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DIE KELDERS CAVE 1 Klipgat Archeological Cave

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Introduction

In 1798, when Lady Anne Barnard visited the "Drup Kelder" at what is now the coastal village of Die Kelders, by candle-light, she was shown a coastal cavern in which were running water and impressive stalagmites and stalactites, which were being exploited for lime by the local farmer. Located under the Die Kelders Hotel, the stream that gushes from within this cavern system now provides the water supply for the village. There are other caves in the Pliocene limestone cliffs and one, a kilometer along the coast is the archaeological site Die Kelders Cave 1 (Klipgat). This is a more open cave complex facing a small cove in the Walker Bay Nature Reserve, some 180km south-east of Cape Town by road. Although during her stay at Die Kelders, Lady Ann Barnard was not shown this cave, people have visited and lived in the cave for at least 70 000 years.

The coast of this region is rich in archaeological sites, including open shell middens, tidal fish traps and the inland cave, Byneskranskopl (Avery, 1975, 1976; Schweitzer and Wilson, 1982)

Die Kelders Cave 1 was located by Jalmar Rudner who had an interest in shell middens and the occurrence of pottery along the Cape Coast (Rudner, 1968). The excavation of the site became the focus of a project initiated in 1969 by Frank Schweitzer of the South African Museum (Schweitzer, 1979; Grine et al, 1991). At roughly this time a series of new projects on coastal archaeology were being established (e.g. Parkington, et al, 1988; Wilson, 1993).

Schweitzer excavated a deep sounding dug below an Aeolian dune complex and through a series of rock falls and established that there was a long Middle Stone Age sequence preserved between the Later Stone Age layers and a cobble beach on bedrock. The sounding showed that the site preserved bone in association with artefacts and Philip Rightmire of the State University of New York at Binghamton was able to identify human remains in the bone samples.

In 1992, a project, funded by the USA National Science Foundation, was initiated to extend the original excavation. The aim was to enlarge the artifact and bone samples and to use new methods to date the deposits ore accurately. It was anticipated that more remains of anatomically modem humans would be found and additional information gained on the environmental and behavioral context in which these remains occurred. This project was led by a team comprising Fred Grine and Curtis Marean of the State University of New York at Stony Brook, Richard Klein of Stanford University and Graham Avery of the South African Museum. A number of other international and South African specialists also joined the team: Kathryn Cruz-Uribe of Northern Arizona University; Paul Goldberg now of Boston University; Henry Schwarcz of McMaster University; Margaret Avery and Michael Wilson of the South African Museum; and Anne Thackeray, affiliated to the University of the Witwatersrand. Additional field assistance was provided by students from the United States, South Africa and Germany. Local people from Gansbaai and Die Kelders were employed to wash and sort excavated material. Contributors' results from the first two seasons are published in Avery et al, (1997). A further and final season, in 1995, focused on enlarging the area of Middle Stone Age sediments excavated in 1993.

The cave was originally a subterranean solution cavity, like the Cango Caves, that formed in Bredasdorp Formation limestone deposited as dunes on underlying Table Mountain Series sandstone during the Pliocene. Much later, a rising sea level cut an opening into this and the underlying sandstone. The remnants form the roof and sides of the present Die Kelders Caves 1 & 2. The intertidal and 'storm beach' boulders below the cave extend into the cave at a depth of some 5 m below the top of the archaeological deposits. Sediments of Aeolian origin built up and include a series of Middle Stone Age occupations over 2,5 m in depth, overlain by a dune, which cut the cave off from human occupation for over 40 000 years. Thereafter, from 2 000 to 1 500 years ago 1,5 m of shell middens accumulated, after which the cave seems to have been abandoned.

The South African Museum houses the Die Kelders Cave1 collections.

The excavations

In his excavations of the Later Stone Age shell middens, Schweitzer became the first to establish that Later Stone Age sheep-keeping Khoekhoen pastoralists were living in the western Cape 1 600 to 2 000 years ago. He also discovered some 2 000-year-old pieces of pots that they or their San hunter-gatherer antecedents had discarded amongst the stone and bone artifacts, ornaments and shellfish, fish and other food remains, discarded at their cave campsite. Domesticated dogs and cattle may also have been present by this time, but material is too fragmentary to be sure. Underlying the shell middens, and an Aeolian dune complex, Schweitzer uncovered the artifacts, well-preserved fauna and some human teeth left there some 40 000 to 80 000 years ago by Middle Stone Age early-modem or near-modern people (Tankard and Schweitzer, 1974). Study of the antelope and other mammal and bird bones has yielded information about past human behavior (Klein, 1975; Grine et al, 1991; Avery, 1990; Table 1).
Together with the bones of thousands of mice, shrews and bats left over the millennia by barn owls that roosted in the cave between human occupations, they also provide us with information about the changing climates, vegetation and sea levels (Avery, D. M, 1982). The Middle Stone Age coast in Walker Bay was at least 3 km distant and there were wetter and drier periods during which there were substantial changes in vegetation and different plant foods were available.

