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**Archaeological Investigations in the Makapansgat and Swartkrans
Valleys, Northern Province, South Africa**

*Progress report on fieldwork and research activities
February 2001 – March 2002*

Proposal for future research 2002-3



Submitted to the Makapansgat Research Advisory Committee, BPI,
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April 2002

1. Introduction

Previous reports to the Makapansgat Research Advisory Committee have included a detailed statement of the research aims and objectives of the Project, and so the current report will include a brief summary of these points before detailing the specific work during the year 2001-2.

To briefly summarise, the Makapansgat Middle-Pleistocene Research Project was initiated in 1997 for the purposes of conducting archaeological research in the Makapansgat Valley and the immediately surrounding valleys, with a view to understanding the changing nature of hominid behaviour from the Middle through to the end of the Upper Pleistocene (broadly correlating to the Early, Middle and Later Stone Age). This time period chosen on account of current debates surrounding major changes in hominid behaviour (concerning the appearance of symbolism, long term planning and logistical use of landscape resources) thought to accompany the transition to anatomically modern humans. The Cave of Hearths, and the archaeological deposits in the Makapansgat and Swartkrans valleys provide an ideal location in which to investigate such potential changes since they preserve a range of archaeological deposits within a circumscribed local topography.

A secondary aim of the project has been a desire to explore ways of integrating archaeological evidence from both a cave and an open-air, landscape context. Whilst caves can provide long time sequences of hominid activity, many, if not most, of the daily activities of hominids are likely to have occurred in an open-air context. Residues from these activities are common in the South African landscape and they present a real interpretive challenge for future archaeology.

The specific aims of the Project are, therefore, as follows:

- 1) to re-analyse the lithic and faunal collections from the Cave of Hearths, previously excavated in the late 1940s and early 1950s, and to include a re-analysis of the formation and infilling processes for the Cave of Hearths complex;
- 2) to consider the hominid activities at the Cave of Hearths into their local regional context, through a programme of intensive landscape survey of the Makapansgat, Swartkrans and immediate valleys;

- 3) to undertake limited test excavation of major archaeological localities to determine their character and integrity, and, in the case of the Cave of Hearths, the nature of currently remaining archaeological deposits.

The field research for the Project was planned for five seasons (1997 to 2001 inclusive), with study season(s) to follow to complete analysis of all collections. The principal field activities of the Project have involved the intensive field-walking survey of the local region and the collection of samples for mineralogical, magnetic and chronological assessment of the site.

South African National Monuments Council, now the South African ^{Heritage} Human Resources Agency research permits were acquired and maintained by one of the Principal Investigators, Patrick Quinney (late of the University of Bristol, UK) for work at the Cave of Hearths, and at specific localities, on the Makapansgat and Swartkrans farms.

The research activities for the Project have been supported by a number of sources. The main Project expenses and the costs of the principal investigators have been supported by grants from the British Academy and more recently, the Arts and Humanities Research Board (AHRB) awarded to Dr A. Sinclair. The daily subsistence expenses for the student field crews have been met by small grants awarded by the Vacation Field Studies fund at the School of Archaeology, Classics and Oriental Studies at the University of Liverpool that funds the field training of students at the University of Liverpool. Students participating in the Project from other universities (Bristol, Cambridge, Cardiff, London and Southampton) have received some degree of financial support from their home institutions.

2. Research Activities in 2001

2.1 *Re-analysis of the Cave of Hearths excavation assemblages from the 1940s & 1950s*

In the original site report (Mason 1988), Mason identified eleven archaeological horizons ranging in age from the late Acheulean of the Earlier Stone Age to the historical Iron Age. Beds 1-3 contain ESA later Acheulean artefacts, purported hearths, fossil faunas and a hominid mandibular fragment - *Homo cf. rhodesiensis* (Tobias, 1971). The earliest occupants of the cave are suggested to have built fires directly onto the surface of deep guano accumulation covering the floor of the cave causing them to smoulder and calcine.

The ESA sequence most likely terminated ca. 250 to 200 kya after which an occupational hiatus occurred. A thick sterile clastic deposit of roof spall, rubble and colluvium accumulated, probably during the full glacial conditions of (O18 Stage 6). After this hiatus the first Middle Stone Age hominids utilised the reduced floor area of the cave accumulating Beds 4-9 which are dominated by points and flake tools, and which includes artefacts made by Levallois prepared core technique. Mason identified the lithic assemblages from Beds 4 and 5 as a manifestation of the early phase of the Pietersburg industry (facies of the MSA 2a and 2b techno-complex) the regionally dominant MSA variant of the Northern Province. After the MSA horizons Later Stone Age hominids occupied the cave (macrolithic LSA Smithfield/Albany) discarding the lithic assemblage in Bed 10. The uppermost Bed 11 is composed of an historical Iron Age material (most probably associated with the Kekana occupation of Historic Cave) and recent detritus.

