquillées* are more numerous in the upper SUs than in the lower. Note that a preliminary functional study performed on one of these artefacts (Fig. 9) shows the presence of a polish originating from long and repeated contact with an organic raw material, probably bone, and suggesting this lithic piece was either exclusively or alternatively used as a tool compared to the exploitation as core (see above).

This overview of the lithic industries from the phases K to F allows us to individualize the following common characteristics: 1) a low rate of lithic artefacts per SU; 2) raw material provisioning strategies based on the exploitation of local rocks and the episodic introduction of finished forms; 3) production primarily oriented towards flakes; 4) the important role of bipolar-on-anvil flaking; 5) a typological corpus dominated by denticulates. But within the phases K to F, we are inclined to sub-categorize the following trends:

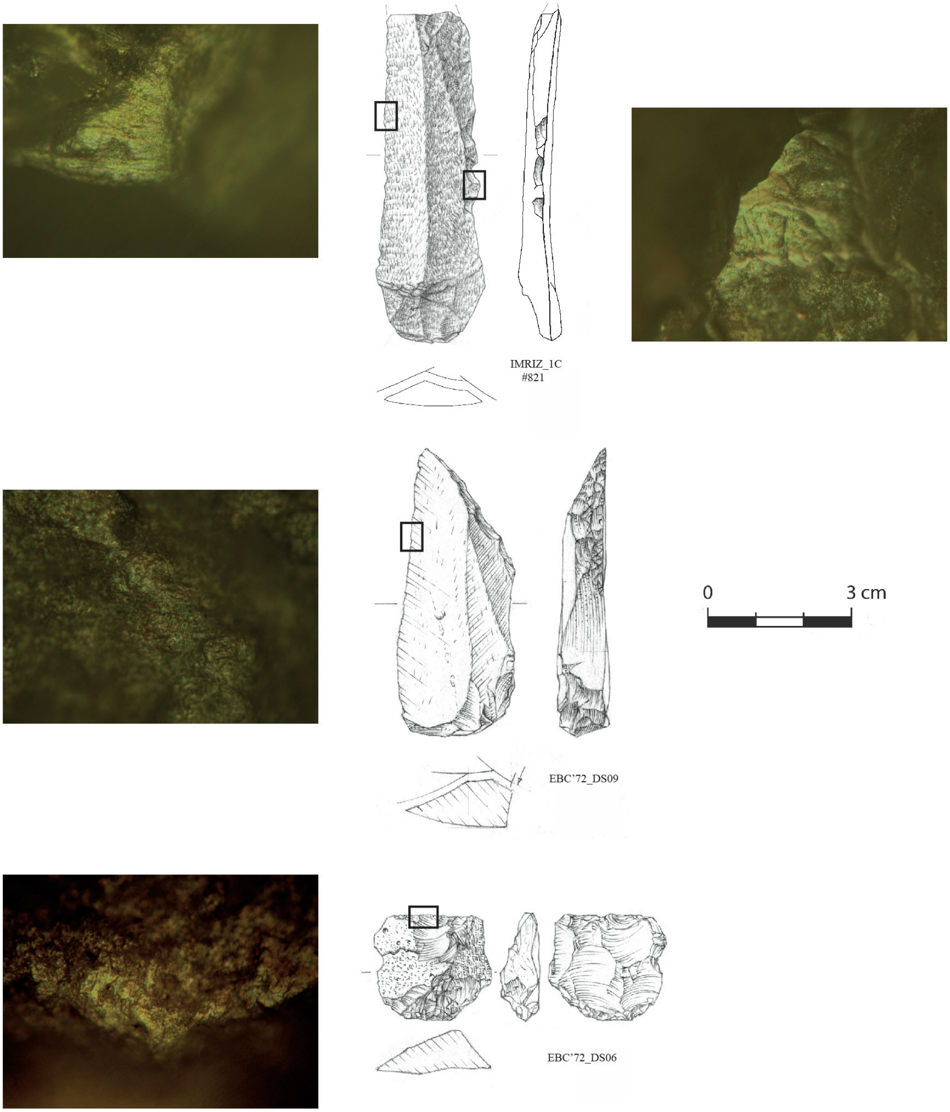

Fig. 9. MSA artefacts of Elands Bay Cave with microscopic use-wear traces. #821 (quartzite) left: rounded edge with parallel striation probably related to insertion of the blade in a handle (hafting), right: wood scraping polish. #DS09 (CCS) polish characteristic of use for soft material (animal) cutting. #DS06 (CCS) *pièce esquillée* with a polish showing contact with hard materials (magnification 200×, drawings by M. Grenet).