The latest series of excavations have recovered new information about the site and its people. The stone technology and ESR dates suggested that the cave was occupied, during the MSA2 technological stage, about 60 000 to 85 000 years ago, and raised questions as to why the Howieson's Poort industry, which elsewhere overlaps this period, is absent. In addition to the thousands of stone artifacts and animal bones recovered, remains of fireplaces, ash dumps and burnt marine shells, which were not identified during the Schweitzer excavation, were recovered. Additional human teeth, a phalange and a small fragment of the jaw of a 5-year-old child have since been recovered (Avery, et al, 1997; Table 1).

Stratigraphy

Schweitzer established a sequence of 12 Later Stone Age and 17 Middle Stone Age sub-units (Schweitzer, 1979; Grine et al, 1991), each group being numbered consecutively from 1. These have been confirmed and subdivided during the recent excavations. (Avery, et al, 1997). The Later Stone Age units are predominantly of marine mollusks with a matrix of quartz tic sand and ash, which forms a substantial component of some.

The Later Stone Age deposits are separated from the Middle Stone Age sediments by a substantial layer of Aeolian sand that could represent a period of almost 60 000 years, based on more recent dating evidence, during which the site was inaccessible to people.

Within the Pre-Middle Stone Age unit 2, deposition took place in standing water, although it is not clear whether such a phenomenon was localized to the cave or signals a more general climatic condition (Goldberg in Avery et al, 1997). Parts of the uppermost Middle Stone Age sediments have been phosphatized, guano being the probable source. The Middle Stone Age deposits are primarily Aeolian in character, with periods during which fallen roof material made substantial contributions to the sedimentary bulk. Layer 6 is an example. In addition, there were at least four occasions of major roof collapse when portions of the cave floor were covered by blocks of considerable area and thickness. Tankard and Schweitzer (1974) suggested that at least one of these resulted from a cataclysmic earthquake, but this must be considered equivocal, given that this period is associated with significant environmental change.

The existence of semi-sterile sandy units between and/or within the layers made sub-division of Schweitzer's units possible and they provided spatial markers as the excavation was extended laterally and vertically. Some of the ephemeral sandy units became clearer as the excavation extended to the west and layers leveled out. It has become evident from microscopic and other study that most of the so-called sterile units include ephemeral human debris.

Decalcification, from ground water movement over the 'acidic' Table Mountain Sandstone bedrock, has caused significant reduction of volumes and sometimes, sub-vertical 'draping' of sediments, which were otherwise undisturbed. This process is often visible in section, where clasts of cave roof are surrounded by 'ghosts' of decalcified limestone. This process undoubtedly also caused the removal of organic material, such as wood and grass bedding and, in particular, substantial volumes of shell, probably from shell middens, but had a lesser effect on the bones, which are relatively well-preserved.

Chronology

Radiocarbon dating of the Later Stone Age shell middens places their deposition between 2 000 and 1 500 years ago. (Schweitzer, 1979). Tankard and Schweitzer (1974) estimated that the Die Kelders MSA accumulated between 80 000 and 40 000 years ago when the cave was closed to human use by the formation of a dune against the opening. Initial ESR results from Layers 4/5 and Upper 6 samples sent to H. Schwarcz suggest that this portion of the sequence was laid down between 80 000 and 60 000 years ago (Avery et al, 1997). This is a critical issue, since A.I. Thackeray (pers. com.) now believes that, on the basis of the extended samples from 1993 to 1995, there is no substantive evidence for the Howieson's Poort at DK1. This suggests that the DKI MSA should fall before or after the generally accepted dates for the Howieson's Poort in other sites of around 75 000 years ago (Thackeray, 1992). Whether deposits from before and/or after the Howieson's Poort are present cannot be established without further dates. Samples taken by J. Feathers, University of Washington, for luminescence dating may throw light on this and indicate the full chronological extent of the DK1 Middle Stone Age. His preliminary results, from five sandy units, are in general accordance with those from ESR (Feathers and Bush, in prep.). He suggests, however, a period of rapid accumulation (not impossibly as short as 10 000 years) for the overall DK1 Middle Stone Age, with the results so far suggesting that the Die Kelders Middle Stone Age sequence could post-date the Howieson's Poort, which appears to have ended by about 75 000 years ago. This would be consistent with the early part of the Last Glacial (isotope stage 4). The Stillbay industry at Blombos Cave appears to pre-date the Howieson's Poort Industry (Henshilwood & Sealy, 1997). This industry is absent at DK1 and the dating at Blombos will be crucial to our understanding of the nature and chronology of MSA Industries in the Western Cape Province and the rest of southern Africa.

