Final Report:
Earlier Stone Age Geoarchaeology of the Northern Kruger Park

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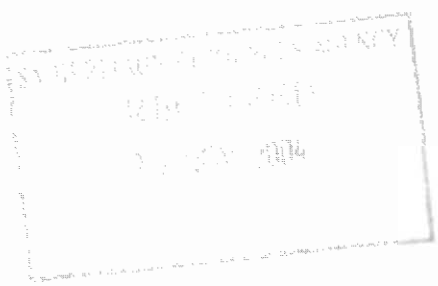

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1 Acknowledgements

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[1] Supervisors:

- Dr K. Kuman (Senior Research Officer, School of Geography, Archaeology and Environmental Studies).
- Prof. B. Moon (Head of the School of Geography, Archaeology and Environmental Studies).

2 Area of Study

Investigation was conducted into the Earlier Stone Age of the Northern Kruger Park, in the Limpopo and Levuvhu River basins. Iron Age survey work in the Northern Kruger Park by Eloff (1979), from the University of Pretoria, recorded several Stone Age occurrences (stone tools scattered on the land surface). Mr J. Verhoef (Manager, Cultural Resource Management Conservation Services) of the South African National Parks also recorded a number of sites discovered during work in the park and during other archaeological survey work (Verhoef 1997). An initial visit to a number of these sites, undertaken with Mr Verhoef, indicated that Earlier Stone Age stone tools were eroding out of sediments consisting of gravel, pebbles, cobbles and boulders (clast-supported 'tool-bearing deposits'). Middle Stone Age and Later Stone Age sites and stone tools were preserved to a lesser degree. Figure 1 shows the study area with the dominant geomorphology (features such as hills in the landscape) and associated archaeological sediments/deposits.

3 The Earlier Stone Age

The Earlier Stone Age record in southern Africa consists first of artefacts (predominantly stone tools) dating to a phase of the Oldowan Tradition, between 2 and 1.7 million years old (Kuman 1998, Kuman & Clarke 2000). This is then followed by an Acheulean Tradition, dating from 1.6 million years ago, with the majority of sites younger than one million years (Deacon & Deacon 1999, Klein 2000). This Acheulean Tradition then ends around 250-200 thousand years ago. Previous research has revealed that Earlier Stone Age sites occur throughout much of southern Africa. Most stone tools have been recovered from surface sites, with fewer than 20 sealed sites with deep sediment reported so far.

Oldowan assemblages across Africa comprise a variety of simple core forms and mainly unmodified stone flakes, with little change through time (Kuman 1998). The tool makers were able to evaluate different rock types (raw materials) and shapes and to adapt the most appropriate flaking techniques.

