A Stone Age analysis of an assemblage from Portion 22 of Mimosa 61HO, Mamusa Local Municipality, North West Province

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Declaration of Independence

The report has been compiled by Drs Tim Forssman and Matt Lotter acting as heritage specialists. The results expressed in this report have been collected using standard archaeological procedures and are objective. The authors declare no other conflicting interests in this report.

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Executive summary

Introduction

During a Phase 1 HIA on portion 22 of Mimosa 61HO, Mamusa Local Municipality North West Province, Stone Age artefacts were identified in the development area (Pelser 2019). These artefacts are dispersed across the property and are contained within gravels that were brought onto the premises to level the development area. Following the recommendations of Pelser (2019), a representative sample of these artefacts was collected for curation and analysis. This report provides the details of the Stone Age collection.

Methods

Analysis of the Stone Age collection followed standard archaeological methods. Given the limited contextual information for the artefacts, and the fact that they have already been heavily damaged by the development activities so far, artefact analysis focused on broader archaeological trends and descriptions. This required a techno-typological approach, which involved the recording of basic morphological, technological and descriptive typological data.

Results

In total, 326 artefacts were analysed. The vast majority comprise debitage (waste products from artefact production; 94%), but 17 are classified as formal tools. Raw material usage shows that quartzite is clearly favoured for artefact production (>98%), followed by less abundant but present pieces made on hornfels and chalcedony. Overall, the assemblage exhibits few indicators that would suggest on-site manufacturing took place. The key features of the assemblage include a large percentage of flakes, followed by less frequent blades and convergent flakes; cores are very infrequent and formal tools are dominated by notched and less formalised retouched pieces (save for three scrapers). A considerable percentage of the debitage sample also illustrates laminar dorsal scars, which when combined with the complete blade percentages, suggests that blade production was an important technological strategy. A limited number of core management pieces were also recovered, of which seven are classified as débordant flakes that likely illustrate the upper technological limits of the assemblage when considering core reduction and maintenance strategies. Nearly every single artefact in the sample possessed some form of edge damage.

Discussion and conclusions

Overall, our ability to interpret this assemblage is limited by several factors relating to the highly disturbed nature of the deposits, the clear and obvious damage across the majority of the artefacts and the overall incompleteness and highly likely non-representative nature of the sample (from its original area of deposition). With these limitations in mind, a reliable chronology cannot be established. However, based on broad technological comparisons with other assemblages from the region, based on published data, and by looking at broader technological trends in the southern African Stone Age following the syntheses of others, this material likely falls sometime within the Middle Stone Age.

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Introduction and aims

During a Phase 1 HIA on portion 22 of Mimosa 61HO, Mamusa Local Municipality North West Province, Stone Age artefacts were identified in the development area (Pelser 2019). These artefacts are dispersed across the property and are contained within gravels that were brought onto the premises to level the development area. Therefore, the study area is not the original location for the artefacts. That the diesel depot will see significant vehicle traffic means the artefacts will be destroyed over time. However, despite their lost context, they still possess scientific potential. They have presumably been moved from a single location and may therefore represent a single assemblage; they may also be a representative sample of the full assemblage in the original source area. As such, and because of the disturbed context, a surface collection was performed in order to study and record the nature of the assemblage, attempt to establish a chronology and relate it to the regional cultural sequence. The findings of this study are presented in this report.