The phase K can be distinguished on the presence of a stronger emphasis on discoidal reduction, as well as on the presence of regular blades and a greater selection of the local quartzite. Typologically, the phase K includes the sole unifacial point that has been found so far at EBC. This phase finds echo in other post-HP assemblages, such as Klein Kliphuis (Mackay 2010) and Border Cave (Beaumont et al. 1978; Villa et al. 2012) from South Africa as well as Ha Soloja,

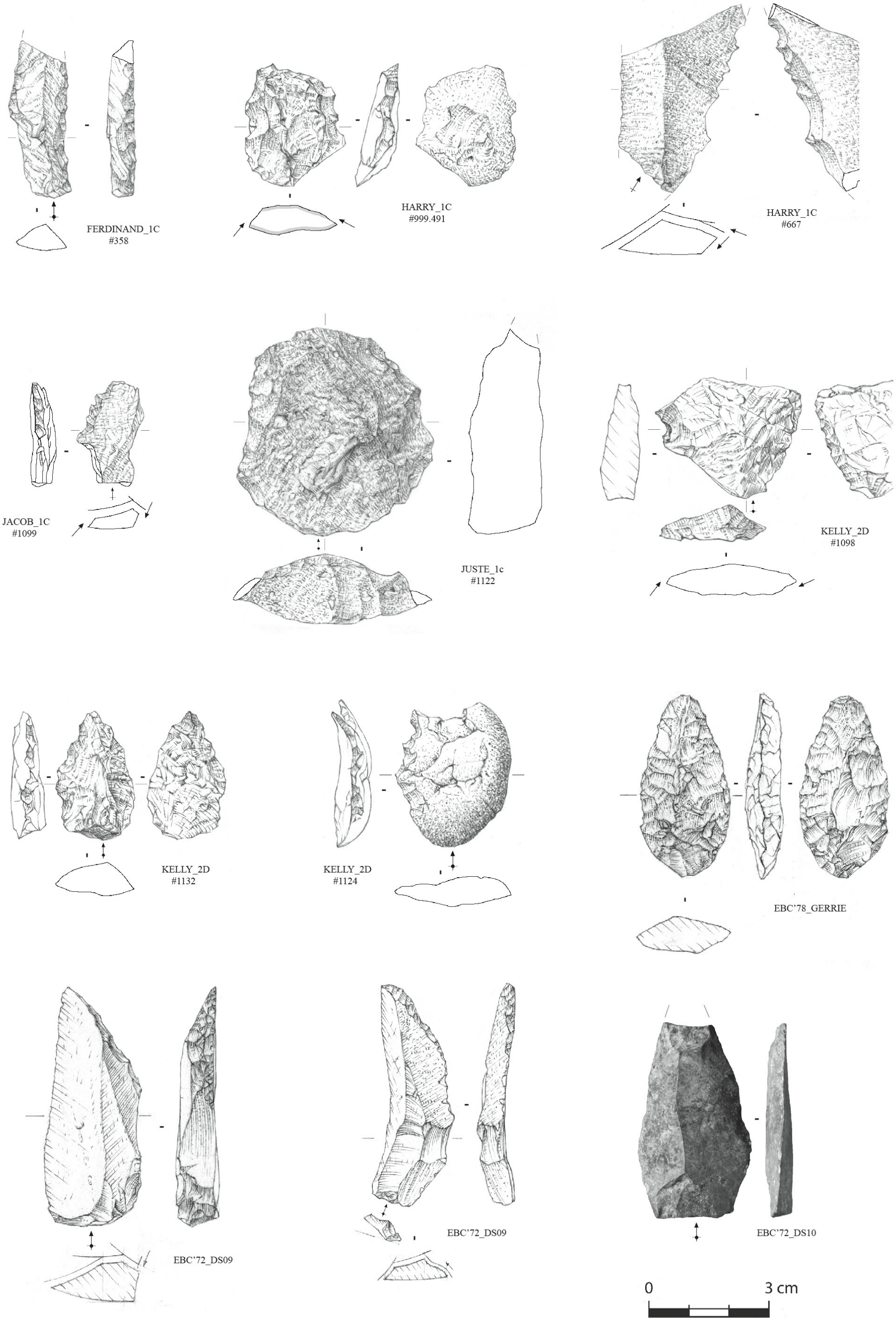

Fig. 10. Formal tools from the MSA and ELSA of Elands Bay Cave (drawings by M. Grenet).