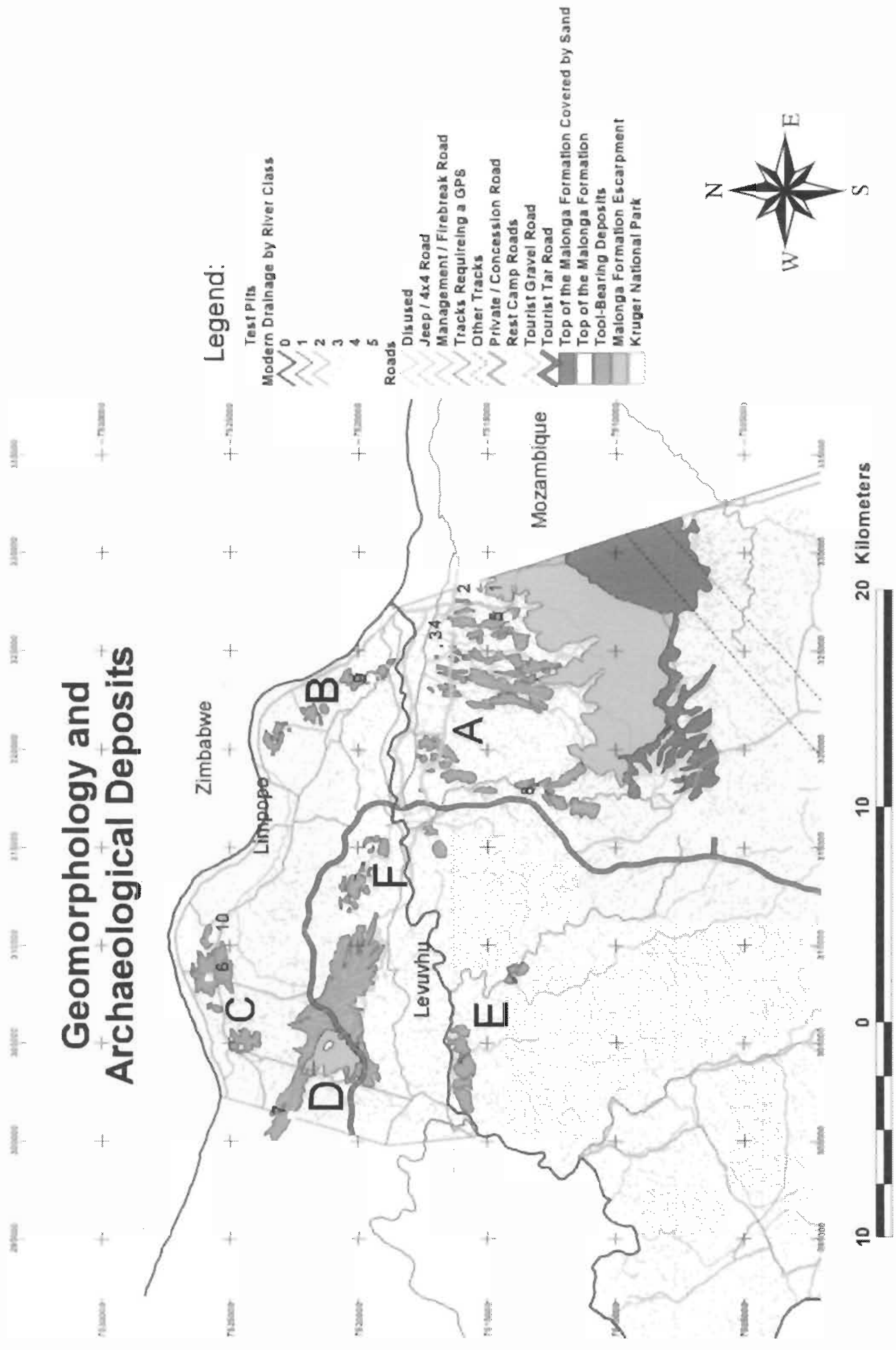


Figure 1: Northern Kruger Park study area showing the dominant geomorphology and associated archaeological deposits. Test pits are numbered from 1 to 10. Drainage and infrastructure data courtesy of the GIS Lab, Skukuza, Kruger National Park.

The Acheulean has been distinguished from the Oldowan by the addition of handaxes, cleavers, picks and other large bifacial tools to assemblages, along with apparent behavioural and habitat changes (Toth & Shick 1986, Clark 1994, Schick & Toth 1994). The Acheulean, which is characterised by a slow change in artefact types, is then separated into the early and later Acheulean, with a few researchers suggesting that a middle Acheulean may exist for specific regional sequences (Isaac 1977, Mason 1988, Roe 1994). If a middle Acheulean can be said to exist as a concept, well dated sites such as Olduvai Gorge and Olorgesailie suggest it occurs from around one million to 600 000 years (see Roe 1994). During this period bifaces became a more standardised component based on tool types from such sites as Olduvai Gorge in Kenya, with the tools not so refined as the late Acheulean types (Roe 1994, 204). The early Acheulean, dating from 1.6 to one million years ago, and the middle and later Acheulean, dating from one million to 250-200 thousand years ago (if the middle and later Acheulean are grouped together), differ in that later bifaces are often much more extensively trimmed, thinner, and more bilaterally symmetrical than the previous ones (Klein 1994, Klein 2000). Some Acheulean assemblages are also characterised by prepared core technology and by a range of flake tools, both of which are forerunners to Middle Stone Age types (Deacon 1975, Kuman 2001, Clark 1994).

