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## Preliminary report on excavations at Sibudu Cave, KwaZulu-Natal.

by

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### ABSTRACT

Preliminary research at Sibudu shows that the cave contains a palimpsest of Middle Stone Age layers. The upper layers are dated by radiocarbon to between 26 000 and 42 000 b.p.; the deeper layers have been sampled for luminescence dates, but no results are yet available. Bone, charcoal and burnt seeds are well preserved in all layers excavated thus far. Stone tools are abundant in all except the deepest layers of the present excavation. Unifacial and bifacial points are the most common retouched tools, but scrapers, knives and adzes are also present.

### INTRODUCTION

Sibudu Cave is situated on a west-south-west facing cliff above the Tongati River, about 15 km inland of the coast (Fig. 1) at an altitude of approximately 100 m amsl (above mean sea level). The cave was formed by the river lowering its channel and eroding through the sandstone and shale cliff, during a marine regression (Maud *pers. comm.*). Today the cave is perched well above the river, probably because most of the deep incision of KwaZulu-Natal river channels into underlying bedrock (as a response to glacio-eustatic lowering of sea-levels) took place during the Penultimate Glacial about 160 000 to 140 000 b.p. when sea-level was about 100 m below that of today (Maud 2000:169). Further incision would have taken place during the Last Glacial of the late Pleistocene when maximum sea-level was probably as low as -130 m (Ramsay 1995:71).

The cave is approximately 55 m in length and 18 m in width (Fig. 2). Its floor slopes dramatically from north to south; there is a 12 m elevation difference between the northern part of the cave, where the excavation grid has been set up at an elevation of approximately 100 m amsl, and the southern entrance that is nearer to the river. There is no rock art at the site.

The area is well-watered with average summer rainfall of about 750 mm and average winter rainfall of about 250 mm. Summers are humid and hot with mean January temperatures of 22-25°C and mean July temperatures of 17-20°C. The area is on the border of Coastal and Riverine ecozones (Grant & Thomas 1998) and the vegetation is a combination of Coastal Scarp

Forest and Riverine Forest (Low & Rebelo 1998). Low & Rebelo (1998:30) refer to the area as Coastal Bushveld-Grassland (Type 23), a mosaic of vegetation types occurring from just above sea level to about 300 m amsl. Soils are Quaternary aeolian and of marine origin and the vegetation is influenced by salt spray, fire and grazing. The water table also plays a crucial role in defining plant communities on the geologically young substratum. Existing examples of this vegetation are mere remnants; the main causes of its eradication in the Tongaat area have been sugar plantations. The vegetation around the cave has survived because of the rugged cliff, which is not useful to farmers, but sugarcane plantations extend right to the edge of the cliff above the cave. The cave is screened and shaded by forest with a rich diversity of species that include: *Obetia tenax*, *Celtis africana*, *C. mildbraedii*, *Trema orientalis*, *Ficus lutea*, *F. natalensis*, *F. polita*, *F. sur*, *F. glumosa*, *F. ingens*, *Uvaria caffra*, *Cryptocarya woodii*, *Maerua racemulosa*, *Capparis tomentosa*, *Crassula sarmentosa*, *Crotalaria pallida*, *Schotia brachypetala*, *Millettia grandis*, *Vepris lanceolata*, *Teclea gerrardii*, *Zanthoxylum davyii*, *Calodendrum capensis*, *Clausena anisata*, *Commiphora harveyi*, *C. woodii*, *Ptaeroxylon obliquum*, *Trichilia emetica*, *Bridelia micrantha*, *Croton sylvaticus*, *Dalechampia capensis*, *Drypetes arguta*, *Harpephyllum caffrum*, *Protorhus longifolia*, *Rhus chirindensis*, *R. gueinzii*, *R. pentheri*, *Pyrenacantha scandens*, *Cyphostemma hypoleucum*, *Cissus fragilis*, *Rhoicissus digitata*, *R. tomentosa*, *Ochna natalitia*, *Dovyalis rhamnoides*, *Rawsonia lucida*, *Combretum molle*, *C. kraussii*, *Syzygium cordatum*, *Manilkara discolor*, *Mimusops obovata*, *Vitellariopsis marginata*, *Sideroxylon inerme*, *Diospyros natalensis*, *Euclea natalensis*, *Strychnos gerrardii*, *S. henningsii*, *S. usambarensis*, *S. decussata*, *Carissa bispinosa*, *Clerodendrum glabrum*, *Burchellia bubalina*, *Canthium inerme*, *Lagynias lasiantha*, *Kraussia floribunda*, *Psydaz locuples*, *Vangueria randii*, *Erythrina caffra* and *Acacia gerrardii* (G. Nichols pers. comm.). The rare *Celtis mildbraedii*, represented by a single large specimen that dominates the Sibudu hill slope, is an indicator of a climax forest. This remnant forest is, however, threatened by encroaching exotic species, by its use as firewood, by the extensive stripping of bark for traditional medicine and by the illegal sand winers whose bulldozers have removed the forest adjacent to the river.

## THE EXCAVATION

The site was first excavated in 1983 by Aron Mazel of the Natal Museum, Pietermaritzburg. His small trial trench reached a depth of approximately one metre. The work has not been published, but notes, stratigraphic drawings, photographs and the excavated material are housed in the Natal Museum. Mazel noted that the uppermost layers contained both Middle Stone Age (MSA) stone artefacts and Later Iron Age pottery, while the layers below about 30 cm contained only MSA material. Mazel obtained two reversed radiocarbon dates for charcoal samples; the uppermost one was  $26\,000 \pm 420$  b.p. (Pta-3765) from layer MOD 2 at a depth of 20-30 cm from the surface; the second date of  $24\,200 \pm 290$  b.p. (Pta-3767) came from layer GAA2 at 79 to 88 cm below surface. This second, younger date is out of context and it must be rejected.

The new excavations began in late September 1998 and, since then, four and a half months have been spent on the Sibudu excavations. The grid of eighteen square metres comprises squares B6-4, C6-2, D6-2 and E6-2. Squares B5 and B6 are being excavated as the trial trench, which is now one and a half metres deep. The remaining excavation is approximately 70 cm deep. Each metre square is excavated in four separate 50 cm quadrants, with material from each quadrant kept separately. All deposit excavated from the site is sieved through 2 mm mesh. A record is kept of the volume of deposit removed from each of the layers. The volume is measured by the bucketful; each bucket holds 10 litres. A permanent datum line is painted on the cave wall and the depth of each layer is measured from the datum line, using a theodolite. The datum line depths on the stratigraphic drawings refer to the depth below the painted datum.

After each field season the excavation is backfilled; the trench is first lined with Geotex (a thick fabric that wicks moisture from the deposit) and is then shored up with planks and nursery bags filled with excavation sievings.

## STRATIGRAPHY

The stratigraphy is complex with palimpsests of hearths and ash lenses occurring within distinct layers. Dr Solveig Schiegl of the University of Tübingen is analysing the samples of putative ash to confirm the presence of hearths. I discuss this work later.

