TANZANIA

The Middle and Later Stone Age of the Iringa Region, southern Tanzania: An Introduction

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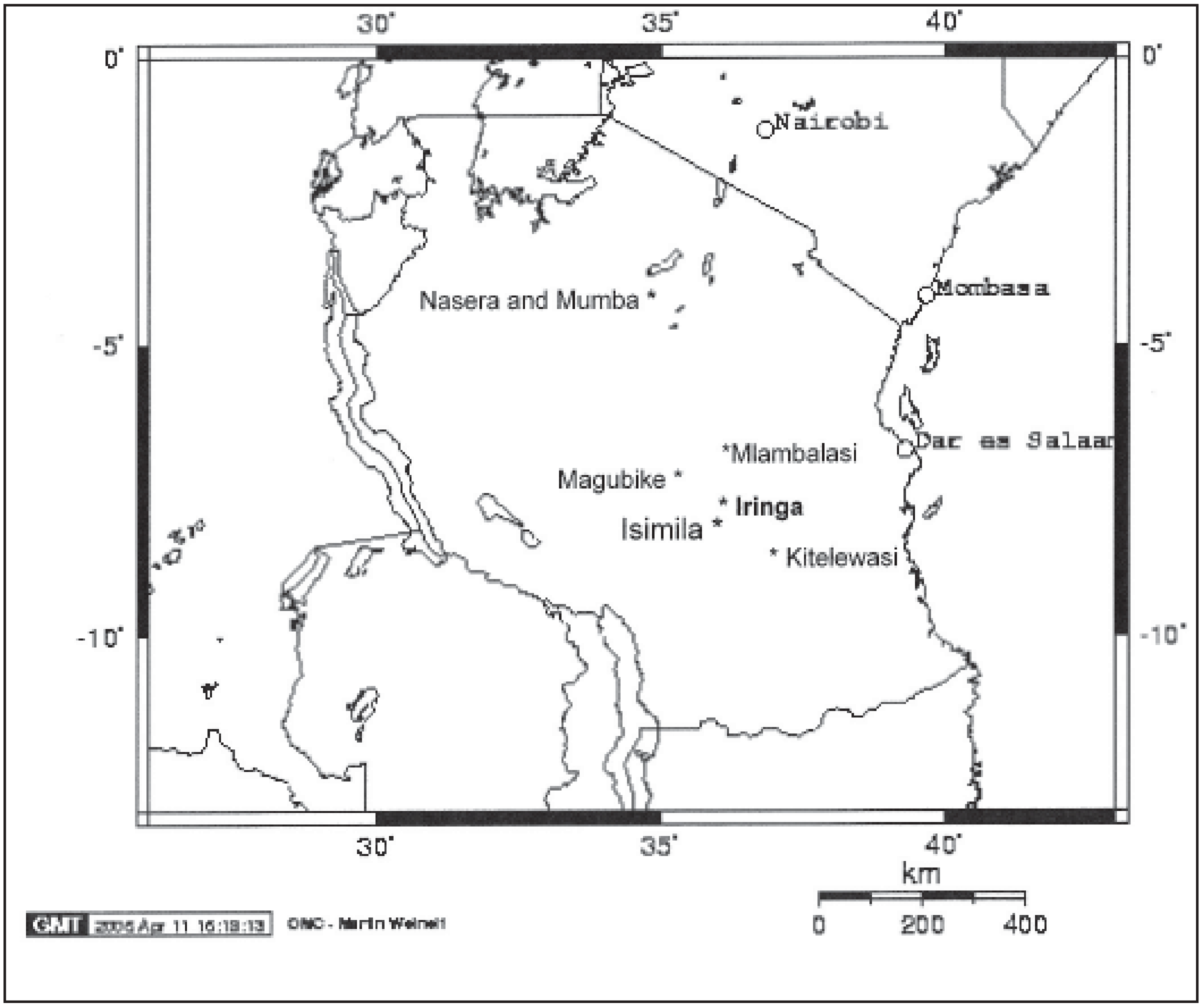
Introduction and background (Pamela Willoughby)