During the Acheulean in southern Africa, in addition to the stone artefacts, limited evidence exists for the controlled use of fire; and no evidence of structures (e.g. a shelter) has been found (Toth & Shick 1986, Klein 2000). It is also believed that Acheulean people may have been closely tied to standing water (e.g. rivers or lakes), with a preference to live at such locations (Klein 2000). Deacon and Deacon (1999, 81) describe Acheulean people as terrain specialists that occupied riverine habitats. These are favourable habitats buffered against seasonal changes, and productive in animal and plant foods. At this time it is also unclear as to whether humans primarily hunted or scavenged.

In considering the actual tool-makers, many researchers believe that early representatives of the genus *Homo* produced most of the Oldowan and early Acheulean stone artefacts, with *Homo ergaster* or *Homo erectus* making Acheulean

artefacts until roughly 600 thousand years ago, and *Homo rhodesiensis* making the later ones (Klein 2000). All of the above tool-makers are termed hominids and form part of the family Hominidae. Humans are also part of this family.

4 Objectives

An Earlier Stone Age researcher's key aim is to learn more about hominid behaviour. To do this, one needs to know how the archaeological sites formed, as well as the age of the sites. An archaeologist also requires information on the environment in which the hominids lived. The Northern Kruger Park Earlier Stone Age research objectives are outlined below. Each of these objectives is linked and cannot be considered alone.

Site Formation Understanding Earlier Stone Age site formation is the first step in the investigation. Integral to understanding a site's formation is the contribution that both past and present geomorphological processes may have had on altering cultural remains. Stone tools may have been washed into a stream during a storm and transported several kilometres from where they were made. In such a case it is more difficult to learn about behaviour than if we found a site with stone tools lying next to an animal that had been butchered. One needs to know how the stone tools became and have remained preserved.

Technology and Industry How old are the stone tools? Do all of the stone tools belong to a specific time period within the Earlier Stone Age? What are the characteristics of the tool industry? Is there consistency in the types of tools across the landscape? All of these questions need to be considered before one can consider hominid behaviour.

Hominid Behaviour The underlying objective of Earlier Stone Age research is to understand hominid behaviour throughout the course of hominid evolution. Once the site formation context and age of the site has been established, patterns relating to hominid behaviour can be considered.

The Hominid Environment What type of environment were the hominids living in? Were they living in a forest or at the edge of a desert? The type of environment they were living in will be linked to their behaviour and their day to day activities.

After the initial assessment of the Stone Age archaeology in the Northern Kruger Park, a full survey of the area was carried out to determine all locations of artefacts and stone tools sites. The findings from the survey were then used as the basis from which to achieve an understanding of the age of the stone tool sites, as well as how the sites formed. It also provided data on the hominid environment and behaviour. Diagnostic stone tool types were used to differentiate between the Earlier, Middle and Later Stone Age occurrences, as well as provide a relative age of the tools.

5 Results

5.1 Site Formation

The tool-bearing deposits that preserve Earlier Stone Age stone tools in the Northern Kruger Park have formed due to unique, localised geomorphic conditions (Figure 1). The Malonga Formation, a dominant rock component of the geology, has through erosion provided the material (sand, gravel, pebbles, cobbles and boulders) necessary for tool-bearing deposit formation. These deposits form features in the modern landscape and constitute an important component of the geomorphological history of the region.

Earlier Stone Age hominids were utilising the eroding clasts (pebbles, cobbles and boulders) from the Malonga Formation to make stone tools. Once used, the tools were dropped on the landscape, and subsequently through a combination of alluvial (stream and river wash) and colluvial (sheet wash over the land surface) processes became engulfed within stream beds and outwash alluvial fans radiating from the Malonga Formation highlands. Fluvial (water) activity concentrated sediment, pebbles, cobbles, boulders and artefacts along drainage

