EARLY STONE AGE OF CENTRAL TANZANIA

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Abstract
Unlike the north-eastern and coastal areas of Tanzania where extensive archaeological researches have been undertaken, the central region of Tanzania, including Kondoa and Singida, has been superficially examined. The earliest archaeological works in Central Tanzania concentrated on documentation of rock art, the Later Stone Age and Iron Age. In contrast, the current research was carried out to investigate the Early Stone Age cultures precisely the Acheulean culture at Haubi. The research focused on describing typology, raw materials and stratigraphic distribution of the Acheulean artifacts from the Iresi A site as an approach to the understanding of pre-Later Stone Age and Iron Age cultures of Central Tanzania. A combination of survey and extraction was employed to recover the Early Stone Age assemblages. Deliberate sampling was used to identify and locate the Early Stone Age surface exposures. Recovered materials included the exclusive Acheulean stone artifacts which were found both in primary and secondary contexts. Data analysis suggested that Iresi A is an Early Stone Age site of Acheulean type. These findings make Haubi one of the important Early Stone Age sites and sheds light on the archaeological potential of Central Tanzania, and Kondoa in particular. It is upon these research findings that the researcher urges for further Early Stone Age studies in Central Tanzania. Also diverse archaeological investigation should be directed towards less considered parts of the country to disclose their archaeological potentials.

Key words: Central Tanzania, Haubi, Acheulean artifacts, stratigraphy, Stone Age, quartzite

Background

From the 1930s until recently, most archaeological investigations in Central Tanzania have focused on later pre-history (Masao, 2005). This may be attributed to either interest by researchers as well as funding opportunities from funding agencies. As noted by Masao (2005), archaeological research in Central Tanzania is very sketchy compared to other parts of the country such as the coastal, northern and southern highlands and the lake region. As such, occurrence of Early Stone Age cultural materials at Haubi presents a breakthrough in the study of human biological and cultural evolution.

The earliest archaeological investigation in Central Tanzania was conducted by Kohl-Larsen who recorded and described a number of rock paintings in Isanzu, Iambi and Iramba Plateau in 1930s (Odner, 1971). Collections of pottery in this region were first done by Kohl-Larsen (1943, 1958), and later studied by Smolla (1957) who categorised them as “Ssandauweland Typhus”. However, later, these ceramics were re-examined by Sutton (1968) and since then the pottery has been referred to as Lelesu. Odner’s archaeological survey of the Iramba Plateau in 1969 focused on several Stone Age and rock painting sites including Lululampembele, Kilili, Kitulu, KilimaWangu, Kisana, Maila, Usungi, Kiomboi I, IV & V, Kaka and Gyezi. The Lululampembele investigation recovered Later Stone Age (LSA) lithic artifacts including cores, scrapers, becs, burins, backed tools, blades and crescents. Other artifacts included pottery, beads ochre, shells and bones (Odner, 1971). Pottery traditions from Iramba included Kansyore, Narosura, Cord impressed, Plaited roulette-decorated and modern wares.

Liesegang (1975) researched on the Iron Age (IA) pottery of Central Tanzania. Liesegang's research covered the sites of Haubi, Musia, Kwa Mdee and Kandaga in Kondoa while for the case of Singida only one site (Kinyingogo) was investigated. Research findings revealed two major wares at Irangi namely Haubi Ware and Kandaga Ware. The former was characterised by a dotted wavy line technique of decoration, while the latter was characterised by deep lines of impression or grooves dating to the eighteenth century. At Isanzu, both twisted plaited cord-roulette and cord impressions were identified. The first comprehensive work on the rock paintings and LSA industries of Central Tanzania was carried out by Masao (1979). Findings from the Kandaga, Majilili, Kwa Mwango and Kirumi Isumbirira indicated that quartz accounted for 90% of the observed LSA raw materials. The LSA industries were dated to 3,500 B.P. while the IA was dated to 200 years B.P. Stratigraphic sequences suggested that the LSA and IA technologies co-existed for a certain period of time regardless of minor inter-site and intra-site variations (Masao, 1979).

According to Masao (1979), the LSA industry of Central Tanzania is characterised by the following four features: (a) Ninety five percent of the raw materials used were either quartz or quartzite, (b) Points and burins were very rare, (c) Proportion of tools was relatively low compared to other East African sites, and (d) Bipolar technique dominated the industry. For the case of rock paintings, it was noted that not all rock paintings belonged to LSA authorship. It has been noted that some paintings like those of Usandawe are more recent to have been made by the LSA or IA people. Generally, the rock art of Central Tanzania share some features including the subject matter and style with that of Sahara, Central and Southern Africa (Masao, 1979; Campbell & Coulson, 2001:57). The author also mentioned the existence of Acheulean surface scatter at Haubi (Masao, 2005) but despite that, no further attempts have been made between the mentioned study and the current investigation.

The most current archaeological research in Kondoa studied the relationship between Later Stone Age and Iron Age cultures of the region (Kessy, 2005). The research centred on the outcome of the interaction between the two cultures and especially the effects of the latter on the former. The archaeological evidence from Pahi strongly points towards acculturation of LSA hunter-gatherers by IA (Kessy, 2005). This brings into halt earlier perception that the event of Bantu migration was associated with displacement, absorption or elimination of the autochthonous LSA hunter gatherers (Phillipson, 2005).

Research Problem

As noted earlier, archaeological researches in Central Tanzania have not only been few, but have been largely biased towards LSA, Neolithic and Iron Age (Masao, 2005). Preliminary visit to Haubi, Kondoa in 2008 surprisingly found scatters of Acheulean tools at Iresi A site. This partial observation raised research inquisitiveness to investigate and have a better understanding of the early pre-history of Central Tanzania.

Objectives

The research was conducted based on three specific objectives of establishing the Iresi A Acheulean artifact types, determining raw materials and technology used in the production of Iresi A lithic artifacts and to establish stratigraphic distribution of Iresi A lithic artifacts.

Study Area

Haubi is located in the Irangi Hills, about 25 km north-east of Kondoa Town, Central Tanzania (Payton *et al*., 1992). The research covers about 5 km² of Iresi A village located in a

deep gully like valley, east of Haubi. The valley consists of several seasonal streams that drain water north-westward to Lake Haubi (Figure 1). The area consists of many earth pillars which resulted from prolonged gully erosion. It is through the aid of these gullies that most archaeological artifacts were exposed to the surface. The selection of the research area was prompted by a number of factors. First, preliminary visit to the area discovered several Acheulean hand axes on the surface. Secondly, the severely eroded earth pillars exposed *in situ* artifacts that are visible in natural layers thereby allowing a better reconstruction of the cultural stratigraphy.