Archaeological background

The study site is located between two very well-studied Stone Age areas. The Kuruman landscape to the west (185km) has seen significant research attention because of the widespread Stone Age accumulations found in the area (Chazan et al. 2008; Orton & Walker 2015). Northeast, by 280km, is the Cradle of Humankind. Here, a lengthy history of Pleistocene-period investigations have examined fossil bearing deposits and Stone Age assemblages (Caruana & Stratford 2019). The landscape of the Schweizer-Reneke is more similar to the former and it is expected to have a somewhat comparable archaeological sequence. Namely, this includes surface scatters of Earlier and Middle Stone Age assemblages, and to a lesser extent Later Stone Age finds spread across large areas of the landscape (e.g. Beaumont 1990, 2004; Dreyer 2008a, 2008b; Kaplan 2008). With many of these sites, the archaeological value is uncertain and negatively influenced by their exposed nature; surface collections are notoriously problematic due to issues involving potential mixing, disturbances and chronology. However, worth noting here are several sites within the wider region, including: Bestwood, Canteen Kopje, Wonderwerk Cave and the sites at Kathu Townlands (notably Kathu Pan; see Mitchell 2002; Lombard et al. 2012; Wilkins et al. 2012; Orton & Walker 2015). Taung is another notable fossil locality that is in closer proximity to the study area (±70km), as is the Stone Age factory site of DB3 (Kuman 2001).

Of these sites, Wonderwerk Cave in the Northern Cape has seen significant research since the 1940s (Chazan et al. 2008). Beyond even the Northern Cape, Wonderwerk is a unique site with an extensive archaeological sequence. Work throughout the cave site has revealed *in situ* Earlier Stone Age, Fauresmith, Middle Stone Age and Later Stone Age assemblages, as well as historic period use of the site (Binneman & Beaumont 1992; Beaumont 1982, 1990, 2004). More recent work has focussed on dating the Earlier Stone Age assemblage as well as exploring Fauresmith and Middle Stone Age layers (Chazan et al. 2008; Chazan 2015).

Kathu Pan in the Northern Cape has also seen substantial work. It is a sinkhole with fluctuating water levels, providing valuable access to water in the dry season. As a result, hominins gathered around the pan and exploited the local environment. Earlier Stone Age deposits and Fauresmith artefacts, as well as earlier Middle Stone Age assemblages, have all been located in the area (Porat et al. 2010; Wilkins 2013). Significantly, the site has yielded early evidence for systematic blade production and

the development of multicomponent hafted tools (Wilkins et al. 2012; Wilkins & Chazan 2012). The site also contains a highly preserved faunal assemblage (Klein 1988).

Canteen Kopje in the Northern Cape has featured in archaeological literature for over a century, and the site preserves a stratified sequence of gravels and fine sediments that preserve multiple Earlier Stone Age assemblages, Fauresmith, Middle and Later Stone Age material (Beaumont & McNabb 2000; McNabb & Beaumont 2011; Leader 2014; Lotter et al. 2016; Lotter 2019). In addition, a range of later artefacts also document the activities of early alluvial diamond diggers, whom moved to the area in the 1860-1870s. The Stone Age assemblages are produced on a range of raw materials, but the majority show a heavy reliance on the locally available andesite that is known as Ventersdorp Lava. The site was clearly a favoured location on the local landscape due to the abundance of Stone Age material, although there is a near-complete lack of organic preservation.

DB3, located near to Taung and approximately 70km from the study area, consists of a Stone Age factory site characterised by Victoria West Acheulean technology (Kuman 2001). Handaxes, cleavers and a range of additional formal tools are preserved within a quartzite quarry site located on the high eastern plateau of a tributary that feeds into the Harts River Valley, which runs upstream in a northeast direction towards the study area. Thus, there could be some typo-technological comparability between the material from DB3 and that of the study area, should the artefacts derive from gravels along the upper reaches of the Harts River. Presently though this has not been confirmed.

Overall, a large number of Stone Age sites occur within the wider region and they each contain assemblages with varied preservation. In addition, the area has seen a large number of heritage assessments, with many reporting surface scatters whilst others have not identified any material (cf. Orton & Walker 2015). This might relate to research methodology or landscape variation. In any case, significant archaeological resources are known from the extended area but not from the immediate landscape around the site.

Methods

Five blocks were identified for surface collections (Fig. 1). Blocks 1 to 4 are all 5x5m and Block 5 is 3x3m. The block locations were selected randomly within the area that contained the dumped artefact-bearing gravels.