Below the surface sweepings is a brown soil with vegetal material (BSV or BSV 1). This contains Iron Age material culture. The underlying brown sand with stones (BSS) also contains Iron Age occupation and charcoal from a pit in square E3 has been dated  $960 \pm 25$  b.p. (Pta-8015)(calibrated to 1044 [1069, 1157] 1171 AD). The Iron Age people excavated several large pits into the MSA deposits causing a mixture of MSA and IA material culture and food waste. To avoid contamination of the MSA layers, the pit contents were removed before the MSA layers were excavated.

I first describe the stratigraphy as it appeared in the trial trench, Squares B5 and B6 (Fig.3), but I shall, where appropriate, mention other layers in adjacent squares B4 and C4 and C3. Later I shall describe a final MSA sequence from the eastern part of the excavation in Squares C2, D2, D3, E2 and E3 (Fig. 4).

In B5 and B6, the first MSA layer below the Iron Age occupations is MOD, which is a mottled brown, fine sand with flecks of white ash, black charcoal and orange-brown sand dated to  $26\ 000 \pm 420$  b.p. (Pta-3765) in Mazel's excavation. O MOD, below this, is a mottled, orange-brown deposit. In Squares B4, C2 and C3 layer O MOD is a thick unit comprising a palimpsest of hearths with orange-brown, burnt earth lenses overlain by charred lenses that are sometimes capped with white or grey ash. A subdivision of O MOD, layer O MOD 2, yielded a charcoal sample, at a depth of 224 cm below datum, that dated to  $34\ 300 \pm 2000$  b.p. (Pta-8142) (see the next section and Table 1 for comment on this date). In Square C3 the layer below this is OMOD2 - BL and it dates to  $>45\ 000$  b.p.. In B5 and B6, O MOD is underlain by G MOD, an undated, light grey-brown deposit mottled in places with white ash and black charcoal. G MOD is underlain by RSp, a reddish-brown layer with white ash specks. RSp, or a variant of it called RD (Fig. 4), is present in all squares excavated this far and, as such, is a good marker layer. A charcoal sample from RSp in Square B5 was dated to  $>41\ 400$  b.p. (Pta-7775). A further charcoal sample from a RSp hearth in Square D3 was dated to  $>45\ 200$  b.p. (Pta-8137)(Table 1). Below is YSp, a yellow-beige, sandy silt with ash flecks and below this is BSp, a brown, sandy silt with black and white flecks of ash and charcoal. Another extensive layer occurring in all the excavated squares is SPCA, a camel-coloured or grey-white sandy deposit of variable thickness. It is underlain by a thin, discontinuous black lens, BL, in part of the excavation grid. Below this, the

Or layer varies from a deep orange to beige earth. Below this is Mi, another black, charcoal-rich, ashy layer. Characteristic of this layer are clear crystals that cling to rock spalls. Che is a thin, discontinuous, chestnut-brown, fine sand that is probably part of layer SS. SS is a gritty, spall-rich deposit, compacted in patches, and variously mottled with yellow, beige and pink-orange. A black, fine, ashy layer, Eb, is below SS. Ma, a distinctive mahogany-brown, fine-grained deposit with no rock spalls, slopes from north to south. It rests on several discontinuous layers: MY, which looks like SS, BO a fine-grained deposit of dark, burnt-ochre colour, B.P., a brown, fine deposit with white flecks, and P which is an orange-brown layer with white flecks. The small lenses Iv (white ash) and BM (black ash) are probably parts of a hearth within P. OP is discontinuous and is an orange, coarse sand with many black and white flecks of ash and charcoal. Su and Su 2 are thin, hard (like calcrete), gritty layers of bright, sulphur-yellow. This colour is unique in the Sibudu sequence. The two sulphur-coloured layers are separated by a thin chocolate-coloured lens, Ch, and a second chocolate-coloured layer of loose ashy deposit, Ch2, is immediately below Su2. G1 is a grey ash in the north-eastern corner of Square B5. Y1 is a yellow, sandy deposit with some spalls and B/G Mix and B/G Mix2 are mottled brown-grey, ashy deposits with some spalls. BL2 and BL3 are dark ash units within B/G Mix. W is a white ash layer in the north-eastern corner of square B5 and Bor is a deep brown, soft deposit under B/G Mix2. Y Mix and YA 1 are yellow, ashy sands with some spalls and a few rootlets.

Against the eastern wall of the excavation grid, in Squares C2, D2 and E2 (Fig. 4), there is an additional MSA sequence more recent than RSp. The first MSA layer, Co, is a coffee-coloured, sandy deposit. It overlies Bu, which is a light grey, gritty deposit with lots of tiny roof spalls. A charcoal sample from this layer was dated to  $42\,300 \pm 1300$  b.p. (Pta-8017). A thin light-brown lens with white flecks, LB MOD, is under Bu and over MC, which is a white ash unit that does not reach the eastern section wall. Under this is a dark-brown fine-grained deposit, Ore. Ore 2 and PB are deep hearths belonging to Ore. A darker brown deposit, Cad, is below Ore in Square C2. Below this, a patchy orange sandy deposit, Pu, may connect to the O MOD 2 series in adjacent squares C3 and C4. RSp, the reddish/brown layer reported earlier from squares B5 and B6, lies over, or is subsumed by, a gritty red/brown layer with many rock spalls (layer RD). RD contains little organic material and gives the appearance of having been affected by water seepage

at the back of the cave. It contains high densities of stone tools of all sizes, including small chips, suggesting that the water flow was not strong.

The eastern sequence of late MSA strata, illustrated in Fig. 4, contains an extra set of layers that appear to fit stratigraphically between MOD and O MOD in the northern part of the excavation grid, and between MOD and RSp in the southern part of the excavation grid. This difference in position is not as complex as it sounds; the O MOD complex of hearths is simply missing from the southern part of the excavation grid. While luminescence dates are needed to test this hypothesis, I suggest that RD may mark a hiatus between the final MSA and a much earlier expression of the MSA that may belong to a pre-Howiesons Poort industry. A geological hiatus of a different kind may be represented by the deeper Su and Su2 layers. These exceptionally hard lenses are of a colour not represented elsewhere in the cave stratigraphy and they are almost sterile.