Tanzania is well known for the richness of its Stone Age past. But what we know about its early history comes from a limited number of northern sites such as Olduvai Gorge, as well as Nasera rockshelter and Mumba Cave near Lake Eyasi. The Iringa Region in the south, however, also contains a long Stone Age record. It begins with the Acheulean at Isimila Korongo and Mgongo, both located just outside of the modern regional capital of Iringa. But the Stone Age past continues in a series of granite rockshelters and caves (Figure 1). Pamela Willoughby first saw these sites in 2005, and directed brief test excavations of two of them in 2006. It became clear immediately that they may contain the entire post-Acheulean cultural record. This paper introduces three rockshelters from which archaeological material was recovered in July and August 2006. This research was done to test models of the emergence of modern humans in this part of Africa (Willoughby 2007). This article introduces new sites and presents preliminary results from the initial fieldwork. Pamela Willoughby describes the sites, the general framework of this research project, and the cultural history of Iringa. Her two PhD students, Katie Biittner and Pastory Bushozi, discuss their own research.

What does it mean to be a modern human?

Anatomically modern people (*Homo sapiens*) are found throughout Africa, as far back as 195,000 years ago. But their associated artifacts are Middle Stone Age (MSA) or Middle Palaeolithic (MP). However, it is not until their descendants reached Europe and become Cro-Magnons with Upper Palaeolithic (UP) tools that they are considered to be truly modern. Innovations said to appear only with the Upper Palaeolithic include (1) blade tools, (2) bone, ivory and antler tools, (3) jewelry and art, (4) curation of tools, (5) long distance transport of resources, (6) information networks and the first true ethnic groups, (7) collector strategy of mobility, (8) specialization in hunting one or two animal species, (9) use of fish or shellfish, (10) more complex burials, (11) expansion into new territories, and (12) association with anatomically modern *Homo sapiens* (Mellars 1991). Archaeologists are split between those who feel that MSA / MP Africans were well on their way to being modern in all respects, and those, like Klein (1992), who argue that modernity appeared only with the onset of the Later Stone Age (LSA) around 50,000 years ago. Klein argues that it was only then that the human brain was rewired to enable complex language and symbolic behavior. Soon afterwards, these fully modern humans dispersed out of Africa and spread everywhere. It is hard to test this idea, as there are few sites which show the transition from the Middle to the Later Stone Age. This change was associated with the onset of cold, dry, glacial conditions, and genetic, fossil and archaeological data all point to a marked reduction in human populations. But parts of Africa may have acted as refugia even in the worst stages of the Upper Pleistocene. Test excavations carried out in the summer of 2006 in the Iringa Region of southern Tanzania show that it was occupied at this critical time period.

Figure 1. Map of Tanzania showing location of the Iringa rockshelters.



The Iringa rockshelters

Mlambalasi (7°35.458'S, 35°30.142'E) is located about 50 km west of the modern regional capital of Iringa (Figure 2). It is well known, since it is the burial site of Mkwawa, Paramount Chief of the Wahehe in the 19th century. The rockshelter above the burial site (at an elevation of 1029 m) has been given SASES # HwJf-02. It is composed of two main chambers. The surface of both is littered with Iron Age and historic materials such as pottery, grindstones, iron and slag, and quartz and crypto-crystalline silica stone tools. A 1 m² test pit was excavated in one of the two main chambers. This test pit 1 produced an archaeological sequence of (1) historic materials, (2) Iron Age, with one uncalibrated AMS radiocarbon date of 460 ± 50 BP (TO-13416), (3) a microlithic (Holocene) LSA, (4) one or more human burials, and then a (5) macrolithic LSA. We did not reach bedrock, as further progress was impeded by many large rocks. Radiocarbon dates were obtained on shell from above and below the human remains. But they were reversed. Shells at 65 to 70 cm below the surface, just above the human remains, gave an uncalibrated date of 12,940 ± 90 BP (TO-13417); those below the bones (at a depth of 110 to 120 cm) were dated to 11,710 ± 90 BP (TO-13418).

Elizabeth Sawchuk (2008) analyzed the human remains for her BA Honours thesis. She determined that, while the human remains were quite fragmentary, they most likely represent a single adult. However, a couple of juvenile bones were also recovered. We plan to return to Mlambalasi in 2009, and will

Figure 2. Mlambalasi rockshelter.

open up the main room to determine whether or not this was a Later Stone Age cemetery. After the human remains are removed, we will excavate further to determine if there is a Middle Stone Age occupation in this shelter. There is in test pit 2, which was excavated on the slope outside the modern shelter. But it lies under about 1.5 m of mixed deposits that have slumped down the hill.

