Botswana Notes and Records, Vol 28

Excavations at the Tsodilo Hills Rhino Cave

By LAWRENCE H ROBBINS,* MICHAEL L MURPHY,** ALEC CAMPBELL*** AND GEORGE A BROOK****

Introduction

During the last 15 years the National Museum and Monuments has been engaged in an intensive study of the archaeology and rock art of the Tsodilo Hills (Robbins, 1990; Robbins *et al*, 1994; Campbell *et al*, 1994a,b). In this paper we will discuss the results of our 1995 test excavations at the recently discovered site of Rhino Cave. This site contains a rich assemblage of Late Stone Age and Middle Stone Age artifacts, so far found concentrated within 1.4 metres of deposits. Moreover, the site contains one of the most striking examples of rock art found at Tsodilo, as well as a series of wall depressions and grooves, many of which are in pristine condition.

Description of Rhino Cave

Rhino Cave is a naturally concealed painted cave that is situated near the north end of Female Hill (Fig 1).[1] In the absence of a local name for the cave, we have named it after a prominent white painting of a rhinoceros that is bifurcated by a large red giraffe (Fig 2). There are two major walls in this cave and the paintings are located on the north wall. The opposite wall is marked by an extensive series of depressions and grooves that have been ground into the wall. The overall visual appearance of the interior of the cave, with its unique paintings dominating one wall and the large number of depressions/grooves covering the opposite wall is quite impressive. Both the paintings and the depressions/grooves will be described in greater detail below.

Rhino cave is a long, relatively narrow fissure that forms a hidden hollow within the Tsodilo Hills quartzite bedrock. It measures about 12 metres in length and generally ranges from about 2 to 5 metres in width. It has a high ceiling varying from about 1.5 to 3 metres above the floor in most areas (Fig 3). The available floor space in the main chamber covers approximately 26 square metres. Such a cave could only have accommodated a comparatively small group of people, probably on the order of 15 individuals. The floor itself may be described as a relatively level sandy area with no obvious traces of human occupation, except one upper grindstone found against one wall.

Excavations and Stratigraphy

Initial testing with a soil auger at the edges of the deposit determined that artifacts were widely distributed, but generally did not appear in any appreciable density until reaching a depth of at least 30cm.[2] Subsequently, two 1 metre squares that extended from the north wall of the

* LHB: Professor of Archaeology, Michigan State University, USA

** MLM: Agricultural Advisor, Michigan and PhD student in Archaeology, Michigan State University, USA

*** ACC: Retired Director, National Museum and Art Gallery, Botswana

**** GAB: Professor of Geography, University of Georgia, USA

cave immediately below the rhino painting, were excavated (Fig 4). The excavations were carried out in 5cm arbitrary levels and all sediments were sieved. Fine screen samples were also periodically taken to insure maximum recovery. While the site is rich in lithic materials, faunal remains were rarely preserved and at this stage of the research have only been found in the LSA deposits. In contrast to both the Tsodilo Depression and White Paintings shelters, there were no finds of ostrich egg shell, bone artifacts, pottery or iron. However, there were occasional finds of carbonised *mongongo* nut shell fragments in the LSA deposits.