#### DATING

Eight  $^{14}\text{C}$  dates have been obtained from charcoal samples (Table 1). One of the charcoal samples provides a date that is out of context in the MSA: the date of  $10\,490 \pm 110$  b.p. (Pta-8137) was obtained for the B/Y layer in C3 at a depth of 232 cm below datum. This sample was removed on the last day of the February 2000 field season and it was not realized until the next field season that the charcoal came from a root channel which probably filled up with sand when the root either decomposed or burnt. The sample from B MOD, dating to  $24\,800 \pm 370$  b.p. (Pta-8022) is also out of sequence and must also be rejected. It was collected from between the O MOD2-BL sample from Square C3 that dated to  $>45\,000$  b.p. and the O MOD2 sample from Square C2 that dated to  $34\,300 \pm 2000$  b.p. (Pta-8142). Dates of approximately 34 000 b.p. are problematic because of the radiocarbon curve; sample Pta-8142 calibrates to a most probable date of 38 397 BC, although it could date in the region of 41 000 BC (Woodborne *pers. comm.*; Table 1). The older calibration fits best with the date of  $42\,300 \pm 1300$  b.p. from layer Bu in Square E2.

It is disappointing that only one out of four finite dates for the Sibudu MSA appears to be unproblematic, but the number of infinite dates suggests that most of the MSA is, in any event, out of the range of radiocarbon dating. For this reason Woodborne recently removed ten soil

samples for luminescence dating and the results are pending.

### ENVIRONMENT DURING THE MSA

The southern African MSA environment is poorly understood and it is hoped that, in the future, a dated proxy record from Sibudu will help to correct the situation. However, until Sibudu has been securely dated, it will not even be possible to correlate the site's findings with known environmental data. Currently, the only long terrestrial environmental record in southern Africa is that of the Pretoria Saltpan where a proxy record of rainfall variations has been derived from a granulometric analysis of sediment samples. The lowest estimated precipitation of approximately 440 mm per annum occurred near the end of Oxygen Isotope Stage 7 (*ca.* 200 000 b.p.), while minimum values during the Last Glacial Maximum are estimated at about 560 mm (Partridge 1997:10). The well-defined periodic (23 000 year) variations in rainfall at the Saltpan show that, as predicted by atmospheric general circulation models, subtropical precipitation over southern Africa is sensitive to late Pleistocene variations in orbital insolation forcing. During the initial warm phase of Oxygen Isotope Stage 5 (between 110 000 and 120 000 b.p.) rainfall appears to have increased up to about 35% (Partridge 1997:12).

Geological data for the coastal region of the eastern seaboard are relatively abundant, and may extend back to the early Pleistocene, but are not without controversy. The Port Durnford Formation, a Pleistocene barrier-lagoon complex along the northern KwaZulu-Natal coast, provides the best and longest sequence. A sea-level, 7-8 m higher than present, once believed to belong to the last (or Eemian) interglacial of Oxygen Isotope Substage 5e, is evidenced from sands of the Port Durnford Formation (Hobday & Orme 1974). Hobday and Orme assigned the Formation to the Eemian because Acheulean tools were found in the basal sands, and the Acheulean was mistakenly believed to be of late age because Early Stone Age chronology was still in its infancy in the early 1970s. The interpretation of the sequence changed when Hendey and Cooke (1985:46) identified the snail *Kolpochoerus Paiceae* from the Port Durnford Formation. The identification of fauna that are minimally of Middle Pleistocene date, but possibly of early Pleistocene date, has meant that the Port Durnford high sea-level is not associated with Eem. 1 (Hendey & Cooke 1985:47). Furthermore, luminescence dates from the sands suggest that they



accumulated between ca. 350 000 - 250 000 b.p. during Oxygen Isotope Stages 8-10 (Maud & Botha 2000:25).

The last glaciation would have caused considerable down-cutting of rivers because maximum sea level was probably as low as -130 m (Ramsay 1995:71). The implication for Sibudu would have been to place it considerably further from the coast than it is today. Periods of increased aridity and reduced vegetation are assumed for parts of the Last Glacial and colluviation evidently occurred as a result of these conditions (Botha & Partridge 2000:97,98). This colluviation is in evidence between Sibudu and the coast. The assumed ocean-wide average rise in sea-level after the LGM is 75.6 m (Clark & Lingle 1979:279) and Sibudu would thereafter have assumed its present position relative to the coastline.

Glacial and interglacial conditions may have had a marked effect on the vegetation in the Sibudu region. With a drop in the minimum temperature of approximately 3°C (a conservative estimate for the Last Glacial), a Coastal Hinterland Bushveld (Type 24) (Low & Rebelo 1998:31) could be anticipated near Sibudu. Type 24 is an open Sweet Thorn *Acacia karroo* savannah or scrub that could be associated with Valley Thicket (Type 5) in the low altitude valleys. Botanical analyses at Sibudu may be able to provide information on past vegetation types, but cognizance must be taken of the anthropomorphic role in introducing firewood and seeds to the cave.

### BOTANICAL ANALYSIS

Charcoal from firewood is well preserved in all Sibudu layers and charcoal analysis will be an invaluable part of future environmental research at the site. Lucy Allott will conduct the charcoal study and she is presently building a comparative collection of woody species from the area. The modern wood is first burnt in a muffle furnace. Tangential, radial and transverse sections of each specimen are then mounted in dag, coated with gold and photographed under the scanning electron microscope.

The charcoal analyses will be complemented by studies of seeds. Charred seeds are present even in the oldest Sibudu layers in Squares B5 and B6. Here two seed types predominate: one is probably a *Euclea* sp. and the other is still unidentified. The seeds from the MSA layers are in the process of analysis; 35 types have been recognised, but it has not yet been possible to identify



many of the types. Two important fruits, *Harpephyllum caffrum* and *Lagynias lasiantha*, are amongst the identifiable remains and there are also other edible species such as *Rhamnus prinoides* and *Celtis africana*. It will not be possible to complete the identifications until a larger comparative collection of seeds has been made. Christine Sievers is currently making monthly forays into several KwaZulu-Natal ecozones to collect seeds. The monthly collections will, in addition to providing a comparative collection, supply seasonal information. Collections will be made from Coastal Lowland Forest in Hawaan Forest and Pigeon Valley, which is the only surviving example of the original climax coastal forest. Grassland and Bushveld collections will be made in the New Germany Nature Reserve and the Coastal scarps habitat will be sampled at Palmiet Nature Reserve. Coastal bush seeds will be collected from Burman Bush Nature Reserve.

#### FAUNAL ANALYSIS

Job Kibii prepared the bone for analysis and Ina Plug is making the taxonomic study of the bone. Amongst the fauna identified this far are birds, reptiles, rodents, insectivores, bats, monkeys, hyena, lion, zebra, alcelaphines and hippo (Plug *pers. comm.*). Travis Pickering has completed a preliminary taphonomic study and he records that the Sibudu fauna is well-preserved with regard to its bone surface preservation, but is extremely comminuted. Most of the small sample of specimens that Pickering studied are limb bone shaft fragments from small to medium-sized mammals. Many pieces are unidentifiable bone fragments less than 20 mm in maximum dimension; few craniodental, vertebral and podial remains are present. Pickering is analysing the bone surface modifications and notes that there is, so far, no indication of carnivore involvement in its collection because there are no carnivore-inflicted tooth marks. Bone surface damage indicative of hominid behaviour - including stone tool cut marks and hammerstone percussion damage - is uncommon. Four specimens show cut marks, one has percussion damage and one specimen has two flake scars. Many specimens are calcined, but it remains to be demonstrated that this burning resulted from fire of anthropogenic origin. To this end, Dr Solveig Schiegl of the University of Tübingen, Germany, is making macroscopic, microscopic and mineralogical observations of the cave's ash deposits.