Lesotho (Carter & Vogel 1974; Mitchell & Steinberg 1992), though the presence of a discoidal reduction sequence has so far not been reported in the literature. The only exception are some post-HP layers from Sibudu (Porraz pers. observation; Conard & Will 2015), which suggests to us that this actually might be a more widespread technology than presently assumed. The discoidal reduction sequence contributes to clarify the technological identity of the industries informally called 'post-HP' (Conard et al. 2012).

The phase J–I is characterized typologically by a certain diversity, as expressed by the presence of bifacial pieces and 'truncated knives'. Another element that characterizes the phase I—J is the drop observed in discoidal reduction while regular blades are still present. Its mean OSL ages is 36 ± 3 (SUs Imriz/Ibis), its mean TL age is 30 ± 4 (SU Furb), while a C14 date from the upper part gives an age of ca. 39–37 ka cal BP.

This phase resembles other MIS 3 lithic assemblages such as Klein Kliphuis (Mackay 2010) and Pugtslaagte 8 (Mackay et al. 2015; Law & Mackay 2016) from the West Coast, though bifacial pieces and truncated blades have so far not been noticed. But the occurrence of a bifacial technology in the MIS 3 of EBC is not an isolated case in southern Africa; we may for example refer to Sibudu where bifacial pieces are documented together with hollow-based points at ca. 39–35 ka BP (Wadley 2005).

The phase H–F is largely dominated by bipolar-on-anvil flaking, oriented towards the production of small flakes and bladelets, and documents a low degree of preparation of the production. The typological corpus only represents denticulates. The C14 dating brackets a time period between ca. 24 and 22 ka cal BP. This phase can be considered as part of the suite of ELSA technologies.

The Robberg

The third phase represents Robberg occupations (Porraz et al. 2016 this issue). This phase, strictly associated with D, dates back to 19 398–18 790 ka cal. BP. It corresponds to depositional units Kallie and Spinks from the 1978 excavation and to the depositional unit DS05 of 1972. However, our comparisons between these collections show differences (notably in terms of the flake component) that we interpret as a consequence of mixing with the underlying units due to the poor stratigraphic integrity of the area excavated in the 1970s. We therefore do not integrate the 1970s collections in the present summary.

Our 2011 lithic assemblage groups together 175 artefacts > 20mm (Table 3). It is predominantly made from quartz and silcrete (Table 2). For silcrete, evidence of heat treatment, post-heating removal scars or heat-induced-non-conchoidal fractures, are common. The lithic assemblage suggests that non-local rocks were introduced in various forms (end-products and cores) and that only short sequences of production took place in the shelter.

The lithic assemblage is dominated by microlithic products (Fig. 11), i.e. bladelets and bladelet cores with a length smaller than 25 mm. The Robberg is characterized by bladelets of various morphologies, coming from different reduction sequences that have the use of single platform cores and the association of direct marginal soft stone

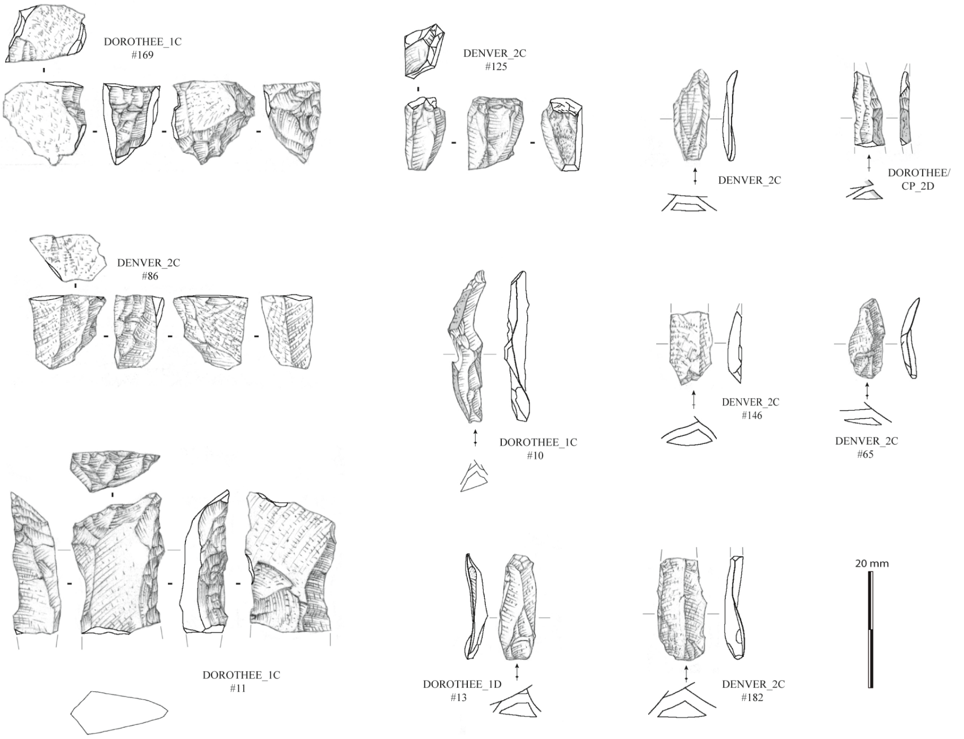

Fig. 11. Lithic artefacts from the earliest Robberg at Elands Bay Cave (drawings by M. Grenet).