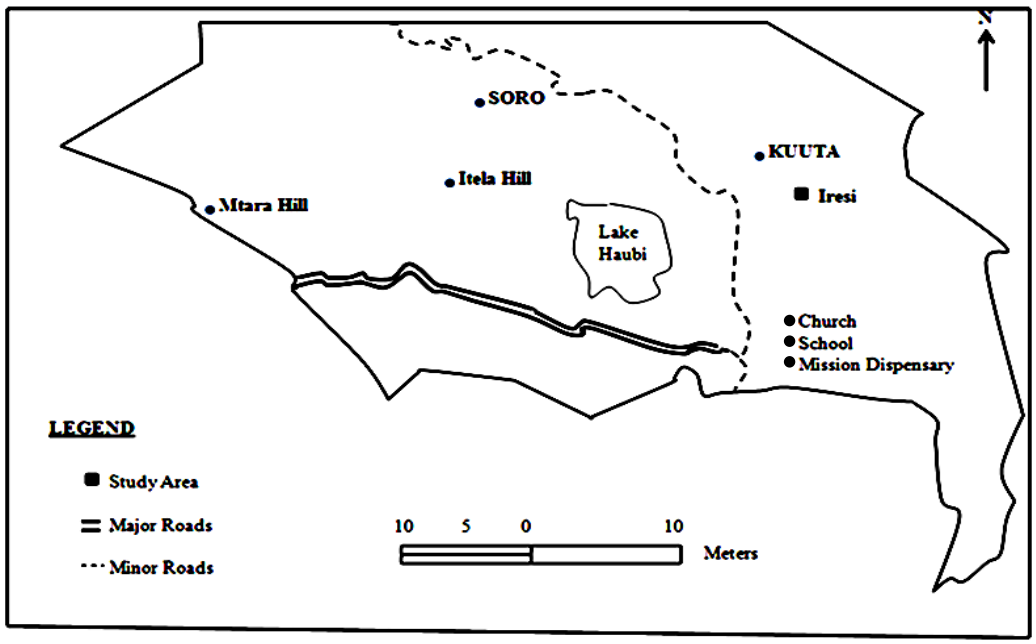


Figure 1: Haubi: Location of research area

Relief

The relief of Central Tanzania (Irangi Hills) is composed of plateaus and plains as well as hills that resulted from faulting and tilting processes (Kangalawe, 2001). The area has been extensively affected by severe soil erosion leading to deterioration of soil quality (Christianson 1972; Ostberg, 1986; Christianson *et al.*, 1991; Yanda 1991; Mudd & Selby, 1963; Payton *et al.*, 1992). On the elevated parts of the Irangi Hills, the Precambrian rocks rise up to 200 meters above sea level while the moderate sloping pediments cutting across weathered rocks dominate the lowland (Payton *et al.*, 1992). Steep hill slopes with alluvial valley floors at about 1,650 meters above sea level are common features of the landscape. As a result of increased soil erosion on the higher lands, the valley floors have been subjected to accelerated sedimentation and aggradation.

Haubi Village is surrounded by hill slopes with several inland drainage basins, the largest being Lake Haubi. A shallow lake with fine sediments and alluvial deposits occupies the central part of Haubi Basin. Perhaps these landscape attributes could have attracted both early hominids as well as wild animals during the lower and middle Pleistocene just as it was in the Ngorongoro Crater or Olduvai Gorge. Today, the Haubi area is one of the most agriculturally productive areas in Kondoa.

Climate

In terms of climate, Haubi experiences a sub-humid climate with about 900mm of rainfall per annum (Yanda, 1991). The rain season starts in November and ends in May, followed by a long dry season from June to October. Altitude and relief greatly affect both temperature and rainfall of the area. The Kondoa District has one of the highest rates of evapo-transpiration of about 1,500mm per year. Rain comes from highly erosive storms which arrive when the protective vegetation cover is almost absent (Morgan, 1973). The main source of water in this area includes boreholes and shallow dugout wells on sand rivers (Mung'ong'o (1991). As a result of poor soil and unreliable rainfall, people opt for animal husbandry to supplement agriculture.

Vegetation

Most of the natural vegetation has been affected by human activities such as agriculture and animal husbandry. Activities such as overstocking have accelerated land degradation through soil erosion. It is for this reason that the Government of Tanzania established Hifadhi Ardhi Dodoma (HADO) to assist in promoting land degradation control measures. Within this project, tree cutting and bush fires are prohibited while destocking is strongly recommended (Yanda, 1995). Maize, finger millet, bulrush millet, sorghum, cassava, groundnuts, peas, beans, sweet and Irish potatoes, and several varieties of oil producing seeds are among the major crops grown, while sugar cane, onions, pawpaws and citrus fruits are cultivated in isolated areas (Kessy, 2005). Due to unreliable rainfall and land scarcity, these activities operate on a small scale.

Primary natural vegetation is composed of savannah woodland and bushland while lands under human use are dominated by savannah grassland, miombo woodland and shrubs (Ostberg, 1986; Madullu & Mong'ong'o, 1990). In general, the ground cover is dominated by short grasses (Madullu & Mong'ong'o, 1990).

Geology and Soils

The geology of the area is composed of Precambrian metamorphic rocks consisting of gneiss and schist. On the hilly rocky slopes are quartz and quartz gravels which were the main sources for prehistoric lithic artifacts raw materials. At the upper land, biotite gneiss and quartz veins are more common while deep weathered biotite schists are dominant in the middle and lower parts of the Haubi Basin. It is from this rock of about 8-10m depth from the surface where the Acheulean assemblages were found. In contrast to biotite schist, the deeply weathered biotite gneiss forms a pinkish gritty sandy clay loam saprolite (Payton *et al.*, 1992). Unlike quartz feldspathetic gneiss, gritty quarzitic schist saprolite forms deeper gullies. Alluvial sand fans form an important feature of the landscape particularly east of Lake Haubi. These fans are active and remain largely unvegetated while some have been cultivated. These are composed of mica, pinkish or reddish fine to medium sands with hornblende and biotite minerals of dark colour.

Survey Results

The survey aimed at locating sites and recording ESA artifacts. Two sites (Iresi A site 1 and 2) located at the intermediate land between the slopes of Itongwi and Mlima wa Fisi (Irangi) Hills and adjacent flat lands were selected on the basis of the occurrences of ESA artifacts. The survey was conducted on both hill top and foot hill areas. On both sites, ESA surface scatters were found on the foothills. The process of recording finds was done through the use of topographical map, tape measure, digital camera, compass and GPS device. The exercise yielded a total of 784 artifacts.

Archaeological Survey Results – Iresi A Site 1

The site is located at 04°47’34.0” South and 035˚58’36.6” East, in a deep gully enclosed by escarpments in an elevation of 1,700 meters above sea level. It is about 3km south of Lake Haubi and bordered by Mlima wa Fisi Hill to the east, while to the north and north-east is boarded by Lichobi and Itongwi Hills, respectively. To the southern side of the site is a water stream. The site is subjected to severe geomorphological activities including soil erosion leading to formation of complex gullies that expose both natural and cultural deposits.

Observed surface scatters were a mix of LSA and Acheulean types in which the former seemed to have been eroded and transported from the upper layers of Mlima wa Fisi while the latter showed no indication of abrasion suggesting restricted action by weathering agents. This proposes that Acheulean artifacts were deposited close to their original context where associated raw materials including quartzite outcrop was located. The abundance of quartzite raw materials at the site in association with lithic artifacts such as cores, preforms, flakes, debris suggest that this was probably a production site where early hominids procured raw materials and manufactured stone tools. Some of the Acheulean artifacts protrude from a profile layer that is composed of red clay with grayish mottling which appears to be their primary context. It is from this layer that severe rain water erosion has exposed and accumulated stone artifacts.

During the field survey, 764 artifacts were collected from two surface collection units established at Iresi A site 1 (Figure 2). The first unit was placed on the southern side of the site and measured 1600m² while the second measured 225m² and was located at the western side. Surface collection was done randomly and was gridded and mapped through the use of a GPS device.