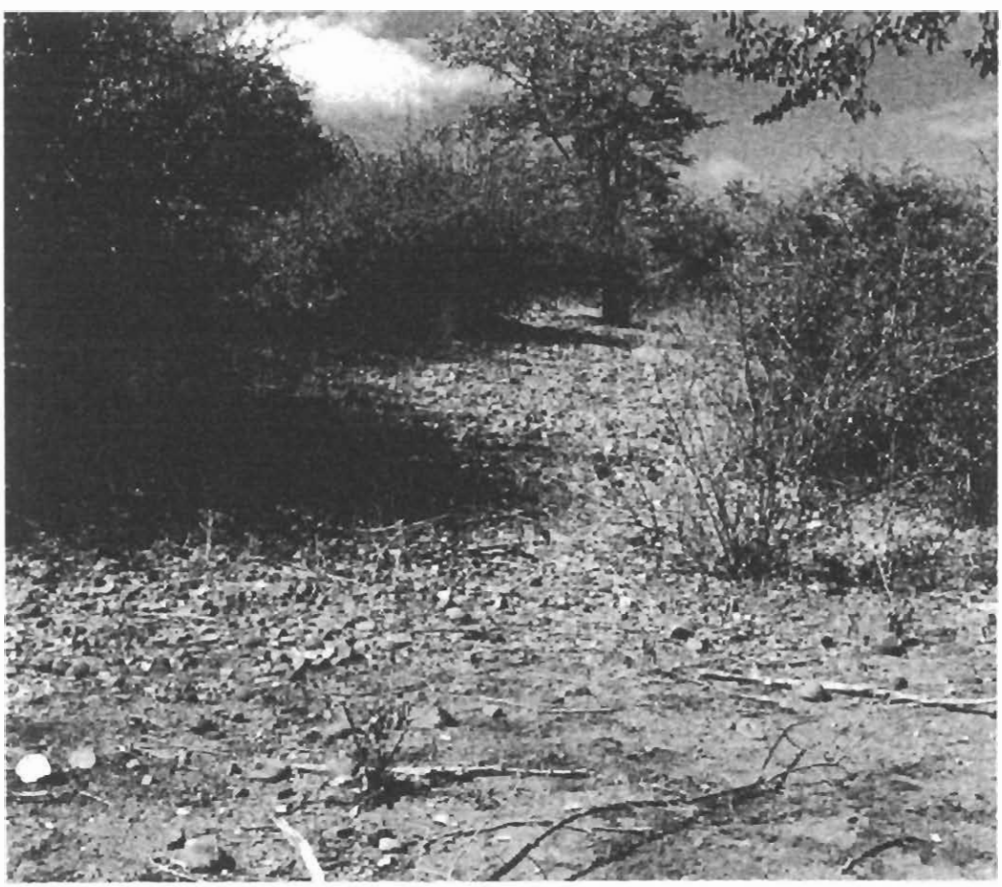
lines. Localised colluvial processes also contributed, with materials washed down the slopes of the retreating escarpments into adjacent streams. Streams thus became filled with both the Malonga clasts and stone tools. These alluvial and colluvial deposits then formed the resistant areas which occur as ridges and hills in the landscape today (Figures 1 and 2). The deposits are far more resistant than the surrounding decaying, gravely basalt bedrock which forms the low areas between these features (Figure 3). Calcification of these deposits provided further resistance to erosion. Such features represent a local inversion of the topography, with the streams beds of the past now forming ridges on the landscape today.

5.2 Technology and Industry

The Earlier Stone Age archaeology preserved within these tool-bearing deposits is thought to be a middle Acheulean industry. The relative appearance of the handaxes indicates that they should be placed within the middle Acheulean, as only a few examples are as extensively trimmed/flaked and refined as later Acheulean examples (Figure 4). Several lines of evidence indicate that the characteristics of the industry (middle Acheulean) are real and not controlled by raw material type. The Northern Kruger Park has been extensively surveyed (roughly 350 square kilometres), and it is large enough that at least a few more refined examples would have been found if the relative working of the handaxes be put down to incomplete working of the tools at a factory site. In support of this, the area was well watered at times and would also have been a favourable place for hominids to live, and thus many refined examples would have been found if they were a component of the industry. In addition, the rest of the formal tools, cleavers, picks, unifaces and scrapers, are not inconsistent with a middle Acheulean time for the industry.