Figure 1. The distribution of surface collections on Mimosa 61HO around the diesel depot.

The artefacts were analysed using a Lithic Analysis Workbook compiled by Lotter and colleagues in 2018, designed specifically for the purposes of recording techno-typological information on artefacts obtained during survey and excavation. Typological designations follow those classification systems of Kleindienst (1962), Leakey (1971), Deacon (1984), Clark and Kleindienst (2001), Kuman (2001) and Shea (2008). Maximum lengths and widths were measured for every artefact, as were raw material designations (following Bell & Wright 1985; Norman & Whitfield 2006). Blank types were also identified for all formal tools and cores. Additional descriptive technological data were also obtained on the artefacts, where possible. This included observations on flake platform faceting and dorsal scar patterns, core reduction strategies and formal tool retouch characteristics.

Maximum lengths and widths

Maximum length is a measurement obtained in millimeters along the longest possible axis of all artefacts (between the two most distal points). Maximum width is a measurement obtained 90° to the maximum length, and it is the greatest distance from lateral edge to lateral edge. Maximum thickness was not recorded. See Figure 2 for the method.

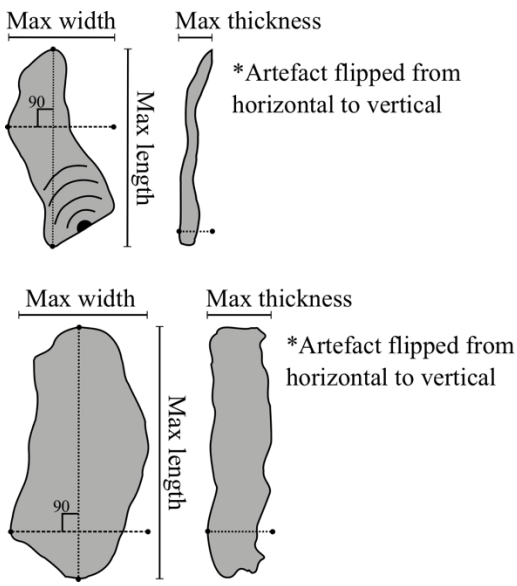

Figure 2. Recording method for maximum dimensions. Thickness was not recorded (top=flake; bottom=core).

The following typological terms are presented in the Lithic Analysis Workbook by Lotter and colleagues and are used here in accordance with these descriptions:

Debitage

Divided into the following categories:

Complete: those flakes/blades/bladelets that have a complete striking platform, bulb of percussion and the piece is complete to the lateral boundaries of termination with no breakage at the distal end. Pieces with stepped, hinged or overshot terminations are classified as complete, but for stepped pieces the termination must be clearly the result of the flaking process (versus breakage of the flake from other forces e.g., *in-situ* breakage).

Incomplete: those flakes/blades/bladelets that are broken and lack one or more distal or lateral portions but retain all or most of the striking platform (proximal portion of the piece). They frequently possess a clear dorsal and ventral surface and bulb of percussion.

Fragment/chunk: those broken pieces of flakes/blades/bladelets that do not possess the striking platform (proximal end). They possess a clear dorsal and ventral surface and sometimes preserve a portion of the bulbar scar. Core fragments and chunks are included here.

Thereafter, debitage is grouped by type into the following categories:

Flake (≥10 mm): a by-product of the flaking process, struck from a core and retaining characteristic features like a bulb of percussion, dorsal and ventral surfaces and a flaking platform.

Blade (≥25 mm): a by-product of the flaking process, struck from a core and retaining characteristic features like a bulb of percussion, dorsal and ventral surfaces and a flaking platform. Blades are flakes that have a length measurement that is two or more times the width measurement.