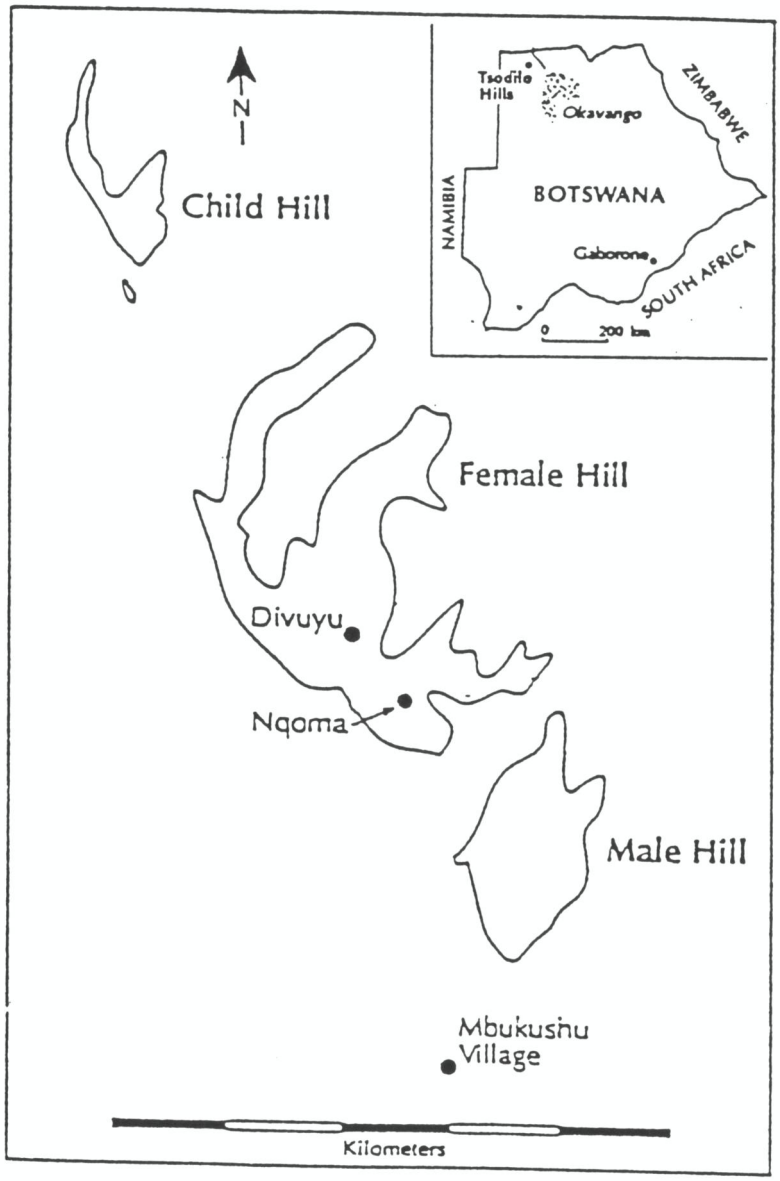


Figure 1: Map of Tsodilo Hills, Northwestern Botswana

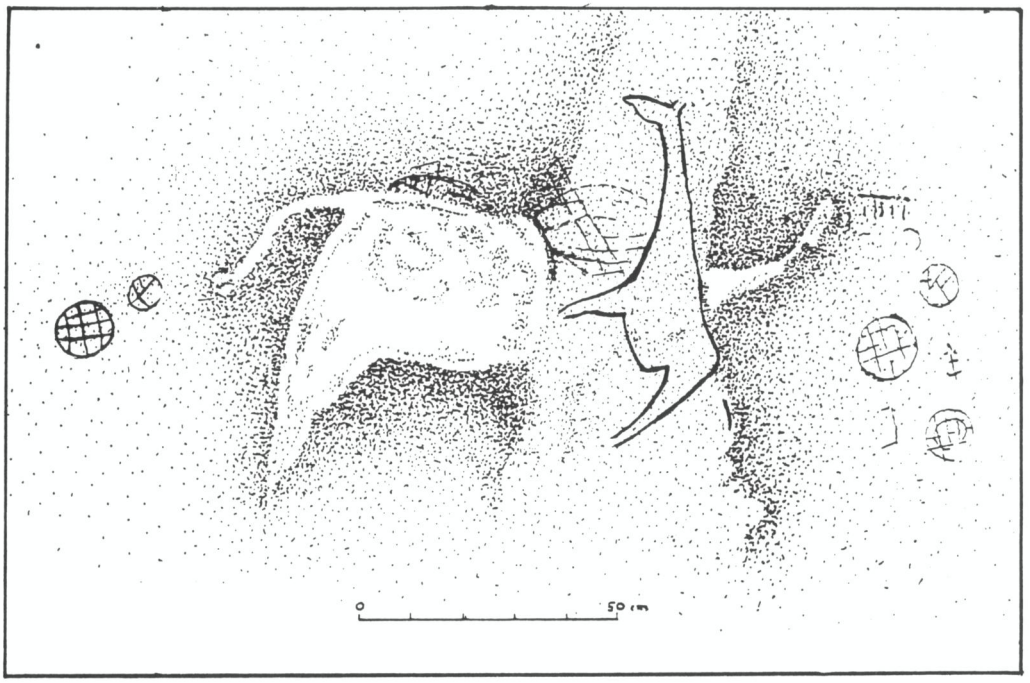


Figure 2: The rhino painting in Rhino Cave.
Note the red paintings of giraffe in the area which has been seeped, and the red geometrics.

Square 1, directly underlying the rhino painting, produced comparatively little material, whereas Square 2 was very rich in stone artifacts below a depth of about 55cm. This report will focus on Square 2. A quick review of the archaeological sequence shows that Late Stone Age debitage was first encountered between 15 to 20cm below the surface, whereas the main LSA levels with high artifact densities were evident between approximately 55 to 80/85cm (Table 1). The Middle Stone Age, marked by well-made points, begins at approximately 90cm and extends to 130/140cm. The total thickness of the artifact bearing deposits exposed in Square 2 was 1.4 metres. Square 2 could not be excavated below this depth because a large boulder, described below, prevented further work. However we were able to excavate to a depth of 1.8 metres in Square 1 where only a few pieces of debitage were found between 1.4 and 1.8 metres. A probe test taken at the base of the excavation indicated that there is a minimum of an additional 1.6 metres of deposits underlying the excavations. Further excavations will be necessary to establish whether the underlying deposits contain artifacts.

The following overview of the nature of the deposits is based on field observations of the stratigraphy and sediments (Fig 4).[3] Most importantly, the excavation revealed a prominent boulder more than a metre in diametre and height. This boulder extends into both squares and was first encountered at a depth of 75cm. As will be shown in the discussion of the artifacts, this boulder appears to have been the scene (as a seat?) of intensive "flint knapping" especially during the MSA as the immediately adjacent areas contained much debitage, as well as some hammerstones and tools that were not finished. Next to the boulder, there were also some small retouching flakes and artifacts such as some MSA points with very sharp edges and tips that do not appear to have been used.

