Settling In: Evidence of Territorial Exclusion in the Late Middle Stone Age of Northern Tanzania

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The Loiyangalani site is a predominantly Middle Stone Age (MSA) occurrence located in the Serengeti National Park, Tanzania. The site lies in the floodplain of the Loiyangalani River, a short distance east of the stream’s juncture with the Mbalageti River which flows westward to Lake Nyanza. Just upstream of this confluence the Loiyangalani has cut a gap through a quartzite ridge bordering the western edge of the Serengeti Plain, a gap through which the renowned Serengeti ungulate migration passes on its way westward around the end of the annual long rains. Thus, the site is strategically located from a predator’s perspective, as is confirmed by the habitual presence of numerous live carnivores in the vicinity of our excavations.

The site was discovered by one of us (JB) in the course of an archaeological survey of the Serengeti National Park in 1977 (Bower and Gogan-Porter 1981). It was first tested in 1979 (Bower 1985), followed by additional tests in 2000 and 2003. A small block excavation was opened in 2004 and enlarged in 2005, at which time further test trenches were also excavated. The excavation layout shown in Figure 1 represents all but the full array of 1979 test trenches, the bench mark for which had disappeared by 2000. However, a surface expression of one of the test pits (1979 Test Unit 1) has been located, making it possible to correlate data from the initial test with more recent finds. Figure 2 illustrates the relationship between the excavation area and the present channel of the Loiyangalani River.

The five episodes of excavation have recovered both MSA and Later Stone Age (LSA) material, but the latter is generally sparse and largely confined to the uppermost stratigraphic unit so far exposed. Overall, the excavated remains are mainly of MSA character and have been recovered from deposits that are, for the most part, isolated from LSA bearing sediments by intervening strata.

The site’s archaeological remains are contained in highly alkaline deposits (pH of 9 and above), which accounts for the excellent state of preservation evident in much of the faunal remains. The stratigraphic and sedimentary context of MSA material exposed in each of the five episodes of excavation is essentially the same, although some of the 2005 test pits revealed a unit absent from all other exposures. The MSA-bearing sediments, designated Unit 1, are interpreted as proximal overbank alluvial floodplain deposits, with an upper limit at about 90-100 cm below surface and a lower limit that exceeds
150 cm below surface, where the water table was reached. Overlying these sediments are about 50 cm of more distal floodplain deposits (Unit 2) with a marked prismatic to blocky structure. These deposits are basically devoid of archaeological content; they are overlain by Unit 3, a well developed soil whose exposure is so far limited to squares N100E115, N96E115 and N64E72 (Figure 1), having been removed elsewhere in the excavation area by headward erosion. Unit 4 consists of materials derived from the erosion of Unit 3, along with flood sediments from the Loiyangalani River and eolian deposits that include volcanic ash.

Both Units 3 and 4 have yielded sparse samples of archaeological material, the Unit 3 component of which is too meager to characterize, but the Unit 4 assemblage is clearly of LSA character. The MSA occupation horizon is stratigraphically situated in all its exposures just below the contact between Units 1 and 2, penetrating to depths ranging from 10-30 cm below the contact, with a diffuse scatter of debris extending to the base of the excavations. The horizon exhibits marked lateral variation in artifact density and composition, such that some exposures have yielded a preponderance of faunal remains, others are dominated by stone artifacts and some have produced little material of any kind.

The geological context of the MSA horizon and its rather loosely organized lateral distribution strongly suggest that the human occupation which produced it was restricted to the dry season and probably reflects ephemeral foraging occupancy, rather than habitation. This inference is supported by characteristics of the MSA lithic assemblage presently to be discussed. However, before turning in that direction, a brief comment on the LSA occurrence is in order.

As previously noted, the LSA material so far recovered from the Loiyangalani site is sparse, consisting of a light scatter of stone artifacts and fragmentary faunal remains that are basically confined to Unit 4, the uppermost stratigraphic layer, but may also be represented in the underlying Unit 3. Although the LSA sample is too limited to admit of taxonomic identification, several features of its lithic assemblage deserve comment because of their bearing on the distinctiveness and integrity of the MSA horizon. The preferred LSA raw material was vein quartz, but obsidian is represented in the assemblage. Both the débitage and the formal tools are essentially microlithic, averaging about 1-2 cm in maximum diameter, and backed elements such as segments and triangles are included.

The MSA lithic assemblage differs radically in all respects. Thus, the predominant raw material is quartzite, obsidian is essentially absent and backed elements of any kind are completely lacking. In addition, the average size of MSA artifacts is substantially larger, lying somewhere around 3-5 cm, while evidence of typical MSA reduction technology (Levallois, radial, etc.) is abundant.

Basic characteristics of the MSA lithic assemblage, including typology, state of abrasion, raw material proportions and quantity of cortex, are shown in Figure 3, which is based on analysis of the material recovered in 2003 but is also broadly consistent with an analysis of the 1979 assemblage (Bower...
1985) and cursory examination of all other excavated samples. Noteworthy in Figure 3 is the relatively low incidence of cores and artifacts exhibiting cortex, which suggests that lithic reduction was largely carried out elsewhere, as is consistent with ephemeral (dry season?) occupation of the site.