hammer percussion with anvil/bipolar percussion in common. A few blades have been found but they remain rare and flakes are mostly associated with the local quartzite. The typological corpus of this Robberg D phase is represented by three pieces, composed of two modified bladelets with a shallow retouch and one retouched silcrete flake, as well as two denticulates.

EBC AND THE MSA TO LSA SUCCESSION IN SOUTHERN AFRICA

Our 2011 excavation allowed a refining of the stratigraphy of the MIS 3 and MIS 2 deposits at EBC as well as the nature of their occupations, in terms of technology, succession and chronology. Of importance and worth discussion is the appearance and definition of the so-called ELSA in southern Africa. The ELSA was first introduced by Beaumont and Vogel (1972) based on their discoveries at the site of Border Cave (BC), with the oldest ELSA layer dated to a time period between 44 and 43 ka cal BP. More recently, two papers (d'Errico et al. 2012; Villa et al. 2012) have confirmed the antiquity of these discoveries as well as clarified their nature. From about 40 000 years ago at BC, ELSA inhabitants were working and engraving bones, using OES, marine pendants and bored stones as well as mixing compound adhesives—all proxies that the authors (d'Errico et al. 2012) associate with earliest San practices (see Mitchell 2012; Pargeter 2014 for discussion). One important result of their study is the discrepancy between the linear changes observed in lithic technology and the abrupt (re)appearance of bone technologies and symbolic proxies that suggest to them the beginning of the LSA in southern Africa.

The ELSA lithic assemblages of BC features a microlithic technology that is based on quartz and bipolar-on-anvil percussion oriented towards the production of small blanks (flakes and bladelets) that were used unretouched. Additionally, the authors note the presence of free-hand hard hammer percussion associated with the production of unstandardized flakes and blades. However, the observations that have so far been published in the literature (see Kaplan 1989; Deacon 1995; Mitchell 2002; Lombard et al. 2012; Ossendorf 2013; Mackay et al. 2015) display an ELSA characterized by a greater technological diversity with lithic assemblages said to be microlithic or not, based on prepared or unprepared cores and with various formal tools (e.g. scrapers, backed pieces etc.), or none. It is worth remembering that these reflect different analytical approaches and have been extracted from different archaeological contexts (stratigraphy and dating), both of which may contribute to an explanation of the poorly resolved picture presently associated with the nature of lithic technologies at the end of the MIS3 in southern Africa.

At EBC, the phase F is dated to 24–22 ka cal BP, a time period conventionally associated with the ELSA (see Lombard et al. 2012). The ELSA at EBC typifies an expedient microlithic technology characterized by (1) the use of local raw materials, predominantly quartz; (2) the application of bipolar-on-anvil and free-hand percussions; (3) the reduction of unprepared cores oriented towards the production of small flakes and bladelets; (4) the virtual absence of formal tools (low diversity and low frequency). This set of observations suggests some similarities between the ELSA technology of EBC and the one of BC, although these two assemblages are separated in time by more than 15 000 years.

The sequence of EBC includes several discontinuities. However, we are inclined to notice some technological continuity from the MSA to the ELSA, reflected notably by the nature of the raw material provisioning strategies as well as a common use of bipolar-on-anvil percussion. The main change from the MSA to the ELSA relates to the impoverishment in formal tools and the increasing importance of bipolar-on-anvil technologies concomitant with the disappearance of prepared core technologies.

Within the sequence of EBC, the main technological change we recognize occurs between the F phase and the D phase, in other words between the ELSA and the first Robberg occupations. This technological discontinuity is illustrated by a change in the raw material provisioning strategies (Table 2) together with a change in the main techno-typological attributes (Table 3). While non-local rocks are a minor component in the ELSA, silcrete reaches up to ca. 50 % of the raw materials spectrum within the first Robberg SU. In addition, we observe new reduction sequences that are based on single platforms cores oriented towards the production of regular bladelets (Porraz et al. 2016 this issue).