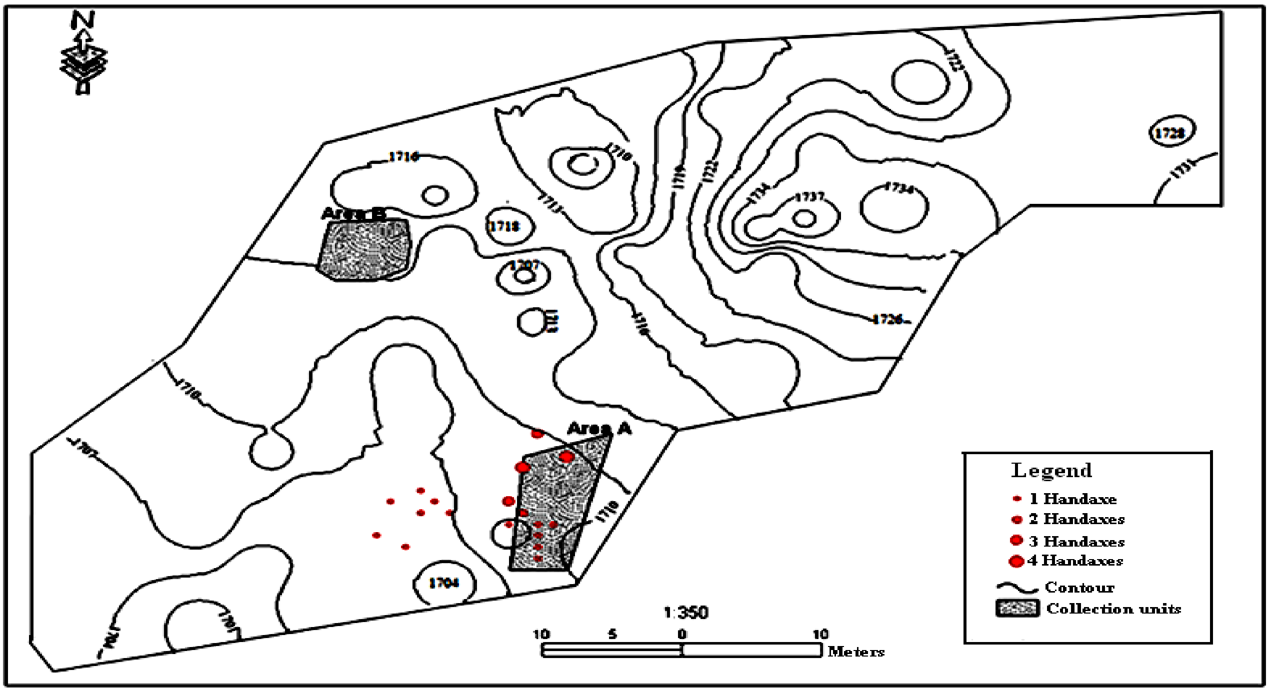


Figure 2: Collection units at Iresi A Site 1

Archaeological Survey Results at Iresi A Site 2

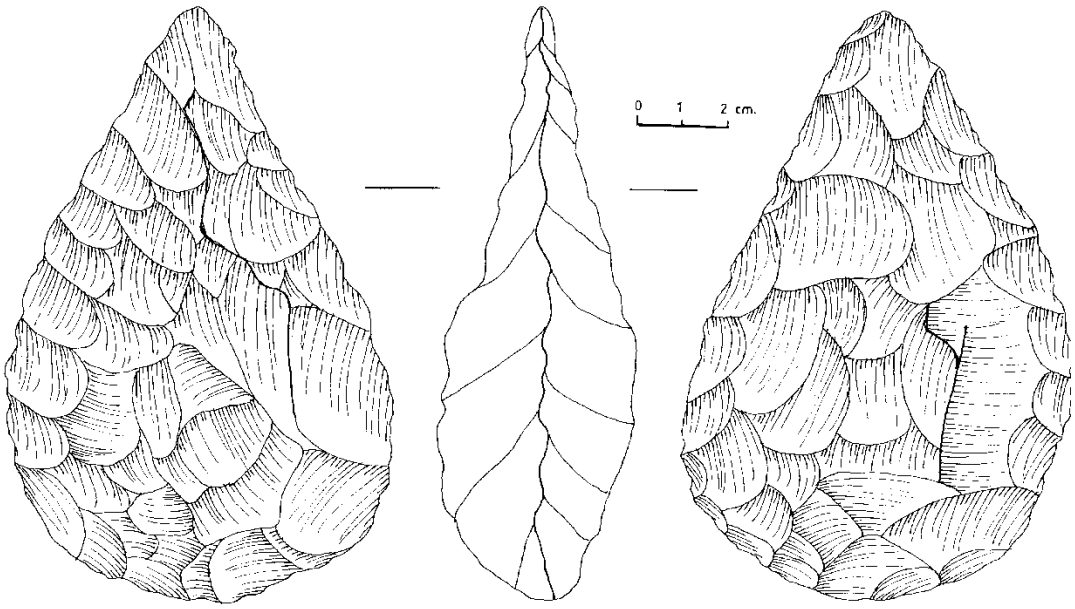
This site is located west of Site 1 at 04°47'3431.9" South and 035˚58'36.2" East with an elevation of 1,710 meters above sea level. It is characterised by deep and vertical gullies formed as a result of erosional activities. To the west, is a seasonal stream that could have served as a source of water for the ESA hominids during the wet season. Lake Haubi that is located 3km from the site was presumably the only reliable permanent source of water and might have extended to this part of the site in pre-history. If this assumption is correct, then it supports the traditional proposition that Early Stone Age hominids placed their activities close to water resources (Clark, 1970; Cole, 1963; Klein, 1999; Phillipson, 2005; Willoughby, 2007). The ESA surface assemblages are located in the north-eastern area that forms the boundary with Iresi A Site 1. Unlike the former site, the assemblage is mainly composed of hand axes, cores, few flakes and quartzite cobbles. Most of the Acheulean artifacts were still *in situ* attached to the walls of standing earth pillars. A total of 20 lithic artifacts were collected at the site in an area of 1,500m².

Extraction Results

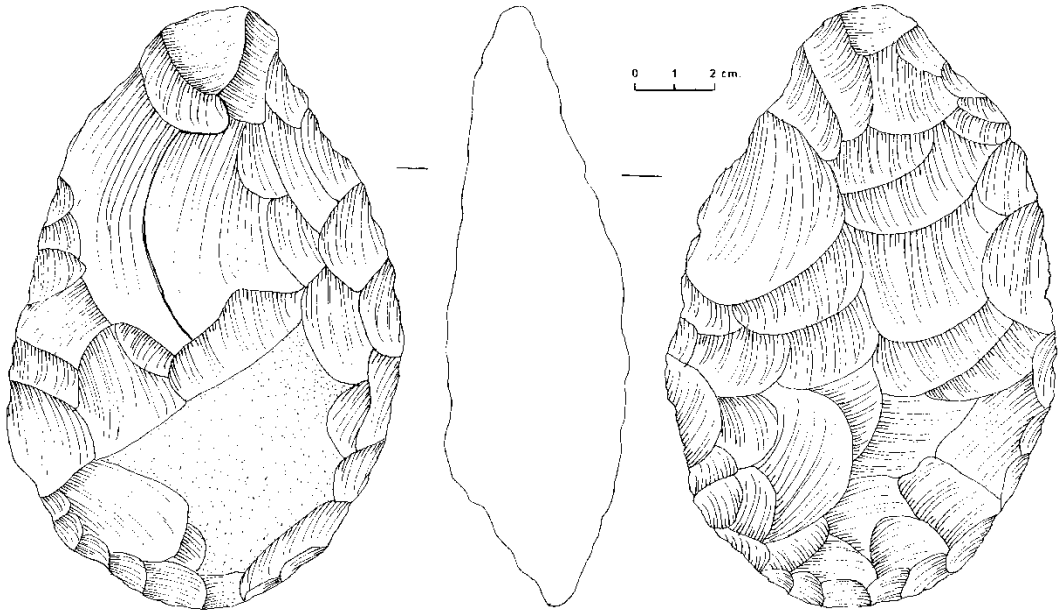
Extraction was opted instead of trench excavation following thorough investigation which found out that the ESA artifacts were eroded from the standing earth pillars and some were still embedded in their primary stratigraphic positions. Following the remarkable number of artifacts identified from survey, extraction was crucial to recover cultural materials *in situ* and establish stratigraphic layers. Given the nature of the site, extraction areas were selected deliberately on the basis of archaeological and stratigraphic visibility observed during survey. This work therefore took advantage of the standing pillars at the site to locate the embedded ESA artifacts *in situ*. This was followed by careful mapping of the stratigraphy including the contexts, from which the ESA artifacts were embedded. A total of eleven artifacts (Table 1) were extracted from earth pillars (wall section) with a depth of 11m and a width measuring 8m. Samples of extracted tools are illustrated in Figure 3.