### MICROMORPHOLOGY OF ASH LAYERS

Observations during excavation of burnt bones, lithics and soils are good indicators of fire, but they need to be supported by independent evidence. Ash is the best indicator, but it is not necessarily easy to identify. Fresh wood ash is composed mainly of calcite, thought to be formed by the decomposition, rehydration and carbonation of calcium oxalate crystals found in many trees (Schiegl *et al.* 1996:764), but the siliceous aggregate and phytolith fraction of ash is more stable than the calcite fraction (Schiegl *et al.* 1996:780). Thus a good criterion for ash layer identification is a layer containing siliceous aggregates, possibly also identifiable wood phytoliths and, where the ash is well-preserved, calcite or one of the phosphatic alteration products of calcite as well. In order to understand ash formation, preservation and diagenesis in Sibudu, Schiegl is examining sediment samples from many of the Sibudu MSA layers. Part of each sample is heat dried, while other samples, collected for micromorphological studies, are impregnated under vacuum with polyester resin. Thin sections are cut for optical analysis and polished sections are cut for scanning electron microscopy (SEM) (Schiegl *et al.* 1996). Diagenesis of ash can result in a major reduction in sediment volume, therefore, understanding the site formation processes will assist with the interpretation of artefact accumulations. Considerable diagenesis of ash can result in deflation, compaction and mixing of artefacts from different occupations.

### THE STONE TOOL ASSEMBLAGE

Analysis is in the initial stage of curation, although G. Cochrane has begun a more detailed analysis of artefacts from the trial trench of squares B5 and B6. The comments here are therefore preliminary, intuitive impressions.

Hornfels and dolerite are the main rock types used for knapping MSA tools at Sibudu. Small quantities of quartz and quartzite are, however, present throughout the sequence and they become more commonly used in the oldest layers of the site. A few poor quality hornfels outcrops occur within 5 km of Sibudu; better quality hornfels has been located near Verullum by geologists of the Geological Survey. Dolerite outcrops locally at Sibudu (Cochrane *pers. comm.*) and quartz occurs in granites about 20 km north-west of Sibudu (Maud *pers. comm.*).

Cores are generally scarce, but some examples of radial and blade cores have been found

together with irregular, multi-platform cores. Some finely worked unifacial and bifacial points have been recovered (Fig. 5). A few of the points have butts that have been deliberately reduced through retouch; these occur in final MSA layers as well as in earlier layers that predate 45 000 b.p.. The points are unstandardized in their production; many are asymmetrical and some have shallow, invasive retouch; others are 'nibbled' to a point and yet others have steep retouch. Some are long, about 100 mm in length, while others are as short as 30 mm. Some are made on thin blades, others on thick flakes. Positions of remaining bulbs of percussion show that most points were produced on end struck flakes or blades, but several specimens have been produced on side struck flakes.

The uppermost MSA layer, MOD, has a few cores, including radial cores, many flakes and chips, pieces of ground ochre, large scrapers, and bifacial and unifacial points. Several of the points have their bulbar ends reduced by retouch. In the eastern part of the excavation, hollow-based points were recovered from layers Co and Bu and MC (Fig. 5:2,3,4). No hollow-based points were found elsewhere in the excavation; they appear to date to 42 000 b.p. and more recently. At this time hollow-based points also occur at Umhlathuzana Cave, situated between Durban and Pietermaritzburg (Kaplan 1990).

In these recent layers a few highly symmetrical bifacial points were also found, together with scrapers, adzes, knives and many flakes. The older O MOD hearth complex also contains abundant flakes and chips, bifacial and unifacial points and scrapers. Far richer, however, are layers RSp and RD: flakes and chips are prolific and retouched tools including unifacial and bifacial points (some with bulbar reduction), adzes, scrapers, retouched blades and knives are common. Some cores and grindstones are also present, as well as worked ochre and ochre-covered flakes.

Blades are present in highest proportions in the final MSA layers, but blades are not a prominent feature in any of the MSA layers at Sibudu. An intuitive study suggests that the largest blades and, indeed the largest flakes, occur in layer SPCA. Here there are a few very long points and knives (>200 mm) together with smaller versions of these tools. SPCA also has several ochre or haematite crayons and flakes, and points that have ochre on their bulbar ends.

Backed tools, usually associated with Howiesons Poort industries, are atypical of the

Sibudu assemblages and they occur only as isolated examples in widely separated layers. A few backed tools were found in the black lenses within O MOD in square B4 and others were found in Eb and in MY.

More dramatic assemblage changes take place deeper in the sequence. Relatively few stone tools occur in P, where two large blades were recovered. Tools are thereafter rare between P and Su2. Su and Su2 are almost sterile. By Ch2 there is a slight increase in the numbers of stone flakes, but retouch is uncommon and there are no blades. Simultaneously there is a marked increase in the proportion of quartz used at the site and quartzite flakes also become more frequent. At the base of the current excavation, for example in layers B/G Mix and Bor (Squares B5 and B6), quartz chunks, chips and cores become common. Flakes are either small and irregular or thick, short and irregular, and they display none of the usual attributes of MSA assemblages, such as faceted platforms or convergent or parallel dorsal scars. There are no diagnostic features that can link this assemblage to any Stone Age industry, but it is closest to the MSA 1, the earliest expression of the MSA described by Volman (1984) and believed to date to Oxygen Isotope Stage 6. Volman recognised the MSA 1 as a problematic technological stage, but comments that it is characterized, at least in the southern Cape, by little formal retouch (mostly denticulates), small, broad flakes with few faceted butts, and a high proportion of cores for the production of flakes with intersecting dorsal scars (Volman 1984:201). Until a larger sample is obtained from Sibudu, and until the luminescence dates are processed for this assemblage, it will not be possible to speculate further about its place in the southern African sequence.

B. Williamson completed a residue analysis on 74 points, 84 other retouched tools and 40 flakes. Sixty-two per cent of the hornfels points contain starch grains and 44% contain plant tissue. Forty-two per cent have ochre on them, but only 12% have animal residues in the form of blood, tissue or collagen. Similarly high percentages of starch grains and ochre occur on the other retouched tools and on flakes, but animal residues are even less well represented than on the points. A resinous substance occurs more often on flakes than on other tools; it is not clear whether this resin was intended as hafting material. Ochre may, however, have been used as part of the hafting process because many points and flakes have ochre residues on their butts. Ochre residues are found in other contexts, too. In layer SPCA, for example, a flake has heavy ochre

staining over its entire surface. It was found next to an ochre crayon. In Ma, in square B6, the tip of a point was smothered in red ochre. Worked ochre and haematite are present in all the MSA layers. An extraordinary find was a patch of ground ochre in layer Ma in square B5, and this feature was set in resin and removed *in toto*.