Also present among the MSA artifacts are a few worked bone pieces, numerous ochre fragments, some of which qualify as pencils (i.e., contain one or more abraded surfaces), including one with an embedded quartz flake of undetermined purpose. Three complete ostrich eggshell beads and two fragmentary specimens have also been recovered, but their association with the MSA material is open to question, as a radiocarbon determination on one of the fragments yielded an uncalibrated age of 13,920 ± 70 years BP (Woodborne 2004). An optical stimulation luminescence (OSL) date of 64 ± 4.4 ka has been obtained on sediments near the top of Unit 1, where the MSA material is concentrated (Feathers and Fusch 2005).

The Loiyangalani faunal assemblage includes small and large bovids, equids, carnivores and a wide range of non-identifiable mammals, with size 2 bovids prevalent. Also present are various aquatic and semi-aquatic species, such as fish (mainly Clarias – catfish) and mud turtles, which bear evidence of human consumption in the form of cut marks.

To summarize, the data so far recovered by excavation of the Loiyangalani site seem mainly to represent a human population that existed around 64 ka, practised MSA lithic technology, seasonally exploited a broad spectrum of faunal resources and produced a non-lithic material culture that included bone artifacts, ochre pencils and perhaps ostrich eggshell beads. How does this compare with the regional picture of the MSA in northern Tanzania? To answer this question, we turn to the two nearest, well-documented MSA-bearing sites: Mumba rock shelter, approximately 100 km south of the Loiyangalani site, and Nasera rock shelter, about 70 km east of our site. Both have been excavated by Mehlman (1989), who has described MSA archives at the two sites that are broadly comparable in age and typology with the Loiyangalani occurrence.

The Kisele Industry, which is well represented at both sites, is typologically MSA and dated by Mehlman (op. cit. 297) to somewhere between 110 to 45 ka. Although this chronology may be open to revision (cf. McBrearty and Brooks 2000), the closest regional match to the Loiyangalani MSA in both cultural aspect and “best estimate” chronology is clearly the Kisele Industry. But despite probable chronological overlap and broad technological resemblance, the Loiyangalani and Kisele industries differ markedly in typology. For example, the salient typological elements of the Kisele formal tool inventory include scrapers, as well as bifacial and unifacial points, while the Loiyangalani assemblage is dominated by nondescript “pointy” pieces (bees, borers, etc). Moreover, to the extent that points are represented in the Loiyangalani MSA, they differ markedly in morphology (and possibly function) from the Kisele points. As shown in Figure 4, the Loiyangalani point is typically shaped on a corner struck flake, is
basically unifacial except for bulbar thinning (for hafting?) and has a distinctly asymmetrical, almost
shouldered configuration – a combination of traits that is not evident among Mehlman’s (op. cit.)
illustrations of Kisele points.

Other notable differences between the Kisele and Loiyangalani lithic assemblages include crudely
geometric, backed elements and occasional obsidian pieces from sources in Kenya, both evident in the
Kisele industry but absent from the Loiyangalani MSA. The lack of obsidian from the Loiyangalani raw
material inventory is particularly noteworthy in view of the fact that this material is evident in the Mumba
and Nasera sequences all the way from earliest MSA to LSA and is also present in Serengeti LSA
occurrences that are widely distributed in space and time. Thus, the absence of obsidian from the
Loiyangalani MSA is a distinct anomaly. It is worth noting that, while regional variation in MSA lithic
industries is well documented throughout Africa (Clark, 1988; McBrearty and Brooks, 2000), MSA
industrial variation on the limited geographic scale evident in northern Tanzania has rarely, if ever, been
detected elsewhere in the continent.

What accounts for the striking dissimilarities between the more or less neighboring Kisele and
Loiyangalani MSA occurrences? One possibility that could be suggested stems from the fact that the
Loiyangalani archive is regionally exceptional as an open air, MSA site and is also so far the only such
occurrence in northern Tanzania to have been investigated in depth. This, together with evidence
pointing toward a non-residential, basically food gathering range of human activity at the Loiyangalani
site, suggests that the difference could reflect behavioral variation related to settlement type.

While the data needed for definitively testing such a hypothesis are presently unavailable, we can
point toward evidence that tends to support the null hypothesis. This is the fact that all surface
occurrences of the MSA that we have observed in the western Serengeti Plain exhibit the distinguishing
typological features of the Loiyangalani MSA, as delineated in a formal definition of the Loiyangalani
industry (Bower, 1985:47). It is extremely unlikely that none of the occurrences in question was a
habitation site. Thus, the distinctive features of the Loiyangalani Industry would appear to be decoupled
from the behavioral differences between habitation sites and ephemeral foraging locations.