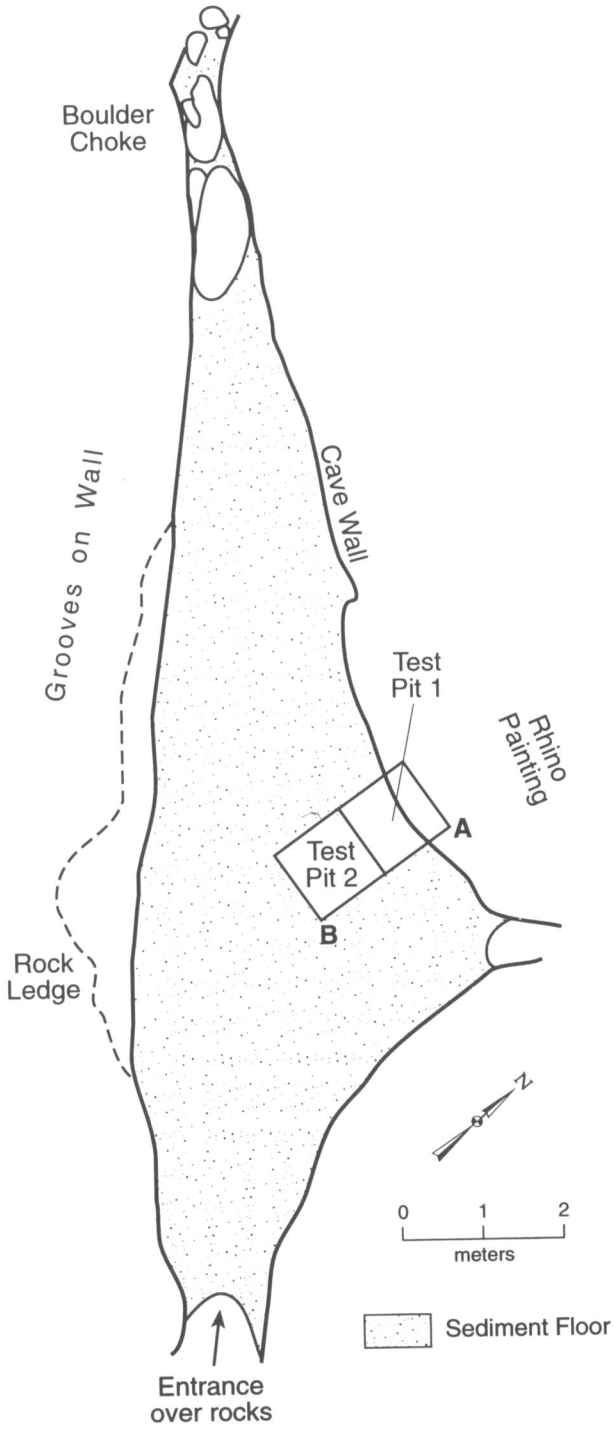


Figure 3: Plan of Rhino Cave, Tsodilo Hills

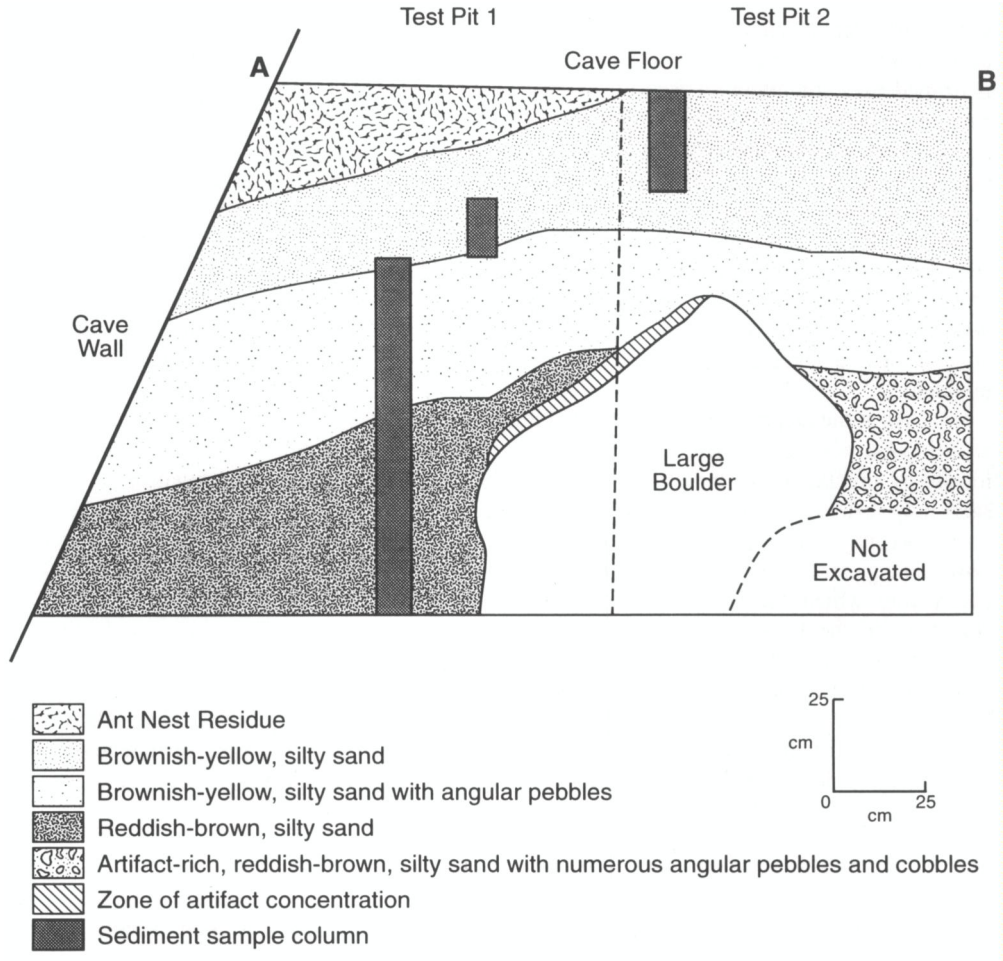


Figure 4: Stratification in Test Pits 1 and 2, Rhino Cave

The boulder has clearly influenced sediment deposition on the cave floor and sediment units are essentially draped over or around it. The deposits are marked by an upper unit of brownish-yellow, silty sand that varies in thickness from about 50 to 85cm. The upper half of this layer in Square 1 contains gray lumps of ant nest material, especially near the north wall of the cave (Fig 4). Relative integrity of the upper unit is suggested by the fact that we were able to refit two pieces of a broken jasper flake, with an old break, from the 55 to 60cm level. Below this layer the deposits are generally coarser. Recognisable is a layer of brownish-yellow, silty sand with angular pebbles ranging from 60cm thick against the cave wall in Square 1 to 35cm at the south wall of Square 2. In Square 2, the upper part of this unit (60 to 85cm deep), which is draped over the upper surface of the large boulder, contains angular pebbles and is artifact-rich. By contrast, the lower 10cm of this unit lacks angular pebbles. The deepest sediments in Square 1 are reddish-brown, silty sands with occasional angular pebbles, which mantle the north side of the large boulder. These sands are characterised by irregular, indurated, clay-rich bands up to 0.5cm thick, sloping towards the north wall of the cave and continuous over distances of more than 40cm. The deepest sediments excavated in Square 2 were artifact-rich, reddish-brown, silty sands containing abundant angular pebbles and cobbles. These sediments, which are essentially banked up against the south side of the large boulder, appear to be older than the deepest sediments in Square 1. Also noticeable in the sediment sequence is an artifact-rich, angular pebble layer 3 to 5cm thick resting on the north-sloping upper surface of the large boulder.

As at the Depression and White Paintings rock shelters, it is likely that the finer sediments at Rhino Cave are of aeolian origin while the coarser sands, gravels and cobbles were produced locally by breakdown of the cave walls. This being the case, the upper brownish-yellow, silty sand may reflect a period of increased aeolian activity during a drier climate, while the deeper sediments may indicate extensive periods during which conditions were substantially wetter than now. The general slope of the sediment units towards the north wall of the cave suggests a lower cavity into which the sediments slumped or were blown/washed at the time of deposition. Augering in the floor of square 1 confirmed the existence of such a cavity at depth. The extremely coarse sediments in the base of Square 2 are part of a talus accumulation extending from the entrance of the cave into its interior. The coarse fragments accumulated behind the large boulder exposed by the excavations, while finer sediments were blown or washed towards the north wall of the cave. At some point in the past, conditions changed sufficiently to bring about a major increase in aeolian transport into the cave. This resulted in burial of the talus material.

Radiocarbon Dates

Scattered pieces of charcoal were well preserved to a depth of about 40cm; thereafter charcoal fragments were less common finds extending to a depth of about 70cm. Isolated pieces of charcoal were found below this depth. Two radiocarbon dates on charcoal samples are available as follows:

1 Test Square 2, -27cm below the surface= 980±80 BP (Beta-84719)[4] (1 sigma calibrated results to calendar years= AD 1015 to 1205). This date is well within the range of dates established for the Tsodilo early Iron Age as well as the range of a large number of unpublished dates that we have recently obtained for intensive specularite mining at Tsodilo. It is, therefore, interesting to report that no Iron Age artifacts were found in the upper levels of the cave, although the dating evidence cited above places some of the period of use of the cave during Iron Age times. However, there is a small amount of LSA debitage from the

dated level. While the sample from the upper levels is small, the available evidence suggests that Rhino Cave was not used by early Iron Age peoples. A further comment is that the date falls within the period estimated for the main red rock paintings of Tsodilo, AD 800-1100 (See discussion of paintings below).

2 Test Square 2, 70-75cm= 5300 ±160 BP (Beta- 84720).[5] (1 sigma calibrated results to calendar years= BC 4315 to 4290 and BC 4260 to 3945). This sample was small and was given extended counting time by Beta Analytic to reduce the standard deviation. Since the MSA begins approximately 15/20cm below this dated level we assume that an extensive period of the early LSA (found at both Depression and White Paintings shelter) is not represented at Rhino Cave.

When taken together, the two dates bracket most of the LSA use of the cave to the period between approximately AD 1,000 to a little older than 4,000 B.C. The distribution of artifacts (table1) in relation to the dates clearly reveals low frequencies between the most recent periods of use of the cave until close to 4,000 BC when there is a marked increase in lithic materials (at the dated 70-75cm level). This certainly suggests that there was a change towards more intensive use of the site at about that time. Interestingly, this date is very close to the onset of a mid Holocene wet period evidenced in the sediment record at Depression Shelter, as well as at Drotsky's Cave (Gcwihaba), located to the southwest of Tsodilo (Burney *et al*, 1994; Robbins *et al*, 1996; Ivester 1995; G A Brook unpublished data).

The MSA deposits have not yet been dated, but we hope to date either burned chert artifacts or sediment samples by thermoluminescence (TL). Other MSA deposits at the Tsodilo White Paintings Shelter appear to be at least 40,000 years old (J Feathers, personal communication), while those at #Gi are even older (Brooks *et al*, 1990).