Magubike (7°45.780'S 35°28.399'E; elevation of 1541 m) is designated HxJf-01. It is a rockshelter complex on the top of a small hill or butte in the village of the same name (Figure 3). There are two main chambers, with Iron Age ceramics, metal and stone tools (quartz and black chert) scattered over the surface. There are also artifacts eroding out on the slope below the main shelter and Middle Stone Age ones exposed on the surface of a fallow tobacco field below. We only had time to dig 1 m² test pits in the two main shelter areas. Test pit 1 produced a sequence of (1) Iron Age, (2) LSA, and, (3) at a depth of 110 cm and in a gravel deposit, MSA, mixed with LSA. This final level could be accidentally mixed, or it could represent a transitional industry such as the Mumba Industry at the site of the same name (Mehlman 1989). What is clear is that the lithic raw materials change radically when the MSA artifacts appear. Above this level, lithics are mainly white quartz and/or a black crypto-crystalline rock. In the MSA, there are a wide variety of materials and the stone tools are quite larger. Test pit 2, in the second chamber, contained (1) the Iron Age, and at a depth of 50 cm, (2) the same kind of MSA recovered deeper in test pit 1. But a large rock prevented any further excavation. Instead, we put another 1 m² adjacent to this test pit. This became test pit 3, and includes (1) about 50 cm of Iron Age materials, then, without a break in the deposition, (2) 1.6 m of MSA, to a depth of 210 cm below the surface. Associated with the thousands of MSA stone artifacts are fossil mammal bones, molluscs (genus *Achatina*), and 6.5 fossil human teeth. There does

Figure 3. Magubike rockshelter.

not appear to be any sign of LSA occupation on this site of Magubike. One surprising thing is that the raw materials used for stone tools in the MSA of test pits 1 and 2/3 are radically different. Volcanics, quartzite, quartz and a variety of crypto-crystalline lithics are used in both. Yet test pit 1 (and on the surface of the tobacco field) is dominated by light colored rocks. Test pits 2 and 3 are mainly black siliceous rocks and basalt.

Kitelewasi (7°48.017'S, 35°64.106'E) is another rockshelter, located off the main highway southeast of Iringa City (Figure 4). At an elevation of 2066 m, it is given the local name of Mangayawatwe. On the surface under the shelter are numerous large stone artifacts, mainly quartz, as well as fossilized mammal bones. Some are cemented in a capping deposit or breccia. Given time constraints, we collected 578 flaked stone artifacts and a few bones from the surface of this site. A sample of the breccia was also taken for dating purposes. The stone artifacts are mainly quartz (n=332 or 57.4%), rock crystal (n=230 or 39.8%). While we attempted to get a representative sample, 364 or 63.0% turned out to be retouched tools, 112 (19.4%) are cores and the remainder (n=102 or 17.6%) were debitage (whole flakes and blades, as well as flaking debris). The retouched tools appear quite similar to those from the deeper levels at Mlambalasi test pit 1, and suggest that Kitelewasi belongs to the MSA or to the MSA to LSA transitional period.

Preliminary Results of lithic raw material characterization at Mlambalasi and Magubike (Katie Biittner)

Raw material characterization allows for the discernment of patterns of mobility and landscape use by the makers of the stone tool assemblages. This application is generally based on understanding the differential use of raw material types present in lithic

Figure 4. Kitelewasi rockshelter.

assemblages, and the proximity of sources of these raw materials in the surrounding landscape. Group mobility and procurement strategies are determined by the abundance, availability, quality, and distribution of resources. The differential use of local versus non-local ("exotic") materials has been used to demonstrate selectivity and decision making processes, as well as knowledge of resource availability and landscape (Gould et al. 1971). Thus understanding the landscape whch the humans were living from is crucial, as context is everything; it is not just raw material abundance and quality but all of the social dimensions that influence the selection of a particular technological strategy as a means of adaptation.