Bladelets occur during the ELSA at EBC and can actually be subdivided into two main populations. The first and larger population represents quartz bladelets with a low degree of regularity, mainly produced by bipolar-on-anvil percussion. The second population of bladelets is represented by three silcrete pieces (2 bladelets, one core). But we question the association of these three elements with the ELSA due to 1) their very low number, 2) their similarities with the overlying Robberg and 3) their difference with regard to other ELSA lithic artefacts. One bladelet comes from the SU Fael, which is immediately below the Robberg SU Dorothee; the other one originates from the SU Furb; the bladelet core comes from the top of the SU France (*décapage* France 1), in the square 2D, which is an area where the stratigraphy starts to be destroyed by secondary gypsum formation. Based on our present set of data and observations, we reject the existence of a silcrete bladelet component in association with the ELSA at EBC and favor the hypothesis of contamination from the overlying deposits.

The ELSA and the Robberg of EBC have in common the microlithic technology, the use of bipolar-on-anvil percussion technique and the manufacture of denticulates. However, the ELSA and the Robberg differ radically with regard to their raw material provisioning strategies and the nature of their reduction sequences. While the succession between the ELSA and the Robberg is abrupt at EBC, the existence of a hiatus estimated to ca. 2 000 years between these two phases does not allow further elaboration on the nature of this succession. However, the observations from EBC suggest to us that this change might have been 'rapid' at a regional scale.

In the present discussion, our aim was to provide a well-controlled case study of the technological changes experienced by southern African societies from MIS 3 to MIS 2. We have avoided some epistemological questions and tried to stay distant from a clear-cut compartmentalization between the MSA and the LSA (Parkington 1990; Mitchell 2008), focusing more on the observations and the processes of change they document.

The present set of information available for South Africa indicates some technological fragmentation at the end of MIS 3 and the beginning of MIS 2. This is suggested, first, by the chronology of the ELSA occupations at BC. While an ELSA technology developed on the edge of the Highveld area ca. 40 000 years ago, MSA technologies persisted much longer in time until ca. 25 ka BP in the Western Cape, some 2000 km westward. Interestingly, MSA technologies vanished and transformed in a similar way as the one described at BC, i.e. towards more miniaturization and less predetermination (but see Mackay et al. 2015). This technological fragmentation during MIS 3 might reflect a process of regionalization, maybe in relation with the arrival of new populations as suggested by d'Errico et al. (2012). The miniaturization that concurs with the definition of the ELSA finds its full expression within the Robberg, a pan-southern African tradition that appears more or less around 23–22 ka cal BP in a scenario that still needs to be understood (slow and gradual, rapid and gradual or abrupt?). The reinvestigation of further key sites such as Heuningneskrans, Rose Cottage, Sehonhong and Boomplaas will likely contribute to a clarification of the MSA to LSA succession in southern Africa (e.g. Beaumont 1981; Deacon 1995; Mitchell 1994; Clark 1997).

DIEPKLOOF AND ELANDS BAY CAVE IN THE VERLORENVLEI CATCHMENT

The Verlorenvlei currently represents 10 km^2 of a coastal and marshy lake, obstructed by a quartzitic sill. Unlike the left side of the bank where the hill of the TMG formation dominates, the right side of the river is characterized by a more sandy landscape with small isolated kopjes. It defines an area rich in resources due to the multiplicity of geological formations and ecological influences. The catchment represents a natural west-east axis of circulation allowing one to bypass the Piketberg Mountains located to the south and it is located at about 50 km from the Olifants River that follows the Cederberg Mountains.

While many open air and sheltered Holocene sites have been recorded in the Verlorenvlei catchment, only DRS and EBC presently document occupations from the Late Pleistocene and earlier. We began the present project at EBC within the framework of the excavation carried out at DRS. It was part of a research perspective aiming to characterize the Pleistocene Stone Age of the Verlorenvlei area.

These two sites, at a distance of 14 km from each other, are two rock shelters located on the left side of the coastal lake. DRS is a large rock shelter, about 25 m wide and 20 m long, providing about 200 m² of protected space. It is located ca. 120 m above the Verlorenvlei and opens towards the east, with good views on the lake and the rocky hills that emerge from the sandy landscape. It is located at the end of the natural lake, about 14 km from the present shoreline. Excavations exposed a ca. 3 m deep sequence recording MSA occupations overlain by shallow Holocene deposits. The MSA sequence, which has not been completely explored yet, starts with occupations dated to MIS 5 and lasts until MIS 4 (Tribolo et al. 2013). There is an ongoing controversy on the luminescence age of the deposits (Jacobs et al. 2008; Tribolo et al. 2013; Jacobs & Roberts 2015), but both teams agree that the MSA occupations of the shelter are not recorded after ca. 45 ka BP.