The prepared cores from the Northern Kruger Park (a prominent component of the industry) follow the Levallois concept, and although they may be larger and less refined looking than many European examples, the hominids still employed the technique to produce predetermined flakes from the core. A characteristic

(a)



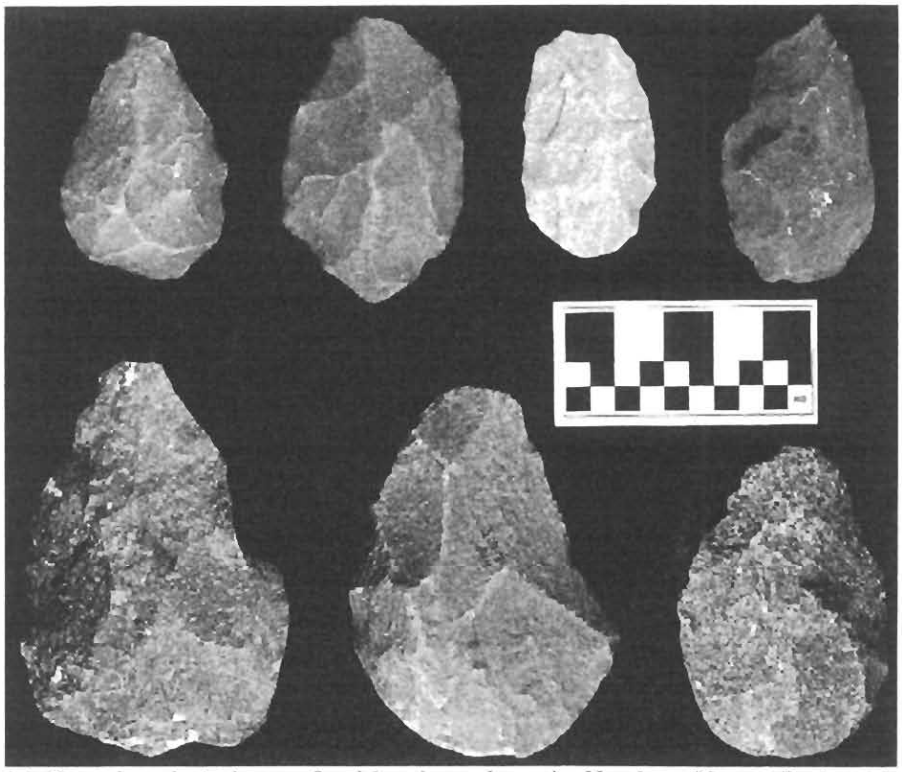
(b)

Figure 2: Tool-bearing deposit ridges.

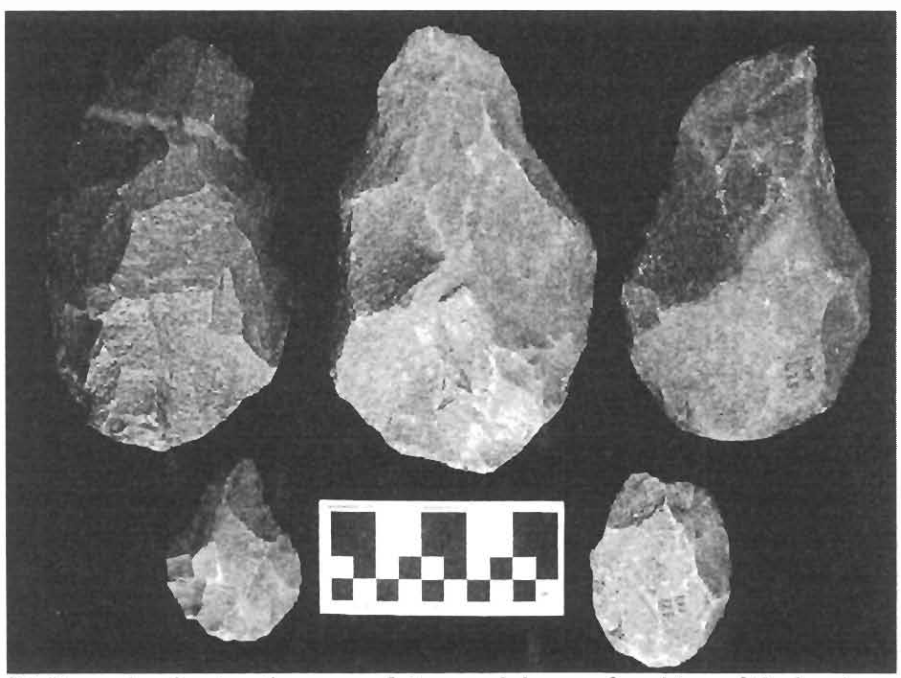
(a) Thin layer of tool-bearing deposit, overlying decaying, calcified basalt bedrock.