#### SIBUDU CAVE IN THE CONTEXT OF OTHER SOUTHERN AFRICAN MSA SITES

The Sibudu assemblage in the basal portion of the deep sounding may belong to the earliest expression of the MSA, but no secure assignment can be made until the appropriate layers are dated. It would be unwise to assess such an indeterminate assemblage on typology alone. The early MSA is poorly understood in southern Africa, but Volman (1984: 201) considers that MSA 1 assemblages are characterised by little retouch, small, broad flakes with few faceted butts, and a high proportion of cores for the production of flakes with intersecting dorsal scars (Volman 1984:201). Scraper retouch is very rare and points are absent. Such assemblages have been found in the Western Cape at Duinefontein 2, Peers Cave and Elands Bay Cave, and MSA 1 might also exist further north at Bushman Rock Shelter in Mpumalanga. Another possible MSA 1 site is Twin Caves, near Clarens, in the eastern Free State (Harper 1997a). Volman infers an Oxygen Isotope Stage 6 date (*ca.* 195 000 to 128 000 b.p.) for the MSA 1 because archaic fauna and the sediment sequence from Duinefontein 2 suggest a late Middle Pleistocene date, as do the geomorphology and sediments from Elands Bay Cave and Bushman Rock Shelter (Volman 1984:201). However, dates obtained for an early MSA assemblage from the open site of Florisbad suggest that the earliest MSA may even predate Oxygen Isotope Stage 6. The Florisbad *Homo helmei* tooth was dated by electron spin resonance to  $259\,000 \pm 35\,000$  b.p., while the earliest sediments (bearing a few MSA tools) were dated by optically stimulated luminescence to  $279\,000 \pm 47\,000$  b.p. (Kuman *et al.* 1999:1410). The Florisbad tool assemblage is unfortunately small, but it does contain a triangular flake, two faceted platforms, some multiple platform cores, a few broken scrapers, a grindstone and anvil stone (Kuman *et al.* 1999:1415). The early Florisbad date is consistent with the Th/U date of  $230\,000 \pm 35\,000$  b.p. from Twin Rivers, central Zambia (Barham & Smart 1996:289). The Florisbad and Twin Rivers dates generally accord well with late Acheulean dates in other parts of Africa (McBrearty & Brooks 2000). The great antiquity of

the new final MSA dates makes the date of 174 000 b.p. for a late Acheulean at Rooidam in the Kimberley district (Szabo & Butzer 1979) seem anomalously late.

Immediately above the amorphous Sibudu assemblage there are some long flake-blades, but these are never a conspicuous part of the sequence. Again, in the absence of dates, it is not possible to find secure parallels at other sites, but it is worth noting that long flake-blades and some denticulates (Volman's MSA 2a) occur in the basal layers of Klasies River (Thackeray 1992:393). These seem convincingly dated, by a variety of techniques, to Oxygen Isotope Stage 5e, between about 129 000 and 122 000 b.p. (Thackeray 1992:393, 402-405), and the earliest MSA from Border Cave may be broadly contemporary because of sedimentological and micromammalian data (Butzer 1984; Avery 1992; Thackeray 1992).

Two KwaZulu-Natal sites with MSA industries, Holley Shelter and Umhlatuzana Shelter, occur within 100 km of Sibudu (Fig. 1). The Holley Shelter date of  $18\,200 \pm 500$  b.p. for an MSA layer (Cramb 1961:48) is, at best, a minimum reading, but it is more likely that it is not representative of any of the MSA occupations. Blades, occasionally as long as 15 cm, triangular flakes with faceted platforms, points and some burins characterise the Holley Shelter MSA (Cramb 1952, 1961). Hornfels (called indurated shale by Cramb) is the most common rock type at Holley Shelter, as it is at Sibudu. Hornfels is scarce in both site localities and Cramb (1952:155) notes that the waterworn cortex on many Holley Shelter tools implies that nodules may have been collected from watercourses.

Umhlatuzana Cave, on the river of the same name about 35 km west of Durban, has a long sequence of MSA assemblages (Kaplan 1990:3). Umhlatuzana lacks an early expression of the MSA, but contains a Howiesons Poort Industry. Sibudu Cave contains only rare backed pieces within the upper MSA layers, but the presence of a few backed tools does not make an assemblage Howiesons Poort because such tools may occur in small frequencies in pre-Howiesons Poort and post-Howiesons Poort industries (Singer & Wymer 1982; Volman 1981, 1984). The absence of a Howiesons Poort at Sibudu may imply that there is a hiatus in the Sibudu chronology, but this need not be the case and only a full sequence of dates will resolve the issue. At Die Kelders Cave, for example, there is no Howiesons Poort Industry (Thackeray 2000), yet the site has yielded five luminescence dates that average between 60 000 to 70 000 b.p. (Feathers



& Bush 2000), a period during which Klasies River has a backed tool industry (Deacon & Wurz 1996). In place of a Howiesons Poort Industry, Die Kelders contains flake-blades, irregular and radial cores, and informal retouched pieces, most of which have isolated notches or rows of notches that could be considered denticulation (Thackeray 2000:161). The MSA of South Africa is generally so poorly dated that it is difficult to adjudicate between hypotheses that claim that the MSA is a time-related industrial sequence (Volman 1981, 1984) and hypotheses that favour activity-related toolkits that are not tightly tethered to chronology (Parkington 1990). The second hypothesis seems better to explain the Die Kelders data.

Intersite variability is a feature of southern African late MSA assemblages that Volman (1984) places within MSA phases 3 and 4. Hollow-based points of the kind found in Sibudu in final MSA layers, dated to more recent than 42 000 b.p., are a good example of regionally specific style. They are also found in Umhlatuzana, and although the dates are difficult to assess at this site, partly because of rotational slippage (Kaplan 1990:7), it is clear that the hollow-based points occur exclusively in the final MSA layers. At Rose Cottage Cave in the eastern Free State a different regional style is expressed in final MSA assemblages that include scrapers, points, knives, small flakes, irregular blades and rare backed pieces (Wadley & Harper 1989; Harper 1997b). In the final MSA layer Dc, dated *ca.* 31 000, there are tiny, white, standardised points that have been backed or retouched (Wadley in press). These little points are unique in the sequence and, to the best of my knowledge they do not occur at other sites.

Sibudu Cave is one of the few southern African long sequence MSA sites to contain bone and plant preservation even in an early MSA context, but it has not yet yielded any worked bone or decorated items. In this regard, it is quite different from Blombos Cave, Southern Cape, where ground bone points have been found together with finely worked bifacial Still Bay points in a clear MSA context (Henshilwood & Sealy 1997). It is apparent, therefore, that there were considerable regional differences in MSA technology that probably began before 80 000 b.p., in other words before the first recognised appearance of the Howiesons Poort Industry. Regional differences, in the form of short-term, volatile artefact style do, however, only occur in the final MSA. The hollow-based points at Sibudu and Umhlatuzana, and the miniature points at Rose Cottage Cave bear testimony to this trend.