Stone Artifacts: overview

Four thousand one hundred and six artifacts were recovered from Square 2, of which over 95% is debitage, largely consisting of flakes and flake fragments, along with blade/bladelets and angular debris (Tables 1 to 3). A description of each of the retouched tools with measurements is presented in Table 3. As noted above in the stratigraphic overview, the time periods represented at Rhino Cave belong to the LSA and MSA based on the presence of diagnostic artifacts and comparison with other regional artifact descriptions (Deacon 1984, Volman 1984). If 90cm is taken as the approximate division between the LSA and MSA deposits, it can be seen that about 68% of the artifacts are from the MSA.

The artifact tables reveal that very little was found in the uppermost deposits while, overall, artifacts were concentrated in two clearly defined areas within the profile with a low density break in the artifact frequencies occurring in the 105 to 110cm MSA levels. The quantity of debitage in the two concentration zones is exceptional with the two peaks reaching 309 LSA artifacts between 80 and 85cm, and an even more impressive 763 artifacts in the 115 to 120cm MSA level.[6] In both cases, the numbers of debitage decrease above and below these levels. The frequency of formal tools also parallels the data for the debitage. Our best guess is that the large quantity of debitage is the result of several episodes of intense tool-manufacture that occurred on, or near the large boulder exposed in Square 2, and the debris from this activity accumulated around the edge of the boulder. Two hammer stones/grindstones found stashed beside the boulder in the 110 to 115cm MSA level which contained 526 pieces of debitage lends further support to this interpretation. Six more hammer stones/grindstones were found at 115 to 120cm. This is the level that produced the highest quantity of debitage. The final hammer stone, found in the 120 to 130cm level, was a small (4.2 x 2.4 x 1.6cm), but comparatively heavy specimen

made from black hematite. This specimen would have made an excellent retouching tool because of its small size coupled with a heavy weight.

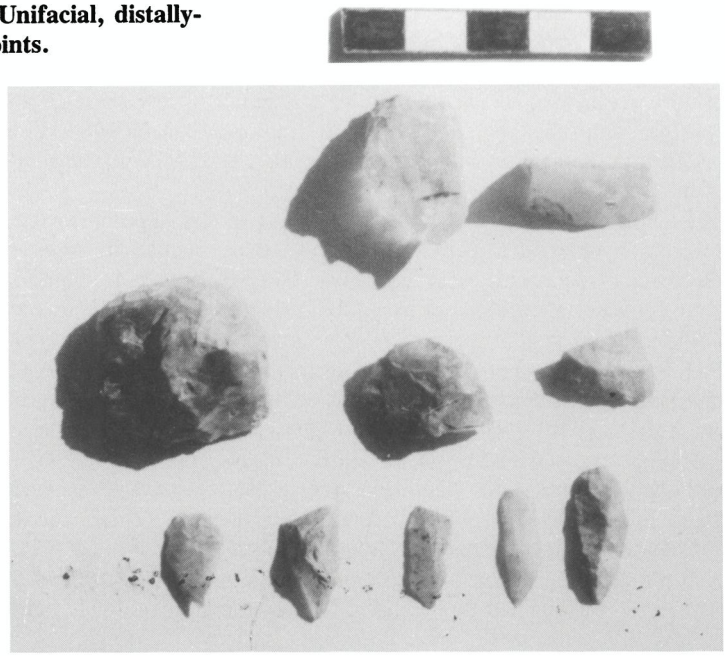
Late Stone Age Artifacts

The LSA artifacts were made from locally available quartz and a variety of cherts, jasper, chalcedony and silcretes which were imported to the Tsodilo Hills.[7] The raw material distributions are presented in Tables 1 and 3. As is the case for the LSA at Depression and White Paintings shelters, most of the debitage consists of quartz, while the retouched tools tend to have been produced on the imported raw materials. Characteristic tools found include microlithic crescents, small scrapers, and small unifacial points. In general, the formal tools are similar to those typical of the widely distributed Southern African Wilton industry. However, it is probably best not to designate the Rhino Cave assemblage with a specific name such as Wilton until systematic comparisons are made.

Beyond these widely recognised LSA artifacts, a particular kind of tool was noted in the assemblage that needs further description (Fig 5). We are calling these artifacts unifacial, distally backed points.[8] These points were produced on bladelets by backing, or steeply retouching the distal portion of one edge all the way to the tip; the remainder of the bladelet is unretouched. In several cases the retouch has produced an asymmetrical oblique shape to the tip of the point. It is interesting to note that 5 of these artifacts were found in the 75 to 80cm level. All of them were similar, and could easily have been made by the same individual. These distinctive artifacts also continue on into the underlying MSA where they are found to a depth of 100cm.

Several additional finds recovered in the LSA levels merit further discussion. We recovered a grindstone with a concave surface from the 65 to 70cm level. The artifact measures 9.5 x 7.9 x 2.5cm. It was made on a piece of banded hematite/specularite which is derived from veins in the bedrock at Tsodilo. Such material was being actively mined from veins at Tsodilo at approximately AD 900 and the largest mine is located within 100 metres of Rhino Cave.[9]

Figure 5: Unifacial, distally-backed points.



Another piece of this ground material was found in the same level and a third piece that is possibly ground was recovered from the 75 to 80cm level which underlies the carbon date of 5300 ±160 BP. In addition, a hematite crystal was found in the 85 to 90cm level. These finds of hematite/specularite clearly demonstrate long-term interest by LSA peoples in obtaining the material well-before the period of intensive mining.[10]

Middle Stone Age Artifacts

The first hint of an MSA occupation at Rhino Cave was the discovery of a prepared discoid shaped core and a bifacial point tip found in the 85 to 90cm level. However, MSA points were not consistently present until the underlying deposits (below 90cm) were excavated. Whereas MSA points were found to a depth of 130cm the points were mainly concentrated in the 110 to 115cm (N=7) and 115-120cm (N=5) levels (Fig 6). The MSA points from Rhino Cave are both bifacially (N=8) and unifacially (N=13) retouched and range in length from 27mm to 77mm. Whereas it has been suggested that MSA points have been used to tip thrusting spears, it is interesting to report that the smallest bifacial points from Rhino Cave resemble arrow points in size and shape. These small MSA "arrow" points were not recovered at the White Paintings Shelter.