STRATIGRAPHIC LAYER	SOIL COLOUR	ARTIFACT TYPE	SUB-TOTAL
Layer 1 (0 -180cm)	Reddish brown sand soil	**Nil**	0
Layer 2 (180cm - 480cm)	Grayish clay loam soil	Un-diagnostic LSA artifacts	3
Layer 3 (480 - 850cm)	Grayish sand clay soil	Nil	0
Layer 4 (850cm - 1150cm)	Reddish clay soil with grayish mottling	Bifacial point	1
"	"	Crude hand axe	1
"	"	Double pointed hand axe	1
"	"	Elongated ovate hand axe	1
"	"	Lanceolate hand axe	1
"	"	Ovate hand axe	1
"	"	Untrimmed butt hand axe	1
"	"	Polyhedral core	1
GRAND TOTAL			**11**

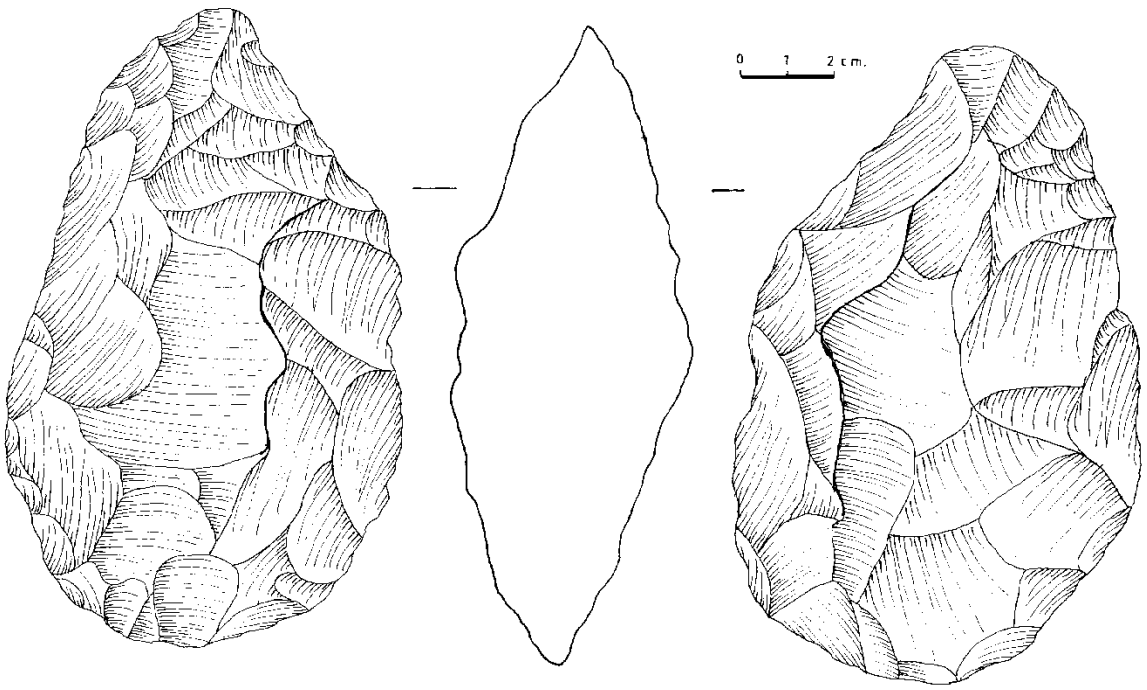
Table 1: Inventory of extracted archaeological materials