Theoretically, lithic resource procurement is an important topic in African archaeology as long distance exchange and the development of trade networks are considered as "key ingredients" in modern human behavior (McBrearty and Brooks 2000:513). The study of raw material utilization and mobility for African assemblages has been limited. The majority of studies of this kind focus on obsidian. The movement of "well-sourced obsidians" over distances greater than 300 km in eastern Africa is well documented (Barut 1996; Muir and Hivernel 1976; Negash and Shackley 2006). Merrick et al. (1994) suggest that increased interaction and exchange among human groups can explain the transport of obsidian for distances >300 km which is well outside of the range of deliberate collecting forays for mobile foraging groups. Furthermore, there are stylistic provinces within the African MSA which supports trade rather than transport as the obsidian distribution mechanism (McBrearty and Brooks 2000:515). Raw material variability has been examined in Early Stone Age (ESA) assemblages at Olduvai Gorge and Laetoli, Tanzania (Kyara 1996), East Turkana, Kenya (Rogers 1996), Gona, Ethiopia (Stout et al. 2005), and

Sterkfontein, South Africa (Kuman 1996). But such comprehensive analyses have not been conducted on MSA and LSA assemblages in southern Tanzania. This is partially the result of the nature of the lithic assemblages themselves; most LSA assemblages are composed primarily of quartz and/or quartzite. Research has been carried out in order to develop techniques for studying south African LSA quartz assemblages as the natural fracture patterns of quartz can be hard to distinguish from human induced ones.

Elsewhere patterns of change in lithic raw material use have been used to suggest changes in resource exploitation in response to environmental change. Ambrose and Lorenz (1990) concluded that changes in the frequency of fine-grained "exotic" lithics during the Howiesons Poort (HP) substage of the southern African MSA at Klasies River, South Africa reflect fundamental changes in behavior in response to similar environmental changes during the glacial-interglacial cycles of the last million years. They use these conclusions to support the idea that MSA people prior to HP were not behaving in a fully modern fashion, following the Klein (1995) model proposed for the timing and nature of modern human origins. On the contrary, Minchillo (2006:363), in examining the same materials but applying a time-dependant foraging model, argues that there is a general pattern of long distance travel and exchange, of local intensification, and of mosaic of approaches during the MSA that as a whole is fully modern. Throughout my investigations, I hope to examine the validity of these proposed models for understanding and interpreting East African assemblages from the same time period.

There are three parts to this provenance study. The first involves the characterization, identification, and description of the raw material types present in the lithic assemblages of the two rockshelters. The second is to identify which sources are represented in the assemblages at Magubike and Mlambalasi. The final part of this study is an attempt to understand why particular sources were being utilized. This will be illuminated by examining mobility, landscape, and source attractiveness (as developed by Wilson 2007) as the key factors determining source selection and use by Stone Age peoples. Here I present preliminary results about the initial part of this provenance study.

Lithic characterization must necessarily begin with macroscopic analysis. Using visual properties such as color, luster, translucence, texture, grain sphericity and angularity, artifacts were preliminary sorted into raw material types. Although quartz, quartzite, and rock crystal were counted and recorded, further attributes were not recorded. Although there is considerable range in the quality of these artifacts, quartz, quartzite and rock crystal are ubiquitous across the landscape and are not amenable to further characterization using microscopic techniques. Other raw material types identified include chert or flint varieties, sandstone, rhyolite, granite, trachyte, basalt, ironstone, argillite, feldspars, and pumice. A few artifacts were not able to be characterized using macroscopic properties. Visual identification was also limited, thus preliminary, owing to the presence of calcium carbonate cement on the surface of some of the artifacts – mainly those from the lower levels of the Magubike test pits.

However, macroscopic analysis is rarely straightforward because of the subjective nature of most of the attributes examined. Microscopic analysis via thin section is required as the accuracy of the visual identification of lithic materials has been proven to be poor. Thin section analysis will also allow for the characterization and description of variability within lithic types, thus demonstrate whether or not the macroscopic types identified are unique. Features indicative of the source environment will assist in the refinement of where to look for raw material sources. Focus will be on sampling each of the raw material types identified under the macroscopic analysis, and on characterizing and identifying unknowns (as per Calegero's 1991 "curious rock" method).

This preliminary analysis indicates that the MSA artifacts demonstrate a considerable range of variability in raw material types including quartz, quartzite, basalt, and numerous chert or flint varieties, while the LSA artifacts are primarily produced from quartz and quartzite. This is significant as quartz and quartzite are poor quality materials but ubiquitous, whereas the volcanic and chert varieties are of higher quality but less abundant and not found in close proximity to the rockshelters. This suggests that the inhabitants of the site would have knowledge of where to acquire these materials, and the foresight to plan to obtain them either via exchange networks or by incorporating the sources into their seasonal movements. The frequency of volcanic materials in the assemblage is significant as the nearest probable sources likely are located within the volcanic range to the southwest of Iringa region.