Core management pieces (≥10 mm; CMPs; following Hovers et al. 2011 and Malinsky-Buller et al. 2011): these are pieces that have been removed from a core to maintain and manage overall core shape/angles/lateral convexities/flaking platforms. These can be flakes, blades, or tablets, and they include all core rejuvenation flakes, débordant flake/blades (core edge), core tablets and core trimming flakes. These CMPs are often used to remove exhausted core flaking platforms, or remove a platform so that flaking from a new direction can be pursued. In the case of tablets, these remove the entire upper surface of a core, from which a new reduction sequence can begin.

Convergent flake (≥10 mm): flakes characterised by converging dorsal scars that meet at the distal end of the piece.

Formal tools

Large Cutting Tool (LCT): large unifacial, partly bifacial, or bifacial artefacts with intentional primary shaping removals and secondary edge shaping removals to create an artefact with a predetermined shape. Those with converging distal ends are commonly known as handaxes and picks, whereas those with large frequently oblique non-convergent distals are known as cleavers.

Retouched piece (RP): artefacts with intentional small removals that provide edge modifications, in preparation for tool use. These are further divided into:

> Scraper (RP): these retouched pieces show several unifacial removals (retouch) in one or more areas of the tool, which were used for scraping purposes (steep edged). These can be divided into several categories.
>
> Notch (RP): Notch (RP): piece with either a single or multiple small removal/s that creates a distinct/small concavity along a lateral edge.
>
> Retouched flake (RP): flakes with more than minimal or discontinuous retouch (that would then be a miscellaneous retouched piece), which cannot be readily assigned to a more formal type (e.g., a scraper).

Cores

Irregular: a core that has been worked in a completely unorganised fashion. The shape is more irregular and flatter than a polyhedral core. Characterised by only a few removals from any given direction.

Discoidal: a core that is worked in a radial fashion with all removals being worked from the outside of the core inwards (centripetal). This gives rise to a core that is frequently round in plan view and disc-like in profile, but cross-sectional thicknesses may vary and discoidal cores can also be elongated. Portions of cortex are frequently found in the centre of the core on both faces. Discoids can be unifacial or bifacial.

Results

Three-hundred and twenty-six stone artefacts were collected and analysed from the study site (Table 1). The majority were recovered from Block 4 (N=103; 31.60%), followed by Block 2 (N=74; 22.70%), Block 1 (N=68; 20.86%), Block 5 (N=42; 12.88%) and Block 3 (N=39; 11.98%). However, the highest density of remains came from Block 5 (4.7/m^2), then Block 4 (4.1/m^2), Block 2 (3/m^2), Block 1

(2.7/m^2) and Block 3 (1.6/m^2; Fig. 3). Nothing noteworthy can be said of this distribution because of the assemblages mixed and disturbed context.

Table 1: Artefact frequencies and raw material types.

Block	Artefacts	Artefact %	Artefacts/m2	Quartzite	Hornfels	Chert	Chalcedony
1	68	20.86	2.72	68	0	0	0
2	74	22.70	2.96	39	3	0	0
3	39	11.96	1.56	102	0	1	0
4	103	31.60	4.12	73	1	0	0
5	42	12.88	4.67	38	0	0	1
Totals	**326**			**320**	**4**	**1**	**1**
%				**98.16**	**1.23**	**0.31**	**0.31**

Almost all of the stone artefacts were produced on quartzite (N=320; 98.16%; Table 1). The remaining material types – hornfels (N=4; 1.23%) and chert and chalcedony (each N=1; 0.31%) – occur in extremely low numbers. It is clear that quartzite was the preferred material. Although, why this was the case cannot be assessed since the original assemblage location is not known; it may be that quartzite was abundant in the area, hence its high percentage. Should the original source be near the Harts River Valley then perhaps this quartzite reflects the predominant raw material type in the local river gravels. Currently though this cannot be confirmed. Artefact size classes are not excessively large and they range from 26-83mm, with an average of 51.24mm. None are microlithic.

Figure 3. The distribution of finds on Mimosa 61HO.