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#### LIST OF FIGURES (WADLEY)

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Fig.5 Retouched tools from Sibudu. 1. Scraper: square C5b, NY2; 2. Hollow-based point: square C2a, Co; 3. Hollow-based point: square C2a, Mou; 4. Hollow-based point: square C2a, Bu; 5. Retouched blade: square C3c, BL; 6. Bifacial cutting tool: square C2c, Es; 7. Bifacial point: square E3c, Ore.

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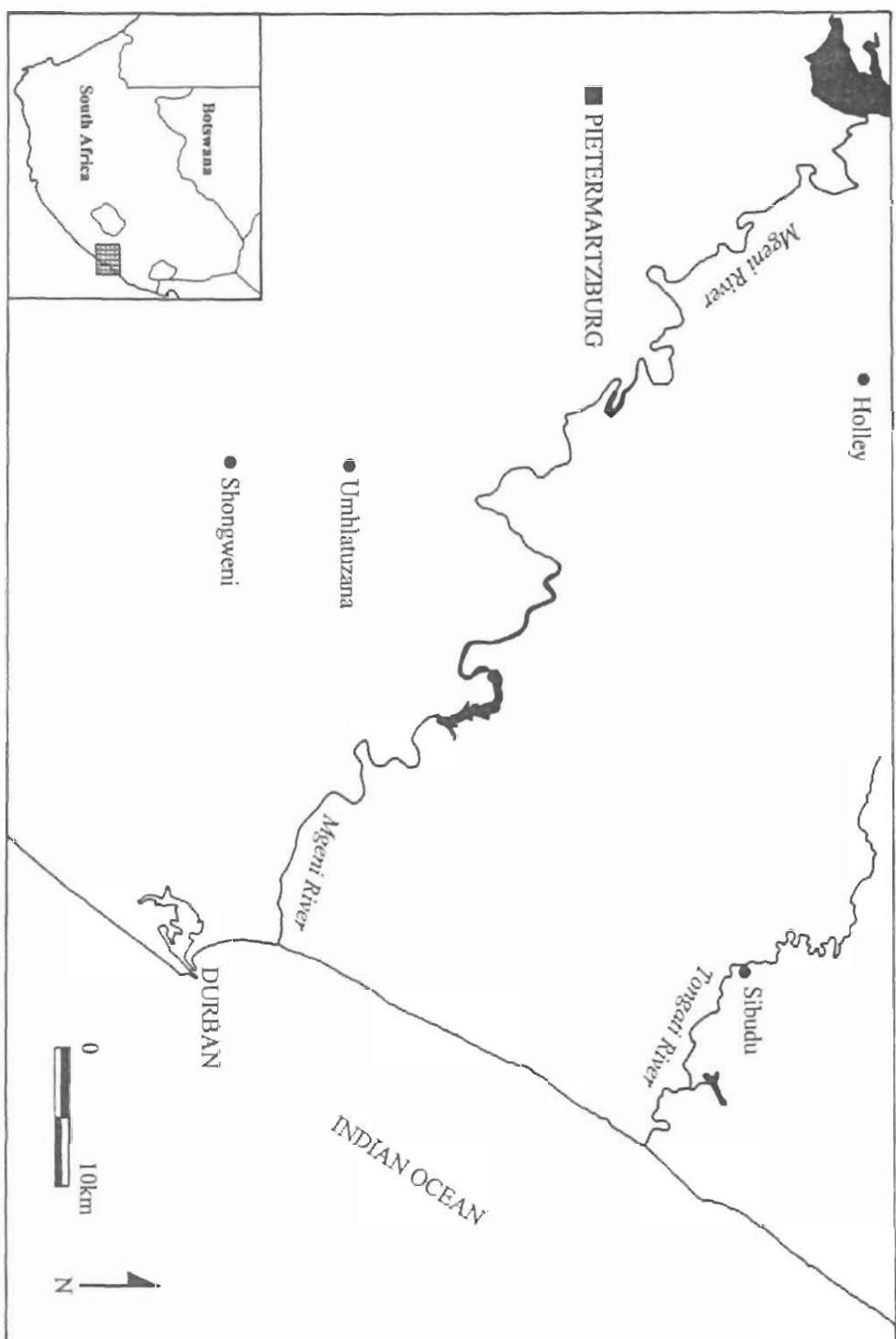