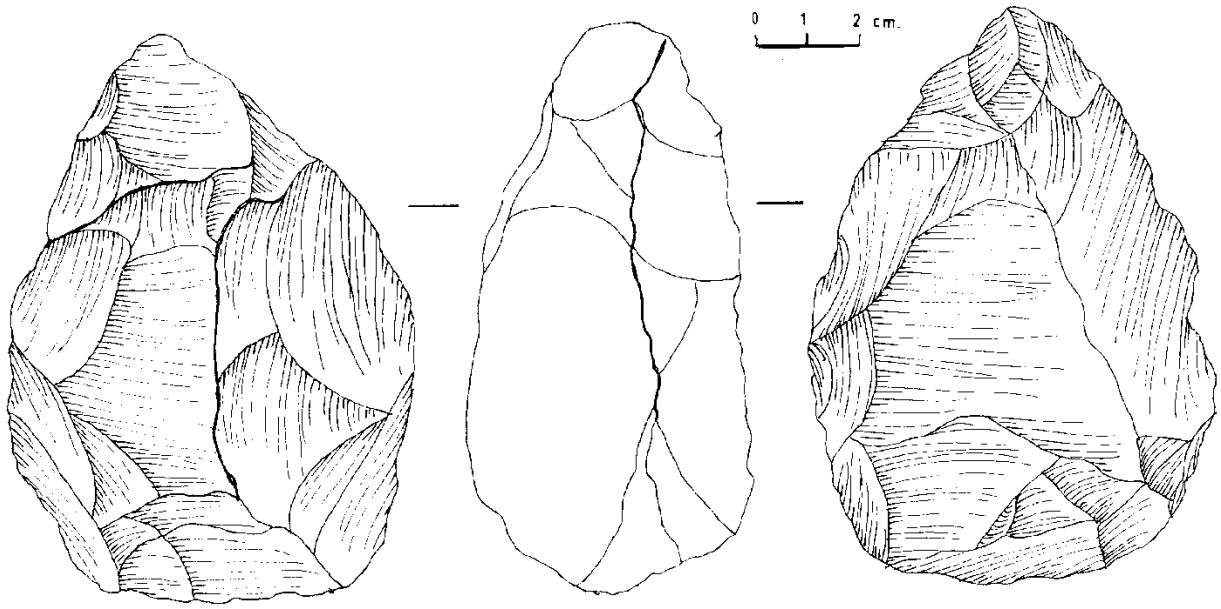
Pointed hand axe



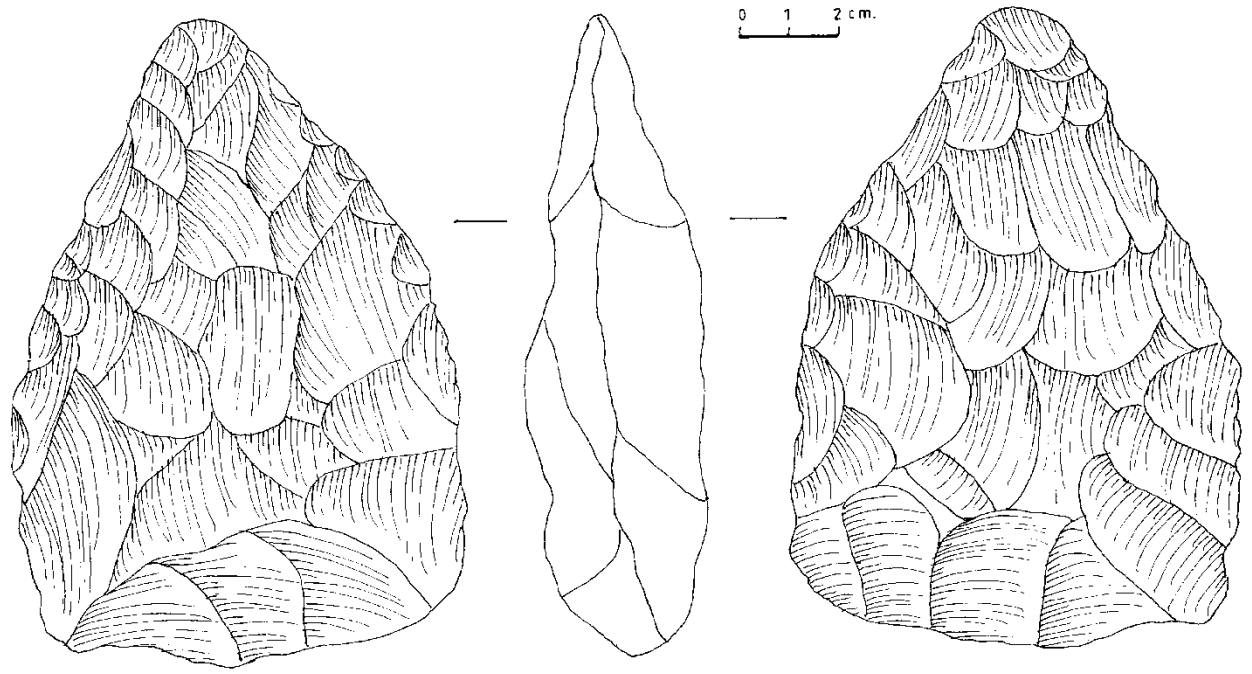
Lanceolate hand axe



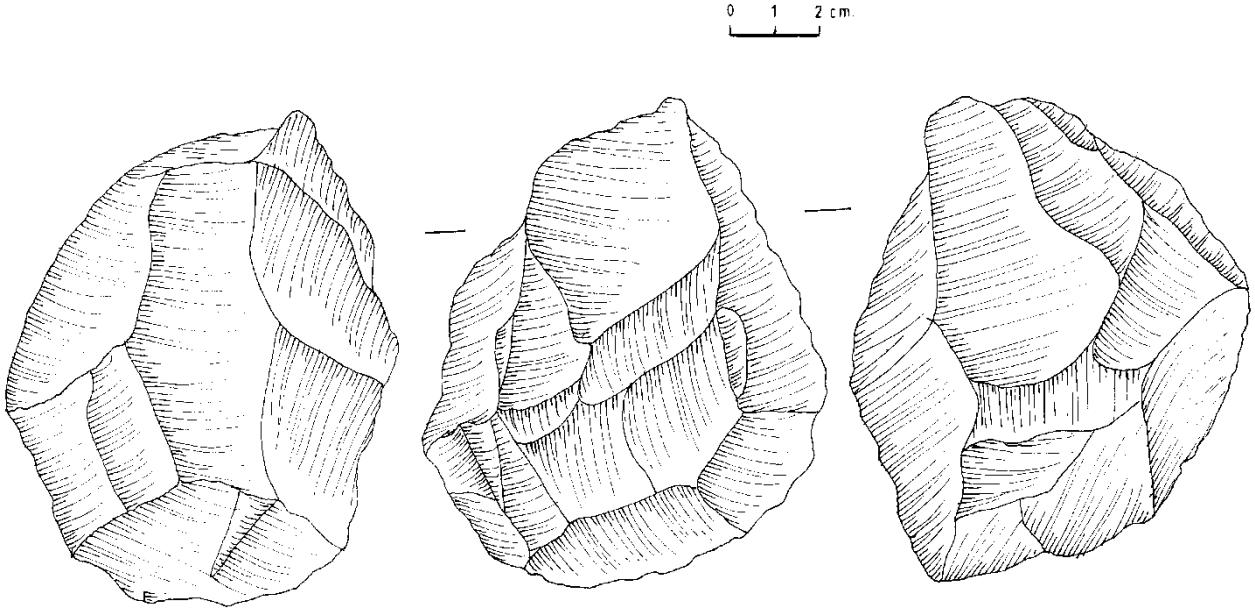
Ovate hand axe



Cordiform hand axe



Sub-triangular hand axe



Polyhedral core

Figure 3: Illustrations of the extracted archaeological materials

Results and Discussion

This research was an attempt to investigate the ESA of Central Tanzania. Recovered artifacts were analysed and presented to unfold types of Acheulean artifacts recovered from Iresi A site. Thereafter, lithic artifacts were analysed separately on the basis of three attributes of analysis, i.e. retouch attributes, metric attributes (length, breadth and thickness) and raw materials used in the making of lithic artifacts. A total of 795 lithic artifacts were recovered from both survey and archaeological extraction and analysed using Clark and Kliendienst's (1974) scheme. This scheme was chosen because of its applicability to many parts of Africa, e.g. Kalambo Falls, Isimila, Olorgesailie and Kariandusi where similar assemblages had been discovered. For light duty tools, Mehlman's (1989) scheme was used instead. Collected

artifacts were categorised into three major groups: shaped tools, utilised pieces and unmodified wastes.

Shaped Tools

Shaped tools refer to artifacts that show evidence of deliberate retouch which often alters the primary shape of a piece (Clark and Kliendienst, 1974). The category of shaped tools was subdivided into three sub-groupings: heavy duty tools, large cutting tools and light duty tools. These sub-groupings are discussed below.

Heavy Duty Tools

This category represents stone tools that are more than 100mm long with no regular standardisation of the shape of the tool by retouch. They include core-axes, picks, choppers, spheroids and core-scrapers (Clark and Kliendienst, 1974). The working parts of these tools appear to have been designed for heavy usage such as digging, scrapping and bone breaking. Although there were no associated remains found to support the argument, location of the site close to a water source and at the foot of the hills suggest the strategic location of the site by early hominids to hunt and explore their means of survival. At Iresi A site large cutting tools form 3.9% (31) of this sub-category. Measurement of heavy duty tools varies depending on the tool type (Table 2). Quartzite is a predominant raw material used constituting 93% (29) while quartz forms 7% (2).

Table 2: Measurements of heavy duty tools

Artifact type	Total (n) & %	Measurement in cm	Range	Median	Mean ± error	S.D
Core scrapers	9 (29)	Length	4 - 12	8.1	7.6± 1.0	3.09
		Breadth	3.5 – 8.7	5.5	5.5 ±0.6	1.67
		Thickness	1.8 –4.5	2.6	3 ±0.40	1.13
		B/L ratio 0.72				
Core axes	12(38.7)	Length	10.5 – 16.5	12.9	13.18 ±0.5	1.64
		Breadth	6.4 – 9.9	7.9	8.05 ±0.3	0.99
		Thickness	3.2 – 7.6	4.4	4.83 ±0.4	1.30
		B/L ratio 0.61				
Picks	6 (19.4)	Length	11.3 – 14.5	13.75	13.3 ±0.5	1.18
		Breadth	7 – 8.7	8.4	8.13 ±0.3	0.69
		Thickness	3.8 - 7	2.25	5.68 ±0.5	1.35
		B/L ratio 0.61				
Spheroids	4 (12.9)	Length	6.5 – 13	12	10.87 ±1.5	2.98
		Breadth	6.5 – 11.5	9.05	9.02 ±1.0	2.13
		Thickness	5.2 – 8.8	6.7	6.85 ±0.8	1.50
		B/L ratio 0.83				
TOTAL	**31 (100)**					

Key:

Numbers in parenthesis are percentages. SD = Standard Deviation,
n = Number of artifacts, Error = SD ÷ √n B = Breadth, L = Length.