It could also be argued that the typological distinctions between the Kisele and Loiyangalani
occurrences are attributable to differences in predominant raw material (quartz in the former, quartzite in
the latter). Although this argument is as yet untested, it seems intuitively unlikely that manufacturing
constraints account for the two most conspicuous distinctions between the industries, namely, the marked
differences in point form and the absence of backed elements from the Loiyangalani MSA. Perhaps a
more plausible hypothesis is simply that the human population represented by the Loiyangalani MSA was
somehow isolated from neighboring MSA populations, as represented by the Kisele industry. This could
account for not only marked typological differences between the Kisele and Loiyangalani industries but
also the absence of obsidian from the latter, since the former is geographically situated between the Loiyangalani area and the Kenya obsidian sources. If the Loiyangalani industry represents an isolated human population, what was the nature of the barrier that separated it from neighboring people? What gave rise to the barrier? In the present state of knowledge, answers to such questions are necessarily speculative. With this understanding, we propose a scenario that, while lacking crucial data, is nevertheless rooted in well documented environmental and human demographic crises from which antagonistic relations could have emerged.

The relevant human demographic crisis consisted of a population “bottleneck” at about 70 ka that was released at some point during the next 10,000 years, as revealed by genetic studies of living people (Harpending et al. 1993). It is the causes and consequences of the demographic crash and recovery that relate to our scenario regarding the isolation of the Loiyangalani MSA from neighboring populations. As to the causes, Ambrose (1998) has suggested that the catastrophic eruption of Mt. Toba (Sumatra) about 71 ka and the ensuing six years of volcanic winter followed by 1000 years of the coldest, driest climate of Late Quaternary time, may have caused widespread human starvation leading to the genetically revealed crash. This explanation gains strength from recently reported evidence of a megadrought in tropical Africa documented by extraordinarily low water levels in several lakes (notably, Lake Malawi) that persisted from about 78 to 70 ka, after which moisture increased until about 62 to 64 ka, when the water level of Lake Malawi stabilized (Scholz et al. 2007).

Whatever resource pressures may have been experienced by humans as a result of prolonged drought conditions could have been catastrophically aggravated by the Mt. Toba volcanic winter, such as to cause the genetically revealed “bottleneck.” However, the “bottleneck” was probably not uniformly distributed, such that populations inhabiting wetter, more productive refugia might have been spared (Ambrose 1998:638). We suggest that the Serengeti Plain and adjacent areas may have constituted a refugium wherein the strategically located western margin of the Plain was particularly favored, such that, under stressed circumstances, its inhabitants might have wanted to exclude populations from less bountiful neighboring areas. From this follows territorial exclusion and the severance of cultural transmission across the territorial boundary.

If this scenario gains support from further research, including particularly the discovery of additional examples of late MSA territorial exclusion, we suggest that it may have implications for the dramatic geographic spread of *Homo sapiens* beginning around 40 to 50 ka. This stems essentially from the reduction in mobility that is caused by the establishment of a territorial boundary. Such limitation need not be heavily restrictive in order to generate major demographic effects, ultimately contributing to the human global diaspora. The reason for this is revealed by Richard Lee’s (1972) observations regarding the relationship between mobility and fertility in hunting-gathering cultures. He points out that
a woman’s need to carry infants and young children while foraging restricts either her fertility (i.e., few offspring) or her economic productivity (i.e., limited foraging capability). However, as Lee (op. cit.:339) puts it, “settling down removes the adverse effects of high fertility on individual women….Thus, for the population as a whole, sedenterization may lead to the upsetting of the hunting-gathering low-fertility adaptation and trigger population growth, even in the absence of any expansion of the food supply (ital. added).

Of course, the long range effect of population growth is resource pressure, which may trigger migration. As Hassan (1975:49) notes, “The limitations on the density and size of hunting-gathering populations, coupled with their low economic growth potential, are not conducive to unrestricted population growth without jeopardizing the standard of living….However, migration…could alleviate the pressure.” Thus, we can entertain the possibility that territorial exclusion by the MSA occupants of the Loiyangalani site, perhaps based on ethnic identity, may have ultimately led to population growth to the point where migration became necessary. What is beyond question is the powerful role of ethnically based territoriality throughout human history. It had to start somewhere.

Acknowledgements

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GrA26016. (CSIR Environmentek, Pretoria, South Africa).
Figure Captions

Fig. 1: Layout of Excavation Units (HcJd1)
Fig. 2: Map of Environments (HcJd1)
Fig. 3: Analysis of the Loiyangalani 2003 Lithic Assemblage
Fig. 4: Loiyangalani Points
Loiyangalani Archaeological Project
Layout of Excavation Units 1979-2005
### État Physique (N = 221)

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### Cortex (N=221)

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### Raw Material (N=238)

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<th>Obsidian (#/%)</th>
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### Typological Summary

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<td>Various Other Formal Tools (17, 37, 43)</td>
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<td>Outil Ecaillés (49)</td>
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*Mehlman’s Types (1989)*