Debitage accounts for the greatest proportion of the assemblage (N=309; 94.79%) (Table 2). There is no small flaking debris and only three cores occur (0.92%; Fig. 4). It appears, depending on the geoarchaeological context of the source, that on-site manufacturing did not take place. The cores offer little information. Two are irregular (one bifacial) and one is an irregular discoidal core (radial flaking towards the centre but with irregular organisation). One of the irregular cores was also produced on a flake blank. From this limited sample it is difficult to understand overall manufacturing techniques and/or the reduction patterns, especially since there is such a high percentage of blades and flakes with laminar dorsal scars. The cores that reflect these reduction strategies are clearly absent from the study sample, which suggests that a considerable portion of the original assemblage is not represented in the gravel deposits across the study area.

Figure 4. Two irregular cores from the study area, both on quartzite.

Most of the debitage is complete (N=154; 50%), meaning they possess a fully intact striking platform and distal termination, but a large potion are incomplete (N=104; 34%) and fragmented (N=49; 16%). The vast majority of debitage pieces are non-descript and variable flakes (N=207; 67.65%), followed by more significant samples of blades (N=59; 19.28%; Fig. 5), convergent flakes (N=30; 9.80%; Fig. 6) and core management pieces (CMP; N=10; 3.27%; Fig. 7). Some of the flakes had laminar dorsal scars (N=46; 22.22%; Fig. 8) and seven of the CMPs were débordant pieces (meaning that the striking platform was struck on one of the flakes edges; 70%; Hovers et al. 2011; Malinky-Buller et al. 2011; Fig. 7). The presence of CMPs, which are essentially flakes removed to rejuvenate a core's striking platform, may indicate that more cores were present in the original assemblage even if not in the Mimosa 60HO assemblage.

Figure 5. A selection of blades from the study area.

Figure 6. Convergent flakes on quartzite.

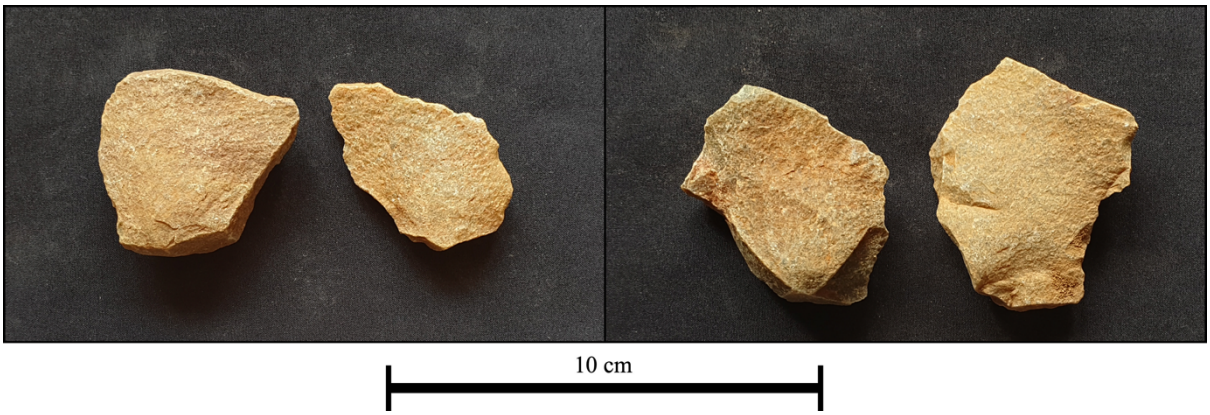

Figure 7. Débordant flakes from the study area (ventral views).

Figure 8. Flakes showing laminar dorsal scars, which are indicative of blade production.