Large Cutting Tools

These are about 100mm long with regular and sharp edges. At the Iresi A site, this category represents 9.1% (72) of the total collected artifacts. They include hand axes and cleavers and vary in measurements (Table 3). Hand axes are found in both Iresi A site 1 and Iresi A site 2 while cleavers were only found in Site 1. Two forms of hand axes were observed; the first consisted of tear drop/oval shape while the second had flat butts. Hand axes are bifacially

worked on by the "hard hammer" technique and exhibit a minimum number of deep flake scars. Observed cleavers were crude and irregular with carefully retouched points and sides. Both tools were retouched sometimes retaining cortex. Concentration of large cutting tools was more intense in Site 2 and again at the western wall of Site 1, which is a border between the two sites. Given the flat nature of the site and circumstances of site formation, it is possible that these tools were intentionally transported to their current location by early hominids rather than effects of environmental agents including water erosion.

Table 3: Measurements of large cutting tools

Artifact type	Total (n) & %	Measurement in cm	Range	Median	Mean ± error	S.D
Hand axes	49 (68)	Length	10.9 – 20.6	14	14.42 ± 0.4	2.63
		Breadth	5.8 – 11.3	8.2	8.40 ± 1.7	1.22
		Thickness	3.2 – 7.1	4.6	4.83 ± 0.12	0.87
		B/L ratio 0.58				
Cleavers	23 (32)					
		Length	5.8 – 13.5	8.6	8.67 ± 0.5	2.33
		Breadth	3.4 – 10.1	5.7	5.82 ± 0.38	1.80
		Thickness	1.2 – 4.7	2.2	2.63 ± 0.21	1.04
		B/L ratio 0.68				
TOTAL	**72 (100)**					

Light Duty Tools

These are tools made on flakes and blades and measure less than 100mm long (Clark and Kliendienst, 1974). They include but not limited to scrapers, points, awls, burins and microliths. Light duty tools account for 117 stone tools, that is 14.7% of the total assemblage from Iresi A site (Table 4). In terms of raw materials, quartzite is the predominant material that constitutes 82.1% (96) of the total, while quartz constitutes 17.9% (21).

Table 4: Measurements of light duty tools

Artifact type	Total (n) & %	Measurement in cm	Range	Median	Mean ± error	SD
Scrapers	66 (56.4)	Length	2.5 – 13.5	5.6	5.9 ± 0.25	2.0
		Breadth	2.2 – 7.6	4.4	4.63 ± 0.17	1.4
		Thickness	0.7 – 3.8	1.5	1.7 ± 0.08	0.7
		B/L ratio 0.78				
Burins	14 (12)	Length	4.3 – 9.7	5.45	5.73 ± 0.4	1.46
		Breadth	2.6 - 7.3	4.05	4.1 ± 0.4	1.43
		Thickness	1.1 – 3.5	1.7	1.92 ± 0.2	0.8
		B/L ratio 0.71				
Backed tools	23 (19.6)	Length	4.6 – 12.5	6.9	7.24 ± 0.42	2.0
		Breadth	3 – 6.4	4.9	4.70 ±0.23	1.1
		Thickness	1 – 3.7	2.0	2.0 ± 0.15	0.71
		B/L ratio 0.46				
Discoids	9 (7.7)	Length	4.4 – 12. 2	9.2	8.42 ± 0.93	2.8
		Breadth	5.2 – 9	7.3	7.18 ± 0.47	1.4
		Thickness	2.4 – 4.8	4	3.8 ± 0.3	0.9
		B/L ratio 0.86				
Points	5 (4.3)	Length	5.6 – 15.7	9.3	10 .1 ±1.94	4.35
		Breadth	5.3 – 8.1	6.45	6.6 ± 0.51	1.15

		Thickness	1.6 – 4.6	2.9	3.0 ± 0.7	1.52
		B/L ratio 0.7				
TOTAL	**117 (100)**					

Utilised Pieces

Utilised pieces possess modifications resulting from utilisation such as fracturing, crushing and battering or damage to one or more of its edges or faces (Clark and Kliendienst, 1974). Classifying stone artifacts into this category is hard because it is difficult to distinguish between utilisation and other forms of wear caused by natural and cultural agents. Another problem is absence of a way to distinguish edge damage from the utilisation of a piece detached by primary flaking from those that are modified as a result of when flake falls on stony or hard ground (*ibid.*). Concentration of stone cobbles and artifacts observed at Iresi A site 1 could have been abraded as a result of river action during their exposure or over burden weight. Yet pieces with signs of intentional use constituted 14.5% (115) of lithic artifacts from Iresi A site. Utilised flakes were abundantly followed by few hammer stones (Table 5). The principal raw material is quartzite with 97.4% (112) and quartz 2.6% (3).

Table 5: Measurements of utilised pieces

Artifact type	**Total (n) & %**	**Measurement in cm**	**Range**	**Median**	**Mean ± error**	**S.D**
Utilised flakes	113 (98.3)	Length	3.2 – 13	5.7	6.03 ± 0.17	1.82
		Breadth	2.1 – 8.8	4.3	4.6 ± 0.15	1.6
		Thickness	0.8 – 4.3	1.6	1.8 ± 0.07	0.71
		B/L ratio 0.4				
Hammer stone	2 (1.7)	Length	9.2 – 9.5	9.4	9.4 ± 0.15	0.21
		Breadth	7.8 – 8.5	8.2	8.2 ± 0.35	0.5
		Thickness	7 – 8.6	7.8	7.8 ± 0.8	1.13
		B/L ratio 0.9				
TOTAL	**115 (100)**					

Unmodified Wastes

These represent stone artifacts that were a result of intentional flaking but lack evidence of utilisation and secondary modification. Lithic artifacts of this type were more regularly distributed over the researched area with concentration in Iresi A site 1. Unmodified waste constituted 58% (460) of the assemblage and included flakes, flake talun, cores, core fragments and angular fragments. There was no great variability in terms of metric attributes shown by these artifacts (Table 6). From the observed concentration of unmodified waste, Iresi A site is presumed to have been used as a settlement site and production site at the same time, on the basis of the occurrences of unmodified wastes *vis-à-vis* stone tools. This is as well-justified by the high density of unmodified waste 58% (460) and low percentages of tools 42% (335) which was evident on both sites. There was high concentration of stone tools at Iresi A site 2 compared to Iresi A site 1 which suggested that the former was the manufacturing site and the latter the settlement site. Given the flat nature of the site and concentration of large quartzite blocks with flakes and fragments, it is impossible to explain if water was responsible for transporting all of these materials but rather it is clear that water could have exposed these materials where they were primarily discarded.