The materials excavated by Kitching and Mason in the 1940s and 1950s still have considerable value for current and future archaeological research. Obviously, the great depth of the excavated stratigraphic sequence provides an ideal opportunity to investigate change in lithic and faunal assemblages through a long and important time frame. Additionally, the quality of the excavation undertaken at the site makes it possible to use the original excavation records within any new interpretation of the stratigraphic sequence at the site. Despite the heavily brecciated nature of the deposit (and the consequent need to use dynamite and jack hammer to excavate these deposits), a careful attempt was made to excavate by (12 inch) spits through the deposit, record the exact provenance of many pieces both retouched and large flake and blade blanks according to the alphanumeric site grid – that still hangs in the Cave today. It is still possible, therefore, to locate many of the excavated materials to their original (3-dimensional) location within the Cave of Hearths, and as a consequence to relocate them within any reinterpretation of the stratigraphic sequence, and also to take account of localised stratigraphic disturbances within the site, such as that called the Swallow Hole.

Since 1997 the Project has been engaged in a re-assessment of both the excavated materials from the Cave of Hearths and the likely geological processes that initially created the Cave of Hearths/Historic Cave complex and the filling of the Cave of Hearths in particular from Middle-Pleistocene times onwards.

2.2 *The formation of the Cave of Hearths*

It is clear from the published site report that Mason originally thought the Cave of Hearths had formed as a cist within the dolomite, and was oriented in a roughly east-west direction, perpendicular to the direction of the Makapansgat Valley. The Cave opening would then have looked outwards towards Sugarloaf Hill. The area of the cave available for hominid occupation would have been much smaller than the area of the Cave open today.

A re-interpretation of the formation processes for the Cave of Hearths Complex (including Hyena and Rainbow Caves and Python Gully, has been undertaken by Dr Alf Latham (SACOS, University of Liverpool) and during the last year, Dr Latham has finalised his interpretation of the complex (Figure 1).

The Cave of Hearths is one infill component of a large and highly complex Makapan phreatic cave system situated high above the Mwaridzi stream bed within the Makapan Cave Valley. The majority of the Makapan Cave system was formed phreatically within the body of the Malamani dolomite by the sub-surface capture of stream flow originating from the direction of the adjacent Python Gully. (The exception is the present-day Historic Cave which formed through subsidence, when the roof of an ancient solutional chamber parted along bedding planes within the dolomite, producing a characteristic stepped appearance in the current chamber.) The Cave of Hearths developed through the phreatic solution of susceptible wallrock controlled by local fault planes, the presence of which may still be noted within the south-west facing dolomite wall at the 'rear' of the excavated cave. The speleogenesis of the cave is intimately associated with that of the adjacent Hyaena Cave. Both caves comprise faces of the same solutional system, with subsequent divergence in the tempo of infilling events caused by the presence of a dolomite septum which separated the two depositional basins (Brain 1988). Both caves contain extensive, and in places massive, deposits of speleothem. Within Hyaena Cave this is highly impure and intercalated with layers of fine clastic sediment. The flowstones from the Cave of Hearths are generally cleaner than those from Hyaena Cave, and the sequence is dominated by a single massive speleothem that would have blanketed the majority of the vadose void. Elsewhere in the Cave speleothem has been laid down upon soft sediments containing clasts of dolomite roof spall. These clastic sediments comprise the infill of a stratigraphically lower solutional chamber; fine elements have subsequently been winnowed away leaving a block-supported void below the central and rear-portion

speleothem. This structure has subsequently deformed at various stages with the fault-controlled, subsidence of indurated sediments in the central portion of the cave - "subsided block" (Mason 1988) - and the catastrophic collapse of the unsupported flowstone floor and overlying sediments towards the rear wall of the cave - "swallow hole" (Mason 1988). Both events were perceived by the original excavator as contemporaneous (1951-53 excavation notes in Mason, 1988) and having occurred prior to the deposition of Bed 6 (MSA). According to Mason (*ibid*), sediments and clasts from Beds 1 to 5, overlying the swallow hole, collapsed and choked the connection between the Cave of Hearths and the lower solutional chamber, with Bed 6 then being deposited on top of the collapse debris.