(b) River cutting showing a thick tool-bearing deposit layer overlying decaying, calcified basalt bedrock.

Figure 3: Tool-bearing deposit stratigraphy



(a) Note the relatively unrefined handaxes from the Northern Kruger Park, with the two top left handaxes the most refined examples found to date. The top right handaxe has a broken point.



(b) Examples showing the range of sizes, and degree of working, of the handaxes from the Northern Kruger Park. The two far left pieces are refined examples. The bottom right handaxe has a broken point.

Figure 4: Handaxes

of the prepared core types is the inclusion of a Victoria West-like component (Figure 5). In the Victoria West method, a core is prepared to predetermine the shape of the flake, which is detached from the side of the core and is thus often wider than it is long. Large side-struck flakes are a characteristic of the Victoria West Industry and have been emphasised because of their use for handaxe and cleaver blanks, or as cutting tools. This industry has been found from Victoria West in the Karoo, to the Vaal River Valley, and to Nakop on the border with Namibia, but has never been reported previously this far east or north.

The prepared cores from the Northern Kruger Park are relatively large and unrefined when compared to later examples, with this exemplified in the Victoria West-like types. They are not out of place in the middle Acheulean and could merely represent the first appearance of this technology in the region. By late Acheulean times (600 to 250-200 thousand years ago) prepared core technology is prominent, becoming increasingly common towards the end of the Acheulean.

The majority of the tools that constitute the tool-bearing deposits represent a single industry within the Acheulean, as there is a consistency across the landscape when these tools are analysed. None of the tool types recovered from the test pits indicates mixing from different time periods. The tool-bearing deposits represent an industry within the middle Acheulean, which contains evidence for the earliest appearance of prepared core technology within the region. The geomorphological data support a middle Acheulean time period.

5.3 Hominid Behaviour

There is a distinct east-west change in tool concentrations across the Northern Kruger Park. This pattern can be explained in terms of the distribution of the quality of the raw materials (or rock types) for making stone tools. In the east of the Northern Kruger Park the Malonga Formation contains good quality raw materials, and a greater number of tools is found in the east. This was a favourable area for hominids and raw material quality was a major draw. The