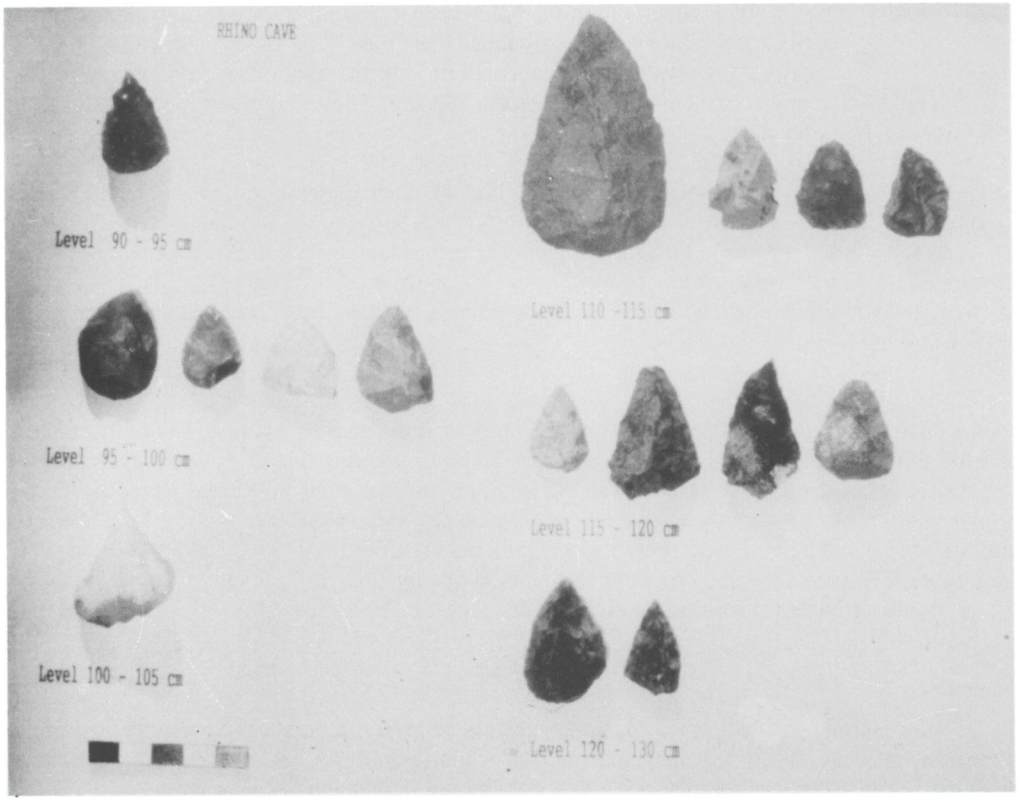


Figure 6: Middle Stone Age points.

Close inspection of the MSA points reveals that they include artifacts that were in various stages of manufacture. Some appear to have been abandoned as the result of failures at thinning or retouching, while others were finished and are in pristine condition. This observation indicates that actual manufacturing occurred at the site. Of special note, many (N=13) of the MSA points were "corner-struck" in the sense that the striking platforms are evident on the corner of the base of the points. This characteristic was not evident on the MSA points at the White Paintings Shelter and it is not clear to what extent it is a prevalent characteristic at other MSA sites. The corner-struck Rhino Cave points were removed from a prepared core with a blow that was directed obliquely to the long axis of the point, leaving the bulb of percussion at the proximal corner of the point. It is not certain whether this very noticeable technique was the personal preference of an individual toolmaker, or whether it conveyed a particular advantage in the production of the smaller MSA points found at the cave.

Other retouched MSA tools were a number of medium to large end and side scrapers as well as awls, denticulates and notches. Some of the scrapers appear to have been heavily reworked with more than one retouched edge. Most of them were produced on non-local raw materials, however, some particularly fine examples were made on crystalline quartz. In addition to the retouched artifacts, several large unretouched blades were found in the MSA levels, the largest measures 49mm in length. Similar large blades were also found in the MSA at White Paintings Shelter.

Several changes were noted within the MSA levels. Initially, the MSA levels include a small proportion of bladelets but they were not found below a depth of 120cm. MSA points were common finds, but were not recovered below a depth of 130cm. Another observation is that the chert artifacts found below 130cm tended to be more heavily patinated in comparison to the chert from the overlying levels.

Fauna and *Mongongo* Nut Shell Fragments

All of the fauna and nut shell fragments are associated with the LSA levels. As mentioned previously, faunal remains were rare. There were a few tortoise shell fragments (10 to 15cm and 15 to 20cm levels) and some unidentifiable mammal bone fragments that appeared to be from small animals.[11]

Mongongo nut shell fragments were found in all levels to a depth of 50cm.[12] Several shell fragments found in the 75-80cm level could be older than the above mentioned radiocarbon date of 5300±160 BP, but it is also possible that the nut shells are intrusive in the level. None were found below this depth. As an observation, we point out that *mongongo* trees would not have grown in the rocky area immediately surrounding the site and would have to have been brought into the cave by people. The long-term use of this important Kalahari food staple at Rhino cave adds to the evidence for *mongongo* nut exploitation documented at the Tsodilo Depression and White Paintings Shelters (Robbins and Campbell, 1990; Robbins, 1990).

Paintings

As mentioned above, the north wall of the cave supports a number of paintings, the most prominent of which is a finely depicted rhino in white (Fig 2). All other paintings have been executed in red or reddish orange. We describe the red paintings first because most, if not all of them, appear to be older than the rhino painted in white, although this is not absolutely certain.

The major red painting depicts a giraffe drawn in outline with one leg back and front, and facing towards the left and upwards. Of the red paintings, it is the clearest and least faded.

From nose to rear hoof the giraffe measures 900mm. The width of the painted outline is fairly uniform and even, measuring about 10 to 12mm, and it would appear to have been drawn with a thumb or index finger, probably of the right hand as the animal faces left. Although somewhat square, the depiction is well executed and life-like, lack of detail not detracting from the overall image. Possibly the most interesting aspect of the painting is its position on the wall. The giraffe has been deliberately painted to fit the vertical seep where water from above has patinated the rock wall with a fine opaque veneer. Between the giraffe's neck and the left margin of the seep and within the seep area are a number of geometrics in faded red. These probably include a so-called 'shield' tilted to the left superimposed by a 'circle enclosing a grid.' To the right of the rhino are the remains of at least seven 'circles enclosing grids,' and to the left of the rhino are two further 'circles enclosing grids' and the remains of what appear to have been three additional similar geometrics. Below these, and just above floor level, is another 'circle,' probably enclosing a 'grid.'

The rhino is superimposed over a 'circle with grid,' part of which is visible above the rhino's back. The rhino has been carefully executed in white, fairly smooth paint, which is neither oily nor very powdery. From nose to tail, the rhino measures 1,000mm. The outline appears to have been drawn first, and then the entire animal was in-filled in the same colour. The seep, mentioned above, has washed away the head and front leg, leaving only the major horn protruding from it. Weathering has removed much of the white pigment making it difficult to currently observe detail. However, it is possible that the animal was originally painted in two shades of white, with the stomach and back leg being lighter in colour than the area of the back and hip. An interesting feature is the division into two of the tail at its tip.

From degree of fading and superimpositions, it would appear that some geometrics are older than others. The 'shield' is very faint and is superimposed by a darker 'circle enclosing grid.' The rhino partially superimposes both of these geometrics and a further 'circle enclosing grid.' The most interesting question regarding the paintings at this site is whether the red giraffe was painted first and then superimposed by the rhino, or whether the rhino came first and the giraffe was carefully fitted into the area of the rhino that was later destroyed by the seep. From visible remaining evidence, it is suspected that the rhino was superimposed over the giraffe, but this conclusion is not certain.

Red 'circles enclosing grids' can be found at many sites in the hills, although Rhino Cave is the only site where such a geometric superimposes a 'shield,' the latter being much less common than circular geometrics. Carefully executed white paintings are rare, the majority of 'whites,' and particularly those of animals, being somewhat crudely drawn. Nearest to the rhino of this site, in relation to careful execution, are the white paintings of rhino and goat found in Goat Cave, and in the complicated white geometrics found in the Upper Cavern on Male Hill (Robbins *et al*, 1993).