Limited test excavation in 1998/1999 of backfill sediments abutting the "Stone Age Rubble" cone (which today provides access from the Cave of Hearths to Historic Cave) has defined the lateral and vertical limits of Mason's 1953 excavations and uncovered *in situ* sedimentary horizons derived from winnowed sediments originating from the "Stone Age Rubble". These sediments contain extensive accumulations of Acheulean artefacts and faunal remains. The undifferentiated sediments abut and underlie a massive fallen stalagmite and continue in an unbroken sequence into the lower solution chamber. The breccia from which the winnowed sediments are derived is stratigraphically lower (< 1.5 metres) than the Subsided Block containing Beds 1-4. These excavations mark the spatial limit of Mason's explorations and the relationship between the rubble and central portion of the cave was thus understandably overlooked, however, we remain highly confident in the internal consistency of Mason's defined areas of excavation, and of the stratigraphic and spatial integrity of the archaeological horizons within the prescribed block and fault zones of the cave.

It is clear from Dr Latham's re-interpretation of the extant remains, that a considerable volume of unexcavated archaeological sediments still remain within the Cave of Hearths to the south-eastern side of the area excavated by Mason. Mason interpreted the Cave as opening directly out into the present Makapansgat Valley with a northeast-facing entrance, that he describes as forming a dolomite roof (i.e. upslope) with the incorporation of roof spall and up-slope colluvium into the clastic sediments filling the cave. Following the Bed 3 occupational hiatus, a massive thickness of roof spall accumulates against the northeast or "front" wall of the cave, forcing hominids, entering during the Middle Stone Age, to clamber down over the rubble talus and occupy a greatly restricted area of the cave between

the talus and the "rear" dolomite wall, an area overlying the eventual swallow hole. It now seems clear that the area within the Cave available for occupation was always far more extensive, and indeed that much of the primary floor area of the cave's Earlier and Middle Stone Age occupancy remains unexcavated. This new interpretation suggests that the original entrance to the Cave occupied a position to the extreme Southeast of the site, in an area now overlain by massive blocks of roof collapse. The opening of the cave did not progress from East to West, but was likely rotated in a Northwest to Southeast direction, with the primary opening to the Southeast. Colluvium and dolomite roof spall would have created a talus in this zone down which hominids would have entered the chamber. Under this revision, the occupational beds recognised by Mason and colleagues were deposited deeper within the cave. The significance of this new reconstruction of the cave structure is that it changes the relationship as presently understood between areas of occupational foci within the cave. Rather than viewing the excavated areas of the cave as representing the central focus of Early Stone Age occupation, with post-Acheulean occupants being forced to inhabit a small trench against the rear wall, the occupational zones of the cave should be viewed as part of a potentially much larger system. It is also probable that there were specific hominid activities that took place in the sunlit-zone of the Cave which remains unexcavated at present.

2.3 *The environment of deposition of the Cave of Hearths sediments*

In 2000 small sediment samples were extracted from the witness block beneath the column supported overhang at the back of the Cave of Hearths. These samples, running from the top to the base of the column have been subject to x-ray diffraction (XRDF), magnetic susceptibility and palaeomagnetic analysis by Andy Herries, as part of his doctoral research (see section 6.4 below). The analyses were completed in late 2001. XRDF can be used to determine the composition of the sediments, whilst palaeomagnetic analysis identifies the direction of magnetism when the sediments were deposited, and can be used as a basic indicator of broad age. Magnetic susceptibility can be used to identify the broad climatic conditions when the sediments were deposited.

XRDF analysis indicates that the sediments in this block are primarily composed of quartz along with magnetite and haematite, the common composition of most sediments in South African caves. The analysis of palaeomagnetism indicates that, with the exception of the lowest basal sample, all of the samples show a normal pattern of magnetism, indicating that

they were deposited sometime since 780 kya. The basal sample, however, reveals an intermediate reversal, that may correlate to a brief reversal event during this time period, such as the Emperor event approximately 420 kya. Finally magnetic susceptibility indicates a changing climatic curve from a cold climate at the base, through a warm climate and finally back to a cold climate again. Along this broad climatic curve, there is evidence for constant smaller fluctuations, though the time frame of these fluctuations cannot be determined at present.