Four different formal tool forms were identified, comprising 11 retouched notches (64.71%; Fig. 9), three scrapers (17.65%), two retouched flakes (11.76%; Fig. 10) and one large cutting tool (LCT; 5.88%; Fig. 11). The LCT fragment is interesting and it may be the broken end of a bifacial tool, or possibly a handaxe. An assessment of tool blanks indicates that the majority of the tools are made on flakes (N=15), whereas the blank type for the LCT fragment is indeterminate. Interestingly, one retouched notch was produced on a convergent flake made of hornfels (Fig. 9). Overall, the formal assemblage is small and limited in diversity.

Table 2: The debitage component of the Mimosa 61HO assemblage.

Block	Artefacts	Debitage	Debitage complete	Debitage incomplete	Debitage fragment	Debitage blade	Debitage flake	Debitage convergent	Debitage CMP
1	68	57	27	20	10	5	45	5	2
2	74	40	25	10	5	13	21	6	0
3	39	102	55	36	11	27	59	12	4
4	103	69	30	26	13	10	49	7	3
5	42	38	16	12	10	4	33	0	1
Totals	**326**	**306**	**153**	**104**	**49**	**59**	**207**	**30**	**10**
%			**50.00**	**33.99**	**16.01**	**19.28**	**67.65**	**9.80**	**3.27**

Figure 9. Notched pieces from the formal tool sample. Note the notch on the convergent hornfels flake (right plate, first specimen).

Figure 10. Retouched pieces on quartzite (left) and two scrapers (right).

Figure 11. Possible distal end of a large cutting tool (LCT).

Discussion

It is not known whether the small artefact sample recovered from the study area is a representative sample of the larger original assemblage from elsewhere. Irrespective, these artefacts were brought in from a non-local source and were then deposited onto the Mimosa 61HO property, where they were then mixed into the local gravels. A high number of artefacts also retain very fresh edge damage on alternate faces of a single edge, which indicates severe disturbance to the artefacts since their original deposition, archaeologically. Despite this though the pieces are fresh to slightly abraded in condition, suggesting their original conditions for preservation are somewhat favourable. Until the original location for these artefacts is found, and a comparative sample of material is collected and analysed from this location, it is not possible to assess the true techno-typological nature of the assemblage.

The assemblage is very limited in its size and in the types of artefacts that are represented. This in itself also suggests that the artefact sample is non-representative of the original source location. Given the frequent number of blades, convergent and laminar flakes, one would expect to find cores that reflect an associated reduction scheme. Yet, cores are nearly absent from the assemblage and those that do occur do not reflect reduction schemes associated with convergent flake and/or blade removals. The presence of a few core management pieces does, however, suggest that more advanced knapping has taken place and it is most likely that these cores are retained elsewhere at the original source.

The extremely small and non-diverse formal tool sample provides little insight into overall technological strategies. Since other types of artefacts in this assemblage have been shown to be incomplete, one must also assume that the formal tool sample is in a similar state. That said, the presence of several notches is interesting, and these types of artefacts are absent from other known sites elsewhere in the Harts River Valley (Kuman 2001). Perhaps these artefacts reflect a unique adaptation to local landscape and environmental conditions. Comparisons with material from the

nearby site of DB3 show no similarities though, other than the presence of pointed flakes that appear similar to this study's convergent flakes (Kuman 2001).

While it is not possible to determine a fixed chronology for the assemblage, a Middle Stone Age designation seems most appropriate given the characteristics of the small assemblage. The presence of a high percentage of blades, convergent flakes leading to points, flakes with laminar dorsal scars and notched pieces indicate that it might belong to a pre-Howiesons Poort Industry (Lombard et al. 2012), although this cannot be strongly supported on present evidence. Either way, it predates c. 40,000 BP.

Conclusions

The assemblage from Mimosa 61HO is a highly disturbed Middle Stone Age stone tool collection that was introduced to the area in gravels used on site for earthworks. The loss of context and considerable damage to the artefacts has limited detailed interpretations, and studying the assemblage further through additional surface collections at Mimosa 61HO would likely not resolve these issues. Ideally, the source for these gravels needs to be identified so that further destruction of the *in situ* deposits can be avoided.

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