Table 6: Measurements of unmodified wastes

Artifact type	Total (n) & %	Measurement in cm	Range	Median	Mean ± error	S.D
Flakes	262 (56.9)	Length	2.7 – 10.9	5.8	6.02 ± 0.1	1.64
		Breadth	1.4 – 8.7	4.3	4.53 ± 0.09	1.42
		Thickness	0.7 – 4.7	1.8	1.8 ± 0.04	0.62
		B/L ratio 0.75				
Flake talun	11 (2.4)	Length	1.6 – 5.8	3.9	3.6 ± 0.37	1.22
		Breadth	2.8 – 6.9	3.7	4.2 ± 0.4	1.3
		Thickness	1 – 2.2	1.7	1.6 ± 0.12	0.4
		B/L ratio 1.17				
Core	36 (7.8)	Length	3.3 – 12	7.9	7.4 ± 0.35	2.1
		Breadth	1.7 – 10.6	6.3	6.3 ± 0.4	2.4
		Thickness	1.1 – 9.5	4.9	4.8 ± 0.38	2.3
		B/L ratio 0.85				
Core fragment	13 (2.8)	Length	3.3 – 12.1	6.8	6.9 ± 0.72	2.6
		Breadth	2.2 – 9.7	4.2	4.8 ± 0.62	2.22
		Thickness	1.3 – 4.2	2.5	2.4 ± 0.24	0.9
		B/L ratio 0.69				
Angular fragment	138 (30)	Length	2.5 – 11.1	5.2	5.4 ± 0.12	1.6
		Breadth	2.2 – 9.5	4.1	4.24 ± 0.1	1.23
		Thickness	0.5 – 4.1	1.5	1.7 ± 8.5	0.1
		B/L ratio 0.79				
TOTAL	**460 (100)**					

Attributes of Retouch

Examined attributes included type of retouch, position of retouch and extent of retouch. The scar (retouch) types found in Iresi A lithic assemblage included scaled, stepped, sub-parallel and parallel with majority of Acheulean artifacts possessing scaled, stepped and sub-parallel types (Table 7). Bifacial retouch is a common retouch position for the Acheulean artifacts particularly the large cutting tools. As such, the extent of retouch covered more than half of the edge circumference for the case of hand axes, core axes and picks, while in cleavers it varied from short to long. In contrast, most of the light duty tools including scrapers and backed pieces had direct retouch with some possessing alternate and inverse retouches while the extent varied from short to long. Based on morphological patterns as well as forms of retouches, it is evident that both hard and soft hammer techniques were applied in manufacturing of Iresi A stone artifacts. Nevertheless there is variation in workmanship and some stylistic features were observed in the Iresi A Acheulean assemblage, in which some tools including hand axes and core axes had been crudely made while others possessed fine finishing by a soft hammer. Probably, such variability in workmanship intended to mark the use of artifacts as well as a result of peculiarity between contemporary individual groups of tool makers, through time.

Table 7: Attributes of retouched tools

Artifact type	Qt	Retouch attributes											
		Types of retouch				Position of retouch				Extent of retouch			
1. Hand axes		Sc	St	Sp	p	Drt	Bf	Alt	Inv	Sht	Lng	Inv	Cvr
Ovate	**7**	4	-	2	1	-	7	-	-	-	-	1	6
Elongate ovate	**4**	1	1	1	1		4					1	3
Ovate accuminate	**4**	3	1	-	-	-	4	-	-	1	-	-	3
Limande	**2**	2	-	-	-	-	2	-	-	-	-	-	2
Double pointed	**2**	1	-	1	-	-	2	-	-	-	-	1	1
Lenceolates	**4**	1	-	1	2	-	4	-	-	-	-	-	4
Sub-triangular	**11**	5	-	6	-	-	11	-	-	-	-	1	8
Cordiforms	**5**	2	-	1	2	-	5	-	-	-	1	-	4
Untrimmed butt	**3**	1	-	2	-	-	1	1	-	-	-	1	4
Crude	**7**	3	1	3	-	1	6	-	-	-	-	2	5
2. Cleavers													
Parallel	**8**	3	5	-	-	7	1	-	-	2	5	1	-
Divergent	**3**	1	2	-	-	3	-	-	-	1	2	-	-
Splayed	**4**	-	4	-	-	3	1	-	-	2	2	-	-
Convergent	**4**	3	1	-	-	2	2	-	-	3	1	-	-
Straight	**2**	-	2	-	-	2	-	-	-	2	-	-	-
Pointed	**2**	1	1	-	-	2	-	-	-	1	1	-	-
3. Picks													
Convergent pointed	**5**	4	-	1	-	1	3	1	-	-	2	-	3
“ round ended	**1**	1	-	-	-	-	1	-	-	-	-	1	-
4. Core axes													
Convergent	**5**	2	-	2	1	1	4	-	-	-	-	4	1
Convergent acuminate	**2**	2	-	-	-	-	2	-	-	-	--	1	4
Irregular	**3**	2	-	1	-	-	3	-	-	-	-	-	3
Truncated	**2**	1	-	1	-	-	1	1	-	-	1	1	-
5. Core scrapers													
Single side	**6**	1	5	-	-	-	-	-	-	-	-	-	-
Side and end	**1**	-	1	-	-	1	-	-	-	1	-	-	-
Double side	**1**	-	1	-	-	-	2	-	-	1	-	-	-
Double side end	**1**	-	-	-	1	1	-	-	-	-	-	1	-
6. Spheroids													
Polyhedral	**3**	2	-	-	1	1	2	-	-	-	-	1	2
7. Scrapers													
Convex side	**16**	2	11	2	1	13	1	-	2	14	2	-	-
Sundry side	**3**	-	3	-	-	3	-	-	-	3	-	-	-
Concave side	**5**	1	4	-	-	5	-	-	-	5	-	-	-
Combination scraper	**3**	2	-	1	-	2	-	1	-	3	-	-	-
Concave side and end	**2**	1	1	-	-	2	-	-	-	2	-	-	-
Convex side end	**9**	3	6	-	-	9	-	-	-	8	1	-	-
Notch	**3**	-	3	-	-	3	-	-	-	3	-	-	-
Nosed side	**3**	1	2	-	-	3	-	-	-	3	-	-	-
Nosed end	**4**		4	-	-	4	-	-	-	4	-	-	-
Divers	**1**	1	-	-	-	1	-	-	-	1	-	-	-
Circular	**3**	-	3	-	-	3	-		1	3	-	-	-
Double side	**4**	1	3	-	-	2	-	2	-	4	-	-	-
Double side end	**6**	1	5	-	-	5	1	-	-	5	-	1	-
8. Backed pieces													
Crescent	**1**	1	-	-	-	1	-	-	-	1	-	-	-
Triangle	**1**	1	-	-	-	1	-	-	-	1	-	-	-
Trapeze	**1**	1	-	-	-	1	-	-	-	1	-	-	-
Curve-backed	**14**	14	-	-	-	14	-	-	-	8	3	3	-
Straight-backed	**5**	5	-	-	-	5	-	-	-	4	1	-	-
Divers	**1**	-	1	-	-	1	-	-	-	1	-	-	-
Backed fragment	**1**	-	1	-	-	1	-	-	-	1	-	-	-
9. Burins													
Dihedral	**-**	-	-	-	-	-	-	-	-	-	-	-	-
Angle	**9**	-	-	-	-	-	-	-	-	-	-	-	-
10. Discoid	**9**	7	-	1	1	-	9	-	-	1	-	6	2

Key:

Sc = Scaled, St = Stepped, Sp = Sub Parallel, P = Parallel, Sht = Short, Inv = Invasive, Drt = Direct, Bf = Bifacial, Alt = Alternate, Cvr = Covering, Lng = Long, Qt= Quantity.

Stratigraphic Distribution of the Acheulean Artifacts

The stratigraphic profile of Iresi A site was derived from observed colour variations and laboratory examination of soil samples submitted to the Department of Soil Survey in Kondoa District. Four stratigraphic layers were identified, analysed and classified (Plate 1). The first layer measured 180cm thick and was composed of moderately loose reddish brown loam sandy soil, granular in structure. No archaeological finds were noted in this layer. The second layer consisted of 3m of grayish sandy clay loam soil; in this layer, undiagnostic LSA materials could be observed most of which were made of quartzite and quartz. The third layer measured 3.7m thick and was composed of lateritic sand clay soil, blocky in structure. Apart from stone cobbles, no archaeological finds were obtained from layer three. All Acheulean artifacts were yielded from the fourth layer that was 3m thick and consisted of highly compacted red clay soil with grey mottling. According to laboratory results, soil in this layer contains calcium carbonate, a low percentage of sand minerals and high content of iron minerals. The Acheulean artifacts were well-distributed across stratigraphic layer four at various depths, the deepest being 10m below the surface. This shows that Acheulean assemblages at Iresi A site are found and distributed in the lower layers preceding the LSA layers (Figure 4).