At this stage of the research it is impossible to give an accurate estimate of the dates of either the red or white paintings. Even so, the red geometrics and giraffe are similar in style and degree of fading to many other paintings in the hills which, on account of including numerous depictions of domestic cattle, have been tentatively dated to AD 800 to 1150 (Campbell *et al*, 1994a). White paintings are not common, forming less than 7% of all paintings at Tsodilo. In southern Africa, white paintings have been attributed to Bantu-speakers (Summers, 1959; Prins and Hall, 1994), and are considered to be of fairly recent origin. Hambukushu living at Tsodilo today strongly deny that their ancestors painted on rocks, and they are the only Bantu-speakers known to have occupied the hills during, at least, the last three centuries.

Superimposing of one painting over another was deliberate and was done with a purpose (Lewis-Williams, 1983). The purpose of superimpositioning at this site is unknown, but both giraffe and rhino are recognised by San as 'meat animals' and are involved with 'bringing rain to the land' (Biesele, 1993). Possibly superimposing one animal over the other enriches the

strength or spiritual power of the painting of the underneath animal.

Wall Depressions

As mentioned previously, the south wall of the cave is covered with a series of circular and oval shaped depressions as well as grooves that have been intentionally ground into the vertical face of the bedrock. These depressions are generally about 6cm, or less, in diametre and are usually a fewcm deep. There are also some depressions that are tear drop shaped and one combination that resembles a bat. A preliminary count indicates that there are at least 346 of these wall alterations (depressions=203, grooves=85, ovals= 54, tear drops= 3, "bat"=1). The depressions occur at other sites at Tsodilo, such as at Depression Shelter, Goat and Male Hill Lower Cave, but Rhino Cave contains the most striking and best preserved examples of them (Robbins, 1990; Campbell *et al*, 1994b). Their purpose is unknown both to ourselves and to the local inhabitants of the Tsodilo area. They may have been ground into the rock using the well-rounded hammer stone/grindstones that have been found in LSA deposits at Tsodilo. One such stone was actually found within two metres of the wall with depressions in the exploratory auger tests (60-70cm depth) of Rhino cave.

Canoe shaped "grinding grooves" have also been noted at many other localities in Central Africa where, unlike Rhino Cave, they appear to be found on horizontal surfaces near water (Derricourt, 1986). At Tsodilo, grooves and cup-like depressions occur on both horizontal and vertical surfaces, at least two of which are located near wet period springs. One of us (Campbell) has seen similar grooves and depressions as far north as the Tadrart Mountains in southern Algeria, where they may be associated with 'cattle period' engravings. Whether the Tsodilo grindings are related to those further north is not known (Fig 7).

Conclusions

Rhino Cave adds to the growing body of information about the archaeology and paleoenvironment of the Tsodilo Hills. Although the sediment record appears complex, and we await final results from our sediment analyses, some broad generalisations can be made. First, the angular pebble layer at 65 to 85cm depth in Square 2, which dates to $5,300 \pm 160$ yr BP, may equate with the mid-Holocene wet phase identified at other sites in the region (eg, Robbins *et al*, 1996; Burney *et al*, 1994). An increased rate of rock breakdown under wetter conditions, coupled with reduced aeolian activity because of a denser vegetation cover, would explain the accumulation of this coarse layer. Based on our two radiocarbon dates, the upper 65-85cm thick brownish-yellow, silty sand unit is of late Holocene age. As with other sites in the region, this deposit is significantly finer in grain size than underlying units implying drier conditions, a reduced vegetation cover on the nearby dunes, and more aeolian transport of the fine sand, silt and clay at the time of its deposition (Robbins *et al*, 1996).

The coarse sediments at the base of Square 2, which contain abundant MSA artifacts, suggest a long period of relatively moist and possibly colder conditions when talus production in the cave dominated over aeolian transport and deposition. The age of this accumulation is problematic. The sediments may have been deposited prior to about 40,000 year BP (the approximate end of the MSA at White Paintings Rock Shelter) but the presence of smaller MSA points could indicate that it is much younger than this. Whatever the case, the absence of significant aeolian or other deposits between the basal MSA artifact-rich sediments and the overlying mid-Holocene LSA artifact-rich sediments is clearly evident at Rhino Cave. The lengthy late-Glacial wet phase at Tsodilo may have been a period of minimal aeolian deposition in Rhino Cave and possibly even a period when there was some erosion of pre-existing, finer-grained sediments possibly towards the fissure paralleling the north wall of the cave.

Figure 7: Excavation in Rhino Cave
Note: painting of rhino on right wall and depressions and grooves ground into the left wall

The result of our excavations suggests a pattern of short-term visits to the site by Late Stone Age peoples for a period of several thousand years. The very sparse remains in the upper 50cm are not what one would expect if the site was used for habitation. However, they would be consistent with use of the cave for brief visits as a ritual site. Visits in connection with the rock paintings would support this interpretation, at least for part of the time span concerned.

At approximately 4,000 BC there is a switch to more intensive use of the site, when it was used as a 'chert knapping' locality for production of artifacts on a wide variety of non-local raw materials, as well as on local quartz/quartzite. Notable artifacts include the distally backed points and use of the hematite grindstone derived from veins within the Tsodilo bedrock. As noted previously, the hematite/specularite finds are very significant because they demonstrate a long-term interest in obtaining the material, prior to the period of intensive mining at Tsodilo.

The change to more intensive use of the cave appears to correlate with the advent of a more moist period during the middle Holocene, as described above. Ongoing studies of the sediments should shed further light on the nature of paleoenvironment during this time. Perhaps the cave was used more intensively because it afforded protection in the rainy season during the mid Holocene. The middle Holocene wet period will be of particular interest in a regional context as our research progresses because of evidence for variable patterns of occupation evident at other shelters and caves during this time. Depression Shelter and Drotsky's Cave both have low artifact densities, while White Paintings Shelter was densely occupied during that period. We hope to explore this problem of middle Holocene variability in site use at greater length in the future.

Rhino Cave is only the third excavated site in the Kalahari that has yielded a significant collection of typical Middle Stone Age tools. The other excavated sites are #Gi and White Paintings Shelter. During the MSA, Rhino Cave continues to reveal the pattern of intensive manufacture of stone tools that was noted for the immediately overlying LSA levels. Of special note are small points resembling arrow heads that were recovered next to the boulder. The advent of the bow and arrow in human technology is of major interest. At this point in the research, we cannot be certain whether the Rhino Cave artifacts functioned as arrow, or spear points. Whatever the case may have been, it will be interesting to obtain TL dates on the MSA at Rhino Cave and to conduct use-wear studies of some of these small points.

Notes

1 We thank the National Science Foundation for funding this research. We are grateful to the authorities of the National Museum of Botswana for facilitating this work, especially the Director, Tjako Mpulubusi. In addition, we are grateful for the field assistance of, Grace Babutsi, Modisi Malapela, Lopang Tatlhego, Mogogi Ledimo, all of whom are from the National Museum and Roger Meyer, US Peace Corps. We also thank Aryn Bartley for editorial assistance.

2 Three auger holes were placed at the periphery of the deposits in areas that were unlikely to be excavated.

3 Sediment samples at 5cm intervals were taken by G A Brook for detailed laboratory study. Samples were also taken for TL dating.