2.4 *The lithic assemblages*

When Mason undertook his analysis (published in 1962 and 1988), his primary aim was to characterise the changing nature of stone tool forms through time (from the Early to the Middle Stone Age, and particularly through the Middle Stone Age as it developed. In doing so, Mason initiated the use of statistical techniques for the analysis of lithic collections in South Africa. Mason's own published work (and the paper archive located in the Department of Archaeology, University of the Witwatersrand) provides detailed information on the provenance, size and raw material type of all the retouched pieces, and many of the regular flake and blade blanks (that he considered to have been used) and a number of cores. It is also clear from the size range of the lithic pieces in the collections from the site that great care was taken to ensure the best standards of collection of material from the excavated blocks. It is a tribute to the quality of the excavations at the site during the 1940s and 1950s that we have been able to undertake the analyses that are described below.

Mason's own analyses, as noted above, focused on describing and interpreting the changes in stone tool form. In common with other lithic analysts of his time, Mason did not focus extensively on the lithic technology by which we mean the techniques by which stone was worked, how specific tools were made, and the detailed patterns of provision and movement of materials into and out of the site that can only be discerned from a technological analysis of the full range of lithic materials from the cave. (Such analyses did not enter Palaeolithic archaeology until the very end of the 1960s and did not become standard practice until the 1980s.)

The analysis of the lithic assemblages by the Project has, therefore, focused on a technological analysis of a full range of stone artefacts, so as to complement Mason's

original typological and metrical analyses. The Early Stone Age collections from Beds 1 to 3 have been analysed by Dr John McNabb (Department of Archaeology, University of Southampton), and the analysis of the Middle and Later Stone Age collections from Beds 4 to 9 are currently being analysed by Dr Anthony Sinclair. On the basis of Mason's excavation recording, we are able to identify materials that have secure provenance to particular beds, and to exclude materials that may have been later mixed into earlier deposits.

The lithic assemblages from Beds 1 to 3 were examined by John McNabb in 1998, 1999 and 2000. In addition to the recording of standard metrical measurements, particular attention is being paid to the evidence for sequences of flaking interpretable from both debitage and core types, as well as the patterning of negative flake scars visible on the dorsal surface of flakes. When combined with the identification of raw material types, this information makes it possible to reconstruct the manner in which the major tool forms (such as handaxes, cleavers and flaked flakes) were manufactured, and to the location of manufacture (either inside or outside the Cave of Hearths). A first draft of his re-analysis was completed by the end of 2001.

In addition to the detailed interpretation of the methods and sequences of manufacture of particular tool forms, John McNabb's analysis has also considered (1) the degree of symmetry present in handaxes (throughout the sequence) and how this might reflect upon standards of acceptability, (2) the presence or absence of Levallois technology in the Early Stone Age beds, (3) whether it is possible to identify the location of manufacture to the inside of the cave, the cave mouth or further afield, and, finally, (4) if there is any indication of the common occurrence of 'domestic' activities such as hide working in the Cave.

In brief, John McNabb has concluded that Levallois technology is absent from the Early Stone Age beds, once only those pieces with provenance secured to Beds 1 to 3 are included. The range of tool forms also indicates that few, if any, 'domestic' activities are likely to have taken place at the site and the reconstruction of the manufacturing stages in handaxe and cleaver manufacture indicate that early stages of manufacture were conducted outside of the Cave or its immediate environs. The raw materials used, as noted previously by Mason, were available within the immediate local environs. The quantity and range of

lithic debris recovered from the Cave has leads McNabb to suggest that Early Stone Age occupation of the Cave of Hearths was of small scale, with likely brief and infrequent episodes of use. The Cave does not form the central focus of a long-term occupation of this landscape during these times.

The analysis of the Middle Stone Age lithic assemblages is currently in progress. Therefore, we are currently not in a position to provide detailed conclusions as to the nature of the technology used in the production of particular tool forms and the exact stages of manufacture, and location of manufacture for the tools. It is, however, already possible to concur with Mason's comments that the Middle Stone Age beds show a common presence of Levallois technology in both Levallois flake and Levallois point forms, what appears to be a clear type of prismatic blade technology, as well as a greatly increased range of raw material types in use. The examination of the Middle Stone Age assemblages will be completed this summer 2002 (see below), with a view to the completion of the analysis in 2003.

2.5 *The faunal assemblages*

At present, the re-examination of the faunal collections from the Cave of Hearths (to be undertaken by Patrick Quinney) is not as far advanced as was originally planned. The original analysis of the material by Basil Cooke (1988) provides a detailed list of the species present in the faunal collections. The planned re-examination was to focus on the agents responsible for the accumulation and the patterning in the faunal assemblages at the site, with particular attention paid to the type of bone fracture, or tooth marks identifiable and the presence and location of any cut marks. In 2000, an initial study was undertaken by Patrick Quinney and two students from University College London, resulting in two undergraduate dissertations (noted below section 6.1).