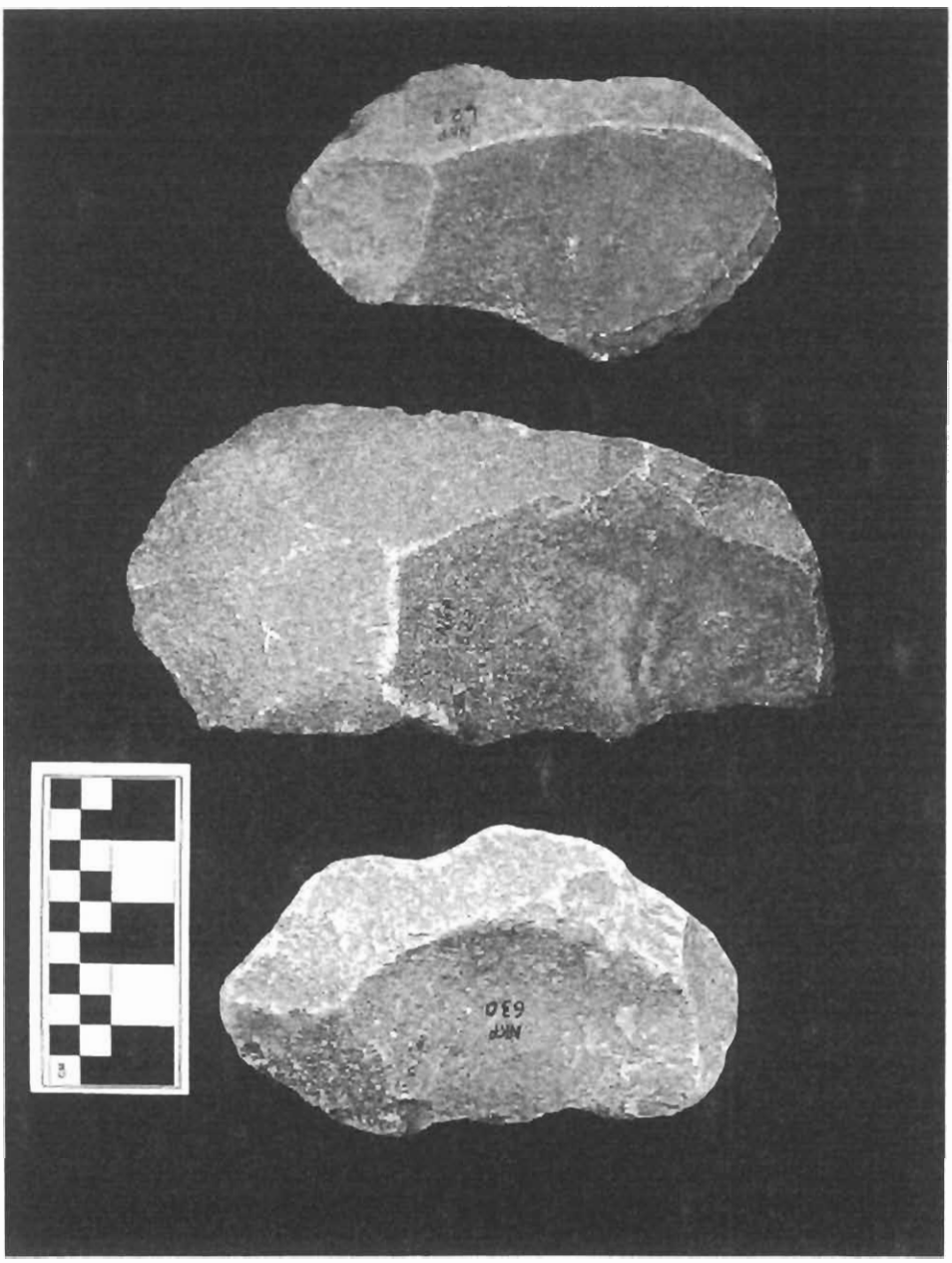


Figure 5: Prepared cores for preferential flakes: Victoria West-like.

good quality raw materials here and greater amounts of stone tools preserved, make the presence of hominids more archaeologically visible in the east. In the west, where good raw materials are scarce, tools were probably carried away with less discard. It is also possible that there was a greater amount of hominid activity within the east due to a preference for better quality raw materials, and this might also have resulted in a greater number of tools becoming engulfed within the deposits.

5.4 The Hominid Environment

A few conclusions can be suggested about the environment in which the hominids lived and carried out their daily activities. In terms of the environmental and climatic conditions necessary for the formation of the tool-bearing deposits, one can look at the modern drainage and associated deposits for analogues. The modern ephemeral drainage is insufficient to produce stream bed deposits of a similar nature. Modern stream deposits are dominated by fine sediments (sand and small pebbles) with only the occasional clast-supported gravel bar containing pebbles, cobbles and boulders. The modern Levuvhu River, however, has permanent flow and higher energy. It contains large sections of clast-supported gravel bed deposits, as well as smaller gravel bars, along stretches near to remnants of the Malonga Formation. These deposits are virtually indistinguishable from the stream bed tool-bearing deposits, dominated by pebbles, cobbles and boulders. The modern Levuvhu River has sufficient energy to collect, transport and then deposit the same clast sizes as preserved within the tool-bearing deposits. In contrast, the modern ephemeral drainage, even during heavy thunderstorms, does not have the energy to achieve this. This finding points to different environmental and climatic conditions during the formation of the tool-bearing deposits than occur at the present.

There are two climatic regimes that could potentially account for the formation of the deposits:

1. Climatic conditions that were wetter than present (increased rainfall), producing high energy permanent and semi-permanent streams radiating

from the Malonga Formation, with clast-supported stream bed deposits.

2. Climatic conditions with greater runoff than present producing clast-supported stream bed deposits. This may include increased thunderstorm and flood action. This would occur in a drier climate than present, with reduced vegetation cover allowing for greater runoff, and also the easier mobilisation of unprotected clasts to be incorporated in the stream bed deposits.