4 The calibrated result (2 sigma, 95% probability) is between AD 975 to 1265.

5 The calibrated age (2 sigma, 95% probability) is between BC 4435 to 4415 and BC 4385 to 3705.

6 These high frequencies exceed the artifact counts for 10cm levels at both Depression and White Paintings Shelters.

7 It is possible that some of the white chert was actually obtained locally. In 1995 we noticed that pieces of white chert had been brought to the surface in the drilling of a new borehole. We believe that the chert occurs about 50cm below the current surface. It could have been obtained by digging.

8 While the artifacts are called points, they may well have been used are borers, though they differ from the double-backed drills that are prevalent at Depression shelter.

9 We have obtained a large number of radiocarbon dates on the mines and are preparing a report on our findings.

10 As mentioned previously, a small black hematite hammerstone/retouching tool was recovered from the MSA 120-130cm level. More than likely, the hematite was also obtained from veins within the Tsodilo bedrock.

11 Bone fragments were distributed as follows: 10-15cm (15), 15-20 (7), 40-45 (1), 45-50 (1), 50-55 (1).

12 *Mongongo* nut shell fragments were found in the following levels: 0-5 (4), 5-10 (2), 10-15 (2), 15-20 (1), 20-25 (1), 25-30 (1), 30-35 (4), 35-40 (1), 40-45 (1), 45-50 (1), 75-80 (2).

References

Biesele, M (1993) Women Like Meat. (Johannesburg: Witwatersrand University Press).

Brooks, A S; P E Hare; J E Kokis; G H Miller; R D Ernst; and F Wendorf (1990) "Dating Pleistocene Archaeological Sites by Protein Diagenesis in Ostrich Eggshell". *Science*, 248:60-64.

Burney, D A; G A Brook and J B Cowart (1994) "A Holocene Pollen Record for the Kalahari Desert of Botswana from a U-series Dated Speleothem". *The Holocene*, 4(3):225-232.

Campbell, A C; J Denbow and E Wilmsen (1994a) "Paintings like Engravings," in *Contested Images*, in T A Dowson and D Lewis-Williams (eds), 131-158. (Johannnesburg: Witwatersrand University Press).

Campbell, A C; L H Robbins and M L Murphy (1994b) "Oral Traditions and Archaeology of the Tsodilo Hills Male Hill Cave," *Botswana Notes and Records*, 26:37-53.

Deacon, Janette (1984) "Later Stone Age People and Their Descendants in Southern Africa," in *Southern African Prehistory and Paleoenvironments*, in R G Klein and Rotterdam: A A Balkema (eds), 221-328.

Derricourt, Robin (1986) "Striated Grinding Grooves in Central Africa," *South African Archaeological Bulletin*, XLI:27-31.

Ivester, A H (1995) A Late Quaternary Paleoenvironmental Record From Sediments At White Paintings Rock Shelter, Tsodilo Hills, Botswana, MA Thesis, Department of Geography, University of Georgia, Athens, Georgia, USA.

Lewis Williams, D (1983) "The Rock art of Southern Africa", in *Imprint of Man Series*, E Anati (ed). (Cambridge: Cambridge University Press).

Prins, F E and Sian Hall (1994) "Expressions of Fertility in the Rock Art of Bantu-speaking Agriculturalists", *The African Archaeological Review*, 12:171-203.

Robbins, L H (1990) "The Depression Site, A Stone Age Sequence in the Northwest Kalahari Desert, Botswana". *National Geographic Research*, 6:329-338.

Robbins, L H and A C Campbell (1990) "Prehistory of Mongongo Nut Exploitation in the Western Kalahari Desert, Botswana," *Botswana Notes and Records*, 22:37-42.

Robbins, L H; A C Campbell; M L Murphy and T Ferone (1993) "Prehistoric mining and New Discoveries of Rock Art at the Tsodilo Hills". *Nyame Akuma*, 40:2-5.

Robbins, L H; M L Murphy; K M Stewart; A C Campbell and G A Brook (1994) "Barbed Bone Points, Paleoenvironment and the Antiquity of Fish Exploitation in the Kalahari Desert, Botswana". *Journal of Field Archaeology*, 21:257-264.

Robbins, L H; M L Murphy; N J Stevens; G A Brook; A H Ivester; K A Haberyan; R G Klein; R Milo; K M Stewart; D G Matthiesen; and A J Winkler (1996) "Paleoenvironment and Archaeology of Drotsky's Cave: Western Kalahari Desert, Botswana". *Journal of Archaeological Science*, 23:7-22.

Summers, R (ed) (1959) Prehistoric Rock Art of the Federation of Rhodesia and Nyasaland, Salisbury (Harare), National Publications Trust.

Volman, T P (1984) "Early Prehistory of Southern Africa", in *Southern African Prehistory and Paleoenvironments*, R G Klein and A A Balkema (eds), 169-220 (Rotterdam).

Table 1: Debitage from Test Pit 2, Rhino Cave

Raw material: QT=quartz; BC=brown chert; CH=chalcedony; JA=jasper; HC=Honey-colour chert; SI=silcrete; MC=multi-colour chert; OT=other.

Location	#QT	#BC	#CH	#JA	#HC	#SL	#MC	#OT	Total
0-5cm	1								1
5-10cm	1								1
10-15cm	4								4
15-20cm	2								2
20-25cm	4								4
25-30cm	5								5
30-35cm	17				1				18
35-40cm	12								12
40-45cm	6								6
45-50cm	2								2
50-55cm	19	2		1					22
55-60cm	33			1	1			3	38
60-65cm	52	2		7		7	5	5	78
65-70cm	52	7	1	15			7	6	88
70-75cm	59	3	3	11	3	18	20	10	127
75-80cm	155		4	33	27	16	25	23	283
80-85cm	143	3	7	32	14	39	49	22	309
85-90cm	144		4	23	21	26	36	16	270
90-95cm	131	5	4	22	5	22	33	22	244
95-100cm	62	2	9	16		25	29	9	152
100-105cm	64		2	14	3	11	23	15	132
105-110cm	40		3	8	4	7	5	7	74
110-115cm	264	3	11	59	13	72	58	46	526
115-120cm	433	3	10	62	23	78	103	51	763
120-130cm	273	8		21	3	36	61	14	416*
130-135cm	215	11		12	3	25	33	11	310
135-140cm	76	6		5	3	18	4	2	114
Totals	**2 269**	**55**	**58**	**342**	**124**	**400**	**491**	**262**	**4 001**

*120-130 is a 10cm level, all remaining levels are 5cm.