The faunal samples studied are highly fragmented with a large number of mid shaft bone fragments present, and few epiphyses. Their findings suggest that throughout the sequence of Early and Middle Stone Age beds, both carnivores and scavengers (principally leopard and hyena) are the major accumulators of the faunal assemblages. Although there is clear support for hominid involvement with a small number of bone fragments showing clear cut marks, further supported by a scanning electron microscopic analysis of latex moulds of selected bone fragments. This preliminary interpretation of the importance of animal

agents in the accumulation of the faunal assemblages supports the initial findings of John McNabb on the basis of the lithic assemblages.

Further analysis is clearly important, and a suitable investigator for re-analysis of these assemblages will be sought. The Project is pleased that the Cave of Hearths faunal assemblages are the subject of study of a Masters student (MA Palaeoanthropology) in the Department of Archaeology at the University of the Witwatersrand.

3. Landscape Survey of the Makapansgat environs

Landscape survey has followed a standard fieldwalking methodology. In simple terms, small crews numbering from 6 to 10 individuals, as appropriate, walk predetermined areas of terrain along the valley bottoms, valley sides or uplands, maintaining as closely as possible, a straight line with approximately 5 metres distance between walkers. Of necessity, the steep nature of many of the valley sides, and their dense vegetation cover, means that it is often impossible for fieldwalking parties to arrange themselves in a perfect line. Survey parties collect stray lithic finds are collected, described and located by a hand-held Ground Positioning Satellite device (a Magellan 2000). These GPS-derived find locations are then correlated against a standard scale (1:50,000) topographic map in the field, and against larger-scale (1:10,000) aerial-photographic maps on return to camp. Experience indicates that the hand-held GPS-derived locations are accurate within the horizontal dimension to within 30 metres, but are quite inaccurate in relation to height above sea level (up to 150 metres at times). Relocation of finds on large-scale aerial photographic maps overcomes this particular problem. Where lithic pieces cluster, samples are collected and a report form completed, describing, amongst other aspects, the local terrain, major topographic features, local vegetation, ground visibility, natural geology, etc., as well as the character of the lithic materials found and the visible spread if any. For the purposes of the landscape survey, the Project has defined three find types; individual find spots, 'localities' which contain between 2 and 20 lithic pieces, and 'sites' containing more than 20 pieces. Potential sources of lithic raw material are also identified, recorded and samples collected. Since 1997, we have been able to examine and record all finds using the methodologies developed for the examination of the Early and Middle Stone Age deposits from the Cave of Hearths by McNabb and Sinclair.

As a check upon the accuracy of fieldwalking observations, there has been an ongoing process of re-survey for certain areas, using different crews and at different times of day (for different light conditions and to cope with potential fatigue of survey teams working at later times of the day). As a further check, on the occasions of re-survey, field survey teams have not been told of the previous survey results from the survey areas. Observations have usually confirmed the presence/absence of archaeological findspots and localities. On just one occasion have fieldwalkers missed the presence of an archaeological locality – albeit small. We are therefore confident that the field survey findings are an accurate account of lithic material that is visible on the land surface in the Makapan, Swartkrans and immediately surrounding valleys.

Since 1999, the Project has also established a GIS database of the landscape survey findings, through the AHRB funded doctoral research project being undertaken by Lorna McCraith (see below). This database will form a key component of the spatial analysis of the location of the major sites, the localities and the find spots, and their relationship to other key landscape features. Computer based catalogues of all lithic finds and locality reports are now also complete.

3.1 *Landscape Survey Results*

In four seasons of work, from 1997-2000, the Project conducted 65 days of field survey. In total an area of approximately 15 square kilometres has been intensively surveyed. Before the Project began, the database held at Witwatersrand recorded the presence of 4 Early and Middle Stone Age 'sites' in the Makapansgat environs: the Cave of Hearths, Rainbow Cave, Magazine Cave and Rufus Cave. With the exception of Rufus Cave, the three other sites are in fact part of the same infill system. This pattern suggests a concentration of activity in the Makapansgat Valley. Field survey has considerably increased the number of Stone Age localities (Figure 2). More than 400 individual lithic artefacts have also been recovered (Figure 3). Just as importantly, systematic field survey has also revealed large areas of landscape where findspots are either absent, or very rare.