Cultural material

The Later Stone Age cultural material is rich in bone artifacts (awls, points, 'needle' points, link-shafts and spatulas) and ornaments of marine shell, ostrich egg shell and bone (mostly beads and pendants. Stone artifacts are generally simple and based on quartzite cobbles and quartz readily available on the coast. Formal tools account for 1% of the assemblage. Large numbers of grindstones and red and black pigment occur throughout. Marine mussels were chipped to form effective scrapers. The occurrence of ochre staining on many of the ornaments indicates its use in body ornamentation. The Die Kelders samples provided the earliest occurrence of ceramics in the western Cape, with finely made and decorated spouted pots being present. Bowls made from tortoise carapace, including one of a geometric tortoise that must have been transported many kilometers, are relatively common. Ochre was stored or used in shells of tortoises, mussels, limpets and abalone. A complete ostrich egg flask was recovered (Schweitzer, 1979; Avery et al, 1997). The new excavations added only a few shards of pottery to the existing samples.

The presence of sheep raises the issue of the identity of the occupants; which is difficult to resolve, given the social and economic flexibility and technological similarity recorded among KhoeSan people (Wilson, 1996). Hopefully, evidence from other supposed herder or hunter-gatherer sites in the region will throw further light on whether the

Die Kelders Later Stone Age people were pastoralists, hunter-gatherers or a mixture of the two.

While there was a possibility that apparently silcrete-rich units in the upper MSA, with fine bladelets, signaled a Howieson's Poort industry (Thackeray in Avery et al, 1997), this was not sustained as larger samples became available. It has also been possible to rule out Volman's suggestion (Volman, 1981; Grine, et al, 1991) that the presence of Howieson's Poort might be confirmed by larger samples from Layer 12.
Modified stone artifacts from Die Kelders Cave 1 Middle Stone Age (after Volman 1984). Raw materials include silcrete, quartzite and quartz.

Thackeray now believes it to be missing at Die Kelders and that the overall impression is one of minimal change over time. Artifacts were primarily on quartzite, with varying, but relatively very low, proportions of quartz and silcrete. Red ochre occurs as nodules, often with signs of abrasion, and tiny chips and nodules (~3 mm). In addition to a range of larger flakes, very small flakes (~1-2 mm) and chips of quartzite, quarts and silcrete indicate that knapping was taking place in situ. Negligible proportions of flakes are damaged or retouched. No formal bone artifacts were found during the excavation. The industrial affinity(s) of the Middle Stone Age is difficult to establish without further dating and understanding of the variation that is becoming apparent, even between well-documented sites, with long sequences, such as the Klasies River Mouth and Blombos Caves.

Hearths were located throughout the Middle Stone Age sequence, some including fragments of burnt marine mollusk, which had not been recognized previously. Indeed, for most units, small rounded shell fragments (<3 mm) form a significant element of the residue). Clearly mollusks were far more prolific in the site prior to decalcification of the sediments. Mollusks were clearly an important element of the diet in line with Klasies River main site and Blombos Cave, where Middle Stone Age shell middens are better preserved.

Modern Homo sapiens

One of the reasons for extending the Schweitzer excavation was the potential that DK1 would add to our knowledge of the anatomy of the Die Kelders people and anatomically modern people in general. In this we were only partially successful. While the teeth do not demonstrate modernity, they are, nevertheless, consistent with evidence from other sites that anatomically modern people existed in sub-Saharan Africa prior to 60 000 years ago, overlapping chronologically with Neanderthals, who were then the sole inhabitants of Europe (Grine in Avery et al, 1997).