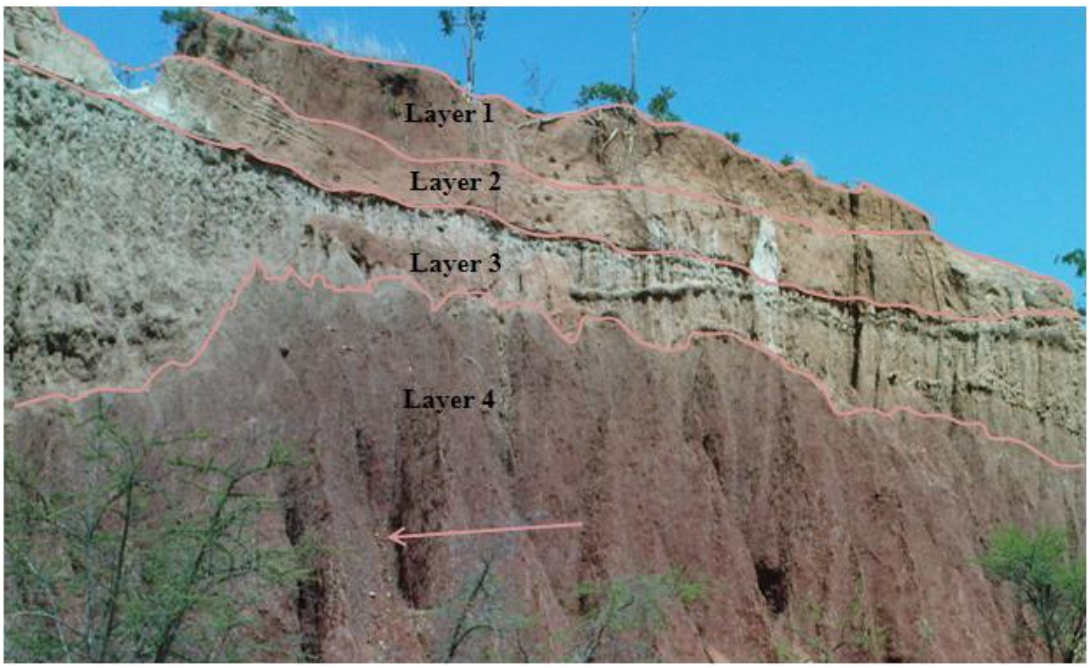


Plate 1: Stratigraphic layers at Iresi A site

NB: The lines mark layer borders while an arrow points at Acheulean artifacts.

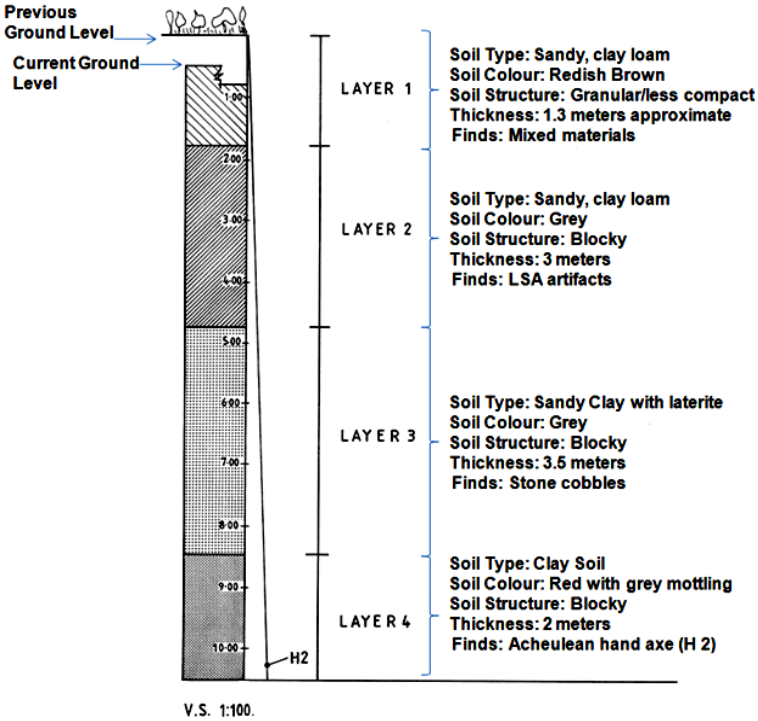


Figure 4: Profile section showing Acheulean artifacts in situ

Raw Materials

The artifacts collected from Iresi A were made from two types of raw materials, of which 710 (89%) were made of quartzite, while 85 (11%) were made of quartz (Figure 4). Most of these raw materials were available close to Iresi A site suggesting the intellectual and technological capability of hominids to manipulate the resources found within their environment. Observed association of raw materials with artifacts such as cores, flakes, fragments and preforms indicates that the makers manufactured their stone tools closer to the source of raw materials probably due to their quality and natural distribution. Nevertheless, the occurrence of quartzite outcrop and presence of surface scatters of unmodified wastes and tools indicated that quartz and quartzite had been quarried in the same area. Quartzite was more preferred probably because of its properties and fracturing mechanics. This type of rock exhibits regular fracturing, but do not form very sharp edges. The preference of quartzite at Iresi A site presumably conforms to the earlier conception that unlike the preceding cultures, the ESA tool makers preferred rocks with cleavage (Carlson *et al.*, 2003:41; Klein, 1999) and not necessarily ones that were highly conchoidal.

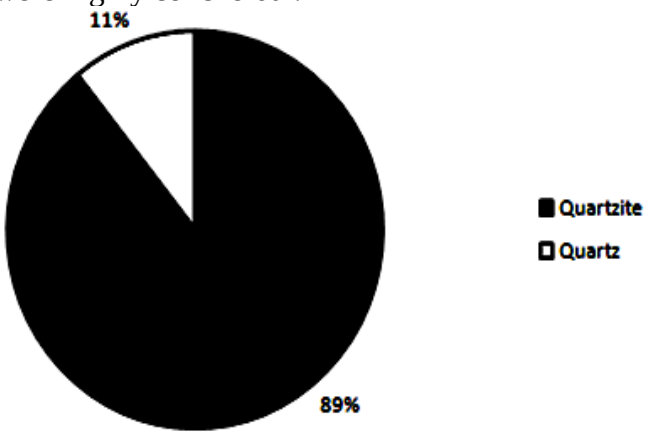


Figure 4: Graphic representation of raw materials

Conclusion

Field observation and analysis of recovered artifacts suggest that Iresi A is an ESA site of Acheulean type. This is justifiable by the presence of stone tools which are typically of Acheulean including hand axes. Distribution of stone artifacts over the landscape and occurrence of quartzite outcrop indicate that raw materials used in manufacturing stone artifacts were mined within the Iresi A site while stratigraphic distribution of stone artifacts *vis-à-vis* unmodified wastes unfold Iresi A as both manufacturing and settlement site. These findings suggest that Central Tanzania was not only occupied during the latter part of pre-history as thought earlier, but as far as ESA times. This marks an important contribution towards the understanding of early pre-history of Central Tanzania which will ultimately draw the archaeological sequence of the area. Hopefully, further research in the area will soon come out with promising results.

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