In comparison with the areas commonly utilised by studies of modern gatherer-hunter populations in a year and especially over a lifetime, the 15 square kilometres of area surveyed by the Project is not large. It includes, however, a wide range of topographies and lithologies, and realistically represents coverage of all areas that were accessible from the

Cave of Hearths within a day. The number of localities discovered and the variation in presence of findspots suggests that the survey data collected so far provide a good basis upon which to begin to understand local geographical planning decisions by Middle Pleistocene hominids. And this addresses the three major aims of the fieldwork.

From a survey perspective all of the larger localities were encountered in the first season (1997) of work. In 1998, 17 localities were identified. In 1999, the number of new localities fell to 6, with 3 new localities in 2000. The number of individual findspots corresponds roughly to the duration spent in the field, and the number of personnel on survey (Table 1). We anticipate on the basis of the character of the survey results by year, that we have now located all major localities and most other localities in the Makapansgat environs.

In 2001, field survey was limited to a revisit to the major and minor localities to reassess their character in the light of our developing experience through the seasons. Using the character of the Cave of Hearths lithic assemblages, and in particular the presence of key markers (such as the use of Levallois technology, we have also assigned provisional assessments as to whether the localities represent Early, Middle, Late Stone Age date (or a mixed combination of the above).

Table 1: The frequencies of major localities, other localities and find spots discovered by field survey. Major localities possess more than 80 pieces. (4 other localities were known from previous work, recorded on the maps in the Department of Archaeology, University of the Witwatersrand).

Field Seasons	No. of major localities	No. of other localities	No. of find spots
1997	5	5	90
1998	0	17	150
1999	0	6	92
2000	0	3	85

3.2 *Locality variation and find spot density*

Among the 37 localities identified in the Makapansgat environs, there is considerable variability in the number / density of artefacts. Excluding the excavated assemblage from the Cave of Hearths, this varies from approximately 15 artefacts visible to more than 600.

Localities identified so far are to be found on all lithologies and in all topographic situations. This includes upland areas, valley bottom and side locations, as well as a number of localities that are some distance from a water source. Across most of the Makapansgat environs it is possible to encounter individual findspots: discarded evidence of a 'background noise' of hominid activity. We have identified two areas that are exceptions to this pattern, both located on dolomite bedrock. The first includes the Northwest side of the Swartkrans Valley (an area of approximately 3 square kilometres), and the second includes the Southeast side of the Makapansgat Valley (an area of approximately 2 square kilometres). There are localities in both areas, but the background noise of general hominid activity is absent despite good visibility for field survey and repeated survey work. Interestingly background noise of activity is usually to be found on quartzite lithology (indeed it obviously appears when crossing from dolomite to quartzite), but this is not the case with all areas of quartzite. A large area of quartzite lithology located to the Northern side of Sugarloaf Hill (again regularly surveyed and with good ground surface visibility), is barren of artefacts.

The specific reasons for the placing of these localities and the discard of a 'background noise' of artefacts are likely to involve a number of factors: raw material availability, local topography (including such factors as local shelter and good vantage points), as well as access to and distance from water sources. We shall be exploring these factors using the GIS database in the next 18 months. Research undertaken as part of a masters dissertation in 2001 suggests that there is also a degree of assemblage variability between localities that cannot be easily explained in terms of raw material factors alone (see section 6.2 below). This variability, Hudgell argues, is likely to result from the integration of the activities which led to the deposition of the assemblages at these localities into the broader temporal structure of tool production, maintenance and discard.

3.3 *The dating of localities in the landscape.*

Typological comparison between assemblages found in the Valley environs and those excavated in the Cave of Hearths can sometimes be used as a rough approximation of age of lithic assemblages recorded in an open air context. In 2000 the Project collected 4 dating samples from two open-air localities in the Makapansgat and Swartkrans Valleys. The Project has, as a result, also been able to date two major localities using Optically Stimulated Luminescence (OSL) dating completed in 2002, by Dr Edward Rhodes of the Research Laboratory for Archaeology and the History of Art at the University of Oxford. (See Appendix 1 for further dating details.)

ZKL001 (McNabbs Gate) is an artefactually rich site located on the terrace above the Mwaridzi river. The site was initially recorded in 1997, and a test excavation was carried out in 1998. Analysis of the lithic assemblages from this site suggest that they have not been subject to any great fluvial or colluvial sorting. The two dating samples from this site bracket the lithic assemblages, which are late Middle Stone Age in character when compared to the assemblages from the Cave of Hearths. The lower dated samples (predating the lithic assemblage, has been dated to approximately 61 kya, whilst the upper dated sample, postdating this assemblage, has been dated to approximately 8 kya.