Fieldwork planned for summer 2008 will allow for the sampling and analysis of potential raw material sources in the region. Information about potential source outcrop locations will be obtained from geological articles and various geological maps. Each source will be systematically sampled in order to account for intrasource variability. This can be quite significant in cherts, while volcanics tend to be more homogeneous within sources. During source location examinations, any cultural material encountered will be recorded.

Archaeological sites and stone quarries will be assigned SASES registration numbers. Surface collections of artifacts and raw material samples will be taken from each location for further laboratory analysis, and limited shovel testing will be used to identify the spatial extent of sites. Datable material, soil samples and ecofacts will also be collected, in order to describe the environment at time of use. Wherever possible, a stratified (and possibly random) sampling method will be used. This involves dividing up the study area into geormorphic units (highlands, foothills, valleys, river courses) and sampling a few of each. A foot survey for open air sites will be done through linear transects, following paths or straight lines wherever possible. Since large quartzite boulders are a recurring feature on the landscape, these will also be focal points for investigation. This survey will also include the identification of all potential sources within 400 km of the two rockshelters. Thin sectioning and petrographic analysis of excavated artifacts will be continued, and will include samples obtained during survey.

Projectile points and hunting technology: A case study (Pastory Bushozi)

My study focuses on the origin and development of modern human behaviour. It examines and discusses if the MSA cultural materials recovered from sub-Saharan Africa represents the technology of people who behaved in a modern way. A number of research programmes now aim to investigate the change and development of modern human behavior, exploring some of the aspects and process involved in cognitive modernization. This study tries to investigate the development in technology and changes in hunting strategies during the MSA and LSA periods in sub-Saharan Africa. It examines the production skills and knowledge applied to modify an artifact designed for a particular purpose. I am also interested in hunting behavior used by MSA and LSA humans to acquire food. I want to examine the ways in which lithic points have assisted towards the development of new hunting skills and food acquistion strategies during the MSA and LSA. Lithic points are widely represented in the MSA assemblages of Sub-Saharan Africa. We need to understand how these points were used.

Various lines of evidence such as human fossils, genetic evidence, tool types, symbolic objects, art, food remains and geographic range have been used by number of scholars to support an idea for the existence of technological and behavioral modernity during the MSA period in Africa (Cann et al. 2007; Mellars 2006; Willoughby 2007). However, the development of behavioral modernity is still debated because the available evidence pays less attention to hunting and subsistence strategies. Available evidence from metric dimensions and residue studies suggests that there was increased competence and efficiency in hunting skills during the MSA, and that technological, behavioral, and food acquisition strategies of MSA people were similar to those of LSA/ Upper Palaeolithic people (Brooks et al. 2006; Shea 2005, 2006; Wadley and Jacobs 2004). For instance, evidence from the metric analysis of points in the Levant suggests that they were used either as short distance or long distance hunting projectile weapons (Shea 1997, 2005, 2006). Studies of points from Aduma in Ethiopia, #Gi in Botswana and Rose Cottage Cave in South Africa suggest that spearheads and arrowheads, widely represented in UP assemblages in Eurasia, are also abundant in the sub-Saharan African MSA ones (Brooks et al. 2006; Mahopi 2007).