EBC is a shelter that provides about 150 m² of protected space. It is located on the modern shoreline ca. 42 m a.s.l. a kilometer or so from the current mouth of the Verlorenvlei. It opens west and faces the Atlantic Ocean and its coast. The excavations exposed a ca. 3 m deep sequence recording MSA and LSA occupations, with shallow deposits at the base that started forming at ca. 230 ka BP and the main sequence accumulating from MIS 3 onwards (Tribolo et al. 2016 this issue).

While these two sites are located near to each other and in a similar environment, excavations document different occupational sequences. The sequence of DRS is concentrated on MIS 5 and MIS 4, while the sequence of EBC, with some shallow pre-MIS 5 deposits at its base, mostly accumulated from MIS 3 onward. This first comparison between the two well-controlled stratigraphic sequences may suggest that these two sites were not inhabited at the same time and eventually that the occupation of one shelter implied the exclusion of the other one. But inhabitants of DRS and EBC were both likely aware of the existence of the other shelter. We have evidence that DRS inhabitants frequented the shoreline (and most likely the EBC area), as depicted by the marine resources that were brought back to the site (Steele & Klein 2013). Concomitantly, we have evidence that EBC inhabitants frequented the inland area, as silcrete artefacts macroscopically similar to the raw materials from Redelinghuys have been found in the lithic assemblages. The exploitation of the Redelinghuys silcrete outcrop, located on the left side of the Verlorenvlei about 20 km eastward of the present shoreline, indicates that EBC people had to pass by DRS.

Various reasons, not exclusive of one another, may explain why the records from DRS and EBC differ so radically. These reasons might relate to changes in the settlement systems of the populations and/or in their subsistence strategies, to climatic factors as well as to differences in the way inhabitants of the Verlorenvlei culturally perceived this living area. Consequently, there might be different scenarios explaining why DRS and EBC do not record similar occupational events. But the null hypothesis is to interrogate the site formation processes. Are there any observations that support the hypothesis that these two sites might have recorded similar occupations that would have been later erased by post-depositional agents?

At DRS, the micromorphological study done by Miller et al. (2013) indicates a fairly continuous depositional sequence. There is no evidence in the studied sequence for major phases of erosion or significant hiatuses in deposition, although trampled surfaces have been identified which are suggestive of minor discontinuities. However, the overall archaeological record (Porraz, Texier et al. 2013, Parkington et al. 2013) is consistent with the study of Miller et al. (2013) and supports a fairly continuous record. Thus, the main question unresolved—besides the lower deposits that remain unexcavated—concerns the post-MIS 4 deposits. At DRS, the deposits on top of the MSA take the form of shallow LSA bedding and a few pits that date to about 2 ka BP (Parkington & Poggenpoel 1987). This suggests a major hiatus (in sedimentation and possibly occupation) of more than 50 000 years, which, if reflecting an absence of occupation, would be enigmatic considering the prominent place of Diepkloof in the landscape as well as the set of evidence that testifies to a local presence during that time period.

Although the sequence at DRS suggests more or less continuous sedimentation until ca. 45 ka, at EBC, the situation is clearly different (Miller et al. 2016 this issue). In contrast to DRS, the site is largely exposed to atmospheric elements that have favoured the formation of secondary minerals and contributed to the disturbance of the stratigraphy in some areas. The shelter itself is formed by tabular joints favoring the circulation of water that is still active today. With regard to the question of continuities and discontinuities, the micromorphological study indicates a sharp and clear contact between SU Keva, associated with EMSA occupations, and the SUs Kelly/Kent which reflect post-HP occupations. In this context, deposits contemporaneous to those from DRS might have existed at EBC, but subsequent post-depositional agents including erosion likely would have removed them. Maybe DRS inhabitants occupied the shelter of EBC too, but the deposits recording their visits have been subsequently eroded, making it difficult to construct a narrative on how these two sites complemented one another during MIS 5 and MIS 4. Regardless of whether we have the full picture of human occupation in the Verlorenvlei or not, we are still left with the question of why was EBC favoured by hunter-gatherers in MIS 3 and onwards?