ZKL003 (the Swartkrans Road Site) is also a locality where a late Middle Stone Age locality has been identified. Test excavation at this site has revealed a 'late' Middle Stone Age lithic assemblage that likewise appears to be primarily *in situ*. The two dates from this site bracket this assemblage to between approximately 60 kya and 41 kya.

4. Proposed Research Activities in 2002

The summer of 2002 will be primarily a study season for the principal investigators on the team. The majority of work will concern the completion of the re-analysis of the Middle Stone Age lithic assemblages (Beds 4 to 9) and the Later Stone Age lithic assemblage (Bed 10) from the previous excavations in the Cave of Hearths, and will take place in Johannesburg. This is in preparation for a draft for the first volume of the final publication of the Project. There are no plans to undertake any landscape survey or test excavations in 2002.

5. Publications, Conference Presentations in 2001/2

McNabb, J., Sinclair, A. & Quinney, P. (in press). The Makapansgat Middle-Pleistocene Research project. In M. Shott & N. Maloney (eds.). *Lithics at the Millenium*. Oxford: British Archaeological Reports, International Series.

Sinclair, A., McNabb, J. & Quinney, (under review). An integrated approach to the study of landscape and cave archaeology for the Acheulean of southern Africa. *CAPRA 3*.

Sinclair, A., McCraith, L. & Nelson, E. Approaches to understanding the landscape of Middle-Pleistocene hominids at Makapansgat, SouthAfrica. Paper given at "African Archaeology in Britain and Ireland". Oxford, April 2002.

6. Associated Research Projects (completed and ongoing) in 2001

The Project has seen the completion of three undergraduate dissertations, one Masters and one MPhil dissertations. There are also three PhD dissertations currently ongoing using data generated by the Project.

6.1 Associated Undergraduate Dissertations completed 2001

D'Athe, Robert 2001. *Evidence for the activities of hominids and other agents from an analysis of faunal collections from Beds 4-9 at the Cave of Hearths, Makapansgat, South Africa*. Unpublished manuscript on file at the Institute of Archaeology, University College London.

Wesley, Anna 2001. *The activities of hominids and other agents from Beds 1-3 at the Cave of Hearths, Makapansgat, South Africa*. Unpublished manuscript on file at the Institute of Archaeology, University College London.

The two dissertations listed above were based on an analysis of a sample of faunal collections that were studied during the 2000 season under the supervision of Patrick Quinney. Observation of the collections revealed the presence of both typical carnivore and scavenger fracture patterns among the bone elements as well as clear cut marks, related to the butchery of animal carcasses or parts, supported by observations using a Scanning Electron Microscope analysis of latex peels from select elements. This pattern of hominid and animal activity is visible throughout the entire sequence at the Cave of Hearths, but with a reduced frequency of the evidence of animal agents from Beds 6 and upwards.

6.2 Associated Masters Dissertation completed 2001

Hudgell, Gemma 2001. *Assemblage variability at Makapansgat, South Africa*. Unpublished manuscript on file at School of Archaeology, Classics and

Oriental Studies, University of Liverpool, UK.

This study analyses the lithic assemblage composition from a number of localities identified through field survey in the Makpansgat and Swartkrans Valleys. It shows that there is a considerable degree of assemblage variability (evidenced in flake types and numbers, core types and numbers and raw material type) between localities that cannot be accounted for in terms of the underlying lithology or the availability of lithic raw materials. It suggests that this variability needs to be explained in terms of a dynamic sequence of lithic production and maintenance keyed into likely variability in subsistence activities distributed around the immediate landscape.

6.3 *Associated M.Phil Dissertation completed 2001*

Nelson, Emma. 2001. *A preliminary investigation into costing movement on a variable landscape using the Makapansgat Valley as a test area*. Unpublished manuscript on file at School of Archaeology, Classics and Oriental Studies, University of Liverpool, UK.

This research has been concerned with attempting to develop new ways of costing the landscape movements of early hominids, in ways that take terrain and exact topography into account. Heart rate monitors, attached to field survey crews in 1999 and 2000, are used as a pilot project to see whether it is possible to develop costing factors that can be used within a GIS landscape to cost the possible movements of hominids around a landscape.