Faunal information

The Later Stone Age occupants of the cave used a wide range of resources readily available to them. Marine resources, primarily mollusks, but including fish, crayfish, seals, whales and dolphins and birds, seem to have provided the major part of the diet. Recently-found seeds and pips confirm the expectation that plant foods would have been of importance, in spite of their limited preservation. While some terrestrial game was probably hunted, emphasis was on small territorial antelope that could have been snared, tortoises, dune mole rats and snakes (Schweitzer, 1979; Avery et al, 1997). Environmental conditions and the suite of species are the same or similar to those existing in historical times.

Evidence from the seals suggests that the Later Stone Age occupations at Die Kelders took place, at least during the August-September period (Klein and Cruz-Uribe, 1989), while that from the birds focuses on October and November, i.e. from late Winter through early Summer (Avery, 1990).

In a study of fragmentation Marean (1998) has shown that the Layer 10 (at least) Die Kelders Middle Stone Age People actively hunted medium and large bovid and processed their bones at the site. A similar conclusion was reached for the Klasies River Mouth people (Milo, 1994, 1998).

A feature of the Middle Stone Age deposits and some of the intervening 'sterile' sandy units is the sometimes dense occurrences of micro mammals originating from barn owl roosts in the cave (D.M.Avery, 1982). Study of these remains provides strong proxy evidence for environmental, particularly vegetation, fluctuations over the period of deposition, which reflect greater or less moisture availability. Improved dating is required to place evidence into the appropriate chronological framework. Be that as it may, existing evidence is still consistent with conditions during fluctuations within the initial stages of the Last Glacial. Birds are present (Table 1) and it is evident that, as at Klasies River Mouth, jackass penguins are more common than flying birds such as gannets and cormorants. This has been interpreted as implying that Middle Stone Age people were less able to take birds that could easily escape (fly) (Klein, 1994), but Avery (1990) has suggested that most of the Die Kelders marine birds were obtained as washed-up carcasses, requiring no particular expertise. No fish remains were found.

A range of antelope and other mammalian species occurs in the MSA deposits and it is notable (Table 1) that there are both similarities and differences with the LSA fauna. The main feature is the occurrence in the Middle Stone Age

deposits of a series of grazers, such as the zebras, two species of buffalo, black wildebeest, southern reedbuck, blue antelope, bontebok, springbuck and large numbers of hares. This suite of species is typical of faunas associated with climatic, substrate and vegetation changes during the Last Glacial. Several were extinct by the Holocene and others, such as the zebras, wildebeest and reedbuck, are unlikely to have been able to have derived sufficient nutrients from the fynbos vegetation that will have existed over the past 10 000 years. Analysis of adult size of small grey mongooses and dune mole rats confirms that the DK1 Middle Stone Age occupation took place under relatively cool, moist conditions (Klein and Cruz-Uribe in Avery et al, 1997).

Unlike during the Later Stone Age, evidence from the Middle Stone Age seals, which cover a wide range of age-classes, suggests that there was no specific seasonal round. Birds indicate a period similar to that in the Later Stone Age, from September to December for Middle Stone Age usage. Most marine birds were scavenged from the beach rather than actively hunted.

Taphonomic evidence suggests that non-human agents may have scavenged the Layer 10 sample after it was acquired and processed by the Die Kelders people (Marean in Avery et al, 1997). The suggestion that the prolific Die Kelders Middle Stone Age dune mole rats were taken by a large owl is as yet unresolved, but evidence from Blombos Cave (Henshilwood, 1997) indicates that Later Stone Age people regularly ate dune mole rats and that this is

indicated by a characteristic burning pattern. This pattern is present in both the LSA and MSA units at Die Kelders Cave and thus signifies the role of people and the antiquity of this practice.

Table 1: Animal Taxa, Excluding Fish and Mollusks, Represented at Die Kelders (DKI) (adapted after Schweitzer, 1979; Avery, 1990; Grine et al, 1991; Avery et al, 1997); * indicates extinct taxa.