This comparison between DRS and EBC first aims at emphasizing the richness and importance of the archaeological heritage of the Verlorenvlei area. We recognize that our narrative requires integrating more sources of information: firstly the archaeological data from the landscape (Mackay 2016 this issue), secondly the palaeoenvironmental data from the riverine and sea coring. However, we regard this discussion as a first attempt to build and explain a local scenario before trying to integrate a large set of archaeological data from a regional to a macro-regional and sub-continental scale. DRS and EBC are two important landmarks in the Verlorenvlei area. Why these two sites present such different occupational records surely relates to the geological factors that have contributed to erase the past, as well as to the environmental settings that have changed through time and that have impacted the subsistence strategies of population. But, we finally have to acknowledge that a territory is also a cultural representation that belongs to a memory and the set of symbols defining the living world of the populations.

The temporary depopulation of an area and/or the replacement of a population might introduce major breaks in cultural transmission and territorial representation. Such mechanisms could be one alternative factor explaining changes in living places within the Verlorenvlei catchment.

By introducing and discussing the Verlorenvlei Stone Age, our intention was to provide an additional piece in the chrono-cultural puzzle of the Late Pleistocene Stone Age of South Africa. We also take a strong stand for continuing efforts to revisit and revise sites that have been previously excavated. As we believe the work presented in this special volume shows, this approach allows us to not only study and secure these important stratigraphic sections, but it also provides new insights into the sites' formation histories, their chronologies, and the lifeways and technological know-how of their Pleistocene inhabitants.

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TABLE 1
Density of lithic artefacts at Elands Bay Cave based on the 2011 excavation.

	Total Lithics > 20mm (N)	Excavated volume (L)	Density Lithics/L
Delport	34	unknown	unknown
Dennis	13	unknown	unknown
Denver	71	20	3,5
Dorothee	57	12	4,5
Fael	24	8	3
Fannie	15	29	0,5
Farik	13	3	4,5
Fatim	18	21	1
Felice	22	7	3
Ferdinand	10	4	2,5
Flavie	6	6	1
France	133	40	3,5
Frida	25	6	4
Fro	30	6	5
Furb	58	22	2,5
Fuzy	71	27	2,5
Harry/Ha	20	10	2
Hazel	24	16	1,5
Henri	70	54	1,5
Ian/I	8	6	1
Ibis	31	39	1
Igor	34	55	0,5
Imran/Ilian	30	49	0,5
Imriz	14	27	0,5
Ines	22	25	1
Jacob	125	43	3
Juste	112	41	2,5
Kali/Kamoa	60	32	2
Kelly	23	16	1,5
Kent	30	16	2
Keva	615	54	11,5
Lara	274	62	4,5
Liam/Letty	500	50	10
TOTAL	2592	-	-

TABLE 2
Classification (%) per raw material of the 2011 lithic collection from Elands Bay Cave.

		Coarse-grained quartzite	**Quartz**	**Silcrete (N heated)**	**Fine-grained quartzite**	**Hornfels**	**CCS**	**Others**	**Total % (N)**
Robberg	**Delport/Dennis**	23	49	28 (7)	0	0	0	0	**100 % (47)**
	Denver	8	46	41 (18)	3	0	2	0	**100 % (71)**
	Dorothee	5	43	49 (15)	0	0	3	0	**100 % (57)**
ELSA	**Fael/Fannie**	10	72	10	5	0	3	0	**100 % (39)**
	Farik/Fatim	22	72	3 (1)	3	0	0	0	**100 % (31)**
	Felice/Ferdinand	7	87	3 (1)	3	0	0	0	**100 % (32)**
	Flavie/France	13	80	4 (1)	1	0	1	1	**100 % (139)**
	Frida/Fro	13	73	2 (1)	4	5	3	0	**100 % (55)**
	Furb	15	78	5	2	0	0	0	**100 % (58)**
	Fuzy	12	72	11 (3)	1	4	0	0	**100 % (67)**
	Harry/Hazel	8	70	11 (1)	9	0	2	0	**100 % (44)**
	Henri	20	67	6 (2)	6	1	0	0	**100 % (70)**

TABLE 2 (*continued*)
Classification (%) per raw material of the 2011 lithic collection from Elands Bay Cave.

		Coarse-grained quartzite	**Quartz**	**Silcrete (N heated)**	**Fine-grained quartzite**	**Hornfels**	**CCS**	**Others**	**Total % (N)**
Late MSA J–I	**Ian/Ibis**	13	79	5 (1)	3	0	0	0	**100 % (39)**
	Igor	0	97	3	0	0	0	0	**100 % (34)**
	Imran/Ilian	7	83	0	7	3	0	0	**100 % (30)**
	Imriz/Ines	14	83	0	3	0	0	0	**100 % (36)**
	Jacob	7	84	6 (3)	2	0	1	0	**100 % (125)**
	Juste	7	82	8 (7)	3	0	0	0	**100 % (112)**
MSA K	**Kali/Kamoa**	23	55	12	10	0	0	0	**100 % (60)**
	Kelly/Kent	41	45	6	4	0	2	2	**100 % (53)**
EMSA	**Keva**	98	0,5	0,5	0,5	0	0,5	0	**100 % (615)**
	Lara	99	1	0	0	0	0	0	**100 % (274)**
	Liam/Letty	98	1	0,5	0,5	0	0	0	**100 % (500)**

TABLE 3
Technological classification of the 2011 lithic collection from Elands Bay Cave.