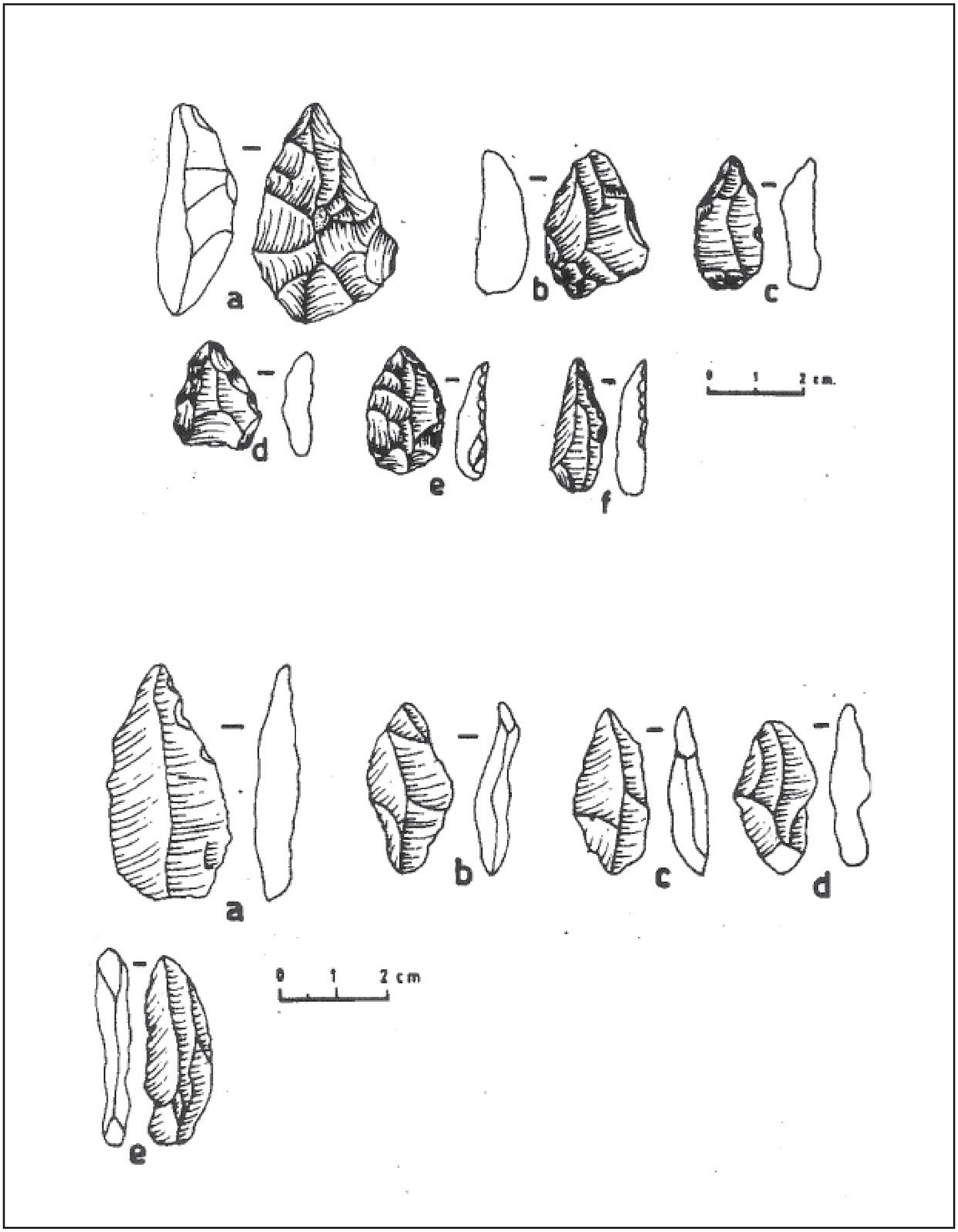
This study aims to reconstruct prehistoric hunting behavior in northern and southern Tanzania. Previous studies in this region were not focused on this question, so they have failed to address the use of stone points. I believe that this study will provide a new outlook for understanding the trend for development of projectile technology and its influence to the development of behavioral modernity. For the technological study, I am using the chaine operatoire method which looks at how stone tools have been produced, used and discarded. It examines: (1) techiques that have applied for core preparation i.e., roughing out and platform preparation, (2) methods that have been applied to remove flakes from cores, (3) strategies for modification or retouching flakes, and (4) the way in which stone tools have been utilized, and discarded. This method emphasis on close examination of skills and labor investiment on tool production and utilization and it is very potential to the study and intepretation of technological and behaviour capability of toolmakers. For hunting behavior, I am using metric measurements to examine ways in which MSA and LSA stone points were used. It focuses on retouched points and examines the technological differences between spearhead and arrowhead points. It is possible that thick, broad, and large points were used as spearheads, which were thrust or hand delivered at animals, while narrow, thin and small points were used arrowheads for distance hunting. This method was first developed in 1970s in North America to study prehistoric points. Using metric dimensions and weights, Thomas (1978) was able to identify three categories: thrusting spearheads, throwing spearheads and arrowheads. In the 1990s it was also used by John Shea (1997, 2006) to study Middle Paleolithic points in the Levant. Recently, the same method has been applied to study MSA points at Aduma in Ethiopia, #Gi in Botswana and Rose Cottage Cave in South Africa (Brooks et al. 2006; Mohapi 2007). These studies revealed that MSA points were used either as spearheads or arrowheads. The understanding of hunting and food arquistation strategegies is very important milestone to the better understanding of the behavioural patterns and subsistence strategies of early modern humans in Africa