As the Malonga Formation remnants are fairly small in size, with their catchments insufficient to support semi-permanent to permanent streams in the mode of the current Levuvhu River, the second climatic regime is supported. It thus appears that the tool-bearing deposits accumulated under more arid climatic conditions than present, with a reduction in vegetation cover. It cannot be known for certain if the hominids were occupying the landscape at this more arid time, or if they were there previously during wetter times and the tools only became incorporated at the later time.

The Northern Kruger Park appears to have been a favourable location for hominid activity. Hominids would have had access to water from the Palaeo-Limpopo and Palaeo-Levuvhu rivers, as well as abundant food resources in the riverine habitat. In a more arid climate than present, if the hominids were indeed inhabiting the landscape, then the presence of water and food resources along the water courses would have been even more critical for survival.

6 Publications

Gibbon, R. J. 2004. *Earlier Stone Age Geoarchaeology of the Northern Kruger Park* - MSc Dissertation. Johannesburg: University of the Witwatersrand.

References

Clark, J. D. 1994. The Acheulian Industrial Complex in Africa and elsewhere. In: Corruccini, R. S. & Ciochon, R. L. (eds) *Integrative paths to the past, paleoanthropological advances in honor of F. Clark Howell*: 451–469. New Jersey: Prentice Hall.

Deacon, H. J. 1975. Demography, subsistence, and culture during the Acheulian in southern Africa. In: Butzer, K. W. & Isaac, G. L. (eds) *After the Australopithecines*: 543–569. The Hague: Mouton Publishers.

Deacon, H. J. & Deacon, J. 1999. *Human beginnings in South Africa: uncovering the secrets of the Stone Age*. Cape Town: David Philip Publishers.

Eloff, J. F. 1979. *Verslag oor argeologiese navorsing in die Nasionale Krugerwildtuin gedurende Junie en Julie 1979*. Pretoria: Unpublished Report.

Isaac, G. L. 1977. *Olorgesailie: Archaeological studies of a Middle Pleistocene lake basin in Kenya*. Chicago: The University of Chicago Press.

Klein, R. G. 1994. Southern Africa before the Iron Age. In: Corruccini, R. S. & Ciochon, R. L. (eds) *Integrative paths to the past, paleoanthropological advances in honor of F. Clark Howell*: 471–519. New Jersey: Prentice Hall.

Klein, R. G. 2000. The Earlier Stone Age of southern Africa. *South African Archaeological Bulletin* **55**: 107–122.

Kuman, K. 1998. The earliest South African industries. In: Petraglia, M. D. & Korisettar, R. (eds) *Early human behaviour in global context: the rise and diversity of the Lower Palaeolithic record*: 151–186. London: Routledge.

Kuman, K. 2001. An Acheulean factory site with prepared core technology near Taung, South Africa. *South African Archaeological Bulletin* **56**: 8–22.

Kuman, K. & Clarke, R. J. 2000. Stratigraphy, artefact industries and hominid associations for Sterkfontein, Member 5. *Journal of Human Evolution* **38**: 827–847.

Mason, R. J. 1988. Cave of Hearths Makapansgat Transvaal. *Occasional Papers of the Archaeological Research Unit* **21**: 1–711.

Roe, D. A. 1994. A metrical analysis of selected sets of handaxes and cleavers from Olduvai Gorge. In: Leakey, M. (ed) *Olduvai Gorge Volume 5: exacavation in Beds III, IV and the Masek Beds, 1968-1971*: 146–234. Cambridge: Cambridge University Press.

Schick, K. D. & Toth, N. 1994. Early stone age technology in Africa, a review and case study into the nature and function of spheroids and subspheroids. In: Corruccini, R. S. & Ciochon, R. L. (eds) *Integrative paths to the past, paleoanthropological advances in honor of F. Clark Howell*: 429–449. New Jersey: Prentice Hall.

Toth, N. & Shick, K. D. 1986. The first million years: the archaeology of protohuman culture. *Advances in Archaeological Method and Theory* **9**: 1–96.

Verhoef, J. 1997. *Important cultural resources of the Limpopo and Levuvhu valleys in the Pafuri area of the KNP.* Pretoria: Unpublished Report.