Table 2: Formal Stone Tools from Test Pit 2, Rhino Cave: Raw Materials and Measurements

C=complete; PF=proximal fragment; MF=medial fragment; DF=distal Fragment

Location	Piece#	State	Descriptive Notes	Max width (mm)	Max length (mm)
30-35cm	1	C	Brown silcrete crescent	9	18
60-65cm	1	C	Grey silcrete end scraper	29	31
	2	DF	Chalcedony unifacial point	--	--
	3	C	Quartz retouched blade/graver	14	27
65-70cm	1	C	Multi-colour chert notch	10	23
	2	PF	Quartz crescent	8	--
	3	C	Multi-colour chert unifacial point	25	32
	4	C	Rose silcrete unifacial point	24	31
70-75cm	1	C	Jasper denticulate	15	23
	2	C	White chert uniface distally backed pt.	8	35
	3	C	Chalcedony uniface distally backed pt	8	15
75-80cm	1	C	Pink chert side scraper	24	29
	2	DF	Chalcedony convex side scraper	11	--
	3	C	Chalcedony uniface distally backed pt.	16	25
	4	C	Chalcedony uniface distally backed pt.	9	15
	5	C	Multi-colour chert distally backed pt.	10	15
	6	C	Honey coloured chert distally backed pt.	10	16
	7	C	Chalcedony uniface distally backed pt.	7	17
	8	C	Jasper thumbnail convex end scraper	13	18
	9	C	Multi-colour chert side scraper	24	34
	10	C	Multi-colour chert convex core scraper	29	29

Table 2 continued

Location	Piece#	State	Descriptive Notes	Max width (mm)	Max length (mm)
	11	MF	Chalcedony scraper	19	--
	12	C	Multi-colour chert biface-scraper/adz	18	26
	13	C	Jasper backed flake	13	23
	14	C	Multi-colour chert denticulate	29	40
80-85cm	1	C	Pink silcrete awl	30	32
	2	C	Chalcedony core/scraper	29	32
	3	C	Quartz side scraper	24	25
	4	C	Chalcedony end scrpaer	22	25
	5	C	Quartz notch	21	41
	6	C	Pink silcrete awl	26	34
	7	C	quartz side scraper	22	34
	8	C	Honey coloured chert awl/scraper	17	24
	9	C	Multi-colour chert awl	20	27
	10	C	Quartz awl/scraper	17	32
	11	C	Multi-colour chert side scraper	18	19
	12	C	Jasper side scraper	15	24
	13	C	Black chert awl/scraper	24	32
	14	C	Quartz awl	12	22
85-90cm	1	C	Multi-colour chert discoidal core		
	2	C	Red silcrete denticulate	38	51
	3	C	Quartz notch	16	34
	4	C	White silcrete denticulate	30	50
	5	C	Yellow silcrete notch	35	44
	6	C	Honey colour chert bec	45	75
	7	PF	Jasper side scraper	25	45
	8	C	Red silcrete convex side scraper	22	28
	9	C	Honey-colour chert convex side scraper	28	43
	10	C	Quartz uniface distally backed pt.	6	14

Table 2 continued

Location	Piece#	State	Descriptive Notes	Max width (mm)	Max length (mm)
	11	C	Jasper side scraper	19	21
	12	C	Honey-colour chert awl/scraper	18	32
	13	C	White chert end/ side scraper	18	20
	14	C	Multi-colour chert denticulate	21	28
	15	C	Quartz awl	21	28
	16	DF	Quartz MSA bifacial point tip	--	--
	17	C	Jasper backed flake	15	26
	18	C	White chert side scraper	18	25
90-95cm	1	C	Multi-colour chert side scraper	17	24
	2	C	Quartz notch	27	40
	3	C	Multi-colour chert side scraper	17	26
	4	C	Brown chert scraper	23	25
	5	C	Jasper MSA point thinning failure	34	35
	6	C	Pink chert MSA bifacial point	21	34
	7	C	Quartz end scraper	24	26
	8	C	Quartz uniface distally backed pt.	8	21
95-100cm	1	C	Quartz side scraper	29	34
	2	C	Quartz side scraper	19	28
	3	C	Chalcedony end scraper	23	28
	4	C	Jasper denticulated scraper	26	31
	5	C	Chalcedony end scraper	21	24
	6	C	Brown silcrete uniface distally backed point	8	27
	7	C	Honey colour chert corner struck MSA biface point	19	27
	8	C	Redish brown chert corner struck MSA biface point	25	33

Table 2 continued

Location	Piece#	State	Descriptive Notes	Max width (mm)	Max length (mm)
	9	C	Multi-colour chert MSA unifacial point	23	34
	10	DF	Quartz MSA biface	24	--
100-105cm	1	C	Quartz denticulated point	31	34
	2	C	Quartz denticulated blade	19	42
	3	C	Multi-colour chert side scraper	16	27
	4	C	Pink chert notch/ scraper	15	29
110-115cm	1	C	Multi-colour chert MSA point	25	33
	2	C	Red silcrete MSA point	30	37
	3	C	Brown chert MSA corner struck unifacial point	23	29
	4	C	Jasper MSA corner struck unifacial point	20	29
	5	C	Brown chert MSA unifacial point	23	33
110-115cm	6	C	Pink chert side cont. scraper	23	35
	7	C	Brown chert side scraper	25	42
	8	C	Brown chert side scraper	23	37
	9	DF	White chert MSA point	--	--
	10	C	Yellow silcrete MSA point	45	77
115-120cm	1	C	Multi-colour chert double side scraper	37	39
	2	C	Multi-colour chert double side scraper	23	24
	3	C	Multi-colour chert MSA unifacial point	26	29
	4	PF	White chert corner struck bifacial MSA point	25	--

Table 2 continued

Location	Piece#	State	Descriptive Notes	Max width (mm)	Max length (mm)
	5	C	White chert corner struck bifacial MSA point	18	27
	6	C	Jasper corner struck unifacial MSA point	28	40
	7	C	Quartz unifacial MSA denticulated point	17	29
	8	C	Pink silcrete side scraper	18	27
	9	C	Black chert corner struck unifacial MSA point	25	42
	10	C	Quartzite end scraper	41	49
120-130cm	1	C	Jasper side scraper	23	35
	2	C	Jasper side scraper	26	43
	3	C	Honey-coloured chert corner struck bifacial MSA point	27	37
	4	C	Brown chert corner struck bifacial MSA point	17	29
	5	DF	Pink chert bifacial MSA point	--	--
130-135cm	1	C	Jasper double side end scraper	20	25
135-140cm	1	C	Red silcrete side scraper	25	25

Table 3: Distribution of Formal Stone Tools from Test Pit 2, Rhino Cave

CR=crescent; ES=end scraper; SS=side scraper; UP=unifacial point; DE=denticulate; UDBP=unifacial distally backed point; AW=awl; NO=notch; MPT=MSA Point; OT=other.

	Tool Class									
Depth/cm	**CR**	**ES**	**SS**	**UP**	**DE**	**UDBP**	**AW**	**NO**	**MPT**	**OT**
0-5										
5-10										
10-15										
15-20										
25-30										
30-35	1									
35-40										
40-45										
45-50										
50-55										
55-60										
60-65		1		1						1
65-70		1		2				1		
70-75					1	2				
75-80		2	5		1	5				1
80-85		2	6				4	1		1
85-90			6		3	1	2	2	1	3
90-95		1	3			1		1	2	
95-100		2	2		1	1			4	
100-105			1		1			1	1	
105-110										
110-115			3						7	
115-120		1	3						6	
120-130*			2						3	
130-135			1							
135-140			1							
Totals	**1**	**9**	**33**	**3**	**7**	**10**	**6**	**6**	**24**	**6=105**

* 120-130 is a 10cm level, all remaining are 5cm.