Some of the behavioral inferences that could be drawn from point tools include the investment of labor power, the amount of time or energy to produce tool before use, as well as functional specialization. A suitable stone point must be knapped and modified. Wooden handles, mastic, or binding materials, such as sinew and plant fibers, must be collected and made ready for use. Finally, one end of wooden handle must be designed to provide a secure attachment portion for the stone point. Manufacturing networks, time investment, labor power, and foresight in planning all require some sort of behavioral organization among toolmakers. The trend of manufacturing process and the increased labor power involved in making spears or arrow weapons suggest the existence of behavioral modernity among people who originally innovated and used stone points. The invention of lithic points is regarded to be one of the important milestones to the development of distance hunting and increased efficiency and productivity in food acquisition. I believe that this study could provide evidence that indicate the existence of specialization in tool uses and social networks. Skills and knowledge applied in making such tools may indicate insight for complex social organizations that link toolmakers, society and the surrounding environment.

In order to accomplish the intended goals the study aims for three specific objectives: (1) to examine the development of hafting technology and the existence of long distance hunting techniques as reflected on the metric dimensions and edge modification strategies of point tools, (2) to examine the spatial representation of points in the MSA and LSA assemblages of the Iringa Region, (3) to understand the chronological boundary for the evolution of distance hunting and develop the chronological sequence of archaeological assemblages in southern Tanzania. Collected data will be compared with other artifacts from northern Tanzania in order to assist in a greater understanding of the change in hunting strategies across the region. Archaeological occurrences in northern Tanzania have well defined chronological sequences from earliest time through the Pleistocene and it has also provided substantial evidence for understanding the trend of technological and behavioral changes over time.

The major focus is on the representation of points, their edge modification strategies and their metric dimensions. I believe that point working edges and metric measurements might provide an excellent source of information to reconstruct prehistoric hunting and subsistence strategies. During the summer of 2007, I collected and analyzed about 136 points from Nasera and Mumba rock shelters in northern Tanzania (Figure 5). Most of the analyzed points MSA points have a high degree of stylistic variation, but most of them were made by the use of Levallois method and exhibit faceted or plain platforms and converging edges. Some also have thinned platforms, suggesting that they were modified to facilitate hafting to form a composite tool. Additional artifacts are from the Mlambalasi and Magubike rockshelters in Iringa. Generally, I expect that metric measurements

Figure 5. Top: Points from Nasera: A – bifacial point, B, D, E – unifacial points, f – Levallois points. Below: Points from Mumba: A C, E – Levallois points, B, D, - unifacial points (drawn by P. Bushozi).



and morphological patterns of points will indicate technological change over time from short to long distance hunting techniques, which suggest for foresighted hunting technology, and the development of behavioral modernity.

Conclusions and future research

In a short field season in 1006, long sequences of Stone Age and more recent occupations were uncovered at two rockshelters near the city of Iringa, Mlambalasi and Magubike. While we are still analyzing the material collected in 2006, we plan to return to Iringa in the summer of 2008 to conduct a survey for additional archaeological sites as well as for the discovery of the sources of the lithic raw materials. We will also continue test excavations at Magubike to determine how far outside and below the shelter one can find evidence of human occupation. This is part of a long-term study of the emergence of behavioral modernity in southern Tanzania. Its goal is to test the idea that there was a fundamental change in human organization when the LSA began. If so, it underlies the dispersal of modern humans out of Africa, the event or process to which we can all trace our common ancestry.

Acknowledgements

Thanks to COSTECH, the Tanzanian Commission on Science and Technology for our research clearance and to the Department of Antiquities, Dar es Salaam, for the excavation permit. Thanks too to Ms. Joyce Nachilema, District Cultural Officer for Iringa Rural (=Iringa Vijijini) who showed Pamela Willoughby these rockshelters in June 2005 and to Mr. Peter Abwalo who was our Antiquities Officer in 2006. Support for the 2006 field season came from the Killam Cornerstone Fund, Office of the Vice-President (Research) and from the Support for the Advancement of Scholarship (SAS) Fund, Faculty of Arts, both at the University of Alberta. Support for the 2008 survey and test excavations is coming from the Social Sciences and Humanities Research Council of Canada (SSHRC), from a Post-PhD research grant from the Wenner-Gren Foundation and from the Killam Cornerstone Fund at the University of Alberta.

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