		Flakes	**Bipolar flakes**	**Discoid flakes**	**Blades**	**Bladelets**	**Cores**	**Anvil/ Bipolarcores**	**Fragments > 20mm**	**Total % (N)**
Robberg	**Delport/Dennis**	36	6	0	6	23	8	16	5	**100 % (47)**
	Denver	24	7	0	3	42	10	8	6	**100 % (71)**
	Dorothee	12	0	0	7	51	7	12	11	**100 % (57)**
ELSA	**Fael/Fannie**	39	20	0	2	8	0	10	21	**100 % (39)**
	Farik/Fatim	39	19	3	0	6	0	3	30	**100 % (31)**
	Felice/Ferdinand	40	16	0	3	9	0	6	26	**100 % (32)**
	Flavie/France	42	24	1	0	1	1	7	24	**100 % (139)**
	Frida/Fro	27	22	2	0	5	0	14	30	**100 % (55)**
	Furb	41	19	5	2	3	0	5	25	**100 % (58)**
	Fuzy	44	20	1	6	7	1	3	18	**100 % (71)**
	Harry/Hazel	41	7	2	0	4	0	7	39	**100 % (44)**
	Henri	48	11	4	1	6	1	0	29	**100 % (70)**

TABLE 3 (*continued*)
Technological classification of the 2011 lithic collection from Elands Bay Cave.

		Flakes	Bipolar flakes	Discoid flakes	Blades	Bladelets	Cores	Anvil/ Bipolarcores	Fragments > 20mm	Total % (N)
Late MSA J–I	**Ian/Ibis**	36	26	5	0	3	0	5	25	**100 % (39)**
	Igor	29	18	3	9	0	0	12	29	**100 % (34)**
	Imran/Ilian	27	23	7	7	3	3	13	17	**100 % (30)**
	Imriz/Ines	44	17	3	5	3	3	11	14	**100 % (36)**
	Jacob	41	21	5	5	0	1	3	24	**100 % (125)**
	Juste	41	26	5	5	2	0	4	17	**100 % (112)**
MSA K	**Kali/Kamoa**	50	22	10	8	0	5	0	5	**100 % (60)**
	Kelly/Kent	53	15	15	6	0	4	0	7	**100 % (53)**
EMSA	**Keva**	76	2	8	3	0	5	0	6	**100 % (615)**
	Lara	78	3	9	2	0	6	0	2	**100 % (274)**
	Liam/Letty	36	1	4	1	0	2	0	56	**100 % (500)**

TABLE 4

Typological classification of the 2011 lithic collection from Elands Bay Cave.

		Denticulates/ notches	Scrapers	Convergent scrapers	Bifacial pieces	Retouched bladelets	Fragments / others	Total (N)
Robberg	**Delport/Dennis**	1	0	0	0	0	0	1
	Denver	1	0	0	0	3	0	4
	Dorothee	0	1	1	0	2	0	4
ELSA	**Fael/Fannie**	1	0	0	0	0	0	1
	Farik/Fatim	0	0	0	0	0	0	0
	Felice/Ferdinand	1	0	0	0	0	0	1
	Flavie/France	2	2	0	0	0	0	4
	Frida/Fro	1	1	0	0	0	0	2
	Furb	1	0	0	0	0	0	1
	Fuzy	2	0	1	0	0	0	3
	Harry/Hazel	2	1	0	0	0	0	3
	Henri	1	1	0	0	0	0	2
Late MSA J–I	**Ian/Ibis**	0	0	0	0	0	0	0
	Igor	0	0	0	0	0	0	0
	Imran/Ilian	1	0	0	0	0	0	1
	Imriz/Ines	0	0	0	0	0	0	0
	Jacob	2	1	0	1	0	0	4
	Juste	3	2	0	0	0	0	5
MSA K	**Kali/Kamoa**	2	0	0	0	0	0	2
	Kelly/Kent	6	0	0	0	0	0	6
EMSA	**Keva**	4	1	0	0	0	0	5
	Lara	2	3	0	0	0	1	6
	Liam/Letty	0	1	0	0	0	0	1