Taxon	LSA	MSA
Insectivora (large species only)		
Erinaceus frontalis, hedgehog		X
Primates		
Papio ursinus, chacma baboon	X	X
Homo sapiens sapiens, human	X	X
Lagomorpha		
Lepus capensis, Cape hare	X	X
Lepus saxatilis, scrub hare	X	X
Rodentia (larger species only)		
Bathyergus suillus, dune mole rat	X	X
Georychus cf.. capensis Cape mole rat	X	X
Hystrix africaeaustralis, porcupine	X	X
Cetacea		
Delphinidae, indet., dolphin	X	
cf. Balaenidae, southern right whale	X	
Taxon (contd)	LSA	MSA
Carnivora		
Canis mesomelas, black backed jackal	X	X
Canis familiaris, domestic dog	?	
Ictonyx striatus, striped polecat	X	X
Mellivora capensis, honey badger>	X	X
Genetta sp., genet	X	X
Herpestes pulverulenta, small grey mongoose	X	X
Atilax paludinosus, water mongoose		?
Felis libyca, wildcat	X	X
Felis caracal/serval, caracal/serval	X	X
Panthera pardus, leopard	X	X
Pinnipedia		
Arctocephalus pusillus, Cape fur seal	X	X
Mirounga leonina, elephant seal	X	

Proboscidea		
Loxodonta africana, African elephant	X	
Hyracoidea		
Procavia capensis, hyrax	X	X
Perissodactyla		
Diceros bicornis, black rhinoceros	X	X
*Equus capensis, Cape zebra		X
*Equus quagga, quagga	X	
Artiodactyla		
Potomochoerus porcus, bushpig	X	
Hippopotamus amphibius, hippopotamus	X	X
Taurotragus oryx, eland		X
*Pelorovis antiquus, 'giant' buffalo		X
Syncerus caffer, Cape buffalo	X	X
Bos taurus, cattle	?	
Taxon (contd)	LSA	MSA
Tragelaphus scriptus, bushbuck	X	
Redunca arundinum, southern reedbuck		X
*Hippotragus leucophaeus, blue antelope		X
Alcelaphus buselaphus, red hartebeest	X	
Damaliscus dorcas, bontebok	X	X
Connochaetes gnou, black wildebeest		X
Raphicerus campestris, steenbok	X	
Raphicerus melanotis, grysbok	X	X
Oreotragus oreotragus, klipspringer	X	X
Antidorcas cf. marsupialis, springbuck		X
Ovis aries, sheep	X	
Aves		
Struthio camelus, ostrich	X	X
Spheniscus demersus, jackass penguin	X	X
Diomedea cauta, shy albatross	X	
Diomedea melanophris, blackbrowed albatross	X	
Diomedea chlororhynchos, yellownosed albatross	X	
Macronectes giganteus, giant petrel		X

Daption capense, pintado petrel	X	X
Halobaena caerulea, blue petrel		X
Pachyptila sp., prion	X	X
Calonectris diomedea, Cory's shearwater	X	
Puffinus gravis, great shearwater	X	
Puffinus griseus, sooty shearwater	X	
Procellaria aequinoctialis, whitechinned petrel		X
Morus capensis, Cape gannet	X	X
Phalacrocorax carbo, whitebreasted cormorant	X	X
Phalacrocorax capensis, Cape cormorant	X	X
Phalacrocorax neglectus, bank cormorant	X	
Taxon (contd)	LSA	MSA
Phalacrocorax coronatus/africanus, crowned/reed cormorant	X	X
Threskiornis aethiopicus, sacred ibis		X
Alopochen aegyptiacus, Egyptian goose	X	X
Tadorna cana, South African shelduck	X	X
Anas undulata, yellowbilled duck		X
Netta erythrophthalma, southern pochard	X	
Fulica cristata, redknobbed coot	X	X
cf. Gyps coprotheres, Cape vulture		X
Buteo rufofuscus, jackal buzzard	X	
Falco tinnunculus, common kestrel	X	X
Francolinus capensis, Cape francolin	X	X
Francolinus africanus, greywing francolin		X
cf. Grus carunculatus, wattled crane		X
Charadriidae, indet., wader		X
Larus dominicanus, kelp gull	X	X
Sterna bergii swift tern	X	
Columba guinea, speckled rock pigeon	X	X
Tyto alba, barn owl		X
Bubo africanus, spotted eagle owl	X	X
Corvus albicollis, whitenecked raven	X	X
Onychognathus morio, redwing starling	X	X
Amphibia		

at least one Anuran species	X	?
Reptilia (larger species only)		
Chersine angulata, angulate tortoise	X	X
Pelomedusa subrufa, fresh water turtle	X	?
Psammobates geometricus, geometric tortoise	X	?
Pseudaspis cana, mole snake	X	?
Bitis arietans, puffadder	X	?

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