6.4 *Ongoing PhD Projects*

Lorna McCraith – School of Archaeology, Classics and Oriental Studies, University of Liverpool. *Understanding Cognition in Middle and Upper Pleistocene Hominids; the case of Makpansgat, South Africa*. (Supervisor Dr A. Sinclair. Submission date December 2002)

This research draws upon recent developments in environmental and evolutionary psychology and considers whether it is possible to suggest ways in which Middle and Upper Pleistocene hominids perceived their environment and moved within it. The field survey data generated by the project, and in particular the location of particular assemblages in space. From the perspective of the Project, patterns of environmental perception may have been a contributory factor in the generation of the specific archaeological assemblages that can be investigated today. A key part of the work for this research has been the generation of a Geographical Information System (GIS) database through which the archaeological materials located and recorded by the Project can be plotted and accessed.

Gemma Hudgell – School of Archaeology, Classics and Oriental Studies, University of Liverpool. *Modelling the formation of Early and Middle Stone Age lithic assemblages in a landscape setting*. (Supervisor Dr A. Sinclair. Submission date May 2004).

The broad aim of this research is to simulate (using a computer programme written in PROLOG) the possible hominid behavioural processes that generate lithic assemblages over a landscape. This model will then be used to interpret the Makapansgat and Swartkrans assemblages against possible outcomes generated through the simulation model as a test case for the purposes of evaluating the model. From the perspective of the Project, this research will help in the interpretation of the largely surface collections that have been located and investigated by the Project, suggesting ways of dealing with the problems of time-averaging inherent in such assemblages, and the possible existence of particular long-term archaeological signatures for human lithic resource use.

Andrew Herries. School of Archaeology, Classics and Oriental Studies, University of Liverpool. (Supervisor: Dr A. Latham. Submission date December 2002)

The palaeomagnetic analysis and the magnetic susceptibility studies of the Cave of Hearths sequence forms one (of a number) of specific case studies from Cave sites in South Africa. The initial findings from this research have been noted above.

7. Final Publication Strategy and Proposed Archiving of Project Data.

7.1 Final Publication Strategy

It is proposed that the final major publications of the Project will take the form of two edited monograph volumes. The first volume will focus on the Cave of Hearths assemblages and the first draft will be completed by mid 2003. The second volume will cover the work of the landscape survey, and the anticipated completion date for the first draft of this volume is 2005.

7.2 Proposed Archiving of Project Data

The data generated by the research activities of the MMPRP has originally been recorded onto paper data forms, and is being inputted by computer using a number of currently standard digital formats. Basic artefact catalogues for lithic and faunal collections from the Cave of Hearths and the landscape survey are being compiled using Microsoft Excel 97. The technological analyses of Early and Middle Stone Age lithics, noted above, are being

inputted using Microsoft Access 97, and this format will be used for the detailed faunal analysis of the Cave of Hearths collections. The main Project Geographical Information System database is currently in MapInfo format.

Heritage
The Project will deposit a number of full digital archives in South Africa (the South African Human Resources Agency, and the University of the Witwatersrand) and in the UK (the University of Liverpool and the Archaeological Data Service) that will hopefully allow future researchers immediate access to Project data, and provide full details of the nature of observations to make sure that this data is fully comprehensible to researchers who may not have any association with the Project. We currently anticipate that these archives will take the form of CDs / DVDs that should be accessible using commonly available personal computers. It is anticipated that the original paper and film archive will be deposited at the School of Archaeology, Classics and Oriental Studies, at the University of Liverpool in the UK.

It is also hoped that the main Project's GIS database may be of immediate use not only to researchers wishing to re-assess the Project's data but also for future archaeological, palaeontological and human resource management work in the area since it's 1:10,000 scale is larger than currently available digital map formats for the area.

8. Acknowledgements

Heritage
The Project would like to acknowledge the South African Human Resources Agency (formerly the South African National Monuments Council) for their allocation of research permits for this work. We would also like to thank the British Academy and the Arts and Humanities Research Board (of the UK) for grant money given in support of this Project, and the School of Archaeology, Classics and Oriental Studies of the University of Liverpool for their financial support for student field crews from 1997 to 2001.

We would particularly like to thank all the members of the the Department of Archaeology, the Bernard Price Institute of Palaeontology, and the Department of Anatomical Sciences at the University of the Witwatersrand for their generous support and advice during the course of this Project, and for the loan of excavation equipment in previous seasons. We would also like to thank Drs Kevin Kuykendall and Kaye Reed and the Makapansgat Area

Palaeoecology & Palaeontology Research Project for allowing us the use of MAPP equipment whilst in the field.

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