Fig. 1



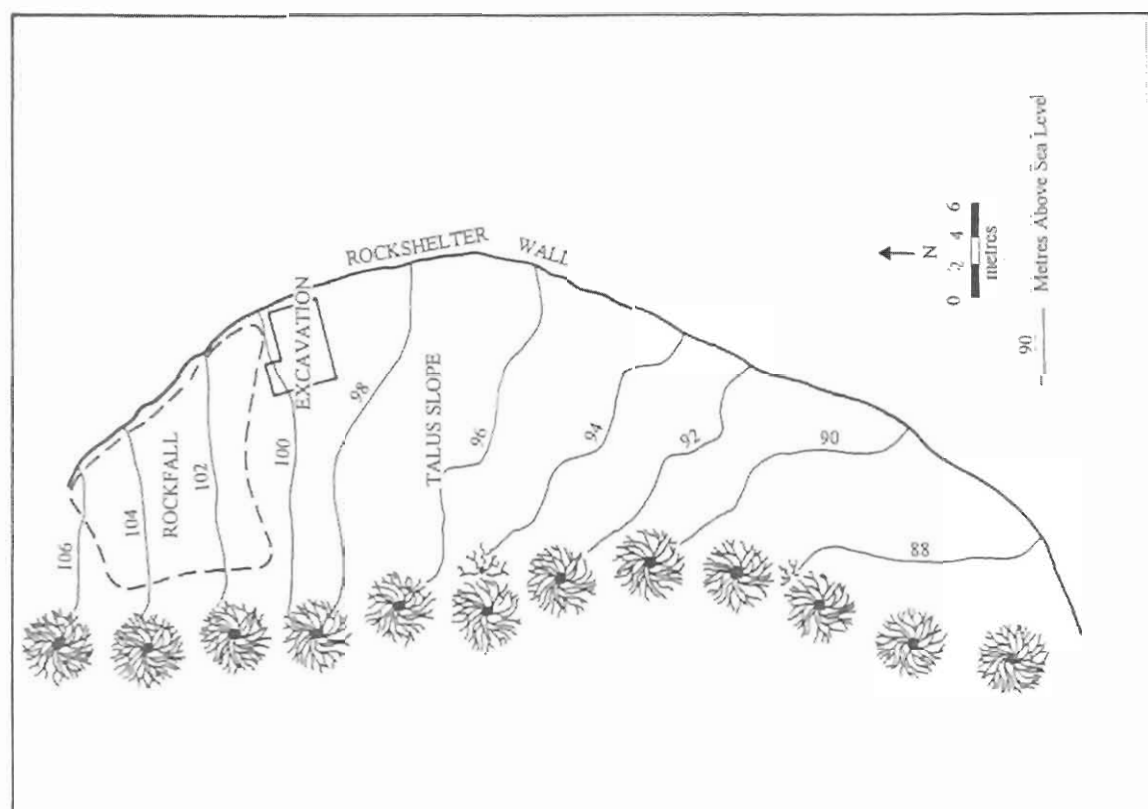


Fig 2

## Sibudu North

B 6

BS

T

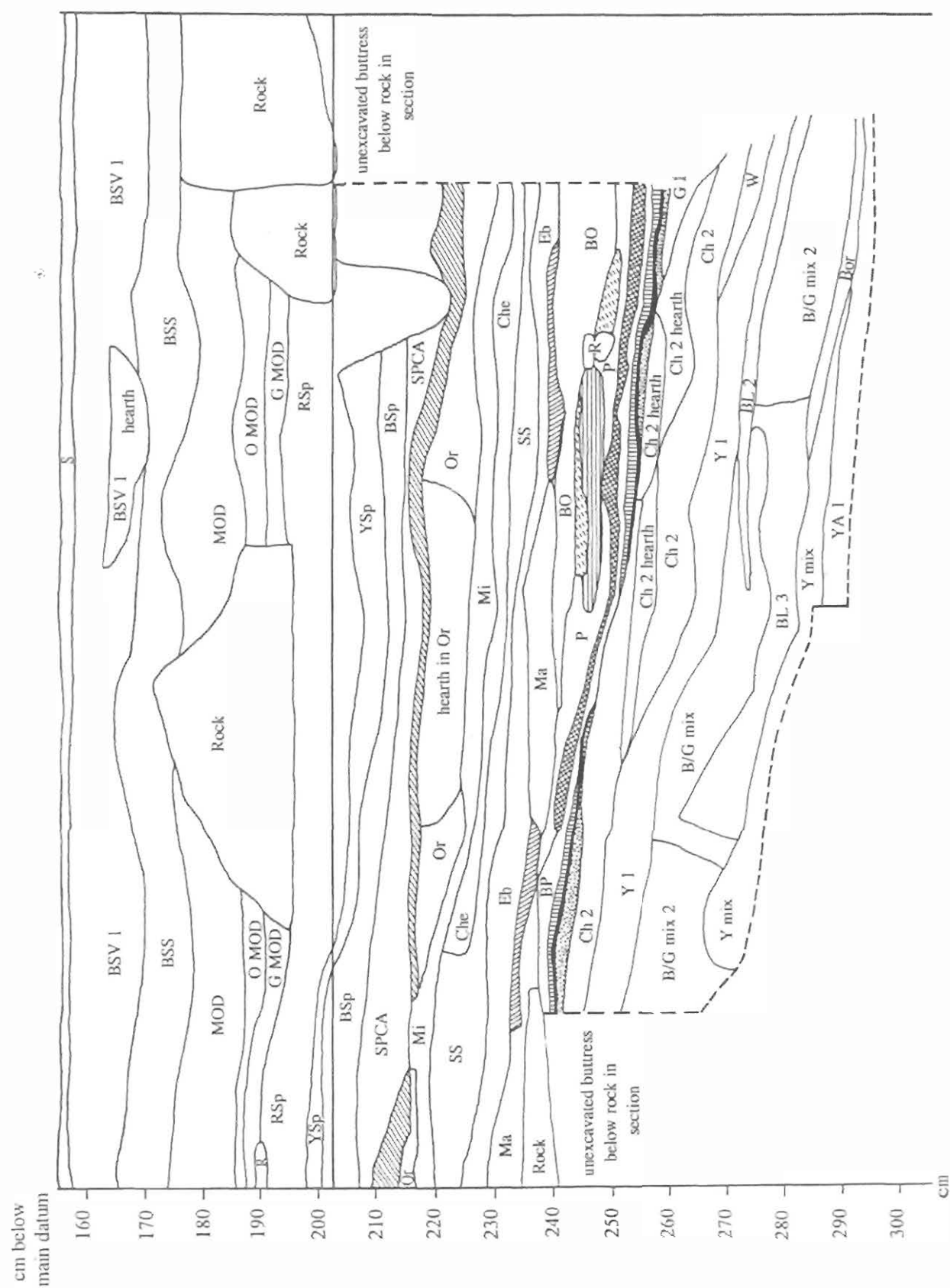


Fig 3

# Sibudu East Section

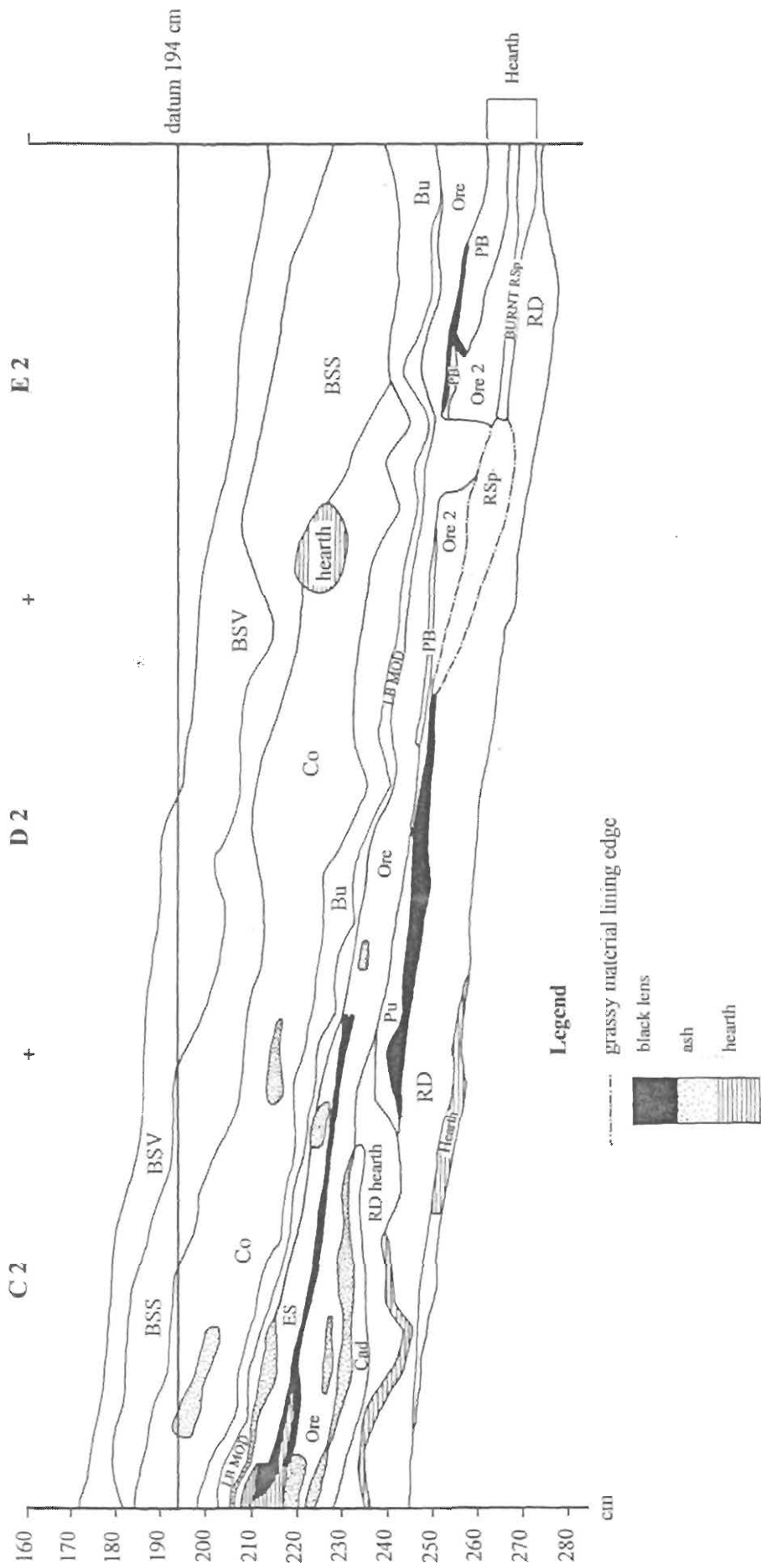


Fig 4

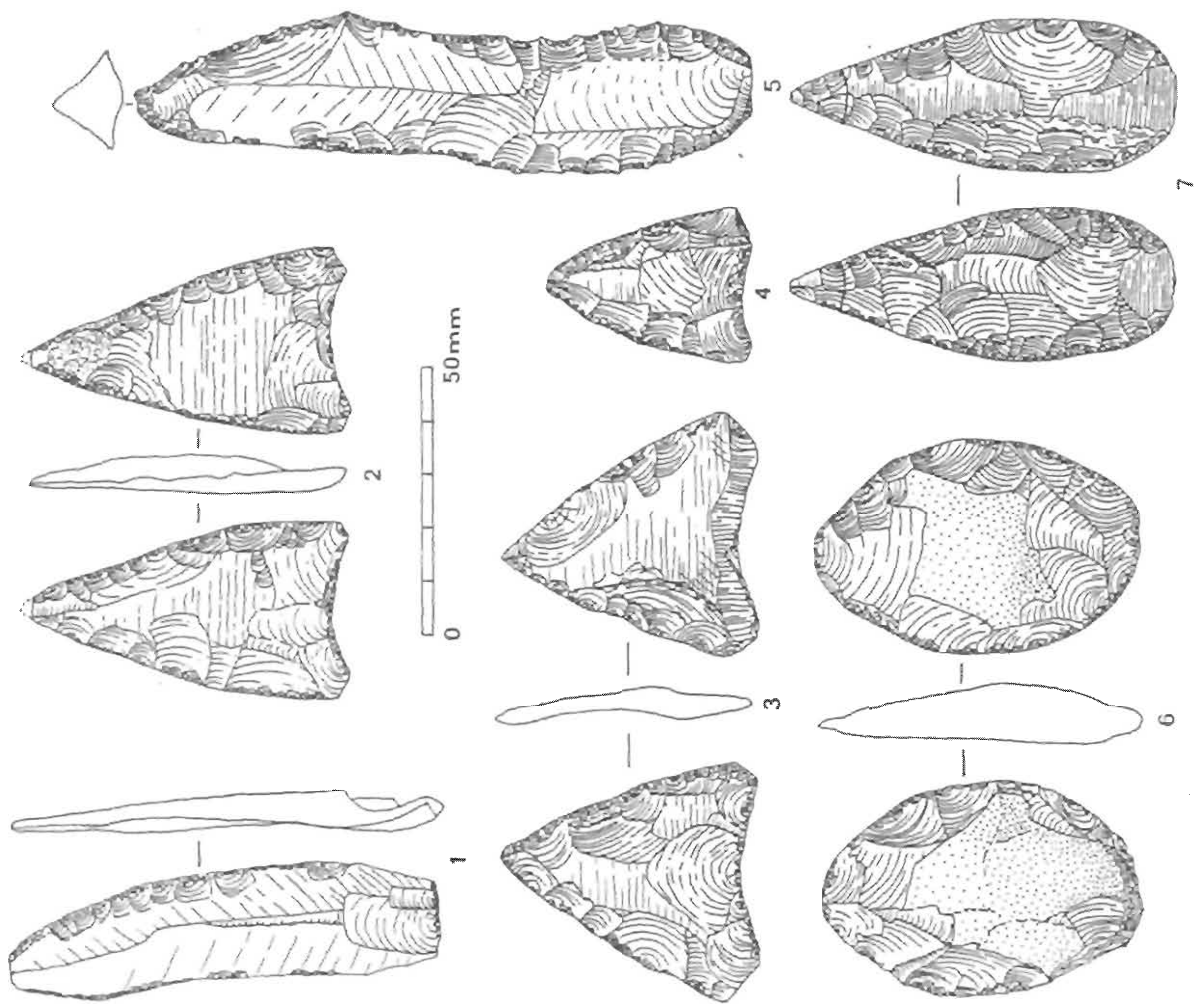


Fig 5

Table 1: Sibudu Cave Radiocarbon Dates on Charcoal

Sample No.	Layer	Square & depth	Radiocarbon age, yrs b.p.	Calibrated date *	Comment
Pta-8015	BSS pit	E3d; 230 cm	960 $\pm$ 25	1044(1069,1157)1171 AD	Iron Age
Pta-8137	B/Y	C3c; 232 cm	10 490 $\pm$ 110	10425(10281)10136 BC	Burnt root; Reject this date
Pta-8022	B MOD	C4a; 213 cm	24 800 $\pm$ 370	24911(24650)24388 BC	Reject this date: reversed
Pta-8142	O MOD2	C2c; 224 cm	34 300 $\pm$ 2000	40898(38397)35973 BC	Final MSA
Pta-8017	Bu	E2a; 224 cm	42 300 $\pm$ 1300	44711(44138)43550 BC	Final MSA
Pta-8136	O MOD2-BL	C3c; 209 cm	>45 000		Final MSA
Pta-7775	RSp	B5b; 208 cm	>41 400		MSA
Pta-8139	RSp hearth	D3b; 270 cm	>45 200		MSA

\*Age calibrated for southern hemisphere with the Pretoria programme (Talma & Vogel 1993) updated 2000. The 1 sigma range is given, with the most probable date between brackets (Woodborne *pers. comm.*)